

PG 8510: CONTEXT AND CONSEQUENCES OF BEHAVIOR.

COURSE SYLLABUS

Christopher Newland, Ph.D.
(Fall, 2000)

Course: PG 8510. Context and Consequences of Behavior.
Prerequisites: Conditioning and Learning.
Meeting Times: Tuesday 5-8
Text: Readings from the primary and secondary literature. Available in mail room.
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Overview and Course Objectives. We will examine the roles that the consequences of behavior, and the context in which behavior takes place in the acquisition, maintenance, and structure of behavior. As befits a graduate seminar we will devote attention not only to mechanisms, and theories about the mechanisms by which behavior is shaped and maintained but also to issues surrounding methods, measurement, and quantification. Topics will include the scheduling of reinforcers, aversive control, conditioned reinforcement, the generation of complex response units, choice, molecular determinants of behavior, mathematical models of behavior, and the dynamics of behavior during transition states. We are especially fortunate this term because two major theoretical pieces have been published, one on fundamental processes underlying discrimination and differentiation and a second on behavior in a variable environment. We will end the course with a treatment of these papers.

Course Structure. The course will be structured as a seminar based upon the primary literature and focused literature reviews. Through the course of the term we will review the topics and papers listed on the syllabus. For most topics, a review has been identified that covers the literature and current thinking on a topic. These reviews are thematic, generally have a theoretical position to advance, and are grounded in data. Indeed, many of them present experiments in some detail. Therefore, we will let the review summarize a topic and provide a perspective on it. Some papers from the primary literature will also be covered during a section. These will be papers representing the experimental approach to a topic, or they will be recent papers on a topic.

Come to class prepared to discuss the literature reviews and papers. I will introduce an area by leading a discussion of a review in class. Then individual papers will be presented by students. By this I mean that you should be able to present the authors' rationale, the methods, results, and conclusions with skeletal notes. *This does not mean reading highlighted sections directly from the paper.* By 8:00 A.M. on the day of class scheduled to cover a review, submit to me at least one question or interpretation of the topic. If something is confusing or needs clarification then I will spend some class time on it. Other questions/observations will be read to the class (anonymously) for discussion. Good questions will be those that generate discussion.

In your discussion of a topic be thorough, concise, and clear. Try the "tell'em" strategy: "tell 'em what your going to tell 'em, tell 'em, and tell 'em what you told 'em." Set up each paper by summarizing what question is being addressed, why it is an important question, and what methods might be used to address it. *It is the presenter's responsibility to provide the background material required to understand the paper*, and this may mean going to the library to read papers referred to prominently. Keep all discussion focused on what was done, what happened, and how this was interpreted. Describe all procedures carefully: say what was done and what happened. *Always* place all behavior in the context of the environmental contingencies such as three-term contingency of reinforcement or the contingencies of respondent conditioning. This may be difficult at first, but it is worth the effort. **We will not tolerate folksy descriptions of behavior**, but instead, will respect the spirit of Lloyd Morgan's canon:

In no case may we interpret an action as the outcome of the exercise of a higher psychical faculty, if it can be interpreted as the outcome of the exercise of one which stands lower in the psychological scale. (From Morgan, C.L. (1894), *An Introduction to Comparative Psychology*. London: Walter Scott.)

Evaluation. Evaluation will be based upon your presentations, class participation (quality and quantity), and the exam/term paper. The distribution will be as follows: Class participation will count as 1/3 of your grade. Each take-home exam will count as 1/3 of your grade.

Following are some of the criteria used to evaluate the presentations:

- Clear and succinct description of the research question and coverage of the points listed above.
- Clear description of the methods. (include *important* details, not all details).
- Graphical presentation of the results (let's use the board and dispense with transparencies).
- Presentation of the author's conclusions.
- The extent to which you go beyond the paper and incorporate what you know, or what you are learning in this course. This can be in the form of critical comment on weaknesses, unanswered questions raised, further research prompted by this experiment, or extensions to understanding human behavior.

Following are some of the criteria for evaluating participation of those not presenting:

- Clear evidence that you have read the paper.
- Questions asked and points of discussion raised.
- Insights about how two or more of the papers tie together (especially relevant for those with no responsibilities to present during a class).
- Participation in discussion.

Students with Disabilities. Students with a disability documented by Auburn's Program for Students with Disabilities should schedule a meeting with me early in the term. I will work with the student to meet the accommodations recommended by the Program for Students with Disabilities.

