PSY 402

Theories of Learning
Chapter 10 – A Synthetic Perspective on Instrumental Learning
10.9 Perceptual-defensive-recuperative model of fear and pain

**Stimulus**
- Predator
- Danger signal (CS)
- Tissue damage

**Motivational state**
- Fear
- Other
- Pain
- Other

**Behavior**
- SSDRs
  - Freeze
  - Flee
  - Bury
  - Etc.
- Recuperative behavior
  - Wound lick
  - Stay at home
  - Etc.
CS Termination is Important

- Animals are able to learn non-SSDR behaviors under certain circumstances.
- Termination of the CS aids such learning because it provides feedback about the correct behavior for avoidance.
  - Feedback stimuli become conditioned inhibitors.
  - The avoidance response becomes an inhibitor too.
  - Not performing the response predicts the US.
Expectancies About Shock

- Seligman & Johnston proposed that an expectancy is formed that response=no shock.
  - This idea is inconsistent with learning theory.
- DeHouwer found that changing an expectancy to response=shock (when no signal is present) does not change the avoidance behavior.
  - The idea that avoidance behavior is a negative occasion setter (response-no shock) fits better.
R1 or R2 mean shock when A or B are off, but no-shock when they are on. The expectancy is not associated with the key, but with the signal (A or B).
Learned Helplessness

- Overmeier & Selgman found that dogs have difficulty learning avoidance behavior after being exposed to inescapable shock.
- Step 1 – expose dogs to 3 conditions: escapable shock, inescapable shock (yoke), no shock
- Step 2 – escape training
- Results – yoked dogs did not learn to escape.
### The learned helplessness effect

<table>
<thead>
<tr>
<th>Group</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 2 % Shocks escaped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escapable</td>
<td>Escapable shock</td>
<td>Escape training</td>
<td>74%</td>
</tr>
<tr>
<td>Inescapable</td>
<td>Yoked, inescapable shock</td>
<td>Escape training</td>
<td>28%</td>
</tr>
<tr>
<td>No shock</td>
<td>—</td>
<td>Escape training</td>
<td>78%</td>
</tr>
</tbody>
</table>
Three Effects of Inescapable Shock

- **Motivational deficit** – 6/10 did not try to escape in phase two (when escape was possible).
- **Cognitive deficit** – they didn’t learn.
- **Emotional deficit** – they passively accepted shock
- **Immunization effect** – escaping in phase 1 protected dogs from these deficits.
Similarity to Learned Irrelevance

- Learned helplessness occurs during instrumental learning.
  - It involves a null contingency between behavior and outcome.

- In Pavlovian conditioning, null contingency between CS-US leads to learned irrelevance.

- The irrelevance of one signal (CS) prevents learning about another signal paired with US.
Attributions and Depression

- Seligman linked learned helplessness to depression in humans.

- Three kinds of attributions lead to depression:
  - Global
  - Stable
  - Internal

- Things are bad, they will stay bad, it’s your fault, and there’s nothing you can do about it.
Alternative Explanations

- Perhaps exposure to shock makes animals less active.
  - Suppressed activity makes learning an escape or avoidance response harder.

- Problems with this view:
  - Rats who had to freeze to avoid shock still had difficulty learning due to helplessness.
  - Rats who had to turn right or left to avoid shock got confused – suppressed activity does cause confusion.
Alternative Explanations (Cont.)

- Perhaps numbing (analgesia) leads to helplessness.
- Helplessness occurs without numbing, so that can’t be the answer.
- Reduction in neurotransmitters (e.g., serotonin, norepinephrine) does not explain it either.
- Controllability seems to be the main factor.
Controllability Affects Stress

- Rats exposed to uncontrollable events develop ulcers.
  - Being able to escape or predict shocks evokes less fear.
  - The escape is helpful because it is predictive of turning off the shock.
  - A cessation cue softens the impact of inescapable shock & has an immunization effect.
- Responding has signaling value.
10.12 Temporal relationships

- **Shock**
- **Escape response**
- **Cessation CS**
- **Backward CS**

Time
**Misbehavior**

- Breland and Breland found that well-trained animals drift away from their behavior over time.
  - Pigs and piggy bank – push around with snout
  - Raccoons – rub coins together, dip in and out
  - Chickens scratch instead of standing still
  - Chickens chase ball instead of running bases

- **Instinctive drift** due to pairing with food.
Superstitious Drift

- Skinner produced superstitious behavior in pigeons by rewarding them intermittently for whatever they happened to be doing.

- Staddon & Simmelhag found that over time superstitious behavior (interim) drifted toward terminal behaviors related to food.
  - Pigeons drifted toward pecking
  - Rats drifted toward being near the feeder
10.13 Behavior of a pigeon and rat given food S*s at regular intervals

(A) Pigeon

- Magazine wall
- Window wall
- Pecking
- Wing flapping

(B) Rat

- Water bottle area
- Drinking
- Feeder area
- Running wheel area
- Running
- Other

All other behaviors are interim
Schedule-Induced Polydipsia

- Polydipsia means drinking an excessive amount of water.
- Adjunctive behaviors are behaviors that occur naturally as part of a species-specific natural behavior system (e.g., for eating).
- When an operant schedule provides frequent reward, the drinking occurs as an adjunct to eating, so rats wind up drinking too much.
Punishment

- People and animals stop performing behaviors that have unpleasant consequences.
- Punishment too can work for both Pavlovian and operant reasons.
  - Do people stop speeding or avoid the cops?
- Bolles taught a rat 4 responses (right/left, up/down levers), then punished one of them.
  - All responding initially declined, due to association.
10.14 The rate of two behaviors directed at the same lever

![Graph showing the rate of two behaviors over time. The graph compares the response rate for behaviors labeled "Punished" and "Not punished." The "Punished" behavior shows a decrease in response rate, while the "Not punished" behavior shows a more stable rate.]
10.15 The suppression of pressing and lifting two levers
Unintended Consequences

- Pain-induced aggression – an animal or person who is hurts reacts aggressively.
- Punishment can lead to a weakening of the parent-child relationship due to fear or anger.
- Children who are physically punished use that same punishment on peers, becoming shunned.
- Other forms of punishment (emotional, social) also have unintended consequences.
Organisms Learn Several Things

- They associate their behavior with its consequences (S-R learning).
- They associate stimuli in the environment with consequences (S-S* learning).
- They learn that some stimuli are relevant to behavior and its consequences (occasion setting).
- They associate an environmental signal with a response out of habit (S-R learning).
10.16 The various types of learning that can occur in any instrumental learning situation

Animals learn all of these relationships during learning.