

PSYCHOLOGY 3031/6016---The Experimental Analysis of Behavior

COURSE OUTLINE

Title: The Experimental Analysis of Behavior

Credit: 4-0-4 (3-0-3 graduate)

Offered: Fall, Spring terms

Prerequisites: BIOL 1510, PSYC 2010 (Research Methods), and PSYC 2020 (Psychological Statistics) or equivalents.

Instructors: M. Jackson Marr, Professor Emeritus (mm27@prism.gatech.edu), Allison Martin (allison.martin@gatech.edu)

Texts: At least at the level of Pierce & Cheney, *Behavior Analysis and Learning* (4th edition—MAKE SURE—*do not* use an earlier edition); Baum, *Understanding Behaviorism* (2nd edition), Rachlin, *The Science of Self-Control*.

Catalog Description:

Conceptual, methodological, and theoretical issues in the experimental analysis of behavior with special emphasis on classical and operant conditioning as foundations for complex human and animal behavior.

Lecture Outline:

1. Behavior Analytic Perspectives and Theory

[EAB Notes: Behavior Theory Folder. Required: “Asking Questions;” “B.F. Skinner APA04;” “Behavior Analysis as a Natural Science;” “Marr Mach.”]

2. Classical Conditioning

[EAB Notes: Pavlovian Conditioning Folder. Required: ALL.]

basic phenomena and procedures

the role of contingency

quantitative approaches: The Rescorla-Wagner Model

applications

3. Operant Conditioning

[EAB Notes: Operant Conditioning Folder. Required: Operant Conditioning ppt; “Motivation;” “Functional Analysis.”]

concepts of reinforcement and punishment

shaping and eliminating behavior

the natural selection model

relationships to classical conditioning
applications

4. Contingencies of Consequences.

[EAB Notes: Contingency Analysis Folder. Required: “Schedules of Reinforcement;” “Marr QuantTBA;” “BaumFBFTBA;” “Marr Feedback Functions;” “SchedulesJABA.”]

[EAB Notes: Choice Folder. Required: *ALL*]

The three-term contingency
schedules of reinforcement
feedback functions and behavior dynamics
aversive control
quantitative analysis of choice
effects of delay and self-control
applications

5. Stimulus Control

EAB Notes: Stimulus Control Folder. Required: “Dinsmoor-Skinner;” “Stimulus Control ppt;” “Skinner Thinking;” “MarrCreativity;” “Hart & Risley.”]

basic definitions, procedures, and issues
scope: psychophysics to complex cognition
conceptual control and abstraction
equivalence relations and relational frames
introduction to verbal behavior
behavior-analytic approaches to memory

Experimental Analysis of Behavior Laboratory (Undergraduates only)

Catalog Description: Application of the principles of operant conditioning including systematic behavioral observations and quantification, shaping and stimulus control. Conducted largely at Zoo Atlanta

Detailed Description:

1. Methods of behavioral observation
2. Quantification of behavior
3. Shaping plans and techniques
4. Developing stimulus control
5. Term project write-up

Assignments (Fall '11)

Texts: W.D. Pierce & C. Cheney, *Behavior Analysis and Learning* (4th Ed.) (P&C)

William M. Baum, *Understanding Behaviorism* (2nd Ed.) (WB)

Howard Rachlin, *The Science of Self Control* (HR)

K. Pryor, *Don't Shoot the Dog* (2nd Ed) (KP)--Lab

Also, see above under Lecture Outline—Required readings.

I. History and Conceptual Issues in Behavior Analysis

WB: Chapters 1, 2, 3

P&C: Chapters 1, 2

KP : All---**TWICE**

II. Respondent Conditioning

WB: Chapters 4, 5, 6

P&C: Chapter 3

HR: Introduction, Chapter 1

BAUM Samples (through at least Chapter 5) due September 27th.

QUIZ 1: *Approximately* October 6th.

III. Operant Conditioning---Introduction

WB: 7, 8, 9

P&C: Chapter 4, 5, 6

HR: Chapters 2, 3

IV. Contingencies of Consequences

WB: 10, 11, 12, 13, 14

P&C: Chapters 7, 9, 10

HR: Chapters 4, 5

BAUM summaries/commentaries due October 20th

V. Choice and Self Control

P&C: Chapters 8, 11, 12

HR: Chapters 6, 7

RACHLIN summaries due November 10th.

QUIZ 2: *Approximately* November 17th.

