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THE UNIVERSITY OF CALGARY

Animal Research in Early American Psychology

by

Tanya Kalmanovitch

A THESIS SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

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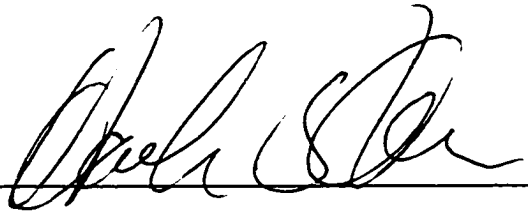

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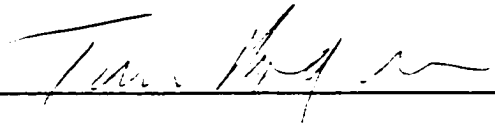

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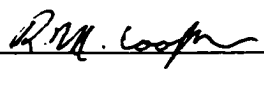

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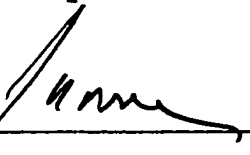

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Abstract

The status of the animal as psychological subject is explored through a critical historical analysis of the relationship between human animals, non-human animals and technology in the psychological laboratory from 1896 to 1940. A general history of animal psychology is presented in order to examine the knowledge claims and interests of American disciplinary psychology from the turn of the century until the beginning of World War Two. The increased mechanization of the laboratory environment and the trend towards the nearly exclusive use of one domesticated animal species, the albino rat, is traced in detail through a content analysis of all major psychological journals published in the United States between 1896 and 1940. This content analysis serves as a basis for my claim that by mechanizing both the animal subject and the process of experimentation, psychologists unwittingly wrote themselves out of the script of experimental animal psychology.

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CHAPTER ONE

Introduction

Historiography and Postmodernism

Historical investigation in psychology has generally proceeded by way of adopting without question the conceptual frameworks and assumptions of the discipline. This type of history, which Kurt Danziger has termed "insider's history", has long been prominent in the traditional psychological literature, and has typically celebrated the present-day by describing the history of psychology as a rational, linear progression from its origins to its current state (typically a glowing description).[1] Such histories are gradually coming out of favour: in his 1987 textbook *A History of Psychology*, Leahey rejected such presentist histories as "fairy-tale accounts", expressing clear preference for "New" histories which may help psychologists by "liberating them from positivist and Whiggish dogma".[2] Writing from the stance of the "New" history, Danziger identifies an alternate approach to history, critical history, which draws upon concepts derived from historiographers, philosophers, and sociologists of science. Here the tone, comments Danziger, is "less celebratory and more critical". Critical history is presented as an emergent framework for current historical writing and thinking within psychology.[3] Danziger has further identified certain recent developments which have contributed to a more favourable context for contemporary critical,

historical work: foremost among these are a "somewhat disenchanted" view of science, the growth of feminist scholarly discourse, and the "international diversification" of psychology.[4]

The concepts and questions which form the bulk of the investigative practice of critical historiography lead the writer and reader to a rather different perspective than that which is adopted by traditional histories of psychology. The difference in perspective may stem not from the direction of regard ("all histories, including postmodern ones, are future-oriented")[5] but rather from historicists' perceptions of the present and future. Unlike the 'insider's history', which arranges facts from the past to provide a linear narrative explaining a specific and unproblematic present, a critical history, simply put, renders problematic the commonplace.[6] The concepts and questions to which Danziger refers typically involve the problematic interactions of spheres of politics, communities and arguments; or, as Latour has phrased it, the real, the social and the narrative: facts, power and discourse.[7]

Postmodernism and Reflexivity

Critical history is a broad term describing such movements as feminist and postmodern histories. A central tenet of each of these is that every history is written from an interested position. The naming of histories - postmodern, feminist, critical; serves to name the position

from which a story will be told. Such a stance, typically referred to as reflexive, considers traditional disciplinary histories to be unreflexive and limited.

The distinction between modernity and postmodernity is crucial in understanding the delineation between 'insider' and 'critical' histories. Yet postmodernism and modernism cannot be considered separately. Nor, as Jenkins has argued, is postmodernism a position to which one might choose to subscribe or to decline: "postmodernity is precisely our condition: it is our fate".[8] In Jenkins' view, postmodernity is arguably the outcome of the general failure of modernity, apparent in the latter part of the twentieth century:

> It is a general failure, as measured in its own terms, of the attempt, from about the eighteenth century in Europe, to bring about through the application of reason, science and technology, a level of personal and social wellbeing within social formulations which, legislating for an increasingly generous emancipation of their citizens/subjects, we might characterize by saying that they were trying, at best, to become 'human rights communities'.[9]

Jenkins comments upon the ideological importance of history in modernist projects: akin to Danziger's description of the 'insider's history', Jenkins describes modernist views of history as "a movement with a direction immanent within it - a history which was purposefully going somewhere . . . a way of looking at the past in terms that assigned contingent events and situations an objective significance by identifying their place and function within a general schema of historical development usually construed as appropriately

'progressive'".[10] Jenkins draws a distinction between upper- and lower-case definitions of history: the modernist view, as described above, is identified as the upper-case sense of the term.

With these terms, it is possible to locate specific histories within the coordinates of modernity and postmodernity; upper and lower case distinctions; and the myriad of contemporary scholarly critical discourses. Jenkins admits a degree of choice when he observes that "although we cannot pick and choose whether we want to live in postmodernity or not, we can (and many of us do) exercise a bit of picking and choosing between the remaining residues of old 'certaintist' modernisms . . . and rhetorical 'postist' discourses . . . rather than going for one or the other".[11] The manner in which historiographers, researchers and other interested parties select between these discursive elements describes the terrain over which the questions of what constitutes a history, how historical knowledge is to be constructed, and what the role of history should be, are debated.

As alluded to above, it is a particular puzzle of reflexive discourse that writing reflexively begs the question of one's own position. Postmodernity itself may be considered to be a privileged position, and the reflexive historicist may find herself lost in an infinite regress -- thinking reflexively about reflexivity. The process of

naming ones history serves a certain contemporary imperative, and provides a means of identifying one's stance within a variety of possible positions. But reflexivity deserves more attention than a self-conscious statement of 'where I, the writer, stand in this'. As Morawski comments, "Taking psychologists seriously in our historical investigations requires taking reflexivity seriously; it requires seeking in our historical studies the ways in which psychologists have handled reflexive conditions in their theories, laboratories, and discourses".[12]

Science Studies and the History of Technology

Traditional histories of psychology have tended to examine only the impact of human figures (psychologists) and, by extension, their theoretical constructions, upon the development of the discipline. Although the influence of such human "actors" is obvious, other actors may be identified upon the historical stage. These include both organic participant (humans and animals) and the products of psychological research (machines) which in turn began to shape disciplinary activity and precepts. Adopting the analytical perspectives of what may be broadly termed science studies allows the historicist to consider impacts upon and influences of both biological and technological bodies in the history of early comparative psychology. Considering literary and material products of research (for example, laboratory equipment and diagrams), and equally the organic

participants (scientists and animals) in the research process permits an author to construct a more profound analytic account of the context, contents and culture of early animal psychology.

Investigating the social aspect of science assumes that the construction of knowledge is an inherently social activity, and that the participants in this construction are equally involved in its outcomes. Such an approach permits me to consider several ideas. The relationships between humans and technology, and culture and psychology, may be mirrored in the interactions between laboratory animals, apparatus, investigators and the construction of psychological knowledge. The arrangement of the technological features of the laboratory in comparative psychology further illustrates the manner in which psychologists of the period adopted or rejected certain reflexive features of their investigative practices. The relationships between psychologists and their apparatus, animal subjects and apparatus, and the animals and their investigator reveals the historical perceptions of culture and nature, evolutionary theory, philosophy of science, and the establishment of a disciplinary psychology.

The use of developments in laboratory apparatus as a lens through which to view the status of the animal as a psychological subject and object will form a significant portion of the analytical strategy and interpretive

repertoire used in this investigation. Broader conceptions of nature, culture and society are mirrored in the special case of relationships between animals and technology in the psychological laboratory. An examination of this special case should allow me to construct an account of the relationships between human minds, animal minds, technology and bodies, the nature of psychological knowledge, and the agenda of disciplinary psychology from the turn of the century to the beginning of the second World War.

Notes

1. Kurt Danziger, Constructing the Subject: Historical Origins of Psychological Research (Cambridge, England: Cambridge University Press, 1990).

2. Thomas H. Leahey, A History of Psychology: Main Currents in Psychological Thought, 2nd Edition. (Englewood Cliffs,
NJ: Prentice Hall, 1987), 29.

3. Danziger, Constructing the Subject.

4. Kurt Danziger, "Does the History of Psychology Have a Future?" Theory and Psychology 4 (1994): 467.

5. K. Jenkins, On "What is History?" (New York: Routledge, 1995), 61.

6. Furthermore, the very act of doing history becomes problematic when it is acknowledged that the form of history (the narrative) does not correspond to the actual content of the past. For more discussion, see Jenkins, 19-21.

7. Bruno Latour, We Have Never Been Modern, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1991).

8. Jenkins, 6.

9. Ibid.

10. Jenkins, 8.

11. Jenkins, 7.

12. Jill Morawski, "Self-regard and Other-regard: Reflexive Practices in American Psychology, 1890-1940," Science in Context 5 (1992): 304.

CHAPTER TWO

General History of Animal Psychology

Introduction

In this investigation I will consider the development and extension of the experimental paradigm within American animal psychology from the inception of disciplinary psychology until 1940. This period is bounded on one end by the widespread acceptance of the New psychology,[1] in which the scientific study of the human species would be pursued through experiment and measurement, and on the other by scientific psychology's firm establishment in academic, political, professional and popular circles. In animal psychology, this scientific emphasis would find its application in a new class of subject, the laboratory animal.

In 1894 Wilhelm Wundt acknowledged the right of comparative psychology to "develop a content independent of human reference".[2] Nearing the end of the nineteenth century, comparative psychology struggled to establish itself as a discrete science of animal study, distinct from pre-existing methods of naturalistic observation. The late nineteenth-century comparative psychology of George Romanes and Lloyd Morgan was an essentially naturalistic enterprise. As much as efforts were made, particularly by Morgan, to systematize various observations, the work of the 'anecdotalists' would quickly pass out of the favour of American animal psychologists. By the first years of the twentieth century,

what Wesley Mills termed "armchair animal psychology"[3] would already become obsolete.

The essential concerns of comparative psychology arose from questions, predating Darwin by centuries, about the nature of the difference between human and non-human minds. Evolutionary theory, and particularly Darwin's mechanism of natural selection, lent a clear framework to the discussion, yet ontological issues in the study of animal mind, specifically the question of the existence of 'mind' in animals, remained largely unresolved. The question of whether it can be said with any certainty that there is such a thing as an animal mind has come in and out of fashion, depending upon what it was that psychologists believed about human minds at any given time. With the advent of evolutionary discourse, mind could be said to emerge over the course of evolution through the process of natural selection. By the early twentieth century, epistemological issues became the topic of lively debate: there may or may not be an animal mind, nevertheless it was of great interest to discuss how it was that psychologists might get to know about it. In this manner, epistemological questions preceded and often replaced ontological questions, with methodological concerns frequently obscuring ontological questions. Researchers could set about 'answering questions' which had replaced essential and enduring ontological questions.

The problem of other minds, long a debate in philosophy, could be recast as the problem of animal minds. If animal psychologists could not say with any certainty that there was such an object as an animal mind, then the professional activities of animal psychologists could be justified upon evolutionary grounds, by holding 'mind' as a trait subject to evolutionary laws and principles. The evolutionary claim, espoused tenuously by Darwin and vigorously by Spencer, was that "mind can be understood only by showing how mind is evolved".[4] The animal researchers of the mid-nineteenth century, thus armed with the evolutionary argument, set out to demonstrate the emergence of mind along the *scala naturae*. The evolutionary answer would not ultimately resolve the problem of other minds, although the dilemma later achieved an uneasy resolution in the argument for the experiment, in which the ontological question was again replaced, this time by a methodological answer.

Animal Study Prior to 1890

Boakes has reported that the animal mind was a popular topic in England in the 1860s and 1870s, observing that "countless letters flowed in to scientific and popular journals, reporting striking observations of animals that suggested unsuspected mental capacities".[5] The researchers subsequently known as anecdotalists, such as C. Lloyd Morgan and George J. Romanes, took these observations as data, and sought to organize them systematically with the goal of

collecting enough reports of intelligent actions from enough species of animals to construct a hierarchy of the evolution of animal mind. The anecdotal research of Romanes and Morgan would become most important to the development of American animal psychology: their work will be discussed in detail in the following sections.

An anecdote typically consisted of an observational report of an animal action that was perceived by the author and the observer to display some form of intelligence. As such, the anecdotal method shared many traits with traditional naturalistic methods of animal study which involved "observing carefully and continuously the *free* life of the animal".[6] Neither the naturalistic nor the anecdotal observer was required to be a scientist by profession: interest and social credibility were required more than technical training or professional status.[7] Differences between prevailing naturalistic methods and anecdotal methods were subtle: the main difference being that the anecdotalists maintained a narrower focus upon animal intelligence in their research.

With the ultimate goal of deducing general principles of mind out of observational data, anecdotalism was not an unscientific enterprise. When George Romanes published *Animal Intelligence* in 1882, he clearly intended the volume as a systematic compilation and classification of known facts about animal intelligence. The subsequent deduction of

general principles was to follow in a later work, *Mental Evolution in Animals*, which was published in 1884. The preface to his 1882 volume makes clear his purpose:

> although it will be apparent that the present treatise is a preliminary to a more important one, I desire to emphasize this statement, lest the critics, in being now presented only with the groundwork on which the picture is eventually to be painted, should deem that the art displayed is of a somewhat too commonplace kind. If the present work is read without reference to its ultimate object of supplying facts for the subsequent deduction of principles, it may well seem but a small improvement upon the works of the anecdote-mongers.[8]

Romanes' methodological model in this deductive process was comparative anatomy: in order to facilitate the gathering of the anecdotes from popular and scientific writings, he developed several principles governing the selection of anecdotes. Reports were to be accepted only from named observers who were known by the author to be competent and credible observers. This policy may have led to the inclusion of some obscure and comparatively unimportant anecdotes, as when, as Boakes speculates, "odd cases were included, one can only judge, because the informant would have been offended by their omission".' Reports by unknown observers were subject to the following conditions: anonymous reports were not to be accepted, unless important enough for consideration. An important anecdote would have to pass scrutiny for alternate plausible explanation, and preferably would report an action of a marked or definite quality, to which a goal could be clearly imparted. Should an important

anecdote fail to meet the above conditions, it would warrant inclusion only if there were other corroborating cases reported by independent, and preferably known, observers.[10]

As Romanes himself feared, *Mental Evolution in Animals* was never as widely read and cited as *Animal Intelligence*. By the time of the publication of Thorndike's *Animal Intelligence*, Romanes' later works would be all but forgotten, and Romanes himself would be remembered "only as the archetypal purveyor of anecdotes about animals".[11] Romanes' contributions to his successors was twofold. First, his interpretations of otherwise credible reports represented a style that would be largely rejected, and second, his compendium of 'facts' about animal behavior would serve as a resource for later investigators who wished to design appropriate situations and apparatus for experimental animal study. Romanes' model of mind remained thoroughly Lamarckian with respect to the evolution of instinct and intelligence: by way of example, he argued that intelligence could be acquired "by the hereditary transmission of novel experiences".[12]

In many ways Romanes' immediate successor, Conwy Lloyd Morgan followed his developments with a critique of a number of key elements in Romanes' work. First, Morgan displayed a more critical stance towards the use of the anecdote: his enduring contribution to the field was a mission statement for comparative psychology, to which he referred as his

"canon". The canon appears in various formulations in Morgan's 1894 *Introduction to Comparative Psychology*, most commonly as follows: "In no case may we interpret an action as the outcome of the exercise of higher psychical faculty, if it can be interpreted as the outcome of the exercise of one which stands lower in the psychological scale".[13]

Morgan, like Romanes, held a purpose in the use of anecdotes which went beyond story-telling. However, he distinguished between two types of psychology; the first being inductive and introspective and the other observational and objective. His methodological model saw comparative psychology as starting from objective observations, from which two types of induction were to be made: the induction of mental laws from introspection, and the derivation of theories for objective data which would be compatible with theories based upon introspection. Morgan gave less credence to informal anecdote than did Romanes, requiring that contributors of anecdotes be skilled in the detached observation of behavior. He likewise advanced the importance of regular observation of an animal's behavior over time, a view that would later be taken up by Small, Kline and Watson.

As a further departure from Romanes, Morgan became convinced of the erroneousness of the popular, Lamarckian, assumption of the heritability of acquired characteristics such as associations and habits. His studies of chicks led him to determine that learning proceeded by way of

association and imitation, an idea which was to become the central focus of Thorndike's 1898 doctoral thesis, and dominate subsequent investigation of animal intelligence for the next fifteen years. Morgan's methodological contributions represented a significant step towards the experimentalism that would quickly become the hallmark of scientific animal psychology. His version of experimentation predated laboratory-based study in animal psychology, and the basic problems set out by Morgan would be drawn upon by the subsequent generation of American animal psychologists.

The changing view of what constituted acceptable data in animal study reflected alterations in the prevailing conceptions of the nature of animal study itself. Both Darwin and Romanes viewed a study of animal behavior as a form of natural history, with its concepts and methods closely allied to those in contemporary anatomy and geology. Morgan and Romanes both claimed that understanding of animal minds could only be accomplished by analogy to human mental experience, which, as the current psychology held, was to be studied by means of introspection.[14] Comparative psychology was thus limited in its available methods, and therefore in its explanatory power, and it appeared as though comparative psychology would remain subordinate to a psychology of human mental experience based upon introspection.

1890-1910

American comparative psychology is conventionally said to have its beginnings in the 1898 publication of Thorndike's doctoral dissertation *Animal Intelligence*, which signified a practical re-orientation in the field by providing substantial impetus towards the development of a standardized experimental paradigm in animal research in psychology. Thorndike himself, in formulating his dissertation as a challenge to the anecdotalist tradition, remarked that the anecdotalists had "looked for the intelligent and the unusual and neglected the stupid and normal."[15] It would became less clear, as apparatus gained prominence and complexity in the methodological canon, whether it was indeed normal behavior that was elicited in the laboratory animal. The study of the animal mind could not be directly patterned upon the experimental study of the animal body: nevertheless, experimental methodology had become, by the end of the nineteenth century, the hallmark of psychology as a natural science. By adopting the methodologies of science (in particular, those of physiology), comparative psychology could aspire to the status of other sciences.

Animal Intelligence serves as a signifier of the first great origin myth in comparative psychology: that Thorndike's methods and explanations overcame the vestiges of the 'old' psychology; anecdotalism, anthropomorphism and introspectionism.[16] In the years immediately following the publication of Thorndike's dissertation, American comparative

psychology attempted to establish itself as a scientific project, with its goal being the production of positive knowledge about the animal mind. Comparative psychology began its disciplinary establishment through the institution of laboratories, such as the one at Clark University and through the publication of professional journals. The cornerstone of comparative psychology as natural science was the move to experimental methodologies, where the anecdote gave way to the experiment, and the naturalist to the scientist. The original ontological question of animal mind, as considered by Romanes and Morgan, was bypassed for a methodological answer. The question of interest rapidly became not one of whether or not there was an animal mind, nor one of kinds or qualities of mental experience, but rather of how psychologists might collect facts about the psychological features and processes of the animal mind. The uniquely American answer, brought to wide attention by Thorndike in 1898, was the laboratory experiment, in which the animal could be systematically isolated, controlled and observed.[17] Out of this control would emerge what could be agreed to be positive knowledge about the mental processes of animals. From 1898 onwards, the number of experimental reports citing the use of animals as subjects rose steadily as the experiment rapidly eclipsed any rival method of animal study in psychology.

The move towards experimental methodologies in comparative psychology followed a general methodological trend in American psychology. Boakes has characterized psychological research at the turn of the century as displaying a "lack of direction" stemming from three conflicting directives: first, that psychology should retain a focus on its subject matter "as traditionally conceived", that is, the study of the nature of subjective mental experience; second, that psychology should be scientific, and that its knowledge claims should be developed and assessed by means of the methods currently in use by other natural sciences; and third, that psychology should be practical and interesting, and relevant to the concerns of everyday life.[18] For comparative psychology to establish itself within the existing institutional and intellectual structures of American psychology, its advocates therefore needed to demonstrate that knowledge about the animal mind would be both scientific and useful, and would shed light upon the mental processes of humans.

The adoption of the experiment as the preeminent model of animal study reflected the value placed upon scientific knowledge. The few researchers active in the early years of comparative psychology managed to establish an active new field of experimental research. Research in the early years, mainly in response to Thorndike's publication, dealt largely with learning and the sensory capacities of animals. The

vibrancy of this early research is in no small part due to the fact that very little precise knowledge about learning and the perceptual capacities of various species had previously been established. By the end of the first decade of the twentieth century, ten new American universities featured courses in experimental animal psychology, and five new research laboratories were established.[19] Herrick announced that "Comparative psychology had arrived"[20] and Watson determined that "comparative psychology has completely justified its existence".[21] Despite the optimistic assessments of these and other researchers, comparative psychology occupied a precarious position within the institution of academic psychology. According to Boakes, "Within the few departments where such work was pursued it was regarded with suspicion if not hostility. It was not at all clear to most American psychologists that such activities merited a place within their subject".[22] College administrators, however, may have seen animal psychology in a more practical light: John Mills has claimed that "pre-World War I college administrators wanted comparative psychologists to collaborate with their colleagues in experimental psychology in providing low-cost training in scientific reasoning".[23] Classroom demonstrations of experimental methodologies in animal psychology could serve a purpose as a useful training ground for a more general scientific psychology of humans.

Although Dewsbury has characterized the years from 1900 - 1909 as a period where "Comparative psychology blossoms"[24], it would not be until well after the first World War that animal research in psychology would occupy a less precarious place in American academic psychology.[25] The rapid growth of American scientific and academic psychology led to the conferring of Doctorates at a greater rate than the establishment of positions in American universities. This resulted in a pressing need to demonstrate that these newly-trained psychologists owned useful knowledge and skills: in the early part of the twentieth century, the most obvious fields of application were education and mental testing, and it was not immediately clear how comparative psychologists could make practical contributions to these fields.

The persistent question of what, exactly, constituted a comparative psychology has its origins in this period. Yerkes' lecture notes from his tenure at Harvard University indicate that from 1910 - 1913 he taught courses in "genetic" and "comparative" psychology, each covering similar subject matter.[26] That the question of nomenclature existed as a disciplinary concern perhaps indicates that the need for animal researchers to demonstrate practical uses for animal research had drawn them away from a truly comparative approach. That approach, defined below by Morgan and endorsed by Dewsbury some eighty years later,[27] is as follows: "Every piece of comparative and genetic work should be so

planned as to contribute something to the establishment or the support of the principles of psychology".[28] Dewsbury has therefore maintained a distinction between "comparative" and "animal" psychologies, suggesting that the broader term "animal psychology" be more appropriately used to describe all research involving animals as subjects, while the term "comparative psychology" be reserved for that more limited body of research which is neither physiological nor process-oriented studies of learning.[29] The role of comparative psychology in this era remained, in any case, ill-defined, there being no clear research paradigm into which the methodologically catholic field could insert itself.

1910-1919

According to conventional accounts, this period represented an extension and expansion of the comparative research programme: Dewsbury comments upon the expansion of field studies, the wider range of animal behaviors studied, and a blossoming of research on sensory functions in animals.[30] The development of increasingly complex apparatus is particularly evident during this decade, beginning with Watson's rather ominous assertion: "Apparatus and methods are at hand for forcing the animal to tell us about the kind of world he lives in. If it is a smell world, we shall find it out. If it is a world of vision in which there are no colours, we shall not long remain ignorant."[31] This equation of science with technology foreshadows arguably the most

impactful event in the history of comparative psychology, the advent of Watson's behaviorism. Although there were other behaviorists at this time, Watson made more radical claims for his science of behavior: it is in hindsight that we recognize the impact of Watson's formulation. Indeed, the notion that Watson's delivery of a lecture at Columbia University on February 24, 1913, titled *Psychology as the Behaviorist Views It* ushered in the behaviorist movement, heralding the end of the study of animal mind and the beginning of a science of animal behavior, constitutes the second great "origin myth" in the field of animal study.

Although one might well question whether Watson was truly a comparative psychologist, Watson's behaviorism would constitute comparative psychology's most readily recognized contribution to academic psychology. The popularity of behaviorism lay in its immediate and viable solutions to the pressing concerns of disciplinary psychology. The application of behaviorist research would obtain results in the fields of education and mental health as readily as could the prevailing methods in psychoanalysis and mental testing. Furthermore, behaviorism owned an undeniably pragmatic bent which "could make contact with the realities of everyday life in a way that academic disputes over the nature of mind singularly failed to do".[32] Behaviorism's commitment to laboratory-based, experimental research methodologies further enhanced its scientific and practical appeal.

The initial reaction to Watson's manifesto was restrained: Samelson has demonstrated that published responses to *Psychology as the Behaviorist Views It* were relatively sparse in the years following its publication.[33] Although most commentators were unwilling to relinquish introspection as the defining feature of psychology, most acknowledged the value of the study of behavior. A study of behavior, though, particularly one independent of reference to mental state, signified not a psychology, but rather a form of biology.[34] Leahey claims that Watson's manifesto did not originate behaviorism, but rather gave it a name and an angry voice, marking the point where behaviorism became "ascendant and self-conscious, creating for later behavioralists a useful 'myth of origin'."[35]

The roots of behaviorism lay not in Watson's address, but rather in the larger, more profound movement towards a scientific psychology where the aim, explicitly and implicitly, was the prediction and control of human behavior. Mills has argued that the theoretical foundations of behaviorism ("The equating of theory with application, of understanding with prediction, and the workings of the human mind with social technology") are identical to those of the early American social scientists, who, from the 1880s onwards, created an intellectual imperative towards socially useful research which would result in a modern, engineered society. Mills asserts that this imperative would continue

to control the research practices and theorizing of American behaviorists until the middle 1950s.[36]

In creating a psychological object in the animal mind, researchers had found it necessary to focus upon isolating and controlling animal behaviors. However, research in animal psychology conducted prior to 1919 was not behaviorally inspired. The use of behavior as an efficient, relatively unambiguous, outcome measure in the study of animal intelligence represents the influence of objectivism, and not behaviorism. As comparative psychologists began to consider that behavior itself, independent of any reference to mental state, might be an appropriate object of psychological investigation, the animal as a natural object had all but disappeared from the landscape of American psychology. Investigation of the animal mind had firmly changed focus from the naturalism of the nineteenth century to the laboratory science of the twentieth. The animal as psychological object became "the interactive locus of a number of independent variables",[37] which were each manipulable to produce socially useful consequences. In the absence of scientific knowledge about the nature of causal factors such as intelligence, psychologists devised operations, methods and manipulations which would ultimately assume knowledge to be derived from action, rather than understanding, and which would assign control to the investigator, and not the investigated.

As psychology in general began to fall away from the criteria of mind and embrace behavior alone, comparative psychology began to gain disciplinary credibility. Where previously, the social relevance of research in the mental processes of animals was not immediately evident, the animal in the behaviorist era was now in many ways more useful than the human subject. Researchers were required to demonstrate the mechanisms of behaviorism, and the animal body was open to investigative techniques involving degrees of control and manipulation which were morally and practically unavailable to researchers conducting human subject experiments. The limits of access to human bodies were not applicable to animal bodies, and research with animals, furthermore, carried the advantage of being able to extend the locus of experimental control over the animal's environmental and genetic history. Particularly relevant in the behaviorist era was the experimenter's ability to have complete control over the animal subject's environment from birth onwards. With the implementation of recording techniques such as Watson's camera lucida (1914) and Slonaker's revolving cage with kymograph attachment (1907); the experimenter's view into the animal's activities could be maintained indefinitely, independent of the researcher's presence.

Experimental psychologists who studied animals were therefore able to create, for their intents, fully intact and discrete treatment groups. Animals could be readily trained,

bred, deprived, indulged, punished, surgically altered and observed to suit the demands of the experimental situation and in this manner served an important role in legitimating behavioral research. The laboratory animal was to become an organism of convenience upon which psychologists could script a variety of processes that were made 'visible' in ways that were not possible with human beings.

Journals specializing in comparative research continued to develop during this decade: in 1911 *Behavior Monographs* began publication and the *Journal of Comparative Neurology and Psychology* established a separate journal dedicated to animal research, the *Journal of Animal Behavior*. After publication was discontinued in 1917 due to "unfavorable conditions created by the war"[38], the first of the two volumes of *Psychobiology* was published. The bulk of the research activity in this period came from the laboratories at Johns Hopkins University, Harvard University, and the University of Chicago, and remained preoccupied with the extension of apparatus and research techniques in animal learning and sensory capacities developed by Yerkes, Watson and Thorndike in the previous decade. Meanwhile, these researchers had largely moved away from comparative research: Thorndike published increasingly in the field of educational psychology, while Yerkes published the first of his articles detailing primate research before becoming extensively involved in intelligence testing for the military. Watson,

after his rapid ascendancy at Johns Hopkins in 1909 to the position of department head (due to a scandal resulting in his predecessor, Baldwin's, termination in 1909), continued his investigations of physiological functions in rats before turning his attention towards newborn babies, who would offer a more enticing and immediate access to the manipulation of human development than could the albino rat.

1920-1929

The first World War interrupted the normal course of research in psychology, and in particular interrupted the debate, such as it may have been, over behaviorism. According to Leahey, "After the war the question was no longer whether behaviorism was legitimate, but what form behaviorism should take".[39] Although military applications of objective psychology had demonstrated that psychology was useful and practical, placing psychology in the public eye, psychologists were not able to clearly define behaviorism, nor were they yet able to form it into a coherent movement. Dewsbury has observed that comparative psychology fell into an unclear period after the war, implying that this was due to the fact that the leaders of previous decades were no longer active in the field. Thorndike had long since left comparative work for educational psychology. Yerkes was concerned with the military testing program during the war, and remained in government service with the National Research Council until 1924, when he joined the faculty at Yale

University, though he retained a position as Chair of the National Research Council Committee for Research in Problems of Sex from 1921 until 1947. Watson had already somewhat distanced himself from animal research, and with his well-chronicled retreat from academic work, soon left comparative psychology altogether for the advertising world. Furthermore, none of the students of Thorndike, Watson or Yerkes had yet established long-term careers in comparative psychology.[40]

John A. Mills has provided another explanation, arguing that the basic perception of early American comparative psychology as constitutive of behaviorism is false: "there is no clear line of descent from Watson's animal work to his behaviorism, while Thorndike, although he briefly flirted with behaviorism, soon renounced it".[41] He draws attention to the fact that the comparative research which took place in the early years of the discipline was more diverse, while the successive animal research was dominated by Pavlovian and instrumental conditioning.[42] The most significant difference, Mills claims, lies in the interactions of institutional and intellectual processes. As described above, early animal research persisted in spite of financial constraint, and varying degrees of disciplinary mistrust, indifference and marginalization. As the developing technology of psychological testing began to offer increasingly more attractive means to scientize and professionalize fields such

as education, comparative psychologists were no longer able to extend their previous promises of the ultimate practical application of their research.

Mills argues that pre-World War I comparative psychology "withered on the vine" because of its lack of a cohesive and unifying research paradigm.[43] The 1920s however, would see the continued development of behavioralism (a term distinct from 'behaviorism', which Leahey has used to describe a long-term trend, with roots in the late nineteenth century, towards defining of psychology as the science of behavior) and in particular the development of a behaviorist model of animal science. Early behaviorism, though marked by controversy and profound theoretical dissension amongst its innovators, was nevertheless unified by a set of shared assumptions about the nature of science and psychology. These would eventually develop, by the 1950s, into the neo-behaviorist science which "played a prominent and decisive role in creating the research practices (derived from operationism) that comprised psychology until very recently."[44]

Although Watson had left academic psychology, he continued to advance the cause of behaviorism through the 1920s and 1930s through a series of articles in the popular media. The form of behaviorism espoused in the *Harper's* articles and in his book *Behaviorism* changed from the earlier formulation in two manners: first, he came to focus

exclusively on humans, and second, his behaviorism became strongly environmentalist.[45] His radical environmentalism was evidenced in his emblematic sentence: "Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one of them at random and train him to become any type of specialist I might select -- doctor, lawyer, artist merchant-chief and, yes, even beggar-man and thief, regardless of his talents, abilities, vocations and race of his ancestors."[46]

While Watson turned towards the study of infants, other psychologists, and in particular psychologists studying animals, negotiated and struggled with the task of defining a behaviorist science. This task served, to a certain extent, to unify comparative psychologists as it became evident that animal study, within a behaviorist science, could become increasingly legitimate, professional and scientific. As Dewsbury comments "The advance guard of the new generation of comparative psychologists arrived during the 1920s."[47] Yerkes' return to Yale, and his efforts towards establishing primate research facilities and protocols, added fuel to the disciplinary fire. Although the outset of the 1920s saw comparative psychology in "desuetude", Dewsbury asserts that "A new generation of comparative psychologists was either preparing to begin or beginning to develop the field in new and exciting ways. Comparative psychology was again healthy and growing".[48]

1930 -- 1939

The development of neo-behaviorist methods and theories would unify animal psychology and mainstream psychology well into the 1960s. However, it is during the 1930s that a bifurcation appears between animal research concerned with learning theory and the more diverse, purely "comparative" research. Dewsbury would have us differentiate the two, with the former being termed "animal psychology" (and in his opinion, being excessively preoccupied with learning theory) and the latter retaining the term "comparative psychology".[49] The grand learning theories of Hull and Tolman were nonetheless published side by side in the journals with the more diverse and purely comparative work of Yerkes, Lashley, Stone and Warden.

From an institutional standpoint, comparative psychologists were far better established than in previous decades: long-term research programs were launched, field stations established, and relatively stable sources of funding were secured. A clear line can be drawn between the neo-behaviorism of Tolman, Hull and Spence, and the experimental and field-based research of other psychologists who explored behavior patterns, reproductive behavior, social behavior, behavioral genetics, development, sensory processes, motivation and physiological processes in animals. Unlike the more purely "comparative" research of this decade, it was neo-behaviorist science which came to dominate North 1

American psychology for the following four decades, and which represents another significant departure in the role of the animal in psychology. I will therefore focus the remaining historical discussion on the purely experimental work of Tolman and Hull, reserving comment on the further development (and ultimate demise) of the comparative programme for the final chapter. Chapter Three will address the content analyses upon which Dewsbury has based many of his conclusions.

Edward Chance Tolman's purposive behaviorism sought a manner in which to account for mental phenomena without directly invoking the mind. Specifically, he noted that while the experimenter may observe raw action, raw purpose would remain invisible. Nevertheless, the differences between purposive and random actions were intuitively clear. His solution, which he termed "operational behaviorism", adopted not only the language of operationalism but also was to equate operationalism with behaviorism, while retaining concepts such as purpose as real entities.[50] Mills describes Tolman's operationalism: "In no sense of the word, then, was Tolman a positivist. But, even if he was not a positivist, he wanted to promulgate a science of behavior that was as pure and adamantine as the logical positivist version. In pursuing his vision, he had to steer a careful course between the trackless jungle of mentalism and the arid plains of a molecular, physiological behaviorism".[51] Although Tolman

inspired students with a zest for learning, Leahey has commented that because Tolman was not a systematic theorist he was unable to provide his students with "a systematic viewpoint with which to evangelize psychology. Tolman had no disciples".[52]

By contrast, Clark Leonard Hull was to become more influential than Tolman. He found an avid disciple in Kenneth Spence, who evangelized a thoroughly positivist version of his neo-behaviorism well into the 1960s. And although Tolman's purposive behaviorism inevitably came into conflict with Tolman's mechanistic behaviorism, Hull's greater influence had perhaps less to do with the inherent value of his theoretical construction, and more to so with the explicit and systematic nature of his theoretical construction as well as his differing academic sensibilities and advantageous institutional placement.

Hull's program initially consisted of two components: a fascination with building intelligent machines, and an effort to formalize psychology according to the principles and systems of mathematics. As the 1930s progressed, he became concerned that his preoccupation with constructing thinking machines would be disadvantageous, fearing that his work would be suppressed by academic authorities.[53] Hull apparently valued the painstaking labour of constructing postulates and deriving theories, and documented both his professional and personal life prolifically.[54] Although Hull

was "the first behaviorist to produce a comprehensive theory" his work was precedented by Tolman, whom Hull recognized as his peer, and not as his rival.[55].

Hull constructed a mathematically explicit set of ideas which dismissed the quasi-mysticism of Tolman's notions of purpose and cognition.[56] His ideas were spread through his students and his colleagues. Hull's position at Yale, and his seminars at the Institute of Human Relations there certainly assisted him in proselytizing the rigors of a mathematical approach to the study of behavior. Spence and his mentor, Hull, continued to be cited heavily into the 1970s, in spite, as Leahy notes, of the cognitive revolution of the 1960s which saw the partial realization of Tolman's concept of cognition and purpose.[57] As Mills comments, Tolman himself was "not a proselytizer or a system builder, in part because it would seem that his assessment of the difficulties involved was more realistic than Hull's." [58]

Leahey has identified several points of agreement between Tolman and Hull, which demonstrate the manner in which neo-behaviorist science represents the first unified conception of a scientific psychology. Of particular significance to the current project is their exclusive experimental use of the white rat. In developing scientific theories of learning and behavior which were intended to be applied to all mammals, including humans, both researchers experimented upon and theorized (and in the special case of

Tolman, fantasized) about rats. Both adopted the assumption that laboratory behavior equally represented naturalistic behavior, and furthermore, that any differences between humans and rats were negligible, if not inessential. In realizing the implicit goal of behavioralism, Tolman and Hull and their successors were to take behavior alone and not consciousness as the subject matter of psychology, and assigned the prediction and control of behavior as psychology's task.[59] In the Hull/Spence/Tolman debates of the late 1930s, the animal body became the site of theoretical controversy. Tolman, Hull, Spence, and later, Skinner realized the development of a cohesive experimental program of animal study, and the creation of a purely behavioral and experimental science. In developing explicit, detailed and cohesive theory and methodology for animal study, and in positing behavior to be equivalent in animals and humans, they served to fully realize the transition of the role of the animal from animal as natural being, to animal as conscious being, to animal as organism. Although the origins of behaviorism in comparative psychology are complex and not necessarily constitutive, it is upon the terrain of the animal that behaviorism achieved its institutional and disciplinary dominance in American psychology.

Notes

1. David Leary, "Telling Likely Stories: The Rhetoric of the New Psychology, 1880-1920," Journal of the History of the Behavioral Sciences, 23 (1987): 315-332.

2. Donald Dewsbury, Comparative Psychology in the Twentieth Century, (Stroudsburg, PA: Hutchinson Ross, 1984), 45.

3. Wesley Mills, "Some Aspects of the Development of Comparative Psychology," Science, 19, (1904): 747.

4. Herbert Spencer, Principles of Psychology, 1st Edition, (London: Longman, 1855), quoted in Robert Boakes, From Darwin to Behaviorism: Psychology and the Minds of Animals (Cambridge, England: Cambridge University Press, 1984), 10.

5. Boakes, 25.

6. Linus Kline, "Methods in Animal Psychology," American Journal of Psychology 10 (1899): 398-430.

7. Boakes, 26.

8. George Romanes, Animal Intelligence, 1882, vii, quoted in Daniel Robinson, Series Ed., Significant Contributions to the History of Psychology: Series A, Volume 7. Orientations. (Washington, DC: University Publications of America).

9. An example of such an "odd case" is reprinted by

Boakes: "A young lady, who objects to her name being published, informs me that her two younger sisters (children) are in the habit of feeding every morning with sugar an earwig, which they call 'Tom,' and which crawls up a certain curtain regularly every day at the same hour with the apparent expectation of getting its breakfast. This resembles analogous instances which have been mentioned in the case of spiders." Boakes, p. 26.

10. Romanes, viii-ix.

11. Boakes, 25.

12. George Romanes, Mental Evolution in Animals, (London: Kegan, Paul, Trench, & Co., 1883).

13. Conwy Lloyd Morgan, An Introduction to Comparative Psychology, 1894, 53, in Daniel Robinson, Series Ed., Significant Contributions to the History of Psychology: Series D, Volume 2. Comparative Psychology. (Washington, DC: University Publications of America).

14. Boakes, 51.

15. Edward Thorndike, "Animal Intelligence: An Experimental Study of the Associative Processes in Animals," Psychological Monographs, 2, whole no. 8, (1898): 5.

16. Henderikus Stam and Tanya Kalmanovitch, "E. L. Thorndike and the Origins of Animal Psychology: On the Nature of the Animal in Psychology," American Psychologist (1998): in press.

17. Washburn placed the birth of experimental animal psychology at Thorndike's lab at Columbia University in 1898: "Since the appearance of Thorndike's work the performance of experiments upon animals has played much part in the work of American psychological laboratories. It has been extensively undertaken in those of Europe, but this is one experimental field in which America can claim priority of entry." Margaret Washburn, The Animal Mind: A Text-book of Comparative Psychology, 3rd ed. (New York: Macmillan, 1930), 10. Dewsbury claims that a comparable and contemporary experimental programme was well underway at this time under the direction of Small and Kline at the Clark University laboratory. Dewsbury, Comparative Psychology, 49.

18. Boakes, 158.

19. C. J. Warden and L. H. Warner, "The Development of Animal Psychology in the United States During the Past Three Decades," Psychological Review 34 (1927): 196-205.

20. C. J. Herrick, "Comparative Psychology," Popular Science Monthly 70 (1907): 76, quoted in Dewsbury, Comparative Psychology, 56.

21. John B. Watson, "The Need of an Experimental Station for the Study of Certain Problems in Animal Behavior," Psychological Bulletin 3 (1906): 155.

22. Boakes, 158.

23. John A. Mills, "Early American Comparative Psychology: A chapter from a Forthcoming Book on the History of Empirical Research in American Psychology," MS, 1997, 4.

24. Dewsbury, Comparative Psychology, 56.

25. Boakes, 158.

26. Robert M. Yerkes, lecture notes, Archives of the History of American Psychology, Akron, OH, Beach Papers, Box M271, Folders X-XII.

27. Dewsbury, Comparative Psychology, 6.

28. Conwy L. Morgan, "Comparative and Genetic Psychology," Psychological Review 12 (1905): 78-97.

29. Donald Dewsbury, "Comparative Psychology in the Journals: Another Look at the Snark," paper resented at Cheiron; Animal Behavior Society, 1997; see also Dewsbury, Comparative Psychology, 6.

30. Dewsbury, Comparative Psychology, 68-80.

31. John B. Watson, "The New Science of Animal Behavior," Harper's Magazine, 120 (1910): 350.

32. Boakes, 159.

33. Franz Samelson, "Struggle for Scientific Authority: The Reception of Watson's Behaviorism, 1913-1920," Journal of the History of the Behavioral Sciences 17 (1981): 399-425.

34. Thomas H. Leahey, A History of Psychology: Main Currents in Psychological Thought 2nd ed. (Englewood Cliffs,

NJ: Prentice Hall, 1987), 315-316.

35. Leahey, 317.

36. John A. Mills, Control: A History of Behavioral Psychology

(New York: New York University Press, in press), 2-3.

37. Mills, Control, 31.

38. Announcement to subscribers. Journal of Animal Behavior 7, (1917): 385.

39. Leahey, 317.

40. Dewsbury, Comparative Psychology, 83. It is worth nothing, though, that the state of comparative psychology at this time would only seem "unclear" to Dewsbury because of the distinctly 'presentist' bent in his approach to historical analysis.

41. Mills, Early American Comparative Psychology, 1.

42. Ibid., 2.

43. Ibid., 4.

44. Ibid.

45. Dewsbury, Comparative Psychology, 88.

46. John B. Watson, Behaviorism 2nd ed., (Chicago: University of Chicago Press, 1930), 104.

47. Dewsbury, Comparative Psychology, 85.

48. Ibid., 99.

49. An indication of Dewsbury's views on this topic can

be gained by noting the absence of any significant discussion of Tolman or Hull in his chapter on this decade. See Dewsbury, Comparative Psychology, 99-117.

50. Mills, Control, 184.

51. Ibid., p. 185.

52. Tolman boldly stated that "in the end, the only sure criterion is to have fun. And I have had fun" (Edward Tolman, "Principles of Purposive Behaviorism," in S. Koch, ed., Psychology: A Study of a Science, Vol. 2, (New York: McGraw Hill, 1959). Leahey comments that Tolman also "admitted to being a "crypto-phenomenologist" who designed his experiments by imagining what he would do if he were a rat, being gratified to find that rats were as clever and commonsensical as he was, being no machines." Leahey, 324.

53. Leahey, 320.

54. Mills, Control, 199.

55. Ibid., 198.

56. By 1943 Hull had become fully committed to the terminology of logical positivism. He saw the unification of behaviorism and positivism as producing "a full-blown natural science". Clark Hull, "The Problem of Intervening Variables in Molar Behavior Theory," Psychological Review 50 (1943): 276.

57. Leahey, 325.

58. Mills, Control, 198.

59. Leahey, p. 324.

CHAPTER THREE

Content Analysis

Introduction

The intent of this chapter is to provide a general understanding of the nature, aims, goals and claims of laboratory experimentation in early American animal psychology. The body of this chapter will consist primarily of a content analysis of American psychological journals published between 1890 and 1940, with particular attention the use of apparatus in laboratory experimentation using animals as subjects. This content analysis will be used as a partial means to construct an account of the nature of experimentation in early American comparative psychology, involving the description and classification of various methodological approaches to experimentation, identification of various contributing researchers, and the description of various approaches to the conceptualization of the subject matter. This should provide me with the basic and detailed groundwork necessary to the larger conceptual analysis to follow.

Content analysis as an indicator of disciplinary interests

A ready source of information about disciplinary practices is found in the published record, the volumes of professional journals which contain experimenters' reports of research activity. The literary products of early professional research in this field are easily accessed

through University libraries and are valuable to projects such as this one, which seeks both to characterize the nature of early experimental activity and to construct an understanding of the context and content of the early psychological laboratory. In addition to offering the facts (the who did what to whom, with whom, and why), these reports also offer a view to disciplinary values and changing knowledge goals and claims, and offer insight into practices of communicating knowledge: in short, how comparative psychologists talk about their professional activity. In contrast to informal, unpublished writings (such as lecture notes, lab notes and correspondence), these constitute a formal disciplinary record, revealing how interested members wished to represent their discipline in a professional forum.[1]

Analysis of the relative frequency of papers published in different topic areas can provide a reliable index of the research attention paid to these topics over time. Such an analysis could, therefore, provide a portrait of the experimental activities of comparative psychology during the period under study. Previous content analyses of the comparative psychology literature have been conducted to address specific questions in the history of the sub-discipline. These will be discussed in some detail in the sections below. The present analysis has been constructed, in part, to answer some of the questions posed by these analyses.

Previous content analyses

In a 1949 Presidential address delivered before the Division of Experimental Psychology of the American Psychology Association, Frank Beach traced "the initial development and subsequent decline" of American comparative psychology.[2] Primary among his concerns was his claim that comparative psychologists had not been engaged in broadly comparative work: rather, they tended to study and compare the behavior of two specific animals: the Norway rat and humans. To illustrate his point, Beach presented the results of a content analysis of all odd-numbered volumes of the *Journal of Animal Behavior*, the *Journal of Comparative Psychology* and the *Journal of Comparative and Physiological Psychology* published between 1911 and 1948. Beach's content analysis had two primary classificatory goals: first, to identify the species of animals studied; and second, to identify the types of behaviors studied.

Beach's analysis demonstrated that while the number of articles published in the selection of journals he examined tended to increase, the number of species studied in any given year decreased. Furthermore, the relative percentage of articles devoted to studies of the Norway rat increased sharply after the early years of comparative research, while articles devoted to study of all other animals (vertebrates and invertebrates) decreased sharply.

Beach identified seven general types of animal behaviors researched by comparative psychologists, listed as follows: (1) conditioning and learning, (2) sensory capacities, (3) general habits and life histories, (4) reproductive behavior, (5) feeding behavior, (6) emotional behavior, and (7) social behavior.[3] His explicit aim was to classify the type of animal behavior studied, rather than the methods researchers employed for their study. Beach determined that the majority of articles he had coded investigated conditioning and learning processes in animal subjects. These figures were taken to suggest that by the end of the first World War, comparative psychologists were already almost exclusively concerned with studying learning processes in the white rat. Beach's concern was that such exclusivity of focus carried both benefits and threats for the continuing vigour of comparative research.

No doubt due in part to Beach's push of the rhetorical envelope, (choosing to publish, for example, a cartoon portraying a large white rat leading maze-toting experimental psychologists out of 'Hamelin' (see Figure 1), and framing his paper with references to Lewis Carroll's humourous poem "The Hunting of the Snark"), Beach's 1950 paper is remembered largely for his warnings, and his analysis has been revisited and extended on major anniversaries. Dewsbury, in the most recent of these revisitations, cites the following: Adkins-Regan, 1990; Bitterman, 1960, 1965; Dewsbury, 1978; Dukes,

1960; Erwin, 1982; Lown, 1975; Porter, Johnson & Granger, 1981; Schrier, 1969; Scott, 1973; Whalen, 1961; Yeager, 1973).[4] Dewsbury has suggested that the proliferation of such analyses may also be due to the fact that "These analyses are relatively easy to do and can be fun".[5] More importantly, Beach's analysis formalized psychology's public and popular reputation as white lab-coated investigators; an image which certain animal psychologists had carefully cultivated.

Nevertheless, Dewsbury's most recent re-visitation has formally stated certain problems inherent in Beach's analysis and its successors. He considers these to be "a flawed phenomenon", all the more troubling for the fact that "[t]hese analyses have shaped the manner in which historians have viewed the history of comparative psychology for nearly half a century".[6] In his 1997 effort, Dewsbury intended to redress these errors. For in spite of the numerous critiques and extensions of the classic Beach analysis, Dewsbury's is "the first effort to re-examine systematically a portion of the data on which Beach's conclusions were based."[7]

Dewsbury claims that Beach's analysis and those of his successors have carried hidden assumptions, which have had two important effects: first, to lead readers into thinking that "numbers are the critical factor"; and second, to inflate perceptions of activity in the field, particularly in the period from 1911-1923, by failing to distinguish the work of biologists and physiologists from that of psychologists.[8]

In his 1997 paper, Dewsbury has identified the following problems: (1) Beach seemed to ignore Schneirla's 1946 content analysis, in which the author noted that much of the work in the *Journal of Animal Behavior* was conducted by biologists, and not by psychologists, (2) by plotting the data for the journals in a single line, Beach "accepted an implicit assumption that they [the journals] served the same clientele",[9] (3) Beach neglected to include data from the journals *Psychobiology* and *Comparative Psychology Monographs*, which renders his analysis effectively incomplete, and (4) Beach has used the term "comparative psychology" to describe all research using animals as subjects: Dewsbury would prefer to reserve this term for reference to research which is neither physiological nor process-oriented, substituting the term "animal psychology" to refer to the larger set of reports describing the use of animals in psychological research.

Dewsbury's 1997 analysis essentially completed Beach's earlier effort. Dewsbury surveyed every volume of the *Journal of Animal Behavior*, *Psychobiology* and the *Journal of Comparative Psychology* published between 1911 and 1927 (and not, as with Beach, every other volume); noted the professional affiliation of the authors (i.e. distinguishing the biologists and physiologists from the psychologists); characterized more accurately the types of behavior studied;

and, significantly, added a fifth category of 'humans' to the kinds of animals studied.

The results of Dewsbury's analyses suggest a rather different pattern from Beach's analyses. Significant aspects are summarized below. (1) Overall, the species distribution was found to be evenly split, (2) Authorship of articles published in the *Journal of Animal Behavior* was divided fairly evenly between psychologists and biologists, suggesting that this journal served different disciplinary needs than *Psychobiology* or the *Journal of Comparative Psychology*, in which over 80% of the articles were authored by psychologists, (3) Congruent with Beach's analysis, Dewsbury noted a steady decline in articles reporting the use of invertebrates and non-mammalian invertebrates. However, Beach's analysis does not reveal the steady increase in the use of human subjects, from 0.7% in the *Journal of Animal Behavior* volumes to 46.4% in the *Journal of Comparative Psychology* volumes.

Demonstrating his enthusiasm and defense of the field, Dewsbury summarized the Beach controversy in this manner in 1984:

> Beach's analysis served an important function in its time and certainly played a role in keeping comparative psychology as vibrant as I believe it to be. However, the time has come to recognize the limitations of such analyses. It matters not what percentage of research in comparative psychology was conducted using rats. What matters is what comparative psychologists did and found, and whether or not it is important. I will attempt to show that it was.[10]

Obviously no content analysis can sufficiently convey the qualities of research in a discipline, even as small a discipline as American comparative psychology. What this method offers, however, is a broad portrait of the growth and interests within a given discipline as reflected in the published record.

