Lecture 8
Generalization & Discrimination

Monday

29th August 2022

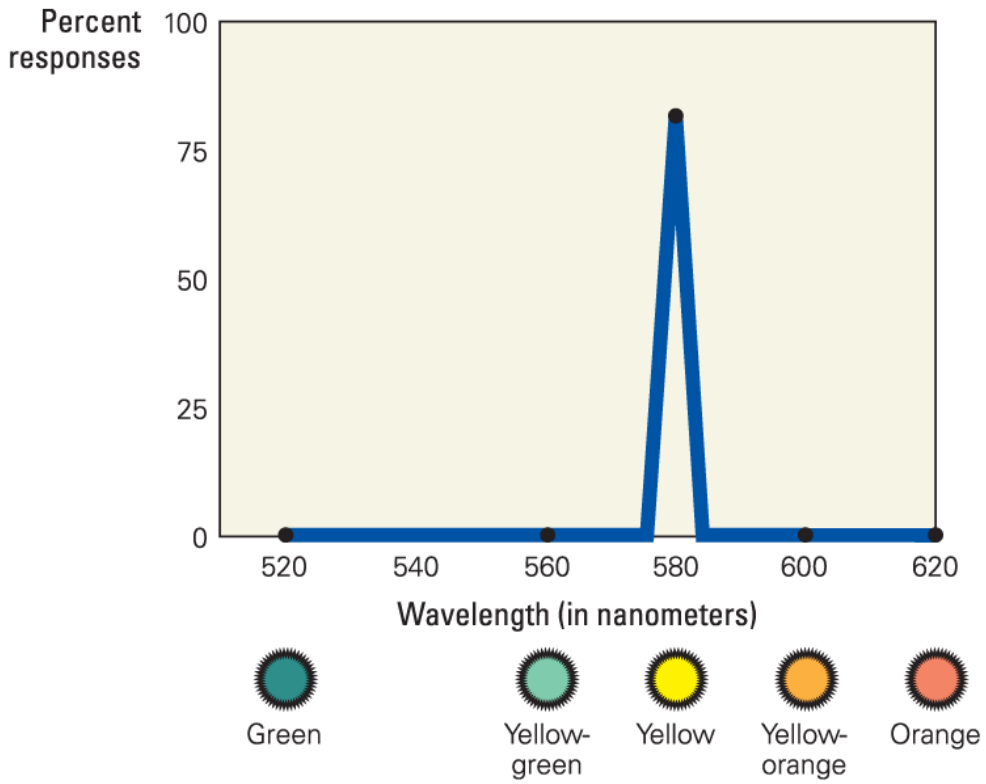
- After eating food in a branded restaurant, you fell ill, then you stopped visiting all other outlets of that brand

- Fire alarm in a movie vs fire alarm in your building

Can you compare?