VI. Stimulus Control & Complex Performances

P&C: Chapters 13, 14

Some Details

1. Read ***KP's book TWICE within the first week of class. This applies to graduate students as well.*** For the lab, this book will be your primary training manual, but also will serve as a quick elementary introduction to the whole course. Other reading assignments will be given by Allison Martin during the term.
2. Keep a notebook on WB briefly summarizing each chapter, but ***more importantly, providing critical commentary and raising questions.*** We will give you some detailed instructions on how we want this done. **The completed Baum notebook will be due October 20th**, but I shall be checking on your commentaries earlier in the term (**September 27th**). ***Please don't hesitate to raise questions in class, especially on this material.***
3. Keep a notebook with careful summaries of each chapter of Rachlin's *The Science of Self Control*. You may want to include questions and comments, but mostly I want you to demonstrate your understanding of this material. This will be due **Thursday, November 10th**. Of course, if properly completed, it may be turned in earlier
4. There will be other readings along the way, in particular, more detailed material than your basic texts cover.
5. There will be two tests during the term, a take-home final exam, and a term paper, counted ***approximately*** as follows:

Undergraduates

Tests: 30%
 Final Exam (Take-home, due **Thursday December 15th**): 20%
 Term Paper: 20%
 WB Notebook: 10%
 HR Notebook: 10%
 Lab: 10% (**BUT SEE BELOW**)

Graduate Students

Tests: 35%
 Final Exam: 20%
 Term Paper: 25%
 WB Notebook 10%
 HR Notebook 10%

We say *approximately* because each student's performance will be carefully evaluated in terms of such variables as consistency across tasks, improvement, engagement in the material as indicated by attendance, questions and comments in class and lab, etc. *Moreover, regardless of designated percentage, failure to turn in an assignment will severely affect your grade. You are reminded that undergraduate majors must earn at least a 'C' to pass this course.*

6. The lab is as much a part of this course as the lecture (graduate students do not take the lab). You **MUST** attend **every** lab for the full scheduled time unless you have an acceptable excuse or other arrangements are made with the Graduate Instructor, Allison Martin (allison.martin@gatech.edu) **AHEAD** of time. **NO EXCEPTIONS WHATSOEVER. If your lab involvement is deemed unsatisfactory, you will NOT pass this course regardless of your in-class grade.**

7. You may find useful information on the www under such topics as *behavior analysis, behavioral pharmacology, JEAB, JABA, Association for Behavior Analysis, American Psychological Association* (Divisions 25, 28), *Cambridge Center for Behavioral Studies, Behavioral Pharmacology Society*, etc. (I'll let you do the exploring). Of course, www sources are **not** substitutes for *primary*, up-to-date references (see, Journals, below), but the sites may lead you to those sources. Once you have selected a term-paper topic, I'll ask you to turn in a **progress report each week** to see how you are doing. I'll give more detail on this and other items related to the term paper in class. **The term paper will be due no later than the last day of class (Thursday, December 8th).** Of course, if properly completed, it may be turned in earlier.

8. There will be other readings along the way, in particular, more detailed material than your basic texts cover. You can access these materials from:

www.psychology.gatech.edu/psyc3031 I will provide exact details in class.

Some Suggested Term Paper Topics

1. equivalence class formation
2. conditioning mechanisms in drug dependency and tolerance
3. behavioral contrast
4. relational frame theory and experiment
5. delay of consequences/hyperbolic discounting

6. consequence-driven systems (robotics)
7. feedback functions and schedule performance
8. quantitative theories of choice
9. recent research in quantitative approaches to Pavlovian conditioning
10. behavior-analytic approaches to concept learning
11. conditioned reinforcement
12. experimental/theoretical analyses of timing
13. behavior dynamics—quantitative models of behavior change
14. matching-to-sample/oddity
15. modern theories of generalization
16. habituation/sensitization
17. verbal behavior—theory and experiment
18. modeling/imitation/observational learning
19. theories of avoidance
20. behavioral approaches to developmental disabilities
21. operant theory, selection, and evolution
22. behavioral economics
23. behavioral ecology
24. punishment
25. non-human models of human memory
26. behavior analysis approaches to social/cultural issues
27. rule-governed vs. contingency-controlled behavior
28. taste aversion
29. theory construction in behavior analysis vs. cognitive psychology
30. behavior analysis and animal training
31. behavior analysis and instructional design
32. neural network and other quantitative models of conditioning
33. behavior momentum
34. behavior analysis of variation and novelty
35. organizational behavioral management

Your term paper should be prepared along the lines of an *Annual Review of Psychology*, *Psychological Review*, or *Psychological Bulletin* article. The format must be in APA style including an abstract and proper referencing. The paper should reflect *up-to-date* effective engagement with the *primary* literature in the field and *must be tied directly to the subject matter of this course*. Again, papers are due no later than the last day of class and will count approximately 20% (25% for graduate students) of your course grade. Here are *some* journals publishing papers relevant to behavior analysis and other topics in this course. Some of them are directly accessible via the web. The first two journals on the list are the flagship journals of the field—you should become quite familiar with them. They may be accessed through: <http://seab.envmed.rochester.edu/jeab/>. Articles more than about 6 months old may be downloaded in pdf format.

