Classical Conditioning I: Prediction learning

things you have learned

• We never stop learning; The importance of a growth mindset
• It is ok to fail; How important it is to say “I am sorry” or “I was wrong” (you don’t have to be wrong to apologize)
• Empathy is all the more important in academic settings
• Most people underestimate their capacity to change (and overestimate their capacity to change others!)
What is your learning style?

This questionnaire brought up aspects of learning I had never considered before or tried to ignore, such as my tendency to skip over figures when reading papers for psych classes. Some of the global learning items seemed like completely difficult ways to learn, but I guess it works for some people.

I am shocked that this is the first time I have genuinely sat down to assess my learning styles. I have never spent a significant amount of time thinking about it seriously and I feel like this information would have been so useful so much earlier in my academic career (at the very least to have tools to learn better, but also to feel confident in my abilities and strengths and to identify my particular weaknesses without feeling generally incapable in certain settings).

I found the part of the explanation about VIS/VRB learners interesting that reads “Everyone learns more when information is presented both visually and verbally.” I believe that this point is true after reading although I never considered that the best learning outcomes for, say, a visual learner are achieved when they are provided both visual and verbal explanations rather than just visuals.
Active vs Reflective learners

• Active learners tend to retain and understand information best by doing something active with it—discussing or applying it or explaining it to others. Reflective learners prefer to think about it quietly first.

• Active learners in passive classes: add your own activities, in class and in studying

• Reflective learners in active classes: review, summarize, prepare (do more thinking offline)

Sensing vs Intuitive learners

• Sensing learners tend to like learning facts, intuitive learners often prefer discovering possibilities and relationships.

• Sensors often like solving problems by well-established methods and dislike complications and surprises; intuitors like innovation and dislike repetition. Sensors are more likely than intuitors to resent being tested on material that has not been explicitly covered in class.

• Sensing learners learning abstract concepts: generate specific examples of concepts and procedures

• Intuitive learners in detail-oriented classes: take the time to draw out the big picture and make connections
Visual vs Verbal learners

- Visual learners remember best what they see—pictures, diagrams, flow charts, time lines, films, and demonstrations. Verbal learners get more out of words—written and spoken explanations. Everyone learns more when information is presented both visually and verbally.
- Most people are visual learners. Most classes are more verbal than visual. Take notes, draw pictures.
- Verbal learners: take notes, study with friends to hear others talk about the material

Sequential vs Global learners

- Sequential learners tend to gain understanding in linear steps, with each step following logically from the previous one. Global learners tend to learn in large jumps, absorbing material almost randomly without seeing connections, and then suddenly “getting it.”
- Sequential learners: you are in luck. But you can fill in even more connections between topics as you study.
- Global learners: you are not slow or stupid, you just learn differently. To help yourself: skim for big picture first, then read for detail.
decision making

Why is this hard?
• Reward/punishment may be delayed
• Outcomes may depend on a series of actions
⇒ “credit assignment problem” (Sutton, 1978)

How does this work? How does the brain solve this problem?

another example:

how did you solve the credit assignment problem?
LEARNING

- non-temporary change in the behavioral mechanisms engaged in a certain situation
- that results from repeated experience with the situation
- and providing the change can’t be explained in terms of innate behavioral tendencies of the organism

what should you learn from interaction with the world?

what is going to happen (prediction learning)
what to do about it (action learning)
5 min break

Act 1: PREDICTIONS
animals learn predictions

Terminology:

- = Unconditional Stimulus (US)
- = Conditional Stimulus (CS)
- = Conditional Response (CR)

(Here, also Unconditional Response; UR)

...with significant event

measure anticipatory behavior

Ivan Pavlov
(Nobel prize portrait)

pair stimulus

Very general form of learning from experience (snails - humans)

example I: fear conditioning (conditioned suppression)

Habituation (tone)  Conditioning (tone+shock)  Extinction (tone)

CS: Tone, 30 sec
US: Shock, 0.5 sec
CR: Freezing

(ITI = 4 min)
example I: fear conditioning (conditioned suppression)

Example II: pigeon food conditioning
some non-trivial terminology

- Pavlov called the US a “reinforcer.” What does that mean? 
  ![reinforcer](image)
- Purely operational definition (makes no assumptions regarding affective components)
- Acquisition
- Extinction

- Predictions are:
  1) shaped by experience
  2) revealed by behavior

Predictions are powerful...

predictions seem to cause behavioral output directly, in a compulsory way
even in light of an “omission schedule”  
(n.b. not Pavlovian)


what makes conditioning Pavlovian?

procedurally: Pavlovian/classical conditioning is a learning situation in which the reinforcer does not depend on the animal’s response

from the animal’s point of view: the conditioned response is unavoidable, like a reflex, not utilitarian or flexible; direct result of a prediction

(e.g., Hershberger (1986) - An approach through the looking glass)
basic Pavlovian procedures

- eye-blink conditioning
- “autoshaping”
- conditioned taste aversion
- conditioned emotional response (fear conditioning; conditioned suppression)
- conditioned place preference
- leg flexion

Pavlovian responses

- most common: approach and withdrawal responses
- in fact: more than one response in every situation (we choose which to measure)
- Homework: examples from daily life: bring with you on Tuesday (3 examples, for each determine the US, CS, UR, CR)
Summary so far:

- Animals learn predictions — we know this from Pavlovian conditioning
- In Pavlovian conditioning we set up a *predictable* scenario. Animals respond compulsively based on their predictions.
- Animals don’t get to choose the CS or US; we don’t get to choose their responses.

How is this related to my life?

Learning curves have a characteristic shape. Ask yourself: where am I on the learning curve?

A lot of our behaviors are Pavlovian…