Stimulus-Generalization Gradients in Pigeons

Ideal



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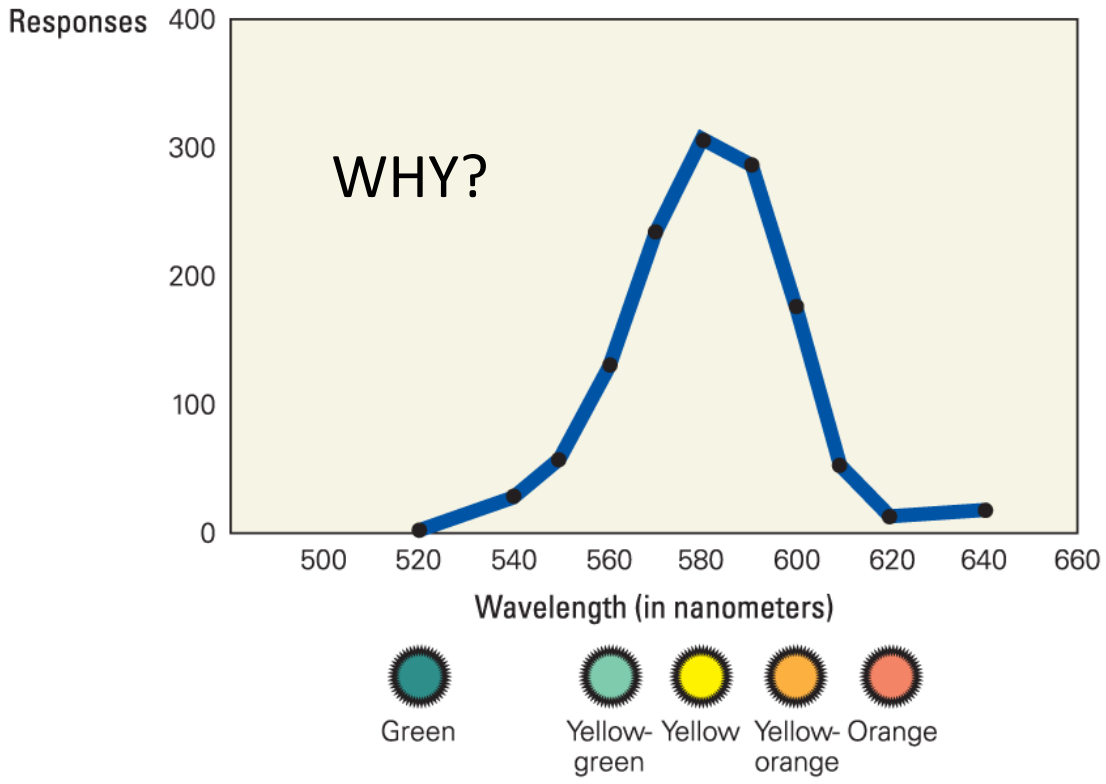
Less error

Realistic



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Similar stimuli might also be rewarding

Purpose of generalization - estimate probability of future events.