The Present Analysis

The present analysis has rather different goals from previous analyses. My interests are to trace the development of the use of apparatus in laboratory experiments using non-human animals as subjects. As such, I have indexed primarily the species of animals studied, the names of the researchers and their professional and institutional affiliation, and the names of apparatus used in these experiment. Because apparatus and methodology became closely linked early on in animal research, the present content analysis tracks to some extent the types of methodologies used in comparative research during this period. The analysis has, as its starting point, a rather earlier date than Beach's or Dewsbury's. I have not chosen to restrict this analysis to journals such as the *Journal of Animal Behavior* and its successors, where the editorial focus was on articles related only to comparative psychology. As Dewsbury has noted, just as biologists, zoologists and physiologists often published in comparative psychology journals, comparative psychologists

also published in other journals.[11] Significantly, I have endeavored to examine every volume of every psychological journal published in the United States which published either animal-related research or general psychological research between the years of 1891 and 1940.

Methods

Journals indexed. In order to trace the inception and development of animal psychology, two primary types of journals were examined: journals intended for a general readership in the psychological community, and journals specialized in the field of animal psychology. This analysis excludes those publications, such as the *American Journal of Physiology* and the *American Journal of Anatomy* which, on occasion, published comparative research, but where the editorial board, institution affiliations, and general readership lay outside of the boundaries of disciplinary psychology and, particularly in the latter portion of the period under investigation, comparative psychology.

All articles appearing in every volume published between 1891 and 1940 of the following journals were examined for this analysis. These are listed as follows. Journals intended for general professional readership: *American Journal of Psychology* (1897-1940); *Psychological Bulletin* (1904-1940); *Psychological Review* (1894-1940); *Psychological Monographs* (1895-1940); the *Journal of General Psychology* (1918-1940); the *Journal of Experimental Psychology* (1916-

1940). Journals specializing in animal psychology: the *Journal of Comparative Neurology* (1891-1903); the *Journal of Comparative Neurology and Psychology* (1903-1910); the *Journal of Animal Behavior* (1911-1917); *Psychobiology* (1917-1920); the *Journal of Comparative Psychology* (1921-1940); *Comparative Psychology Monographs* (1922-1940); *Behavior Monographs* (1911-1922).

Coding protocol. The selection of articles to be coded in this content analysis was based upon the following considerations, some of which are borrowed from Danziger.[12] Articles concerned exclusively with the description of laboratory research involving animals as subjects were included. On occasion, and particularly after 1919, comparative research would be reported which included groups of human as well as non-human subjects. These articles were indexed, and the human subjects disregarded for the purposes of the current analysis. Articles which reported on previous research not conducted by the author (such as annual reviews of research in comparative psychology) were not included. Likewise, brief reports consisting of five pages or less (often described by the title "minor studies") were not included. Reviews of previously published material were not coded, nor were articles exclusively concerned with theory (common later in the period studied, with authors such as Hull and Tolman), or with the description of apparatus. Because I am largely concerned with apparatus developed for

the study of animal behavior, I have taken a rather different approach from Beach and have chosen to disregard articles exclusively employing methods directly borrowed from pre-existing fields such as neurology, zoology and physiology. Several articles concerned with representing signal stimulus response through electrodes and sensors were therefore discarded from this analysis. Likewise, articles which were purely descriptive in nature were not included, unless the context of the animal's behavior was manipulated in the laboratory by the experimenter during the course of observation. In short, an article was coded if it described an experimental manipulation including the typical sections representing previous research, subjects, apparatus, results and discussion.

After attempts at several different methods of coding, the following method was adopted. First, the table of contents was read to gain a broad indication of the types of articles contained therein: page numbers of articles likely to report animal experimentation were noted. Next, the index was checked for the following typical referencing terms: "Animals", "Animal Psychology", "Animal Learning", "Comparative Psychology", and in later volumes, "Behaviorism". Entries for the term "Apparatus" were also noted for later study. Relevant page numbers were similarly noted, and cross-referenced with the notes from the Table of Contents reading. This typically generated a complete index

of the articles in a volume which reported experimental research using animals as subjects.[13] Each article would then be read, and appropriate notes taken on the names and institutional affiliation of the authors of the article; the article's title, volume number and page numbers; the type of animal or animals studied; the goals of the research; the method used; apparatus used; the motives manipulated (including punishment and reward); and brief notes of the results of the experimental procedure. Institutional affiliation of the authors was noted in every case, not for the purpose of excluding comparative articles not conducted by psychologists, but rather to address the concern, expressed by Dewsbury, that previous content analyses have tended to fail to distinguish the contributions of psychologists from the contributions of biologists and other scientists. The resultant notes were summarized and compiled into annotated lists of relevant experimental reports from each journal title (see Appendix A).

This method proved to be the most exhaustive and efficient. Although the initial index search frequently resulted in a number of 'red herrings', trials using only the table of contents proved to be inexhaustive. Although the majority of the reports list the type of subjects used in the title, a significant number of report titles indicate only the psychological process studied. The 'red herrings', by contrast, were easily dealt with by briefly scanning the

relevant page numbers in the volume. Frequently these would prove to be book reviews or 'minor studies' of the type excluded from the content analysis. Although excluded from the analysis, these articles form a small but significant body of primary sources for discussion in further research: as such, general knowledge of their contents has proven to be useful.

Aspects coded. The following information was extracted, wherever possible, from each of the reports coded in this analysis. The author's name and gender were recorded, as well as any given title and institutional affiliation which might assist in determining the disciplinary context in which the research was conducted. Information regarding the animal subjects was also recorded, typically consisting of the species of animal studied, the number of animal used, and the origin of the animals (e.g. laboratory stock, dealership). Nomenclature referring to the animal subject was also recorded: although this typically consisted of a numbering or lettering system, animals were occasionally referred to by proper names. The type of apparatus used was recorded, as well as any information relating to the designer of the apparatus. The motivation manipulated in the study was recorded, noting the presence of reward and/or punishment, and the type of motive used. Finally, notes were taken of interesting or unusual features of the article: for reasons of space, these have been omitted from the Appendix.

Scoring: Animals studied. Data concerning the species of animals studied has been treated in two manners: on the level of individual species, as well as by classification based on sub-phylum, order and class. For purposes of comparison, the classification system used by Beach (1950) and Dewsbury (1997) has been replicated in the present analysis, with the omission of Dewsbury's category for human subjects. Each of the species of animals appearing in these reports were assigned to one of four categories, which are listed as follows: (a) all invertebrates (phylum), (b) all vertebrates except mammals (subphylum), (c) all mammals except the rat (order), and (d) the rat (species). In all cases, a score of 1 was assigned where a single species of animal was used in a single report. Where more than one species of animal was studied, a corresponding fraction was assigned to that species (for example, where five species of animals were studied, each species would be assigned a score of .20).

Scoring: Apparatus. A list of apparatus used in the indexed reports was extracted from the notes. Each appearance of a lexically distinct piece of apparatus was given a score of 1. Since the intent of the analysis is to provide a picture of the breadth and variety of apparatus used in animal psychology: it was thought that indexing apparatus which differed only negligibly from standard models would, in certain cases, misrepresent the relative importance

Table 1. Published experimental reports using animals as subjects in American psychological journals, 1896-1940

Journals	Year of Publication								
	1896-1901	1901-1905	1906-1910	1911-1915	1916-1920	1921-1925	1926-1930	1931-1935	1936-1940
AJP	1	4	3	2	1	1	1	0	2
BM	--	--	--	8	7	2	--	--	--
CPM	--	--	--	--	--	7	21	15	24
JAB	--	--	--	42	19	--	--	--	--
JCNP	--	4	11	--	--	--	--	--	--
JCP	--	--	--	--	--	34	71	129	206
JEP	--	--	--	--	0	1	2	2	24
JGP	--	--	--	--	--	--	--	5	11
PB	--	0	1	0	0	0	0	0	0
PM	1	3	4	0	3	1	1	3	1
PR	1	0	0	0	0	0	0	2	0
PSYB	--	--	--	--	15	0	--	--	--
TOTAL	3	11	19	52	45	46	97	156	268

Sources: American Journal of Psychology; Behavior Monographs; Comparative Psychology Monographs; Journal of Animal Behavior; Journal of Comparative Neurology and Psychology; Journal of Comparative Psychology; Journal of Experimental Biology; Journal of General Psychology; Psychological Bulletin; Psychological Monographs; Psychological Review; Psychobiology.

of various kinds of apparatus. The numbers yielded therefore represent a broad indice of the use of various kinds of apparatus. Furthermore, since apparatus for the experimental study of animals was not widely standardized during the period of study, functionally similar pieces of equipment might bear different names, thereby leading the reader to assume that a far greater variety of apparatus existed. In coding the entries, therefore, an effort was made to ascertain the function of a given piece of apparatus. Very close variations of apparatus were not coded multiply, regardless of the name given to the apparatus.

The pieces of apparatus indexed in the analysis were categorized as follows: (1) Puzzle boxes and variants, (2) Conditioning apparatus, (3) Discrimination apparatus, (4) Multiple choice apparatus, (5) Mazes, (6) Delayed reaction apparatus; (7) Obstruction apparatus, (8) Apparatus for studying general activity, (9) Observation cages, and (10) Miscellaneous apparatus.

Results

Number of reports. Table 1 displays the number of published experimental reports by year of publication and title of journal. A total of 697 reports published between 1896 and 1940 were indexed in the analysis. Examination of the data by year of publication demonstrates a marked increase in the number of reports published in journals specific to animal research, such as the Journal of Animal

Table 2: Relative frequency of use of animals as subjects in published experimental reports, 1896-1940

Kind of Animal	Year of Publication								
	1896-1901	1901-1905	1906-1910	1911-1915	1916-1920	1921-1925	1926-1930	1931-1935	1936-1940
Innvertebrates	0.0	2.0	0.0	11.6	3.0	2.0	5.0	3.0	0.0
% of reports	.00	.18	.00	.22	.06	.04	.05	.02	.00
Non-mamm. vert.	1.3	4.0	3.0	15.8	6.83	5.0	8.0	16.5	12.0
% of reports	.44	.36	.16	.30	.15	.11	.08	.11	.04
Mammals, non-rat	0.7	4.0	10.0	11.8	12.71	9.5	24.5	32.0	79.0
% of reports	.23	.36	.53	.23	.28	.21	.25	.21	.29
The rat	1.0	1.0	6.0	12.8	22.45	29.5	62.5	104.5	177.0
% of reports	.33	.09	.32	.25	.50	.64	.64	.67	.66
Total reports	3	11	19	52	45	46	97	156	268

Behavior and the Journal of Comparative Psychology, were in publication. Reports published between 1931 and 1940, the last decade of the period under study, account for 61% of the total number of reports coded in the analysis, whereas those published between 1921 and 1930 account for 21% of all reports coded. This is in keeping with the growth in professional activity during this period, as described in the Chapter Two.

Animals. Table 2 displays the relative frequency of use of various kinds of animals as subjects in the published experimental reports surveyed by year of publication. Significant trends include the following: in every five year period, beginning in 1916, the rat as subject never accounted for less fifty percent of all uses of animals as subjects. Between 1921 and 1940, the rat represented roughly two-thirds of all animal subjects. Although Dewsbury's 1997 analysis demonstrated a similar dominance of rats as subjects, the trend is more apparent in the current analysis for several reasons. First, unlike Beach and Dewsbury, I have not indexed the use of humans as subjects in the analysis. Second, I have covered a greater time period in this analysis: whereas Dewsbury's 1997 analysis stopped at 1927, the current analysis extended to 1940. Similarly, I have included more journals than either Dewsbury or Beach. Because this is an index of the relative frequency of use of the animals, the increase in use of the rat as subject is

Table 3. Apparatus cited in published experimental reports, 1896-1940

Kind of Apparatus	Year of Publication								
	1896-1901	1901-1905	1906-1910	1911-1915	1916-1920	1921-1925	1926-1930	1931-1935	1936-1940
Problem Boxes	2	3	13	6	5	6	10	9	6
Conditioning	--	--	--	--	--	--	2	8	30
Discrimination	1	5	15	17	14	10	17	45	57
Multiple choice	--	--	--	1	4	5	2	6	5
Mazes	--	6	4	11	17	24	55	100	108
Delayed Reaction	--	--	--	1	2	1	1	14	7
Obstruction	--	--	--	--	--	1	3	1	10
General Activity	--	--	1	1	1	3	7	5	11
Observation Cages	--	--	1	20	7	6	16	17	37
Miscellaneous	--	2	4	3	3	4	6	28	35
Total cited	3	16	38	60	53	60	119	233	306

associated with a decrease in use of all other kinds of animals.

Apparatus. The varieties of apparatus cited by experimenters in the reports indexed increased rapidly with each five year increment. Table 3 represents the number of kinds of apparatus mentioned in the experimental reports by year of study. Out of the ten categories of apparatus represented in the reports, the maze consistently demonstrates the greatest frequency values: a steady increase of varieties of mazes may be observed in each five year increment. A similar, though less marked increase may be observed in the category of discrimination apparatus. Because the entries of apparatus represent lexical entities and not actual numbers of apparatus, this measure serves only as a gross indicator of disciplinary activity.

Conclusion

The data from this analysis would tend to indicate that Beach's 1950 critique was accurate: by the early 1940s, comparative psychology was largely preoccupied with studies of rats in mazes. An examination of the 697 reports indexed in the current analysis reveals that the rat accounted for nearly half of all nonhuman animal laboratory subjects from 1896-1940, and for two thirds of all nonhuman animal subject from 1921 though 1940. In the period from 1896 through 1940, the maze accounted for slightly over one third of all types of apparatus mentioned in the reports, eclipsing all other

categories of apparatus used in the reports. A detailed discussion of the varieties of apparatus used in the indexed reports will be presented in Chapter Four, and an account of the predominance of the rat as laboratory subject will be presented in Chapter Five.

Notes

1. Kurt Danziger made exemplary use of the public record in Constructing the Subject. His general methods have been adopted where possible for the current analysis. Kurt Danziger, Constructing the Subject: Historical Origins of Psychological Research (Cambridge, England: Cambridge University Press, 1990).

2. Frank A. Beach, "The Snark Was a Boojum," American Psychologist 5 (1950): 115-124.

3. Beach, 118.

4. Donald Dewsbury, "Comparative Psychology in Journals, 1911-1927: Another Look at the Snark," paper presented at Cheiron, Animal Behavior Society, 1997.

5. Dewsbury, Another Look at the Snark.

6. Ibid.

7. Ibid. It is, however, unclear whether Dewsbury's 1997 analysis pre-dates the analysis reported in this thesis. An abstract reporting on certain aspects of my analysis was submitted for the 1996 conference of the American Psychological Association, as well as for a forthcoming special edition of the American Psychologist: Dewsbury served as evaluator for both submissions. In personal communication, Dewsbury expressed concerns with my research, and it is possible that he formulated his 1997 analysis in response to, as well as during, the impending completion of my analysis.

8. Dewsbury, Comparative Psychology, 22-24.

9. Dewsbury, Another Look at the Snark.

10. Dewsbury, Comparative Psychology, 25-26.

11. Dewsbury, Another Look at the Snark.

12. Danziger, Constructing the Subject, 198-200.

13. This procedure had, as an indirect effect, the consequence of leading me through a scan of every research article in a volume.

CHAPTER FOUR

Apparatus Used in Experimental Reports

Introductory Comments

In this chapter I will discuss the various categories of laboratory apparatus described in the experimental reports coded in the content analysis reported in the previous chapter. Where necessary for clarification, or for the presentation of a more complete account of the laboratory apparatus, experimental reports from other journals have also been referenced. In addition to the experimental literature, the following textbooks have served as references in this chapter: John B. Watson's 1914 book *Behavior: An Introduction to Comparative Psychology;*[1] and for research in later periods, Norman Munn's 1950 textbook, *Handbook of Psychological Research on the Rat.*[2]

Puzzle Boxes

The puzzle box was the first apparatus to appear in the published experimental reports surveyed in the current analysis. In its typical form, this apparatus consisted of a box or cage-like enclosure to which the animal was required to gain entry, or from which it might escape, in order to obtain a food reward. The means to entry or exit were governed by various "puzzle" devices: successful manipulation of the devices would cause the door to or from the cage to open. Although several authors have credited Clark University psychologist Linus Kline with the construction of

the earliest puzzle boxes,[3] Edward Lee Thorndike is typically acknowledged as the inventor of this apparatus. Thorndike's influential 1898 monograph "Animal Intelligence" brought the experimental application of the puzzle-box to widespread attention.

Kline's work was roughly contemporary with Thorndike's and displayed similar roots in the anecdotal reports collected by Romanes and Morgan. While reading Morgan's *An Introduction to Comparative Psychology*, Kline had been struck by the "idea . . . of using little boxes somewhat as traps to study the ways by which rats search for food in out-of-the-way places."[4] Kline developed cages containing smaller food boxes: his animals were required to dig through sawdust or to break a strip of paper in order to gain entry to the food box. His studies using these puzzle boxes were mainly observational in nature, and Kline expressed significant concern with maintaining as natural an environment as possible for the subjects of his research. Kline's puzzle box work may therefore be characterized as both theoretically and methodologically allied with the work of the nineteenth century British naturalists. Although Kline's research was conducted independently, and according to Dewsbury, earlier, than Thorndike's, Kline's work would be overshadowed by that described in the more analytic and forceful dissertation by Thorndike.

The puzzle boxes developed by Edward Lee Thorndike and popularized in his 1898 publication heralded the beginning of the experimental paradigm in American animal psychology. Thorndike formulated his dissertation as a methodological challenge to the prevailing naturalist tradition in animal psychology: he intended to elaborate Morgan's notion of trial and error learning in a systematic, quantitative manner.[5] As with Kline, Thorndike's constructions were apparently suggested to him by some of the description of the mechanical abilities of cats and dogs in the works of Morgan and Romanes.[6] Morgan, in particular, had described two possible forms of trial-and-error learning whereby the acquisition of skills could be attributed to the consequences of an action rather than the attribution of complex form of association to the animal. Thorndike used the types of situations described in anecdotal accounts to devise an experimental method: wooden crates were fitted with doors that could be opened by means of latches, levers, strings and loops. The configuration of each box was determined by consideration of the tasks best suited to each animal's instinctive repertoire of movements and motivations (information that, in Thorndike's case, was derived from the accounts presented in the works of Romanes and Morgan). The general procedure, in every case, was similar. Animals were placed in a cage where the means to escape involved a specific sequence of actions.

When an animal escaped the cage, it was rewarded with food. Thorndike tested the animal subjects of the 1898 paper in a state of "utter hunger", a phrase he later came to regret following repeated criticism.[7]

The critical feature of Thorndike's use of the puzzle box was the inclusion of a clearly quantifiable dependent variable, the time from the insertion of the animal into the apparatus until the occurrence of the appropriate action which opened the door. By plotting response latency as a function of the number of trials, Thorndike could devise a graphical representation of the learning process, or a "learning curve". According to Thorndike, these learning curves were "absolute, and whatever can be deduced from them is true. So also the question of whether an animal does or does not form an association requires for an answer no higher qualification than a pair of eyes."[8] These learning curves, the first of many to follow, would become a heuristic for the objective psychology of animal intelligence.

Thorndike argued for his method by reference to its convenience in the purposeful and systematic study of animals, and by the absence of the personal involvement of the investigator. The puzzle boxes emerged from the need for a contained animal for controlled observation, a standardized task upon which to compare many animals, efficient manipulation of the main motive for escape (hunger), and a quantifiable dependent variable (response latency).

Thorndike claimed that the behavior of his animals could be accounted for in purely associative terms, independent of any reference to higher mental processes: "The animal's behavior is quite independent of any factors save its own hunger, the mechanism of the box it is in, the food outside, and such general matters as fatigue, indisposition, etc. Therefore the work done by one investigator may be repeated and verified or modified by another. No personal factor is present save in the observation and interpretation".[9] This methodology therefore carried the additional, advantageously scientific, aspect of replicability: Thorndike's work could, and certainly was, repeated by other investigators.

Immediately following the publication of Thorndike's thesis critics raised doubts as to the validity and utility of the results obtained with the use of puzzle boxes. Wesley Mills, in particular, thought that the forced confinement of the animal resulted in unnatural levels of fear which, quite apart from concerns with cruelty, would adversely affect researchers' understanding of the mental processes under investigation: the resultant associations would "bear about the same relation to the normal psychic evolution of animals as the behavior of more or less panic-stricken or otherwise abnormal human beings does to their natural conduct."[10] Later developments in laboratory apparatus, animal handling, and the development of 'sophisticated' experimental animal subjects would diminish somewhat the impact of Mills'

concerns. Nevertheless, Mills spoke directly to the implicit agenda of Thorndike's methodology: the explicit agenda, to remove observer variability, concealed a strong move towards the removal of variability associated with the activities characteristic of animals in their natural environments. This move would later become essential to the development of behaviorism, which would become the dominant paradigm in experimental and popular American psychology for many decades.

Puzzle boxes: Modifications

After the publication of Thorndike's dissertation many variants of the puzzle box appeared in the experimental reports surveyed in this analysis. Thorndike's basic puzzle box model underwent repeated modification as investigators expanded the variety of species that had been subjected to the apparatus. Modifications typically consisted of varying the dimensions of boxes to accommodate the size of the animal under study and the exit tasks to best suit the habits and motor skills of the species under study. The egress-type puzzle box (in which the animal was required to perform the successful manipulation in order to escape the apparatus) fell rather quickly out of general favour: many researchers sympathized with Mills' concerns about the influence of an animal's confinement anxiety upon experimental results. One ready solution was to place the food reward inside the box, and the hungry animal outside the box, in what I have termed

an ingress configuration. Watson, by 1914, had little to say about the modified puzzle boxes, except the following:

> All we maintain for them is that they are serviceable and have a wider range of usefulness. We do not maintain that they are better adapted to the study of motor habits than others which have been employed. Nor do we claim that placing the food inside the box is more advantageous than Thorndike's method of placing the animal inside and allowing it to escape.[11]

Examples of some of these modifications include sawdust boxes, latch boxes with varying types and numbers of latches, and inclined plane boxes. Of these, one of the more complex was the inclined plane box. Bassett's 1909 Modified Inclined Plane Box featured a food box contained within a larger cage box. When the animal subject ascended the inclined plane, a magnet contact resulted in the opening of the door to the food box. An optional kymograph attachment recorded the number of attempts and the ratio of successful to unsuccessful attempts.[12] Later developments to Bassett's box included the addition of another inclined plane with electric shock capacity used for the study of inclined plane discrimination.[13]

Conditioning Apparatus

It is generally thought that the concept of conditioning was brought to the attention of American psychologists around 1909 in a paper by Yerkes and Morgulis describing the Russian physiologist Ivan Pavlov's studies of digestive reflexes in dogs.[14] Although many researchers had advanced the view that conditioning processes form the basis of all learning, the

kind of conditioning previously discussed by animal psychologists differed significantly from Pavlovian conditioning. In a 1934 paper, B. F. Skinner drew a clear delineation between two types of conditioning and a third pseudo-type. The first type represented 'operant' conditioning, such as the kind of condiyioning which might occur with the use of Thorndike's puzzle boxes or Skinner's lever-pressing apparatus. In this type, the stimulus-response sequence necessitates an intervening action on behalf of the animal, such as pressing a lever or pulling a string.[15] The second type, represented by 'classical', or Pavlovian conditioning, required no relevant intervening behavioral response. Citing Pavlov, Skinner claimed that the first type of conidioning was the more important of the two, in that the conditionied stimulus evoked a motor response essential to a complex reflex such as "nutrition".[16] Although operant conditioning of the varieties practiced by Thorndike and his successors were prominent in the earlier periods of animal psychology, it would be the widespread availability of Pavlov's research in English translation which would become instrumental to the ascendance of neo-behaviorism in American psychology. It is also of note that Pavlovian conditioning research was well in place in American physiology by the time psychologists adopted its practice.

A description of apparatus relating to the study of conditioning must therefore take these distinctions into account. Apparatus used in the study of classical, or under

Skinner's classification, Type II, conditioning, did not differ substantially from that described in Pavlov's research. The apparatus typically consisted of a restraining device for the animal subject, a stimulus producing device such as a bell-tone or light, and recording devices. Featured prominently in the study of Type I conditioning was the Skinner box. Skinner published three papers in 1932 and 1933 studying conditioned reflexes in albino rats using an early version of the apparatus which consisted of a food tray with a lever and kymograph.[17] By 1936 he had streamlined the mechanism into a "conditioning apparatus" that featured an automated food delivery mechanism that eliminated the need for the researchers' direct involvement in the animal's activities.[18] In a rather candid autobiographical paper published in 1959, in which Skinner discussed the evolution of his research methodology, Skinner admitted that these modifications were accomplished largely to his convenience. This will be treated in some detail in the final chapter.

By 1939 reports by Smith and Smith,[19] and Arakelian,[20] featured modifications to the "Skinner rat apparatus". The "Skinner box", as it later became known, has most commonly been presented in the study of conditioning: in essence, however, the box is a simple puzzle box in which the delivery of reward occurs more efficiently and in which the dependent variable becomes the rate of lever pressing or the number of correct responses in successive units of time.[21]

In 1969, Bitterman celebrated Thorndike's invention as "the ancestor of the most widely used contemporary technique for the study of learning in animals. Our modern apparatus looks much better, and it is considerably more efficient -- the response of the animal is detected by an electrical device rather than by the experimenter, and the need for handling the animal is avoided by delivering food to the animal rather than by admitting the animal to food -- but the principle is the same".[22]

Yerkes' Discrimination Box

Referred to variously as experiment boxes, discrimination boxes, or control boxes, this class of apparatus represented extensions of cages used primarily for studying sensory functions and sensory discrimination in animals. The most common reference to this type of apparatus invoked Yerkes' name, as the first widely cited use of this type of apparatus was by Yerkes in 1903.[23] Although Kinnaman has developed a discrimination apparatus based upon similar general principles a year prior to Yerkes, Kinnaman's apparatus differed significantly in construction and function. In two papers published in 1902, Kinnaman tested colour and form discrimination using paper-covered food vessels that were placed on a table-top, easily accessible by the monkeys he used in his study.[24] By contrast, Yerkes' apparatus enclosed the animal entirely, providing it with a two-choice maze. In a 1904 paper describing his work with

English sparrows, Porter referred to his version of the apparatus as the "Kinnaman Discrimination apparatus", likely to differentiate the methodology and apparatus from Yerkes'.[25] Yerkes further refined the discrimination apparatus in 1907 in his book on dancing mice,[26] and in subsequent related articles published in 1908,[27] and 1909.[28] The general method involves what Watson referred to as "forcing the formation of sensory habits".[29] Watson described the general procedure, in which an animal is forced to learn to discriminate between two stimuli, as follows:

> the animal is placed in an experiment box. This box has a home compartment where the animal is restrained until the experimenter is ready to make the test. At the will of the experimenter the door of the home box is opened and the animal is then confronted with both stimuli simultaneously; e.g. a circular and a square translucent plate illuminated from behind... A partition divides one end of the stimulus chamber into two compartments. The animal, leaving the home box, may respond by entering the compartment illuminated by the square or the compartment illuminated by the circle.[30]

The animal was typically rewarded for performing the desired response by finding a food reward in the correct compartment. Most uses of this method involved the addition of punishment for incorrect responses; usually in the form of an electric shock. The experimenters frequently equipped the discrimination box with electric grilles to administer shock as punishment. Special variants of these boxes were devised for use with different types of animals, but the typical form was considered suitable for use with a range of animals, from pigeons and rats to young chicks and small monkeys.

Other variants of this apparatus were used for studying different sensory functions: Watson described "Animal Control Boxes" used for studying auditory and olfactory discrimination.[31] In 1909, Clarence S. Yoakum presented a temperature discrimination apparatus for use with squirrels and white rats. According to Yaokum's report, the planned experimental procedures were not completed: of the two squirrels used as subjects, one was "accidentally killed" in the apparatus, and experiments with the second were discontinued when the experimenter relocated.[32] Nevertheless, construction specifications for "Yoakum's Temperature Apparatus" (identical to those published in Yoakum's 1909 paper) appeared in Watson's 1914 textbook with no mention of the first squirrel's fate, and in spite of the fact that Yoakum's apparatus appeared in none of the published reports coded in the current analysis.

Miscellaneous Discrimination Apparatus

Numerous pieces of apparatus were developed with the intent to force the formation of associations and to test sensory discrimination in animals. Some of these pieces relied upon the animals' instinctive repertoire of movements such as digging, jumping and pecking. Moseley employed a pecking apparatus to study the accuracy of the pecking reflex in young chicks,[33] and Shepherd used colour-dyed bread cubes to which bitter and sweet flavourings had been added to test the ability of Rhesus monkeys to form associations between

colour and taste.[34] Numerous types of discriminations were tested, including weight, texture, audition and olfaction, although discrimination testing seemed to pale somewhat as the use of the rat became standard and information about its sensory capabilities accumulated.

Significant among these variations was the development of the jumping apparatus for the study of rats. Although Florence Richardson used a platform-jumping apparatus in her 1909 study of white rats[35], Lashley's 1930 Jumping Stand, intended for use in the study of visual pattern discrimination in rats, became the standard form of this type of apparatus.[36] Lashley's apparatus was important because previous studies of visual pattern discrimination using the discrimination box had yielded consistently negative results: by requiring the rat to jump from a certain distance on to stimulus patterns Lashley's method overcame the functional limitations of the standard discrimination box. Research using the jumping stand permitted Lashley to reveal that the rat's ability to form pattern discriminations was indeed consistent with the degree of differentiation in its optic system, and with what was then known about other visual capacities of the rat.

Multiple Choice Apparatus

A common modification of the discrimination box involved the addition of one or more discrimination chambers, requiring the animal to choose from multiple options. This

apparatus was generally referred to as the "Multiple Choice Box", or as the "Yerkes Multiple Choice Apparatus", although Yerkes himself felt that the multiple choice method represented a discrete and novel method of animal study, quite distinct from the puzzle box method. Yerkes first devised the multiple choice method around 1913, and employed a rudimentary keyboard apparatus in studies of human subjects at the Psychopathic Hospital in Boston, MA. He was unsatisfied with the apparatus however, and felt that it did not adequately demonstrate the value of the multiple choice method. He refined the apparatus, adapting its mechanisms for use in the study of crows, pigs, rats and ring-doves.[37] Although other researchers had adopted the multiple choice method Yerkes felt it necessary, in a 1916 monograph on ideational behavior in apes, to provide a detailed description of the multiple choice method, since, he claimed, "no adequate description of the method has yet been published to which I can here refer".[38]

The multiple choice method represents an adaptation of work done by one of Yerkes' students, Gilbert Hamilton, in 1911 at the latter's private research facility in Montecito, CA. Hamilton had analyzed the reactions of humans and animal to an insoluble multiple-choice problem.[39] Hamilton required that his subjects enter an enclosure where the means of exit was by one of four doors: a reward would be found behind the exit door. Only one door would be unlocked in any given

trial, and the only consistent feature was that the door which was unlocked in the previous trial would be locked in the current trial. The pattern was otherwise random, except that over the 100 trials each subject was required to complete, each of the doors would be unlocked twenty-five times. Hamilton used the number of attempts to open a door as an overall measure of performance: a subject who understood the task and consistently remembered which door had been unlocked on the previous trial would therefore score about 200, whereas one who understood the situation yet failed to recall which door had been unlocked might score slightly higher. Yerkes' multiple choice method was superficially similar to Hamilton's, and according to Boakes, it was Hamilton's 1911 paper that provided the "final impetus" for Yerkes' multiple choice method.[40] Yerkes' multiple choice tasks were soluble: using what Yerkes theorized to be ideational thought, a subject could in principle predict which door would be open on a given trial. The location of the unlocked door could be inferred from the understanding of the systematic position rule employed by the experimenter in a given series of trials.[41]

By the time of his 1916 application of the method to monkeys and apes, Yerkes had added the incentive of punishment by confinement in order to "discourage random, hasty or careless choices".[42] In a paper also published in 1916, Hamilton added electric shock as an incentive with lower animals, and reminded his readers that his applications

of the multiple choice method predated Yerkes'.[43] Yerkes was under considerable pressure at Harvard to expand his research to more directly involve humans, and, in particular, to specialize in educational research.[44] Although he rejected incentives to change the focus of his research, in 1916 Yerkes reported that his multiple choice method was "being tried out as a practical test in connection with vocational guidance and various forms of institutional examination, such as psychopathic hospital and court examinations".[45]

Yerkes' research using the multiple choice method persisted well into the 1930s. He modified his original apparatus for use in his primate research stations, developing turntables with multiple food boxes,[46] and in the case of the study of larger animals such as gorillas and chimpanzees, turning entire laboratories into multiple-choice mazes and boxes.[47]

Mazes

Although the first mention of mazes in the reports surveyed occurred in Thorndike's 1898 paper,[48] the maze as a formalized piece of laboratory apparatus did not appear until 1901 with the publication of Small's "Psychic Development of the Rat - II".[49] As described by Warden and Warner in 1927, the maze consisted of "an apparatus without puzzle devices, so constructed as to require for its solution the selection of the shortest route (either spatially or temporally) to a goal which remains constant in position".[50] The maze quickly

became a popular apparatus for animal study: like the puzzle and problem boxes, hunger could be easily used as an incentive, and successful and unsuccessful outcomes could be unambiguously recorded. The first formal laboratory maze, the Hampton Court maze, became a model for a number of variants which were quickly presented in the experimental literature. By 1950, Munn reported that over 100 mazes had been used in investigations of learning processes in animals.[51]

Hampton Court Maze

The Hampton Court Maze made its experimental debut in 1901 in the work of Willard S. Small, then a graduate student at Clark University under the supervision of Linus Kline. Kline had observed runways made by wild rats on his father's farm: after describing these pathways to fellow Clark professor Edmund C. Sanford, Sanford suggested the use of the Hampton Court maze as a laboratory analog to the wild rats' outdoor pathways.[52] The Clark University biologist Colin C. Stewart suggested the use of the white rats with which he had been working for some time.[53] Kline copied the maze from the *Encyclopedia Britannica*, and Small constructed the apparatus based upon that design. Although both Small and Kline accorded credit to Sanford for first suggesting the use of the maze in animal study, the seminal 1901 work on rat maze learning was published in Small's name alone. The concern throughout appears to be upon maintaining as natural an

environment as possible in the experimental situation: Dewsbury has noted that in certain passages Kline "sounds very much like an ethologist of a much later era".[54] In the 1901 paper, Small noted that the rat's natural tendency towards pathmaking was a major factor in adopting the maze apparatus: later version of the maze would do away with many of the early concerns with naturalistic research.[55] A single runway, for example, is hardly a "maze", though such constructions would be later referred to as such.

Early Spatial Mazes

One of the most baroque of the early maze variants was Watson's 1914 Circular Maze with Camera Lucida Attachment, a modular maze that could be adjusted to various degrees of difficulty. The maze was fully illuminated and came with a double-mirror attachment which permitted experimenters to observe the animal's movements in the maze without the animal being aware of the experimenter's observation.[56] Functionally similar to the Camera Lucida was the Yerkes-Kellog Double Reflection Apparatus.[57] By 1950, Munn commented that the Watson Circular maze, along with the Carr maze, were the most widely used in animal psychology. In his exploration of the relationship between rats and psychology, Frederick Wertz has commented that the agenda implicit in Watson's circular maze was that of isolation, observation and control. The effect of a design which promoted the removal of "experimenter effects" was that "The experimenter may consequently be completely absent, available to neither hearing nor smell,

yet observe everything".[58] In spite of the popularity of the Watson and Carr mazes, experimental results obtained from their use displayed insufficient reliability for use in research which sought to compare different treatment groups: in a 1922 analysis of the reliability coefficients of various pieces of apparatus, William T. Heron and Walter S. Hunter determined that the Watson Circular maze yielded low reliability coefficients, and, in particular, that there was no correlation between maze and problem box learning.[59] In 1950, Munn commented that "Relatively few of the earlier mazes possessed sufficient reliability to warrant their use in the research involving comparison of groups tested under different conditions of learning".[60]

Maze Variants

As with the puzzle box, experimenters frequently modified mazes to suit their current experimental needs. A 1927 survey of comparative reliabilities of various mazes examined a list of nine different mazes, including the Multiple Choice maze, the Circular maze, the Carr maze, the simple three-way maze, the forward going right and left maze, six- and eight- unit T mazes with and without doors, the Blodgett 6-unit maze, and the Multiple T unit maze.[61] Munn's 1950 textbook makes additional mention of the Automatically Recording T-maze, the Narrow Path Elevated Maze with T-Shaped Units, and the Block Elevated T-Maze, all constructed before 1940. In the course of compiling a list of apparatus for the

current content analysis, I encountered at least 91 distinct varieties of mazes.

Some mazes, such as the one designed by Otto Glaser, were submerged inside water tanks: Glaser's subjects were required to negotiate the maze while swimming through water that was variously fresh or salted, either undesirably hot or cold, and were on occasion subjected to electric shock upon entry. The incentive, upon escape, was the promise of being "wrapped in warm towels and given a nibble of cheese".[62] The purpose of this apparatus was largely propadeutic.[63] Glaser had lamented that traditional demonstrations of habit formation in animals were too lengthy for presentation to an audience. By developing an apparatus to test conditions in which rats would learn most quickly, students of animal psychology could see "by actual experiments, what has been accomplished in this interesting field".[64] Only secondarily, and perhaps as added justification, did Glaser claim that animals in their natural environment are required to solve problems quickly, rather than by repeated trial-and-error processes.

Lashley's Simple Maze consisted only of three alleys and a food-box (the simplicity perhaps a boon to the unfortunate subjects of Cameron's 1929 use of the apparatus, who were first subjected to temporal lobotomies).[65] Other researchers studied the influence of manual guidance on rat learning, introducing collars and leashes fitted for their subjects.[66] Features of mazes and puzzle boxes were occasionally combined

in a single piece of apparatus, which would sometimes include electric shock punishment. Ligon used such a hybrid of his design to study the relative force of hunger, fear and competition in white rats.[67]

Other maze variants, such as Miles' Skeleton Maze, were elevated above the laboratory floor: Miles contended that the elevated pathway permitted individuals and groups to more easily observe the animal's progress, and that the narrow elevated path allowed less room for the rat to explore, thereby reducing the time to maze solution. The elevated maze carried the additional benefit of being constructed of a number of modular T-shaped units, which could be interchanged to form different configurations and which were more easily stored than could conventional maze designs.[68] Efforts were equally directed at streamlining and standardizing maze construction: the Michigan maze, also known as the Shepard Universal maze, was a modular maze which could be assembled in a number of configurations and sizes so that a single set of construction pieces might produce mazes accommodating smaller mammals, such as rats, as well as larger mammals, such as monkeys and dogs.[69]

Munn reported efforts to enhance the reliability of mazes: the most prominent of these was an automatically recording T-maze developed in 1929 by Tolman, Tyron and Jeffress.[70] The apparatus in its entirety encompassed two separate rooms in a laboratory: an animal room, in which rats were bred and housed and in which the experimenter maintained

a work desk, and a maze room which contained a maze constructed of seventeen successive T units.

The animals were housed in two tiers of nests which were contained in removable compartments, similar to desk drawers. The following sequence of events occurred in a single run: while in the nest compartment the rat was transferred to the lower tier where it would begin the maze. The maze units had moveable floors that were connected to mercury cups which, when depressed by the animal's feet, would close an electrical circuit, automatically recording the animal's progress through the maze. Completion of the maze brought the animal to the door of its compartment in the upper tier where a food reward waited. As the door to the compartment rose, another circuit was completed which set off an automatic revolving table which then brought the next compartment onto position at the start of the maze. This would continue in succession until all of the animals housed in the apparatus had been run through the maze. Sensors in the floor of the entry of the maze would set off a recording device; similar sensors at the end of the maze shut it off. When used according to protocol, this maze yielded reliability coefficients as high as .98, a marked contrast to those derived from the use of the Hampton Court or Circular mazes.[71] Although several modifications were proposed by Buel in 1932,[72] Munn suggested that the reliability of the automatically recording maze could be ascribed to the following factors: (1) alleys of equal length ensured that

all paths were of equal difficulty, (2) the use of T-shaped units provided the animal, at each choice-point, with two apparently equal possibilities, thus equalizing the difficulty of blinds, (3) the maze was of sufficient complexity to be difficult for the animal to solve, (4) doors prevented retracing of paths, (5) performance was objectively scored, (6) the animals were not handled before or during experimentation, (7) all surrounding conditions, such as illumination, odor, sound and time, were constant.[73]

The consequence of obtaining such reliability, however, was the complete separation of animal and experimenter. The Tolman, Tyron and Jeffress maze represented the technological extension of Watson's circular maze: not only were the animals observed without the presence of the experimenter, but they were also shuttled from nest to test and back without the direct involvement of the investigator. This apparatus accounted for every aspect of the experimental animal's existence, from birth through service in laboratory experimentation, without any degree of significant involvement from the investigator. The Tolman, Tryon and Jeffress maze therefore represents the complete separation of experimenter and subject: significantly, in automating the process of experimentation, the experimenters themselves become in many ways mechanized, and somewhat redundant.

Temporal Mazes

In a spatial maze, the animal may use a number of cues to learn the correct pathway: visual, auditory, tactual,

olfactory, kinesthetic and other cues associated with the alleys act as signs guiding the animal to the food box. The temporal maze was designed to render these cues ineffective. Temporal mazes typically consisted of a rectangular pathway bisected by a central alley. Because there were no differential spatial cues, the animal would be required to learn a sequence of directional movements over a series of trials, such as the pattern of *lrlr*.[74] Munn described a typical procedure as follows:

> The rat is placed on the apparatus at one end of the central path. It is then required to run along the top of the path and turn, let us say, to the left. When it returns from this trip it is required to run along the central alley and go to the left once more. On the two subsequent trials the animal is required, after emerging from the central alley, to turn to the right. After an incorrect turn the rat's progress is blocked with an alley stop.[75]

The preceding example is an example of a double alternation sequence. In both single (*lrlr*) and double (*llrrllrr*) alternation sequences, the external stimuli associated with the initial trip along the central alley are identical, and it is impossible for the animal to learn the correct pathway by associating it with a particular stimulus, or combination of stimuli such as length of pathway, the visual appearance of different choice-points, and so forth.

In his work with temporal mazes, Walter S. Hunter sought to uncover the symbolic processes involved in maze learning. His initial work with the apparatus, however, was designed to test the role of kinesthetic processes in maze learning in white rats.[76] Through subsequent research designed to

elucidate the relationship between kinesthetic and other processes and symbolic thought in maze learning, Hunter designed increasingly complex temporal and spatial mazes such as the Double Alternation Tridimensional spatial maze,[77] and a Double Alternation temporal maze.[78]

Delayed Reaction Apparatus

The delayed reaction apparatus, devised by Carr and originally used in 1913 by Hunter, required the animal to reach a solution on the basis of signs alone.[79] The apparatus consisted of a box set up essentially similarly to a discrimination box, in which the subject was first trained to associate the presence of a light in one of three doors with a food reward behind that door, and to associate punishment with an electric shock delivered on the path to the incorrect door. Once the association was in place, Hunter began trials in which the light was turned off before the subject was able to run towards the correct door. Finally, the animal was restrained in a glass-fronted holding area for a series of delay trials: the ultimate goal of the experiment was to determine how long the subject could retain the memory of which door contained the reward. Among Hunter's subjects in this study were rats, dogs, raccoons and children, although he found punishment by electric shock unnecessary with the children and a candy reward sufficient: one gathers from reading the report that Hunter did not find it necessary to administer electric shocks to the children in

order to determine the efficiency of punishment versus reward.

McCord was able to obtain rather longer successful delays by employing a delayed reaction apparatus that incorporated the features of the Lashley jumping-stand with the discrimination features of Hunter's original apparatus.[80] A small cage was suspended within the apparatus, by which the rats were lowered into place: this cage also served as the delay chamber. With the rat in place, the experimenter's hand would appear at one of four doors, each differentiated by a visual pattern. The experimenter would then thrust a food pan through the door, tap the pan on the sill, and wave it about until the rat's attention had been secured. When released from the delay cage, the rat would have the opportunity to jump to the correct door and receive a bit of food in a similar pan. Should the rat choose the incorrect door, no food would be made available.

Obstruction Apparatus

The obstruction method was frequently used to measure the relative strength of drives in animals. Moss first devised this method around 1924: the essential problem presented to the animal was to overcome electrical and other barriers in attempting to reach such 'stimulus objects' as food, water, or an animal of the opposite sex.[81] Moss also pitted drive against drive; in one case requiring animals that had been deprived of both food and sex to decide which

they desired more. In another experiment, the drive of a mother rat to run to her young was measured by the number of times she crossed an electrified grill. Munn claimed that Moss' experiments were not quantitatively significant but that Moss' work was generative of future research in drives and motives.[82]

Two years later, Jenkins, Warner and Warden of Columbia University revised Moss' apparatus, adding a number of mechanical features, and re-named it the Columbia Obstruction Apparatus.[83] The modifications rendered, importantly, individual differences in skin resistance to electrical shock negligible, thus ensuring that each animal received the same 'punishment'. The Columbia apparatus was self-operating, with the observer safely hidden from the view of the animals. Jenkins et. al. also made a number of methodological improvements on Moss' work: animals were tested individually, and the subjects were standardized by age, and by genetic and physiological condition. These modifications lent the Columbia apparatus high retest reliability coefficients. The development of apparatus specific to the presumed isolation of drives, as well as the impressive statistical pedigree of the Columbia apparatus, prompted Calvin Stone to remark in 1942 that the original Moss method and the subsequent Columbia modifications "deserve to stand as important landmarks in the evolution of experimental techniques for the study of animal drives".[84]

Apparatus for Studying General Activity

Revolving-drum technique

First used by biologist Colin C. Stewart at Clark University in 1898, the revolving drum method permitted the researcher to measure the general motor activity of an animal over time periods ranging from days to months.[85] Operating on the same principle as the contemporary 'hamster wheel', the apparatus made use of the subject's (typically a rat's) proclivity to daily periods of running: rats have typically run from one to as many as twenty-seven miles daily on such wheels. By confining the animal's living area to as small a space as possible, the experimenter could obtain a gross record of the subject's level of activity, either by recording the number of revolutions of the wheel, or by measuring the distance traveled. Because early studies using Stewart's apparatus almost universally sought to investigate 'normal' activity, experimental manipulations were minimal: Slonaker used a revolving drum in his 1907 study of the nocturnal activity of white rats at different ages, varying only the level of light exposure his subjects received.[86] Various modifications of the revolving drum apparatus were eventually presented to address measurement problems inherent in Stewart's original design: in 1933 Skinner introduced a revolving drum with a friction brake which caused the wheel to cease revolution shortly after the animal stopped running.[87]

Tambour mounted cage

Originally developed by the German physiologist Szymanski, this method reached American psychologists in 1921 through the research of Curt Richter. The Richter Activity Cage, as the apparatus became known, consisted of a living cage suspended on rubber tambours that were attached to kymographs which recorded the gross motor activity of the caged animal.[88] The cage then became a stabilimeter, and the mechanical records of the animal's motor activity were typically recorded against time markers, thereby providing researchers with accurate records of the animal's activity over time, including cyclic or rhythmic activity. Richter constructed a number of modifications of the tambour-,mounted cage, enabling him to construct records of a variety of his animal subjects' activities, including eating, drinking, burrowing and climbing: by separating food and activity compartments and suspending each on separate tambours, he was able to obtain records of differential activity.[89] Wang's 1923 variant of Richter's apparatus consisted, similarly, of two cage areas: a very small living area and a large rotating wheel. This had the effect of confining all non-food-seeking motor activity to the wheel area.[90] Separate kymograph attachments measured activity in the living area and the activity area. An apparatus designed by Skinner in 1932 provided the researcher with the means to obtain positive evidence of eating activity, including the temporal distribution of food-seeking behavior: a food tray could be

attached to a kymograph that recorded the activity. The door could be closed by the experimenter by means of a bellows in order to introduce feeding delays.[91] Skinner's 1936 modification of the apparatus dispensed single food pellets automatically each time the rat pressed the lever. This is the since widely-used Skinner box, presented in the earlier discussion of puzzle boxes and conditioning apparatus.[92]

Various transducing and inscription devices were used to record the activity of animals: these included the kymograph, the Marey tambour, the electromagnetic signal marker, the seconds pendulum signal marker and the double signals marker.[93] Although these devices do not differ from those used in research with humans, measurement devices form a unique and significant class of apparatus in animal psychology because the advent of these technologies permitted researchers to monitor continually the physical movements of the animal.

Observation Cages

A significant class of apparatus cited in the reports indexed in my analysis consisted of observation cages. These were generally the same as cages intended to house animals, although occasionally features which enhanced the visibility of the animal to the experimenter were introduced. While lacking certain mechanical features of other forms of apparatus, their use is significant as a form of control introduced into studies which otherwise purported to use essentially naturalistic methodologies.

Surgical Methods

While not described in experimental reports as a class of apparatus, but rather as a class of methods borrowed from physiology, zoology and medical science, the incorporation of surgical techniques from another important part of the experimental repertoire of animal psychologists. Watson termed these "Control methods" and introduced them as follows:

> In order thouroughly to control sensory habits it becomes necessary to be able to remove or add stimuli. Besides the normal methods of controlling the stimulating factors in the environment, we have another very serviceable one; that of removing the sense organs not employed specifically in the task set the animal.[94]

Although some attempts were made towards the temporary restriction of animals' sensory functions (such as Inez Dunkelberger's efforts to fit her mice with tiny blindfolds), these were generally abandoned in favour of the more efficient surgical techniques.[95] Watson provided a major innovation in 1907 which would come to define experimental animal research in psychology. He considered his 1907 monograph "Kinaestheic and Organic Sensations" to constitute the introduction of a new research paradigm in animal psychology in which vivisection would be performed on animals which had previously been trained in an association task, in this case, the Hampton Court Maze. Although he acknowledged in a footnote that a 1902 paper by Shepherd Ivory Franz had already presented a virtually identical method, Watson announced with typical grandiosity "Here is, undoubtedly, a

new field for the student of animal psychology; a field which must be worked over from the psychophysical standpoint, in contradistinction to the purely physiological one".[96]

The method reported in this paper consisted of training white rats in a modified Hampton Court maze task (in a virtual replication of the task reported by Small in 1901) and successively removing or lesioning sensory functions in order to address questions about sensory organ processes in the animals studied.[97] Watson admitted to not going far beyond the interpretive scope of Small's earlier work, but he did claim to have made certain minor methodological improvements. These improvements constituted in large part the use of tame animals, which accustomed to laboratory life, were thought to settle into their tasks straight-away without needing time to be familiarized to the laboratory environment or to adjust to the rigors of maze-learning.[98] This would seem to indicate that, by 1907, Watson at least expected the animal as psychological subject to be a sophisticated denizen of the laboratory. Fittingly, the rats in this report are referred to by number, or as "normal" or "defective".

Consistent with Watson's intention to form a synthesis of neurological and psychological experimentation, details of the methods of vivisection are presented alongside the methods and results for the relevant stage of psychological experimentation. In an appendix, Watson considered that the successive, but temporally distributed, elimination of separate sensory functions might allow a source of error into

his conclusions. To address this problem, he performed a final operation in which the eyes, the olfactory bulbs and the vibrissae of a young male rat were simultaneously removed. According to Watson's rather optimistic report, "Naturally recovery was slow with this animal . . . The animal finally recovered and is still alive . . . and in absolutely perfect condition. He shows the same eager curiosity, which is so characteristic of the normal animal".[99] Whether successive or simultaneous, the destruction of sensory functions nevertheless carried the same consequence for the subjects of Watson's research, rendering them essentially and enduringly unsuitable for any other life than that of the laboratory subject.

Miscellaneous apparatus

Rotation apparatus.

Rotational apparatus, such as the Maxwell Rotating Table, consisted of a turntable upon which animals could be restrained and rotated. This apparatus was typically used during and after the first World War to study the effects of rotation on animals' vestibular organs in order to estimate the effects of similar conditions on American Air Force pilots.[100]

Rope and Rope ladders.

Rope ladders were used occasionally as a task in studying learning in rats: this apparatus made use of the rat's tendency to climb.[101] Ropes were also used to suspend food from the ceiling in primate studies designed to test the

subjects' mechanical reasoning abilities.[102] Wolfgang Köhler reported apparatus of this type in his work with primates during World War I, described in *The Mentality of Apes*.[103]

Restraint Apparatus.

This category consists of apparatus designed specifically for the restraint of various types of animals. These were used most frequently in the execution of Pavlovian conditioning experiments. Restraining apparatus formed a small but significant part of the psychologist's complement of tools of control. The construction of much of the apparatus described in the indexed reports tended to enclose the animal during experimentation, making restraint necessary typically only for the administration of medications and anaesthesia.