PG 636 BEHAVIOR AND ITS CONSEQUENCES			
Schedule (Fall, 1998)			
Week Of	Week	Topic	Readings
Reinforcement and Aversive Control			
22 Aug	1	Scheduling positive reinforcers	[1, 2]
29 Aug	2	Aversive control	[3-6, 7]
Respondent Conditioning, Stimulus Control, Complex Response Units.			
5 Sep	3	Respondent conditioning	[8-11]
12 Sep	4	Stimulus Control	[12-15]
19 Sep	5	Conditional stimulus control	[16-18]
26 Sep	6	Complex response units: Second order schedules.(variability as an operant/machado) IRT as the operant/Galbicka and Platt.	[19-22]
3 Oct	7		
Choice, Matching, and Applications.			
10 Oct	8	Choice and concurrent schedules. Proportional matching.	[23] (chapter 1,2,3), [24, 25]
17 Oct	9	Choice and concurrent schedules. Generalized Matching.	Chapter 4.[26-28]
24 Oct	10	Matching and psychophysics	Chapter 11. [29-31]
31 Oct	11	Behavioral economics	[32-35]
7 Nov	12	Dynamics: behavioral momentum.	[36, 37]
New Developments.			
14 Nov	13	Stimuli, reinforcers, and behavior: An integration.	[38]
21 Nov	14	Choice in a variable environment.	Baum and Davison, when published.
28 Nov	15	Selectionism (time permitting).	[39, 40]
5 Dec	16	Student presentations.	
13 Dec	17	Final exam scheduled. Student presentations.	

Readings

1. Lattal, A., *Scheduling positive reinforcers*, in *Techniques in the Behavioral and Neural Sciences: Experimental Analysis of Behavior*. 1991, Elsevier: Amsterdam. p. 87-134.
2. Zeiler, M.D., *Output dynamics*, in *Reinforcement and the Organization of Behaviour*, M.D. Zeiler and P. Harzem, Editors. 1979, John Wiley and Sons: New York. p. 79-115.
3. Baron, A., *Avoidance and punishment*, in *Experimental Analysis of Behavior. Part 1.*, I.H. Iversen and K.A. Lattal, Editors. 1991, Elsevier: Amsterdam. p. 173-417.
4. Dinsmoor, J.A., *Escape, Avoidance and Punishment: Where do we Stand?* JEAB, 1977. **28**: p. 83-95.
5. Badia, P., *et al.*, *Choice and the dependability of stimuli that predict shock and safety*. Journal of the Experimental Analysis of Behavior, 1976. **26**: p. 95-111.
6. Mueller, K.L. and J.A. Dinsmoor, *Testing the reinforcing properties of S-: a replication of Lieberman's procedure*. Journal of the Experimental Analysis of Behavior, 1984. **41**(1): p. 17-25.
7. Perone, M. and M. Galizio, *Variable-interval schedules of timeout from avoidance*. JEAB, 1987. **47**: p. 97-113.
8. Rescorla, R.A., *Behavioral studies of Pavlovian conditioning*. Annual Review of Neuroscience, 1988. **11**: p. 329-52.
9. Barker, L.M. and J.C. Smith, *A comparison of taste aversions induced by radiation and lithium chloride in CS-US and US-CS paradigms*. Journal of Comparative & Physiological Psychology, 1974. **87**(4): p. 644-54.
10. Hawkins, R.D., W. Greene, and E.R. Kandel, *Classical conditioning, differential conditioning, and second-order conditioning of the Aplysia gill-withdrawal reflex in a simplified mantle organ preparation*. Behavioral Neuroscience, 1998. **112**(3): p. 636-45.
11. Eldridge, G.D. and J.J. Pear, *Topographical variations in behavior during autoshaping, automaintenance, and omission training*. Journal of the Experimental Analysis of Behavior, 1987. **47**(3): p. 319-333.
12. Harrison, J.M., *Stimulus Control*, in *Techniques in the Behavioral and Neural Sciences: Experimental Analysis of Behavior*. 1991, Elsevier: Amsterdam. p. 251-299.
13. Herrnstein, R.J., *Acquisition, generalization, and discrimination reversal of a natural concept*. Journal of Experimental Psychology: Animal Behavior Processes, 1979. **5**(2): p. 116-29.
14. Honig, W.K., *et al.*, *Positive and negative generalization gradients obtained after equivalent training conditions*. Journal of Comparative and Physiological Psychology, 1963. **56**: p. 111-116.
15. Gray, V.A., *Stimulus control of differential-reinforcement-of-low-rate responding*. Journal of the Experimental Analysis of Behavior, 1976. **25**: p. 199-207.