Behavioral Processes

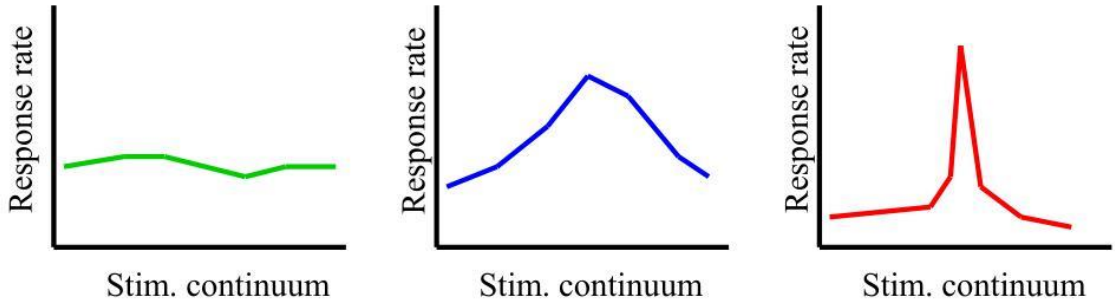
Generalization

transfer of past learning to novel events and problems

Discrimination

learn to respond differently to different stimuli

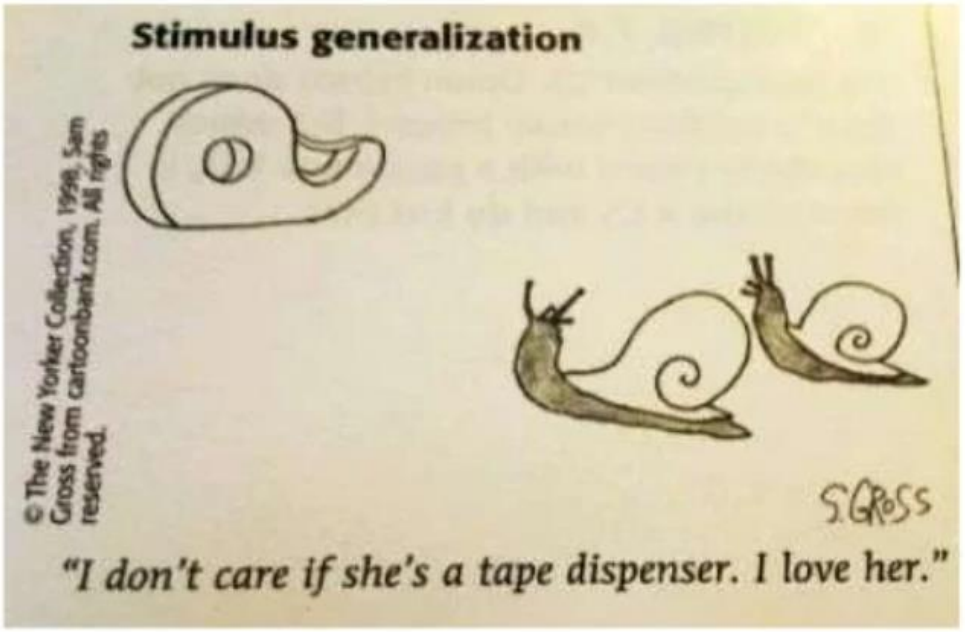
	Same outcome	**Different outcomes**
Similar stimuli	Similar stimuli → same outcome *Broccoli and cauliflower → nasty* **Moderate Generalization**	Similar stimuli → different outcomes *Broccoli → nasty* *Cauliflower → yummy* **High Discrimination**
Dissimilar stimuli	Dissimilar stimuli → same outcome *Broccoli and Brinjal → nasty* **High Generalization**	Dissimilar stimuli → different outcomes *Broccoli → nasty* *Brinjal →yummy*



Flat: No discrimination/ high generalization

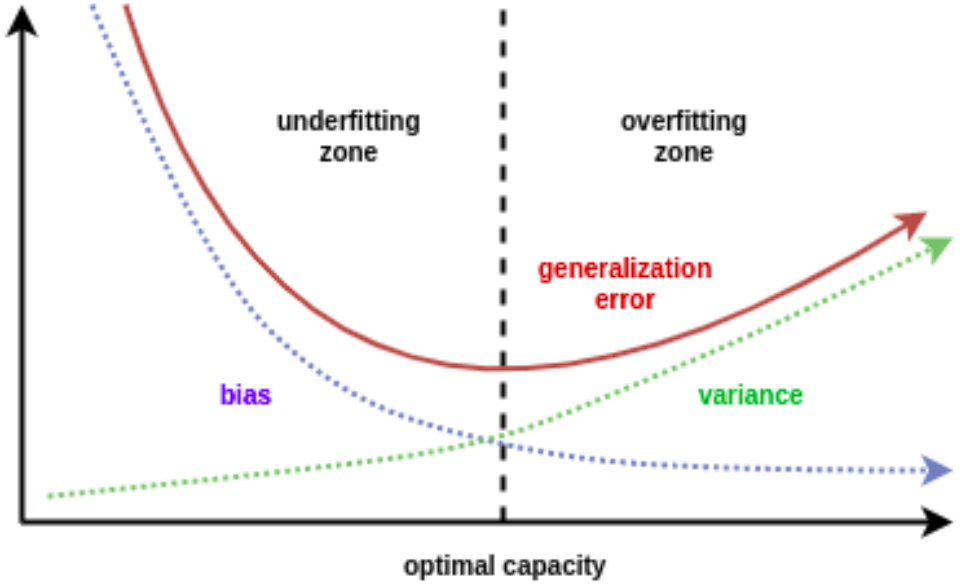
Broad: Some discrimination/ some generalization