Stimulus apparatus.

This category consists of apparatus, such as the Monochromatic Light Apparatus, the Selenium Cell apparatus, the Ground Plan Double Spectrometer, and the Apparatus for Obtaining Constant Air Supply, which served to provide accurate and replicable conditioning stimuli.[104] Other stimuli, such as alcohol vapors, odors and chemicals were either administered through feeding or injection, or were administered in anaesthesia chambers. Most of the apparatus in this category does not differ significantly from that used in experimental research with humans.

Some Trends

In examining changes in laboratory apparatus used in early animal psychology, certain trends become evident. These are summarized below, followed by some brief comments regarding their significance: (1) Increased isolation of the animal from other animals, and increased isolation of the animal from the experimenter, (2) a move towards continuous surveillance of the animal, (3) greater limitation placed upon and greater control of animal responses, (4) the mechanization and automization of experimental apparatus, resulting in the mechanization and automization of the experimental animal and the process of experimental observation.

The mechanization of the laboratory environment clearly brought about the mechanization of the laboratory animal, a topic that will be addressed in greater detail in the following chapter. Yerkes' Discrimination Box, incorporating both reward and punishment in a forced-choice dichotomous trajectory, bears a passing resemblance to the rather cruder frames of Thorndike's hand-made puzzle boxes. Watson's Circular Maze with Camera Lucida Attachment, which permitted the experimenter hidden observation of the animal's actions, has its origins in Small's Hampton Court Maze, but bears a greater resemblance, as Wertz has pointed out, to Bentham's Panopticon.[105] Richter's Activity Cage accorded no private space to the animal: freed from the need to be physically present to accomplish the task of observation, the experimenter could ascribe scientific eyes to the Marey

Tambour and kymograph. Indeed, a glance at the names of various common apparatus (Watson, Carr and Blodgett Mazes; the Marey tambour; the Yerkes-Kellogg Double Reflection Apparatus; the Richter cage) might seem to indicate that psychologists were surrendering their identities to the machines they made, while surrendering the animal's identity to a transcription of its actions.[106]

Most researchers indexed in the current content analysis ascribed their technological refinements to the service of their adopted scientific goals of reliability and replicability. The addition of automatized recording devices may have had an explicit origin in the drive to standardize and optimize inherently subjective observational techniques, yet was often accomplished to the convenience of the experimenter. The implicit goal was the erosion of the experimental animal as a private entity with ties to the natural world. This natural world was inaccessible to animal psychologists, who nevertheless were constituents of the class of natural objects that they studied. The elimination of the mental and subsequent concentration on observable behavior justified the construction of psychological knowledge by process of translation. The rolls of inscribed paper printouts represent the transcription of the animal as natural object into animal as psychological object. It seems evident that something was lost in the translation.

The further incorporation of surgical techniques of control of the animal's sensory functions had serious

consequences for animals and, explicitly in the mandate of comparative psychology, their human analogs. This is not simply another case of psychology having adopted the methodologies of physiology: it is of no little significance that Watson referred to surgical manipulation of the animal body as no more than a very serviceable method of *environmental* control. And while behaviorism enjoyed a prolonged and expansive reign over the academic and popular psychological communities, its eventual demise may have been due, in part, to the ultimate consequences it carried for its human subjects.

Notes

1. John B. Watson, Behavior: An Introduction to Comparative Psychology, (New York: Henry Holt & Co., 1914).

2. Norman Munn, Handbook of Psychological Research on the Rat: An Introduction to Animal Psychology, (Boston, MA: Houghton Mifflin, 1950).

3. Donald Dewsbury, Comparative psychology in the twentieth century (Stoudsburg, PA: Hutchinson Ross, 1984); Norman Munn, Handbook of psychological research on the rat: An introduction to animal psychology (Boston, MA: Houghton Mifflin, 1950).

4. Linus Kline, quoted in W. R. Miles, "On the History of Research With Rats and Mazes: A Collection of Notes," Journal of General Psychology 3 (1930): 326.

5. Aside from his methodological challenge, the 24-year-old Thorndike adopted a rather deliberately cocksure tone throughout his dissertation. Shortly before its publication he wrote to his fiancee that "It is fun to write all the stuff up and smite all the hoary scientists hip and thigh. I shall be jumped on unmercifully when this thing gets printed, if I ever raise up the cash to print it." E. L. Thorndike, quoted in G. Jonçich, The Sane Positivist: A Biography of Edward Lee Thorndike (Middletown, CT: Wesleyan University Press, 1968), 146.

6. Although Morgan visited Harvard in 1896, while Thorndike was a student there, Thorndike made no mention of having attended Morgan's lectures. He would have been aware of Morgan's work, however, through William James, and he quoted Morgan extensively in his 1898 dissertation. Henderikus Stam and Tanya Kalmanovitch, "E. L. Thorndike and the origins of animal psychology: On the nature of the animal in psychology," American Psychologist (1998): in press. Furthermore, Boakes claimed that Thorndike's development of the puzzle boxes was directly inspired by specific accounts of the mechanical abilities of cats (in Romanes) and a fox terrier (in Morgan). In Robert Boakes, From Darwin to Behaviorism: Psychology and the Minds of Animals. (Cambridge: Cambridge University Press, 1984): 69.

7. Edward Lee Thorndike, Animal Intelligence: Experimental Studies (New York: Macmillan, 1911).

8. Edward Lee Thorndike, "Animal Intelligence: An Experimental Study of the Associative Processes in Animals," Psychological Monographs 2 (1898): 8.

9. Ibid., 7.

10. Wesley Mills, "The Nature of Animal Intelligence and the Methods of Investigating It," Psychological Review 6 (1899): 274.

11. Watson, Behavior, 94-95.

12. Watson described Bassett's inclined plane box in his 1914 book. Watson, Behavior, 96. Other examples of its use were found in Ulrich (1921c) and Warden (1925).

13. T. C. Ruch, "Preliminary Study of the Ability of the Albino Rat to Discriminate Inclined Planes," Journal of Comparative Psychology 9 (1927): 317-338.

14. Robert M. Yerkes and Serge Morgulis, "The Method of Pawlow in Animal Psychology," Psychological Bulletin 6 (1909): 257-173.

15. B. F. Skinner, "Two Types of Conditioned Reflex and a Pseudo Type," Journal of General Psychology 12 (1934): 66-77.

16. Skinner, "Two Types of Conditioned Reflex," 75.

16. B. F. Skinner, "Drive and Reflex Strength. I. II," Journal of General Psychology 6 (1932): 22-48; B. F. Skinner, "On the Rate of Formation of a Conditioned Reflex," Journal of General Psychology 7 (1932): 274-286; B. F. Skinner, "On the Rate of Extinction of a Conditioned Reflex," Journal of General Psychology 8 (1933): 114-129.

17. B. F. Skinner, "The Effect of the Amount of Conditioning of an Interval of Time Before Reinforcement," Journal of General Psychology 17 (1936): 49-62.

18. M. F. Smith and K. U. Smith, "Thirst-motivated Activity and its Extinction in the Rat," Journal of General Psychology 21 (1939): 89-98.

19. P. Arakelian, "Cyclic Oscillations in the Extinction Behavior of Rats," Journal of General Psychology 21 (1939): 187-202.

20. Munn, 268.

21. M. E. Bitterman, "Thorndike and the Problem of Animal Intelligence," American Psychologist 24 (1969): 445.

22. Yerkes developed a discrimination box for studying the frog in 1903. Robert M. Yerkes, "The Instincts, Habits, and Reactions of the Frog," Psychological Monographs 4 (1903): Whole No. 17. Descriptions of a later form of the discrimination box, developed for studying the dancing mouse, were published by Yerkes in 1907. The 1907 form became the standard model of the discrimination box.

23. A. J. Kinnaman, "Mental Life of Two Macacus Rhesus Monkeys in Captivity - I," American Journal of Psychology 13 (1902): 98-148; A. J. Kinnaman, "Mental Life of Two Macacus Rhesus Monkeys in Captivity - II," American Journal of Psychology, 13 (1902): 173-218.

24. J. P. Porter, "A Preliminary Study of the English Sparrow," American Journal of Psychology 15 (1904): 313-346.

25. R. M. Yerkes, The Dancing Mouse: A Study in Animal Behavior. New York: Macmillan, 1907.

26. R. M. Yerkes and J. D. Dodson, "The Relation of Strength of Stimulus to Rapidity of Habit Formation,"

Journal of Comparative Neurology and Psychology, 18 (1908): 459-482.

27. R. M. Yerkes, "Modifiability of Behavior in its Relation to the Age and Sex of the Dancing Mouse," Journal of Comparative Neurology and Psychology 19 (1909): 238-271.

28. Watson, 61.

29. Ibid., 61-62.

30. Ibid., 87, 90.

31. C. S. Yoakum, "Some Experiments Upon the Behavior of Squirrels," Journal of Comparative Neurology and Psychology 19 (1909): 541-568.

32. D. Moseley, "The Accuracy of the Pecking Response in Chicks," Journal of Comparative Psychology 5 (1925): 177-204.

33. W. T. Shepherd, "Some Mental Processes of the Rhesus Monkey," Psychological Monographs 12 (1909): Whole No. 52.

34. Florence Richardson, "A Study of Sensory Control in the Rat," Psychological Monographs 12 (1909): Whole No. 48.

35. K. S. Lashley, "The Mechanism of Vision: I. A Method for Rapid Analysis of Pattern-Vision in the Rat," Journal of Genetic Psychology 37 (1930): 453-460.

36. R. M. Yerkes, "The Study of Human Behavior," Science 39 (1914): 625-633; C. A. Coburn and R. M. Yerkes, "A Study of the Behavior of the Crow *Corvus americanus* Aud. by the Multiple Choice Method," Journal of Animal Behavior 5

(1915): 75-114; R. M. Yerkes and C. A. Coburn, "A Study of the

Method," Journal of Animal Behavior 5 (1915):185-225.

37. R. M. Yerkes, "The Mental Life of the Monkeys and Apes: A Study of Ideational Behavior," Behavior Monographs 3 (1916): Serial No. 12.

38. George Hamilton, "A Study of Trial and Error Reactions in Mammals," Journal of Animal Behavior 1 (1911): 33-66.

39. Boakes, 1984, p. 153.

40. Additional description taken from Boakes, 155-157.

41. The addition of confinement proved to be frustrating for one subject, Julius. As Yerkes reported, "The new method proved a severe test of the orang utan's patience and perseverance, for he had to work much harder than formerly for his reward, and often became much fatigued before completing the regular series of ten trials. Early in the use of the method, he developed the habit of rolling around from exit door to starting point by a series of somersaults. When especially discouraged he would often bump his head against the floor so hard that I could hear the dull thud" (Yerkes, The Mental Life of the Monkeys, 81).

42. G. V. Hamilton, "A Study of Perseverance Reaction in Primates and Rodents," Behavior Monographs 3 (1916): Serial No. 13.

43. Boakes, 158.

44. Yerkes, The Mental Life of the Monkeys, 9.

45. R. M. Yerkes, "The Mind of a Gorilla. Part III. Memory," Comparative Psychology Monographs 5 (1928): 4.

46. H. C. Bingham, "Selective Transportation by Chimpanzees," Comparative Psychology Monographs 5 (1929): 24.

47. In 1898, Thorndike used books to construct pens and maze-like enclosures which he used for experiments with five of his chicks.

48. W. S. Small, "The Psychic Development of the Rat -- II," American Journal of Psychology 12 (1901): 206-239.

49. C. J. Warner and C. J. Warden, (1927). "The Development of a Standardized Animal Maze," Archives of Psychology 92 (1927): 1-35; quoted in Munn, 255.

50. Munn, 256.

51. In the conclusion to the 1901 paper, Small expressed his "indebtedness to Dr. E. C. Sanford for the initial suggestion" which would seem to indicate that the initial credit for the maze should be attributed to Sanford. (Small, 239).

52. Stewart had been studying the effects of changes in alcohol, diet, and barometric pressure on the behavior of rats in revolving cages. In correspondence with Miles in 1930 he commented: "If anyone wants to know why I changed from wild gray rats to white rats in 1895, let them work with

gray rats for a year" (Stewart quoted in Walter Miles, "On the History of Research With Rats and Mazes: A Collection of Notes," Journal of General Psychology 3 (1930):334).

53. Dewsbury, Comparative Psychology, 53.

54. W. S. Small, "An Experimental Study of the Mental Processes of the Rat," American Journal of Psychology 11 (1901): 135-165.

55. Watson, Behavior, 99-102.

56. E. T. Rickey, "The Thyroid Influence on the Behavior of the White Rat," Comparative Psychology Monographs 2 (1925): 12.

57. F. J. Wertz, "Of Rats and Psychologists: A Study of the History and Meaning of Science," Theory and Psychology 4 (1994): 165-197.

58. W. T. Heron and W. S. Hunter, "Studies of the Reliability of the Problem Box and the Maze in Animal Subjects," Comparative Psychology Monographs 1 (1922): 1.

59. Munn, 256.

60. E. C. Tolman and D. B. Nyswander, "Reliability of Maze-measures for Rats," Journal of Comparative Psychology 7 (1927): 432-450.

61. O. C. Glaser, "The Formation of Habits at High Speed," Journal of Comparative Neurology and Psychology 20 (1910): 178.

62. As discussed in Chapter 2, Mills makes this claim about early animal psychology.

63. Glaser, 178.

64. N. Cameron, "Cerebral Destruction and its Relation to Maze Learning," Psychological Monographs 34 (1928): No. 177.

65. A. S. Alonzo, "The Influence of Manual Guidance Upon Maze Learning," Journal of Comparative Psychology 6 (1926): 143-158.

66. E. M. Ligon, "A Comparative Study of Certain Incentives in the Learning of the White Rat," Comparative Psychology Monographs 6 (1929): 2.

67. W. R. Miles, "The Narrow Path Elevated Maze for Studying Rats," Proceedings of the Society of Experimental Biology and Medicine 24 (1927): 454-456.

68. Shepard's maze is described in N. Cameron, "Cerebral Destruction in its Relation to Maze Learning," Psychological Monographs 39 (1928): 172, 7.

69. E. C. Tolman, R. C. Tyron and L. Jeffress, "A Self-recording Maze With an Automatic Delivery Table," University of California Publications in Psychology 4 (1929): 99-112.

70. R. C. Tyron, "Studies in Individual Differences in Maze Ability. I. The Measurement of the Reliability of Individual Differences," Journal of Comparative Psychology, 11 (1930): 145-170.

71. J. Buel, "Some Improvements in a "Self-recording Maze With an Automatic Delivery Table"," Journal of General Psychology 6 (1932): 483-492.

72. Munn, 256-258.

73. The given sequence for a maze was denoted in the literature by lowercase italicized letters 'l' and 'r', corresponding to left and right turns respectively.

74. Munn, 182.

75. W. S. Hunter, "Kinaesthetic Sensory Processes in the White Rat," Psychological Bulletin 15 (1918): 36.

76. W. S. Hunter, "A Tridimensional Maze," Journal of General Psychology 2 (1929): 130-134.

77. W. S. Hunter and J. W. Nagge, "The White Rat and the Double Alternation Temporal Maze," Journal of Genetic Psychology 39 (1931): 303-319.

78. W. S. Hunter, "The Delayed Reaction in Animals and Children," Behavior Monographs 2 (1913): 16.

79. F. McCord, "The Delayed Reaction and Memory in Rats. I. Length of Delay," Journal of Comparative Psychology 27 (1939): 1-37.

80. F. A. Moss, "Study of Animal Drives," Journal of Experimental Psychology 7 (1924): 165-185.

81. Munn, 85.

82. R. N. Jenkins, L. H. Warner and C. J. Warden, "Standard Apparatus for the Study of Animal Motivation," Journal of Comparative Psychology 6 (1926): 361-382.

83. C. P. Stone, "Maturation" and "Instinctive Functions and Motivation" in Moss, F. A. Ed., Comparative Psychology. Rev. Ed., (New York: Prentice Hall, 1942): 32-97. Quoted in Munn, 85.

84. C. C. Stewart, "Variations in Daily Activity Produced by Alcohol and by Changes in Barometric Pressure and Diet, With a Description of Recording Methods," American Journal of Physiology 1 (1898): 40-56.

85. J. P. Slonaker, "The Normal Activity of the White Rat at Different Ages," Journal of Comparative Neurology and Psychology 17 (1907): 342-359.

86. B. F. Skinner, "The Measurement of "Spontaneous Activity"," Journal of General Psychology 9 (1933): 3-23.

87. C. P. Richter, "A Behavioristic Study of the Activity of the Rat," Comparative Psychology Monographs 1 (1922): 2.

88. Ibid.

89. G. H. Wang, "The Relation Between 'Spontaneous' Activity and Oestrus Cycle in the Female White Rat," Comparative Psychology Monographs 2 (1923): 6.

90. B. F. Skinner, "Drive and Reflex Strength, I. and II.," Journal of General Psychology 6 (1932): 22-48; B. F.

Skinner, "On the Rate of the Formation of a Conditioned Reflex," Journal of General Psychology 7 (1932): 274-286; B. F. Skinner, "On the Rate of Extinction of a Conditioned Reflex." Journal of General Psychology 8 (1933): 114-129.

91. B. F. Skinner, "The Effect on the Amount of Conditioning of an Interval of Time Before Reinforcement," Journal of General Psychology 17 (1936): 49-62.

92. J. B. Watson, "The Conditioned Reflex in Psychology," Psychological Review 23 (1916): 89-116.

93. Watson, Behavior, 69

94. Inez Dunkelberger, "Spiral Movement in Mice," Journal of Comparative Psychology 6 (1926): 383-390.

95. J. B. Watson, "Kinaestheic and Organic Sensations: Their Role in the Reactions of the White Rat to the Maze," Psychological Monographs 7 (1907): No. 33.

96. A public outcry that followed the presentation of this study at the American Association for the Advancement of Science in 1906: Dewsbury has described this event as well as the broader historical context of anti-vivisectionist critiques of psychology. See Donald Dewsbury, "Early Interactions Between Animal Psychologists and Animal Activists and the Founding of the APA Committee on Precautions in Animal Experimentation," American Psychologist 45 (1990): 315-327.

97. Watson, Kinaesthetic and Organic Sensations, 4.

98. Ibid., 98.

99. For example, see F. S. Fearing, "Post-rotational Head Nystagmus in Adult Pigeons," Journal of Comparative Psychology 6 (1926): 115-132.

100. J. L. Ulrich, "Integration of Movements in Learning in the Albino Rat. A Study of the Adjustment of an Organism to an Environment," Journal of Comparative Psychology 1 (1921): 1-19.

101. H. C. Bingham, "Selective transportation by chimpanzees. Comparative Psychology Monographs 1 (1929): 26.

102. Wolfgang Köhler, The Mentality of Apes, (New York: Harcourt Brace, 1925).

103. Watson, Behavior, 70-90.

104. Bentham's architectural design for a cylindrical prison, the Panopticon, permitted constant observation of inmates from an inner tower, As described by Michel Foucalt, each prisoner becomes an actor "alone, perfectly individualized and constantly visible". Quoted in Wertz, 165-197.

105. A somewhat more contemporary comparative psychologist poked fun at the nomenclature of psychological apparatus: "Some day, if I can, I'm going to join the illustrious by patenting the tree as the Menzel Jumping Stand, the river as Menzel's Obstruction Apparatus, and the jungle as the Delta Primate Center General Test Apparatus".

E. W. Menzel, "Naturalistic and Experimental Research on Primates," Human Development 10 (1967): 171.

CHAPTER FIVE

Animals and Machines

The Evolution of the Experimental Animal

In the opening chapter of *Origin of the Species*, Darwin claimed that the process of domestication constitutes an appropriation by humans of a process which goes on in nature: domestication is a deliberate and accelerated form of selection in which certain characteristics are promoted and others discarded. The transition of animal as object of natural study to animal as object of psychological investigation involved just such a process, resulting in a biological restructuring of the animal. A further consequence was the creation of not only a new class of psychological subjects, animals, but also a unique kind of animal; the domesticated laboratory animal. By 1940 animal psychologists had accomplished the evolution of a highly selected and specialized animal which was suitable for a single purpose: the creation and justification of the knowledge claims of experimental psychology.

The case of the animal in experimental psychology furthermore represents a unique case in the relationship of science, humans and nature. The role of the animal subject in psychological investigations differed fundamentally from the roles of animal subjects of the preexisting models of naturalistic, physiological and zoological investigation.

Only the animal subject of psychological experimentation was required to comply on an ongoing basis with the demands of the experimenter. Animals were therefore enjoined by psychologists to occupy an increasingly mechanized and artificial environment where reward and punishment were used to induce desired actions in order to obtain desired results.

The evolution of the animal as experimental object was gradual, but the change in location of study, from the natural or quasi-natural context of naturalistic investigation, to the psychological laboratory, has been demonstrated to have occurred with the publication of Thorndike's doctoral dissertation in 1898. The move to the laboratory effected the essential first step towards the evolution of a biologically and rhetorically 'psychological' animal. The move away from the anthropomorphism of anecdotal research, and the emphasis upon objective, mechanized methods of collecting data, would further conceal an essential relationship between the animal and the experimenter.

Thorndike's research, in effect, inaugurated a new set of relationships between the psychologist and the animal in the creation of the field of experimental animal psychology. Not only the application of an experimental method, and not simply a precursor of behaviorism, Thorndike's work led to the production of a convention that treats animals as abstract devices for introducing many of the concepts that were to become common in human psychology. That is, animals

became organisms of convenience upon which psychologists could script a variety of processes that were made 'visible' in ways that were not possible with human beings. The notion that Thorndike's work, and the work of experimental animal psychologists in general, overcame anecdotalism, anthropomorphism and introspectionism has been used by psychologists as a 'myth of origin'. However, in the creation of a new technology of experimentation and in the concern with standardization, the methods and explanations of animal psychology came to replace anthropomorphism with mechanomorphism and theriomorphism (hereafter mechanicotheriomorphism). Mechanomorphism is the exclusive attribution of mechanistic principles to psychological phenomena[1] whereas theriomorphism is the attribution of the qualities of nonhuman animals to human beings.[2] By mechanicotheriomorphism I mean the ascription of mechanical properties to phenomena that are psychological in nature in nonhuman animals and that is subsequently used to explain human psychological phenomena (for example, instinct and habit).[3]

A Case Study: The Albino Rat

There are numerous stories about the relationships of animals and psychology: Donna Haraway, for example, has constructed a detailed critical account of Yerkes' primate research program.[4] Animals have served over the course of a century as the site of theoretical, moral and disciplinary

controversy. But just as the development, in the 1930s, of an explicit set of theoretical and methodological tenets served to advance behaviorism to a position of institutional and disciplinary dominance in North American psychology, so did the development of the albino rat as a standardized laboratory animal serve a critical role in defining and justifying the claims of behaviorism. The rat was the first animal to be standardized as a tool for laboratory: this animal came to be the foremost citizen of not only animal psychology, but of psychology as a whole. The story of the transformation of the rat from pest to primary subject illustrates the manner in which the interests of industry, institutions and academia converged upon the body of the rat.

Contrary to Dewsbury's claims[5], my research has demonstrated the rat to be the most prominent citizen of the community of psychological subjects in the first part of this century. In the current content analysis, the rat accounted for over 59% of all species animals studied. Beach saw danger in this in 1949 and attempted alert his colleagues with the "Snark" paper discussed in Chapter Three.[6] Drawing a rather protracted analogy to Lewis Carroll's whimsical poem, "The Hunting of the Snark", Beach compared the comparative psychologist to the member of Carroll's fictional hunting party who sought the wrong beast: "Instead of animals in a general sense he found one animal, the albino rat, and thereupon the Comparative Psychologist suddenly and softly

vanished away".[7] Beach attributed the rapid ascendancy of the rat to "historical accident", speculating that the story had gone something like this:

> Someone, I believe it was W. S. Small at Clark University in 1899, happened to use white rats in a semi-experimental study. The species "caught on," so to speak, as a laboratory subject, and gradually displaced other organisms that were being examined. Psychologists soon discovered that rats are hardy, cheap, easy to rear, and well adapted to a laboratory existence. Because of certain resemblances between the associative learning of rats and human beings, *Rattus norvegicus* soon came to be accepted as a substitute for *Homo sapiens* in many psychological investigations. Lack of acquaintance with the behavioral potentialities of other animal species and rapid increase in the body of data derived from rat studies combined to progressively reduce the amount of attention paid to other mammals, to sub-mammalian vertebrates and to invertebrate organisms. Today the trend has reached a point where the average graduate student who intends to do a thesis problem with animal turns automatically to the white rat as his experimental subject; and all to often his professor is unable to suggest any alternative.[8]

His rather excessive rhetoric aside, Beach's account of the ascendancy of the rat is inaccurate in several respects. First, the utility of the rat as a laboratory subjects had been established prior to Small's 1899 publication. As Miles demonstrated in a brief collection of correspondence with early comparative psychologists published in 1930, Colin C. Stewart was generally acknowledged by his colleagues as being the first to use the rat, beginning in 1894, in his biological studies at Clark University. Stewart attributed his switch from grey to white rats a year later to practical reasons of ease of handling.[9] Small's choice of rats was influenced by prior experience with the animals while a

student at Clark University. Among other reasons stated for choosing the rat, he admitted to having "developed a liking for the animal".[10]

Second, the use of the rat did not simply "catch on": efforts to promote the use of the white rat as a standard laboratory subject in biological research were underway at Chicago University by 1897. Henry Donaldson had traced his first exposure to the albino rat to 1893, in a neuroanaotmy class taught by Adolf Meyer in Chicago.[11] In correspondence with Miles, Meyer wrote that he had later "urged Donaldson to make the white rat the standard animal (May, 1897), and furnished him with a large lot, handled by Hardesty."[12]. Irving Hardesty recalled that Henry Donaldson used the animals that Meyer sent to him at Chicago University to begin a colony, later to be developed with Donaldson's participation, into the famed Wistar colony. While at Chicago University, Watson developed a research programme using white rats and mazes: the papers published between 1901 and 1908 further served to establish the use of the albino rat as a psychological subject.

Watson's 1907 and 1908 research galvanized the small community of researchers in experimental animal psychology: although his 'manifesto' would not come until 1913, all of the pieces were well in place in the 1907 paper. The study of behavior, in any event, was widespread before the onset of Watsonisn behaviorism, although, as I have demonstrated

earlier, there exists a necessary distinction between objectivism and behaviorism. This represents a third manner in which Beach's account is incomplete. As Munn stated in 1950, "General acceptance of the white rat as an animal for behavior research has gone hand in hand with an increasing appreciation of the value and systematic significance of behavior studies in general."[13] And as Wertz has pointed out, studies of rat learning did not become "the prime target" for animal psychology by accident, "for learning was synonymous with environmentally controlled behavior, which was the obsession of the behaviorist school of psychology."[14] While the rat was promoted as a useful subject for behavioral research, behaviorism was gaining ground in American psychology. The goal of behaviorism, explicit or otherwise, was nothing short of the control of human behavior. As I argued in Chapter Two, the advent of Watsonian behaviorism presented a compelling reason for the use of animals: animals were an ideal testing ground for a science of human control, a blank slate upon which psychologists could draft their theories of what should constitute a human psychology. Although animals served only a limited practical purpose in the early experimental science of the turn of the century, an environmental behaviorism such as Watson's would employ them to great effect.

Finally, the ascendancy in earnest of use of albino rats can be demonstrated to occur contemporaneously with the mass commercial production and distribution of the highly selected Wistar strain of laboratory rats. The Wistar Institute of Philadelphia, PA distributed its animals from 1906 though the 1940s: by 1931 the Wistar Rat was in service worldwide in laboratories as far away as China and Japan. The Wistar Rat fast became the standard for laboratory animals because it was engineered with the goal of promoting and, moreover, standardizing those characteristics which would allow it to serve the needs of experimenters. In a 1993 paper describing the history of the Wistar Institute, Bonnie Clause has claimed that the preeminence of the Wistar Rat can be attributed not only to effective standardization of its animals, but also to the clearly articulated mission of the Institute's Director, Milton Greenman: researchers came to possess 'brand awareness' as a result of an astutely engineered mass production and marketing strategy.

The Wistar Institute was founded by General Wistar in 1892 to honour the legacy of a prominent physician and family member, Caspar Wistar, MD. Originally founded as a museum of anatomy and biology, its mission also included, broadly put, a mandate to support original research. Dissatisfied by 1905 with the progress of the Institute towards this second goal, General Wistar promoted the assistant director of the Institute, biologist Milton Greenman, to director. Greenman

therefore was interested in promoting the Wistar Institute as a preeminent anatomical institute which would be of indispensable service to science. Greenman's goal was therefore to "resurrect a small, independent institution and to insure its survival in a time of change in the biological sciences."[15] The Wistar Rat became the means by which Greenman would achieve the goal of enhancing the Institute's reputation: the application of basic principles of industry and economy resulted in widespread recognition of the Institute, and its primary commercial product, the laboratory rat. Inspired by the impact of the development of a standardized screw thread system (which became critical to the construction of the United States Railroad and which came to represent a significant advance in mass production and international industry, as well as significant profit) Greenman self-consciously drafted plans for the rat as a commercial tool to be marketed to biological and behavioral scientists. Commercial rights to the name were secured and, on more than one occasion, defended, and Wistar became identified as "the quintessential brand of rodents."[16]

Henry Donaldson's involvement with the Wistar Institute lent further credibility to the commercial product. Over the course of his first ten years as a research director for the Institute, he compiled a massive amount of anatomical, physiological and neurological data on the rat. The 1915

publication of *The Rat: Data and Reference Tables for the Albino Rat and the Norway Rat* represented a significant step towards the recognition of the utility of the rat as a standardized animal. Donaldson's publication was unprecedented in its scope and detail: nowhere before had such data been collected in such detail for any animal. Full-page advertisements for *The Rat* were placed, free of charge, in each of the Wistar Institute's five biological journals, further ensuring that the Wistar name reached laboratories worldwide. Association with Donaldson's prestigious name further lent credibility to the Institute: Clause suggests that "it is logical to assume that this "celebrity endorsement" was yet another contributory factor in the growing repute of the Wistar Rat."[17]

The Wistar story therefore demonstrates another transition in the status of the animal: from object to investigation to a marketable commercial product capable of generating profit. The goals of profit and service to science are difficult to separate: the rat served both aims admirably. Clause has summarized the story as follows:

> The widespread use of the Wistar Rats. . . is a function of the ingenuity of Milton Greenman who saw in them a way for a small institution to provide service to science. Greenman's rhetoric... shows that he was unusually sensitive to his times and the economics of science and of society. In the era when biology was being defined, he recognized in the rat the potential to be a living analog to the pure chemicals that legitimate experimental science. From management literature he extracted the ideals of uniformity of product, standards of quality, and efficiency of production, applying them to scientific practice to generate an animal model that

> thrives as standard equipment in laboratories throughout the world today.[18]

"Bewitched Princes" and "Overgrown Rats"

Beach was largely concerned with the notion that a psychology of the Norway rat could in no way be considered 'comparative'. By the time of the publication of Beach's paper, however, the early promises of comparative psychology had largely given way to the less cohesive interests of an animal psychology, which in turn were focused in behaviorism, versions of which would preoccupy experimental psychologists for some decades to come. The aims of a truly 'comparative' psychology were no longer of interest to the majority of psychologists; the Europeen ethological tradition kept these alive. American comparative psychology did persist, albeit in a diminished form, under Beach's leadership.[19]

By the 1920s, psychologists had effected a clear delineation between albino rats and wild rats. This is evidenced rhetorically in the case of a 1920 experimental report by Dashiell. Dashiell had noted that the eighth trial of his tests displayed irregular records which were inconsistent with the records from previous trials, as well as previous experience with the animals involved. He wrote:

> It was soon after discovered that wild gray rats had lately found their way into the building where the experiments were being conducted and had even left their trail in the mazes.
>
> The exact form and degree of disturbance produced in the white rats by the presence of the gray pests is a thing yet to be made out in precise terms, but that

> there is a general disturbance produced seems unquestionable from the writer's observations. It may be mentioned incidentally that before the gray rats had been completely disposed of a few of them had forced their way into nests of the white rats, wounding or killing some of the inmates. [20]

The rhetorical distinction between white rats and gray rats is clear: the albinos are referred to throughout as animals, as subjects, and in the special case quoted above, as inmates, whereas the wild grey rats are referred to as pests. Dashiell's report demonstrates that the by 1920 the rat had been transformed from pest to servant of science. The rat as psychological subject was shorn from its natural history. As "inmates" of the laboratory Dashiell's rats were seemingly inadequate to the task of mounting a defense against wild rats. The laboratory rat is evidenced to be a completely different organism from the wild rat.

In enumerating the virtues of the albino rat as psychological subject, researchers have tended to emphasize the following points, as in this example from Munn: "It is small, clean, easy to house and handle, and inexpensive to maintain. It's docility and general adaptivity to environmental conditions make it a good subject for studies of learning and activity."[21] Munn also stressed the advantage of the fecundity of the rat: its relatively brief gestational cycle allows for large numbers of offspring, and for the genetic control of successive generations of animal subjects. This is all to say that rats have proved an ideal species for the selection of those behavioral characteristics which would

be favourable to laboratory experimentation. These included docility, and adaptivity, as well as biological characteristics such as hardiness which were not reliably present in wild animals. The traits that researchers have praised most have been engineered in the albino rat by a deliberate process of domestication. The laboratory rat came to occupy a specific ecological niche, that of the psychological laboratory, in which there was no direct competition for resources, and no mechanism of selection other than those imposed by experimenters' requirements.

The rat was so quickly and wholeheartedly endorsed as the standard subject of experimental psychology, that it became an enduring disciplinary mascot.[22] Furthermore, as behaviorism became the dominant research paradigm in American psychology, the rat began to displace humans as the chief subject of psychological research. In 1924 Donaldson wrote that "In enumerating the qualifications of the rat as a laboratory animal, and in pointing out some of its similarities to man, it is not intended to convey that the rat is a bewitched prince or that man is an overgrown rat. . . . [but] that in some instances. . .the results obtained with one form can be very precisely transferred to the other."[23] In 1938, Tolman claimed that "everything important in psychology (except such matters as the building of a super-ego, that is everything save such matters as involve society and words) can be investigated in essence through the

continued and theoretical analysis of the determiners of rat behavior at a choice-point in the maze."[24] In 1950 Munn claimed the rat subject to be superior in many respects to human subjects: "Where it is possible to control the daily economy of an organism from birth until death, and where one need not contend with ambiguous language responses, techniques of observation can approximate great accuracy."[25] In one respect, Beach's account of the history of the rat in psychology was accurate: once the rat became an organism of supreme convenience, few researchers thought to look elsewhere for animal subjects. The albino rat was readily available, effectively marketed, were not used as pets, did not constitute a 'food source', and retained just enough of its cultural history as pest to escape the protection of the anti-vivisectionist movement.

Machines

Much as the albino rat has been demonstrated to have been selected to the point of mechanization, so were the mechanical features of the animals' laboratory environment selected to maximize experimental control. The course of research in animal psychology from the turn of the century until the second World War saw a good deal of attention paid to the construction of ever more elaborate pieces of apparatus.[26] The increasing mechanization of the experimental processes of testing, recording and analyzing had its clear beginnings in the 1898 doctoral dissertation of Thorndike,

and reached elaborate heights in such constructions as Tolman, Tyron and Jeffress' 1927 Automatic T-maze, and the Columbia Obstruction Apparatus. The design of physical environments which would induce animals to desired actions became of great importance, because it was through the relentless mechanizing of the animal's physical environment that an animal with an evolutionary history might be transformed into a scientific tool. Apparatus was the ultimate unit of control: for where even the rigorous standardization of the albino rat could not erase individual differences, a sufficiently mechanized apparatus could result in a mechanized animal. The animal psychologist of the 1930s was no longer interested in animals, but rather was interested in a convenient manner of finding what one sought (in many ways, an anti-scientific pose).

In "A Case History in Scientific Method", B. F. Skinner presented an account of his own history as a experimenter. He elaborated the development of several pieces of apparatus in a rather light-hearted manner, emphasizing throughout the role of chance, luck and serendipity in shaping the course of research. A read though his accounts of the development of apparatus for studying conditioning indicates that convenience itself, in large part, determined not only the development of specific pieces of apparatus, but indeed shaped the nature and content of his theoretical structures. The second of the several "unformalized principles of

scientific practice" presented in the paper reads, simply, "some ways of doing research are easier than others".[27] This is evidenced in several examples, leading to the development of the now-famous "Skinner Box", described in Chapter Three. The quotes from Skinner, below, demonstrate the importance of the experimenter's convenience and comfort in constructing laboratory apparatus:

> I got tired of carrying the rat back to the other end of the runway. A back alley was therefore added. . .Now the rat could eat a bit of mash at point C, go down the back alley A, around the end as shown, and back home by runway B. The experimenter at E, could collect records from the kymograph at D in comfort.[28]
>
> . . .as the second principle came into play again, I saw no reason why the rat could not deliver its own reinforcement. A new apparatus was built.[29]
>
> The rat had to only to complete its journey by coming down the home stretch B to enjoy its reward. The experimenter was able to enjoy *his* reward at the same time, for he had only to load the magazine, put in a rat, and relax.[30]

Other chance incidences shaped the developments of the method: he obtained an extinction curve when the food magazine jammed, and eventually removed the food magazine altogether (hence the fourth principle "apparatus sometimes breaks down").[31] Realizing one day that his supply of food pellets was low, and being unwilling to spend the rest of the day at the task of making pellets "led [him] to apply our second principle of unformalized scientific method and to ask myself why *every* press of the lever had to be reinforced."[32] This was, in theoretical terms, the first experimental use of fixed ratio reinforcement.

Skinner's accounts of the automization of the process of experimentation demonstrate that, at least in some cases, consideration of the experimenter's convenience played a significant role in determining the nature of the laboratory animal's experience. That for some time, the primary goal of experimental control seemed to elide with the experimenters' convenience, is not necessarily coincidental.

The development of multiple means of mechanizing the animal allowed a generation of psychologists to ignore the evolutionary history of the animal. The consequence of ever-increasing levels of automization and ever-increasing levels of control over animals' behavior was to eventually become a stale-mate between theory and technology: as Skinner wrote in 1959, "When we have achieved a practical control over the organism, theories of behavior lose their point."[33] Indeed, Skinner claims that in such research, the animal most effectively controlled is the experimenter.[34] Bound by methods of convenience and tied to the manipulation of predictable outcomes, the experimenter and the animal are strangely united in the grip of control.

In an excerpt from Skinner's fantasy novel *Walden Two*, the character Frazier (who Skinner admits, "said many things which I was not yet ready to say myself") describes his coming to terms with his desire for control. Frazier says:

> I've had only one idea in my life -- a true idee fixe. . . to put it as bluntly as possible the idea of having my own way. "Control" expresses it, I think. The control of human behaviors, Burris. In my early

> experimental days it was a frenzied, selfish desire to dominate. I remember the rage I used to feel when a prediction went awry. I could have shouted at the subjects of my experiments, "Behave, damn you, behave as you ought!" Eventually I realized that the subjects were always right. They always behave as they ought. I had made a bad prediction. And what a strange discovery for a would-be tyrant, that the only effective technique of control is unselfish.[35]

My claim is that the consequence of having ultimately achieved great degrees of experimental control of the animal subject, was inevitably the control of the experimenter. Psychologists unwittingly wrote themselves out of the script of experimental animal psychology. Animals had provided a body upon which mechanistic models could be inscribed and from which inferences could be drawn about human beings (i.e. mechanotheriomorphism). A science which had built itself upon the foundation of animals floundered once the animal body was rendered equivalent to the machines built to test it, for the ultimate consequence of a mechanicotheriomorphistic psychology is the mechanization of the human animal.

Notes

1. Horace B. English & Ada V. English, A Comprehensive Dictionary of Psychological and Psychoanalytical Terms: A Guide to Usage (London: Longmans, Green and Co., 1948) 313..

2. Ibid., 552-553.

3. H. Stam and T. Kalmanovitch, 3-4.

4. Donna Haraway, Primate Visions: Gender, Race and Nature in the World of Modern Science, New York: Routledge (1989).

5. Donald Dewsbury, Another Look at the Snark (1997).

6. Frank Beach, "The Snark Was a Boojum", American Psychologist, 5 (1950): 120.

7. Beach, 115.

8. Beach, 119-120.

9. "At [Dr. Hodge's] suggestion the wild gray rat was used as the experimental animal. The difficulty in handling the gray rats (1894-95) was the reason for changing to albino rats for the remaining two years of my stay at Clark (1895-1897). No one was in any way associated with me in the animal activity work. There were no white rats in the department before 1895, and there were none but those employed in my experiments during the years 1895-1897. . . Albino rats were on sale in bird and animal stores and I know that I purchased some in Worcester" (Stewart, in Miles, 1930).

10. Small, in Miles, 332.

11. Henry H. Donaldson, "Research at The Wistar Institute, 1905-1925,: Bulletin of the Wistar Institute 6 (1925), 44, quoted in Bonnie Clause, 336.

12. Adolf Meyer, in Miles, 334.

13. Norman Munn, "Handbook of Psychological Research on the Rat", 1950: 4.

14. Frederick Wertz, "Of Rats and Psychologists: A Study in the History and Meaning of Science," Theory and Psychology 4 (1994): 181.

15. Bonnie Clause,. "The Wistar Rat as a Right Choice: Establishing Mammalian Standards and the Ideal of a Standardized Mammal", Journal of the History of Biology 26 (1993): 332.

16. Clause, 331.

17. Ibid., 435.

18. Ibid., 348-349.

19. Hilgard, "Frank A, Beach", in Psychology in America: A Historical Survey, New York: Harcourt Brace Jovanovich (1987): 415.

20. J. A. Dashiell, "Some Transfer Factors in Maze Learning by the White Rat", Psychobiology 2 (1920): 335-336.

21. Munn, 4.

22. Wertz draws attention to a contemporary use of the rat as mascot: "In the January 1986 APA Monitor, the American

Psychological Association celebrated the newspaper's 15th anniversary. On the front page of the publication stands an exuberant rat wearing a party hat carelessly drinking champagne and blowing a party horn. . . there is something incongruous about this white rat in party gear; there is something disturbing about the relationship between psychologists and their mascots." Wertz, p, 165.

23. Donaldson, 1924, xiv.

24. Edward Tolman, "The Determiners of Behavior at a Choice-Point", Psychological Review 45 (1938): 34.

25. Munn, 5.

26. In seeming contrast, the 1930 Stoelting catalog of psychological apparatus listed no apparatus exclusive to animal study. This may be due to a relatively lower commercial value of such apparatus, as it would not be widely used in other applications such as scholastic testing.

27. Burrhus F. Skinner, "A Case History in Scientific Method", 364.

28. Skinner, 364-65.

29. Ibid., 365.

30. Ibid.

31. Ibid., 367.

32. Ibid., 368.

33. Skinner, 375.

34. Skinner, 378.

35. Ibid.

BIBLIOGRAPHY

Alonzo, A. S. "The Influence of Manual Guidance Upon Maze Learning." Journal of Comparative Psychology 6 (1926): 143-158.

Announcement to subscribers. Journal of Animal Behavior 7, (1917): 385.

Arakelian, P. "Cyclic Oscillations in the Extinction Behavior of Rats." Journal of General Psychology 21 (1939): 187-202.

Beach, Frank. "The Snark Was a Boojum." American Psychologist 5 (1950): 115-124.

Bingham, H. C. (1929). "Selective Transportation by Chimpanzees." Comparative Psychology Monographs 5 (1929): 24.

Bitterman, M. E. "Thorndike and the Problem of Animal Intelligence." American Psychologist 24 (1969): 444-453

Boakes, Robert. From Darwin to Behaviorism: Psychology and the Minds of Animals. Cambridge: Cambridge University Press, 1984.

Buel, J. "Some Improvements in a "Self-recording Maze With an Automatic Delivery Table"." Journal of General Psychology 6 (1932): 483-492.

Cameron, N. "Cerebral Destruction and its Relation to Maze Learning." Psychological Monographs 34 (1928): No. 177.

Clause, Bonnie. "The Wistar Rat as a Right Choice: Establishing Mammalian Standards and the Ideal of a Standardized Mammal." Journal of the History of Biology 26 (1993): 329-349.

Coburn, C. A. and R. M. Yerkes. "A Study of the Behavior of the Crow *Corvus americanus* Aud. by the Multiple Choice Method." Journal of Animal Behavior 5 (1915): 75-114.

Danziger, Kurt. "Does the History of Psychology Have a Future?" Theory and Psychology 4 (1994): 467-484.

Danziger, Kurt. Constructing the Subject: Historical Origins of Psychological Research. Cambridge, England: Cambirdge University Press, 1990.

Dashiell, J. A. "Some Transfer Factors in Maze Learning by the White Rat." Psychobiology 2 (1920): 329-350.

Dewsbury, Donald. "Comparative Psychology in the Journals: Another Look at the Snark." MS. Paper resented at Cheiron, Animal Behavior Society, 1997.

Dewsbury, Donald. "Early Interactions Between Animal Psychologists and Animal Activists and the Founding of the APA Committee on Precautions in Animal Experimentation," American Psychologist 45 (1990): 315-327.

Dewsbury, Donald. Comparative Psychology in the Twentieth Century. Stroudsburg, PA: Hutchinson Ross, 1984.

Dunkelberger, Inez. "Spiral Movement in Mice." Journal of Comparative Psychology 6 (1926): 383-390.

English, Horace B. & Ada V. Engilsh. A Comprehenmsive Disctionary of Psychological and Psychoanalytical Terms: A Guide to Usage. London: Longmans, Green and Co., 1948.

Fearing, F. S. "Post-rotational Head Nystagmus in Adult Pigeons." Journal of Comparative Psychology 6 (1926): 115-132.

Glaser, O. C. "The Formation of Habits at High Speed." Journal of Comparative Neurology and Psychology 20 (1910): 165-184.

Hamilton, G. V. "A Study of Perseverance Reaction in Primates and Rodents." Behavior Monographs 3 (1916): Serial No. 13.

Hamilton, G. V. "A Study of Trial and Error Reactions in Mammals." Journal of Animal Behavior 1 (1911): 33-66.

Haraway, Donna. Primate Visions: Gender, Race and Nature in the World of Modern Science. New York: Routledge, 1989.

Herbert Spencer, Principles of Psychology, 1st Edition, (London: Longman, 1855), quoted in Robert Boakes, From Darwin to Behaviorism: Psychology and the Minds of Animals (Cambridge, England: Cambridge University Press, 1984), 10.

Heron, W. T. and W. S. Hunter. "Studies of the Reliability of the Problem Box and the Maze in Animal Subjects." Comparative Psychology Monographs 1 (1922): 1.

Hull, Clark L. "The Problem of Intervening Variables in Molar Behavior Theory." Psychological Review 50 (1943): 273-288.

Hunter, W. S. "A Tridimensional Maze." Journal of General Psychology 2 (1929): 130-134.

Hunter, W. S. "Kinaesthetic Sensory Processes in the White Rat." Psychological Bulletin 15 (1918): 36.

Hunter, W. S. "The Delayed Reaction in Animals and Children." Behavior Monographs 2 (1913): 16.

Hunter, W. S. and J. W. Nagge. "The White Rat and the Double Psychology 39 (1931): 303-319.

Jenkins, K. On "What is History?" New York: Routledge, 1995.

Jenkins, R. N., Warner, L. H. and C. J. Warden. "Standard Apparatus for the Study of Animal Motivation." Journal of Comparative Psychology 6 (1926): 361-382.

Jonçich, G. The Sane Positivist: A Biography of Edward Lee Thorndike. Middletown, CT: Wesleyan University Press, 1968.

Kinnaman, A. J. "Mental Life of Two Macacus Rhesus Monkeys in Captivity - I." American Journal of Psychology 13 (1902): 98-148.

Kinnaman, A. J. "Mental Life of Two Macacus Rhesus Monkeys in Captivity - II." American Journal of Psychology 13 (1902): 173-218.

Kline, Linus. "Methods in Animal Psychology." American Journal of Psychology 10 (1899): 398-430.

Köhler, Wolfgang. The Mentality of Apes, New York: Harcourt Brace, 1925.

Lashley, K. S. "The Mechanism of Vision: I. A Method for Rapid Analysis of Pattern-Vision in the Rat." Journal of Genetic Psychology 37 (1930): 453-460.

Latour, Bruno. We Have Never Been Modern, Trans. Catherine Porter. Cambridge, MA: Harvard University Press, 1991.

Leahey, Thomas H. A History of Psychology: Main Currents in Psychological Thought. 2nd ed. Englewood Cliffs, NJ: Prentice Hall, 1987.

Leary, David. "Telling Likely Stories: The Rhetoric of the New Psychology, 1880-1920." Journal of the History of the Behavioral Sciences 23 (1987): 315-332.

Ligon, E. M. "A Comparative Study of Certain Incentives in the Learning of the White Rat." Comparative Psychology Monographs 6 (1929): 2.

McCord, F. "The Delayed Reaction and Memory in Rats. I. Length of Delay." Journal of Comparative Psychology 27 (1939): 1-37.

Miles, Walter R. "The Narrow Path Elevated Maze for Studying Rats." Proceedings of the Society of Experimental Biology and Medicine 24 (1927): 454-456.

Miles, Walter. R. "On the History of Research With Rats and Mazes: A Collection of Notes." Journal of General Psychology 3 (1930): 324-337.

Mills, John A. "Early American Comparative Psychology: A chapter from a Forthcoming Book on the History of Empirical Research in American Psychology." MS, 1997.

Mills, John A. Control: A History of Behavioral Psychology. New York: New York University Press, in press.

Mills, Wesley. "Some Aspects of the Development of Comparative Psychology." Science 19 (1904): 745-757.

Mills, Wesley. "The Nature of Animal Intelligence and the Methods of Investigating It." Psychological Review 6, (1899): 262-274..

Morawski, Jill. "Self-regard and Other-regard: Reflexive Practices in American Psychology, 1890-1940." Science in Context 5 (1992): 281-308.

Morgan, Conwy L. "Comparative and Genetic Psychology." Psychological Review 12 (1905): 78-97.

Morgan, Conwy Lloyd. An Introduction to Comparative Psychology, 1894, in Daniel Robinson, Series Ed., Significant Contributions to the History of Psychology:

Series D, Volume 2. Comparative Psychology. Washington, DC: University Publications of America.

Moseley, D. "The Accuracy of the Pecking Response in Chicks." Journal of Comparative Psychology 5 (1925): 177-204.

Moss, F. A. "Study of Animal Drives." Journal of Experimental Psychology 7 (1924): 165-185.

Munn, Norman. Handbook of Psychological Research on the Rat: An Introduction to Animal Psychology. Boston, MA: Houghton Mifflin, 1950.

Porter, J. P. "A Preliminary Study of the English Sparrow." American Journal of Psychology 15 (1904): 313-346.

Richardson, Florence. "A Study of Sensory Control in the Rat." Psychological Monographs 12 (1909): Whole No. 48.

Richter, C. P. "A Behavioristic Study of the Activity of the Rat." Comparative Psychology Monographs 1 (1922): 2.

Rickey, E. T. "The Thyroid Influence on the Behavior of the White Rat." Comparative Psychology Monographs 2 (1925): 12.

Romanes, George. Animal Intelligence, 1882, reprinted in Daniel Robinson, Series Ed., Significant Contributions to the History of Psychology: Series A, Volume 7. Orientations. (Washington, DC: University Publications of America).

Romanes, George. Mental Evolution in Animals. London: Kegan, Paul, Trench, & Co., 1883.

Ruch, T. C. "Preliminary Study of the Ability of the Albino Rat to Discriminate Inclined Planes." Journal of Comparative Psychology 9 (1927): 317-338.

Samelson, Franz. "Struggle for Scientific Authority: The Reception of Watson's Behaviorism, 1913-1920." Journal of the History of the Behavioral Sciences 17 (1981): 399-425.

Shepherd, W. T. "Some Mental Processes of the Rhesus Monkey." Psychological Monographs 12 (1909): Whole No. 52.

Skinner, B. F. "A Case History in Scientific Method." In Psychology: A Study of a Science, Vol. 2. General Systematic Formulations, Learning and Special Processes, ed. Sigmund Koch, 359-379. New York: McGraw Hill, 1959.

Skinner, B. F. "Drive and Reflex Strength, I. and II.," Journal of General Psychology 6 (1932): 22-48.

Skinner, B. F. "On the Rate of Extinction of a Conditioned Reflex." Journal of General Psychology 8 (1933): 114-129.

Skinner, B. F. "On the Rate of Formation of a Conditioned Reflex." Journal of General Psychology 7 (1932): 274-286.

Skinner, B. F. "On the Rate of the Formation of a Conditioned Reflex," Journal of General Psychology 7 (1932): 274-286.

