Course: 830:311 *Learning Processes*, Fall 2020

When/Where: M, W (**section 01**, 3:20-4:40, SEC 111, index 07271)
This course **will be delivered asynchronously. Times are only relevant for three scheduled exams and occasional discussion sessions (the latter of which will be recorded and can be watched asynchronously**

Instructor: Dr. Louis Matzel (Office hours: I will generally be available on W, 12:00-1:30, or most any time by appointment). If you need to speak to me, you can either call my office or schedule a Zoom or Webex meeting.)

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Book: Domjan, M., *The Principles of Learning and Behavior,* 7th ed. (This link will give you easy access: http://www.facultybookshelf.org/course/19745). The link leads to our bookstore, and also to an Amazon and electronic rental version (the latter of which is the cheapest option). Note that my lectures make only loose contact with the book (the book provides background info, but the tests are drawn *only* from material in the lectures), thus older editions of Domjan (all the way back to even the 4th edition) will suffice. The bottom line: the cheapest book that you can find will be fine. ***Do NOT interpret any of the above to mean that you do not need the book!! I am assigning the book for a reason; it will clarify my lectures, provide background information, provide a good source of review, and will provide depth in areas that I do not explicitly cover in class. If you don't read the book, the lectures will be harder to follow and you will need to do more test prep!***

TA: Allyson Bazer <asb242@scarletmail.rutgers.edu> Office hours TBA

The TA's primary function is to make your exams available for you to review. Since I am the guy who teaches the material, makes the exams, and assigns the grades, you need to speak with me with any questions about the material or your grade. Throughout the semester, the TA will have your exams (I will *never* have them). If you want to look at your exams (and you *should*), you MUST arrange to do so through the TA, then you can speak to me if you have questions. I'm not yet certain how we will make exams available to you (if you want to see them), but we'll figure it out and I'll let you know.

About the delivery of material:

This class will be delivered mostly asynchronously. My plan is to post two recorded lectures early each week. Each lecture will be 60-70 min long, and you can watch them at your convenience. (Were I you, I would get in the habit of planning a regular schedule of times each week to watch the lectures. Exercise some discipline and treat it like you would a regular course. What you should *never* do is try to cram all of your viewing into the night before the exam. If you do, you are absolutely *doomed*.) I will also post a set of about 600 slides (for the entire semester) that will accompany the lectures. I will review the appropriate slides as part of each lecture. You should watch the lectures, then use the slides to review and THINK about the material. (Given that this material is delivered asynchronously, there is no excuse to EVER not have "attended" every lecture!) About every two weeks, I will have a question/answer session hosted on ZOOM. These will be scheduled during one of our regular class periods. You should attend these meetings if you can, and come prepared to ask questions. I will then post a record of the meetings for you to review or if you can't attend in person. During these bi-weekly meetings, I won't be explicitly reviewing, but instead will answer any questions relevant to the material from the previous two weeks.

We'll have three exams this semester. They will be scheduled during our regular class times, and you must take them at these times. In rare instances, I may be able to schedule other times for an individual to take the exam, but if you need to do so, you *must* contact me in advance of the scheduled exam time. Doing this will be a royal pain for everyone, so you'll need a really good reason to take the exam at other than the scheduled time.

During the exams, you can use your notes/slides/book, but you will *not* be allowed to confer with *anyone.* If you do confer with someone, you are *cheating*, and if you are caught (e.g., by my statistical analysis of patterns of errors), you will immediately be assigned an "F" for the semester.

Although you are allowed to use your notes/slides/book during the exam, the exams will be strictly time-limited. If you don't know the material, you should not think that having access to your notes/slides/books will help. Were I you, I would plan on *not* using any materials during the exam; it just won't help and you will not have enough time. (Note that I expect you to understand the material, not to memorize, and you won't be able to learn the material during the exam.) I should also note that if you try to elicit help during the exam (which again, is called cheating), both you and the person trying to help you will run out of time. Here's what you should do: Just learn the material. It's not hard, I think it's interesting, and learning is presumably why you want to be in college. Learning the material (and thinking) will assure that you get a good grade and it's a lot easier (and more rewarding) than trying to figure out ways to game the system.