Narrow: High discrimination/ low generalization



Generalization

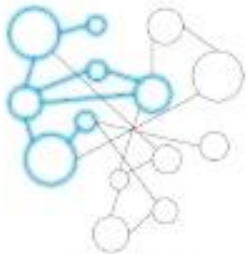
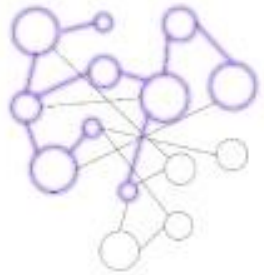
Generalization in machine learning



Training Data

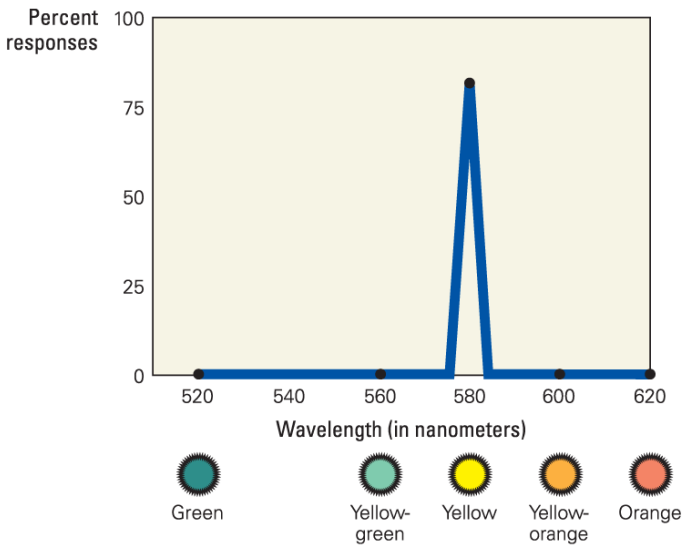
Testing Data

Unseen or untrained data

	Memories	Interference	Generalization
Synaptic level	Memory A:  Memory B: 	One memory is enhanced, strengthening its representation on the expense of the other 	Both memories are linked, strengthening the overlapping representations 

Generalization at neuronal level

Discrete Response model



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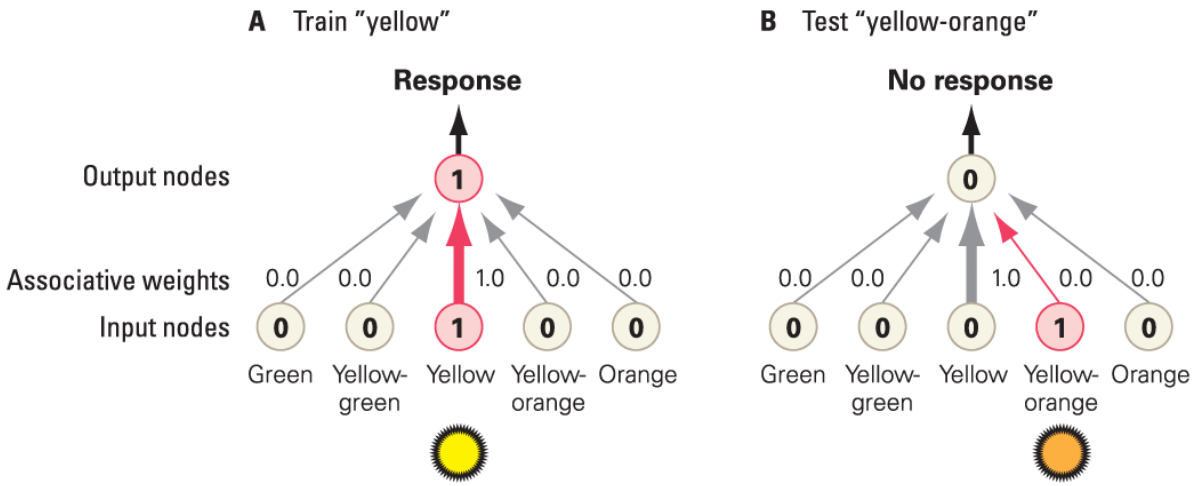