Skinner, B. F. "The Measurement of "Spontaneous Activity"." Journal of General Psychology 9 (1933): 3-23.

Skinner, B. F. "The Effect on the Amount of Conditioning of an Interval of Time Before Reinforcement." Journal of General Psychology 17 (1936): 49-62.

Skinner, B. F. "Two Types of Conditioned Reflex and a Pseudo Type." Journal of General Psychology 12 (1934): 66-77.

Slonaker, J. P. "The Normal Activity of the White Rat at Different Ages." Journal of Comparative Neurology and Psychology 17 (1907): 342-359.

Small, W. S. "An Experimental Study of the Mental Processes of the Rat." American Journal of Psychology 11 (1901): 135-165.

Small, W. S. "The Psychic Development of the Rat -- II." American Journal of Psychology 12 (1901): 206-239.

Smith, M. F. and K. U. Smith. "Thirst-motivated Activity and its Extinction in the Rat." Journal of General Psychology 21 (1939): 89-98.

Stam, Henderikus and Tanya Kalmanovitch. "E. L. Thorndike and the Origins of Animal Psychology: On the Nature of the Animal in Psychology." American Psychologist (1998): in press.

Stewart, Colin C. "Variations in Daily Activity Produced by Alcohol and by Changes in Barometric Pressure and Diet, With a Description of Recording Methods." American Journal of Physiology 1 (1898): 40-56.

Stone, Calvin P. "Maturation" and "Instinctive Functions and Motivation" in Moss, F. A. Ed., Comparative Psychology. Rev. Ed., New York: Prentice Hall, 1942.

Thorndike, E. L. Animal Intelligence: Experimental Studies. New York: Macmillan, 1911.

Thorndike, Edward L. "Animal intelligence: An experimental Study of the Associative Processes in Animals." Psychological Monographs 2, (1898): Whole No. 8.

Tolman, Edward C. "Principles of Purposive Behaviorism," in S. Koch, ed., Psychology: A Study of a Science, Vol. 2, New York: McGraw Hill, 1959.

Tolman, Edward C. "The Determiners of Behavior at a Choice-Point." Psychological Review 45 (1938): 34.

Tolman, Edward C. and D. B. Nyswander. "Reliability of Maze-measures for Rats." Journal of Comparative Psychology 7 (1927): 432-450.

Tolman, Edward C., Tyron, R. C. and L. Jeffress. "A Self-recording Maze With an Automatic Delivery Table." University of California Publications in Psychology 4 (1929): 99-112.

Tyron, R. C. "Studies in Individual Differences in Maze Ability. I. The Measurement of the Reliability of Individual Differences." Journal of Comparative Psychology, 11 (1930): 145-170.

Ulrich, John L. "Integration of Movements in Learning in the Albino Rat. A Study of the Adjustment of an Organism to an Environment." Journal of Comparative Psychology 1 (1921): 1-19.

Wang, G. H. "The Relation Between 'Spontaneous' Activity and Oestrus Cycle in the Female White Rat." Comparative Psychology Monographs 2 (1923): 6.

Warden, Carl J. and L. H. Warner. "The Development of Animal Psychology in the United States During the Past Three Decades." Psychological Review 34 (1927): 196-205.

Washburn, Margaret. The Animal Mind: A Text-book of Comparative Psychology, 3rd ed. New York: Macmillan, 1930.

Watson, John B. "Kinaestheic and Organic Sensations: Their Role in the Reactions of the White Rat to the Maze." Psychological Monographs 7 (1907): No. 33.

Watson, John B. "The Conditioned Reflex in Psychology," Psychological Review 23 (1916): 89-116.

Watson, John B. "The Need of an Experimental Station for the Study of Certain Problems in Animal Behavior." Psychological Bulletin 3 (1906): 149-156.

Watson, John B. "The New Science of Animal Behavior." Harper's Magazine 120 (1910): 346-353.

Watson, John B. Behaviorism. 2nd ed. Chicago: University of Chicago Press, 1930.

Watson, John B. Psychology from the Standpoint of a Behaviorist. Philadelphia, PA: J. B. Lippincott Co, 1919.

Watson, John B. Behavior: An Introduction to Comparative Psychology. New York: Henry Holt & Co., 1914.

Wertz, Frederick J. "Of Rats and Psychologists: A Study of the History and Meaning of Science." Theory and Psychology 4 (1994): 165-197.

Wylie, H. H. "An Experimental Study of Transfer of Response in the White Rat." Behavior Monographs 3 (1919): Serial No. 16.

Yerkes, Robert M. "Modifiability of Behavior in its Relation to the Age and Sex of the Dancing Mouse." Journal of Comparative Neurology and Psychology 19 (1909): 238-271.

Yerkes, Robert M. "The Instincts, Habits, and Reactions of the Frog." Psychological Monographs 4 (1903): Whole No. 17.

Yerkes, Robert M. "The Mental Life of the Monkeys and Apes: A Study of Ideational Behavior." Behavior Monographs 3 (1916): Serial No. 12.

Yerkes, Robert M. "The Mind of a Gorilla. Part III. Memory." Comparative Psychology Monographs 5 (1928): 4.

Yerkes, Robert M. "The Study of Human Behavior." Science 39 (1914): 625-633.

Yerkes, Robert M. lecture notes, Archives of the History of American Psychology, Akron, OH, Beach Papers, Box M271, Folders X-XII.

Yerkes, Robert M. and C. A. Coburn. "A Study of the Behavior of the Pig *Sus scrofa* by the Multiple Choice Method." Journal of Animal Behavior 5 (1915):185-225.

Yerkes, Robert M. and J. D. Dodson. "The Relation of Strength of Stimulus to Rapidity of Habit Formation." Journal of Comparative Neurology and Psychology 18 (1908): 459-482.

Yerkes, Robert M. and Serge Morgulis. "The Method of Pawlow in Animal Psychology." Psychological Bulletin 6 (1909): 257-173.

Yerkes, Robert M. The Dancing Mouse: A Study in Animal Behavior. New York: Macmillan, 1907.

Yoakum, C. S. "Some Experiments Upon the Behavior of Squirrels." Journal of Comparative Neurology and Psychology 19 (1909): 541-568.

APPENDIX

Published Experimental Reports Using Animals as Subjects, 1896-1940

Published Experimental Reports Using Animals as Subjects, 1896-1900
Psychological Monographs: 1
Psychological Review: 1
American Journal of Psychology: 1

Psychological Monographs

Thorndike, E. L. (1898). Animal Intelligence: An experimental study of the associative processes in animals. Psychological Monographs, 2, (4, Whole No. 8).

Researcher: male
Animals used: chicks, cats, dogs
Reference: animals numbered
Apparatus: puzzle boxes of various types (egress); maze-like pens constructed from books
Motive: confinement, hunger
Institution: University Fellow in Psychology, Columbia University

Psychological Review

Thorndike, E. L. (1899). The instinctive reaction of young chicks. Psychological Review, 6, 282-291.

Researcher: male
Institution: Western Reserve University
Animals used: 60 chicks, 18-30 hours
Reference: subjects
Apparatus: (1) experiment table; (2) cards with coloured squares
Motive: N/A largely observational

American Journal of Psychology

Small, W. (1900). An experimental study of the mental processes of the rat. American Journal of Psychology, 11, 134-164.

Researcher: male
Institution: Clark University
Animals: albino rats, *mus decumanus*
Reference: by number and letter, characterizations
Apparatus: 2 sawdust-type puzzle boxes (ingress type)
Motive: hunger, pathway-making, digging

Published Experimental Reports Using Animals As Subjects: 1901-1905

American Journal of Psychology, 1901-1905: 4
Journal of Comparative Neurology and Psychology, 1904-1905: 4
Journal of Comparative Neurology, 1901-1904: 0
Psychological Bulletin, 1904-1905: 0
Psychological Monographs, 1901-1905: 3
Psychological Review, 1901-1905: 0

American Journal of Psychology

Small, W. (1901). An experimental study of the mental processes of the rat - II. American Journal of Psychology, 12, 206-239.

Researcher: male
Institution: Clark University
Animals: wild brown rats; albino rats; brown rats proved difficult to work with
Reference: by letter, anthropomorphic description
Apparatus: Hampton Court Maze, first use
Motive: hunger, pathway-making

Kinnaman, A. J. (1902a). Mental life of two *Macacus rhesus* monkeys in captivity - I. American Journal of Psychology, 13, 98-148.

Researcher: male
Institution: Clark University
Animals: 2 monkeys male and female (*Macacus Rhesus*) , picture. p. 105
Reference: named Jack and Jill, but referred to in manuscript as "male" and "female"
Apparatus: (1) Puzzle-box, ingress; (2) assorted forms and colour objects used in discrimination apparatus of author's design (vessels covered with white paper to test form discrimination with food stimulus)
Motive: hunger

Kinnaman, A. J. (1902b). Mental life of two *Macacus rhesus* monkeys in captivity - II. American Journal of Psychology, 13, 173-218.

Researcher: male
Institution: as above
Animals: as above
Reference: as above
Apparatus: (1) discrimination apparatus, as above; (2) Hampton Court Maze
Motive: hunger

Porter, J. P. (1904). A preliminary study of the English sparrow. American Journal of Psychology, 15, 313-346.

Researcher: male
Institution: Indiana University Psychological Laboratory
Animals: English sparrows
Reference: sex and number
Apparatus: (1) Puzzle box (ingress, placed inside larger cage); (2) "Kinnaman" discrimination apparatus; (3) Hampton Court maze
Motive: hunger

Journal of Comparative Neurology and Psychology

Yerkes, R. M. (1904). Space perception of tortoises. Journal of Comparative Neurology and Psychology, 14, 17-26.

Researcher: male
Institution: Harvard Psychological Laboratory
Animals used: Tortoises (*Chrysemys picta* Schneider; *Nanemys guttata* Schneider; *Terrapen carolina* Linnaeus) several of each species
Reference: species name
Apparatus: cliff: board 30 x 60 cm above a net of black cloth: three heights: 30, 90 and 180 cm
Motive: see if animals will fall off the cliff

Yerkes, R. M. (1904). Inhibition and reinforcement of reaction in the frog, *Ranada mitans*. Journal of Comparative Neurology and Psychology, 14, 124-137.

Researcher: male
Institution: Harvard Psychological Laboratory
Animals used: 6 green frogs
Reference: number
Apparatus: (1) Hipp Chronoscope, controlled by a Cattell falling screen for time measurement; (2) devices for giving stimulation and indicating reactions - electric stimulation delivered by a key apparatus; (3) Mesco dry batteries
Motive: NC

Allen, J. (1904). The associative processes of the guinea pig: A study of the psychical development of an animal well medullated at birth. Journal of Comparative Neurology and Psychology, 14, 293-359.

Researcher: female
Institution:
Animals used: guinea pigs (very young; adults)
Reference: "she... young one... mother"
Apparatus: (1) box; (2) labyrinth inside box; (3) cage: spontaneous movement recorded by smoked paper on floor
Motive: (1) mother-seeking in newborns; (2) food/hunger

Spaulding, E. G. (1904). An establishment of association in hermit crabs, *Epagurus longicarpus*. Journal of Comparative Neurology and Psychology, 3, 389-408.

Researcher: male
Institution: College of the City of New York; experiments conducted at Wood's Hole
Animals used: E. longicarpus: 36, 40, 24 and 30
Reference: species name
Apparatus: (1) aquarium; (2) screen with dark front; (3) maze
Motive: food-seeking, heliotropism

Psychological Monographs

Thorndike, E. L. (1901). The mental life of monkeys. Psychological Monographs, 3, (5, Whole No. 15).

Researcher: male
Institution: Columbia University
Animals used: 3 South American monkeys (*Cebus*)
Reference: by number
Apparatus: puzzle boxes (ingress)

Motive: hunger

Yerkes, R. M., & Huggins, G. E. (1903). Habit formation in crawfish, *Camurus affinis*. Psychological Monographs, 4, (1, Whole No. 17).

Researchers: male
Institution:
Animals used: crawfish *Camurus affinis*
Reference: 'subject'
Apparatus: simple labyrinth half-submerged in water
Motive: desire to return to water

Yerkes, R. M. (1903). The instincts, habits and reaction of the frog. Psychological Monographs, 4, (1, Whole No. 17).

Researcher: male
Institution:
Animals used: green frog
Reference: 'subject'
Apparatus: (1) electric shock discrimination box; (2) simple maze (pictures. p. 584); (3) chronoscopes to measure reaction time (picture. p. 603): (a) Hipp Chronoscope; and (b) Cattell's "Falling Screen" or "Gravity" Chronoscope as a control
Motive: pain avoidance

Published Experimental Reports Using Animals As Subjects: 1906-1910

American Journal of Psychology, 1906-1910: 3
Journal of Comparative Neurology and Psychology, 1906-1910: 11
Psychological Bulletin, 1906-1910: 1
Psychological Monographs, 19006-1910: 4
Psychological Review, 1906-1910: 0

American Journal of Psychology

Porter, J. P. (1906). Further study of the English sparrow and other birds. American Journal of Psychology, 17, 248-271.

Researcher: male
Institution: Indiana university
Animals: passenger pigeon; red-headed woodpecker; English sparrow; cowbird; dove-cot pigeon
Reference: species name
Apparatus: (1) simple maze; (2) puzzle box (ingress); (3) colour discrimination
Motive: hunger

Davis, H. B. (1907). The raccoon: A study in animal intelligence. American Journal of Psychology, 18, 447-489.

Researcher: male
Animals: 12 raccoons secured from the wild, picture. p. 487
Apparatus: (1) 13 puzzle boxes (ingress: food box inside cage); (2) colour discrimination - multiple choice coloured papers/food
Motive: hunger, 'curiosity'
Institution: Fellow at Clark University

Porter, J. P. (1910). Intelligence and imitation in birds: A criteria of imitation. American Journal of Psychology, 21, 1-71.

Researcher: male
Institution: Clark University
Animals used: English sparrows; blue jays; cowbirds; Junco; Baltimore orioles; crows
Reference: species name
Apparatus: puzzle box (ingress), with string (picture. p. 44)
Motive: hunger

Journal of Comparative Neurology and Psychology

Washburn, M. F. & Bentley, M. (1906). The establishment of an association involving colour-discrimination in the creek chub, *Semotilus atrimaculatus*. Journal of Comparative Neurology and Psychology, 16, 113-125.

Researcher: MFW: female; MB: ?
Institution: ?
Animals used: female creek chubs
Reference: species name
Apparatus: (1) circular glass tank, 50 cm diametre; 45 cm deep; (2) forceps with colour plates for feeding with colour association
Motive: hunger

Berry, C. S. (1906). The imitative tendency of white rats. Journal of Comparative Neurology and Psychology, 16, 334-361.

Researcher: male
Institution: Harvard Psychological Laboratory
Animals used: 6 albino rats, 4 black and white rats
Reference: the rat, the animal
Apparatus: (1) wire ladder inside a jar, ladder as escape; (2) swinging door - food (egress); (3) sawdust box (egress); (4) door in top of box (egress); (5) pulling a wooden box, pulling a knot
Motive: food/hunger

Cole, L. W. (1907). Concerning the intelligence of raccoons. Journal of Comparative Neurology and Psychology, 17, 211-261.

Researcher: male
Institution: Professor of Psychology, University of Oklahoma
Animals used: Raccoons (Procyon lotoe), 4 female, 2 male
Reference: number, "animals"
Apparatus: 21 puzzle boxes modeled after Thorndike's
Motive: hunger, escape from confinement

Hamilton, G. van T. (1907). An experimental study of an unusual type of reaction in a dog. Journal of Comparative Neurology and Psychology, 17, 329-341.

Researcher: male
Institution: McLean Hospital, Waverly, MA
Animals used: bull terrier; mixed breed; domesticated dogs
Reference: "subject"
Apparatus: puzzle-cages: odor, colour cards (picture. p. 331)
Motive: escape

Slonaker, J. R. (1907). The normal activity of the white rat at different ages. Journal of Comparative Psychology and Neurology, 17, 342-359.

Researcher: male
Institution: Stanford University
Animals used: rats
Reference: number and age
Apparatus: developed by C. C. Steward (Am. Jrn. Phys., 1, 40-56): (1) revolving cage; (2) recording apparatus: clock, kymograph
Motive: observation

Berry, C. S. (1908). An experimental study of imitation in cats. Journal of Comparative Neurology and Psychology, 18, 1-25.

Researcher: male
Institution: Harvard Psychological Laboratory
Animals used: 4 Manx cats: mother and three kittens
Reference: designated by letters M, X, Y, and Z, occasionally "she"
Apparatus: puzzle boxes (egress)
Motive: food, escape

Carr, H. & J. B. Watson (1908). Orientation in the white rat. Journal of Comparative Neurology and Psychology, 18, 26-44.

Researchers: males
Institution: University of Chicago
Animals used: albino rats
Reference: number
Apparatus: maze
Motive: food

Yerkes, R. M. & J. D. Dodson (1908). The relation of strength of stimulus to rapidity of habit formation. Journal of Comparative Neurology and Psychology, 18, 459-482.

Researchers: male
Institution: Harvard Psychological Laboratory
Animals used: 40 mice
Reference: sex, species
Apparatus: discrimination box, as pioneered in "the Dancing Mouse" (1908)
Motive: food, shock avoidance

Yerkes, R. M. (1909). Modifiability of behavior in its relation to the age and sex of the dancing mouse. Journal of Comparative Neurology and Psychology, 19, 238-271.

Researcher: male
Institution: Harvard Psychological Laboratory
Animals used: dancing mice
Reference: number and sex
Apparatus: same as the 1908 discrimination box (with shock)
Motive: pain avoidance

Glaser, O. C. (1910). The formation of habits at high speed. Journal of Comparative Neurology and Psychology, 20, 165-184.

Researcher: male
Institution: Zoological Laboratory, University of Michigan
Animals used: White rats
Reference: number
Apparatus: Labyrinth enclosed in zinc tank, tank filled with water
Motive: food, escape confinement and water

Waugh, K. T. (1910). The role of vision in the mental life of the mouse. Journal of Comparative Neurology and Psychology, 20, 549-599.

Researcher: male
Institution: Harvard Psychological Laboratory
Animals used: mice
Reference: numbers and letters
Apparatus: (1) discrimination box, like Yerkes'; (2) Porter inductorium; (3) Distance perception table; (4) Depth perception apparatus
Motive: hunger, pain avoidance

Psychological Bulletin

Watson, J. B. (1908). Imitation in Monkeys. Psychological Bulletin, 5, No. 6.

Researcher: male
Institution: University of Chicago

Animals used: 4 monkeys selected for gentleness or alertness from a group of 9: 1 baboon (cynocephalus); 1 capuchin (cebus); 2 rhesus (macacus).
Reference: Rhesus macacus named Jimmie (imported) and Billy (large male stray probably from a circus).
Apparatus: puzzle boxes, rakes and cylinders: adaptive learning
Motive: hunger

Psychological Monographs

Watson, R. M. (1907). Kinaesthetic and organic sensations: Their role in the reaction of the white rat to the maze. Psychological Monographs, 8, (2, Whole No. 33).

Researcher: male
Institution: Instructor in Psychology, University of Chicago
Animals used: rats
Reference: number, sex
Apparatus: (1) Hampton Court Maze (smaller dimensions); (2) Cumulative stop-watch (as opposed to continuous)
Motive: hunger

Colvin, S. S. & Burford, C. C. (1909). The color perception of three dogs, a cat and a squirrel. Psychological Monographs, 11, (1, Whole No. 44).

Researcher: (1) male; (2) unknown
Institution: Psychology Lab; University of Illinois
Animals: 3 dogs; 1 kitten; 1 squirrel. (2nd kitten unable to learn task and therefore was disposed of)
Reference: number, species
Apparatus: (1) discrimination boxes; (2) discrimination boxes with latches; (3) discrimination pan with pull-out trays
Motive: hunger

Richardson, F. (1909). A study of sensory control in the rat. Psychological Monographs, 12, (1, Whole No. 48).

Researcher: female
Institution: Associate Professor, Drake University / Psychology Lab, University of Chicago
Animals: black & white and white rats; 120 days old; bred in lab of known, good stock: bind rats; anosmic rats
Reference: number and sex as well as disability
Apparatus: food box (ingress) placed inside larger cage: (1) sawdust box; (2) inclined plane box; (3) latch box: (4) platform-jumping apparatus
Motive: hunger

Shepherd, W. T. (1909). Some mental processes of the *Rhesus* monkey. Psychological Monographs, 12, (5, Whole No. 52).

Researcher: male
Institution: Psychological Lab, George Washington University
Animals used: 11 Rhesus monkeys, obtained from importer from India: 8 - 9 months of age
Reference: number
Apparatus: (1) Puzzle box (ingress); (2) colour discrimination apparatus (cards), picture. p. 13; (3) colour discrimination with dyed flavored bread cubes; (4) lever apparatus for adaptive intelligence testing (p. 56)
Motive: hunger; avoidance of aversive taste

Published Experimental Reports Using Animals As Subjects: 1911-1915

American Journal of Psychology, 1911-1915: 2
Behavior Monographs, 1911-1915: 8
Journal of Animal Behavior, 1911-1915: 42
Psychological Bulletin, 1911-1915: 0
Psychological Monographs, 1911-1915: 0
Psychological Review, 1911-1915: 0

American Journal of Psychology

Shepherd, W. T. (1912). The discrimination of articulate sounds by cats. American Journal of Psychology, 23, 461-463.

Researcher: male
Institution:
Animals: 2 cats, 3 years, 7 months
Reference: 3 year old names 'Widget' but referred to by number
Apparatus: 66 cm tall cage, wire netting
Motive: hunger

Shepherd, W. T. (1915). Tests on adaptive intelligence in dogs and cats, as compared with adaptive intelligence in Rhesus monkeys. American Journal of Psychology, 26, 211-216.

Researcher: male
Institution: Waynesburg College
Animals: three dogs: mongrel male, part hound male, female of uncertain stock; two full grown cats "apparently of fair intelligence"
Reference: by number
Apparatus: (1) cage, wire netting, string & stick; (2) cage and lever apparatus
Motive: hunger

Behavior Monographs

Breed, F. S. (1911). The development of certain instincts and habits in chicks. Behavior Monographs, 1, (No. 1).

Researcher: male
Institution: Harvard Psychological Laboratory
Animals used: Plymouth Rock chicks: hatched and raised in lab
Reference: by number
Apparatus: incubator (Junior No. 2, sold by the Prairie State Incubator Co., Homer City, PA); brooder (Indoor Brooder No. 5); tiny blindfolds (ref. to Spalding, D. A., who used blindfolds and flannel bags to eliminate visual sense); discrimination apparatus with electric shock (note ref. to Yerkes' dancing mouse apparatus which used a card which "gradually forced the animals toward the electric box". "Chicks that won't work without force won't work with it, is a rule that can generally be relied upon" (p. 46). Diagram of apparatus on p. 43 - 44); Bradley coloured papers
Methods: numerous observational studies of pecking development; discrimination task on coloured paper on tabletop; discrimination task with mild electric shock: colour, form, effects of training

Vincent, Stella Burnham (1912). The function of the vibrissae in the behavior of the white rat. Behavior Monographs, 1, (No. 5).

Researcher: female
Institution: University of Chicago Psychological Laboratory
Animals used: rats approx. 2 months old, with vibrissae and without (cut on right side; cut on left side; removed at birth); anosmic rats with and without vibrissae; rats with fifth nerve cut; blind rats with and without vibrissae: lovely pictures plates 2-3
Reference: generally referred to by number, some by letter, but one group were named: "These animals were all males with the exception of 1 and 2. Seven of them about two months old were sent out by a dealer in the city. There were as unpromising material as one often sees, dirty, with sore ears, bitten and bloody where they had fought in the box, wild and savage. Later three other animals were bought and added to this same group. These were named "Baby," "Footless," and "Bobtail." Baby was a young rats about the age of the former lot but the other two were fully a year old. Footless had lost his left front leg and hobbled along on three, while Bobtail as his name implies had lost his tail close up to his body." (p. 24)
Apparatus: elevated maze, no walls (picture, plate I); problem box with electric shock (diagram p. 54, picture plate 4)
Motive: slight hunger, pain avoidance

Hunter, Walter S. (1913). The delayed reaction in animals and children. Behavior Monographs, 2, (1, Serial No. 6).

Researcher: male
Institution: Instructor in Philosophy, University of Texas: experiments reported conducted at University of Chicago by a graduate student, W. R. Hough, and the next year by H. B. Reed
Animals used: 22 white rats; 2 mongrel dogs with terrier strain, "Blackie' and "Brownie"; 4 raccoons, "Bob", "Jack", "Betty" and "Bill"; five children, two males "Hd" and "L", and three females "F", "M" and "H".
Reference: rats by number, dogs and raccoons by name, and children by initials
Apparatus: Box A for raccoons, Box B for dogs, Box C for rats, Box D for rats ("not wired for punishment"); room set up as discrimination task for children. Pictures and diagrams pp. 22-25.
Motive: hunger and pain avoidance; candy as reward for children

Sackett, Leroy Walter (1913). The Canada porcupine: A study of the learning process. Behavior Monographs, 2, (2, Serial No. 7).

Researcher: male
Institution: Department of Education, University of Texas / Clark University experiment station
Animals used: 16 wild porcupines (*Erithizon dorsatus*)
Reference: number, description of each included the causes of death, some deaths related to experimental manipulations (p. 2 - 3)
Apparatus: puzzle boxes (experimenter's construction); discrimination apparatus (form, colour, brightness(pre-Yerkes/Watson, 1911); Hampton Court Maze; rotated maze.
Motive: hunger

Johnson, Harry Miles (1913). Audition and habit formation in the dog. Behavior Monographs, 2, (3, Serial No. 8).

Researcher: male
Institution: Psychological Lab., National Electric Lamp Association / Johns Hopkins Lab
Animals used: 2 year-old female mongrels (sisters), temporarily blinded by scarification of the edges of the eyelids at 9 days of age; 4 sighted dogs; 2 temporarily blinded
Reference: number
Apparatus: food-box with punishment grills (plate p. 32; tuning forks and resonators (plate p. 39); standard puzzle-boxes
Motive: hunger, pain-avoidance

Bassett, Gardner Cheney (1914). Habit formation in a strain of albino rats of less than normal brain weight. Behavior Monographs, 2, (4, Serial No. 9).

Researcher:
Institution: Resident Investigator in Psychology, Station for Experimental Evolution, Carnegie Institution of Washington
Animals used: Wistar rats, inbred and control groups
Reference: coded by generation, number, group and sex
Apparatus: Watson circular maze; Inclined Plane box (electric, as developed by Watson, 1903); plate p. 25
Motive: hunger

Ulrich, John Linck (1915). *Distribution of effort in learning in the white rat.* Behavior Monographs, 2, (5, Serial No. 10).

Researcher: male
Institution: Instructor in Psychology, Catholic University of America / Johns Hopkins University
Animals used: white rats
Reference: group number
Apparatus: latch box (ingress); Circular maze; inclined plane box (non-electric, plate p. 24)
Motive: hunger

Hubbert, Helen B. (1915). *The effect of age on habit formation in the albino rat.* Behavior Monographs, 2, (6, Serial No. 11).

Researcher: female
Institution: Psychological Laboratory Johns Hopkins University
Animals used: Albino rats, 200 bred in own lab
Reference: age group
Apparatus: Watson circular maze with camera lucida attachment (picture. p. 8)
Motive: hunger

Journal of Animal Behavior

Casteel, D. B. (1911). The discriminative ability of the painted turtle. Journal of Animal Behavior, 1, 1-28.

Researcher: ?
Institution: Zoological Laboratory, University of Texas
Animals used: 15 Western Painted Turtle Chrysemys marginata, collected around Ann Arbor where the work was done. "Those shipped to Texas did not well undergo the hardships of the journey, nor have they since reacted as satisfactorily as before the trip. (p. 11).
Reference: number
Apparatus: modified Yerkes (1907) electric-box apparatus (modified to make it more adaptable to the habits if the turtles)
Motive: food, electric shock

Hamilton, G. V. (1911). A study of trail and error reactions in mammals. Journal of Animal Behavior, 1, 33-66.

Researcher: male
Institution: Montecito, CA
Animals used:
Reference:
Apparatus:
Motive:

Pearse, A. S. (1911). The influence of different colour environments on the behavior of certain anthropods. Journal of Animal Behavior, 1, 79-110.

Researcher: ?
Institution: Zoological Laboratory University of Michigan
Animals used: Crayfish *Cambarus propinquis* Girard, Caddis fly larva; Spiders;
Reference: number
Apparatus: water tank with different monochrome areas, study movement towards certain colours
Motive: N/A

Cole, L. W. (1911). The relation of strength of stimulus to rate of learning in the chick. Journal of Animal Behavior, 1, 111-124.

Researcher: male
Institution: Harvard Psychological Laboratory
Animals used: 68 barred Plymouth Rock chicks, all but six obtained as eggs from a single poultry breeder
Reference: number
Apparatus: visual discrimination box, similar to Yerkes and Dodson
Motive: pain avoidance - electric shock

Bogardus, E. & F. G. Henke (1911). Experiments on tactual sensations in the white rat. Journal of Animal Behavior, 1, 125-137.

Researchers:
Institution: Psychological Laboratory of the University of Chicago
Animals used: rats with vibrissae cut off 2 days before experiments began
Reference: number
Apparatus: modified Hampton Court maze - food box in corner rather than in centre
Motive: hunger

Hicks, V. C. (1911). The relative values of the different curves of learning. Journal of Animal Behavior, 1, 138-156.

Researcher:
Institution: Psych. Lab, University of Chicago
Animals: 17 white rats
Reference: number
Apparatus: Hampton Court Maze
Motive; Hunger

Hunter, W. S. (1911). Some labyrinth habits of the domestic pigeon. Journal of Animal Behavior, 1, 278-304.

Researcher: male
Institution: Psychological Laboratory, University of Texas
Animals used: 8 domestic pigeons
Reference: number
Apparatus: 3 mazes "Labyrinth A is identical in plan with a labyrinth designated as L by Rouse in his study of the pigeon (Harvard Psychological Studies, 1906)"
Motive: food

Schaeffer, A. A. (1911). Habit formation in frogs. Journal of Animal Behavior, 1, 309-335.

Researcher: ?
Institution: University of Tennessee
Animals used: 7 frogs captured in the field; mealworms and earthworms as bait
Reference: species
Apparatus: observation cage, worms treated with different substances (oil of cloves, CaCl2)

Motive: hunger, electric shock paired with presentation of food

Turner, C. H. (1911). Notes on the behavior of a parasitic bee of the family Stelidae. Journal of Animal Behavior, 1, 374-392.

Researcher: male
Institution: Sumner High School, St. Louis, MO
Animals used: 13 imago bees in mud cells, from Mr. Phil Rau of St. Louis
Reference: sex, "the bees"
Apparatus: observation cage
Motive: NFC

Wodsedalek, J. E. (1912). Formation of associations in the may-fly nymphs *Heptagenia interpunctata* (Say). Journal of Animal Behavior, 2, 1-19.

Researcher:
Institution: Zoological Laboratory, University of Wisconsin
Animals used: H. interpunctata
Reference: number
Apparatus: observation cage with small glass tunnel to prevent "random movements"
Motive: NFC, food

Slonaker, J. R. (1912). The normal activity of the albino rats from birth to natural death, its rate of growth and the duration of life. Journal of Animal Behavior, 2, 20-42.

Researcher: male
Institution: Physiological Lab., Stanford U.
Animals used: white rats bred in lab
Reference: number
Apparatus: Slonaker's apparatus for measuring activity (JCNP 1907): revolving cage and kymograph
Motive: NFC

Hoge, M. A. & R. J. Stocking (1912). A note on the relative value of punishment and reward as motives. Journal of Animal Behavior, 2, 43-50.

Researchers: female
Institution: Psychological Lab., Johns Hopkins University
Animals used: albino and black-and-white rats
Reference: number
Apparatus: modified Yerkes discrimination box
Motive: punished for incorrect choices (shock); rewarded for correct choices (milk-soaked bread)

Szymanski, J. S. (1912). Modification of the innate behavior of cockroaches. Journal of Animal Behavior, 2, 81-90.

Researcher: male
Institution: Institute for Experimental Biology, Vienna
Animals used: cockroaches Periplaneta orientalis L.: male larvae, 1 mo. old
Reference: number
Apparatus: glass box, partially shielded from light, placed over electrodes "Apparatus for the study of the modifiability of reaction to light in the cockroach")
Motive: innate darkness-seeking behavior

Washburn, M. F. & E. Abbott (1912). Experiments on the brightness values for the light adapted eye of the rabbit. Journal of Animal Behavior, 2, 145-180.

Researchers: female
Institution: Psychological Lab., Vassar College
Animals used:
Reference: "Abednego; Polly; Light Nose; Dark Nose; Shadrach; Meschach;
Apparatus: wooden discrimination box with Bradley coloured papers on doors
Motive: hunger

Harper, E. H. (1912). Magnetic control of geotropism in paramoecium. Journal of Animal Behavior, 2, 181-189.

Researcher:
Institution: Zoological Lab., Northwestern University
Animals used: paramecium
Reference:
Apparatus: injection and suspension of iron particles in water tank, electro-magnet passed through to make a current
Motive: NFC

Reese, A. M. (1912). Food and chemical reactions of the spotted newt, Diemyctylus viridescens. Journal of Animal Behavior, 2, 190-208.

Researcher: male
Institution: West Virginia University
Animals used: spotted newts collected in Morgantown, WV
Reference: number
Apparatus: observation tank
Motive: reactions, hunger

Boring, E. G. (1912). Note on the negative reaction under light-adaptation in the planarian. Journal of Animal Behavior, 2, 229-248.

Researcher: male
Institution: Cornell Laboratory for Comparative Psychology
Animals used: planaria removed from a stream near Ithaca, NY
Reference: "the planarian"
Apparatus: circular glass tank, paper under for tracing, light display apparatus
Motive: light adaptation - turn away from source of light

Breed, F. S. (1912). Reaction of chicks to optical stimuli. Journal of Animal Behavior, 2, 280-295.

Researcher: male
Institution: University of Michigan / Harvard Psychological Laboratory
Animals used: Plymouth Rock chicks
Reference: number, sex
Apparatus: visual discrimination box, similar to Yerkes and Dodson (see Cole, 1911)
Motive: hunger, pain avoidance

Lashley, K. S. (1912). Visual discrimination of size and form in the albino rat. Journal of Animal Behavior, 2, 310-331 .

Researcher: male
Institution: Psychological Lab., Johns Hopkins University
Animals used: albino rats
Reference: number, sex, age
Apparatus: discrimination box, modeled after Yerkes (1907)
Motive: food, shock avoidance

Yerkes, R. M. (1912). The intelligence of earthworms. Journal of Animal Behavior, 2, 332-352.

Researcher: male
Institution: Harvard Psychological Laboratory
Animals used: a single worm, no. 2, Allolobophora foetida
Reference: number
Apparatus: T apparatus for study of habit formation in the earthworm: glass tube T maze with electric shock
Motive: escape, avoidance of pain

Turner, C. H. (1912). Reactions of the mason wasp, *Trypoxylon albotarsus*, to light. Journal of Animal Behavior, 2, 353-362.

Researcher: male
Institution: Sumner High School, St. Louis, MO
Animals used: wasps
Reference: number
Apparatus: observation cage
Motive: NFC reactions to various kinds of light

Watson, J. B. and M. Watson (1913). A study of the responses of rodents to monochromatic light. Journal of Animal Behavior, 3, 1-14.

Researchers: male, female
Institution: Johns Hopkins University
Animals used: "pure white rat" "grey Belgian hare" (p. 1); two gray Belgian hares and three rats. "We were unfortunate in the case of our rabbits. Not one completed the experiment. All three of the rats continues work throughout the experiment." (p.6).
Reference: the animal, species, number. Except for "Polly, a rabbit which Professor Washburn kindly gave us; one used in her recent light work. Polly had been used to working in illumination and nothing would induce her to work steadily in darkness" (p. 7)
Apparatus: Yerkes & Watson colour discrimination apparatus
Motive: hunger, electric shock

Fasten, N. (1913). The behavior of a parasitic copepod, *Lernaepoda edwarsii* Olsson. Journal of Animal Behavior, 3, 36-60.

Researcher: male
Institution: Zoological. lab., Univ. of Wisconsin
Animals used: outbreak of parasitic copepods at trout hatchery at Wild Rose, Wis.
Reference: species, no individual
Apparatus: hatching tank
Motive: NFC observational

Bingham, H. C. (1913). Size and form perception in *Gallus domesticus*. Journal of Animal Behavior, 3, 65-114.

Researcher: male
Institution: Harvard Psychological Lab
Animals used: 25 chicks, 3 groups: poultry breeder, artificially incubated in lab: all Barred Plymouth Rock
Reference: the chicks
Apparatus: Yerkes and Watson vision discrimination apparatus (BM 1911 with automatic release designed by F. S. Breed
Motive: shock punishment

Lashley, K. S. & J. B. Watson (1913). Notes on the development of a young monkey. Journal of Animal Behavior, 3, 114-139.

Researchers: male
Institution: Psych. Lab., Johns Hopkins
Animals used: two male monkeys in Johns Hopkins lab: purchased at Chicago in 1904-5; female, purchased at Baltimore in 1907
Reference: Jimmie; Billy; Dolly
Apparatus: observation room in ;lab
Motive: NC observational

Stevens, H. C. (1913). Acquired specific reactions to color (Chromotropism) in *Oregonia gracilis*. Journal of Animal Behavior, 3, 149-178.

Researcher: ?
Institution: Psych. Lab., Univ. of Wisconsin
Animals used: long legged spider crabs, some blinded "by cutting off the eye stalks with a pair of scissors" 9P. 174)
Reference: sex, number
Apparatus: light-proof reaction box
Motive: observational - reactions to light

Gregg, F. M. and C. A. McPheeters (1913). Behavior of raccoons to a temporal series of stimuli. Journal of Animal Behavior, 3, 241-259.

Researchers: males
Institution: Psych. Lab., Univ. of Chicago
Animals used: 2 raccoons, used previously. in Hunters' delayed reaction experiments
Reference: Jack and Jill
Apparatus: Gregg & McPheeters' experiment table and apparatus: modified Cole apparatus (1907, JCNP)
Motive: hunger - food reward

Copeland, M. (1913). The olfactory reactions of the spotted newt, Diemyctylus viridescens (Rafinesque). Journal of Animal Behavior, 3, 260-273.

Researcher: male?
Institution: Bowdoin College
Animals used: spotted newt
Reference: the animals
Apparatus: aquarium
Motive: hunger, but largely observational

Shepard, J. F. & F. S. Breed (1913). Maturation and use in the development of an instinct. Journal of Animal Behavior, 3, 274-285.

Researchers: male
Institution: Psych. Lab., Univ. of Michigan
Animals used: barred Plymouth Rock chicks
Reference: group number
Apparatus: experiment table, incubator, brooder
Motive: NC - confined in darkroom, fed and watered artificially from hatching

Yerkes, R. M. (1913). The heredity of savageness and wildness in rats. Journal of Animal Behavior, 3, 286-296.

Researcher: male
Institution: Harvard University
Animals used: wild rats (captured in Belmont or Cambridge, MA), tame rats (strain in use for coat colour at the Bussey Institution, also bred in Harvard Zoological Lab for at least 10 years), and rats of 1 and 2 generation hybrids
Reference: number and sex
Apparatus: observation cage
Motive: NA observational

Gee, W. (1913). Modifiability in the behavior of the California shore-anenome *Cribrina Xanthogrammica* Brandt. Journal of Animal Behavior, 3, 305-328.

Researcher: male
Institution: Lab of Experimental Zoology, University of California
Animals used: shore anemones
Reference: specimens, the animal, etc.
Apparatus: observation tanks
Motive: NC observational;

Brundin, T. M. (1913). Light reactions of terrestrial amphipods. Journal of Animal Behavior, 3, 334-352.

Researcher: female
Institution: University of California
Animals used: beach fleas collected on the beach south of the Cliff House, San Francisco
Reference: N/A
Apparatus: observation jar
Motive: observational - reactions to light. heat, etc.

Lashley, K. S. (1913). Reproduction of inarticulate sounds in the parrot. Journal of Animal Behavior, 3, 361-366.

Researcher: male
Institution: Psych. Lab., Johns Hopkins U
Animals used: large Amazon parrot (Chrysotis sp)
Reference: the bird,
Apparatus: none
Motive: observations

Shelford, V. E. & W. C. Allee (1914). Rapid modification of the behavior of fishes by contact with modified water. Journal of Animal Behavior, 4, 1-30.

Researchers; male
Institution: Zoological Lab., University of Chicago
Animals used: river chub Hybopsis kentuckienses Rap., Lepomis, Abramis
Reference: species
Apparatus: control and experiment tanks
Motive: NC observation of reactions to different chemicals in water

Shelford, V. E. (1914). Modification of the behavior of land animals by contact with air of high evaporating power. Journal of Animal Behavior, 4, 31-49.

Researcher: male
Institution: Hull Zoological Laboratory, University of Chicago
Animals used: yellow margined millipede, ground beetles, wood frog, red backed salamander, common toad, small digger wasp, bronze tiger beetle, sand spiders

Reference: species, the animal
Apparatus: small cages with air forced on through three narrow slits: gradients of evaporating power
Motive: NC - observational

Hubbert, H. B. (1914). Time versus distance in learning. Journal of Animal Behavior, 4, 60-69.

Researcher: female
Institution: Psych. :Lab., Johns Hopkins
Animals used: rats
Reference: number
Apparatus: Watson's Circular Maze with Camera Lucida attachment (first experimental use/reported)
Motive: food/hunger

Tugman, E. F. (1914). Light discrimination in the dog. Journal of Animal Behavior, 4, 79-109.

Researcher: female
Institution: Psych. Lab., Indiana University
Animals used: house (English) sparrow, captured by experimenter
Reference: sex and number
Apparatus: Yerkes-Watson brightness apparatus, experiment box modified
Motive: pain avoidance (punishment by shock)

Craig, W. (1914). Male doves reared in isolation. Journal of Animal Behavior, 4, 121-133.

Researcher: male
Institution: University of Maine
Animals used: Blond Ring-Doves reared in isolation, three used here
Reference: Jack, No. 22; Billy, No. 23; Frank, No. 30
Apparatus: observation cages
Motive: NFC observation

Coburn, C. A. (1914). The behavior of the crow, *Corvus americanus*, Aud. Journal of Animal Behavior, 4, 185-201.

Researcher: ,male
Institution: Harvard Psych. Lab; Franklin Field Station, Franklin, NH
Animals used: two crows captured at field station
Reference: number
Apparatus: modified discrimination box (Breed, JAB. 1912; Cole, JAB, 1911): three-stimulus plate-shifter
Motive: food - reward; confinement in darkness - p[punishment

Hunter, W. S. (1914). The auditory sensitivity of the white rat. Journal of Animal Behavior, 4, 215-222.

Researcher: male
Institution: University of Texas
Animals used: white rats
Reference: number
Apparatus: T-shaped discrimination box
Motive: reward - food; punishment - electric shock

Hamilton, G. V. (1914). A study of sexual tendencies in monkeys and baboons. Journal of Animal Behavior, 4, 295-318.

Researcher: male

Institution: Montecito, CA
Animals used: 28 monkeys
Reference: all identified by "pet" name, sex, age and number (pp. 297-298)
Apparatus: observation cages
Motive: NC

Johnson, H. M. (1914). Visual pattern discrimination in the vertebrates - II. Comparative visual acuity in the dog, the monkey and the chick. Journal of Animal Behavior, 4, 340-361.

Researcher: male
Institution: Nela Research Lab., National Lamp Works of General Electric Company
Animals used: dog, monkey, chick (Gallus domesticus)
Reference: species and number
Apparatus: Yerkes experiment-box; (Yerkes and Watson, BM, 1911)
Motive: reward - food; punishment - shock

Published Experimental Reports Using Animals As Subjects: 1916-1920

American Journal of Psychology, 1916-1920: 1
Behavior Monographs, 1916-1920: 7
Journal of Animal Behavior, 1916-1917: 23
Journal of Experimental Psychology, 1916-1920: 0
Psychobiology, 1917-1920: 15
Psychological Bulletin, 1916-1920: 0
Psychological Monographs, 1916-1920: 3
Psychological Review, 1916-1920: 0

American Journal of Psychology

Shepherd, W. T. (1919). On sound discrimination in dogs. American Journal of Psychology, 30, 291
Researcher: male
Institution: Yale University
Animals used: 6 dogs, mongrels
Reference: letter coding (e.g. BTF = black terrier, female)
Apparatus: visual discrimination apparatus
Motive: food (no punishment)

Behavior Monographs

Yerkes, R. M. (1916). The mental life of monkeys and apes: A study of ideational behavior. Behavior Monographs, 3, (1, Serial No. 12).

Researcher: male
Institution: Harvard University
Animals used: 3 apes, *Pithecus irus* (Skirrl); *Pithecus rhesus* (Sobke); and *Pongo pygmaeus* (Julius)
Reference: Proper names, Skirrl, Sobke and Julius
Apparatus: (1) multiple choice apparatus (see photocopy and description); (2) box-stacking task (photocopy plate V); (3) box and pole (see plate VI)
Motive: bananas and peanuts as reward; confinement as punishment

Hamilton, G. V. (1916). A study of perseverance reaction in primates and rodents. Behavior Monographs, 3, (2, Serial No. 13).

Researcher: male
Institution: Montecito, California (private lab)
Animals used: 20 girls, Baboon, 5 monkeys, 1 mouse, 5 gray rats, 5 black rats, 10 white rats, 6 gophers
Reference: subject, number, species
Apparatus: multiple choice apparatus with transfer boxes and electric shock stimuli (see photocopies)
Motive: food, shock avoidance (not needed with humans and primates), "toy credit" for human subjects

Thompson, Elizabeth Lockwood (1917). An analysis of the learning process in the snail, *Physa gyrina* Say. Behavior Monographs, 3, (3, Serial No. 14).

Researcher: female
Institution: Zoological Laboratory, University of Michigan
Animals used: several hundred snails collected from an oxbow pond cut off from a small creek
Reference: by number
Apparatus: (1) pressure device (plate I); (2) U shaped labyrinth (plate V)
Motive: food, avoidance of electric shock

Wylie, Harry H. (1919). An experimental study of transfer of response in the white rat. Behavior Monographs, 3, (5, Serial No. 16).

Researcher: male
Institution: none specified
Animals used: white rats, average three to four months old, N more or less 175
Reference: group number
Apparatus: conditioned response apparatus (p. 12): choice of two alleys. reward and punishment conditions (positive and negative responses)
Motive: sunflower seeds, pain avoidance

Wiltbank, Rutledge T. (1919). Transfer of training in white rat upon various series of mazes. Behavior Monographs, 4, (1, Serial No. 17).

Researcher: male
Institution: Instructor, University of Washington / Psych. Lab., University of Chicago
Animals used: white rats, 2-3 months old, 1/3 born in lab
Reference: group number
Apparatus: five mazes with different configurations (plate I)
Motive: hunger, association with food reward

Brockbank, Thomas William (1919). Redintegration in the albino rat. Behavior Monographs, 4, (2, Serial No, 18).

Researcher: male
Institution: not specified: J. L. Ulrich as supervisor for dissertation?
Animals used: rats bred in own lab
Reference: the rat, the animal
Apparatus: (1) Watson Circular Maze with camera lucida attachment (modified)p. 9; (2) inclined plane (p. 49)
Motive: hunger, food rewards

Reeves, Cora D. (1919). Discrimination of light of different wave-lengths by fish. Behavior Monographs, 4, (5, Serial No. 19).

Researcher: female
Institution: Zoological Laboratory, University of Michigan
Animals used: horned dace (creek chub) *Semotilus atromaculatus* Mitchill; sunfish (2) *Eupomotis gibbosus L.*
Reference: letter and sex
Apparatus: black-lined, galvanized-iron aquarium: movable partitions separate three areas - stimulus, discrimination and retention compartments (p. 5-6)
Motive: food association

Journal of Animal Behavior

Lashley, K. S. (1916). The color vision of birds. I. The spectrum of the domestic fowl. Journal of Animal Behavior, 6, 1-26.

Researcher: male
Institution: Johns Hopkins University
Animals used: game Bantam cocks
Reference: by letter, "he"
Apparatus: Yerkes-Watson light apparatus, with slight modifications for ease of manipulation (1911)
Motive: shock - punishment

Myers, G. C. (1916). The importance of primacy in the learning of a pig. Journal of Animal Behavior, 6, 64-69.

Researcher: male
Institution: Brooklyn Training School for Teachers
Animals used: 8 week-old pig
Reference: "he", "the pig"
Apparatus: simple pen enclosure, like maze
Motive: hunger

Fletcher, J. M., Cowan, E. A. & A. H. Arlitt (1916). Experiments on the behavior of chicks hatched from alcoholized eggs. Journal of Animal Behavior, 6, 103-137.

Researchers: male, female, female
Institution: Callendar Lab. of Psychology and Education of H. Sophie Newcomb Memorial College of Tulane University
Animals used: chicks hatched from alcoholized eggs (Buff Orpington; White Leghorn; Rhode Island Red)
Reference: group name - "normal"; "alcohol"; "Water"; "holes"; and number
Apparatus: light reactions, pecking reactions, drinking reactions, heights, three mazes, Yerkes visual choice apparatus, inhibition
Motive: food, confinement, etc.

Johnson, H. M. (1916). Visual pattern-discrimination in the vertebrates - III. Effective differences in width of visible striae for the monkey and the chick. Journal of Animal Behavior, 6, 169-188.

Researcher: male?
Institution: Nela Research Lab., National lamp works of General Electric Company
Animals used: young male Capuchin monkey; two Indian gamecocks
Reference: number and species
Apparatus: Yerkes discrimination box
Motive: punishment - shock; reward - food

Johnson, H. M. (1916). Visual pattern-discrimination in the vertebrates - IV. Effective differences in direction of visible striae for the monkey and the chick. Journal of Animal Behavior, 6, 189-204.

Researcher: male?
Institution: Nela Research Lab., National lamp works of General Electric Company
Animals used: young male Capuchin monkey; two Indian gamecocks; dog 1
Reference: number and species
Apparatus: Yerkes discrimination box
Motive: punishment - shock, reward - food

Johnson, H. M. (1916). Visual pattern-discrimination in the vertebrates - V. A demonstration of the dog's deficiency in detail-vision. Journal of Animal Behavior, 6, 205-221.

Researcher: male?
Institution: Nela Research Lab., National lamp works of General Electric Company
Animals used: dogs which had been blinded by fusing their eyelids together in the first week; trained as blind
Reference: number
Apparatus: Yerkes discrimination box
Motive: punishment - shock, reward - food

Burtt, H. E. (1916). A study of the behavior of the white rat by the multiple choice method. Journal of Animal Behavior, 6, 222-246.

Researcher: male

Institution: Psych. Lab., Harvard University
Animals used: white rats, three outbred and two inbred strains from Harvard Lab stock
Reference: strain, letter and sex
Apparatus: multiple-choice apparatus - fan-shaped
Motive: punishment - confinement, reward - food

Churchill, Jr., E. P. (1916). The learning of a maze by goldfish. Journal of Animal Behavior, 6, 247-255.

Researcher: ?
Institution: Laboratory of Animal Behavior, Johns Hopkins University
Animals used: goldfish Carassius auratus
Reference: group number
Apparatus: maze in aquarium
Motive: food

Kempf, M. D., E. J. (1916). Two methods of subjective learning in the monkey *Macacus rhesus*. Journal of Animal Behavior, 6, 256-265.

Researcher: male
Institution: Clinical Psychiatrist to the Government Hospital for the Insane, Washington, DC
Animals used: 6 Macacus rhesus monkeys
Reference: lettered
Apparatus: problem-box type task - draw food into the cage
Motive: food-hunger

Yerkes, A. W. (1916). Comparison of the behavior of stock and inbred albino rats. Journal of Animal Behavior, 6, 267-296.

Researcher: female
Institution: Psych. Lab., Harvard University
Animals used: Wistar rats; 13th generation inbred rats
Reference: number, sex, stock/inbred, age
Apparatus: circular maze (Watson, 1914); Yerkes discrimination box (Yerkes, 1908).
Motive: food/hunger; pain avoidance/punishment

Reese, A. M. (1917). Light reactions of the crimson-spotted newt - Diemyctylus viridescens. Journal of Animal Behavior, 7, 29-48.

Researcher: male
Institution: West Virginia University
Animals used: 12 crimson-spotted newts (salamanders)
Reference: "the animal"
Apparatus: glass aquariums (w/water to keep newts active, and water acts as heat-screen)
Motive: 1-normal reactions to light were tested (no punishment, no reward)
2-normal reaction to heating of water (animal seeking shade)

Hunter, W. S. & J. U. Yarbrough (1917). The Interference of auditory habits in the white rat. Journal of Animal Behavior, 7, 49-65.