Course Description:

This course is as a survey of the processes that underlie the acquisition, storage (memory), and expression of learning in animals (including humans). The acquisition of knowledge (i.e., learning) pervades every aspect of our lives, influencing our thoughts and behavior in sometimes intuitive and in other times perplexing ways. As psychologists, we must understand these learning processes if we are to understand the complexity of behavior.

Learning is a mental *process*, and thus under most conditions, cannot be directly observed. Instead, we typically *infer* learning from changes in behavior. However, behavior is often difficult to interpret (thus requiring "control" observations), and can often be simplified with the study of nonhuman animals. For the purposes of this course, we will assume that species differences (e.g., between human and nonhuman animals) are often quantitative as opposed to qualitative, and as such, the general processes underlying learning in one species will apply to other species. (Note that in some instances, human learning *is* qualitatively different than animal learning, e.g., in the case of language acquisition. These are topics that are primarily covered in other classes. In *this* class, we will discuss basic processes that are common to both human and non-human animals.) Do not expect each of the *behaviors* that we discuss to have a direct analog in human behavior (just look at the videos suggested at the end of this document!). For our purposes, behaviors are merely tools to study mental processes, and the behaviors may not be interesting in themselves. This is a *critical* distinction; if you fail to recognize it, you will often make the mistake of concluding that the behaviors that we discuss have no analog in human behavior, and therefore are not interesting. If you make this mistake, you will quickly become bored. Remember, it's the *process* that the behavior reveals, not the behavior itself, that usually matters!

I have arranged the course to cover nine topic areas that are of fundamental interest to modern learning theorists (and to me) and which in total provide a broad overview of the sometimes narrow/esoteric issues covered in your text (I will *not* be discussing everything that is covered in your text). While discussing each of these topics, we will introduce many related concepts. To understand the material that we cover in class, you should be familiar with the material in the book, as it provides a foundation for the lectures. **On the other hand, much of what I will discuss in class does not appear *anywhere* in the book**. If you don't understand something in the book, or want me to discuss something in the book that I haven't covered, or want clarification of what we talk about during lectures, *please* ask questions (or make comments) during our bi-weekly review sessions or during my office hours! Discussion helps us all understand the material a little better. Additionally, I can always talk to you about the material during my office hours (or any other time that you can catch me) and I respond to email when possible (but often not on the night before an exam, and *usually* not on the morning before an exam). Again though, **it is a good idea to *discuss* things, and that will be the purpose of our bi-weekly reviews. Of course you should also discuss the material with *yourself*. Try to *understand*, not just memorize (which is usually a waste of time).** *The exams will be EASY if you just think about the material while it is being presented.*

Course requirements and grading: Very simple: three tests. The first two tests will each be worth 30% of your grade, and the final is worth 40%. The final is *not* cumulative, but you must understand the material from earlier in the semester in order to understand the later stuff (i.e., you *cannot* do well on the final if you simply forget the material from earlier in the semester). The exams will be entirely multiple choice. The only time I give make-up exams is if you provide me a *written* explanation of a *verifiable* emergency. (I'll probably not feel well or have a headache at times this semester, but I will still do my work.) Make-up exams are given on the reading day at the start of the final exam period (sometimes falling on the day before the final exam), and will not include questions that appeared on the regularly-scheduled exam. If you miss an exam, it is *your* responsibility to contact me to make any arrangements. (Note that this make-up policy will not apply to anyone who makes pre-arrangements to take the exam at a time other than the scheduled exam period; see the description above.)

This is *important*: don't expect to simply memorize words or facts and do well on my exams; you need to *understand* the material, *particularly* the concepts. *Don't busy yourself memorizing what I say in my lectures*! Instead, **think about** what I say. In these regard, I should also note that it is not important that you write down every word that I say; instead, *think about the concepts*!

