

Mind the Gap

Stimulus-Stimulus Pairing

KIKI YABLON, MA, KPA-CTP, CPDT-KA

Overview

- What is stimulus-stimulus pairing?
- How do we talk about it?
- How do we actually use it?
- Could we use it more effectively or efficiently?

What Is Stimulus Pairing?

- Causing one stimulus to precede and/or predict another closely in time
- Is it a synonym for "classical conditioning"?
- Procedure or process?
- What behavior? What is learned? (Friedman)
- We can ask all of the above

Classical Conditioning

- New elicitors for respondent behavior
- Reflexive behavior, not influenced by consequences
- Predictors of eliciting stimuli often also come to evoke operant behavior
- What else were Pavlov's dogs doing?



Classical Conditioning

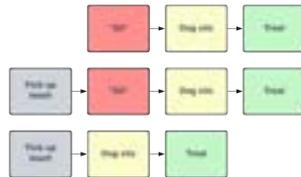
- "Conditioned emotional responses"
- Little Albert: Startling, whimpering, crying, pulling and crawling away, shaking head from side to side
- From *Mine!* Tail wagging, "happy facial expression," orienting toward where the appetitive stimulus originates, lifting the head from guarded object upon the trainer's approach



JOHN B. WATSON, AKRON PSYCHOLOGY ARCHIVES / WATSON & RAYNER, 1920 / JEAN DONALDSON, "MINE!"

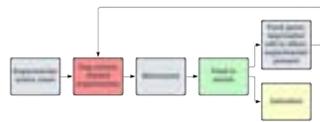
Operant Conditioning

- New behavior
- New discriminative stimuli for operant behavior
- New relations between behavior and the environment on both ends
- What physiological reactions might also be happening in response to the same stimuli?



Mind the Gap(s)

- Stimuli play multiple roles at once
- Antecedents evoke operant behavior and elicit respondent behavior
- Consequences for one behavior are antecedents for others
- CER arguably: New elicitors, new behavior, new discriminative stimuli, and new reinforcers
- That's always happening



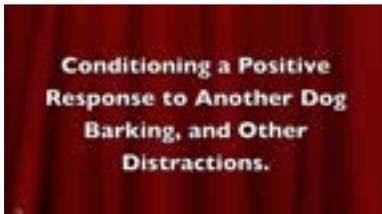
Michael and Noodles

- All of this goes on 24/7, not only when we conduct procedures
- We started saying "breakfast" in an excited way as we were wiping him down after his morning walk. . . . At some point I was saying it repeatedly, on our way home, and it turned sing-songy."
- And then this happened



Eileen and Clara

- When the first dog barks, give the second dog cheese



[HTTPS://EILEENANDDOGS.COM/BLOG/2012/12/18/CLASSICAL-CONDITIONING-POSITIVE-RESPONSE-TO-BARKING/](https://eileenanddogs.com/blog/2012/12/18/classical-conditioning-positive-response-to-barking/)

Eileen and Clara

Respondent view:

S1: Summer barks

S2: Eileen picks up cheese can

S3: Cheese in mouth

R: ?

Operant view:

A1: Summer barks

A2: Eileen picks up cheese can

B: Clara orients to Eileen

C: Cheese in mouth

Operant view:

A: Summer barks

B: Clara orients to Eileen

C: Eileen picks up cheese can, puts cheese in Clara's mouth

Denise and Dice

- While the dog is biting, say "out" then throw the toy and say "toy"



DENISE FENZI, [HTTPS://WWW.INSTAGRAM.COM/P/CP_SVYBNWTE/](https://www.instagram.com/p/CP_SVYBNWTE/)

Denise and Dice

Respondent view:

S1: Say "out"

S2: Say toy/throw toy

S3: Toy access

R: ?

Operant view:

A1: Say "out"

A2: Throw toy

B1: Dog releases and turns away

C1/A2: Toy access

B2: Dog retrieves toy

C2: Denise tugs

Operant view:

A1: Say "out"

B1: Dog releases and turns away

C1: Throw toy

C1: Toy access

B2: Dog retrieves toy

C2: Denise tugs

Charging the Clicker

- Compare to "magazine training"
- Noncontingent delivery of reinforcer, take care that no particular response is reinforced

Magazine training serves two functions. First, it teaches the subject where to find the reinforcement and how to deal with it. Second, it establishes the discriminative function of the stimuli which are associated with reinforcement delivery (H). That is to say, the contextual stimuli serve to mark those occasions upon which magazine behavior will be reinforced. When the stimuli occur, magazine approach is followed immediately by reinforcement.



CC BY SA 4.0/SIDMAN, TACTICS OF SCIENTIFIC RESEARCH, P 266

Developing the Operant Contingency

- "Pavlov's dog might prick up its ears when it hears the metronome tick, and that is followed by the reinforcing event. Did the reinforcing event occur because the metronome sounds, or because the dog pricked up its ears? There's no way the animal can distinguish between the two on a single occasion. The moment of reinforcement the procedures are identical. The differences in the procedures, in the outcome, though, emerge over time."
—John Donahoe
- As the operant contingency develops, we can use differential reinforcement to select behavior
- With antecedent arrangement to reduce errors, we may not need to

DONAHOE (2022), [HTTPS://BARRETTINITIATIVE.ORG/VIDEO-GALLERY](https://barrettinitiative.org/video-gallery)

Kirby and the Door Chime

- When the door chime sounds, toss a treat to the mat, regardless of behavior
- When the door chime sounds, if the dog moves toward the mat, toss a treat to the mat
- Previous history with antecedent of mat



Kirby and the Door Chime

Respondent view:

- S1: Door chime
- S2: Toss treat to mat
- S3: Food in mouth

Operant view:

- A1: Door chime
- A2: Toss treat to mat
- B: Orientation or movement toward the mat or lying down
- C: Treat

Contingency development:

- A1: Open door/chime
- B: Go to mat and lie down
- C: Treat

Wait When the Leash Is Dropped

- Mark/treat when the leash hits the ground



- Mark/treat when the dog turns upon the leash dropping



Wait When the Leash is Dropped

Respondent view:

- S1: Drop leash
- S2: Click
- S3: Treat by me

Operant view:

- A1: Drop leash
- A2: Click
- B: Dog orients to me
- C: Treat by me

Contingency development:

- A1: Drop leash
- B1: Dog orients to me
- A2/C1: Click
- B2: Dog comes the rest of the way back
- C2: Treat by me

Contingency development:

- A: Drop leash
- B: Dog comes back to me
- C: Click/treat

Location, Location, Location

- Dimensions of stimulus presentation (e.g., location of treat) can influence what behavior evolves between stimuli



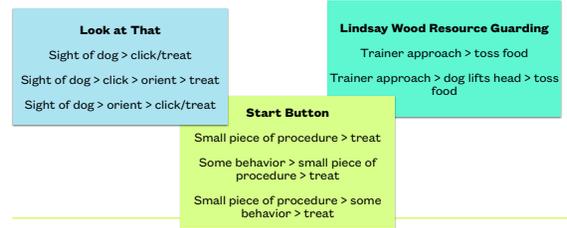
Location, Location, Location



Goal: I would like Apollo to stand still while I slide my hand down the lead rope.

MARY HUNTER, BEHAVIOREXPLORER.COM

Common Applications



Other Ideas

- Could we teach dogs to go in the direction of leash tension without waiting for them to "give"?
- Could we teach "off" without dogs jumping on?

Counterconditioning

- Is a traditional respondent view suddenly more useful when the target behavior is "emotional"?
 - What makes the behavior "emotional"
 - Are emotions respondent?
- How are we assessing whether CC has been effective?
 - CER, "anticipatory behavior"
 - Will the animal behave to produce the stimulus?
 - Is the stimulus now a conditioned reinforcer?
- What makes pairing effective?

Response-Contingent Pairing

- It may be as or more effective to make the pairing contingent on a response from the learner
- Variety of study designs, procedures, ways of measuring effectiveness, responses required for pairing
- Studied with "neutral" stimuli
- Limited populations, types of stimuli, relatively small number of studies

Overall, there is promising evidence regarding procedures that require participants to actively respond to the pairing trial. Compared to RCT, both RCP and CRT procedures often showed better results (Grueter et al., 2013; Smith et al., 2016) or were equally effective but preferred by participants (i.e., CRT procedures; Lepper et al., 2013). These results were consistent in different sets of stimuli, social stimuli administered via computer (Grueter et al., 2016), pain (Smith et al., 2013), and speech sounds (Lepper & Petruskiene, 2017; Lepper et al., 2013). Positive results for CRT, though, were not replicated in Rodriguez and Lammann's study (2017), which reported "that the response-based procedure (speaking) resulted in more robust and enduring effects than the separate procedure (demonstrative-stimulus procedure)" (p. 176).

Scout and the Ice Maker

- Previous: tried lowering intensity by having her out of room, wearing a snood
- Response contingent: Look/wag > small piece of procedure > treat
- Is she "conflicted," "scared" or are we capturing circling?



Scout and the Ice Maker

- Added mat.
- Brief reinforcement history with the mat



Scout and the Ice Maker

- Formalized the "question"



Scout and the Ice Maker

- Starting away from the mat—another question



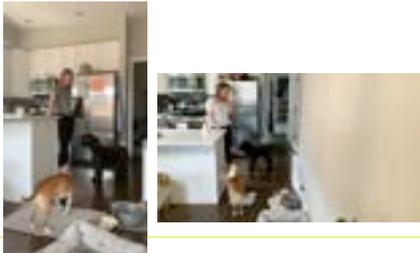
Scout and the Ice Maker

- Probe: What happens without the mat?



Scout and the Ice Maker

- Back to mat
- Fading mat (half, quarter, washcloth)



Scout and the Ice Maker

- Napping in the back room, where she previously would hide from the sound



Scout and the Ice Maker

- Mat faded, no circling, approaches



Scout and the Phone Tones

- Working on a similar procedure for running away and hiding from iPhone sounds



Does Scout “Like” the Ice Maker Now?

- How would we decide?



What Is Most Useful?

- In applied practice
- Rather than label stimulus pairing procedures one or the other, why not
- Identify the behavior(s) of interest
- Identify the procedures likely to influence them
- Describe what we do “technologically” rather than with labels



BAER, WOLF, & RISLEY (1968)

Parting Thoughts

- When we pair stimuli, we may teach new elicitors for respondent behavior, new operant behaviors, and new cues and reinforcers for operant behavior. And the same stimulus may play multiple roles.
- Operant processes may account for why our counterconditioning procedures work, or don't.
- When we don't “mind the gap,” we may run over the very behavior we hope to see.
- Arranging antecedents carefully and considering reinforcement history makes it likelier that we will get the behaviors we want stimulus pairing to produce.
- There may be an advantage to using operant procedures to condition reinforcers, and someone should look at whether that's true of counterconditioning aversive stimuli
- It may be most useful to simply describe what we do.



Where to Find Me

- kikiablondogtraining.com
 - Instagram: @kiki.yablon
 - Facebook (less often): <https://www.facebook.com/KikiYablonDogTraining>
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