1. Background: This lesson is situated in the context of comparing and contrasting two major perspectives in the field of psychology with regards to one key topic, learning. Namely, students need to understand the opposing conceptions of the processes by which learning takes place as posited by behaviorist and cognitive psychologists. To this effect, students must be able to assess competing claims based on empirical data generated by behavioral studies, whose results are presented in quantitative form.

2. Learning Goals:

2.1. Knowledge and conceptual understanding learning goal:

I want students to be able to examine a learning curve and explain what is changing over time and discuss the rates of change. I want students to be able to look at graphs representing learning curves and understand what the axes mean, which represents time and which represents experience, what measure is used to represent experience and what units are used to measure time and experience. Then I want students to understand what the curve means, how it indicates that learning has occurred. Finally, I want students to identify different directions of a learning curve and understand that a learning curve could either increase or decrease depending on how learning is measured, for example by time to complete a task, scores, etc.

2.2. Thinking and other skills learning goal:

I want students to make to inferences about learning based on the data represented in learning curves. First, I want them to indicate whether the data presented provide evidence that learning has occurred. Second, I want them to make inferences about learning based on rates of change. Third, I want them to trace rates of change to factors and conditions, such as presence of rewards, etc.

2.3. Attitudes, values, dispositions and habits of mind learning goal:

I want students to understand the value of using quantitative data to analyze behavioral phenomena and to understand how quantitative data can be used to adjudicate between claims by examining the links between evidence and claims.

3. Description of the Lesson:

A. Preliminary homework prior to lesson[[1]](#footnote-1)[1]:

Students will replicate Ebbinghaus’s memory test, which was the first learning curve experiment in psychology. Students will be given a set of 20 items to be committed to memory that (hopefully) will have no previous associations[[2]](#footnote-2)[2], so-called **nonsense syllables --** these consist of a sequence of consonant, vowel, and consonant (*CVC*) that does not spell anything in one's language -- in English, CAJ would be an example. They will be instructed to carry out the following procedure: (1) read the first item, (2) say it to themselves, (3) then go on to the next item, (4) repeat it to themselves, and so on, spending the same amount of time on each item (just a few seconds). Students will then calculate how many items they retain after a repetition (one complete run through the list constituted a single repetition) and express it as a percentage (they will have to perform at least 5 repetitions). After some number of repetitions, they should find out that their ability to recall the items improved as the number of repetitions went up, rapidly at first and then more slowly, until finally the list was mastered. Students will be asked to bring a graph representing their results – some may go to the web for a shortcut find Ebbinghaus’s learning curve, though when I googled it I couldn’t find it so readily available. The point though is for them to bring a learning curve to class.

Instructions for graphing retention results:

1.     After each repetition (trial) write down the number of syllables retained.

2.     Calculate the percentage of syllables retained out of 20 total (100%).

3.     Draw a graph in which the x axis represents each trial (repetition) and the y axis represents the percent of syllables retained.

4.     Draw a dot indicating the percent of syllables retained for each trial (repetition).

5.     Draw a line linking the dots from the first to the last trial.

In class: we will have a brief discussion about students’ findings followed by a write-up of their conclusions. They will be asked to write a one-paragraph explanation of the graph, including what the axes represent, the units for learning and experience respectively, and what the shape of curve obtained indicates.

B. In-class lesson and activity

Next I will present to students an example of some of the experiments performed by Edward Tolman’s that led to his discovery of latent learning. I will first present a diagram for an alley maze. Then I will describe the typical experiment in which a hungry rat is put at the entrance of the maze and wanders about through the various true path segments and blind alleys until it finally comes to the food box and eats. This is repeated daily, one trial every 24 hours.

Before proceeding to the results, I will ask students what they would expect to see in the data after several trials (days). I expect them to indicate that the animal will make fewer and fewer errors (that is, blind-alley entrances) and to take less and less time between start and goal-box. I will then show them a graph with 2 curves. One represents a smooth decrease of errors by trial (until the rats are entering no blinds at all) for rats that found food in the box in every trial (reward group). The other curve, representing rats that never found food (non-reward group), shows much less decrease in the number of errors (the curve does not drop). Students will be asked a series of questions to demonstrate they can interpret the graph, again including what the axes represent, the units for learning and experience respectively, and what the shape of curves obtained indicate. In addition, students will be asked to make inferences about why the curves are different (I expect they will point out the different conditions, reward vs. non-reward, to account for the difference). Finally, they will be asked to generalize the findings and indicate what they reveal about learning.

Finally, students will be presented with a second table including the 2 curves described above plus a third one, representing another group of rats (another condition). This third curve represents a group of rats that were put to several trials (one each day) without reward until the 11th day, when they found food in the box. One the following day the number of errors decreases dramatically, so the curve shows a steep drop. Then students will be asked to describe the shape of this third curve, including relating conditions to changes in the rate of change. Then, students will have to explain whether or not this curve provides evidence for learning as well as whether and how this new set of data require reviewing previous conclusions (e.g., if learning is always manifest in behavior, if learning depends on external rewards to occur). Finally, students will be asked to explain why Tolman took the third curve as conclusive evidence that learning was occurring from the very first trials in the absence of rewards. To prompt them, they will be asked to contrast 2 possibilities, whether learning was occurring from the beginning or whether it only began after the reward was administered. Their answers must include an explanation of what the curve would like look for each of these possibilities.

1. [1] This course is provided with weekly review sessions funded by the peer leaders program, a student affairs initiative at LaGuardia. Thus, students will be encouraged to run their memory tests during a review session under the supervision of peer leaders. [↑](#footnote-ref-1)
2. [2] Actually, the syllables are not treated as "nonsense" and most subjects easily relate nonsense syllables to actual or made-up words. Yet, nonsense syllables are stimuli nobody has seen before, so it consists of material being learned for the first time. [↑](#footnote-ref-2)