JOURNALS

JOURNAL OF THE EXPERIMENTAL ANALYSIS OF BEHAVIOR (JEAB)

JOURNAL OF APPLIED BEHAVIOR ANALYSIS (JABA)

THE BEHAVIOR ANALYST

BEHAVIOURAL PROCESSES

BEHAVIOR ANALYSIS LETTERS

THE ANALYSIS OF VERBAL BEHAVIOR

BEHAVIORISM

BEHAVIOR AND PHILOSOPHY

BEHAVIOR AND SOCIAL ISSUES

BEHAVIOR RESEARCH AND THERAPY

BEHAVIOR THERAPY

EUROPEAN JOURNAL OF BEHAVIOR ANALYSIS

JOURNAL OF BEHAVIORAL THERAPY AND EXPERIMENTAL PSYCHIATRY

BEHAVIOR MODIFICATION

ANIMAL LEARNING AND BEHAVIOR

LEARNING AND MOTIVATION

JOURNAL OF EXPERIMENTAL PSYCHOLOGY: ANIMAL BEHAVIOR PROCESSES

JOURNAL OF COMPARATIVE PSYCHOLOGY

ANIMAL BEHAVIOUR

BEHAVIORAL AND BRAIN SCIENCES

PSYCHOPHARMACOLOGY

JOURNAL OF PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS

PHARMACOLOGY BIOCHEMISTRY AND BEHAVIOR

DRUG AND ALCOHOL DEPENDENCE

ADVANCES IN BEHAVIORAL PHARMACOLOGY

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES

JOURNAL OF EXPERIMENTAL CHILD PSYCHOLOGY

PSYCHOLOGICAL REVIEW

PSYCHOLOGICAL BULLETIN

PSYCHOLOGICAL RECORD

PSYCHOLOGICAL SCIENCE

ZOO BIOLOGY

PSYCHONOMIC BULLETIN AND REVIEW

NEUROSCIENCE AND BIOBEHAVIORAL REVIEWS

THE QUARTERLY JOURNAL OF EXPERIMENTAL PSYCHOLOGY

NEWSLETTER FOR BEHAVIORAL ARTIFICIAL INTELLEGENGE

BRAIN RESEARCH REVIEWS

BEHAVIORAL NEUROSCIENCE

SOME COURSE OBJECTIVES

1. Demonstrate to our satisfaction that you have achieved an *active* knowledge/understanding of the principles, methods, terminology, scholarly sources, and basic research findings in the experimental analysis of behavior (including Pavlovian conditioning) *at least at the level of your texts, the handouts, the lab and the lectures.*
2. Demonstrate to our satisfaction your knowledge/understanding of major conceptual/philosophical issues relevant to a science of behavior.
3. You will demonstrate the above through: (a) your performance on two essay tests by scholarly and coherent responses to the questions, again, at the level to which the material was presented; (b) providing careful summaries of certain assigned material as well as thoughtful, non-superficial, and rational commentary on Baum's *Understanding Behaviorism*; (c) preparing a major term paper (review article) on a selected topic in the field demonstrating your knowledge of the history, major issues, and up-to-date research in that field as contained in appropriate *primary* sources. The goal here is for you to become an *expert* your topic; (d) for those in the lab, demonstrating skill in the observation of behavior as well as shaping and maintaining a significant performance in your animal that involves some aspects of stimulus control; (e) demonstrating in your test essays and other work an ability to apply your knowledge/understanding of behavioral principles to natural, everyday situations as well as to behavioral problems and challenges outside the laboratory; and (f) active engagement in class through raising questions and comments.
4. Upon completion of this course, you should be able to pick up an issue of any major behavioral journal such as the *Journal of the Experimental Analysis of Behavior*, *Journal of Applied Behavior Analysis*, and *The Behavior Analyst* and read the majority of papers with sufficient understanding to explain to a colleague what a given paper was about.

