Classical Conditioning II

Generalization/Discrimination; Time and the Order of Events

**Generalization and Discrimination**

- Generalization – responding to a stimulus because of its similarity to the CS.
- Discrimination – responding differently to a stimulus because of its difference from the CS.
- These are actually two ends of a single continuum.

**Generalization Example**

- A young child is bitten by a German Shepherd. Fear is conditioned to sight and sound of the dog.
- Strong fear is elicited by the dog.
- However, fear is also elicited by other dogs because they are somewhat similar to the German Shepherd.
Testing for Generalization/Discrimination

- Pair a tone CS with meat powder until the tone evokes a strong salivary CR.
- Test for salivation using several different tones whose frequencies (pitches) differ from that of the CS.
- Salivation evoked by the tones will be strongest for frequencies close to the CS and weakest for those farthest away.

Importance of Generalization and Discrimination

- Generalization – Similar stimulus may demand a similar response: best guess in the absence of relevant information.
- Discrimination – With experience we can learn to respond differently, as needed, despite stimulus similarities.

Temporal Parameters and Classical Conditioning

- The ordering and spacing of CS and US turns out to be extremely important to the success of classical conditioning and the nature of the conditioned response.
- The next slides examine several procedures differing in their temporal parameters.
Short-delay Conditioning
- CS begins only a short time before US appears (e.g., 5 seconds).
- CS remains present until US appears (e.g., tone sounds until meat powder is given).
- This is the most effective procedure for classical conditioning, so long as the delay is not too short.

Long-delay Conditioning
- CS begin a relatively long time before the US appears (e.g., 30 seconds).
- CS continues until US appears.
- In general, as the delay is increased, it gets more difficult to obtain a conditioned response. Not as effective as short-delay conditioning.

Inhibition of Delay
- This is a phenomenon observed in long-delay conditioning.
- Initially, the CR develops it occurs throughout the presentation of the CS. With more training, it gradually becomes limited to the few seconds prior to US delivery.
- Pavlov believed that the earlier portions of the CS developed a conditioned inhibition, and called this inhibition of delay.
Trace Conditioning
- CS begins before US is presented.
- CS appears briefly (e.g., 1 second), leaving a gap between the CS and US during which no stimulus is present.
- The gap is called the trace interval.
- Less effective than delay conditioning using the same CS-US interval.

Simultaneous Conditioning
- CS and US appear and disappear together as a unit (simultaneously).
- This represents the maximum possible temporal contiguity.
- The procedure is ineffective in producing classical conditioning to the CS.

Pavlov's Explanation for the Failure of Simult. Conditioning
- Pavlov's model required slowly spreading waves of excitation to reach the response center just as it was being activated by the US.
- Because these waves were slow, they needed a head start in order to arrive in time. The head start is absent in simultaneous conditioning.
Backward Conditioning

- The CS is presented after the US, reversing the usual order.
- Pavlov believed that this procedure is ineffective.
- However, we now know that it produces inhibitory conditioning – the CS gains the power to inhibit the response.

Making Sense of Backward Conditioning

- In ordinary (forward) conditioning, the CS warns that the US is about to occur.
- In backward conditioning, the CS warns that the US will now be absent for a time (food-free period).
- It thus makes adaptive sense not to salivate following the backward CS.

Temporal Conditioning

- No formal CS is presented. Instead, the US is presented at regular intervals (e.g., every 30 seconds).
- A CR develops and occurs just prior to each delivery of the US.
- To account for this, one must assume that internal, time-correlated stimuli are becoming paired with the US, thus serving as the CS.