Researcher: male
Institution: The University of Texas
Animals used: 20 rats
Reference: by number, by set (group), or "the rat(s)"
Apparatus: T-shaped discrimination box, buzzer

Motive: turning away from or towards a given sound (trained to "turn" in a certain direction - associating the direction to a specific sound)

Olmsted, J. M. (1917). Geotropism in Planaria Maculata. Journal of Animal Behavior, 7, 81-86.

Researcher: male
Institution: Zoological laboratory of the Museum of Comparative Zoology at Harvard College
Animals used: Flat-worms
Reference: "the planarians", number
Apparatus: One-half of one surface of a glass plate, 10 x 8cm, was coated with black wax. This plate was supported in a horizontal position by wax feel 4mm. high on a second glass plate. The pair were placed in a flat dish and covered with water to the depth of 3cm. The flat dish had a collar of black paper about its sides so that only light from above could fall on the plates. Then, twenty planarians were placed at one time on the upper plate, at another on the lower one, and their positions recorded twice a day.
Motive: partly hunger, not motive, otherwise, N/A

Yarbrough, Joseph U. (1917). The delayed reaction with sound and light in cats Journal of Animal Behavior, 7, 87-110.

Researcher: male
Institution: University of Texas, Psychological Laboratory
Animals used: 8 cats
Reference: name -- cats tested on light: Bobby, Jim, Tom and Fay; and those on sound Bess, Phil, Kitty and Judy
Apparatus: complex plan
Motive: hunger

Utsurikawa, N. (1917). Temperamental differences between outbred and inbred strains of the albino rat. Journal of Animal Behavior, 7, 111-159.

Researcher: male?
Institution: Harvard Psychological Laboratory
Animals used: Albino rats
Reference: by number, source and parentage
Apparatus: cages (simple observation)
Motive: none -- observation of behavior in laboratory setting; hunger (in activity testing); defense (in viciousness testing)

Reeves, C. (1917). Moving and still lights as stimuli in a discrimination experiment with white rats Journal of Animal Behavior, 7, 160-168

Researcher: female?
Institution: none
Animals used: four male albino rats of the same litter
Reference: "the animals", by letter (A through D)
Apparatus: two crayon boxes blackened inside and out, with a doorway cut in one end. To each, on the end opposite the opening was attached a narrow vertical support with a horizontal bar on top of it. Suspended from this bar and immediately above the door was a miniature tungsten, 2 cp. lamp.
Motive: hunger -- discrimination of boxes (and therefore movement of light associated with it) to find the box with food

Pearce, B. (1917). A Note on the interference of visual habits in the white rat Journal of Animal Behavior, 7, 169-177

Researcher: female?
Institution: Psychological Lab of University of Texas (under Prof. W. S. Hunter)

Animals used: 12 crimson-spotted newts (salamanders)
Reference: "the rats", by number
Apparatus: t-shaped discrimination box, mazda light placed in a small box behind main apparatus
Motive: hunger, Punishment and reward ""rat expected to react to the presence of absence of light by turning to the left of the right as the conditions of the experiment required. When the reaction to the stimulus was correct, the animal escaped through an open alley to food -- when incorrect, an electric shock was given.

Lashley, K. S. (1917). Modifiability of the preferential use of the hands in the rhesus monkey Journal of Animal Behavior, 7, 178-186

Researcher: male?
Institution: Government Hospital for the Insane
Animals used: two rhesus monkeys
Reference: "the animal", by number
Apparatus: none other than cage
Motive: hunger, defense

Peterson, J. (1917). Frequency and recency factors in maze learning by white rats Journal of Animal Behavior, 7, 338-364

Researcher: male
Institution: University of Minnesota
Animals used: white rats
Reference: by number
Apparatus: 20 rectangular mazes
Motive: hunger

Psychobiology

Franz, S. I. & K. Lashley (1917). The retention of habits by the rat after destruction of the frontal portion of the cerebrum. Psychobiology, 1, 3-18.

Researcher: male
Institution: Government Hospital fro the Insane; Psychological Laboratory, Johns Hopkins University
Animals used: white rats
Reference: group, number, sex
apparatus: simple maze (patterned after Yerkes discrimination box)
Motive: hunger

Ogden, R. & S. I. Franz (1917). On cerebral motor control: The recovery from experimentally induced hemiplegia. Psychobiology, 1, 33-49.

Researchers: males
Institution: Psychological Laboratory, George Washington University; Government Hospital for the Insane
Animals used: 4 male monkeys (rhesus macacus), 1.5 years old
Reference: number
Apparatus: various restraints (jackets, straps)
Motive: reaction to stimuli

Watson, J. B. (1917). The effect of delayed feeding upon learning. Psychobiology, 1, 51-59.

Researcher: male
Institution: Psychological Lab., Johns Hopkins University
Animals used: 12 white rats, long-term lab stock, supplied by Dr. H. Hubbert

Reference: the animal,(s), number
Apparatus: delayed-reward problem-box, modified from that presented in *Behavior* (1914): cylindrical restraining area with release rod (picture. p. 52)
Motive: hunger

Lashley, K. S. & S. I. Franz (1917). The effects of cerebral destruction upon the habit-formation and retention in the albino rat. Psychobiology, 1, 71-139.

Researcher: males
Institution: Dept. of Psychology of the Johns Hopkins University, Government Hospital for the Insane
Animals used: white rats -- cortical destruction
Reference: the animal(s), sex, "the old female", "she", age, size: case study format
Apparatus: (1) simple maze (from prev. paper in same Journal); (2) inclined plane box; (
Motive: hunger

Lashley, K. S. (1917). The effects of strychnine and caffeine upon the rate of learning. Psychobiology, 1, 141-169.

Researcher: male
Institution: Dept. of Psychology of the Johns Hopkins University
Animals used: albino rats, approx. 65 do
Reference: the animal(s), sex, "the old female", "she", age, size: case study format
Apparatus: circular graphic maze (Watson, 1914)
Motive: hunger

Stout, J. D. (1917). On the motor functions of the cerebral cortex of the cat. Psychobiology, 1, 177-229.

Researcher: male
Institution: Laboratory of Physiology, George Washington University
Animals used: adult cats
Reference: number
Apparatus: surgical apparatus
Motive: NC: anesthesia, stimulation of motor cortex, observation of response

Dodson, J. D. (1917). Relative values of reward and punishment in habit formation. Psychobiology, 1, 231-276.

Researcher: male
Institution: Psychological Laboratory, University of Minnesota
Animals used: albino rats bred from Harvard Lab Stock ("from a pure albino "pet rat stock" secured from Miss A. E. C. Lathrop, Granby, Massachusetts" p. 237).
Reference: number
Apparatus: control box with electric shock, picture. and desc. pp. 237-240
Motive: two groups: (1) hunger -- fed "tasted corn flakes soaked in cream" (p. 241), sounds tasty; (2) electric shock

Lashley, K S. (1917). A simple maze: With data on the relation of the distribution of practice to the rate of learning. Psychobiology, 1, 353-367.

Researcher: male
Institution: The Johns Hopkins University and the University of Minnesota
Animals used: 25 albino rats trained on maze
Reference: group membership by condition of training
Apparatus: simple maze, as described above (modeled after Yerkes discrimination box , choice between single cul de sac and alley leading to food

Motive: hunger

Hunter, W. S. (1920). The temporal maze and kinaesthetic sensory processes in the white rat. Psychobiology, 2, 1-17.

Researcher: male
Institution: The University of Kansas
Animals used: white rats
Reference: number
Apparatus: (1) T-shaped discrimination box (with electric grilles); (2) Temporal maze; (3) Spatial maze composed of successive T-shape units where the choices alternate as *llrrllrrll*
Motive: hunger, electric shock (reward, punishment)

Griffith, C. R. (1920). The behavior of white rats in the presence of cats. Psychobiology, 2, 19-28.

Researcher: male
Institution: Psychological Laboratory, University of Illinois
Animals used: "five groups of docile white rats, varying in age and sex, and three females with litters, were used as subjects. Five cats, two digs, a variety of odorous chemicals, and some mice and common Norway rats were used to excite the response" (p. 20).
Reference: number
Apparatus: (1) nesting cage, to allow "minimal disturbance in the normal living conditions", object brought to them; (2) wire puzzle-box (animal brought to object)
Motive: NC - observational

Lashley, K. S. (1920). Studies of cerebral function in learning. Psychobiology, 2, 55-135.

Researcher: male
Institution: Department of Psychology of the University of Minnesota
Animals used: white rats subjected to cortical destruction. "As it was not possible to breed rats in the laboratory in time for the work, the ancestry and exact age of the animals used in the experiments is unknown" (p. 75).
Reference: group membership by location of lesion, number
Apparatus: (1) modified Slonaker revolving cage/kymograph apparatus; (2) Double-platform box, ingress (p. 74); (3) Yerkes discrimination box (visual)
Motive: hunger, food reward

Dolley Jr., W. L. (1920). The relative stimulating efficiency of continuous and intermittent light in vanessa antiopa. Psychobiology, 2, 137-176.

Researcher: male
Institution: Biological Laboratory, Randolph-Macon College, Ashland, Virginia
Animals used: butterflies reared in lab from larvae collected in field
Reference: number
Apparatus: lamps in darkroom, smoked paper
Motive: NC - observational

De Camp, J. E. (1920). Relative distance as a factor in the white rat's selection of a path. Psychobiology, 2, 245-253.

Researcher: male
Institution: Pennsylvania State College (work conducted in the Psychological Lab., Stanford University)
Animals used: white rats
Reference: number
Apparatus: (1) rectangular maze; (2) circular maze. Both equipped with two food boxes, which were alternated to eliminate association between food and direction of turn.

Motive: hunger

Dashiell, J. F. (1920). Some transfer factors in maze learning by the white rat. Psychobiology, 2, 329-350.

Researcher: male
Institution: University of North Carolina (exp'l work at Oberlin College Laboratory)
Animals used: white rats
Reference: number, group membership by training condition
Apparatus: 25 mazes (rectangular)
Motive: hunger

Ulrich, J. L. (1920). Integration of movements in learning in the albino rat: A study of the adjustment of an organism to an environment. Psychobiology, 2, 375-500.

Researcher: male
Institution:
Animals used: white rats
Reference: number, group membership by training condition
Apparatus: (1) latch-box (lovely pic. p. 388); (2) inclined-plane box (pic. p. 456)
Motive: hunger

Psychological Monographs

Sutherland, A. H. (1917). Complex reactions of the dog: A preliminary study. Psychological Monographs, 23, (3, Whole No. 100).

Researcher: male
Institution: Yale University
Animals used: 6 dogs, mongrels
Reference: letter coding (e.g. BTF = black terrier, female)
Apparatus: visual discrimination apparatus
Motive: food (no punishment)

Webb, L. W. (1917). Transfer of training and retroaction: A comparative study. Psychological Monographs, 24, (3, Whole No. 104).

Researcher: ?
Institution: Instructor in Psychology and Education, Northwestern University
Animals used: 136 albino rats; human subjects
Reference: 'subjects'
Apparatus: (1) rectangular mazes adjustable to 6 patterns; (2) pencil mazes for humans
Motive: normal hunger

Arlitt, A. H. (1918). The effect of alcohol on the intelligent behavior of the white rat. Psychological Monographs, 26, 2.

Researcher: female
Institution:
Animals used: albino rats purchased form dealer, three successive generations
Reference: sex and group number
Manipulation: groups of rats given alcohol, some became 'alcoholics', selective breeding of alcoholic pairs
Apparatus: rectangular maze
Motive: hunger

Published Experimental Reports Using Animals As Subjects: 1921-1925

American Journal of Psychology, 1921-1925: 1
Behavior Monographs, 1921-1922: 2
Comparative Psychology Monographs, 1922-1925: 7
Journal of Comparative Psychology, 1922-1925: 34
Journal of Experimental Psychology, 1921-1925: 1
Journal of General Psychology, 1921-1935: 0
Psychobiology, 1921-1921: 0
Psychological Bulletin, 1921-1925: 0
Psychological Monographs, 1921-1925: 1
Psychological Review, 1921-1925: 0

American Journal of Psychology

Liddell, H. S. (1925). The behavior of sheep and goats in learning a simple maze. American Journal of Psychology, 36, 544-552.

Researcher: male
Institution: Physiological Field Station, Cornell University
Animals sued: 11 lambs 2-3 weeks old.; 35 may lambs
Reference: number
Apparatus: outdoor maze in a field
Motive: "When the door falls the animal emerges, and, impelled by the gregarious instinct and usually by desire for food as well, finds its way down the alley" (p. 544).

Behavior Monographs

Bingham, Harold C. (1922). Visual perception of the chick. Behavior Monographs, 4, (4, Serial No. 20).

Researcher: male
Institution: Johns Hopkins University, doctoral dissertation
Animals used: four groups of Plymouth Rock chicks
Reference: number
Apparatus: discrimination-apparatus (Yerkes & Watson) p. 24-29
Motive: food association

Coburn, Charles A. (1922). Heredity of wildness and savageness in mice. Behavior Monographs, 4, (5, Serial No. 21).

Researcher: male
Institution: Harvard Psych. Lab. / Franklin Field Station
Animals used: white mice
Reference: classified by grade of savageness, sex (0 through 5, 5 as wildest) p. 4 - 8
Apparatus: N/A

Comparative Psychology Monographs

Heron, W. T., & W. S. Hunter (1922). Studies of the reliability of the problem box and the maze with human and animal subjects. I. The reliability of the inclined plane problem box as a method of measuring the learning ability of the rat. II. Correlation studies with the maze in rats and humans. Comparative Psychology Monographs, 1, (Serial No. 1).

Researchers: male
Institution: University of Kansas
Animals used: I. 80 albino rats, lab stock; II. 110 rats, 31 human subjects
Reference: number
Apparatus: I. (1) problem box (inclined plane); (2) circular maze. II. (1) simple pencil maze A; (2) Complex pencil maze B; (3) Simple rat maze A; (4) Rat maze of intermediate difficulty B; (3) Complex rat maze C (circular); (4) Otis intelligence test
Motive: hunger

Richter, C. P. (1922). A behavioristic study of the activity of the rat. Comparative Psychology Monographs, 1, No. 2.

Researcher: male
Institution: Psychological laboratory, Johns Hopkins Hospital
Animals used: albino rats
Reference: 'the animals'
Apparatus: (1) activity cage; (2) Marey tambour; (3) Kymograph; (4) double cage to restrict activity to wheel area - activity not related to food-seeking is constrained to wheel area; (5) revolving drum 29)
Motive: observation

Warden, C. J. (1923). The distribution of practice in animal learning. Comparative Psychology Monographs, 1, No. 3.

Researcher: male
Institution: University of Chicago
Animals used: albino rats from various local dealers, no strain selection
Reference: group membership
Apparatus: square maze
Motive: hunger

Wang, G. H. (1923). The relation between 'spontaneous' activity and oestrus cycle in the female white rat. Comparative Psychology Monographs, 2, No. 6.

Researcher:
Institution: Johns Hopkins Hospital
Animals used: albino rats, female
Reference: 'the animals, the rats'
Apparatus: Richter Activity Cage (pic. p. 4); (2) surgical intervention
Motive: N/A

Simmons, R. (1924). The relative effectiveness of certain incentives in animal learning. Comparative Psychology Monographs, 2, No. 7.

Researcher: female
Institution: Instructor in Educational Psychology, University of Texas
Animals used: albino rats, some born in lab, majority from local dealers
Reference: 'the rats, the animals'
Apparatus: large and small mazes designed by author
Motive: (1) hunger: bread and milk vs. sunflower seeds; (2) bread and milk vs. escape from the maze; (3) bread and milk vs. return home; (4) sex/maternal impulses; (5) bread and milk under various circumstances

Tsai, C. (1924). Comparative study of retention curves for motor habits. Comparative Psychology Monographs, 2, pp. 1-19.

Researcher: male

Institution: University of Chicago
Animals used: rats raised in lab, purchased rats
Reference: group membership
Apparatus: (1) maze; (2) inclined plane box
Motive: food incentive

Rickey, E. T. (1925). The thyroid influence on the behavior of the white rat. Comparative Psychology Monographs, 2, No. 12.

Researcher: female
Institution: Ohio State University
Animals used: Wistar rats: "gentling process" of Dr. F. S. Hammett
Reference: group membership
Apparatus: (1) Simplified Watson Circular Maze; (2) Yerkes-Kellog Double-reflection method (pic. p. 18-19)
Motive: hunger
Manipulation: thyroidectomy; injection of thyroid gland substance

Journal of Comparative Psychology

Ulrich, J. L. (1921a) Integration of movements in learning in the albino rat. A study of the adjustment of an organism to an environment. Journal of Comparative Psychology, 1, 1-95.

Researcher: male
Institution:
Apparatus: (1) rope ladder (pic. p. 3); (2) circular maze; (3) square maze, acute turns; (4) square maze, obtuse turns (pp. 26-29)
Animals used: 50 albino rats
Reference: number
Motive: hunger/food

Wheeler, G. C. (1921). The phototropism of land snails. Journal of Comparative Psychology, 1, 149-154.

Researcher: ?
Institution: Zool. Lab., Museum of Comparative Zoology, Harvard College
Apparatus: light apparatus (pic. 150)
Animals used: land snails (*Helix Aspersa* Mull)
Reference: number
Motive: phototropism

Ulrich, J. L. (1921b). Integration of movements in learning in the albino rat. A study of the adjustment of an organism to an environment. Journal of Comparative Psychology, 1, 155-199.

Researcher: male
Apparatus: (1) discrimination latch-box (p. 162); (2) problem-box: light intensity discrimination (p. 179); (3) delayed-function problem-box (p. 187)
Animals used: albino rats
Reference: number
Motive: food

Ulrich, J. L. (1921c). Integration of movements in learning in the albino rat. A study of the adjustment of an organism to an environment. Journal of Comparative Psychology, 1, 221-286.

Researcher: male
Institution:

Apparatus:(1) inclined-plane latch-box; (2) sawdust box; (3) circular maze; (4) square maze; (5) rope ladder
Animals used: 20 albino rats
Reference:
Motive: food/hunger

Stone, C. P. (1921). Notes on light discrimination in the dog. Journal of Comparative Psychology, 1, p. 413-431.

Researcher: male
Institution: Psychological Laboratory, Indiana University
Animals used: cocker spaniel; 2 fox terriers; mongrels; 10 humans
Reference: sex, age, species
Apparatus: (1) adapted Yerkes-Watson brightness apparatus: termed 'control box', with "punishment grill" (oxidized copper wires)
Motive: avoidance of pain

Atkins, E. W. & J. F. Dashiell (1921). Reactions of the white rat to multiple stimuli in temporal orders. Journal of Comparative Psychology, 1, pp. 433-452.

Researchers: male, male
Institution: University of North Carolina
Animals used: albino rats (Wistar); 6 male, 6 female
Reference: number and sex, identified by slits cut in ears and shaved in hair
Apparatus: temporal maze
Motive: food, pain avoidance

Lashley, K. S. (1921). II. The effects of long continued practice on cerebral localization. Journal of Comparative Psychology, 1, pp. 453-xxx.

Researcher: male
Institution: Department of Psychology, University of Minnesota
Animals used: 16 albino rats
Reference: number
Apparatus: discrimination box
Motive: food / punishment

Bills, M. A. & O. Maukin (1921). Preliminary study of the effects of methyl alcohol fumes on brightness discrimination in the white rat. Journal of Comparative Psychology, 1, pp. 495-504.

Researchers: ?, female
Institution: Carnegie Institute of Technology; University of Kansas (lab there)
Animals used: 18 albino rats, lab stock
Reference: number
Apparatus: (1) Yerkes discrimination box and brightness apparatus with movable stimulus adapter; ... (2) alcohol box (pic. p. 497)
Motive: electric shock/pain avoidance

Kuo, Z. Y. (1922). The nature of unsuccessful acts and their order of elimination in animal learning. Journal of Comparative Psychology, 2, 1-27.

Researcher: male
Institution: Psychological Laboratory, University of California
Animals used: 13 black & white rats
Reference: number
Apparatus: "Multiple-choice" apparatus: food box short path/food box long path/ confinement/electric shock

Motive: food reward, shock punishment, avoid confinement

Hunter, W. S. (1922). Habit interference in the white rat and in human subjects. Journal of Comparative Psychology, 2, 29-59

Researcher: male
Institution: University of Kansas
Animals used: rats
Reference: number
Apparatus: (1) T-shaped discrimination box (Hunter, Yarbrough and Pearce); (2) circular maze
Motive: pain avoidance

Stone, C. P. (1922). The congenital sexual behavior of the young male albino rat. Journal of Comparative Psychology, 2, 95-153.

Researcher: male
Institution: University of Minnesota
Animals used: male and female albino rats; guinea pig
Reference: sex, age, number
Apparatus: observation cages
Motive: N/A

Nicholls, E. E. (1922). A study of the spontaneous activity of the guinea pig. Journal of Comparative Psychology, 2, 303-330.

Researcher: female
Institution: Department of Physiology, School of Hygiene and Public Health, Johns Hopkins University
Animals used: guinea pigs
Reference: by letter
Apparatus: (1) observation cages (Richter, 1921); (2) kymograph
Manipulations: light, dark, alone, groups, exhaustion, temperature
Motive: normal activity

Cowan, E. A. (1923). An experiment testing the ability of the cat to make delayed response and to maintain a given response toward a varying stimulus. Journal of Comparative Psychology, 3, 1-10.

Researcher: female
Institution: Wichita, Kansas
Animal: cat
Reference: proper name, "Mitzi"
Apparatus: living-room problem-box
Motive: food

Sadovinkova, M. P. (1923a). A study of the behavior of birds in a maze. Journal of Comparative Psychology, 3, 123-139.

Researcher: female
Institution: Institute of Experimental Biology, Moscow
Animals used: assorted wild birds: canaries, bullfinches, siskin, cha-finches, pine-grosbeak, crossbills, tomtit, parrots, finch
Reference: species, sex
Apparatus: Hampton Court Maze
Motive: hunger/food

Sadovinkova, M. P. (1923b). A study of the behavior of birds by the multiple choice method. Journal of Comparative Psychology, 3, 249-282.

Researcher: female
Institution: Institute of Experimental Biology, Moscow
Animals used: Animals: birds (see 1923a)
Reference: siskins: "Peppo" & "Alladin"; Canaries: "Ellis" & "Badrool-Boodoor"; Bullfinch: "Anaxagore"
Apparatus: multiple choice box (p. 252)
Motive: food

White, A. E. & E. C. Tolman (1923). A note on the elimination of short and long blind alleys. Journal of Comparative Psychology, 3, 327-333.

Researchers: male
Institution: University of California
Animals used: 14 male rats
Reference: number
Apparatus: "three-choice" box, short blind and long blind
Motive: food/ pain avoidance

Spencer, L. T. (1923). Central inhibition in the albino rat. Journal of Comparative Psychology, 3, 389-408.

Researcher: ?
Institution: Yale University / began work at University of Minnesota
Animals used: 7 albino rats
Reference: number
Apparatus: Yerkes discrimination box, electric shock
Motive: food/hunger; pain avoidance

Stone, C. P. (1923). Further study of sensory functions in the activation of sexual behavior in the young male albino rat. Journal of Comparative Psychology, 3, 469-478.

Researcher: male
Institution: Stanford University
Animals used: white male rats without feeling in the penis
Reference: the rats, the animal
Apparatus: observation cage
Motive: NFC, observation

Tolman, E. C. (1924). The inheritance of maze-learning ability in rats. Journal of Comparative Psychology, 4, 1-18.

Researcher: male
Institution: University of California
Animals used: 82 rats, white, black and grey hooded; genetically selected "bright" and "dull" rats
Reference: sex, group number
Apparatus: two mazes (sex-segregated)
Motive: food/hunger

Macht, D. I. & D. W. Seago (1924). Effect of ovariectomy and lutein injections on the behavior of rats. Journal of Comparative Psychology, 4, 151-162.

Researchers: male, female
Institution: Pharmacological and Psychological Laboratories, Johns Hopkins University
Animals used: female albino rats, 60 - 90 days old

Reference: group number
Apparatus: circular maze (adjustable)
Motive: food/ hunger

Stone, C. P. (1924). Delay in the awakening of copulatory activity in the male albino rat incurred by defective diets. I. Quantitative deficiency. Journal of Comparative Psychology, 4, 195-224.

Researcher: male
Institution: Stanford University
Animals used: male albino rats
Reference: group number
Apparatus: observation cages
Motive: N/A observation

Hunter, W. S. & V. Randolph (1924). Further studies on the reliability of the maze with rats and humans. Journal of Comparative Psychology, 4, 431-442.

Researchers: males
Institution: University of Kansas
Animals used: albino rats, psychology students
Reference: number
Apparatus: Rats: (1) problem box; (2) T-maze; (3) straight-away; Humans: Complex maze B
Motive: food

Moseley, D. (1925). The accuracy of the pecking response in chicks. Journal of Comparative Psychology, 5, 75-98.

Researcher: female
Institution: Department of Psychology, University of Kansas
Animals used: Plymouth Rock chickens hatched in lab
Reference: group number
Apparatus: "pecking apparatus" pic. p. 81
Motive: food

Stone, C. P. (1925). Delay in the awakening of copulatory activity in the male albino rat incurred by defective diets. Journal of Comparative Psychology, 5, 177-204.

Researcher: male
Institution: Department of Psychology, Stanford University
Animals used: albino rats, male
Reference: group number, age
Apparatus: observation cages
Motive: NC, observation

Sams, C. F. & E. C. Tolman (1925). Time discrimination in white rats. Journal of Comparative Psychology, 5, 255-264.

Researchers: males
Institution: University of California
Animals used: albino rats
Reference: number
Apparatus: Time discrimination box (two detention chambers of different length)
Motive: food

Kuroda, R. (1925). A contribution to the subject of the hearing of tortoises. Journal of Comparative Psychology, 5, 285-292.

Researcher: male
Institution: College of Niigita, Japan
Animals used: 6 tortoises (*Clemmys japonica*)
Reference: number
Apparatus: auditory discrimination box with electric shock
Motive: pain avoidance

Revesz, G. (1925). Studies of discrimination in monkeys. Journal of Comparative Psychology, 5, 293-344.

Researcher: male
Institution: Psychological and Pedagogical Lab, Amsterdam
Animals used: monkeys (Pitheci Rhesi, Cercocebul fulginosis)
Reference: "the monkey"
Apparatus: 4-box Yerkes multiple choice discrimination apparatus
Motive: food

Warden, C. J. (1925). The value of the preliminary period in the feeding box. Journal of Comparative Psychology, 5, 365-372.

Researcher: male
Institution: Columbia University
Animals used: 14 albino rats
Reference: group letter
Apparatus: Inclined-plane box (Bassett)
Motive: food

Dashiell, J. F. & H. A. Helms (1925). The learning by white rats of an inclined plane maze. Journal of Comparative Psychology, 5, 397-406.

Researchers: ?
Institution: University of North Carolina
Animals used: 9 albino rats
Reference: number
Apparatus: simple maze (pic. p. 398)
Motive: food/hunger

Tsai, C. (1925). The relative strength of sex and hunger motives in the albino rat. Journal of Comparative Psychology, 5, 407-416.

Researcher: male
Institution: Fuh Tan University, Shanghai
Animals used: albino rats
Reference: group number
Apparatus: choice box
Motive: sex drive versus hunger drive

Bierens de Haan, J. A. (1925). Experiments on vision in monkeys. I. The colour-sense of the pig-tailed Macaque. Journal of Comparative Psychology, 5, 417-454.

Researcher: ?
Institution: Psychological Institute of the Free University, Amsterdam

Animals used: pig-tailed macaque Nemestrinus *(Macacus) nemestrinus L.*
Reference: "Kobus", "Klaas"
Apparatus: modified Multiple Choice apparatus (pp. 424-425)
Motive: food reward

Miller, S. D. & M. Gans (1925). Some observations on the reaction of the ant *Crematogaster Lincolata* (Say) to heat. Journal of Comparative Psychology, 5, 465-474.

Researcher: ?
Institution: Ohio State University
Animals used: colony of ants living outside lab building
Reference: number of ants
Apparatus: heating and cooling devices installed in ant colony
Motive: N/A observational;

Liddell, H. S. (1925). The relation between maze learning and spontaneous activity in the sheep. Journal of Comparative Psychology, 5, 475-484.

Researcher: male
Institution: Physiological Field Station, Cornell University Medical College, Ithica, NY
Animals used: 17 and 18 may lambs at field station
Reference: group / activity level
Apparatus: mazes (outdoor)
Motive: food

Dunlap, K. (1925). Adaptation of nystagmus to repeated caloric stimulation in rabbits. Journal of Comparative Psychology, 5, 485-.

Researcher: male
Institution: Psychological Lab/. Johns Hopkins University
Animals used: white rabbits
Reference: number
Apparatus: (1) restraining harnesses; (2) heat device (irrigation)
Motive: NFC

Journal of Experimental Psychology

Moss, F. (1924). Study of animal drives. Journal of Experimental Psychology, 7, 165-185.

Researcher: ?
Institution: George Washington University
Animals used: 36 albino rats, 125-200 d.o.
Reference: number: males odd, females even
Apparatus used: experiment box with water and brass plates conducting electric shock; maze from army beta intelligence test
Motive: food vs. shock; food vs. sex drive; food vs. maternal drive

Psychological Monographs

Yarbrough, J. U. (1921). The influence of the time interval upon the rate of learning in the white rat. Psychological Monographs, 30, (2, Whole No. 135).

Researcher: male
Institution: University of Chicago

Animals used: white rats
Reference: number
Apparatus: (1) maze, devised by Carr & Freeman (PR, Vol. 26, p. 465); (2) Zimmerman kymographs; (3) sound stimulus; (4) electric current for shock induction (pic. p. 17)
Motive: hunger, punishment

Published Experimental Reports Using Animals As Subjects: 1926-1930

American Journal of Psychology, 1926-1930: 1
Comparative Psychology Monographs, 1926-1930: 21
Journal of Comparative Psychology, 1926-1930: 71
Journal of Experimental Psychology, 1926-1930: 2
Journal of General Psychology, 1926-1930: 1
Psychological Bulletin, 1926-1930: 0
Psychological Monographs, 1926-1930: 1
Psychological Review, 1926-1930: 0

American Journal of Psychology

Upton, M. (1929). The auditory sensitivity of guinea pigs. American Journal of Psychology, 41, 412-421.

Researcher:
Institution: Harvard University
Animals used: guinea pigs
Reference:
Apparatus: (1) sound-proof box; (2) electrodes; (3) graphing machines
Motive: pain avoidance (electric shock)

Comparative Psychology Monographs

Heron, W. T., & W. S. Hunter (1922). Studies of the reliability of the problem box and the maze with human and animal subjects. I. The reliability of the inclined plane problem box as a method of measuring the learning ability of the rat. II. Correlation studies with the maze in rats and humans. Comparative Psychology Monographs, 1, (Serial No. 1).

Researchers: male
Institution: University of Kansas
Animals used: I. 80 albino rats, lab stock. II. 110 rats; 31 human subjects
Reference: number
Apparatus: I. (1) problem box (inclined plane); (2) circular maze; (3) square maze. II. (1) Simple pencil maze A; (2) Complex pencil maze B; (3) Simple rat maze A; (4) Rat maze of intermediate difficulty B; (3) Complex rat maze C (circular); Otis intelligence test
Motive: hunger

Richter, C. P. (1922). A behavioristic study of the activity of the rat. Comparative Psychology Monographs, 1, (Serial No. 2).

Researcher: male
Institution: Psychological laboratory, Johns Hopkins Hospital
Animals used: albino rats
Reference: 'the animals'
Apparatus: (1) activity cage; (2) Marey tambour; (3) Kymograph; (4) double cage to restrict activity to wheel area - activity not related to food-seeking is constrained to wheel area (pic. p. 49); (5) revolving drum (pic. p. 26)
Motive: observation

Warden, C. J. (1923). The distribution of practice in animal learning. Comparative Psychology Monographs, 1, (Serial No. 3).

Researcher: male
Institution: University of Chicago
Animals used: 168 albino rats from various local dealers, no strain selection
Reference: group membership
Apparatus: square maze
Motive: hunger

Wang, G. H. (1923). The relation between 'spontaneous' activity and oestrus cycle in the female white rat. Comparative Psychology Monographs, 2, (Serial No. 6).

Researcher:
Institution: Psychological Lab., Phipps Psychiatric Clinic, Johns Hopkins Hospital
Animals used: albino rats, female
Reference: 'the animals, the rats'
Apparatus: Richter Activity Cage (pic. p. 4); (2) surgical intervention
Motive: N/A

Simmons, R. (1924). The relative effectiveness of certain incentives in animal learning. Comparative Psychology Monographs, 2, (Serial No. 7).

Researcher: female
Institution: Instructor in Educational Psychology, University of Texas
Animals used: albino rats, some born in lab, majority from local dealers
Reference: 'the rats. the animals'
Apparatus: large and small mazes designed by author
Motive: (1) hunger: bread and milk vs. sunflower seeds; (2) bread and milk vs. escape from the maze; (3) bread and milk vs. return home; (4) sex/maternal impulses; (5) bread and milk under various circumstances

Tsai, C. (1924). Comparative study of retention curves for motor habits. Comparative Psychology Monographs, 2, (Serial No. 11).

Researcher: male
Institution: University of Chicago
Animals used: (1) rats raised in lab, purchased rats; (2) 96 psychology students
Reference: group membership
Apparatus: (1) maze; (2) inclined plane box; (3) stylus maze
Motive: food incentive

Rickey, E. T. (1925). The thyroid influence on the behavior of the white rat. Comparative Psychology Monographs, 2, (Serial No. 12).

Researcher: female
Institution: Ohio State University
Animals used: Wistar rats: "gentling process" of Dr. F. S. Hammett
Reference: group membership
Apparatus: (1) Simplified Watson Circular Maze; (2) Yerkes-Kellog Double-reflection method (pic. p. 18-19)
Motive: hunger
Motive: thyroidectomy; injection of thyroid gland substance

Holden, Frances (1926). A study on the effect of starvation upon behavior by means of the obstruction method. Comparative Psychology Monographs, 3, (Serial No. 17).

Researcher: female (?)
Institution: Psychological Laboratory, Columbia University (dir. of C. J. Warden)
Animals used: 803 albino rats: by starvation group and shock level
Reference: group
Apparatus:(1) control box for testing the animal; (2) mechanism for the control of the current supplied to the grill
Method: obstruction method

Williams, Joseph A. (1926). Experiments with form perception and learning in dogs. Comparative Psychology Monographs, 4, (Serial No. 18).

Researcher: male
Institution: Professor of Education and Psychology, South Dakota State College / Indiana University lab (dir. Haggerty)
Animals used: assorted male and female dogs, obtained from kennels, laboratory stock, or otherwise unspecified
Reference: all dogs in first series have proper names: Bumps, Chloe, Jack, Spotty, Blackie. Larry, and Curly. Commonly referred to as "subject number x" in the text. Dogs in second series have no proper names at all.
Apparatus: First series: Yerkes Brightness Apparatus (modification constructed at Indiana U. lab). Second series: maze with electric shock circuitry
Method: discrimination task

Warner, L. H. (1927). A study of sex behavior in the white rat by means of the obstruction method. Comparative Psychology Monographs, 4, (Serial No. 22).

Researcher: male
Institution: Psychological Laboratory, Columbia University (dir. by C. J. Warden)
Animals used: male and female albino rats (Wistar)
Reference: number
Apparatus: obstruction box apparatus, as described in an earlier article
Method: obstruction method

Bingham, H. C. (1928). Sex development in apes. Comparative Psychology Monographs, 5, (1, Serial No. 23).

Researcher: male
Institution: Institute of Psychology, Yale University
Animals used: 4 Chimpanzees @ Yale Inst. of Psych
Reference: Dwina, Billy, Pan and Wendy (photos p. 39)
Apparatus: experiment room with special viewing areas ("neutral environment') diagram p. 61
Motive: no choice - observational

Yerkes, R. M. (1928). The mind of a gorilla part III. Memory. Comparative Psychology Monographs, 5, (2, Serial No. 24).

Researcher: male
Institution: Yale University (observed at Ringling Bros. in Sarasota, FL)
Animals used: Ringling Bros. Circus Gorilla
Reference: "Congo" (photos pp. 86-87)
Apparatus: turntables with closed food containers for memory experiments (pic. p. 84-85)
Motive: hunger

Bingham, H. C. (1929). Chimpanzee translocation by means of boxes. Comparative Psychology Monographs, 5, (3, Serial No. 25).

Researcher: male
Institution: Institute of Psychology, Yale University
Animals used: 4 chimps
Reference: Dwina, Pan, Billy and Wendy
Apparatus: (1) standardized boxes: wooden crates (pic. p. 4); (2) experiment room with critical observation area, separate observation room, rope at ceiling
Motive: food/hunger

Bingham, H. C. (1929). Selective transportation by chimpanzees. Comparative Psychology Monographs, 5, (4, Serial No. 26).

Researcher: male
Institution: Yale University
Animals used: 4 chimps
Reference: proper names; Dwina, Pan, Billy and Wendy (even deadlier pic., p. 5)
Apparatus: Transportation cage (pic. p. 4), modular problem box: transport food to a place of accessibility under a number of selective conditions
Motive: food/hunger

Adams, D. K. (1929). Experimental studies of adaptive behavior in cats. Comparative Psychology Monographs, 6, (1, Serial No. 27).

Researcher: male
Institution: Wesleyan University
Animals used: cats from the cat colony at Yale
Reference: all have proper names
Apparatus: (1) As close to exact duplicates of Thorndike's boxes as possible (desc. and photos of Thorndike's boxes pp. 28-35) - egress type; (2) cubical cage (with levers, pic. p. 96); (3) string; (4) boxes
Motive: *hunger, escape confinement, reach food, etc.*

Ligon, E. M. (1929). A comparative study of certain incentives in the learning of the white rat. Comparative Psychology Monographs, 6, (2, Serial No. 28).

Researcher: male
Institution: Assistant Professor of Psychology, Connecticut College (conducted at Yale lab)
Animals used: albino rats
Reference: group membership
Apparatus: (1) combination maze/puzzle box, own design (pp. 10 - 13, desc. & pic.); (2) activity cage (history of, pp. 15-17); (3) activity chronograph
Motive: hunger, presence of another rat; buzzer; no hunger

Maier, N. R. (1929). Reasoning in white rats. Comparative Psychology Monographs, 6, (3, Serial No. 29).

Researcher: male
Institution: University of Michigan/University of Berlin
Animals used: albino rats
Reference: letters and numbers
Apparatus: (1) maze with obstacles to food; (2) various configurations of apparatus and furniture in lab (see pp. 34 - 37).
Motive: hunger/food

Schneirla, T. C. (1929). Learning and orientation in ants. Comparative Psychology Monographs, 6, (4, Serial No. 30).

Researcher: male

Institution: NYU (Washington Square College)/University of Michigan Lab
Animals used: ants (*Formica*) maj. taken from their field nests
Reference: letter and species name
Apparatus: universal maze (pic. p. 28)
Motive: food

Perkins, F. Theodore and Wheeler, Raymond Holder (1930). Configurational learning in the goldfish. Comparative Psychology Monographs, 7, (1, Serial No. 31).

Researcher: males
Institution: University of Kansas
Animals used: 42 goldfish
Reference: group number, "Individual fish were distinguished by characteristic markings" (p. 7)
Apparatus: aquarium, modified multiple-choice task
Method: multiple choice
Motive: conditioned stimulus - light and food

Dashiell, J. F. (1930). Direction orientation in maze running by the white rat. Comparative Psychology Monographs, 7, (2, Serial No. 32).

Researcher:
Institution: University of North Carolina
Animals used: albino rats "from a colony locally maintained and originally derived from stock obtained from the Wistar Institute" (p. 7).
Reference: group
Apparatus: F-B Maze, Multiple T Maze, Open-Alley Maze, Center-Entrance Mazes;
Method: maze
Motive: food

Hanawalt, Ella May (1930). Whole and part methods in trial and error learning. Comparative Psychology Monographs, 7, (5, Serial No. 35).

Researcher: female
Institution: University of Michigan (sup. J. F. Shepherd)
Animals used: 15 male albino rats "Most of them were bred in the laboratory, a few were secured from a near-by dealer and two from the Wistar Institute of Anatomy in Philadelphia" (p. 14).
Reference: number
Apparatus: Shepherd Universal Maze ("the maze in the University of Michigan laboratories, designated by Cameron (4) as the "Shepherd universal type," designed by Shepherd and briefly described by him (28)" (p. 10).
Method: whole versus part
Motive: hunger

Journal of Comparative Psychology

Stone, C. P. (1926). The initial copulatory response of female rats reared in isolation from the age of twenty days to the age of puberty. Journal of Comparative Psychology, 6, 73-84.

Researcher: male
Institution: Stanford University
Animals used: white rats
Reference:
Apparatus: isolation cages, observation cages
Motive: N/A

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Animals used: normal and malnourished rats (pic. p. 351)
Reference: group number
Apparatus: modular/universal maze (p. 343)
Motive: hunger

Dunkelberger, I. (1926). Spiral movement in mice. Journal of Comparative Psychology, 6, 383-390.

Researcher: female
Institution: University of Kansas
Animals used: mice (peromyscus maniculatus)
Reference: letter and date of birth
Apparatus: (1) water tank: (2) tiny mice-sized blindfolds
Motive: hunger

King, B. G. (1926). The influence of repeated rotations on decerebate and blinded squabs. Journal of Comparative Psychology, 6, 399-422.

Researcher: male
Institution: Rudolf Spreckels Physiological Laboratory, University of California
Animals used: pigeons (blinded); pigeons (decerebrate)
Reference: number
Apparatus: (1) Maxwell rotating table, modified pigeon holder; (2) kymographs (good pics. p. 400- 407); pigeon holder; (4) Jacquet chronograph, signal magnet, writing lever
Motive: NFC

Lashley, K. S. & D. A. McCarthy (1926). The survival of the maze habit after cerebellar injuries. Journal of Comparative Psychology, 6, 423-434.

Researcher: male, female
Institution: Department of Psychology, University of Minnesota
Animals used: albino rats
Reference: number
Apparatus: rectangular maze, 8 cul-de-sacs
Motive: hunger

Stone, C. P. (1926). The effect of cerebral destruction on the sexual behavior of male rabbits. III. The frontal, occipital and parietal regions. Journal of Comparative Psychology, 6, 435-448.

Researcher: male
Institution: Stanford University
Animals used: rabbits (Himalayan and Flemish giants)
Reference: case number, sex, age
Apparatus: observation cages
Motive: NFC - observational

Agar, W. E. (1927). The regulation of behavior in water-mites and some other arthopods. Journal of Comparative Psychology, 7, 1-38.

Researcher: male
Institution: Dept. of Zoology, University of Melbourne
Animals used: water-mites (Hydrachnida acarina)
Reference: group, number
Apparatus: maze box in water tank
Motive: escape confinement

Hubbard, R. M. (1927). The stimulus for the visual discrimination habit. Journal of Comparative Psychology, 7, 75-82.

Researcher: female
Institution: University of Minnesota
Animals used: albino rats
Reference: number
Apparatus: Discrimination box with electric lights
Motive: food, electric shock

Gayton, A. H. (1927) The discrimination of relative and absolute stimuli by albino rats. Journal of Comparative Psychology, 7, 93-105.

Researcher: male
Institution: University of California (E. C. Tolman, supervisor)
Animals used: albino rats
Reference: number
Apparatus: visual discrimination box
Motive: food reward / hunger

Warden, C. J. & E. L. Haas (1927). The effect of short intervals of delay in feeding upon speed of maze learning. Journal of Comparative Psychology, 7, 107-116.

Researcher: male, female
Institution: Columbia University
Animals used: 43 albino rats
Reference: 'subject', group membership
Apparatus: 8 cul-de-sac maze with restraining device fro delay period (p. 110)
Motive: hunger

Warden, C. J. & Aylesworth, M. (1927). The relative value of reward and punishment in the formation of a visual discrimination. Journal of Comparative Psychology, 7, 117-127.

Researcher: male, female
Institution: Psychological Laboratory, Columbia University
Animals used: 10 albino rats
Reference: group membership, number
Apparatus: modified Yerkes-Watson box
Motive: pain avoidance and hunger
Motive: electric shock - punishment; food - reward

McDougall, W, & McDougall, K. D. (1927). Notes on instinct and intelligence in rats and cats. Journal of Comparative Psychology, 7, 145-176.

Researcher: males
Institution: Harvard University
Animals used: Wistar rats; cats
Reference:
Apparatus: (1) bath-maze (rats); (2) discrimination box in water tank (rats); (3) latched puzzle-box (ingress) cats & rats
Motive: avoidance of water, food reward, escape confinement
Manipulation: pairing of electric shock and light stimuli

Loutitt, C. M. (1927). Reproductive behavior of the guinea pig. I. The normal mating behavior. Journal of Comparative Psychology, 7, 247-263.

Researcher: male
Institution: Institute of Psychology, Yale University
Animals used: young guinea pigs from pedigreed stock at Cornell
Reference:
Apparatus: observation cage
Motive: isolation, observation

Stone, C. P. (1927). The retention of copulatory ability in male rats following castration. Journal of Comparative Psychology, 7, 369-387.

Researcher: male
Institution: Stanford University
Animals used: 45 male albino rats reared in lab., "large and healthy"
Reference: number
Apparatus: observation cage
Motive: NC

Ruch, T. C. (1927). Preliminary study of the ability of the albino rat to discriminate inclined planes. Journal of Comparative Psychology, 7, 405-423.

Researcher: male
Institution: University of Oregon
Animals used: specially blinded albino rats
Reference: number
Apparatus: inclined plane discrimination box with electric shock(pic. p. 408)
Motive: NC

Shirley, M. (1928). Studies of activity. I. Consistency of the revolving drum method of measuring the activity of the rat. Journal of Comparative Psychology, 8, 23-38.

Researcher: female
Institution: University of Minnesota
Animals used: male rats "no cyclic activity"
Reference: group membership
Apparatus: activity drums, Veeder counter, no nest boxes
Motive: observation

Muenzinger, K. F. (1928). Plasticity and mechanization of the problem box habit in guinea pigs. Journal of Comparative Psychology, 8, 45-69.

Researcher: male
Institution: University of Colorado
Animals used: 13 guinea pigs
Reference: group membership
Apparatus: problem box (ingress) with lever
Motive: food

Chang, H. S. & Liu, S. Y. (1928). The influence of the ligation of the two common carotid arteries on maze performance by the white rat. Journal of Comparative Psychology, 8, 71-73.

Researcher: males
Institution:
Animals used: rats

Reference:
Apparatus: maze
Motive:

Liu, S. Y. (1928). The relation of age to the learning ability of the white rat. Journal of Comparative Psychology, 8, 75-85.

Researcher: male
Institution: Psychological Lab., University of Chicago
Animals used: white rats, 7 groups
Reference: group membership
Apparatus: maze
Motive: hunger

Ho, H. Y. (1928). Transfer and degree of integration. Journal of Comparative Psychology, 8, 87-99.

Researcher: male
Institution: Psychological Lab., University of Chicago
Animals used: albino rats, Wistar Institute: 3 age groups, 17 total
Reference: group membership, lettered
Apparatus: 2 mazes: Webb (PM, 1917); Wiltbank (BM, 1919).
Motive: hunger

Fields, P. E. (1928). Form discrimination in the white rat. Journal of Comparative Psychology, 8, 143-157.

Researcher: male
Institution: Psychological Lab., Ohio Wesleyan University
Animals used: white rats
Reference:
Apparatus: form discrimination box of own design
Motive: hunger

Shirley, M. (1928a). Studies in activity. II. Activity rhythms; age and activity; activity after rest. Journal of Comparative Psychology, 8, 159-185.

Researcher: female
Institution: University of Minnesota
Animals used: 31 albino rats
Reference:
Apparatus: save as previous, activity cage/revolving drum
Motive: NC - observational

Shirley, M. (1928b). Studies in activity. IV. The relation of activity to maze learning and to brain weight. Journal of Comparative Psychology, 8, 187-195.

Researcher: female
Institution: University of Minnesota
Animals used: 29 male 4 m.o. rats
Reference:
Apparatus: 8 cul-de-sac maze (Lashley); activity drums
Motive: food reward

Tinklepaugh, O. L. (1928). An experimental study of representative factors in monkeys. Journal of Comparative Psychology, 8, 197-235.

Researcher: male
Institution: Yale/UC Berkeley
Animals used: Macacus cynomologos; Macacus rhesus
Reference: Psyche, Topsy, Cupid & Eva
Apparatus: delayed reaction apparatus
Motive: food

Yerkes, R. M. & D. M. Yerkes (1928). Concerning memory in the chimpanzee. Journal of Comparative Psychology, 8, 237-271.

Researcher: males
Institution: Yale University, Franklin Field Station
Animals used: chimpanzees
Reference: Wendy, Pan, Billy & Dwina
Apparatus: discrimination table
Motive: food

Warner, L. H. (1928). A study of hunger behavior in the white rat by means of the obstruction method. A comparison of sex and hunger behavior. Journal of Comparative Psychology, 8, 273-299.

Researcher: ?
Institution: Animal Lab., Department of Anthropology, University of California
Animals used: white rats
Reference: 'animals'
Apparatus: obstruction apparatus
Motive: sex and food

Clements, F. E. (1928). The effect of time on distance discrimination in the albino rat. Journal of Comparative Psychology, 8, 317-323.

Researcher: male
Institution: Department of Anthropology, University of California
Animals used: rats
Reference: 'animals', 'he'
Apparatus: T-shaped apparatus with detention chamber and straightaway
Motive: hunger, confinement

Warden, C. J. & H. W. Nissen (1928). An experimental analysis of the obstruction method of measuring animal drives. Journal of Comparative Psychology, 8, 325-342.

Researcher: males
Institution: Columbia Univ.
Animals used: Wistar rats
Reference:
Apparatus: obstruction apparatus (Jenkins & Warden, 1923)
Motive: food incentive, electric shock

Valentine, W. L. (1928). Visual perception in the white rat. Journal of Comparative Psychology, 8, 369-375.

Researcher: male
Institution: Psychological Lab., Ohio Wesleyan University
Animals used: 19 rats
Reference: number
Apparatus: 3-arm maze with 2 cul-de-sacs
Motive: food

Gengerelli, J. A. (1928). The effect of rotating the maze on the performance of the hooded rat. Journal of Comparative Psychology, 8, 377-383.

Researcher:
Institution: University of Pennsylvania; Animal Lab., University of Wisconsin
Animals used: 8 normal hooded rats
Reference: letter
Apparatus: adjustable maze, unit type
Motive: food

Woodrow, H. (1928). Temporal discrimination in the dog. Journal of Comparative Psychology, 8, 395-427.

Researcher: male
Institution: Univ. of Illinois
Animals: 2 rhesus monkeys
Reference: letter
Apparatus: 2 pendula, sound-hammer, electric circuit, cage
Motive: food

Gengerelli, J. A. (1928). Preliminary experiments on the causal factors in animal learning. Journal of Comparative Psychology, 8, 459-481.

Researcher: male
Institution: Univ. Pennsylvania
Animals: 15 albino rats
Reference: group, number
Apparatus: Shephers Universal Maze, 20 units, galvanized tin plates
Motive: food

Cohen, L. H. (1929). The relationship between refractory phase and negative adaptation in reflex response. Journal of Comparative Psychology, 9, 1-15.

Researcher: male
Institution: Yale University
Animals used: 8 guinea pigs
Reference: 'animal'
Apparatus: way too complicated: pp. 3-6; 2 noise stimuli
Motive: NC observational

Swartz, R. D. (1929). Modification of behavior in earthworms. Journal of Comparative Psychology, 9, 17-33.

Researcher: female
Institution: Laboratory of Zoology and Anatomy, University of Nebraska
Animals used: earthworms: Helodrilus caliginosus, H. parrus, H. foetidus: collected from pond/compost @ Nebraska State Fair Grounds
Reference:
Apparatus: Y-shaped tubs
Motive: pain avoidance

Lashley, K. S. & J. Ball (1929). Spinal conduction and kinesthetic sensitivity in the maze habit. Journal of Comparative Psychology, 9, 71-105.

Researcher: male, female
Institution: University of Chicago

Animals used: white rats, 2 groups, from local dealer
Reference: number, condition
Apparatus: 8 cul-de-sac maze which record errors automatically
Motive:

Fields, P. E. (1929). The white rats' use of visual stimuli in the discrimination of geometrical figures. Journal of Comparative Psychology, 9, 107-121.

Researcher: male
Institution: Ohio State University
Animals used: rats
Reference: letter/number
Apparatus: discrimination box as previously used
Motive: food

Woodrow, H. (1929). Discrimination by the monkey of temporal sequences of varying number of stimuli. Journal of Comparative Psychology, 9, 123-157.