SOME FURTHER THOUGHTS

I. Achieving the above objectives will require considerable *active and continual engagement* with all the materials and assignments; you cannot hope to gain sufficient understanding of this field through casual reading, underlining, etc. I strongly recommend you carefully and consistently use the behavior analysis instruction program by Holland and Skinner that may be found at <http://www.bf Skinner.org/instruction/setup.exe>. This program was used by Harvard students (and me) years ago and it remains one of the easiest ways of acquiring an appropriate terminology as well as an understanding of the organization of the field. You should take careful notes on *everything* you read, including raising questions, and especially noting what you don't understand. *You should come to talk about this field as fluently as your texts, including the appropriate vocabulary.* Long experience has indicated that most students find this course difficult, perhaps on a par with the statistics

class. This is to be expected because you will be exposed to a scientific approach to behavior utterly alien to most of you. Perhaps for the first time you will come to see the behavior of organisms as a *natural phenomenon* in the same way as you learned chemistry, physics, or biology. Behavior analysis is based foremost on the perspective that, not only can there be a science of behavior, but that science must be a *natural science*—actually a branch of biology. Behavior is a biological feature of organisms—what else could it be? From a very early age, you (like everyone else) have acquired modes of description and explanation of human and animal behaviors that one can collectively describe as “folk psychology”. While these modes can get us through our day and serve in ordinary discourse, they have little or no place or value in a science of behavior, any more that one would appeal to a “folk organic chemistry” or a “folk nuclear physics” in understanding phenomena in those fields. Of course, there is no such thing as, say, a folk nuclear physics because nuclear physics did not have a folk origin; it came from within an already established science. This is obviously not the case with human behavior and that is why you will find it difficult to step out of the everyday “hush-puppy” or “kitties and bunnies” explanations for your own and other’s behavior. As you were required to learn new terminology and patterns of explanation and problem solving in chemistry, physics and biology, so you will in learning behavior analysis. The issue here is not, as some commonly assert, merely a matter of vocabulary, but rather a whole way of approaching the behavior of organisms, as I hope you will come to see. Throughout the course you will be tempted to “put things in your own words”, but this will utterly miss the point and you will not do well, especially on the essay tests. Try putting organic chemistry, or multivariate calculus, or molecular genetics in your own words!

II. Students sometimes mistakenly call this course “Behaviorism”, even after they have taken the class. As I will emphasize, this is an inaccurate description, at best. Behaviorism is term applying to *particular philosophical or conceptual approaches to human behavior*; there are actually many forms of behaviorism with considerable controversies among the advocates of each of these various forms. That is, there is no one, overarching behaviorism. “Behavior Analysis” (i.e., the experimental and applied analyses of behavior) describes the *scientific study of behavior* as is practiced and explored by *behavior analysts* in laboratories and applied settings all over the world. You will largely be learning about the science of behavior in this class—what behavior analysts *do*. Many behavior analysts have little or no interest in the sorts of lively debates that center on the philosophical or conceptual issues related to behaviorism, though most would have perspectives in conformity with what the psychological community would typically label behaviorist. There are many subtleties here, some of which you will have to wrestle with. Anyway, you should properly refer this course as simply “EAB” or “behavior analysis”.

III. Sometimes we hear from our faculty colleagues that this course focuses on “cognitive bashing”—of course, that’s what they hear from some students in the class. As in II above, this is an inaccurate description, to say the least. Our task is not to “convert” you to any particular point of view—this is not a *religious* or *ideological* argument; quite to

the contrary. The real point here is that for most of you this class will be the first to deal directly with such rich and complex questions as: How can we most effectively talk about behavior? What does it mean to talk about a science of behavior? What constitutes an account or explanation of behavior? What can we say about the relations between physiology and behavior? What does it mean (and not mean) to talk about a model of behavior? How can terms like “mind”, “cognitive processes”, “free will”, “choice”, “expectancy”, “motivation”, “memory”, “attention”, “language”, “thought”, “intentions”, “feeling”, and “perception” to be addressed in a natural science of behavior? These kinds of questions and issues raised by them *must*, at some point, be *actively* confronted by anyone claiming to be a psychologist. Failure to do so is not simply a reflection of ignorance, but can result in misleading, if not outright nonsensical, “explanations” and, at best, will very severely limit how one can understand behavior. As future psychologists, you will (or certainly should) evolve your own perspectives on the issues mentioned here, and much more. But you cannot do this without confronting and vigorously wrestling with these sorts of issues. Whatever we might say about them (and your texts and other readings), you should think of any assertions not as prescriptions, but as *questions*. Through thoughtful scholarship and careful thinking, you will have to find your own answers.

“The confusion and barrenness of psychology is not to be explained by its being a ‘young science’; its state is not comparable with that of physics, for instance, in its beginnings. For in psychology there are experimental methods *and conceptual confusion*.”

Ludwig Wittgenstein, *Philosophical Investigations*.

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