This lab exercise appeared in Section VII: Learning, developed by Garth Neufeld, Kiersten Baughman, Stephanie P. da Silva, & Elyse Hall, in Promoting psychological science: A Compendium of laboratory exercises for teachers of high school psychology (Miller, 2018). This exercise is provided here with permission from the editor.

Lab Title: Classical Conditioning

Adapted from/References:

Stowell, J. R. (2013, August). Learning: A Five-Day Lesson Plan for High School Teachers. Retrieved June 26, 2017, from http://www.apa.org/ed/precollege/topss/lessons/secure/learning-lesson-plan.pdf

- Activity 1.2 Salivating to Music

Section 1: Performance Expectations

What will the student be asked to do?

- Carry out a scientific investigation by experiencing classical conditioning as a class
- Communicate the experience in a written, scientific, lab report

Main Idea/Concept Demonstrated or Taught by Lab:

This lab allows all students to experience classical conditioning firsthand and tests students' understanding of classical conditioning principles.

After concluding this lab, students should be able to:

- Describe the principles of classical conditioning.
- Apply classical conditioning to everyday life.
- Interpret graphical representations of data as used in both quantitative and qualitative methods.

Key Terms and Psychologists Associated with Main Idea/Concept:

associative learning, classical conditioning, neutral stimulus, unconditioned stimulus, unconditioned response, conditioned stimulus, conditioned response, acquisition, extinction, spontaneous recovery, discrimination, generalization, Ivan Pavlov, John B. Watson

Materials:

You will need lemonade drink mix powder (one teaspoon per student), and each student will need a blank sheet of paper. Student should also have a pen and paper for recording data.

Instructions:

Please read all instructions before beginning this lab.

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1. Have students create two columns a sheet of paper, one column labeled "trial #" and the other labeled "# of students".
2. Have students fold up the edges of a blank piece of paper to be used as a container for a small amount of lemonade drink mix powder (about a teaspoon).
    a. Be sure to check with students about food allergies before introducing any substance to be tasted in a class demonstration.
3. Have students lick the tip of their finger and taste the lemonade powder (UCS), which will cause salivation (UCR).
4. Instruct students to have some lemonade powder ready on their fingertip so they can lick their fingertip as soon as they hear the music begin playing.
5. Play 3-4 seconds of a song with a pronounced musical introduction (e.g., "Don't Stop Believin"). The first note of the song should be paired with the lemonade powder for 8-10 trials, waiting about 20 seconds between pairings.
6. Then, play the music only (without the lemonade powder). Students should note if they start salivating. See #7.
7. Have students collect data at each trial. You might say, "By show of hands, how many students salivated to the music?"
8. Play the song again and again, between 20 second rests (inter-trial intervals), until salivation no longer occurs (extinction). Collect data by show of hands.
9. Play the music again at the start of the next class period to see if spontaneous recovery occurs.
10. Have students complete their lab reports (directions below.)

Follow-up and Discussion:

- At the end of the first day of this activity, ask students to discuss what they noticed about the process and write down any questions they have after the process is complete. Answer these questions in a class discussion.
- As they discuss, share, and identify questions, help students identify and define the UCS (lemonade powder), UCR (salivation), CS (music), and CR (salivation). You can also discuss the timing of the stimuli during the acquisition process, as well as extinction.

What are some commonly held student ideas (both troublesome and helpful) about this topic? How could instruction build on them?

- Helpful: There are certain automatic behaviors that are difficult to explain, like fear.
- Helpful: Advertisers try to sell us one thing, like a car, by associating it with another, like a sexy person
- Troublesome: generalizability - 'this only has to do with salivating' - instructor should help students apply this to a variety of conditioned physical and emotional responses

What prior concepts do students need to learn to understand the core ideas? What level of abstraction is expected of them?

- Students should understand the scientific method.
- Students will need to be able to think like a scientist by identifying variables and thinking critically.
- Students would benefit from reading about Pavlov's, and Watson and Raynor's experiments
- Students would benefit by identifying the Classical Conditioning labels in these experiments.

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What representations or media help students make sense of core ideas?

- John Watson - Little Albert
- Ivan Pavlov's - Classical Conditioning

What practices could students engage in to explore phenomena and/or representations of this concept?

- Students could evaluate their own classically conditioned responses
    - Fears
    - Taste aversions

Section 2: Crosscutting Concepts

Select at Least One

- Students will identify *patterns* of association between NS and UCS.
- Students will evaluate the *cause and effect* of pairing the NS with the UCS over and over again.
- If the music is played during subsequent classes, students will also be able to determine the *stability* of the learned response over time.

Section 3: Lab Report (written, verbal, or recorded)

Suggested Content to be Included in Student Report:

Students will summarize their findings in a written report according to the following questions:

- Describe Pavlov's discovery of classical conditioning?
- What were the objectives of this study?
- Can you think of any reason that we didn't collectively attempt to form a hypothesis at the beginning of the study?
- What materials were used?
- What was the step-by-step procedure of this study?
- How would you best represent this data? Produce appropriate graphs/tables to display the data that you collected.
- What were the findings of this study? (i.e., discuss your data, draw conclusions.)
- From a scientific perspective, how could the experiment be improved?
- Was this an experiment, a correlation, a study, or something else? Explain your answer.

Note: This lab can be adjusted for individual self-data collection by asking students to rate the strength of the CR from 1-10 and graphing that data by trial.

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