Researcher: male
Institution: University of Illinois
Animals used: 3 rhesus monkeys
Reference: letter: D, Y & J
Apparatus: electromagnetic sound hammer, pendulum
Motive: food

Brown, C. H. & M. H. Hatch (1929). Orientation and "Fright" reactions of whirligig beetles (Gyrindaes). Journal of Comparative Psychology, 9, 159-185.

Researcher: males
Institution: Zoological Lab., University of Michigan
Animals used: beetles
Reference:
Apparatus: circular tank, rotation of water (currents), varying temperature, water levels; shutters to change illumination levels
Motive: NC observational

Sturman-Hulbe, M. & C. P. Stone (1929). Maternal behavior in the albino rat. Journal of Comparative Psychology, 9, 203-237.

Researcher: female, male
Institution: Department of Psychology, Stanford University
Animals used: 15 pregnant female rats
Reference: number
Apparatus: separate cages with various nesting materials: dirt, shavings, sand, sawdust
Motive: NC - observational

Leuba, J. H. & V. Fain (1929). Note on orientation in the white rat. Journal of Comparative Psychology, 9, 239-243.

Researcher: male, female
Institution: Bryn Mawr
Animals used: 4 rats
Reference: "rat"
Apparatus: maze with living cage attached, rotated
Motive: food

Gengerelli, J. A. (1929). Preliminary experiments on the causal factors in animal learning. II. Journal of Comparative Psychology, 9, 245-273.

Researcher: male
Institution: University of Pennsylvania
Animals used: 8 rats
Reference: number
Apparatus: 4 cul-de-sac maze, various configurations
Motive: food

Warden, C. J. & J. Barr (1929). The Muller-Lyon illusion in the ring dove, Turtur risorius. Journal of Comparative Psychology, 9, 275-292.

Researcher" males
Institution: Animal Lab., Department of Psychology, Columbia University
Animals used: ring dove, Turtur risorius
Reference: number
Apparatus: *animal control section of the Columbia modification of the Yerkes-Watson discrimination* apparatus
Motive: starved and fed on alternate days, shock used to "break up place habits"

Warden, C. J. & J. B. Rowley (1929). The discrimination of absolute versus relative brightness in the ring dove, Turtur risorius. Journal of Comparative Psychology, 9, 317-337.

Researcher: male, female
Institution: Animal Lab., Department of Psychology, Columbia University
Animals used: 3 doves "I was discarded after about 150 trials since it practically refused to react in the apparatus for some unknown reason" (p. 325).
Reference:
Apparatus: visual discrimination apparatus: "Animal control section of the Columbia modification of Yerkes-Watson discrimination apparatus"
Motive: shock/food

Husband, R. A. (1929). A comparison of human adults and white rats in maze learning. Journal of Comparative Psychology, 9, 361-377.

Researcher: male
Institution: Department of Psychology, University of Illinois
Animals used: rats, 43-65 do
Reference:
Apparatus: Warden U-type maze (animals); Miles & Hubbard (human)
Motive: food, compliance

Loutitt, C. M. (1929). II. The ontogenesis of the reproductive behavior pattern. III. Modification of the behavior pattern. Journal of Comparative Psychology, 9, 293-315.

Researcher: male
Institution: Yale University
Animals used: laboratory guinea pigs in separate cages
Reference: number
Apparatus: (1) Porter inductorium; (2) living/observation cages
Motive: pain avoidance

Gregg, F. M., E. Jamison, R. Wilkie & T. Radinsky (1929). Are dogs, cats and raccoons colour blind? Journal of Comparative Psychology, 9, 379-395.

Researcher: male, female, male, male
Institution: Psychology Department, University of Nebraska
Animals used: dog, 2 raccoons
Reference: Trix; Jack & Jill
Apparatus: operating table, colour discrimination
Motive: food

Sharp, W. L. (1929). Disintegrative effects of continuous running and removal of food incentive upon a maze habit of albino rats. Journal of Comparative Psychology, 9, 405-423.

Researcher:
Institution: Denison University, University of Chicago
Animals used: 181 rats, lab stock
Reference: group membership
Apparatus: maze "of the type commonly used" at the Chicago lab
Motive: food; food incentive removed after task learned

Muenzinger, K. F., L. Koerner & E. Irey (1929). Variability of an habitual movement in guinea pigs. Journal of Comparative Psychology, 9, 425-435.

Researcher: male, female, female
Institution: University of Colorado
Animals used: 6 guinea pigs
Reference: number
Apparatus: puzzle box, latch, lever, ingress
Motive: food

Higginson, G. D. (1930). The after-effects of certain emotional situation upon maze learning among white rats. Journal of Comparative Psychology, 10, 1-9.

Researcher: male
Institution: Illinois
Animals: albino rats
Reference: group membership
Apparatus: maze
Motive: food

Ruch, T. C. (1930). The discrimination ability of albino rats measured by a triple-unit inclined plane discrimination apparatus. Journal of Comparative Psychology, 10, 11-33.

Researcher: male
Institution: Stanford
Animals: albino rats
Reference: group membership
Apparatus: triple unit inclined plane apparatus
Motive: food reward, shock punishment

Valentine, R. (1930). The effects of punishment for errors on the maze learning of rats. Journal of Comparative Psychology, 10, 35-53.

Researcher: female
Institution: California
Animals: albino rats
Reference: group membership
Apparatus: T unit maze with electric shock punishment
Motive: food reward, shock punishment

Simpson, R. M. (1930). Adaptive behavior in circus movements of the dog following brain lesion. Journal of Comparative Psychology, 10, 67-83.

Researcher: male
Institution: Chicago
Animals: dog
Reference: operated mongrel, normal fox terrier
Apparatus: surgical apparatus; 3 successive boxes, last containing food
Motive: food reward

Munn, N. L. (1930). Visual pattern discrimination in the white rat. Journal of Comparative Psychology, 10, 145-165.

Researcher: male
Institution: Clark
Animals: albino rats
Reference: number
Apparatus: visual discrimination apparatus
Motive: food reward, shock punishment

Wever, E. G. (1930). The upper limit of hearing in the cat. Journal of Comparative Psychology, 10, 221-233.

Researcher: male
Institution: Princeton
Animals: cats
Reference: letter
Apparatus: Pavlovian conditioning apparatus: restraints, oscillator, shock, pneumograph, kymograph
Motive: CR

Miles, W. R. (1930). The competitive learning of rats on elevated and alley mazes of the same pattern. Journal of Comparative Psychology, 10, 237-261.

Researcher: male
Institution: Stanford
Animals: albino rats
Reference: number
Apparatus: elevated maze, alley maze
Motive: food reward

Patrick, J. A. & Anderson, A. C. (1930). The effect of identical stimuli on maze learning with the white rat. Journal of Comparative Psychology, 10, 295-307.

Researcher: male, male
Institution: Ohio
Animals: albino rats
Reference: group membership
Apparatus: Stone multiple-T maze
Motive: food reward

Yoshioka, J. G. (1930). A further note on a position habit in rats. Journal of Comparative Psychology, 10, 309-315.

Researcher: male
Institution: Institute of Juvenile Research, Chicago
Animals: albino rats

Reference: group membership
Apparatus: diamond maze, triangular maze
Motive: food reward

Stavsky, W. H. & Pattie Jr., F. A. (1930). Discrimination of direction of moving stimuli by chickens. Journal of Comparative Psychology, 10, 317-323.

Researcher: male, male
Institution: Harvard, The Rice Institute
Animals: 4 Rhode island red chickens
Reference: number
Apparatus: discrimination box with confinement as punishment
Motive: avoid confinement

Tsai, L. S. (1930). Gradual vs. abrupt withdrawal of guidance in maze learning. Journal of Comparative Psychology, 10, 325-331.

Researcher: male
Institution: Chicago
Animals: albino rats
Reference: group membership
Apparatus: maze with guidance
Motive: food reward

Corey, S. M. (1930). Sex differences in maze learning by white rats. Journal of Comparative Psychology, 10, 333-337.

Researcher: male
Institution: Illinois
Animals: albino rats
Reference: sex
Apparatus: 9 cul-de-sac maze
Motive: food reward

Higginson, G. D. (1930). The performance of the white rat in a rotated maze. Journal of Comparative Psychology, 10, 355-373.

Researcher: male
Institution: Illinois
Animals: albino rats
Reference: number, group membership
Apparatus: rotated maze (Watson circular)
Motive: food reward

Kuo, Zing-Yang (1930). Genesis of the Cat's response to the Rat. Journal of Comparative Psychology, 11, 1-35.

Researcher: male
Institution: University of Chekiang, China
Animals used: kittens
Reference: number
Apparatus: observation cage
Motive: food reward, instinct

Maurer, S. & L. S. Tsai (1930). Vitamin B deficiency and learning ability. Journal of Comparative Psychology, 11, 51-62.

Researcher: males
Institution: Otho S. A. Sprague Memorial Institute, and the University of Chicago
Animals used: albino rats
Reference: group membership
Apparatus: Carr maze
Motive: food reward

Tinklepaugh, O. & C. G. Hartman (1930). Behavioral aspects of parturition in the monkey (Macacus rhesus). Journal of Comparative Psychology, 11, 63-98.

Researchers: males
Institution: Yale and Carnegie Laboratory of Embryology, Baltimore
Animals used: female macacus rhesus monkeys
Reference: number
Apparatus: cameras, artificial lights, birthing cage
Motive: observational

Tyron, R. C. (1930). Studies in individual differences in maze ability. I. The measurement of the reliability of individual differences. Journal of Comparative Psychology, 11, 145-170.

Researcher: male
Institution: California
Animal used: albino and pigmented rats
Reference: group membership and sex
Apparatus: 17-unit automatically recording T maze
Motive: food

Fritz, M. F. (1930). Long-term training of white rats on antagonistic visual habits. Journal of Comparative Psychology, 11, 171-191

Researcher: male
Institution: Iowa State College
Animals used: albino rats
Reference: number
Apparatus: visual discrimination apparatus
Motive: food reward

Journal of Experimental Psychology

Helson, H. (1927). Insight in the white rat. Journal of Experimental Psychology, 10, 378-396.

Researcher: male
Institution: University of Kansas
Animals used: albino rats
Reference:
Apparatus: two-light discrimination box
Motive: hunger

Lewis, M. H. (1930). Configural response in the chick. Journal of Experimental Psychology, 13, pp. 61-75.

Researcher:

Institution: University of Kansas
Animals: 25 chicks
Apparatus: multiple choice box (semi-circular)
Reference:
Motive: hunger

Psychological Monographs

Cameron, N. (1928). Cerebral destruction in its relation to maze learning. Psychological Monographs, 39, (1, Whole No. 172).

Researcher: male
Institution: Professor of Psychology, University of Wisconsin/Ph. D. diss. Michigan
Animals used: Wistar rats
Reference: number
Apparatus: universal adjustable maze (designed by J. F. Shepherd)
Motive: hunger

Journal of General Psychology

Hoagland, H. (1929). Geotropic orientation of chicks. Journal of General Psychology, 2, 187-198.

Researcher: male
Institution: Lab. of Gen. Physiology, Harvard University
Animals used: 6 3 do chicks: (2) bared Plymouth Rock; (1) white Plymouth Rock; (3) Rhode Island Reds
Reference:
Apparatus: inclined plane
Motive: food

Published Experimental Reports Using Animals As Subjects: 1931-1935

American Journal of Psychology, 1931-1935: 0
Comparative Psychology Monographs, 1931-1935: 15
Journal of Comparative Psychology, 1931-1935: 129
Journal of Experimental Psychology, 1931-1935: 2
Journal of General Psychology, 1931-1935: 5
Psychological Bulletin, 1931-1935: 0
Psychological Monographs, 1931-1935: 3
Psychological Review, 1931-1935: 2

American Journal of Psychology

no reports

Comparative Psychology Monographs

Nissen, Henry W. (1931). A field study of the chimpanzee. Observations of chimpanzee behavior and environment in Western French Guinea. Comparative Psychology Monographs, 8, (1, Serial No. 36).

Researcher: male
Institution: Laboratories of Comparative Psychology, Yale University/Pasteur Institute Lab, Guinea
Animals used: field study of wild chimpanzees
Reference: sex, approx. age
Apparatus: N/A
Motive: N/A

McAllister, W. G. (1932). A further study of the delayed reaction in the albino rat. Comparative Psychology Monographs, 8, (2, Serial No. 37).

Researcher: male
Institution: University of Illinois / University of Minnesota (sup. W. T. Heron)
Animals used: 30 albino rats, 20 males, 10 females, bred from colony at the University of Minnesota
Reference: "original number" from birth, and "experimental number", which codes the type of cue used (auditory, kinaesthetic, visual)
Apparatus: delayed-reaction box
Motive: food, escape confinement

Thorndike, E. L. (1932). Reward and punishment in animal learning. Comparative Psychology Monographs, 8, (4, Serial No. 39).

Researcher: male
Institution: Institute of Educational Research Teachers College, Columbia University
Animals used: 13 to 50 day-old chicks
Reference: he/animal/chick
Apparatus: delayed-reaction multiple-choice boxes
Method: delayed-reaction, multiple-choice

Jacobsen, C. F., Jacobsen, M. M., & Yoshioka, J. G. (1932). Development of an infant chimpanzee during her first year. Comparative Psychology Monographs, 9, (1, Serial No. 41).

Researcher: male, female, male
Institution: Laboratories of Comparative Psychology, Yale University

Animals: female chimpanzee infant (Orange Park, Florida)
Reference: Alpha
Apparatus: Gesell tests
Motive: observational

Fields, P. E. (1932). Studies in concept formation. I. The development of the concept of triangularity by the white rat. Comparative Psychology Monographs, 9, (2, Serial No. 42).

Researcher: male
Institution: NRC Fellow, Stanford University
Animals: 11 female white rats 4 months old raised in Stanford lab
Reference: number
Apparatus: modified Lashley jumping apparatus (1930)
Motive: food

Dunlap, J. W. (1933). The organization of learning and other traits in chickens. Comparative Psychology Monographs, 9, (4, Serial No. 44).

Researcher: male
Institution: Fordham University
Animals used: 119 white Leghorn chickens from breeding stock of the Dept. of Poultry Husbandry, Kansas State College; 20 decoy chicks painted purple
Reference: experimental group; decoy group
Apparatus: (1) rotor (Prof. Strickland), (decoys); (2) tunnel (decoys); (3) S maze (decoys); (4) Vocalization chamber (isolation); (5) periscope (decoys); (6) multiple T maze; (7) alternate stimulus box (mirrors); (8) problem box A (Thorndike, 1911); (9) problem box B (Kohler, 1925); (10) directional tendency with problem box B.
Motive: food, isolation

Mowrer, O. H. (1934). The modification of vestibular nystagmus by means of repeated elicitation. Comparative Psychology Monographs, 9, (5, Serial No. 45).

Researcher: male
Institution: Psychological Lab., Johns Hopkins University
Animals: 24 common adult pigeons (because of frequent use of them in previous experiments and ease of handling)
Reference: group membership, 'subjects'
Apparatus: rotation apparatus: (1) driving unit (Dunlap, 1921); rattan unit consisting of a large cylinder and a multiple holder for six subjects
Motive: no choice

Peterson, G. M. (1934). Mechanisms of handedness in the rat. Comparative Psychology Monographs, 9, (6, Serial No. 46).

Researcher: male
Institution: University of New Mexico
Animals used: albino rats
Reference: number
Apparatus: cage with feeding dish which required animals to reach in and scoop up food; latch box
Motive: hunger, observational

Yerkes, R. M. (1934). Modes of behavioral adaptation in chimpanzee to multiple-choice problems. Comparative Psychology Monographs, 10, (1, Serial No. 47).

Researcher: male
Institution: Yale University

Animals used: 4 sexually immature chimpanzees, gifts of the Pasteur Institute captured in French Guinea
Reference: number, Beta, Soda, Al and Mamo
Apparatus: multiple choice apparatus (outdoors)
Motive: food

Wendt, G. R. (1934). Auditory acuity of monkeys. Comparative Psychology Monographs, 10, (3, Serial No. 49).

Researcher: male
Institution: Lab. of Neurophysiology, Yale University School of Medicine
Animals: 5 monkeys (macacus; baboon; mangabey; 2 spider monkeys
Reference:
Apparatus: confined in a cage with barred opening through which the animal could reach a drawer containing food; grille could be closed by a curtain; sound-proof room; oscillator (tone generating apparatus)
Motive: hunger

Tsang, Y. (1934). The functions of the visual areas of the cerebral cortex of the rat in the learning and retention of the maze. Comparative Psychology Monographs, 10, (4, Serial No. 50).

Researcher: male
Institution: University of Chicago
Animals: 96 female rats from the ;lab colony; hybrids of several strains of Mus norvegicus with hooded blood predominating
Reference: number, 'subjects'
Apparatus: modified Lashley's maze III (1929)
Motive: hunger

Liddell, H. S., James, W. T., and Anderson, O. D. (1934). The comparative physiology of the conditioned motor reflex. Comparative Psychology Monographs, 11, (1, Serial No. 51).

Researcher: male
Institution: Cornell University Medical School
Animals used: several pigs, sheep, goats, rabbits
Reference: name of animal (e.g. pig)
Apparatus: Pavlovian conditioning: (1) Harvard Inductorium; (2) "prickers"; (3) table and leather restraining straps; (4) kymograph to record galvanic skin response
Motive: physiological response/food stimulus

Lashley, K. S. (1935). Studies of cerebral function in learning. XI. The behavior of the rat in latch box situations. The mechanism of vision. XII. Nervous structures concerned in the acquisition and retention of habits based on reactions to light. Comparative Psychology Monographs, 11, (2, Serial No. 52).

Researcher: male
Institution: University of Chicago
Animals used: pigmented male rats from a strain derived by interbreeding Wistar, hooded, and trapped wild stock. Approx. 150 days old
Reference: number
Apparatus: latch boxes
Method: latch box; lesions "where more than one area is significantly involved, the one more completely destroyed is given first" (p. 23): auditory, visual, somesthetic (motor), visual (somesthetic), visual (auditory), motor (somesthetic)
Motive: hunger

Kirk, S. A. (1935). Hemispheric cerebral dominance and hemispheric equipotentiality. Comparative Psychology Monographs, 11, (5, Serial No. 55).

Researcher: male
Institution: Wayne County Training School, Northville, MI / (dir. Norman Maier) University of Michigan
Animals used: 48 adult albino rats (6 died in surgery, 1 died during testing, and animals which "would not jump to the visual forms... were therefore excluded from the pattern-vision experiment... For reasoning or intelligent behavior there are data on 37 rats since 1 rat would not run and 3 died before the experiment was completed" (p. 13)
Reference: number
Apparatus: (1) T-shaped metal feeding cup for handedness test; (2) jumping apparatus similar to Lashley's; (3) three tables connected by elevated runways (similar. to Maier (1932, 1932(a), Journal of Comparative Neurology).
Motive: food

Halstead, W. (1935). The effects of cerebellar lesions upon the habituation of post-rotational nystagmus. Comparative Psychology Monographs, 12, (1, Serial no. 56).

Researcher: male
Institution: Northwestern University (Ph.D. dissertation, sup. Franklin Fearing)
Animals used: 80 adult common pigeons (Columba domestica)
Reference: group, number
Apparatus: (1) surgical apparatus; (2) rotator (Mowrer, CPM, 1934)
Method: cerebellum destroyed surgically
Motive: N/A

Journal of Comparative Psychology

Gengerelli. J. A. (1931). The principle of Maxima and Minima in animal learning. Journal of Comparative Psychology, 11, 193-236.

Researcher: ?
Institution: California
Animals used: albino rats
Reference: number
Apparatus: unit adjustable maze
Motive: food rewared

Fields, Paul E. (1931). Contributions of visual figure-discrimination in the white rat. Part I. Part II. Journal of Comparative Psychology, 11, 327-366.

Researcher: male
Institution: Ohio State University
Animals used: 25 Wistar rats
Reference: group membership
Apparatus used: figure discrimination apparatus
Motive: reward - food

Hamill, R. (1931). Sequence of turns versus distances as essential pattern-elements in the maze problem. Journal of Comparative Psychology, 11, 367-382.

Researcher: female
Institution: UNC
Animals used: rats
Reference: group
Apparatus: multiple T maze (Stone & Nyswander)
Motive: food

Munn, N. L. (1931). The relative efficacy of form and background in the chick's discrimination of visual patterns. Journal of Comparative Psychology, 12, 41-75.

Researcher: male
Institution: U. Pittsburgh
Animals used: chicks
Reference: number
Apparatus: modified Yerkes- Watson apparatus
Motive: shock punishment, food reward

Dashiell, J. F. & Bayroff, A. G. (1931). A forward-going tendency in maze running. Journal of Comparative Psychology, 12, 77-94.

Researcher: males
Institution: UNC
Animals used: albino rats
Reference: number
Apparatus: multiple U maze
Motive: food reward

Miles, W. R. (1931). Behavior of fish in elevated water-bridges connecting adjoining aquaria. Journal of Comparative Psychology, 12, 123-132.

Researcher: male
Institution: Stanford U
Animals used: fish
Reference: 'the fish'
Apparatus: elevated water-bridge, glass tubing and aquaria
Motive: rheotropism?

Kuroda, R. (1931). On the counting ability of a monkey (Macacus cynomolgus). Journal of Comparative Psychology, 12, 171-180.

Researcher: male
Institution: Keijo Imperial University
Animals used: monkey
Reference: "it"
Apparatus: multiple choice apparatus
Motive: food reward

Muenzinger, K. F. & Gentry, E. (1931). Tone discrimination in white rats. Journal of Comparative Psychology, 12, 195-205.

Researcher: male, female
Institution: U Colorado
Animals used: albino rats
Reference: number
Apparatus: Y shaped tone discrimination box
Motive: food reward, shock punishment

McAllister, W. G.& Berman, H. D. (1931). Visual form discrimination in the domestic cat. Journal of Comparative Psychology, 12, 207-241.

Researcher: ?
Institution: U Illinois, U Minnesota

Animals used: cat
Reference: "the cat"
Apparatus: Katz/Revesz disc. App. (modified)
Motive: food reward, shock punishment

Gundlach, R. H. (1931). A test of "directional sense" in cats and pigeons. Journal of Comparative Psychology, 12, 347-356.

Researcher: male
Institution: U. Washington
Animals used: cats and pigeons
Reference: lettered
Apparatus: Walton directional maze (plus sign form which rotates)
Motive: food reward

Dennis, W. (1931). The proprioceptive ability of the white rat. Journal of Comparative Psychology, 12, 379-392.

Researcher: male
Institution: U Virginia
Animals used: albino rats
Reference: group membership
Apparatus: location of a wire ladder leading to food
Motive: food reward

Tsai, L. S. (1931). The cul-de-sac phenomenon. Journal of Comparative Psychology, 12, 393-400.

Researcher: male
Institution: National Research Institute of Psychology, Peiping, China
Animals used: albino rats
Reference: number
Apparatus: Carr maze
Motive: food reward

Anderson, A. C. (1932). Time discrimination in the white rat. Journal of Comparative Psychology, 13, 27-55.

Researcher: male
Institution: Ohio U
Animals used: albino rats
Reference: number
Apparatus: discrimination app: runway leading to multiple compartments
Motive: food reward, avoid confinement

Thuma, B. D. (1932). The response of the white rat to tonal stimuli. Journal of Comparative Psychology, 13, 57-86.

Researcher: ?
Institution: U Michigan
Animals used: albino rats
Reference: number
Apparatus: tone discrimination box
Motive: food reward

Frank, M. (1932). The effect of a rickets-producing diet on the learning ability of white rats. Journal of Comparative Psychology, 13, 87-105.

Researcher: female
Institution: U Chicago
Animals used: albino rats
Reference: number. group
Apparatus: Carr mazes
Motive: food reward

Rogers, W. W. (1932). Controlled observations on the behavior of kittens toward rats from birth to five months of age. Journal of Comparative Psychology, 13, 107-126.

Researcher: ?
Institution: Winthrop College
Animals used: kittens, rats
Reference: number
Apparatus: observation apparatus
Motive: N/A

Bunch, M. E. & Lund, W. R. (1932). An experiment on backward associations in animal learning. Journal of Comparative Psychology, 13, 143-156.

Researcher: female, male
Institution: Washington U
Animals used: albino rats
Reference: number
Apparatus: Stone multiple-T unit maze
Motive: food reward

Tinklepaugh, O. L. (1932). Multiple delayed reaction with chimpanzees and monkeys. Journal of Comparative Psychology, 13, 207-243.

Researcher: male
Institution: Yale
Animals used: chimpanzees, monkeys
Reference: named
Apparatus: delayed reaction apparatus
Motive: food reward

Hausmann, M. F. (1932). The behavior of albino rats in choosing food and stimulants. Journal of Comparative Psychology, 13, 279-309.

Researcher: male
Institution: Johns Hopkins University
Animals used: albino rats
Reference: number
Apparatus: Richter activity cage
Motive: food

Harlow, H. F., Uehling, H. & Maslow, A. H. (1932). Comparative behavior of primates. I. Delayed reaction tests on primates from the lemur to the orang-outan. Journal of Comparative Psychology, 13, 313-343.

Researcher: males
Institution: ?

Animals used: primates from Madison Zoological Park
Reference: familiar name and species/family
Apparatus: delayed reaction apparatus
Motive: food reward

Fritz, M. F. (1932). Maze performance of the white rat in relation to unfavorable salt mixture and vitamin B deficiency. Journal of Comparative Psychology, 13, 365-390.

Researcher: ?
Institution: Iowa State College
Animals used: albino rats
Reference: numbered
Apparatus: Carr maze
Motive: food reward

Anderson, J. E. & Smith, A. H. (1932). Relation of performance to age and nutritive condition in the white rat. Journal of Comparative Psychology, 13, 409-446.

Researcher: males
Institution: U Minnesota/ Yale
Animals used: albino rats
Reference: group membership
Apparatus: Richter Activity cage, Maze, Problem box
Motive: food reward

Commins, W. D. (1932). The effect of castration at various ages upon the learning ability of male albino rats. Journal of Comparative Psychology, 14, 29-53.

Researcher: ?
Institution: Catholic University of America
Animals used: albino rats
Reference: number, group membership
Apparatus: Stone multiple-T floor maze; Stone multiple-light discrimination box; elevated 12-unit U maze; elevated 12-unit T maze
Motive: food

Dorcus, R. M. & Gray, W. L. (1932). The effectiveness of food and electric shock in learning and retention by rats when applied at critical points in the maze. Journal of Comparative Psychology, 14, 191-218.

Researcher: males
Institution: Johns Hopkins University
Animals used: albino rats
Reference: group membership
Apparatus: 6 unit multiple U maze with electric shock and food reward
Motive: shock avoidance, food reward

Harlow, H. F. (1932). Comparative behavior of primates. III. Complicated delayed-reaction tests on primates. Journal of Comparative Psychology, 14, 241-262.

Researcher: male
Institution: Wisconsin
Animals used: primates from Vilas Park Zoo
Reference: species/family & familiar name
Apparatus: delayed reaction apparatus
Motive: food reward

Krechevsky, I. (1932). Antagonistic visual discrimination habits in the white rat. Journal of Comparative Psychology, 14, 263-277.

Researcher: male
Institution: U California
Animals used: albino rats
Reference: number
Apparatus: 4 unit discrimination box which forces animal through the stimulus
Motive: food reward

Ingebritsen, O. C. (1932). Maze learning after lesion of the cervical cord. Journal of Comparative Psychology, 14, 279-295.

Researcher: male
Institution: U Chicago
Animals used: albino rats
Reference: group membership
Apparatus: 8 cul-de-sac maze
Motive: food reward

Young, P. T. (1932). Relative food preferences of the white rat. Journal of Comparative Psychology, 14, 297-319.

Researcher: male
Institution: U Illinois
Animals used: albino rats
Reference: group membership
Apparatus: circular feeding-plate apparatus
Motive: food reward

Ruch, F. L. (1932). The effect of inanation upon maze learning in the white rat. Journal of Comparative Psychology, 14, 321-329.

Researcher: male
Institution: Illinois
Animals used: albino rats
Reference: group membership
Apparatus: maze
Motive: food reward

Patrick, J. R. & Anderson, A. C. (1932). Further studies of the effect of incidental stimuli on maze learning with the white rat. Journal of Comparative Psychology, 14, 335-343.

Researcher: males
Institution: Ohio University
Animals used: albino rats
Reference: group membership
Apparatus: 14 alley multiple T maze
Motive: food reward

Maier, N. R. F. (1932). A study of orientation in the rat. Journal of Comparative Psychology, 14, 387-399.

Researcher: male
Institution: U Michigan

Animals used: albino rats
Reference: numbered
Apparatus: Maier reasoning apparatus
Motive: food reward

Daub, C. T. (1933). The effect of doors on latent learning. Journal of Comparative Psychology, 15, 49-58.

Researcher: male
Institution: Princeton
Animals used: albino rats
Reference: numbered
Apparatus: 14 unit multiple T maze
Motive: food reward

Horton, G. P. (1933). A quantitative study of hearing in the guinea pig (Cavia cobaya). Journal of Comparative Psychology, 15, 59-73.

Researcher: male
Institution: Princeton
Animals used: guinea pigs
Reference: numbered
Apparatus: conditioning apparatus
Motive: N/A

Honzik, C. H. (1933). Cerebral control in the maze learning of rats. Journal of Comparative Psychology, 15, 95-132.

Researcher: male
Institution: U California
Animals used: albino rats
Reference: group membership
Apparatus: Honzik elevated maze
Motive: food reward

Muenzinger, K. F. & Mize, R. H. (1933). The sensitivity of the white rat to electric shock: Threshold and skin resistance. Journal of Comparative Psychology, 15, 139-148.

Researcher: males
Institution: Colorado
Animals used: albino rats
Reference: group membership
Apparatus: observation cage with grille
Motive: N/A

Young, P. T. (1933). Relative food preferences of the white rat. II. Journal of Comparative Psychology, 15, 149-165.

Researcher: male
Institution: Illinois
Animals used: albino rats
Reference: group membership
Apparatus: food preference apparatus (Young)
Motive: N/A food reward

Bayroff, A. G. (1933). Direction orientation and the forward-going tendency in white rats. Journal of Comparative Psychology, 15, 211-228.

Researcher: male
Institution: UNC
Animals used: albino rats
Reference: "the rat"
Apparatus: pathway apparatus
Motive: food reward

Swann, H. G. (1933). The function of the brain in olfaction. I. Olfactory discrimination and an apparatus for its test. Journal of Comparative Psychology, 15, 229-241.

Researcher: ?
Institution: Chicago
Animals used: albino rats
Reference: "the rats"
Apparatus: platform apparatus, sawdust box, food box
Motive: food reward

Schneirla, T. C. (1933). Motivation and efficiency in ant learning. Journal of Comparative Psychology, 15, 243-266.

Researcher: male
Institution: NYU
Animals used: ants
Reference: numbered
Apparatus: maze
Motive: food reward

Gates, M. F. & Allee, W. C. (1933). Conditioned behavior of isolated and grouped cockroaches on a simple maze. Journal of Comparative Psychology, 15, 331-358.

Researcher: female, male
Institution: Exp'l. Zool., Chicago
Animals used: cockroaches
Reference: numbered
Apparatus: maze
Motive: food reward

Walton, W. E. (1933). Color vision and color preference in the albino rat. II. The experiments and results. Journal of Comparative Psychology, 15, 373-394.

Researcher: male
Institution: Nebraska
Animals used: albino rats
Reference: group membership
Apparatus: discrimination box
Motive: food reward

Hanawalt, E. M. (1933). Whole and part methods in trial and error learning. A supplementary study. Journal of Comparative Psychology, 15,.395-406

Researcher: female
Institution:
Animals used: albino rats

Reference: numbered
Apparatus: mazes
Motive: food reward

Hausmann, M. F. (1933). The behavior of rats in choosing foods. II. Differentiation between sugar and saccharin. Journal of Comparative Psychology, 15, 419-428.

Researcher: male
Institution: Johns Hopkins
Animals used: albino rats
Reference: group membership
Apparatus: observation cages
Motive: N/A

Krechevsky, I. (1933). The docile nature of "hypotheses". Journal of Comparative Psychology, 15, 429-443.

Researcher: male
Institution: U California
Animals used: albino rats
Reference: group membership
Apparatus: 4 unit discrimination box (Krechevsky)
Motive: food reward

Gardner, L. P. (1933). The responses of horses to the situation of a closed feed box. Journal of Comparative Psychology, 15, 445-467.

Researcher: female
Institution: Cornell University
Animals used: horses
Reference: number and familiar name
Apparatus: food box with door
Motive: N/A, food reward

Gilhousen, H. C. (1933). Fixation of excess distance patterns in the white rat. Journal of Comparative Psychology, 16, 1-23.

Researcher: ?
Institution: UCLA
Animals used: albino rats
Reference: group membership
Apparatus: intact multiple path maze (multiple stools elevated, cross small gaps between platforms)
Motive: hunger

Carpenter, C. A. (1933). Psychobiological studies of social behavior in aves. I. The Effect of Complete and Incomplete Gonadesctomy on the Primary Sexual Activity of the Male Pigeon. Journal of Comparative Psychology, 16, 25-57.

Researcher:
Institution: Stanford
Animals used: pigeons from lab stock, pigeons reared in lab
Reference: group membership, number
Apparatus: isolation-observation cage;
Motive: N/A

Carpenter, C. A. (1933). Psychobiological studies of social behavior in aves. II. The Effect of Complete and Incomplete Gonadesctomy on Secondary Sexual Activity with Histological Studies. Journal of Comparative Psychology, 16, 58-97.

Researcher:
Institution: Stanford
Animals used: pigeons
Reference: group membership, number
Apparatus: isolation-observation cage
Motive: N/A

Krechevshy, I. (1933). Hereditary Nature of "Hypotheses". Journal of Comparative Psychology, 16, 99-116.

Researcher:
Institution: University of California
Animals used: albino rats
Reference: "brights" and "dulls": bred for stupidity
Apparatus: 4 unit discrimination apparatus, insoluble and soluble
Motive: food

Elder, J. H. & H. W. Nissen (1933). Delayed Alternation in Raccoons. Journal of Comparative Psychology, 16, 117-135.

Researcher: male
Institution: Yale University, Lab of Comp Psych
Animals used: 4 raccoons
Reference: number
Apparatus: alternation apparatus (delayed reaction? Two boxes, food in alternate box on each trial)
Motive: hunger

Brigden, R. L. The Basis of Directional Orientation. Journal of Comparative Psychology, 16, 159-170.

Researcher: male
Institution: University of Kansas
Animals used: albino rats
Reference: group membership
Apparatus: open alley maze
Motive: hunger

Harlow, H. F. And H. C. Yudin (1933) Social Behavior of Primates. I. Social Facilitation of Feeding in the Monkey and Its Relation to attitudes of Ascendance and Submission. Journal of Comparative Psychology, 16, 171-185.

Researcher: males
Institution: Univ. Of Wisconsin
Animals used: 6 macacus rhesus
Reference: number
Apparatus: experimental compartment, observation compartment, connecting compartment
Motive: hunger, competition

Maslow, A. H. (1933). Comparative Behavior of Primates. VI. Food Preferences of Primates. Journal of Comparative Psychology, 16, 187-197.

Researcher: male
Institution: Univ. Of Wisconsin
Animals used: 10 primates: chimpanzee, gibbon, mandrill, baboon. Ape. Rhesus, mangabey, mona guenon, spider monkey. Vilas park zoo
Reference: species name
Apparatus: table top for food choices to be presented
Motive:

Tomlin, M. I. & C. P, Stone (1933). Sex Difference in Learning Abilities of Albino Rats. Journal of Comparative Psychology, 16, 207-229.

Researcher: males
Institution: Stanford
Animals used: albino rats
Reference: group membership
Apparatus: Modified Warden U-shaped floor maze; Elevated Miles T-maze; Stone multiple-light discrimination box
Motive: hunger, punishment

Hamilton, J. A. & I. Krechevsky (1933). Studies in the Effect of Shock Upon Behavior plasticity in the rat. Journal of Comparative Psychology, 16, 237-253.

Researcher: males
Institution: Univ.,. Of California
Animals used: albino rats
Reference: number
Apparatus: elevated single-unit T maze
Motive: food reward, shock punishment

Hull, C. L. (1933). Differential; habituation to internal stimuli in the albino rat. Journal of Comparative Psychology, 16, 255-273.

Researcher: male
Institution: Yale
Animals used: albino rats
Reference: number
Apparatus: differential habituation maze
Motive: hanger reward, thirst reward

Omwake, L. (1933). The activity and learning of white rats. Journal of Comparative Psychology, 16, 275-285.

Researcher: female
Institution:
Animals used: albino rats
Reference: number
Apparatus: maze, unspecified origin
Motive: thirst

Herrington Jr., G. B. & Gundlach, R. (1933). How well can guinea pigs and cats hear tones. Journal of Comparative Psychology, 16, 287-303.

Researcher: males
Institution: Univ. Of Washington
Animals used: guinea pigs, cats
Reference:

Apparatus: E-shaped tone discrimination box
Motive: food reward

Ormwake, L. (1933). The influence of barbital on the activity and learning of white rats. Journal of Comparative Psychology, 16, 317-325.

Researcher: female
Institution: George Washington University
Animals used: albino rats
Reference: number, group membership
Apparatus: maze, unspecified origin
Motive: thirst drive, water reward

Gundlach, R. (1933). The visual acuity of homing pigeons. Journal of Comparative Psychology, 16, 327-342.

Researcher: male
Institution: Univ. Of Washington
Animals used: pigeons
Reference: letter, sex
Apparatus: visual discrimination box, own design
Motive: food reward

Bird, C. (1933). Maturation of practice: their effects upon the feeding reactions of chicks. Journal of Comparative Psychology, 16, 343-366.

Researcher: male
Institution: Univ. Of Minnesota
Animals used: chicks
Reference: group membership
Apparatus: observation apparatus
Motive: pecking instinct

Bunch, M. E. & W. K. Magdsick (1933). The retention in rats of an incompletely learned maze solution for short intervals of time. Journal of Comparative Psychology, 16, 385-409.

Researcher: females?
Institution: Washington University
Animals used: albino rats
Reference: group membership
Apparatus: multiple-T water maze
Motive: escape from water

Rundquist, E. A. (1933). Inheritance of spontaneous activity in rats. Journal of Comparative Psychology, 16, 415-438.

Researcher: male
Institution: Univ. Of Minnesota
Animals used: albino rats
Reference: group membership
Apparatus: Stewart revolving drum
Motive: observational

Wolfe, J. B. (1934). The effect of delayed reward upon learning in the white rat. Journal of Comparative Psychology, 17, 1-21.

Researcher: male
Institution: Yale
Animals used: albino rats
Reference: group membership
Apparatus: single-T maze; black-white discrimination box
Motive: hunger

Balachey, E. L. (1934). Variation in maze length as a actor influencing the rate of learning in the white rat. Journal of Comparative Psychology, 17, 23-45.

Researcher: ?
Institution: Univ. Of California
Animals used: albino rats
Reference: group
Apparatus: linear maze, new type
Motive: food

Tomilin, M. I. & C. P. Stone (1934). Intercorrelation of measures of leaning ability in the albino rats. Journal of Comparative Psychology, 17, 73-88.

Researcher: males
Institution: Stanford
Animals used: albino rats
Reference: group membership
Apparatus: modified Warden U-maze; ibid., reversed pattern; Miles elevated maze; ibid., reversed pattern; Stone multiple light discrimination apparatus; ibid., reversed cue
Motive: food reward

Hall, C. S. (1934). Drive and emotionality: Factors associated with adjustment in the rat. Journal of Comparative Psychology, 17, 89-108.

Researcher: male
Institution: U of California
Animals used: albino rats
Reference: group
Apparatus: field apparatus: circular space 50.2 feet in area, 8 feet in diameter; 18" high sheet of tin all around. Circular food container in center, 2' in diameter, walls of 6" high wire mesh so that animals could see food but not access it
Motive: hunger, observer emotionality

Diamond, S. (1934). Habit-formation under non-selective conditions. Journal of Comparative Psychology, 17, 109-122.

Researcher: male
Institution: NYU
Animals used: albino rats
Reference: number
Apparatus: simple choice-box (two choices) set up on Shepard maze floor
Motive: food reward, shock punishment, detention

Bernhardt, K. S. (1934). The effect of vitamin B deficiency during nursing on subsequent learning the rat, Journal of Comparative Psychology, 17, 123-148.

Researcher: male
Institution: U of Toronto
Animals used: albino rats

Reference: group
Apparatus: Carr maze; water maze; multiple choice apparatus
Motive: hunger

Elder, J. H. (1934). Auditory acuity of the chimpanzee. Journal of Comparative Psychology, 17, 157-183.

Researcher: male
Institution: Yale
Animals used: chimpanzees,
Reference: Moos, Bokar and Bimba
Apparatus: audiometer, key depressed food reward (conditioning apparatus)
Motive: food reward

Buel, J. (1934). The linear maze. I. Choice-point expectancy, "correctness" and the goal-gradient. Journal of Comparative Psychology, 17, 185-199.

Researcher: male
Institution: Univ. of California
Animals used: albino rats
Reference: group
Apparatus: Warden linear maze, modified
Motive: food reward

Ballachey, E. L. & J. Buel (1934). Centrifugal force as a determinant of choice-point behavior in the maze running of the white rat. Journal of Comparative Psychology, 17, 201-223.

Researcher: males
Institution: Univ. of Calif.
Animals used: albino rats
Reference: group membership
Apparatus: 3 maze patterns, new form to test centrifugal force
Motive: hunger

Ruch, F. L. (1934). Goal direction orientation, generalized turning habit and goal gradient as factors in maze learning in the rat. Journal of Comparative Psychology, 17, 225-232.

Researcher: male
Institution: U of Illinois
Animals used: albino rats
Reference: group
Apparatus: multiple-T mazes (3)
Motive: food reward

Sears, R. R. (1934). Effect of optic lobe ablation on the visuo-motor behavior of the goldfish. Journal of Comparative Psychology, 17, 233-265.

Researcher: male
Institution: Illinois
Animals used: goldfish either purchased from Kresge's Ten Cent Store or from a high grade pet shop
Reference: number
Apparatus: observation tank with Marey tambour
Motive: shock punishment, observational

Muenzinger, K. F. (1934). Motivation in learning. I. Electric shock for correct response in the visual discrimination habit. Journal of Comparative Psychology, 17, 267-279.

Researcher: male
Institution: U of Colorado
Animals used: albino rats
Reference: number and sex
Apparatus: T-shaped discrimination box with electric shock
Motive: shock punishment

Ni,. C. (1934). An experimental study of the influence of [punishment for errors during learning upon retention. Journal of Comparative Psychology, 17, 279-301.

Researcher: ?
Institution: U of Chicago
Animals used: albino rats
Reference: number
Apparatus: Lashley Maze III
Motive: punishment by elec. shock, food reward

Schneirla, T. C. (1934). The process and mechanism of ant learning. The combination-problem and the successive-presentation problem. Journal of Comparative Psychology, 17, 303-328.

Researcher: male
Institution: NYU
Animals used: ants
Reference: number
Apparatus: combination-problem maze, successive-problem maze
Motive: food reward

Morey, R. H. (1934). Swimming speed of rats as a function of the presence or absence of sound. Journal of Comparative Psychology, 17, 329-354.

Researcher: male
Institution: Princeton
Animals used: albino rats
Reference: group
Apparatus: water apparatus: rats swim to a platform to escape water; 6 corner T maze in water
Motive: escape water

Lashley, K. S. & M. Frank (1934). The mechanism of vision. X. Postoperative disturbances of habits based on detail vision in the rat after lesions in the cerebral visual areas. Journal of Comparative Psychology, 17, 355-391.

Researcher: male, female
Institution: U of Chicago
Animals used: rats: Wistar x trapped wild Norway
Reference: group
Apparatus: Lashley jumping stand for visual discrimination
Motive: food

Hull, C. L. (1934). The rat's speed-of-locomotion gradient in the approach to food. Journal of Comparative Psychology 17, 393-422.

Researcher: male
Institution: Yale
Animals used: albino arts
Reference: group and number
Apparatus: straight runway with electrical contacts to measure speed of running

Motive: food

Spence. K. W. & W. C. Shipley (1934). The factors determining the difficulty of blind alleys in maze learning by the white rat. Journal of Comparative Psychology, 17, 423-436.

Researcher: males
Institution: Yale, Delaware State Hospital
Animals used: albino rats
Reference: number
Apparatus: maze, new design
Motive: food

Wilson, M. O. (1934). Symbolic behavior in the white rat. I. Relation of amount of interpolated activity to adequacy of the delayed response. Journal of Comparative Psychology, 18, 29-49.

Researcher: ?
Institution: Oklahoma
Animals used: albino rats
Reference: group
Apparatus: delayed-response apparatus
Motive: food

Spragg, S. D. S. (1934). Anticipatory responses in the maze. Journal of Comparative Psychology, 18, 51-73.

Researcher: ?
Institution: Yale
Animals used: albino rats
Reference: number
Apparatus: sectional maze (Walton)
Motive: food

Maslow, A. H. & El Groshong (1934). Influence of differential motivation on delayed reaction in monkeys. Journal of Comparative Psychology, 18, 75-83

Researcher: male, female
Institution: Wisconsin
Animals used: mandrill, baboon, ape, gibbon, macacus rhesus, moca guenon
Reference: familiar name, age and sex
Apparatus: delayed reaction
Motive: food

McCulloch, T. L. (1934). Performance preferentials of the white rat in force-resisting and spatial dimensions. Journal of Comparative Psychology, 18, 85-111.

Researcher: ?
Institution: Duke
Animals used: albino rats
Reference: group
Apparatus: weight discrimination box (modified, new design)
Motive: food reward

Wingfield, R. C. & W. Dennis (1934). The dependence of the rat's choice of pathways upon the length of the daily trail series. Journal of Comparative Psychology, 18, 135-147.

Researcher: ? and male

Institution: Virginia
Animals used: albino rats
Reference: number
Apparatus: elevated mazes
Motive: food

Dennis, W. & R. T. Sollenberger (1934). Negative adaptation in the maze exploration of albino rats. Journal of Comparative Psychology, 18, 197-206.

Researcher: males
Institution: Virginia
Animals used: albino rats
Reference: number
Apparatus: Y-unit maze, own design, after Warner and Warden's
Motive: food/hunger

Breslaw, B., S. E. Barrera & C. J,. Warden (1934). The effect of the removal of the post-central convolution of the macacus rhesus monkey upon the delayed response. Journal of Comparative Psychology, 18, 207-226.

Researcher: male, ?, male
Institution: NY state Psychiatric Inst., Columbia University
Animals used: macacus rhesus monkeys
Reference: letter
Apparatus: delayed reaction apparatus: cage, table base for two cups, concealing screen and 1-way visual screen
Motive: food

Gentry, E. (1934). Methods of discrimination training in white rats. Journal of Comparative Psychology, 18, 227-258.

Researcher: female
Institution: Johns Hopkins
Animals used: albino rats
Reference: group
Apparatus: Dunlap observation box, visual discrimination with electric shock
Motive: food/shock

Ruch, F. L. (1934). Kinesthesia, motivation and transfer. I. Preliminary experiments and statement of a problem. Journal of Comparative Psychology, 18, 259-269.

Researcher: male
Institution: Illinois
Animals: albino rats
Reference: group
Apparatus: Dunlap observation box, visual discrimination box with electric shock
Motive: food

McCulloch, T. L. & Pratt, J. G. (1934). A study of the pre-solution period in weight discrimination by white rats. *Journal of Comparative Psychology, 18*, 271-290.

Researcher: male, ?
Institution: Duke
Animals used: albino rats
Reference: group
Apparatus: weight discrimination

Motive: food

Culler, E. & F. A. Mettler (1934). Conditioned behavior in a decorticate dog. Journal of Comparative Psychology, 18, 291-303.

Researcher: males
Institution: U. Illinois, U. Georgia School of Medicine
Animals used: dog
Reference: the dog
Apparatus: conditioning apparatus
Motive: NC
"The dog was finally dispatched on the morning of August 8" (p. 297).

Andretev, L. A. (1934). Extreme limits of pitch discrimination with higher tones. Journal of Comparative Psychology, 18, 315-332.

Researcher: ?
Institution: McGill, dept. of Physiology
Animals used: dogs
Reference: letter
Apparatus: conditioning apparatus
Motive: food, CR

Spence, K. W. (1934). Visual acuity and its relation to brightness in chimpanzee and man. Journal of Comparative Psychology, 18, 333-361.

Researcher: male
Institution: Yale
Animals used: 2 chimpanzees, 2 human adults, 1 human child
Reference: proper names
Apparatus: modified Yerkes-Watson box
Motive: food and other rewards

Wilson, M. O. (1934). Symbolic behavior in the white rat. II. Relation of quality of interpolated activity to adequacy of the delayed response. Journal of Comparative Psychology, 18, 367-384.

Researcher: ?
Institution: U Oklahoma
Animals used: albino rats
Reference: group
Apparatus: delayed response apparatus (H-shaped maze)
Motive: food reward, shock punishment

Hall, C. S. (1934). Emotional behavior in the rat. I./ Defecation and urination as measures of individual; differences in emotionality. Journal of Comparative Psychology, 18, 385-403.

Researcher: male
Institution: U California
Animals used: albino rats
Reference: group and sex
Apparatus: circular enclosure with food in center
Motive: rats accustomed to food in apparatus, the deprived of food

Horton, G. P. (1934). The effect of intense and prolonged acoustical stimulation of the auditory sensitivity of the guinea pig. Journal of Comparative Psychology, 18, 405-417.

Researcher: male
Institution: Princeton
Animals used: guinea pigs
Reference: number
Apparatus: audiometer, amplifier, cradle-like holder, shocking equipment, photographic equipment
Motive: NC

Harlow, H. F. & Settlage, P. H. (1934). Comparative behavior of primates. VII. Capacity of monkeys to solve patterned string tests. Journal of Comparative Psychology, 18, 423-435.

Researcher: male, ?
Institution: U Wisconsin
Animals used: macacus, papio, etc.
Reference: all had proper names, age and sex
Apparatus: string test board: strings in patterns, select one which has a cube of apple hidden at the end.
Motive: food

Wolfe, J. B. & Spragg, S. D. S. (1934). Some experimental tests of "reasoning" in white rats. Journal of Comparative Psychology, 18, 455-469.

Researcher: male, ?
Institution: Yale
Animals used: albino rats
Reference: number
Apparatus: compartments and alleyways: discrimination/maze (Maier reasoning apparatus)
Motive: food

Hilgard, E. R. & Marquis, D. G. (1935). Acquisition, extinction and retention of conditioned lid responses to light in dogs. Journal of Comparative Psychology, 19, 29-58.

Researcher: males
Institution: Stanford, Yale
Animals used: dogs
Reference: number and letter
Apparatus: conditioning apparatus, Pavlovian
Motive: CR

Campbell, A. A. (1935). Community of function in the performance of rats on alley mazes and the Maier reasoning apparatus. Journal of Comparative Psychology, 19, 69-76.

Researcher: male
Institution: Stanford
Animals used: albino rats
Reference: number
Apparatus: Stone Multiple T maze, Warden U maze, Maier reasoning apparatus
Motive: food

Heron, W. T, (1935). The inheritance of maze learning ability in rats. Journal of Comparative Psychology, 19, 77-89.

Researcher: male
Institution: U Minnesota
Animals used: albino rats
Reference: group, generation and sex
Apparatus: Minnesota automatic maze (Heron)
Motive: hunger and thirst

Wolfle, D. L. (1935). The effect of continuous interchange of alley sections on the maze behavior of rats. Journal of Comparative Psychology, 19, 91-106.

Researcher: male
Institution: U Mississippi
Animals used: albino rats
Reference: group
Apparatus: elevated T maze (Honzik type)
Motive: food

Mowrer, O. H. (1935) The nystagmic response of the pigeon to constant angular acceleration at liminal and supraliminal intensities. Journal of Comparative Psychology, 19, 177-193.

Researcher: male
Institution: Princeton
Animals used: pigeons
Reference: number
Apparatus: apparatus for producing constant angular acceleration (Mowrer)
Motive: NC

Stone, C. P., Tomilin, M. I. & Barker, R. G. (1935). A comparative study of sexual drive in adult male rats as measured by direct copulation and the Columbia obstruction apparatus. Journal of Comparative Psychology, 19, 215-241.

Researcher: male, male, ?
Institution: Stanford
Animals used: albino rats
Reference: number
Apparatus: observation cage, Columbia obstruction apparatus
Motive: N/A

Britt, S. H. (1935). Tonal sensitivity in the white rat. Journal of Comparative Psychology, 19, 243-264.