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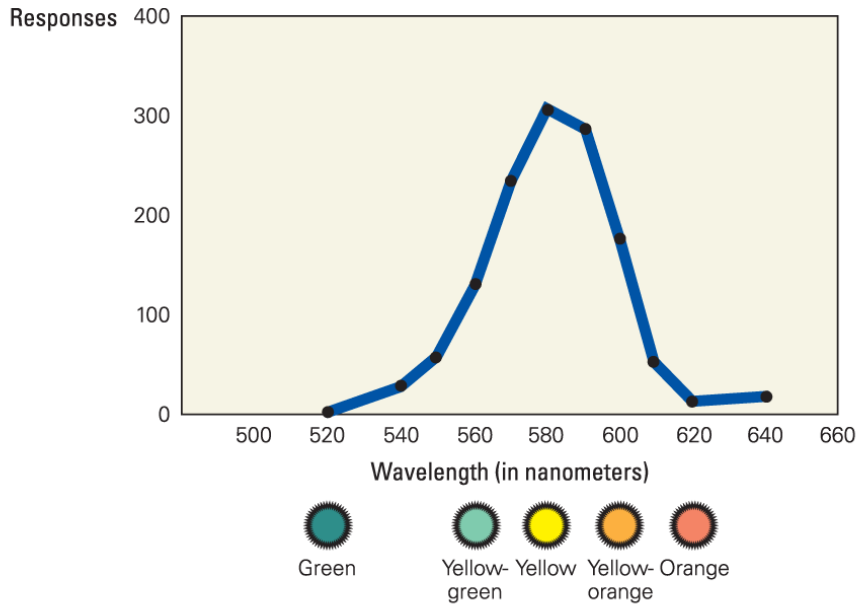
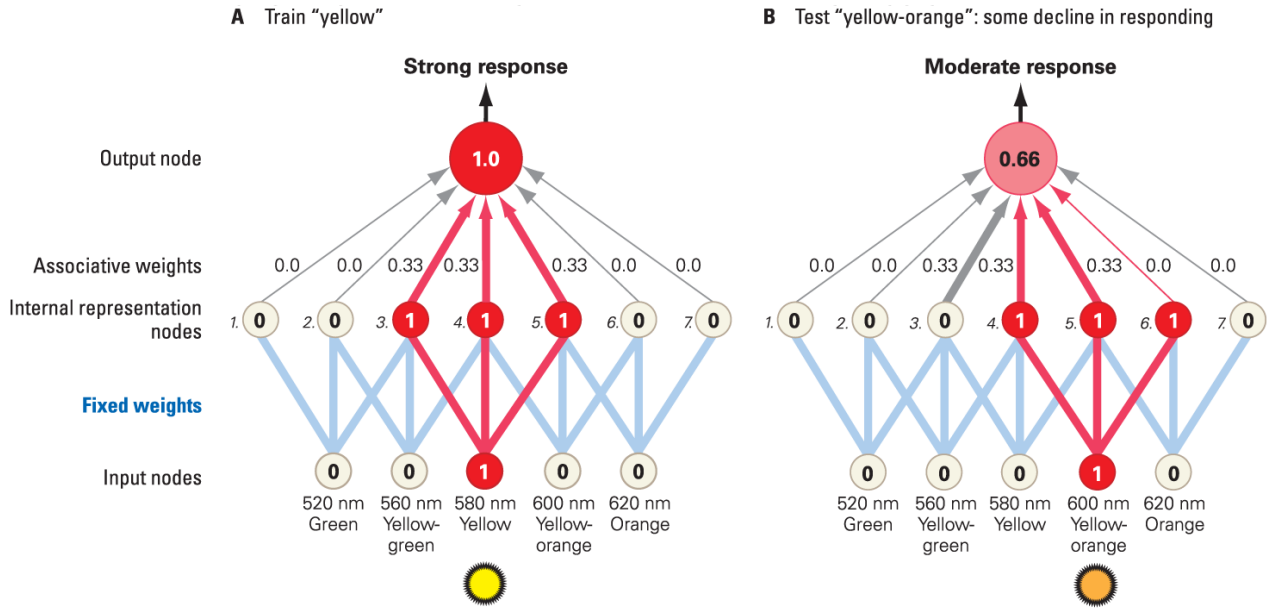
Distributed Response model