16. Mackay, H.A., *Conditional stimulus control*, in *Techniques in the Behavioral and Neural Sciences: Experimental Analysis of Behavior*. 1991, Elsevier: Amsterdam. p. 301-350.
17. Carter, D.E. and D.A. Eckerman, *Symbolic matching by pigeons: rate of learning complex discriminations predicted from simple discriminations*. *Science*, 1975. **187**(4177): p. 662-4.
18. Wright, A.A., *Concept learning and learning strategies*. *Psychological Science*, 1997. **8**(2): p. 119-123.
19. Marr, M.J., *Second-order schedules and the generation of unitary response sequences*, in *Advances in the Analysis of Behavior. Vol 1. Reinforcement and the Organization of Behavior*. 1979, Wiley: New York. p. 223-260.
20. Galbicka, G. and J.R. Platt, *Interresponse-time punishment: A basis of shock-maintained behavior*. *JEAB*, 1984. **41**: p. 291-308.
21. Page, S. and A. Neuringer, *Variability is an operant*. *J Exp Anal Behav*, 1985. **11**: p. 429-452.
22. Machado, A., *Increasing the variability of response sequences in pigeons by adjusting the frequency of switching between two keys*. *JEAB*, 1997. **68**: p. 1-25.
23. Davison, M. and D. McCarthy, *The Matching Law: A Research Review*. 1988, Hillsdale, NJ: Erlbaum.
24. Dallery, J., J.J. McDowell, and J.S. Lancaster, *Falsification of matching theory's account of single-alternative responding: Herrnstein's k varies with sucrose concentration*. *Journal of the Experimental Analysis of Behavior*, 2000. **73**(1): p. 23-43.
25. McDowell, J.J. and J. Dallery, *Falsification of matching theory: changes in the asymptote of Herrnstein's hyperbola as a function of water deprivation*. *Journal of the Experimental Analysis of Behavior*, 1999. **72**(2): p. 251-68.
26. Baum, W.M., *On two types of deviation from the matching law: Bias and undermatching*. *Journal of the Experimental Analysis of Behavior*, 1974. **22**: p. 231-242.
27. Miller, H.L., *Match-based hedonic scaling in the pigeon*. *JEAB*, 1976. **26**: p. 335-347.
28. Todorov, J.C., *Concurrent performances: Effect of punishment contingent on the switching response*. *JEAB*, 1971. **16**: p. 51-62.
29. McCarthy, D.C. and M.D. Davison, *The interaction between stimulus and reinforcer control on remembering*. *JEAB*, 1991. **86**: p. 51-66.
30. Alsop, B. and M. Davison, *Effects of varying stimulus disparity and the reinforcer ratio in concurrent schedule and signal-detection procedures*. *JEAB*, 1991. **56**: p. 67-80.
31. Nevin, J.A., H. Cate, and B. Alsop, *Effects of differences between stimuli, responses, and reinforcer rates on conditional discrimination performance*. *Journal of the Experimental Analysis of Behavior*, 1993. **59**(1): p. 147-161.
32. Hursh, S.R., *Economic concepts for the analysis of behavior*. *JEAB*, 1980. **34**: p. 219-238.

33. Mathis, C.E., D.F. Johnson, and G. Collier, *Food and water intake as functions of resource consumption costs in a closed economy*. JEAB, 1996. **65**: p. 527-547.
34. Baum, W.M. and J.R. Kraft, *Group choice: competition, travel, and the ideal free distribution*. JEAB, 1998. **69**: p. 227-245.
35. Foster, T.M., K.A. Blackman, and W. Temple, *Open versus closed economies: Performance of domestic hens under fixed-ratio schedules*. Journal of the Experimental Analysis of Behavior, 1997. **67**(1): p. 67-89.
36. Nevin, J.A., C. Mandell, and J.R. Atak, *The analysis of behavioral momentum*. JEAB, 1983. **39**: p. 49-59.
37. Nevin, J.A., *An integrative model for the study of behavioral momentum*. JEAB, 1992. **57**: p. 301-316.
38. Davison, M. and J.A. Nevin, *Stimuli, reinforcers, and behavior: An integration*. Journal of the Experimental Analysis of Behavior, 1999. **71**(3): p. 439-482.
39. Donahoe, J.W., J.E. Burgos, and D.C. Palmer, *A selectionist approach to reinforcement*. JEAB, 1993. **60**: p. 17-40.
40. Zeiler, M.D., *The sleeping giant: reinforcement schedules*. JEAB, 1984. **42**: p. 485-493.