Researcher: male
Institution: Yale
Animals used: albino rats
Reference: number
Apparatus: conditioning apparatus (Pavlovian): tone instrument, restraints, induction app
Motive: CR

Rundquist, E. A. & Heron, W. T. (1935). Spontaneous activity and maze learning. Journal of Comparative Psychology, 19, 297-311.

Researcher: males
Institution: U Minnesota
Animals used: albino rats
Reference: group and sex
Apparatus: maze (unspecified)
Motive: food

Young, W. C., Dempsey, E. W. & Myers, H. I. (1935). Cyclic reproductive behavior in the female guinea pig. Journal of Comparative Psychology 19, 313-335.

Researcher: males

Institution: Brown University
Animals used: guinea pigs
Reference: number
Apparatus: observation cages
Motive: N/A

Everall, E. E. (1935). Perseveration in the rat. Journal of Comparative Psychology, 19, 343-369.

Researcher: female
Institution: U California
Animals used: albino rats
Reference: group, number
Apparatus: straightaway; T maze with electric shock
Motive: shock punishment

Cruze, W. W. (1935). Maturation and learning in chicks. Journal of Comparative Psychology, 19, 371-409.

Researcher: male
Institution: NC State College
Animals used: chicks
Reference: group
Apparatus: observation, pecking tests
Motive: food

Hunter, W. S. (1935). Conditioning and maze learning in the rat. Journal of Comparative Psychology, 19, 417-424.

Researcher: male
Institution: Clark
Animals used: albino rats
Reference: number
Apparatus: conditioning apparatus (own design, after Warner); multiple-T elevated maze; runway
Motive: food, shock punishment, CR

Krechecsky, I (1935). Brain mechanisms and "hypotheses". Journal of Comparative Psychology, 19, 425-468.

Researcher: male
Institution: U Chicago
Animals used: albino rats
Reference: group
Apparatus: modified stone multiple-T unit discrimination box
Motive: food

Moore, H. & E. Mathias (1935). The effect of vitamin A- and B- deficiency on the maze-learning ability of the whiter rat. Journal of Comparative Psychology, 19, 487-496.

Researcher: male, female
Institution: Mt. Holyoke
Animals used: albino rats
Reference: group
Apparatus: Lashley's maze III
Motive: food

McCulloch, T. L. (1935). The selection of the intermediate of a series of weights by the white rat. Journal of Comparative Psychology, 20, 1-11.

Researcher: male
Institution: Yale
Animals used: albino rats
Reference: group
Apparatus: weight discrimination apparatus
Motive: food

Ruch, F. T. (1935). Experimental studies of the factors influencing the difficulty of blind alleys in linear mazes. I. Experiments with the maze patterns: RLRLLRLRRLRL and LRLRRLRLLRLR. Journal of Comparative Psychology, 20, 21-34.

Researcher: male
Institution: U Illinois
Animals used: albino rats
Reference: number
Apparatus: linear mazes
Motive: food

Ruch, F. T. (1935). Experimental studies of the factors influencing the difficulty of blind alleys in linear mazes. I. Generalized turning habits. Journal of Comparative Psychology, 20, 35-52.

Researcher: male
Institution: U Illinois
Animals used: albino rats
Reference: group
Apparatus: linear maze
Motive: food

Muenzinger, K. F. & Newcomb, H. (1935). Motivation in learning. III. A bell signal compared with electric shock for right and wrong responses in the visual discrimination habit. Journal of Comparative Psychology, 20, 85-93.

Researcher: male, female
Institution: U Colorado
Animals used: albino rats
Reference: group
Apparatus: T shaped discrimination box
Motive: shock avoidance

Muenzinger, K. F. & Wood, A. (1935). Motivation in learning. IV. The function of punishment as determined by its temporal relation to the act of choice in the visual discrimination habit. Journal of Comparative Psychology, 20, 95-106.

Researcher: male, female
Institution: U Colorado
Animals used: albino rats
Reference: group
Apparatus: T shaped discrimination box
Motive: shock avoidance

Ruch, F. T. (1935). Experimental studies of the factors influencing the difficulty of blind alleys in linear mazes. III. Is there an anticipatory tendency in maze learning? Journal of Comparative Psychology, 20, 113-124.

Researcher: male
Institution: U Illinois
Animals used: albino rats
Reference: group
Apparatus: linear mazes, simple alternation
Motive: food

Bruce, R. H. (1935). A further study of the effect of variation of reward and drive upon the maze performance of rats. Journal of Comparative Psychology, 20, 157-182.

Researcher: male
Institution: U Wyoming
Animals used: albino rats
Reference: group
Apparatus: Tolman and Honzik multiple T unit maze
Motive: hunger and thirst

Fields, P. E. (1935). Studies in concept formation. II. A new multiple-choice stimulus jumping apparatus for visual figure discrimination. Journal of Comparative Psychology, 20, 183-203.

Researcher: male
Institution: Maryville College
Animals used: albino rats
Reference: number
Apparatus: multiple stimulus discrimination apparatus
Motive: food

Wenrick,. J. E. (1935). Some effects of partial suprarenalectomy upon the learning of white rats in a water maze. Journal of Comparative Psychology, 20, 243-262.

Researcher: male
Institution: OSU
Animals used: albino rats
Reference: group
Apparatus: water maze
Motive: water escape

Girden, E. (1935). Effect of roentgen rays upon the hearing in dogs. Journal of Comparative Psychology, 20, 263-290.

Researcher: male
Institution: Brooklyn College
Animals used: dogs
Reference: number
Apparatus: conditioning apparatus -- Pavlovian
Motive: CR

Maurer, S. & Carr, H. A. (1935). II. The empirical effects of maze reliability. Journal of Comparative Psychology, 20, 291-308.

Researcher: males

Institution: S. A. Sprague Memorial Institute and the University of Chicago
Animals used: albino rats
Reference: group
Apparatus: Carr maze
Motive: food

Maurer, S. (1935). III. The effect of partial depletion of vitamin B (B1) upon performance in rats. Journal of Comparative Psychology, 20, 309-317.

Researcher: male
Institution: Otho S.A. Sprague Memorial Institute and the University of Chicago
Animals used: albino rats
Reference: group
Apparatus: observation cage
Motive: N/A

Yerkes, R. M. & Tomilin, M. I. (1935). Mother-infant relations in chimpanzee. Journal of Comparative Psychology, 20, 321-359.

Researcher: males
Institution: Yale
Animals used: chimpanzees
Reference: proper names
Apparatus: observation
Motive: N/A

Forster, M. C. (1935). Temporal relations of behavior in chimpanzee and man as measured by reaction time. Journal of Comparative Psychology, 20, 361-383.

Researcher: male
Institution: Yale
Animals used: chimpanzee
Reference: proper names
Apparatus: reaction time apparatus
Motive: food reward

Miller, N. E. & Miles, W. R. (1935). Effect of caffeine on the running speed of hungry, satiated and frustrated rats. Journal of Comparative Psychology, 20, 397-412.

Researcher: males
Institution: Yale
Animals used: albino rats
Reference: number
Apparatus: runway
Motive: food

Padrilla, S. G. (1935). Further studies on the delayed pecking of chicks. Journal of Comparative Psychology, 20, 413-443.

Researcher: male
Institution: U of the Philippines
Animals used: chicks
Reference: group
Apparatus: brooder, testing tables
Motive: food

Journal of Experimental Psychology

Corey, S. M. (1931). An experimental study of retention in the white rat. Journal of Experimental Psychology, 14, pp. 252-259.

Researcher: male
Institution: DePaul University
Animals: 186 albino rats, Wistar stock
Reference:
Apparatus: Eight cul-de-sac, elevated, skeleton maze
Motive: hunger

Perkins, F. T. (1931). A further study of configurational learning in the goldfish. Journal of Experimental Psychology, 14, pp. 508-538.

Researcher:
Institution: University of Kansas
Animals: Goldfish (*Carassins auratus*)
Reference:
Apparatus: Three-compartment multiple choice food box (in tank)
Motive: hunger

Journal of General Psychology

Skinner, B. F. (1932). Drive and reflex strength. I. II. Journal of General Psychology, 6, 22-48.

Researcher: male
Institution: Harvard
Animals used: adult albinos, "king inbred strain", 65 & 66 generation of brother-sister inbreeding
Reference: 'the rat'
Apparatus: food tray with lever; kymograph
Motive: food

Skinner, B. F. (1932). On the rate of formation of a conditioned reflex. Journal of General Psychology, 7, 274-286.

Researcher: male
Institution: Harvard
Animals: 4 male rats
Reference: number
Apparatus: food box with lever
Motive: food

Skinner, B. F. (1933). On the rate of extinction of a conditioned reflex. Journal of General Psychology, 8, 114-129.

Researcher: male
Institution: Harvard
Animals: 4 male rats
Reference: number
Apparatus: food box with lever
Motive: food

Bousfiels, W. A. (1933). Certain quantitative aspects of the food-behavior of cats. Journal of General Psychology, 8, 446-454.

Researcher: male
Institution: Harvard
Animals used: 3 cats
Reference: number
Apparatus: Pekouze scale, kymograph
Motive: hunger

Gidansky, J. (1934). An investigation of the mechanism of caloric nystagmus in the rabbit. Journal of General Psychology, 10, 440-450.

Researcher: male
Institution: Central Institute for the Deaf
Animals used: rabbits
Reference:
Apparatus: board 2.5 feet long., 1 ft. wide, Czermak clamp, rotated. threads attached to eye muscles. tube to stimulate semi-circular canals
Motive: N/A

Psychological Bulletin

no reports

Psychological Monographs

Cutsforth, M. G. (1933). A study of successive discriminations of brightness in chicks. Psychological Monographs, 44, (1, Whole No. 197).

Researcher: female
Institution: University of Kansas
Animals: 22 white Leghorns, purchased form hatchery
Reference: group membership
Apparatus: multiple choice box
Motive: reward - food

Brigden, R. L. (1933). Goal activity in the white rat. Psychological Monographs, 44, (1, Whole No. 197).

Researcher: male
Institution: University of Kansas
Animals used: 7 rats
Reference: sex and number
Apparatus: maze/choice box; proper path indicated by stimulus light
Motive: food reward

Curti, M. W. (1935). Native fear responses in the presence of cats. Psychological Monographs, 46, (6, Whole No. 210).

Researcher: female
Institution: Smith College

Animals: 60 white rats, 3 tame grey mice, setter-shepherd pup, several cats and kittens
Reference: numbered and lettered
Apparatus: cage, observation box, odor-proof observation box
Motive: N/A observational

Psychological Review

Krechevsky, I. (1932). "Hypotheses" in rats. Psychological Review, 39, 516-532.

Researcher: male
Institution: University of California
Animals used: white rats
Reference:
Apparatus: multiple-unit discrimination box (Stone, 1928, Journal of Genetic Psychology)
Motive: hunger?

Anderson, A. & J. R. Patrick (1934). Some early behavior patterns in the white rat. Psychological Review, 41, 480-496.

Researcher: males
Institution: Ohio State University
Animals used: 45 rats (Experimental colony, originally Wistar)
Reference: number
Apparatus: each placed on piece of paper on table and presented with stimuli
Motive: N/A

Published Experimental Reports Using Animals As Subjects: 1936-1940

American Journal of Psychology, 1936-1940: 2
Comparative Psychology Monographs, 1936-1940: 24
Journal of Comparative Psychology, 1936-1940: 206
Journal of Experimental Psychology, 1936-1940: 24
Journal of General Psychology, 1936-1940: 11
Psychological Bulletin, 1936-1940: 0
Psychological Monographs, 1936-1940: 1
Psychological Review, 1936-1940: 0

American Journal of Psychology

Zenner, K. (1937). The significance of behavior accompanying conditioned salivary secretion for theories of conditioned response. American Journal of Psychology, 50, 384-403.

Researcher: male
Institution: Duke University
Animals: 2 dogs
Reference: "Bob" & "Stella"
Apparatus: one-way mirror, parlor set-up, bell
Motive: conditioned stimulus: bell with food, acid as negative stimulus

Brogden, W. J., E. A. Lipman & E. Cullen (1938). The role of incentive in conditioning and extinction. American Journal of Psychology, 51, 109-117.

Researcher: ?
Institution: University of Illinois
Animals: 8 guinea pigs; 11 dogs
Reference: number
Apparatus: rotator: modified activity cage, Pavlovian
Motive: UCS - shock, CS - 100 cycle tone, move cage 1" to escape shock; flex R forelimb to escape shock

Comparative Psychology Monographs

Tsang, Y. (1936). The functions of the visual areas on the cerebral cortex of the rat in the learning and retention of the maze. II. Comparative Psychology Monographs, 12, (2, Serial No. 57).

Researcher:
Institution: University of Chicago
Animals used: "One hundred and one hooded rats were employed. They were born in the laboratory in which they were trained afterwards. All of them were blinded by enucleation of the eyes on the thirteenth day" (p. 4).
Reference: subgroup, number
Apparatus: 8 cul-de-sac maze
Motive: food

Layman, J. D. (1936). The avian visual system. I. Cerebral function of the domestic fowl in pattern vision. Comparative Psychology Monographs, 12, (3, Serial No. 58).

Researcher: male
Institution: University of California at Los Angeles

Animals used: young pullets approx. 9-12 weeks old at purchase. "White Leghorn pullets were preferred because of their activity, but during the winter months these could not be obtained and nineteen barred rocks were substituted" (pp. 13-14)
Reference: number
Apparatus: discrimination box (modified Yerkes)
Motive: hunger, shock avoidance

Wolfe, J. B. (1936). Effectiveness of token-rewards for chimpanzees. Comparative Psychology Monographs, 12, (5, Serial No. 60).

Researcher: male
Institution: Yale Laboratories of Primate Biology
Animals used: colony chimpanzees at Yale
Reference: Alpha, Bula, Bimba, Bon, Velt and Moos
Apparatus: automatic food-delivering machines (venders)
Motive: hunger and thirst

Spragg, S. D. S. (1936). Anticipatory responses in serial learning by chimpanzee. Comparative Psychology Monographs, 13, (2, Serial No. 62).

Researcher: male
Institution: Yale Laboratories of Primate Biology
Animals used: "Five immature chimpanzees from the laboratory colony, two males and three females, were employed as subjects in the experiments to be reported in this paper... The five animals--Frank (no. 25 in the laboratory series), Bimba (no. 26), Bebe (no. 60), Bula (no. 48), and Moos (no. 11)--were well tamed and sophisticated laboratory subjects" (p. 7)
Reference: in methodology section, always "the subject(s)", in discussion of results, always by proper name
Apparatus: (1) 2 stylus mazes; (2) blindfolds; (3) temporal maze
Motive: food

Jacobsen, C. F. (1936). Studies of cerebral function in primates. I. The functions of the frontal association areas in monkeys. Comparative Psychology Monographs, 13, (3, Serial No. 63).

Researcher: male
Institution: Yale Lab. of Primate Biology
Animals used: "Several species of monkeys were used as experimental subjects (Macaca mulatta, Cercocebus torquatus and Papio papio). Details of age, sex, adaptation to experimental procedures, etc., are indicated in the protocols for individual subjects" (p. 15). Animals were given various operation which removed frontal/cortical tissue.
Reference: subject. apparently, when you lobotomize a primate, you don't want to be its friend anymore
Apparatus: (1) experiment cage with various attachments: rope box, pull box, crank box, hook and handle box, serial combination box; (2) delayed response apparatus: (3) visual discrimination apparatus, modified Lashley Jumping apparatus.
Motive: food/hunger-reward

Jacobsen, C. F. & J. H. Elder (1936). Studies of cerebral function in primates. II. The effect of temporal lobe lesions on delayed response in monkeys. Comparative Psychology Monographs, 13, (3, Serial No. 63).

Researchers:
Institution: Yale Lab. of Primate Biology
Animals used: male baboon (papio papio)
Reference: subject, S
Apparatus: Experiment cage (As above) with partition to prevent attempts at making a second choice
Motive: food/hunger

Honzik, C. H. (1936). The sensory basis of maze learning in rats. Comparative Psychology Monographs, 13, (4, Serial No. 64).

Researcher: male
Institution: University of California
Animals used: albino and hooded rats from lab stock. "The animals used in the following experiments came from the stock maintained by the Department of Psychology of the University of California. Because the supply from this stock ran low on a few occasions rats were procured from the Zoology and Household Science Departments, but these never constituted more than a small percentage of any group. and were normal rats not selectively bred nor used on any other experiment" (p. 6).
Reference: group and condition (i.e. anosmic, normal, etc.)
Apparatus: a variety of mazes: 2 elevated mazes
Motive: hunger, confinement

Yerkes, R. M. & J. H. Elder (1936). Oestrus, receptivity and mating in chimpanzee. Comparative Psychology Monographs, 13, (5, Serial No. 65).

Researchers: male
Institution: Yale Laboratories of Primate Biology
Animals used: 18 chimpanzees from lab colony
Reference: proper names
Apparatus: observation cages
Motive: no choice - observational

Spragg, S. D. S. (1936). Anticipatory responses in serial learning by chimpanzee. Comparative Psychology Monographs, 13, (2, Serial No. 62).

Researcher:
Institution: Yale Laboratories of Primate Biology
Animals: 5 immature chimpanzees from lab colony
Reference: number and proper names: Frank, Bimba, Bebe, Bula, Moos
Apparatus: (1) spatial stylus mazes (A and B)0; (2) temporal maze; (3) blindfold
Motive: food reward

Ball, J. (1937). A test for measuring sexual excitability in the female rat. Comparative Psychology Monographs, 14, (1, Serial No. 67).

Researcher: female
Institution: Psychological Lab, U of California., Phipps Psychiatric Clinic, Johns Hopkins University
Animals used: rats
Reference: sex
Apparatus: largely observational
Method: frequency of response method (Stone): rate responses to stimuli: (a) "The artificial stimulus was one that had been discovered accidentally, while handling a large number of estrous females. It consists of a series of light, quick clasps by the fingers of the experimenter just in from of the iliac crests, a crude imitation of the palpitation by the male in mounting (Stone). This stimulus is much slower and less accurately placed as well as heavier and spread over a larger area than the natural stimulus, but many females respond to it with hopping, crouching and war vibration (Long and Evans (10), Stone (11), especially in the more excitable stages" (pp. 2-3)
Motive: N/A

Crawford, M. P. (1937). The cooperative solving of problems by young chimpanzees. Comparative Psychology Monographs, 14, (2, Serial No. 68).

Researcher: male

Institution: Yale Labs of Primate Biology
Animals used: Bula, Ross, Kambi, Bimba
Reference: proper name
Apparatus: box pulling, two-cord problem, double handle problem (puzzle boxes - ingress); (2) restraining box
Motive: food

Vaughn, C. L. (1937). Factors in rat learning: An analysis of the intercorrelations between 34 variables. Comparative Psychology Monographs, 14, (3, Serial No. 69).

Researcher: male
Institution: Wayne County Training School, Northville, MI / University of Chicago (sup. Lashley)
Animals: "subjects" 80 male rats, 4 and 6 generation offspring of a cross between Wistar and trapped wilds, colony of Psych lab at U of Chicago "However, runts and others obviously physically defective were excluded" (p. 3)
Reference: "subjects", number
Apparatus: (1) Wildness Tunnel; (2) Activity cages; (3) Straightway; (4) Simple maze; (5) Multiple-T maze; (6) Rectangular maze; (7) Double platform problem box; (8)Light discrimination box; (9) Maier test; (10) Perseverance box
Motive: food

Cowles, J. T. (1937). Food-tokens as incentives for learning by chimpanzees. Comparative Psychology Monographs, 14, (5, Serial No. 71).

Researcher: male
Institution: Yale (Ph.D. dissertation)
Animals: Alpha, Bimba, Bula, Frank and Moos
Reference: "subject", proper name
Apparatus: (1) circular restraining cage; (2) opaque screen to conceal experimenter; (3) weightlifting apparatus; (4) sliding tray; (
Motive: food

Anderson, E. E. (1938). The interrelationship of drives in the male albino rat. II. Intercorrelations between 47 measures of drives and of learning. Comparative Psychology Monographs, 14, (6, Serial No. 72).

Researcher:
Institution: Dept. of Psychology, Harvard U. / NRC Fellowship in Biological Sciences at Stanford, sponsored. C. P. Stone
Animals used: 55 male albino rats, 125 days old
Reference: number
Apparatus: Modified Dashiell Maze, Vertical Exploratory Maze; Open Field Apparatus; Emotional Defecation; Copulation Tests; Sex Barrier Apparatus; Jump Obstruction Apparatus; Observation Cage; Drinking Tests; Salt water drinking tests; Quinine eating tests; Sand digging apparatus; Speed Runway; Columbia Obstruction Apparatus; Modified Warden U-Maze; Multiple Light Discrimination Apparatus; Activity Cage
Motive: various, as above

Maller, N. R. F. (1938). A further analysis of reasoning in rats. II. The integration of four separate experiences in problem solving. III. The influence of cortical injuries on the process of "direction". Comparative Psychology Monographs, 15, (1, Serial No. 73).

Researcher: male
Institution: University of Michigan
Animals used: 56 male and female albino and pigmented rats (determined previously that pigmentation had no determining effects on scores on reasoning tests) (p. 6)

Reference: sex and number (65M, 23F)
Apparatus: multiple-obstruction apparatus (simple reasoning problem: Maier, 1932, JCNeur)
Motive: hunger

Biel, W. C. (1938). The effect of early inanition upon maze learning in the albino rat. Comparative Psychology Monographs, 15, (2, Serial No. 74).

Researcher: male
Institution: Ohio State University / Stanford U (Stone, data gathering)
Animals used: inbred stock from Stanford University
Reference: group and number
Apparatus: (1) Modified Warden U-Maze; (2) Stone Multiple-T Maze; (3) Straightway maze
Motive: Food (water in control group)

Spence, K. W. (1939). The solution of multiple choice problems by chimpanzees. Comparative Psychology Monographs, 15, (3, Serial No. 75).

Researcher: male
Institution: Yale labs
Animals used: 17 chimpanzees: classified as adult. adolescent and children (!)
Reference: "subjects" Mona, Pati, Josie, Wendy, Mimi, Lia, May, Bokar, Nira, Cuba; Bentia, Soda, Al, Mamo; Tom, Bob. Dick.
Apparatus: multiple-choice apparatus (manual)
Motive: food

Grether, W. F. (1939). Colour vision and colour blindness in monkeys. Comparative Psychology Monographs, 15, (4, Serial No. 76).

Researcher: male
Institution: University of Wisconsin . Yale Labs
Animals used: cebus, rhesus, spider, pig-tailed, green monkeys; guinea baboon
Reference: marked difference in tone in ref. to the animal
Apparatus: (1) 2 monochromators (used to produce spectral colours);
Method: food as incentive in colour-disc task
Motive: food

Reisen, A. H. (1940). Delayed reward in discrimination learning by chimpanzees. Comparative Psychology Monographs, 15, (5, Serial No. 77).

Researcher: male
Institution: Yale labs (Ph.D. dissertation
Animals used: Dick, Don, Beta, Tom Hal
Reference: proper name
Apparatus: discrimination apparatus
Motive: food

Winslow, C. N. (1940). A study of experimentally induces competitive behavior in the white rat. Comparative Psychology Monographs, 15, (6, Serial No. 78).

Researcher: male
Institution: Brooklyn College, Brooklyn, NY
Animals used: 18 rats (7 males, 11 females)
Reference:
Apparatus: (1) Competition apparatus (straightaway); (2) double elevated mazes converging on same goal; (3) string-pulling apparatus (for cooperation)
Motive: hunger - 24 hours food deprivation

Spragg, S. D. S. (1940). Morphine addiction in chimpanzees. Comparative Psychology Monographs, 15, (7, Serial No. 79).

Researcher: male (?)
Institution: Dept. of Psychology, Queens College, Flushing, NY / Yale labs, Orange Park
Animals used:
Reference:
Apparatus: delayed reaction and multiple choice tests
Motive: NC
Notes: detailed study of morphine addiction and withdrawal

Maier, N. R. F., and N. M. Glaser (1940). Studies of abnormal behavior in the rat. II. A comparison of some convulsion-producing situations. Comparative Psychology Monographs, 16, (1, Serial No. 80).

Researcher: males
Institution: University of Michigan
Animals used: rats, 9 weeks old
Reference: number and sex
Apparatus: Key test; air test; box C, W, and O
Motive: NFC: induced seizures

Fletcher, F. M. (1940). Effects of quantitative variation of food-incentive on the performance of physical work by chimpanzees. Comparative Psychology Monographs, 16, (3, Serial No. 82).

Researcher: male
Institution: Yale labs (Ph.D. dissertation, Nissen)
Animals used: Tom, Dick, Beta and Gamma
Reference: proper names
Apparatus: resistance apparatus (Gravity resistance/Electric brake); baited-incentive carriage
Motive: food

Margolin, S. E. and M. E. Bunch (1940). The relationship between age and strength of hunger motivation. Comparative Psychology Monographs, 16, (4, Serial No. 83).

Researcher: males(?)
Institution: Harris Teachers College; Washington University
Animals used: "In this study only male subjects were used. This was done merely for convenience, since female rats show cyclic activity correlated with the estral rhythm, which might unnecessarily complicate the control of the experimental conditions" (p. 6) male albino rats from own colony
Reference:
Apparatus: obstruction apparatus
Motive: food incentive: under varying levels of shock intensity and days of food deprivations

Journal of Comparative Psychology

Light, J. S & W. H. Gantt (1936). Essential part of reflex arc for establishment of conditioned reflex. Formation of conditioned reflex after exclusion of motor peripheral end. Journal of Comparative Psychology, 21, 19-36.

Researcher: males
Institution: Johns Hopkins Hospital
Animals used: dogs
Reference: number
Apparatus: Conditioning apparatus, Pavlovian
Motive: CR

Bunch, M. E. & M. Rogers (1936). The relationship between transfer and the length of the interval separating the mastery of two problems. Journal of Comparative Psychology 21, 37-52.

Researcher: females
Institution: Washington U
Animals used: albino rats
Reference: group
Apparatus: multiple T unit maze
Motive: food reward

Yerkes, R. M. & A. W. Yerkes (1936). Nature and conditions of avoidance (fear) response in chimpanzee. Journal of Comparative Psychology , 21, 53-66.

Researcher: male. female
Institution: Yale
Animals used: chimpanzee
Reference: Jack
Apparatus: observation cage (huge, open-air)
Motive: N/A

Bayroff, A. G. (1936). The experimental social behavior of animals. I. The effect of early isolation of white rats on their later reactions to other white rats as measured by two periods of free choices. Journal of Comparative Psychology, 21, 67-81.

Researcher: NS
Institution: UNC
Animals used: albino rats
Reference: number and letter
Apparatus: choice apparatus (2 boxes)
Motive: food, isolation

Muenzinger, K. F. (1936). Motivation in learning. V. The relative effectiveness of jumping a gap and crossing an electric grid in a visual discrimination habit. Journal of Comparative Psychology, 21, 95-104.

Researcher: male
Institution: U Colorado
Animals used: albino rats
Reference: gender - letter
Apparatus: T shaped discrimination box with gaps and electric grille
Motive: food reward, shock punishment

Lorge, I. (1936). Irrelevant rewards in animal learning. Journal of Comparative Psychology, 21, 105-128.

Researcher: male
Institution: Teachers College, Columbia U
Animals used: albino rats
Reference: 'the animal', number
Apparatus: problem boxes: (3) new design
Motive: escape from confinement, food,

Kirk, S. A. (1936). Extra-striate functions in the discrimination of complex visual patterns. Journal of Comparative Psychology, 21, 145-159.

Researcher: male

Institution: Milwaukee State Teachers' College
Animals used: albino rats
Reference: number
Apparatus: Lashley jumping apparatus
Motive: food

Pattie Jr., F. A. (1936). The gregarious behavior of normal chicks and chicks hatched in isolation. Journal of Comparative Psychology, 21, 161-178.

Researcher: male
Institution: rice institute
Animals used: chicks
Reference: number
Apparatus: testing pen
Motive: N/A

Miller. N. E. & W. R. Miles (1936). Alcohol and remittal of reward. An analytical study of rodent maze behavior. Journal of Comparative Psychology, 21, 179-204.

Researcher: males
Institution: Yale
Animals used: albino rats
Reference: group membership
Apparatus: maze emphasizing homogenous goal-pointing blinds
Motive: food reward, alcoholized rats

Miller, N. E. & S. S. Stevenson (1936). Agitated behavior of rats during experimental extinctions and a curve of spontaneous recovery. Journal of Comparative Psychology, 21, 205-231.

Researcher: males
Institution: Yale
Animals used: albino rats
Reference: number
Apparatus: short alley; activity cage
Motive: food reward

Wedell, C. E. (1936). The taste sensitivity of the white rat. I. Sensitivity of quinine sulphate. Journal of Comparative Psychology, 21, 233-244.

Researcher: male
Institution: Princeton
Animals used: albino rats
Reference: group membership
Apparatus: obs cages
Motive: food

Taylor, F. V. (1936). The effect of transposition of the Achilles tendon on the walking and righting movements of the frog. Journal of Comparative Psychology, 21, 245-273.

Researcher: male
Institution: Princeton
Animals used: frog
Reference: 'the frog'
Apparatus: observation cage
Motive: N/A

Kellogg, W. N. & W. B. Pomeroy (1936). Maze learning in water snakes. Journal of Comparative Psychology, 21, 275-295.

Researcher: males
Institution: Indiana University
Animals used: water snakes
Reference: number and letter
Apparatus: two blind alley T maze
Motive: temperature differential

Kennedy, J. L. & C. P. Stone (1936). Cross-sectional area of maze pathways in relation to learning by rats. Journal of Comparative Psychology, 21, 325-340.

Researcher: males
Institution: Stanford
Animals used: albino rats
Reference: group membership
Apparatus: narrow tread maze (Miles elevated maze); wide tread maze; floor-less alley maze
Motive: food reward

Fields, P. E. (1936). Studies in concept formation. IV. A comparison of white rats and raccoons with respect to their visual discrimination of certain geometrical figures. Journal of Comparative Psychology, 21, 341-355.

Researcher: male
Institution: Maryville College
Animals used: albino rats,. raccoons
Reference: number
Apparatus: Stone multiple light discrimination box
Motive: food reward

Girden, E., Mettler, F. A., Finch, G. & E. Culler (1936). Conditioned responses in a decorticate dog to acoustic, thermal and tactile stimulation. Journal of Comparative Psychology, 21, 367-385.

Researcher: males
Institution: Illinois, Brooklyn College: Illinois, Georgia Med. Centre; Illinois
Animals used: dog
Reference: 'the dog'
Apparatus: conditioning apparatus, Pavlovian
Motive: CR

Krechevsky, I. (1936). Brain mechanisms and brightness discrimination learning. Journal of Comparative Psychology, 21, 405-445.

Researcher: male
Institution: U Chicago
Animals used: albino rats
Reference: group membership
Apparatus: Lashley discrimination box
Motive: shock punishment

Anderson, E. E. (1936). Consistency of tests of copulatory frequency in the male albino rat. Journal of Comparative Psychology, 21, 447-459.

Researcher: female
Institution: Stanford

Animals used: albino rats
Reference: number
Apparatus: observation cages
Motive: N/A

Hall, C. S. (1936). Emotional behavior in the rat. III. The relationship between need and emotionality. Journal of Comparative Psychology, 22, 61-68.

Researcher: male
Institution: Oregon
Animals used: albino rats
Reference: group membership
Apparatus: circular field
Motive: hunger

Poe, E., Poe, C. F. & Muenzinger, K. (1936). The effect of vitamin deficiency upon the acquisition and retention of the maze habit in the white rat. I. The vitamin B-complex. Journal of Comparative Psychology, 22, 69-77.

Researcher: f, m, m
Institution: Colorado
Animals used: albino rats (Wistar)
Reference: group membership
Apparatus: water maze
Motive: escape from water

Muenzinger, K. & F. M. Fletcher (1936). Motivation in learning. VI. Escape from electric shock compared with hunger-food tension in the visual discrimination habit. Journal of Comparative Psychology, 22, 79-91.

Researcher: males
Institution: Colorado
Animals used: albino rats
Reference: group membership
Apparatus: visual discrimination apparatus
Motive: food/hunger, shock

Bissonnette, T. H. (1936). Modification of mammalian sexual cycles. V. The avenue of reception of sexually stimulating light. Journal of Comparative Psychology, 22, 93-103.

Researcher: male
Institution: Trinity College, Hartford
Animals: ferrets
Reference: letter and number
Apparatus: hoods and light
Motive: observational

Henry, F. F. (1936). Audition in the white rat. II. The learning of a pure tone discrimination. Journal of Comparative Psychology, 22, 105-121 .

Researcher: male
Institution: California
Animals: albino rats
Reference: 'the animals'
Apparatus: eight unit linear auditory discrimination apparatus
Motive: food reward, shock punishment

Allee, W. C. & R. H. Masure (1936). A comparison of maze behavior in paired and isolated shell-parakeets (Melopsittacus undulatus Shaw) in a two-alley problem box. Journal of Comparative Psychology, 22, 131-155 .

Researcher: ?
Institution: Chicago
Animals: parakeets
Reference: group membership
Apparatus: two-alley problem box
Motive: food, photo-sensitivity

Marquis, D. & E. R. Hilgard. (1936). Conditioned lid responses to light in dogs after removal of the visual cortex. Journal of Comparative Psychology, 22, 157-178.

Researcher: males
Institution: Yale, Stanford
Animals: dogs
Reference: letter and number
Apparatus: Pavlovian conditioning apparatus
Motive: CR

Graves, E. A. (1936). Interrelationships in performances in the albino rat. Journal of Comparative Psychology, 22, 179-186.

Researcher: female
Institution: Minnesota
Animals: albino rats
Reference: sex and "bright/dull"
Apparatus: Stone Multiple T maze; *Columbia Obstruction apparatus*; revolving cages; reaction time apparatus (own design)
Motive: food, shock

Reynolds, H. E. (1936). The disinhibiting effect of an electric shock upon the maze performance of the white rat. Journal of Comparative Psychology, 22, 187-197.

Researcher: ?
Institution: Colorado
Animals: albino rats
Reference: 'the animal'
Apparatus: modified Valentine maze
Motive: food reward

Zeigler, L. & A. Knudson (1936). Activity after recovery from rickets. An experimental study. Journal of Comparative Psychology, 22, 199-217.

Researcher: males
Institution: Albany Medical College
Animals: albino rats
Reference: group membership
Apparatus: activity cage
Motive: N/A

Fearing, F. & G. Ross (1936). Behavior factors affecting body temperature in pigeons. I. General level of activity as modified by anesthesia and visual controls. Journal of Comparative Psychology, 22, 219-239.

Researcher: male, female
Institution: UCLA
Animals: pigeons
Reference: group membership
Apparatus: observation cages
Motive: N/A

Causey, D. & R. H. Waters (1936). Parental care in mammals with especial reference to the carrying of young by the albino rat. Journal of Comparative Psychology, 22, 241-254.

Researcher: male, ?
Institution: Arkansas
Animals: albino rats
Reference: sex, age
Apparatus: observation cage
Motive: N/A

Wentworth, K. L. (1936). The effect of a native Mexican diet on learning and reasoning in white rats. Journal of Comparative Psychology, 22, 255-267.

Researcher: male
Institution: ?
Animals: albino rats
Reference: letter, sex, number
Apparatus: Maier reasoning apparatus; Lashley 10-cul-de-sac simple alternation maze;
Motive: food

Honzik, C. H. & E. C. Tolman (1936). The perception of spatial relations by the rat: A type of response not easily explained by conditioning. Journal of Comparative Psychology, 22, 287-318.

Researcher: males
Institution: UC
Animals: albino rats
Reference: group membership
Apparatus: spatial relation apparatus, with and without screen (own design)
Motive: food reward

Hall, C. S. (1936). Emotional behavior in the rat. III. The relationship between emotionality and ambulatory activity. Journal of Comparative Psychology, 22, 354-352.

Researcher: male
Institution: Oregon
Animals: albino rats
Reference: group membership
Apparatus: open field apparatus
Motive: food

Grether, W. G. & D. L. Wolfle (1936). The relative efficiency of constant and varied stimulation during learning. II. White rats on a brightness discrimination problem. Journal of Comparative Psychology, 22, 365-374.

Researcher: male, ?
Institution: Mississippi
Animals: albino rats
Reference: group membership[
Apparatus: five-window modification of Lashley jumping-stand

Motive: food, hunger

Nissen, H. W. & M. P. Crawford (1936). A preliminary study of feed-sharing behavior in young chimpanzees. Journal of Comparative Psychology, 22, 383-419.

Researcher: male, ?
Institution: Yale
Animals: chimpanzee
Reference: Alpha, Bula, Bimba, Ross, Velt, Moos
Apparatus: observation cage for food-sharing: token device as food dispenser
Motive: food

Bunch, M. E., Cole, A. & J. Frerichs (1937). The influence of twenty-four hours of wakefulness upon the learning and retention of a maze problem in white rats. Journal of Comparative Psychology, 23, 1-12.

Researcher: ?
Institution: Washington
Animals: albino rats
Reference: group membership
Apparatus: 4-unit multiple T maze
Motive: food

Gardner, L. P. (1937). The responses of horses in a discrimination problem. Journal of Comparative Psychology, 23, 13-34.

Researcher: female
Institution: Cornell
Animals: horses
Reference: number
Apparatus: discrimination apparatus, own design
Motive: food reward

Gardner, L. P. (1937). The responses of cows in a discrimination problem. Journal of Comparative Psychology, 23, 35-58.

Researcher: female
Institution: Cornell
Animals: cows
Reference: number
Apparatus: discrimination apparatus. Own design
Motive: food reward

Muenzinger, K. F. , Poe, E. & C. F. Poe (1937). The effect of vitamin deficiency upon the acquisition and retention of the maze habit in the white rat. II. Vitamin B_2 (G). Journal of Comparative Psychology, 23, 59-66.

Researcher: male, female, male
Institution: Colorado
Animals: albino rats
Reference: group membership
Apparatus: water maze
Motive: food, escape from water

Muenzinger, K. F. , Poe, E. & C. F. Poe (1937). The effect of vitamin deficiency upon the acquisition and retention of the maze habit in the white rat. III. Vitamin B_1. Journal of Comparative Psychology, 23, 67-76.

Researcher: male, female, male
Institution: Colorado
Animals: albino rats
Reference: group
Apparatus: 2 water mazes
Motive: food, escape from water

Spence, K. W. (1937). Analysis of the formation of visual discrimination habits in chimpanzee. Journal of Comparative Psychology, 23, 77-100.

Researcher: male
Institution: Yale
Animals: chimpanzee
Reference: Pan, Wendy, Bokar, etc.
Apparatus: modified Bingham manual multiple choice apparatus
Motive: food reward

Jacobsen, C. F. & H. W. Nissen (1937). Studies of cerebral function in primates. IV. The effects of frontal lobe lesions on the delayed alternation habit in monkeys. Journal of Comparative Psychology, 23, 101-112.

Researcher: males
Institution: Yale
Animals: monkeys
Reference: 'the animal'
Apparatus: delayed alternation apparatus
Motive: food reward

Krechevsky, I. (1937). Brain mechanisms and variability: I. Variability within a means-end readiness. Journal of Comparative Psychology, 23, 121-138.

Researcher: male
Institution: Chicago
Animals: albino rats
Reference: group
Apparatus: Dashiell checkerboard maze
Motive: food reward

Krechevsky, I. (1937). Brain mechanisms and variability: II. Variability where no learning is involved. Journal of Comparative Psychology, 23, 139-164.

Researcher: male
Institution: Chicago
Animals: albino rats
Reference: group
Apparatus: modular maze, own design
Motive: food reward

Nissen, H. W. & T. L. McCulloch (1937). Equated and non-equated stimulus situations in discrimination learning by chimpanzees. I. Comparison with unlimited response. Journal of Comparative Psychology, 23, 165-190.

Researcher: males
Institution: Yale
Animals: chimpanzees
Reference: familiar names (Yale colony)
Apparatus: discrimination apparatus
Motive: food reward

Girden, E. & E. Culler (1937). Conditioned responses in curarized striate muscle in dogs. Journal of Comparative Psychology, 23, 261-274.

Researcher: males
Institution: Brooklyn College, U. Illinois
Animals: dogs
Reference: 'the animal'
Apparatus: Pavlovian conditioning apparatus
Motive: CR

Witkin, H. A. & T. C. Schneirla (1937). Initial maze behavior as a function of maze design. Journal of Comparative Psychology, 23, 275-304.

Researcher: ?, male
Institution: NYU
Animals: albino
Reference: number
Apparatus: Shepherd Universal Maze
Motive: food reward

Gardner, L. P. (1937). Response of horses to the same signal in different positions. Journal of Comparative Psychology, 23, 305-332.

Researcher: female
Institution: Cornell
Animals: horses
Reference: number
Apparatus: box-stall, cloth
Motive: food reward

Gardner, L. P. (1937). The responses of cows to the same signal in different positions. Journal of Comparative Psychology, 23, 333-350.

Researcher: female
Institution: Cornell
Animals: cows
Reference: numbers
Apparatus: box-stall, cloth
Motive: food reward

Krechevsky, I. (1937). Brain mechanisms and variability. III. Limitations of the effect of cortical injury upon variability. Journal of Comparative Psychology, 23, 351-364.

Researcher: male
Institution: Chicago
Animals: albino rats
Reference: group
Apparatus: modular maze, own design
Motive: food reward

McCulloch, T. L. & H. W. Nissen (1937). Equated and non-equated stimulus situations in discrimination learning by chimpanzees. II. Comparison with limited responses. Journal of Comparative Psychology, 23, 365-376.

Researcher: males
Institution: Yale
Animals: chimpanzees
Reference: proper name (Yale colony)
Apparatus: multiple choice visual discrimination apparatus
Motive: food reward

Nissen, H. W. & T. L. McCulloch (1937). Equated and non-equated stimulus situations in discrimination learning by chimpanzees. III. Prepotency of response to oddity through training. Journal of Comparative Psychology, 23, 377-382.

Researcher: males
Institution: Yale
Animals: chimpanzees
Reference: familiar name (Yale colony)
Apparatus: see above
Motive: food reward

Muenzinger, K. F. & F. M. Fletcher (1937). Motivation in learning. VII. The effect of an enforced delay at the point of choice in the visual discrimination habit. Journal of Comparative Psychology, 23, 383-392.

Researcher: males
Institution: Colorado
Animals: albino rats
Reference: group
Apparatus: T shaped discrimination box
Motive: hunger-food; shock

Anderson, A. C. (1937). The effect of equalizing reward upon the breakdown of a discrimination habit and its bearing upon reminiscence. Journal of Comparative Psychology, 23, 421-438.

Researcher: male
Institution: Ohio U
Animals: white rats
Reference: number
Apparatus: discrimination box (runway, detention, food)
Motive: food, escape confinement

Williams, G. W. & C. O'Brien (1937). The effect of sodium phenobarital on the learning behavior of white rats. Journal of Comparative Psychology, 23, 457-474.

Researcher: male, female
Institution: U of Rochester
Animals: albino rats
Reference: group
Apparatus: Multiple U universal maze
Motive: food reward

Gray, W. L. (1937). The effect of forced activity on the maze performance of rats. Journal of Comparative Psychology, 23, 475-512.

Researcher: male
Institution: Johns Hopkins University
Animals: albino rats
Reference: group
Apparatus: 6 section multiple-U maze
Motive: food reward

Maier, N. R. F. & Curtis, Q. F. (1937). A further analysis of reasoning in rats. I. The influence of trace-aggregation on problem solving. Journal of Comparative Psychology, 24, 1-20.

Researcher: male, ?
Institution: Michigan
Animals: albino rats
Reference: group
Apparatus: Maier reasoning apparatus
Motive: food reward

Maier, N. R. F. & Sabom, M. V. (1937). The effect of the shape of cortical lesions on reasoning in rats. Journal of Comparative Psychology, 24, 21-48.

Researcher: male, female
Institution: Michigan
Animals: albino rats
Reference: group
Apparatus: Maier reasoning apparatus
Motive: food reward

Wolfle, D. L. (1937). Absolute brightness discrimination in the white rat. Journal of Comparative Psychology, 24, 59-72.

Researcher: ?
Institution: Chicago
Animals: albino rats
Reference: number
Apparatus: 5-window modification of the Lashley Jumping apparatus
Motive: food reward

Andersen, A. E. (1937). Interrelationship[of drives in the male albino rat. I. Intercorrelations and measures of drives. Journal of Comparative Psychology, 24, 73-118 .

Researcher: male
Institution: Harvard
Animals: albino rats (male)
Reference: number
Apparatus: Columbia Obstruction Apparatus; Activity Drums; Tolman & Honzik Multiple T Maze; Dashiell Maze; Observation Cage
Motive: hunger, drives

Ziegler, L. H. & Knudson, A. (1937). Qualitative analysis of behavior after recovery from rickets -- An experimental study. Journal of Comparative Psychology, 24, 119-126.

Researcher: males
Institution: Albany Medical College
Animals: albino rats
Reference: group
Apparatus: Carr maze

Motive: food reward

Grether, W. F. & Maslow, A. H. (1937). An experimental study of insight in monkeys. Journal of Comparative Psychology, 24, 127-134.

Researcher: males
Institution: Wisconsin
Animals: monkeys
Reference: familiar name
Apparatus: multiple choice reasoning task (position alternate)
Motive: food reward

Ball, J. (1937). Sex activity of castrated male rats increased by estrin administration. Journal of Comparative Psychology, 24, 135-144.

Researcher: female
Institution: Johns Hopkins Medical School
Animals: albino rats (male)
Reference: number
Apparatus: observation cage
Motive: N/A

Tsang, Y. (1937). Maze learning in rats hemidecorticated in infancy. Journal of Comparative Psychology, 24, 221-253.

Researcher: male
Institution: Chicago
Animals: albino rats
Reference: group and number
Apparatus: Tsang maze
Motive: food reward

Tsang, Y. (1937). Visual sensitivity of rats deprived of visual cortex in infancy. Journal of Comparative Psychology, 24, 255-262.

Researcher: male
Institution: Chicago
Animals: albino rats
Reference: group and number
Apparatus: modified jumping apparatus
Motive: food reward

Bernhardt, K. S. & Snygg, D. (1937). The effect of cues on the choice of the shorter path. Journal of Comparative Psychology, 24, 269-276.

Researcher: males
Institution: Toronto
Animals: albino rats
Reference: group
Apparatus: discrimination box, own design
Motive: food reward

Hebb, D. O. (1937). The innate organization of visual activity. II. Transfer of response in the discrimination of brightness and size by rats reared in total darkness. Journal of Comparative Psychology, 24, 277-300 .

Researcher: male
Institution: Harvard
Animals: albino rats
Reference: number
Apparatus: modified jumping apparatus: platform discrimination
Motive: food reward

Cowles, J. T. & Nissen, H. W. (1937). Reward-expectancy in delayed responses of chimpanzees. Journal of Comparative Psychology, 24, 345-358.

Researcher: ?, male
Institution: Yale
Animals: chimpanzees
Reference: familiar name
Apparatus: delayed-response apparatus with cups
Motive: food reward

Hall, C. S. (1937). Emotional behavior in the rat. IV. The relationship between emotionality and stereotyping of behavior. Journal of Comparative Psychology, 24, 369-376.

Researcher: male
Institution: Oregon
Animals: albino rats
Reference: number
Apparatus: multiple choice unit, 5 paths
Motive: food reward

Beach, F. A. (1937). The neural basis of innate behavior. I. Effects of cortical lesions upon the maternal behavior pattern in the rat. Journal of Comparative Psychology, 24, 393-440.

Researcher: male
Institution: Harvard
Animals: albino rats
Reference: group
Apparatus: observation cage
Motive: N/A

Stevens, H. (1937). Avitaminosis B (B1) maze performance and certain aspects of brain chemistry. Journal of Comparative Psychology, 24, 441-458.

Researcher: male
Institution: School of Medicine, U of Pennsylvania
Animals: albino rats
Reference: number
Apparatus: 10-unit T maze
Motive: food reward

Pechstein, L. A. & Reynolds, W. A. (1937). The effect of tobacco smoke on the growth and learning behavior of the albino rat and its progeny. Journal of Comparative Psychology, 24, 459-469.

Researcher: males
Institution: Teachers College, U. Cincinnati
Animals: albino rats
Reference: group
Apparatus: exhaust box; unit Y maze; alternation problem
Motive: food reward

Zieve, L. (1937). Experimental study of visual perception and of Hull's conditioning theory. Journal of Comparative Psychology, 24, 487-494.

Researcher: ?
Institution: Minnesota
Animals: albino rats
Reference: number
Apparatus: rectangular maze
Motive: food reward

Gilliland, A. R. (1937). The law of effect ion learning. Journal of Comparative Psychology, 24, 495-504.

Researcher: ?
Institution: Northwestern
Animals: albino rats
Reference: number
Apparatus: simple maze, own design
Motive: food reward

Ellson, D. G. (1937). The acquisition of a token-reward habit in dogs. Journal of Comparative Psychology, 24, 505-522.

Researcher: male
Institution: Yale
Animals: dogs
Reference: number
Apparatus: food-vending machine (tokens)
Motive: food reward

Witkin, H. A. & Granich, L. (1937). An application of some principles of maze-mechanics in the planning of a serviceable maze. Journal of Comparative Psychology, 24, 523-546.

Researcher: ?, ?
Institution: NYU
Animals: rats
Reference: number
Apparatus: Shepherd Universal Maze
Motive: food reward

Wilder, C. E. (1937). Selection of rachitic and anti-rachitic diets in the rat. Journal of Comparative Psychology, 24, 547-477.

Researcher: ?
Institution: Johns Hopkins
Animals: rats
Reference: group
Apparatus: Warner/Warden Multiple Y unit maze
Motive: food reward

Kuo, Z. Y. (1938). Further study on the behavior of the cat towards the rat. Journal of Comparative Psychology, 25, 1-8.

Researcher: male
Institution: Yale
Animals: cat, rat

Reference: number
Apparatus: observation cage
Motive: N/A

Hull, C. L. & Spence, K. W. (1938). "Correction" vs. "Non-correction" method of trial-and-error learning in rats. Journal of Comparative Psychology, 25, 127-145.

Researcher: males
Institution: Yale
Animals: albino rats (Wistar)
Reference: group
Apparatus: T-maze
Motive: food

Krechevsky, I. (1938). Brain mechanisms and Umweg behavior. Journal of Comparative Psychology, 25, 147-173.

Researcher: male
Institution: Swarthmore
Animals: albino rats
Reference: group
Apparatus: modified brightness-discrimination box
Motive: food reward

Pennington, L. A. (1938). The function of the brain I auditory localization. Journal of Comparative Psychology, 25, 195-211.

Researcher: ?
Institution: Arkansas
Animals: albino rats
Reference: group
Apparatus: Y-maze discrimination
Motive: food reward

Spence, K. W. (1938). Gradual versus sudden solution of discrimination problems by chimpanzees. Journal of Comparative Psychology, 25, 213-224.

Researcher: male
Institution: Yale
Animals: chimpanzees
Reference: familiar name, number
Apparatus: discrimination apparatus
Motive: food reward

Bruce, R. H. (1938). The effect of lessening the drive upon performance by white rats in a maze. Journal of Comparative Psychology, 25, 225-248.

Researcher: male
Institution: Wyoming
Animals: albino rats
Reference: group, number
Apparatus: 14 unit multiple T maze
Motive: food reward

Ghiselli, E. E. (1938). Mass action and equipotentiality of the cerebral cortex in brightness discrimination. Journal of Comparative Psychology, 25, 273-290.

Researcher: male
Institution: Maryland
Animals: albino rats
Reference: number
Apparatus: Krechevsky discrimination box
Motive: food reward

Pratt, J. G. (1938). An experimental analysis of the process of solving a weight discrimination problem in white rats. Journal of Comparative Psychology, 25, 291-314.

Researcher: ?
Institution: Duke
Animals: albino rats
Reference: group
Apparatus: discrimination box (pulling-in, weights)
Motive: food reward

Loucks, R. B. (1938). Studies of neural structures essential for learning. II. The conditioning of salivary and striped muscle responses to faradization of cortical sensory elements, and the action of sleep upon such mechanisms. Journal of Comparative Psychology, 25, 315-332.

Researcher: male
Institution: Washington
Animals: dogs
Reference: number, familiar name
Apparatus: Pavlovian conditioning apparatus, neurosurgical apparatus
Motive: N/A -- CR

Hebb, D. O. (1938). Studies of the organization of behavior. I. Behavior of the rat in a field orientation. Journal of Comparative Psychology, 25, 333-354.

Researcher: male
Institution: Harvard
Animals: albino rats
Reference: number
Apparatus: position discrimination apparatus
Motive: food reward

Honzik, C. H. (1938). Exteroceptive stimuli and the relative difficulty of maze blinds. Journal of Comparative Psychology, 25, 355-372.