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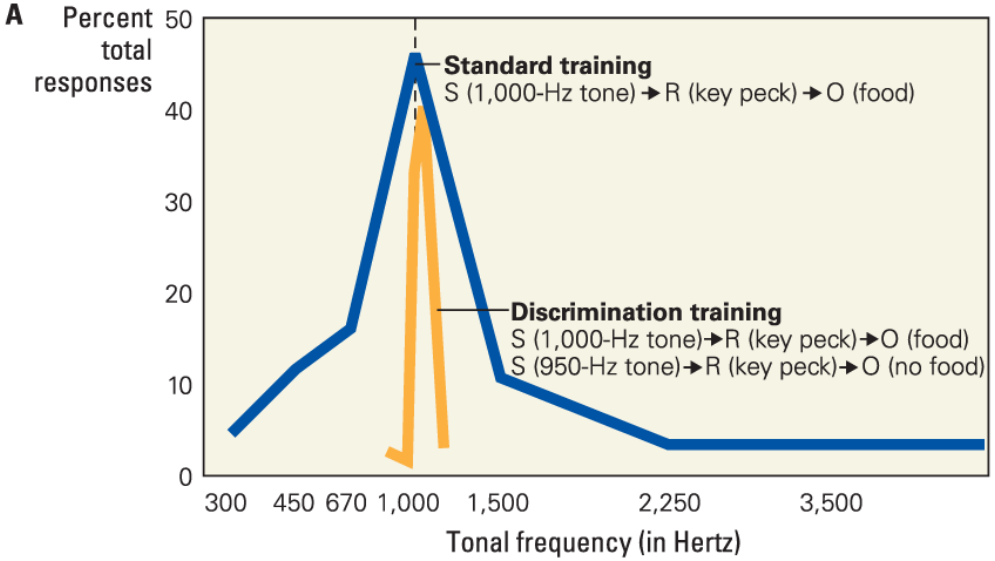
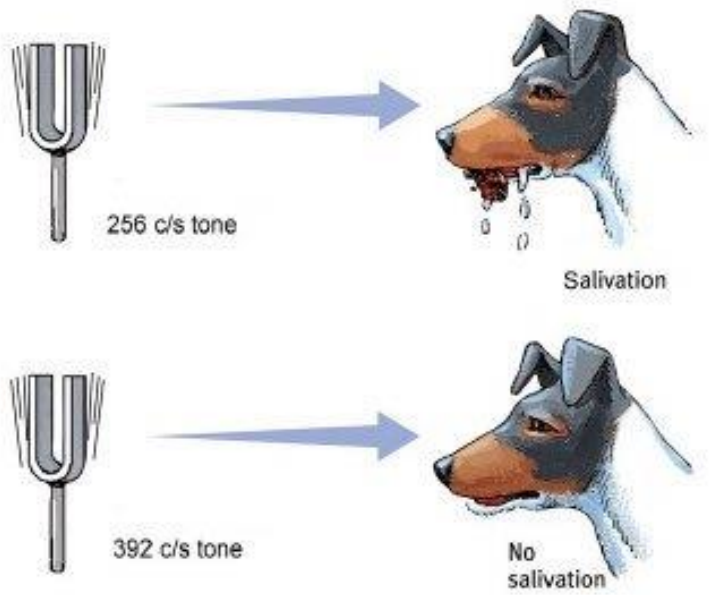
Generalization or Discrimination?