Because of an increasing tendency of students to try to persuade me to change their grade after the semester is over, let me be *very explicit*: I will give anyone as much help as they need *to prepare for tests* during the semester, and if you need to get extra help, or want to do "extra" work (i.e., prepare more, think more, study harder, talk to me more…), the time to do so is during the semester. Once you take the final exam, there is *nothing* you can do to change your grade, and I will *never* let you do "extra credit".

IMPORTANT: If you make that little effort to watch the lectures (its less than three hours per week!), read a little, and think about the material, you will learn a lot and get a good grade. I also happen to think that the material is fun. (**Here's an anecdote: Last year we had excellent attendance and participation in our "in-person" lectures. It's no coincidence that 86% of the students received a final grade of either an "A" or a "B". Students that regularly missed classes probably failed. If you read somewhere that "it's impossible to get better than a C in this class", it was probably written by someone who didn't come to class, even to hear the discussion of exam grades.**) Remember, if you "only" miss two classes (or in this case, don't watch two of the lectures) before an exam, you have missed about **20%** of the

material for that exam. It's hard to do well on an exam if you start with only 80% of the information.

Some University administrator (who probably doesn't teach) has decided that we must post "learning objectives". Here they are:

1. Learn to think critically about the nature of psychological experimentation.
2. Understand the processes that underlie basic learning abilities.
3. Understand how learning underlies seemingly mysterious behaviors.
4. Understand how learning contributes to abnormal behavior.
5. Understand how *your* behavior changes with experience.
6. **Develop an appreciation for the complexity of behavior and the strategies to interpret it**.

Topic   Week (all dates are *tentative*, and subject to change: **KEEP UP!**)   Relevant Chapters

1.   #1   Chapters 1, 3
What are the necessary and sufficient conditions for the formation of simple memories?
Thorndike, Pavlov, and the origins of the empirical analysis of learning and memory.

2.   #2-3   Chapter 4
Is learning a *reflexive* or *cognitive* process?
Tolman, Hull, and the origins of modern learning theory.

3.   #4-5   Chapter 2, review Chap 4
Processing stimuli in combination; learning is an *active* process!
Formal models of learning

Test 1   #5 or 6

Our exams will be scheduled for our Wednesday class meeting times. As of now, I would expect that Exam 1 will happen on Wednesday, October 14. However, this is VERY tentative!!! It's impossible right now to be sure how this will develop. I will be sending regular notices to you through SAKAI, and we will figure out the exact date several weeks into the semester

4.   #7   Chapers 5, 6, 7
Instrumental learning and schedules of reinforcement: Earning a paycheck

5.   #8-9   Chapter 8, 9, 10
Aversive control of behavior with punishment: Why do we commit crimes?
Avoidance and escape behavior.

6.   #10   Review Chapters 5, 6
Depression and anxiety: do these disorders reflect a failure to control or predict our environment?
Animal models of dementia.

Test 2   #11 or 12 Wednesday (exact date to be determined)

7.   #12-13   Chapter 11, 12
Representing space in memory; the "cognitive map". Memory processes.

8.   #14
Working memory, attentional systems, and animal (that includes human) intelligence.   Review Chapter 11

Two Definitions of Learning (what's the difference?):

"[Conditioning] is the process by which an activity originates or is changed through reacting to an encountered situation, provided that the change in activity cannot be explained on the basis of native tendencies, maturation, or temporary states."

E.R. Hilgard, 1956

"Conditioning is the learning of relations among events so as to allow the organism to represent its environment."

R.A. Rescorla, 1988

Videos and pictures/text that accompany lectures. I'll show most of these (and many more) during my lectures (links will be provided on slides). However, you should look at all of these before our second lecture. They will make the procedures that I discuss immediately easy to understand (rather than abstractions). The numbers before each video indicate the topic for which each video is most relevant. Many other videos will be shown during my lectures.

1) Shaping a bar-press response (Trial-and-error; Thorndide's Law of Effect; operant conditioning):
http://www.youtube.com/watch?v=4TyYX5C8uuI&list=UUZGlCwh60p09VER10CTn8-A&index=2&feature=plcp
Note that the green light indicates that food has been delivered.