Take Home Examinations.

All work on the examinations should be done by yourself with no outside help, except from me. A passing answer will draw from the materials that we cover during the course. An “A” answer will draw from materials covered outside of the course. Do not refer to a paper that you have not read; by this I mean the whole paper, especially the methods and results. Feel free to illustrate your answers. Photocopying a figure is acceptable, as long as it is referenced. All references should be in APA format. Each item could easily be a Major Area Paper, but I do not want that much detail. No answer should be more than about 8 pages, (1 ½ spaces, 12 characters/inch) plus figures and references and some could be less. Anticipated lengths are included with the question. Take these estimates as guides, not requirements. The brevity means that you will have to plan your presentation of the material very carefully. I *do* want to see method, data and, where applicable, theory included in every answer. Writing a good answer succinctly will require some careful writing. Plan ahead and don't turn in a first draft. Figures, drawn by hand, computer, or scanned/photocopied are welcome where they contribute to the answer. All references may be listed at the end of the exam, if that is easier for you.

I am giving the examinations on the first day of class, in order that you may plan your time for this term. However, I would like to reserve the right to modify a question, or to add an alternative question, if an interesting topic comes up in our class discussion. *Do not procrastinate!* You should be able to write answers as we go through the course. For example, the answer to the first question can be written after the first day of class.

Examination 1.

Due 10 October 2000.

Answer any 7 of the following 11 questions:

1. One distinction that has been made between time- and response- based schedules has been the role that the reinforcement of interresponse times plays in these schedules. (*anticipated length: 4-6 pages*).
 - a. Describe clearly and succinctly this distinction.
 - b. Defend, from the literature, the proposition that consequences *can* act on interresponse times.
 - c. Defend, from the literature, the theoretical position that (some) schedule patterns can be understood on the basis of reinforcement of IRTs. Include the proposed mechanism and the supporting evidence.
 - d. Identify schedule patterns, if any, that *cannot* be accounted for in this way. Again, base your defense on the extant literature.
 - e. State whether interresponse times represents a direct, indirect, or theoretical variable in the FI schedule, and defend the position (use Zeiler, Schedule of Reinforcement in Honig and Staddon, 1977, to answer this).
2. Describe and explain Sidman avoidance. (*anticipated length, 4-6 pages*).
 - a. Provide a complete description of the schedule (stimuli, responses, and consequences).
 - b. Using the figure from Sidman's original figure, plot the relationship between the R-S interval and the average interresponse time for a S-S interval of 2.5". Use log-log coordinates. Describe and interpret what you see.
 - c. Use the three-term contingency to describe behavior maintained by the Sidman avoidance, and related procedures. Briefly characterize at least two theories of performance under such schedules and describe the empirical support, and lack thereof, for these theories. You may organize your answer by considering the discriminative stimulus occasioning the lever press and its consequence.
3. Describe the conditions under which respondent mechanisms act in aversive control. In your discussion, include some procedures by which higher-order respondent conditioning might be identified. (*anticipated length, 3-5 pages*).
4. It has been said that punishment suppresses more behavior than the punished response. Even that it suppresses all behavior. (*anticipated length, 3-5 pages*).

— Review evidence to support or refute this comment.

— Is the inverse true for reinforced behavior?

5. Characterize the roles of discriminative stimuli and conditioned reinforcers in shaping and maintaining complex response units (second-order schedules, response sequences, or other complex units). Be sure to include some discussion of the distinctions (empirical, procedural, and theoretical) among neutral, discriminative, and secondarily reinforcing stimuli. Discuss whether there might be a role for respondent mechanisms to act here, and how you would determine that role. (*anticipated length, 4-6 pages*)
6. Discuss the concept that “variability is an operant.” Include in your discussion a characterization of what the response unit is in these experiments or, lacking that, the conditions under which such a unit might be identified. (*anticipated length, 2-4 pages*)
7. Describe the conditions under which electric shock functions as a reinforcer. How has this puzzle been resolved? (*anticipated length, 2-4 pages*).
8. Identify the different forms of stimulus control under the match-to-sample procedure. Include in your discussion the conditions likely to give rise to each of these different sources of control. It may be necessary to look at the review by Carter and Werner (referenced in Mackay's review) to provide a complete answer. (*anticipated length, 4-6 pages*).
9. Characterize the *basic* (mostly animal, I suppose, but not entirely) literature on fading. Define what fading is, byproducts of fading, differences in stimulus control associated with fading vs "errorful" learning, and research questions that may still be open. (*anticipated length, 4-6 pages*)
10. Describe the "feature positive effect," including empirical support for its existence and theoretical work behind the effect. (*anticipated length, 2-4 pages*).
11. Address the notion that "information is reinforcing" by drawing from the literature on observing responses. (*anticipated length, 2-4 pages*).