Researcher: male
Institution: U California
Animals: albino rats
Reference: group, deformity
Apparatus: Honzik maze
Motive: food reward

Uhrich, J. (1938). The social hierarchy in albino mice. Journal of Comparative Psychology, 25, 373-414.

Researcher: male
Institution: Zoology, U. Chicago
Animals: albino mice
Reference: marking
Apparatus: observation cage
Motive: N/A

Loucks, R. B. & Gantt, W. H. (1938). The conditioning of striped muscle responses based upon Faradic stimulation of dorsal roots and dorsal columns of the spinal cord. Journal of Comparative Psychology, 25, 415-426.

Researcher: males
Institution: Washington, Phipps Clinic Johns Hopkins Hospital
Animals: dogs
Reference: number and familiar name
Apparatus: Conditioning apparatus and neurosurgical apparatus
Motive: N/A – CR

Hebb, D. O. (1938). The innate organization of visual activity. III. Discrimination of brightness after removal of the striate cortex in the rat. Journal of Comparative Psychology, 25, 427-437.

Researcher: male
Institution: Harvard
Animals: hooded rats
Reference: number
Apparatus: brightness discrimination apparatus (Yerkes)
Motive: food reward, shock punishment

Bunch, M. E. & Magsdick, W. K. (1938). A study of electric shock motivation in maze learning. Journal of Comparative Psychology, 25, 497-506.

Researcher: ?, ?
Institution: Washington
Animals: albino rats
Reference: group
Apparatus: 14 unit Stone multiple T maze
Motive: food reward

Haselrud, G. M. (1938). The effect of movement of stimulus objects upon avoidance reactions in chimpanzees. Journal of Comparative Psychology, 25, 507-528.

Researcher: male
Institution: Yale
Animals: chimpanzees
Reference: familiar name
Apparatus: cage/experimenter interface device
Motive: food reward

Tsang, Y. C. (1938). Hunger motivation in gastrectomized rats. Journal of Comparative Psychology, 26, 1-17.

Researcher: male
Institution: Chicago
Animals: albino rats
Reference: group
Apparatus: ordinary enclosed alley maze
Motive: hunger/food

Jones, F. N. & Taylor, F. E. (1938). The relative effects of goal orientation and direction of the last turn on maze learning in the rat. Journal of Comparative Psychology, 26, 19-26.

Researcher: ?, female
Institution: UC Berkeley
Animals: albino rats

Reference: group
Apparatus: modified Spence/Shipley maze
Motive: food reward

Brown, C. W. & Ghiselli, E. E. (1938). Subcortical mechanisms in learning. II. The maze. Journal of Comparative Psychology, 26, 27-44.

Researcher: males
Institution: UC, U Maryland
Animals: albino rats
Reference: number
Apparatus: 18 unit multiple T maze
Motive: food reward

Henry, F. M. (1938). Audition in the white rat. III. Absolute and relative intensity thresholds. Journal of Comparative Psychology, 26, 45-62.

Researcher: male
Institution: UC Berkeley
Animals: albino rats
Reference: number
Apparatus: auditory discrimination apparatus
Motive: shock punishment

Kellogg, W. N. & Walker, E. L. (1938). "Ambiguous conditioning," a phenomenon a bilateral transfer. Journal of Comparative Psychology, 26, 63-77.

Researcher: ?
Institution: Indiana
Animals: dogs
Reference: letter
Apparatus: Pavlovian conditioning apparatus
Motive: N/A -- CR

Ghiselli, E. E. & Brown, C. W. (1938). Subcortical mechanisms in learning. IV. Olfactory discrimination. Journal of Comparative Psychology, 26, 93-107.

Researcher: males
Institution: UC, U. Maryland
Animals: rats
Reference: group., number
Apparatus: brightness discrimination apparatus
Motive: electric shock punishment

Brown, C. W. & Ghiselli, E. E. (1938). Journal of Comparative Psychology, 26, 109-120.

Researcher: males
Institution: U. California; U Maryland
Animals: albino rats
Reference: number
Apparatus: olfactory discrimination apparatus
Motive: positive and negative odors

Bugelski, R. (1938). Extinction with and without sub-goal reinforcement. Journal of Comparative Psychology, 26, 135-156.

Researcher: male
Institution: Yale
Animals: rats
Reference: number
Apparatus: Skinner box
Motive: reinforcement -- food

Jukes, C. L. (1938). Selection of diet in chicks as influenced by vitamins and other factors. Journal of Comparative Psychology, 26, 135-156.

Researcher: female
Institution: Psychology and Poultry Husbandry, UC Berkeley and Davis
Animals: chicks
Reference: group
Apparatus: food choice
Motive: preference

Gilhousen, H. C. (1938). Temporal relations in anticipatory reactions of the white rat in a maze. Journal of Comparative Psychology, 26, 163-175.

Researcher: ?
Institution: UCLA
Animals: albino rats
Reference: group
Apparatus: 2 choice point maze
Motive: hunger

Muenzinger, K. F., Bernstone, A. H. & Richards, L. (1938). Motivation in learning. VIII. Equivalent amounts of electric shock fro right and wrong responses in a visual discrimination habit. Journal of Comparative Psychology, 26, 177-186.

Researcher: m,m,?
Institution: Colorado
Animals: albino rats
Reference: group
Apparatus: T shaped discrimination box
Motive: shock punishment

Honzik, C. H. & Tolman, E. C. (1938). The action of punishment in accelerating learning. Journal of Comparative Psychology, 26, 187-200.

Researcher: males
Institution: U California
Animals: albino rats
Reference: group
Apparatus: gap-jumping apparatus
Motive: forced jumping

Karn, H. W. (1938). The behavior of cats on the double alternation problem in the temporal maze. Journal of Comparative Psychology, 26, 201-208.

Researcher: male
Institution: U Pittsburgh
Animals: cats
Reference: familiar name

Apparatus: double alternation temporal maze
Motive: food reward

Stone, C. P. (1938). Effects of cortical destruction on reproductive behavior and maze learning in albino rats. Journal of Comparative Psychology, 26, 217-236.

Researcher: male
Institution: Stanford
Animals: albino rats
Reference: number
Apparatus: Lashley simple maze
Motive: food reward

Stone, C. P. & Ferguson, L. (1938). Preferential responses for male albino rats to food and to receptive females. Journal of Comparative Psychology, 26, 237-253.

Researcher: male, ?
Institution: Stanford
Animals: albino rats
Reference: number
Apparatus: Tsai choice apparatus
Motive: choice/drive

Porter, J. M. Jr. (1938). Extinction of an acquired response as a function of the interval between successive non-rewarded trials. Journal of Comparative Psychology, 26, 261-270.

Researcher: male
Institution: Carnegie Institute
Animals: albino rats
Reference: number
Apparatus: Hull speed-gradient alley
Motive: food

Ghiselli, E. E. & Brown, C. W. (1938). Subcortical mechanisms in learning. V. Inclined plane discrimination. Journal of Comparative Psychology, 26, 271-285.

Researcher: males
Institution: U Maryland, U California
Animals: albino rats
Reference: number
Apparatus: 6-unit inclined plane discrimination apparatus
Motive: food reward

Brown, C. H. & Ghiselli, E. E. (1938). Subcortical mechanisms in learning. VI. Pattern vision discrimination. Journal of Comparative Psychology, 26, 287-300.

Researcher: males
Institution: Maryland, California
Animals: albino rats
Reference: number
Apparatus: pattern discrimination apparatus
Motive: shock punishment

Ghiselli, E. E. & Brown, C. H. (1938). Subcortical mechanisms in learning. VII. Effect of cerebral injury upon relative distribution of errors in a spatial maze. Journal of Comparative Psychology, 26, 301-309.

Researcher: males
Institution: Maryland, California
Animals: albino rats
Reference: number
Apparatus: 18 multiple-T unit maze
Motive: food reward

Pratt, J. G. (1938). Studies in equivalent stimuli in hooded rats. I. Effect of brightness of the background upon brightness preferences resulting from acquired size preference. Journal of Comparative Psychology, 26, 311-330.

Researcher: ?
Institution: Duke
Animals: hooded rats
Reference: groups
Apparatus: T-shaped discrimination apparatus
Motive: shock punishment, food reward

Morgan, C. T. & Fields, P. E. (1938). Effect of variable preliminary feeding upon the rat's speed-of-locomotion. Journal of Comparative Psychology, 26, 331-348.

Researcher: males
Institution: Rochester U., Ohio Wesleyan U.
Animals: albino rats
Reference: group
Apparatus: Multiple unit T maze; straightaway
Motive: food reward

Nissen, H. W., Riesen, A. H. & Nowlis, V. (1938). Delayed response and discrimination learning by chimpanzees. Journal of Comparative Psychology, 26, 361-386.

Researcher: male, ?, ?
Institution: Yale
Animals: chimpanzees
Reference: familiar name
Apparatus: discrimination box, delayed reaction apparatus
Motive: food reward

Winslow, C. N. (1938). The irradiation of extinction of conditioned responses Journal of Comparative Psychology, 26, 397-412.

Researcher: male
Institution: Philosophy, Brooklyn College
Animals: cats
Reference: number
Apparatus: Pavlovian conditioning apparatus
Motive: N/A -- CR

Loevinger, J. (1938). "Reasoning" in maze-bright and maze-dull rats. Journal of Comparative Psychology, 26, 413-426.

Researcher: female
Institution: U. Minnesota
Animals: rats
Reference: number, group
Apparatus: Heron's automatic maze; Maier reasoning apparatus

Motive: food reward

Hebb, D. O. (1938). Studies of the organization of behavior. II. Changes in the field orientation of the rat after cortical destruction. Journal of Comparative Psychology, 26, 427-443.

Researcher: male
Institution: MNI, McGill
Animals: albino rats
Reference: group
Apparatus: orientation apparatus (Hebb)
Motive: food reward

Peterson, G. M. (1938). The influence of cerebral destructions upon the handedness of the rat in the latch box. Journal of Comparative Psychology, 26, 445-458.

Researcher: male
Institution: U. New Mexico
Animals: albino rats
Reference: number, group
Apparatus: latch box
Motive: food reward

Anderson, E. E. & Anderson, S. F. (1938). The relation between the weight of the endocrine glands and measures of sexual, emotional and exploratory behavior in the male albino rat. Journal of Comparative Psychology, 26, 459-474.

Researcher: male, female
Institution: Harvard, Radcliffe
Animals: albino rats
Reference: number
Apparatus: open field apparatus; stovepipe, measures of emotionality
Motive: N/A

Evans, L. T. (1938). Courtship behavior and sexual selection of anolis. Journal of Comparative Psychology, 26, 475-497.

Researcher: male
Institution: Harvard Biological Lab., Montana State University
Animals: anolis (birds)
Reference: group, number
Apparatus: observation cage
Motive: N/A

Bunch, M. E., Frerichs, J. B. & Licklider, J. R. (1938). An experimental study of maze learning ability after various periods of wakefulness. Journal of Comparative Psychology, 26, 499-514.

Researcher: ?
Institution: Washington U.
Animals: rats
Reference: group
Apparatus: 140 unit Stone multiple T maze
Motive: food reward

Foley, J. P. Jr. (1938). Tonic immobility in the Rhesus monkey (Maccaca mullatta) induced by manipulation, immobilization and experimental inversion of the visual field. Journal of Comparative Psychology, 26, 515-526.

Researcher: male
Institution: George Washington Univ.
Animals: monkey
Reference: 'the subject'
Apparatus: restrain apparatus, observation apparatus
Motive: N/A

Maier, N. R. F., & Sherburne, B. J. (1938). The effect of certain aspects of a problem situation on the reasoning score of rats. Journal of Comparative Psychology, 26, 527-544.

Researcher: male,. female
Institution: U. Michigan
Animals: albino rats
Reference: number, sex
Apparatus: apparatus for the integration of two separate experiences
Motive: food reward

Young, P. T. (1938). Preferences and demands of the white rat for food. Journal of Comparative Psychology, 26, 545-589.

Researcher: male
Institution: U. Illinois
Animals: albino rats
Reference: number
Apparatus: modified preferential apparatus for controlling the path of approach to food; eating rate recording apparatus
Motive: food

McCord, F. (1939). The delayed reaction and memory in rats. I. Length of delay. Journal of Comparative Psychology, 27, 1-37.

Researcher: male
Institution: Duke
Animals: albino rats
Reference: number
Apparatus: delayed reaction apparatus (Own design)
Motive: food reward

Young, W. O., Dempsey, E. W., Hagquist, C. W. & Boling, J. L. (1939). Sexual behavior and sexual receptivity in the female guinea pig. Journal of Comparative Psychology, 27, 49-68.

Researcher: males
Institution: biology, anatomy: Brown Univ. & Yale Univ.
Animals: guinea pigs
Reference: number
Apparatus: observation cages
Motive: N/A

Bruner, J. S. & Cunningham, B. (1939). The effect of thymus extract on the sexual behavior of the female rat. A preliminary report. Journal of Comparative Psychology, 27, 69-77.

Researcher: males
Institution: Psych., Harvard; Zoology, Duke
Animals: hooded rats
Reference: number, group
Apparatus: observation cages

Motive: N/A

Haire, M. (1939). Some factors influencing repetitive errors in discrimination learning. Journal of Comparative Psychology, 27, 79-91.

Researcher: male
Institution: Swarthmore
Animals: rats
Reference: group
Apparatus: modified jumping apparatus
Motive: food reward

Settlage, P. H. (1939). The effect of occipital lesions on visually-guided behavior in the monkey. I. Influence of the lesions on final capacities in a variety problem situation. Journal of Comparative Psychology, 27, 93-131.

Researcher: male
Institution: Chicago
Animals: monkey
Reference: numbered
Apparatus: brightness discrimination apparatus; delayed reaction apparatus
Motive: food reward

Crawford, M. P. & Spence, K. W. (1939). Observational learning of discrimination problems by chimpanzees. Journal of Comparative Psychology, 27, 133-147.

Researcher: ?, male
Institution: Yale
Animals: chimpanzees
Reference: familiar name,. number
Apparatus: observational learning apparatus (2 cages, 2 animals)
Motive: food reward

Honzik, C. H. (1939). The role of stimulation in maze learning: Specificity vs. patterning. Journal of Comparative Psychology, 27, 149-164.

Researcher: male
Institution: U. California
Animals: blind rats
Reference: group
Apparatus: elevated maze
Motive: food reward

Comsweet, A. C. (1939). Recovery sequence after anesthetization. III. Ethyl alcohol. Journal of Comparative Psychology, 27, 165-173.

Researcher: male
Institution: UNC
Animals: albino rats
Reference: number
Apparatus: anaethesia chamber, observation cages
Motive: N/A

McCord, F. (1939). The delayed reaction and memory in rats. II. An analysis of the behavioral dimension. Journal of Comparative Psychology, 27, 175-210.

Researcher: male

Institution: Duke
Animals: albino rats
Reference: group, number
Apparatus: McCord delayed reaction apparatus
Motive: food reward

Hill, C. J. & Calvin, J. S. (1939). The joint extinction of two simple excitatory tendencies. Journal of Comparative Psychology, 27, 215-232.

Researcher: males
Institution: Yale
Animals: albino rats
Reference: group
Apparatus: Skinner-Youtz experiment box
Motive: food reward

Hull, C. L. (1939). Simple trial-and-error learning -- An empirical investigation. Journal of Comparative Psychology, 27, 233-258.

Researcher: male
Institution: Yale
Animals: albino rats
Reference: number
Apparatus: Skinner-Youtz experiment box., Ellson modification (soundproof)
Motive: food reward

Reynolds, H. E. (1939). Further disinhibition phenomena in the maze behavior of the white rat. Journal of Comparative Psychology, 27, 271-282.

Researcher: male
Institution: Colorado
Animals: albino rats
Reference: number
Apparatus: modified Valentine maze
Motive: food reward, shock punishment

Maier, N. R. F. (1939). Qualitative differences in the learning of rats in a discrimination situation. Journal of Comparative Psychology, 27, 289-331.

Researcher: male
Institution: U. Michigan
Animals: albino rats
Reference: group, number
Apparatus: Lashley jumping stand
Motive: food reward

Drew, G. C. (1939). The speed of locomotion gradient and its relation to the goal gradient. Journal of Comparative Psychology, 27, 333-372.

Researcher: male
Institution: Harvard
Animals: albino rats
Reference: number
Apparatus: straight runway; water tank (escape); shavings box (dig)
Motive: food reward, escape confinement

Ericksen, S. C. (1939). The relative effect of a cerebral lesion upon learning, retention and transfer. Journal of Comparative Psychology, 27, 373-391.

Researcher: male
Institution: U. Arkansas
Animals: albino rats
Reference: group
Apparatus: runway; 12-unit multiple T maze
Motive: food reward

Walker, E. L. & Kellogg, W. N. (1939). Conditioned respiration and the conditioned flexion response in dogs. Journal of Comparative Psychology, 27, 393-409.

Researcher: males
Institution: Indiana U.
Animals: dogs
Reference: letter
Apparatus: Pavlovian conditioning apparatus
Motive: N/A – CR

Sackett, R. S. (1939). The effect of strength of drive at the time of extinction upon resistance to extinction in rats. Journal of Comparative Psychology, 27, 411-431.

Researcher: male
Institution: American University
Animals: albino rats
Reference: group
Apparatus: Skinner box
Motive: food reward

Smith, K. U. (1939). The behavior of decorticate guinea pigs. Journal of Comparative Psychology, 27, 433-447.

Researcher: male
Institution: Univ. Of Rochester
Animals: guinea pigs
Reference: number
Apparatus: observation cage
Motive: N/A

Bunch, M. E. & Lang, E. S. (1939). The amount of transfer of training from partial learning after varying intervals of time. Journal of Comparative Psychology, 27, 449-459.

Researcher: ?
Institution: Washington Univ.
Animals: albino rats
Reference: group
Apparatus: 2 multiple-T water mazes
Motive: escape from water, food reward

Harlow, H. F. (1939). Recovery of pattern discrimination in monkeys following unilateral occipital lobectomy. Journal of Comparative Psychology, 27, 467-489.

Researcher: male
Institution: Univ. Of Wisconsin
Animals: monkeys

Reference: familiar name
Apparatus: standard experimental cage designed by Harlow and Bromer
Motive: food reward

Stott, L. H. & Ruch, L. L. (1939). Establishing time-discriminatory behavior in the white rat by use of an automatically controlled training and recording apparatus. Journal of Comparative Psychology, 27, 491-503.

Researcher: males
Institution: Univ. Nebraska; USC
Animals: albino rats
Reference: group
Apparatus: training box with electric grille and platform, own design
Motive: shock punishment

Biel, W. C. (1939). The effects of early inanation on a developmental schedule in the albino rat. Journal of Comparative Psychology, 28, 1-15.

Researcher: male
Institution: OSU
Animals: albino rats
Reference: group
Apparatus: multiple T water maze
Motive: escape from water, food reward

Ericksen, S. E. (1939). A second study on the relative effect of a cerebral lesion upon learning, retention and transfer. Journal of Comparative Psychology, 28, 45-54.

Researcher: male
Institution: Univ. Arkansas
Animals: albino rats
Reference: group
Apparatus: maze, unspecified origin
Motive: food reward

Karn, H. W. & Patton, R. A. (1939). The transfer of double alternation behavior acquired in a temporal maze. Journal of Comparative Psychology, 28, 55-61.

Researcher: males
Institution: Univ. Pittsburgh
Animals: cats
Reference: familiar names
Apparatus: temporal maze, double alternation
Motive: food reward

Keller, F. S. (1939). Some experimental operations affecting drive constancy. Journal of Comparative Psychology, 28, 63-72.

Researcher: male
Institution: Columbia Univ.
Animals: rats
Reference: group
Apparatus: lever-pressing apparatus
Motive: food reward

Morgan, C. T. (1939). Studies in vision. I. A technique for the study of visual discrimination in the rat. Journal of Comparative Psychology, 28, 73-79.

Researcher: male
Institution: Univ. Rochester
Animals: rats
Reference: number
Apparatus: discrimination box with food delivery mechanism, own design
Motive: food reward

Sollenberger, R. T. & Hamilton, J. B. (1939). The effect of testosterone propionate upon the sexual behavior of castrated male guinea pigs. Journal of Comparative Psychology, 28, 81-92.

Researcher: males
Institution: Psychology, Anatomy: Yale
Animals: guinea pigs
Reference: group, number
Apparatus: observation cage
Motive: N/A

Wolfe, J. B. (1939). An exploratory study of food-storing in rats. Journal of Comparative Psychology, 28, 97-108.

Researcher: male
Institution: Univ. Mississippi
Animals: albino rats
Reference: number and sex
Apparatus: observation cages
Motive: N/A

Bash, K. W. (1939). An investigation into a possible organic basis for the hunger drive. Journal of Comparative Psychology, 28, 109-135.

Researcher: ?
Institution: Univ. Chicago
Animals: rats
Reference: group
Apparatus: activity cages, obstruction apparatus
Motive: hunger

Bash, K. W. (1939). Contribution to a theory of the hunger drive. Journal of Comparative Psychology, 28, 137-160.

Researcher: ?
Institution: Univ. Chicago
Animals: rats
Reference: group
Apparatus: activity cage, obstruction apparatus, maze
Motive: food reward, drive

Smith, D. E. (1939). Cerebral localization in somesthetic discrimination in the rat. Journal of Comparative Psychology, 28, 161-190.

Researcher: male
Institution: Philosophy, Univ. Alberta
Animals: rats, blinded
Reference: number
Apparatus: Y-shaped elevated path apparatus (discriminate between smooth and rough)
Motive: food reward, shock punishment

Bunch, M. E. (1939). Transfer of training in the mastery of an antagonistic habit after varying intervals of time. Journal of Comparative Psychology, 28, 189-200.

Researcher: ?
Institution: Washington Univ.
Animals: rats
Reference: group
Apparatus: 1-unit T discrimination apparatus
Motive: escape from water

Beach, F. A. (1939). The neural basis of innate behavior. III. Comparison of learning ability and instinctive behavior in the rat. Journal of Comparative Psychology, 28, 225-262.

Researcher: male
Institution: Laboratory of Experimental Biology, Amer. Museum of Natural History
Animals: albino rats
Reference: number
Apparatus: Lashley Maze III, Straight runway; Observation Cage
Motive: food reward,

Ball, J. (1939). Male and female mating behavior in prepubertally castrated rats receiving estrogens. Journal of Comparative Psychology, 28, 273-283.

Researcher: female
Institution: Johns Hopkins Medical School
Animals: albino rats
Reference: 'the subjects'
Apparatus: observation cages
Motive: N/A

Hunt, J. McV., & Schlosberg, H. (1939). The influence of illumination upon general activity in normal, blinded and castrated male white rats. Journal of Comparative Psychology, 28, 285-298.

Researcher: ?, male
Institution: Brown Univ.
Animals: albino rats
Reference: number
Apparatus: Hunt & Scholsberg activity apparatus
Motive: N/A

Dennis, W. (1939). Spontaneous alternation in rats as an indicator of the persistence of stimulus effects. Journal of Comparative Psychology, 28, 305-312.

Researcher: male
Institution: Univ. Virginia
Animals: albino rats
Reference: group
Apparatus: temporal maze
Motive: food reward

van Vorst, R. B., Stone, C. P. & Kuznets, G. M. (1939). A comparison of the learning rate of rats on elevated horizontal with rats on elevated inclined maze treadways. Journal of Comparative Psychology, 28, 335-347.

Researcher: male, male, ?
Institution: Stanford Univ.
Animals: albino rats

Reference: group, sex
Apparatus: 4 mazes, elevated multiple T adjustable
Motive: food reward

Minkowsky, W. L. (1939). The effect of benzadrine sulphate upon learning. Journal of Comparative Psychology, 28, 349-360.

Researcher: male
Institution: Univ. Minnesota
Animals: rats
Reference: group
Apparatus: multiple T maze
Motive: food reward

Tryon, R. C. (1939). Studies in individual differences in maze learning. VI. Effects of stimulus variation; a theory of generalized directional components. Journal of Comparative Psychology, 28, 361-415.

Researcher: male
Institution: Univ. California
Animals: albino rats
Reference: number, group
Apparatus: 17 unit automatically recording t maze
Motive: food reward

Walton, W. E. & Bornemeier, R. W. (1939). Color discrimination in rats. Journal of Comparative Psychology, 28, 417-436.

Researcher: male, ?
Institution: Univ. Nebraska
Animals: rats
Reference: number, group
Apparatus: Lashley jumping stand, modified with two long light channels
Motive: food reward

McCulloch, T. L. & Haselrud, G. M. (1939). Affective responses of an infant chimpanzee reared in isolation from its kind. Journal of Comparative Psychology, 28, 437-445.

Researcher: males
Institution: Yale
Animals: chimpanzee
Reference: Peter
Apparatus: reactions to various objects and toys
Motive: N/A

Crutchfield, R. S. (1939). Psychological distance as a function of psychological need. Journal of Comparative Psychology, 28, 447-469.

Researcher: male
Institution: Mount Holyoke
Animals: rats
Reference: group
Apparatus: runway with 8 blinds, temporal maze
Motive: food reward

Gilhousen, H. C. (1939). The rat's speed of locomotion to intermediate fields. Journal of Comparative Psychology, 28, 471-496.

Researcher: male
Institution: UCLA
Animals: albino rats
Reference: group, number
Apparatus: straightaway
Motive: food reward

Seward, J. P. & Seward, G. H. (1940). Studies on the reproductive activities of the guinea pig. I. Factors in maternal behavior. Journal of Comparative Psychology, 29, 1-24.

Researcher: male, female
Institution: Connecticut College
Animal: guinea pig
Reference: number, group
Apparatus: modification of obstruction apparatus: jumping instead of shock; 'hurdle box'
Motive: drives

Seward, G. H. (1940). Studies on the reproductive activities of the guinea pig: II. The role of hunger in filial behavior. Journal of Comparative Psychology, 29, 25-41.

Researcher: female
Institution: Connecticut College
Animal: guinea pig
Reference: number and letter
Apparatus: hurdle box
Motive: food

Kellogg, W. N., Brown Scott, V., Davis, R. C., & Wolf, I. S. (1940). Is movement necessary for learning? An experimental test of the motor theory of conditioning. Journal of Comparative Psychology, 29, 43-74.

Researcher: ?
Institution: Indiana
Animal: dogs
Reference: group, number and letter
Apparatus: observation, conditioned by shock
Motive: CR

Wherry, R. J. (1940). A test by factorial analysis on Honzik's exteroceptive data. Journal of Comparative Psychology, 29, 75-95.

Researcher: male
Institution: North Carolina
Animal: rats
Reference: group
Apparatus: Honzik multiple T-maze
Motive: food

Munn, N. L. (1940). Learning experiments with larval frogs. A preliminary report. Journal of Comparative Psychology, 29, 97-108.

Researcher: male
Institution: Vanderbilt University

Animal: larval frogs
Reference: number
Apparatus: Y-shaped maze
Motive: shock punishment

Bayroff, A. G. (1940). Air blasts as substitutes for electric shock in discrimination learning of white rats. Journal of Comparative Psychology, 29, 109-118.

Researcher: ?
Institution: North Carolina
Animal: white rats
Reference: group
Apparatus: discrimination apparatus
Motive: compressed air and electric shock

Finan, J. L. (1940). Quantitative studies in motivation: I. Strength on conditioning in rats under varying degrees of hunger. Journal of Comparative Psychology, 29, 119-134.

Researcher: male
Institution: Illinois
Animal: albino rats
Reference: group
Apparatus: skinner box
Motive: food

Buxton, C. E. (1940). Three experimental notes on the speed-of-locomotion gradients in the rat. Journal of Comparative Psychology, 29, 139-156.

Researcher: male
Institution: Northwestern University
Animal: black rats
Reference: group
Apparatus: runway
Motive: food

Ball, J. (1940). The effect of testosterone on the sex behavior of female rats. Journal of Comparative Psychology, 29, 151-165.

Researcher: female
Institution: The Henry Phipps Clinic, Johns Hopkins Medical School, and the Carnegie Institution of Washington
Animal: rats
Reference: number
Apparatus: observation cage, smears
Motive: N/A

Grether, W. F. (1940). Chimpanzee color vision. I. Hue discrimination at three spectral points. Journal of Comparative Psychology, 29, 167-177.

Researcher: male
Institution: Yale
Animal: chimpanzees, monkeys
Reference: proper names
Apparatus: Grether discrimination apparatus
Motive: food

Grether, W. F. (1940). Chimpanzee color vision. II. Color mixture proportions. Journal of Comparative Psychology, 29, 179-186.

Researcher: male
Institution: Yale
Animal: chimpanzees, monkeys
Reference: proper names
Apparatus: Grether discrimination apparatus
Motive: food

Beach, F. A. (1940). Effects of cortical lesions upon the copulatory behavior of male rats. Journal of Comparative Psychology, 29, 193-245.

Researcher: male
Institution: Laboratory of Experimental Biology, American Museum of Natural History, New York
Animal: rats
Reference: group
Apparatus: copulation cage
Motive: copulation

Herb, F. H. (1940). Latent learning - Non-reward followed by food in blinds. Journal of Comparative Psychology, 29, 247-256.

Researcher: male
Institution: U California
Animal: rats
Reference: group
Apparatus: fourteen-unit T-maze (Tolman / Honzik)
Motive: food

Mendenhall, M. C. (1940). The effects of sodium phenobarbital on learning and "reasoning" in white rats. Journal of Comparative Psychology, 29, 257-276.

Researcher: female
Institution: North Carolina
Animal: albino rats
Reference: group
Apparatus: Miles elevated skeleton maze
Motive: food

Bayroff, A. G. (1940). The experimental social behavior of animals. II. The effect of early isolation of white rats on their competition in swimming. Journal of Comparative Psychology, 29, 293-306.

Researcher: ?
Institution: North Carolina
Animal: white rats
Reference: number
Apparatus: swim tank
Motive: escape water

Billingslea, F. (1940). The relationship between emotionality activity, curiosity, persistence and weight in the male rat. Journal of Comparative Psychology, 29, 315-325.

Researcher: male
Institution: Western Reserve University
Animal: albino, hooded and black rats
Reference: number

Apparatus: activity wheel (observational), Vaughn apparatus
Motive: N/A, food

Martin, R. F. (1940). "Native" traits and regression in rats. Journal of Comparative Psychology, 30, 1-16.

Researcher: male
Institution: Western Reserve University
Animal: rats
Reference: number
Apparatus: Krechevsky multiple-unit discrimination box
Motive: food

Fearing, F. (1940). The retention of the effects of repeated elicitation of the post-rotational nystagmus in pigeons. Journal of Comparative Psychology, 30, 31-40.

Researcher: male
Institution: U California
Animal: pigeons
Reference: group
Apparatus: rotating apparatus
Motive: NC

O'Kelly, L. I. (1940). An experimental study of regression. I. Behavioral characteristics of the regression response. Journal of Comparative Psychology, 30, 41-53.

Researcher: ?
Institution: U Colorado
Animal: albino rats
Reference: number
Apparatus: open-field discrimination apparatus
Motive: shock punishment, food

O'Kelly, L. I. (1940). An experimental study of regression. II. Some motivational determinants of regression and preservation. Journal of Comparative Psychology, 30, 55-95.

Researcher: ?
Institution: U Colorado
Animal: albino rats
Reference: number
Apparatus: open-field discrimination apparatus
Motive: shock punishment, food

Brown, W. L. (1940). A study of changes in orientation resulting from changed intra-organic motivation in learning. Journal of Comparative Psychology, 30, 111-127.

Researcher: ?
Institution: U Texas
Animal: rat
Reference: number
Apparatus: multiple T-maze (Tolman / Honzik)
Motive: food and water

Tolman, E. C. (1940). Spatial angle and vicarious trial and error. Journal of Comparative Psychology, 30, 129-135.

Researcher: male
Institution: U California, Berkeley
Animal: rats
Reference: group
Apparatus: trial and error apparatus (Tolman)
Motive: food

Skinner, B. F. (1940). A method of maintaining an arbitrary degree of hunger. Journal of Comparative Psychology, 30, 139-148.

Researcher: ?
Institution: U Minnesota
Animal: rats
Reference: group
Apparatus: lever
Motive: food

Yerkes, R. M. (1940). Social behavior of chimpanzees. Dominance between mates, in relation to sexual status. Journal of Comparative Psychology, 30, 147-186.

Researcher: male
Institution: Yale
Animal: chimpanzees
Reference: proper names
Apparatus: observation cage
Motive: N/A

Weinstein, B., & Grether, W. F. (1940). A comparison of visual acuity in the rhesus monkey and man. Journal of Comparative Psychology, 30, 187-195.

Researcher: ?
Institution: U Wisconsin
Animal: rhesus monkey
Reference: proper names
Apparatus: visual acuity test apparatus
Motive: food

Mote, F. A. Jr. (1940). Correlations between conditioning and maze learning in the white rat. Journal of Comparative Psychology, 30, 197-219.

Researcher: male
Institution: Brown University
Animal: white rats
Reference: number
Apparatus: activity wheel, 10-unit Multiple T Alley maze, conditioning apparatus
Motive: shock punishment, food

Biel, W. C., & O'Kelly, L. I. (1940). The effect of cortical lesions on emotional and regressive behavior in the rat. I. Emotional behavior. Journal of Comparative Psychology, 30, 221-240.

Researcher: males
Institution: Miami University, and U Colorado
Animal: rats
Reference: group
Apparatus: straightaway, 1-unit T maze, electrical shock
Motive: food, shock punishment

Young, P. T., & Wittenborn, J. R. (1940). Food preferences of rachitic and normal rats. Journal of Comparative Psychology, 30, 261-277.

Researcher: males
Institution: U Illinois
Animal: rats
Reference: group and number
Apparatus: food preference apparatus
Motive: food

Tryon, R. C. (1940). Studies in individual differences in maze ability. VII. The specific components of maze ability and a general theory of psychological components. Journal of Comparative Psychology, 30, 283-335.

Researcher: male
Institution: U California
Animal: rats
Reference: number
Apparatus: automatically recording 17-unit T-maze
Motive: food

Zerga, J. E. (1940). An introductory investigation of learning behavior in birds. Journal of Comparative Psychology, 30, 337-346.

Researcher: male
Institution: U South California
Animal: roller canaries
Reference: number
Apparatus: maze (own construction)
Motive: food

Storey, R. T. (1940). Proprioceptive discrimination in the cat. I. Apparatus and Method. Journal of Comparative Psychology, 30, 347-373.

Researcher: female
Institution: Stanford
Animal: Cat
Reference: number
Apparatus: Stanford tilt-box
Motive: food, shock punishment

Storey, R. T. (1940). Proprioceptive discrimination in the cat. II. Analysis of group data. Journal of Comparative Psychology, 30, 375-398.

Researcher: female
Institution: Stanford
Animal: cat
Reference: group and number
Apparatus: Stanford tilt-box
Motive: food

Anderson, A. C. (1940). Evidence of reminiscence in the rat in maze learning. Journal of Comparative Psychology, 30, 399-412.

Researcher: male

Institution: Ohio University
Animal: rat
Reference: group
Apparatus: 14-unit multiple T maze (Stone)
Motive: food

Stone, C. P., & Ferguson, L. W. (1940). Temporal relationships in the copulatory acts of adult male rats. Journal of Comparative Psychology, 30, 419-433.

Researcher: male
Institution: Stanford
Animal: rat
Reference: number
Apparatus: film, observation cage
Motive: N/A

Seward, J.P. (1940). Studies on the reproductive activities in the guinea pig. III. The effect of androgenic hormone on sex drive in males and females. Journal of Comparative Psychology, 30, 435-449.

Researcher: male
Institution: Connecticut College
Animal: guinea pigs
Reference: number, sex
Apparatus: observation cage
Motive: N/A

Witkin, H. A. (1940). "Hypotheses" in rats: An experimental critique. I. The genesis of systematic behavior in linear situations. Journal of Comparative Psychology, 30, 457-482.

Researcher: ?
Institution: Brooklyn College
Animal: rats
Reference: number
Apparatus: Krechevsky maze
Motive: food

Crawford, M. P. (1940). The relation between social dominance and the menstrual cycle in female chimpanzees. Journal of Comparative Psychology, 30, 483-513.

Researcher: female
Institution: Yale
Animal: chimpanzees
Reference: proper names
Apparatus: observation cage, food chute
Motive: food

Tryon, R. C. (1940). Studies in the individual differences in maze ability. VIII. Prediction validity of the psychological components of maze ability. Journal of Comparative Psychology, 30, 535-582.

Researcher: male
Institution: U California
Animal: rats
Reference: number
Apparatus: automatic recording 17-unit T maze
Motive: food

Lepley, W. M. (1938). Competitive behavior in the albino rat. Journal of Experimental Psychology, 21, 194-201.

Researcher:
Institution: Pennsylvania State College
Animals: 12 albino rats
Reference:
Apparatus: 30 foot long alley with starting gate and finish line/food box
Motive: food reward

Hunter, W. S. (1938). Muscle potentials and conditioning in the rat. Journal of Experimental Psychology, 21, 611-624.

Researcher: male
Institution: Brown University
Animals used: rats
Reference:
Apparatus: (1) bandaging and adhesive tape to immobilize the animal; (2) holder through which legs projected; (3) inductorium - electric shock device; (3) electrically-shielded semi-sound-proof box through which the head protruded; (4) Clough-Brengle cathode-ray oscillograph, amplifiers, loudspeaker; (5) 16mm Filmo camera
Motive: pain avoidance, electric shock

Skolnick, A. (1938). The upper limit of cutaneous sensitivity to frequency of vibration in the white rat. Journal of Experimental Psychology, 22, 273-276.

Researcher:
Institution: Princeton University
Animals used: albino rats
Reference:
Apparatus: (1) 3 platforms: starting base, vibrating and non-vibrating; (2) amplifiers and loudspeakers attached to platforms to provide different frequencies of vibrations
Motive: hunger

Youtz, R. E. (1938). The change with time of a Thorndikian response in the rat. Journal of Experimental Psychology, 22, 305-318.

Researcher:
Institution: Barnard College, Columbia University
Animals: 39 Experimental Colony Wistar rats
Reference:
Apparatus: Skinner box
Motive: hunger

Krechevsky, I. (1938). An experimental investigation of the principle of proximity in the visual perception of the rat. Journal of Experimental Psychology, 22, 497-523.

Researcher:
Institution: Swarthmore College
Animals: 42 pigmented male rats, Swarthmore Psychological Lab Stock
Reference:
Apparatus: (1) Lashley Jumping-Stand for visual discrimination learning; (2) Gestalt visual discrimination problems
Motive: presumably hunger

Kam, H. W. (1938). A case of experimentally induced neurosis in the cat. Journal of Experimental Psychology, 22, 589-592.

Researcher:
Institution: University of Pittsburgh
Animals: cats
Reference:
Apparatus: Double-alternation temporal maze
Motive: hunger

Youtz, R. E. (1938). Reinforcement, extinction and spontaneous recovery in a non-Pavlovian reaction. Journal of Experimental Psychology, 23, 128-140.

Researcher:
Institution: Barnard College, Columbia University
Animals: 18 male Wistar rats
Reference:
Apparatus: (1) Sound-reinforced Skinner box; (2) polygraph
Motive: hunger

Beebe-Center, J. G. & S. S. Stevens (1938). The emotional responses: Changes of heart-rate in a gun-shy dog. Journal of Experimental Psychology, 23, 239-257.

Researcher:
Institution: Harvard University
Animals: gun-shy dog
Reference:
Apparatus: (1) Western Union Undulator, electrodes; (2) polygraph
Motive: NC

Hughes, B. & H. Schlosber (1938). Conditioning in the white rat, IV. The conditioned lid reflex. Journal of Experimental Psychology, 23, 641-650.

Researcher:
Institution: Brown University
Animals: albino rats
Reference:
Apparatus: (1) Holder; (2) Sound-resistant box; (3) compound pendulum (buzzer and subsequent puff of air to the eyeball; (4) kymograph to record eyeblink
Motive: NC

Lepley, W. M. (1939). The social facilitation of locomotor behavior in the albino rat. Journal of Experimental Psychology, 24, 106-109.

Researcher:
Institution: Pennsylvania State College
Animals: 18 albino rats
Reference:
Apparatus: (1) same as before: rat race alley; (2) polygraph for timing
Motive: hunger

Chard, R. D. (1939). Visual acuity in the pigeon. Journal of Experimental Psychology, 24, 588-608.

Researcher:
Institution: Princeton University

Animals: 6 homing pigeons and 1 tumber pigeon
Reference:
Apparatus: Halstead and Yacorzynski platform apparatus
Motive: hand trained to jump to the platform

Shuragger, P. S. & E. Cullen (1940). Conditioning in the spinal dog. Journal of Experimental Psychology, 26, 133-159.

Researcher: ? and male
Institution: U of Rochester
Animals: dog
Reference: number
Apparatus: Pavlovian conditioning apparatus
Motive: CR

Graham, C. H. & R. M. Gagne, (1940). The acquisition, extinction and spontaneous recovery of a conditioned operant response. Journal of Experimental Psychology, 26, 251-280.

Researcher: ? and ?
Institution: Brown University
Animals: albino rats
Reference: group
Apparatus: runway and food box
Motive: food

Dworkin, S., Katzmer, J. Hutchinson, G. & J. McCade. (1940). Hearing acuity of animals as measured by conditioning methods. Journal of Experimental Psychology, 26, 281-298.

Researcher: ?
Institution: McGill
Animals: cats
Reference: number
Apparatus: Pavlovian conditioning apparatus
Motive: CR

Grether, W. F. (1940). A comparison of human and chimpanzee spectral hue discrimination. Journal of Experimental Psychology, 26, 394-403.

Researcher: male
Institution: Yale
Animals: chimpanzees
Reference: proper names
Apparatus: discrimination apparatus, own design
Motive: food

Smith, K. U. (1940). The neural centers concerned in the mediation of apparent movement vision. Journal of Experimental Psychology, 26, 443-466.

Researcher: male
Institution: University of Rochester
Animals: guinea pigs
Reference: number
Apparatus: nystagmus apparatus: rotating drum with visual cue, polygraph
Motive: NC restrained

Maier, N. R. F., Glaser, N. M. & J. B. Klee (1940). Studies of abnormal behavior in the rat. III. The development of behavior fixations through frustration. Journal of Experimental Psychology, 26, 521-546.

Researcher: males
Institution: Michigan
Animals: albino rats
Reference: group
Apparatus: Lashley jumping stand
Motive: food

Kellogg, W. N. & I. S. Wolf (1940). 'Hypothesis' and 'random activity' during the conditioning of dogs. Journal of Experimental Psychology, 26, 588-601.

Researcher: ? and male
Institution: Indiana
Animals: dogs
Reference: number, letter
Apparatus: Pavlovian conditioning apparatus
Motive: CR

Maier, N. R. F. (1940). Studies of abnormal behavior in the rat. IV. Abortive behavior and its relation to the neurotic attack. Journal of Experimental Psychology, 27, 369-393.

Researcher: male
Institution: Michigan
Animals: albino rat
Reference: number, letter
Apparatus: modified jumping stand with air blast
Motive: food reward and punishment avoidance

Wever, E. G., C. W. Bray & M. Lawrence (1940). A quantitative study of combination tones. Journal of Experimental Psychology, 27, 469-496.

Researcher: males
Institution: Princeton
Animals: guinea pigs
Reference: number
Apparatus: cochlear potentials
Motive: NC under anesthesia

Mowrer, O. H. (1940). Anxiety-reduction and learning. Journal of Experimental Psychology, 27, 497-516.

Researcher: male
Institution: Yale
Animals: albino rats
Reference: group
Apparatus: circular electrified grille
Motive: shock punishment

Keller, F. S. (1940). The effect of sequence of continuous and periodic reinforcement upon the 'reflex reserve'. Journal of Experimental Psychology, 27, 559-565.

Researcher: male
Institution: Columbia
Animals: albino rats

Reference: group
Apparatus: lever-pressing apparatus
Motive: food

Brogden, W. J. (1940). Conditioned flexion responses in dogs re-established and maintained with change of locus in the application of the unconditioned stimulus. Journal of Experimental Psychology, 27, 583-600.

Researcher: ?
Institution: Johns Hopkins
Animals: dogs (mongrel, lab)
Reference: group and number
Apparatus: test chamber (Pavlovian conditioning apparatus)
Motive: CR

Bartley, S. H. (1940). The relation between cortical response to visual stimuli and changes in the alpha rhythm. Journal of Experimental Psychology, 27, 624-639.

Researcher: male
Institution: Washington University Medical School
Animals: rabbits
Reference: letter
Apparatus: eye flashes, measure optical potentials (anesthesia)
Motive: NC

Journal of General Psychology

Brown, R. H. (1936). The dim visibility curve of the rabbit. Journal of General Psychology, 14, 62-82.

Researcher: male
Institution: Clark University
Animals: 3 rabbits
Reference: number
Apparatus: lamp, colour filters, intensity filters, holders, electric pneumograph, kymograph
Motive: NC:

Skinner, B. F. (1936). The effect on the amount of conditioning of an interval of time before reinforcement. Journal of General Psychology, 14, 127-135.

Researcher: male
Institution: Harvard
Animals: 12 rats
Reference: number
Apparatus: conditioning apparatus
Motive: hunger

Bruce, R. H. (1937). An experimental investigation of the thirst drive in rats with especial reference to the goal gradient hypothesis. Journal of General Psychology, 17, 49-62

Researcher: male
Institution: University of Wyoming
Animals: 17 male 18 female rats
Reference: group letter
Apparatus: 47 ft long runway: starting box, water box

Motive: thirst

Lashley, K. S. (1938). The mechanism of vision. XV. Preliminary studies of the rat's capacity for detail vision. Journal of General Psychology, 18, 123-193.

Researcher: male
Institution: Harvard
Animals: white rats
Reference: number
Apparatus: Lashley jumping-stand
Motive: food-correct choice; fall into net - incorrect choice

Hu, C. (1938). The effects of brain injury upon retentiveness in the rat. Journal of General Psychology, 18, 267-304.

Researcher: male
Institution: Department of Psychology, University of Chicago
Animals: rats, some with cortical lesions
Reference: group, number
Apparatus: 3 mazes, runway, square and rectangular
Motive: hunger/food

Levy, D. M. (1938). In instinct saturation: An experiment on the pecking behavior on chickens. Journal of General Psychology, 18, 327-348.

Researcher: male
Institution: Medical Doctor, NYC
Animals: 200 Rhode Island Reds
Reference:
Apparatus: observation cages
Motive: NC

Smith, M. F. & K. U. Smith (1939). Thirst-motivated activity and its extinction in the cat. Journal of General Psychology, 21, 89-98..

Researcher: female, male
Institution: University of Rochester
Animals: 7 cats
Reference: number
Apparatus: modified Skinner apparatus
Motive: hunger/food

Arakelian, P. (1939). Cyclic oscillations in the extinction behavior of rats. Journal of General Psychology, 21, 137-162.

Researcher: male
Institution: Yale University
Animals: 80 naive male albino rats
Reference: number
Apparatus: modified Skinner rat apparatus
Motive: hunger/food

Burnatay, E. F. (1939). Predictability of performance at a locus in the learning process: A dynamic theory of learning. Journal of General Psychology, 21, 187-202.

Researcher: male

Institution: University of Texas
Animals: rats
Reference: number
Apparatus: floor maze
Motive: 1. hunger/food, 2. thirst/water deprivation

Young, P. T. (1940). Reversal of food preference of the white rat through controlled pre-feeding. Journal of General Psychology, 22, 33-61.

Researcher: male
Institution: University of Illinois
Animals: 12 albino rats (Wistar)
Reference: number
Apparatus: food-preference apparatus
Motive: hunger/food

O'Kelly, L. I. (1940). The validity of defecation as a measure of emotionality in the rat. Journal of General Psychology, 23, 75-87.

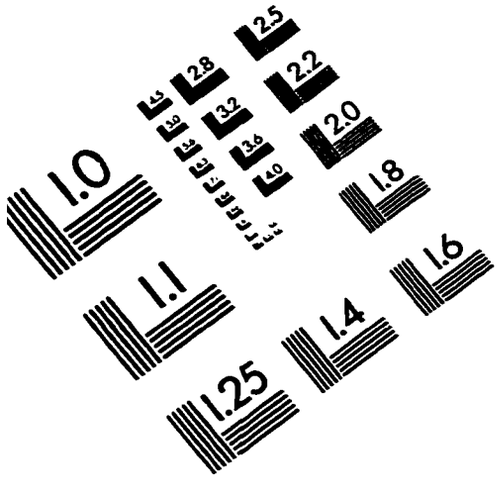
Researcher:
Institution: Ohio State University
Animals: 85 rats, OSU lab stock, Wistar x J. Kaufman strains
Reference: number
Apparatus: water maze
Motive:

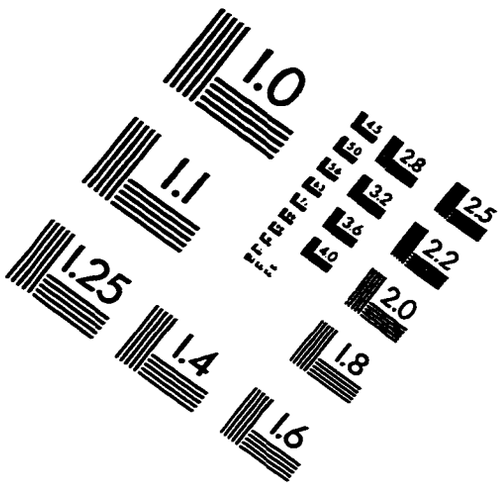
Psychological Monographs

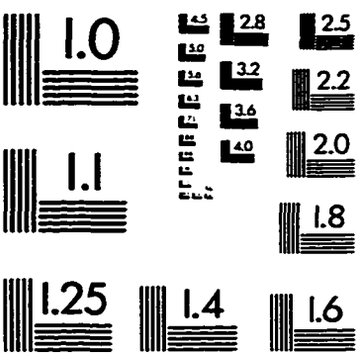
Hilgard, E. R. & Marquis, D. G. (1936). Conditioned eyelid responses in monkeys with a comparison of dog, monkey and man. Psychological Monographs, 47, 186-198.

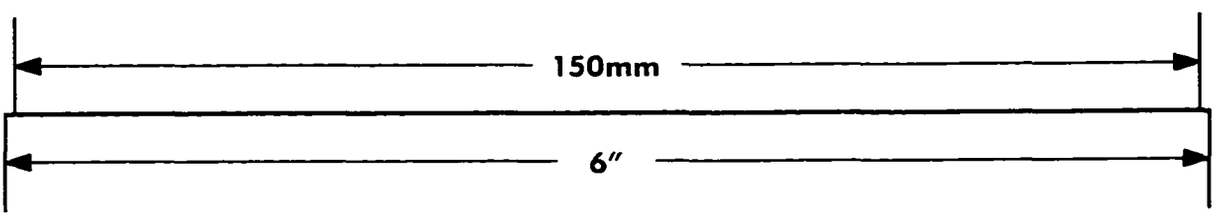
Researcher: males
Institution: Stanford University, Yale University
Animals: 5 rhesus monkeys (Macaca mullatta)
Reference: "the monkeys"
Apparatus: restraint box ("no effort made to tame"); artificial paper eyelashes glued to lids to produce "shadows by which lid movements were photographically recorded" (manometer)
Motive: NC

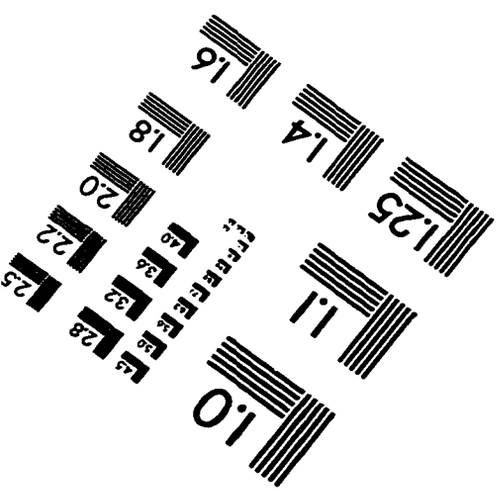
IMAGE EVALUATION
TEST TARGET (QA-3)

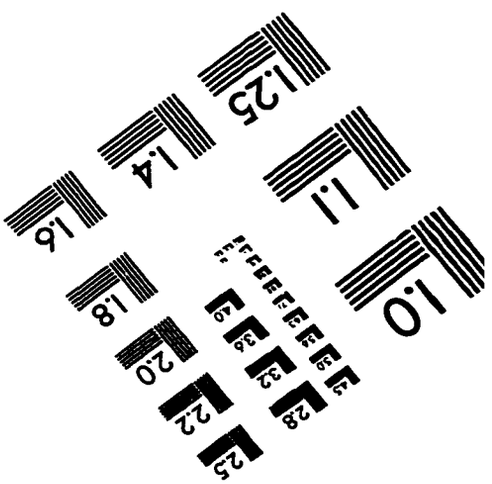












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