1) Yes, operant conditioning does operate in the "real world":
https://www.youtube.com/watch?v=K6JICVEDfuE
Is the "functional significance" of shaping a bar press now obvious?

1) Have a look at Pavlov's Dogs. http://blogs.smithsonianmag.com/smartnews/2013/02/what-kind-of-dog-was-pavlovs-dog There are TWO errors in the very FIRST sentence of the accompanying article. Can you figure out what they are? (Hint: One is conceptual, one is technical.) Note that the first dog in the fourth row is in the actual harness that is used during training.

1) Different forms of conditioned responses to either a light or a tone paired with the delivery of food:
http://www.youtube.com/watch?v=5WQFygY-qZM&list=UUZGlCwh60p09VER10CTn8-A&index=5&feature=plcp
Note that the red light indicates food delivery.

1) Fear Conditioning (15 sec tone followed by brief foot-shock. Note that the animal has previously learned to press the bar to earn food. By the 10th pairing of the tone and shock, the animal suppresses bar pressing during the tone (indicative of learned fear of the tone). http://www.youtube.com/watch?v=ZlZekx1P1g4&feature=relmfu **Note that there is no sound in this video, so the tone is indicated by the "tone symbol" and the shock is indicated by a "lightning bolt". Observe that the shock is quite mild (i.e., the animal is clearly agitated by it, but does not exhibit any real pain).**

1) Autoshaped keypeck response:
http://www.youtube.com/watch?v=cacwAvgg8EA&list=UUZGlCwh60p09VER10CTn8-A&index=10&feature=plcp
The round light is the Conditioned Stimulus (CS) and the Unconditioned Stimulus is grain pellets (the delivery is indicated by the illumination of the food hopper). Look carefully at the bird's beak as it pecks at the key.

2) Complex Maze (egocentric, i.e., self-referenced, form of operant learning):
http://www.youtube.com/watch?feature=fvwp&NR=1&v=Ma8HCM3Z5Ic

3) Autoshaped keypeck in a long box (is this behavior "dysfunctional"?):
http://www.youtube.com/watch?v=KnJPPaiJG6Y&feature=autoplay&list=UUZGlCwh60p09VER10CTn8-A&playnext=2

3) Habituation of a startle response (a *nonassociative* form of learning):
http://www.youtube.com/watch?v=Kfu0FAAu-10&feature=autoplay&list=UUZGlCwh60p09VER10CTn8-A&playnext=4

3) Omission procedure imposed on an autoshaped keypeck
http://www.youtube.com/watch?v=gE6ixMxrCuo&feature=autoplay&list=UUZGlCwh60p09VER10CTn8-A&playnext=1

Note that the bird *really* wants to peck that key!

5) Operant responding on a fixed schedule
https://www.youtube.com/watch?v=MOgowRy2WC0

6) Elevated Plus Maze (test for anxiety/fear/exploration) http://www.youtube.com/watch?v=PLcX2MbpmdY&feature=related

7) Radial Arm Maze (*can be* guided by spatial cues, but in this case…):
www.youtube.com/watch?v=zBNoNoEB1X0
http://www.youtube.com/watch?v=y7zQgz0vmWo&feature=related
Note that this animal has acquired an algorithmic strategy, i.e., "turn left", to solve the maze. The investigators that are using this maze have incorrectly assumed that the behavior reflects spatial learning.
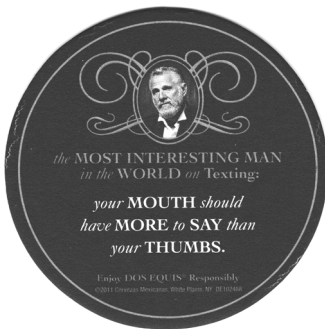
7) Water Maze (non-spatial, visible platform):
http://www.youtube.com/watch?v=MO_G5gXDZAQ&feature=related

7) Water Maze (spatial, hidden platform):
http://www.youtube.com/watch?v=24kDZncAC9M&feature=related

Animals have feelings too:
www.youtube.com/watch?v=nGeKSiCQkPw&feature=my_watch_later_videos&list=WL75B7AC719163AEDE

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