Take-Home Examination 2. Due 14 November 2000

Questions 1 and 2 are *required*. Answer any 6 of the remaining questions.

1. Beginning with the Findley (1958) experiment, or earlier if you like, review the idea that the visit (or interchangeover time) is the important operant in concurrent schedule performance. (*anticipated length, 3-5 pages*).
2. Describe the application of the generalized matching relationship to item (a) below and any two of the remaining items. In your discussion be sure to describe the relevant units, free parameters, important values of the parameters, and the conditions under which the quantitative relationship does not apply. As part of your answer, take the raw data published in the appendix of a representative paper from *one* subject and plot behavior ratios vs consequence ratios *by hand* on log-log axes it using the generalized matching relationship. Determine the slope and the intercept and add a curve with that slope and intercept to your plot. The point here is to extend the relationship to other schedule relationships. Let me know if I've overlooked one that you prefer to review. (*anticipated length, 3-5 pages, plus figures.*)
 - a. Concurrent schedules with *either* the lever-press, the key-peck, or time spend responding as the response unit.
 - b. Concurrent DRL schedules
 - c. Delay-of-reinforcement
 - d. Avoidance
 - e. Concurrent VR schedules
 - f. Reinforcer durations.
3. Under what conditions does "matching" obtain with concurrent ratio schedules? When does it *never* appear? (*anticipated length, 2-3 pages*)
4. Pick any two of the following accounts of behavior under concurrent schedules and describe the theory, its quantification, supporting evidence, and difficulties with the theory. (*anticipated length, 3-5 pages*)
 - a. Matching is the cause, not an effect.
 - b. Melioration
 - c. Molecular maximization
 - d. Molar maximization

5. Distinguish between a closed and an open economy. Include definitions of the two, whether this represents a continuum or a dichotomy, and whether this distinction is important behaviorally. Include discussion of at least application in which such a distinction might be important, and how it might important. (*anticipated length, 3-5 pages*).
6. Critically discuss the “self-control” procedure, the behavior it supports, and considerations in species generality of this effect. (*anticipated length, 4-5 pages*).
7. Describe the relationship between theories of signal detection and the matching relationship. Extend this thinking to applications of TSD in public health considerations or diagnosis. (*anticipated length, 3-5 pages*.)
8. Describe the “concatenated” matching law and its empirical support. (*anticipated length, 2-4 pages*).
9. Describe the quantification that has resulted from Premack’s proposal that reinforcement is relative. (*anticipated length, 2-4 pages*)
10. Review whether and how the principles of conditioning apply across different classes of vertebrates (mammals, birds, fish) and phyla (e.g., insects). One approach to this question might be to generate a table showing some of the important characteristics (control by consequences, temporal patterns, aversive control, conditioned reinforcement, schedule patterns, etc) where known. A table alone will not be enough, however, some narrative is necessary. (*anticipated length, 3-5 pages*).
11. Describe and critically evaluate laboratory “analogs” of foraging. (*anticipated length, 2-4 pages*).
12. Characterize the role of respondent mechanisms in behavioral momentum. (*anticipated length, 2-3 pages*).
13. Contrast selectionistic accounts of reinforcement with any alternative. (*anticipated length, 2-4 pages*).

Third exam

(Schedule presentations on last days of the semester/final exam period).

1. Prepare a *oral* proposal to either 1) test in a laboratory any element of the Davison and Nevin paper or the Baum and Davison paper or 2) extend a specific element of one of these theories to an applied problem. I define application rather broadly. Applied human settings, classrooms, zoos, understanding effects of drugs or toxicants and so forth could all qualify. Your proposal should include a brief characterization of the element, a clear procedure, and at least two sets of anticipated data and how you would interpret them. This will be presented at the end of the course.