What determines whether two stimuli are to be treated as similar (generalization) or different (discrimination)?





Sensory Preconditioning: Co-occurrence and Stimulus Generalization

red light + other vehicles stop → Stop at traffic light

Group	Phase 1	Phase 2	Phase 3: test
Compound exposure	*Tone + light (together)*	Light → airpuff → blink!	Tone → blink!
Separate exposure (control group)	*Tone, light (separately)*	Light → airpuff → blink!	Tone → no blink

Reverse of blocking

Generalization across two dissimilar stimuli → because of co-occurrence

Acquired Equivalence:
Novel Similar Predictions Based on Prior Similar Consequences

- **Acquired equivalence:** it is possible for generalization to occur between two very dissimilar stimuli even if they never co-occur

Phase 1 training	**Phase 2 training**	**Phase 3: test**
A1 →X1→ food A2 →X1→ food	A1→ food	A2: strong pecking response
B1→ Y1→ food B2 →Y1→ food	B1→ no food	B2: no strong response

Friend A1 → diabetes → craves sugary foods
Friend A2 → craves sugary food (therefore must have diabe

Generalization of bad behaviour of black people by US police

Gender stereotyping

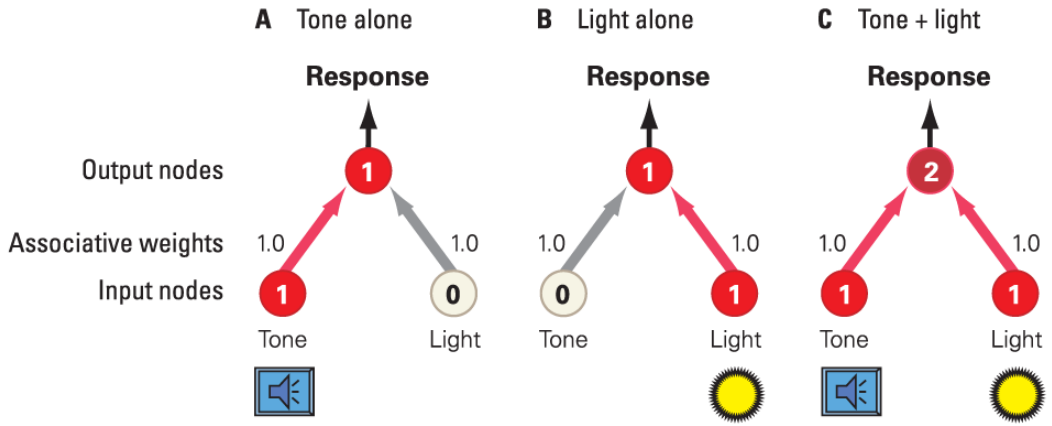
Negative Patterning: When the Whole Means Something Different Than the Parts

negative patterning
A behavioral paradigm in which the appropriate response to individual cues is positive, whereas the appropriate response to their combination (pattern) is negative (no response).

Headlights Off
Turning Left

Headlights Off
Turning Right

Headlights Off
Hazard Warning



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Tone ➔ airpuff
Light ➔ airpuff
Tone + light ➔ no airpuff

Various behavioral paradigms of generalization

a. discrimination training
b. sensory preconditioning
c. acquired equivalence
d. negative patterning

1. Kareena is quite impressed by men who, on a first date, bring her either gifts or flowers. However, if a man shows up with both, she is turned off, feeling he is coming on too strong.
2. As a child, Karthik learned that people who have deep voices also tend to have beards. He later became convinced that men with beards are strong, and he inferred that a deep voice is also likely a sign of strength.
3. By playing snippets of music by Rahman, then Ilaiyaraja, and then Rahman again, a music teacher is able to teach his class how to recognize the style of each.
4. Megha and Kiran enjoy many of the same foods and people. Based on this observation, Megha guesses that Kiran will also like a particular song of which she is fond.