

# Stimulus-Stimulus Pairing

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## Overview

- What is stimulus-stimulus pairing?
- How do we talk about using it?
- How do we actually use it?
- Could we use it more effectively or efficiently?
- Some ways I have used it

## What Is Stimulus Pairing?

- Causing one stimulus to precede and/or predict another closely in time
- Is it operant or respondent (classical) conditioning?
- We can ask what behavior we're talking about and what was learned
- We can ask what procedure
- We can ask all of the above

## Classical Conditioning: What Is Learned

- New elicitors for respondent behavior
- Predictors of eliciting stimuli often also come to evoke operant behavior



## Classical Conditioning: What Is Learned

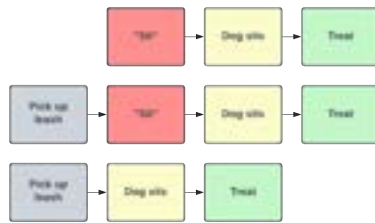
- “Conditioned emotional responses”
- Little Albert: Startling, whimpering, crying, pulling and crawling away, shaking head from side to side
- From *Mine!* Tail wagging, “happy facial expression” orienting toward where the appetitive stimulus originates, lifting the head from guarded object upon the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



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

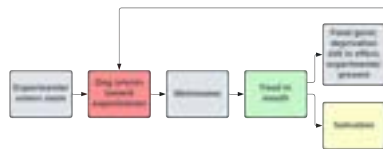
## Operant Conditioning: What Is Learned

- New behavior
- New discriminative stimuli for operant behavior—usually described as a Pavlovian process, but after the first reinforcer, how would you distinguish?
- Antecedents are also paired with the consequence



## Mind the Gap(s)

- Stimuli play multiple roles at once
- Behavior occurs between, before, and after stimuli
- Antecedents evoke and elicit
- Consequences for one behavior are antecedents for another
- Antecedents evoke and elicit
- CER, probably: new elicitors, new behavior, and new discriminative stimuli
- All of this goes on 24/7, not only when we conduct procedures



## Michael and Noodles

- 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.”



- What constitutes the “CER” here?

# 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



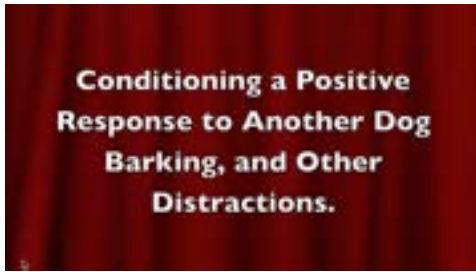
BAER, WOLF, & RISLEY (1968)

# “Classically Conditioning” a ...

- Teaching a recall cue by pairing a word or other event with food
- Teaching a drop by pairing a word with food
- Teaching a drop by pairing a word with a toy toss
- We could ask “what behavior” and “what was learned”
- We could say it was “taught by stimulus pairing” which would definitely be accurate and prompt us to look at all processes and stimulus roles

# Eileen and Clara

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



[HTTPS://EILEENANDDOGS.COM/BLOG/2012/12/19/CLASSICAL-CONDITIONING-POSITIVE-RESPONSE-TO-BARKING/](https://eileenanddogs.com/blog/2012/12/19/classical-conditioning-positive-response-to-barking/)

# Eileen and Clara

What behavior?	<b>Respondent view:</b>	<b>Operant view:</b>
What is learned?	S1: Summer barks	A1: Summer barks
What is the procedure?	S2: Eileen picks up cheese can	A2: Eileen picks up cheese can
Which is more useful?	S3: Cheese in mouth	B: Clara orients to can C: Cheese in mouth

## Chirag and Bracken

- Start counting and put food on the ground



CHIRAG PATEL, [HTTPS://YOUTU.BE/R8BTKCWTDBK](https://youtu.be/R8BTKCWTDBK)

## Chirag and Bracken

What behavior?

**Respondent view:**

**Operant view:**

What is learned?

S1: Counting

A1: Counting

What is the procedure?

S2: Putting food on ground

A2: Putting food on the ground

Which is more useful?

S3: Food in mouth

B: Dog comes

C: Food accessible

B2: Dog eats (incompatible with holding toy)

C: Food in mouth

## Denise and Dice

- While the dog is biting, say "out" then throw the toy and say "toy" regardless of behavior.



DENISE FENZI, [HTTPS://WWW.INSTAGRAM.COM/PCP\\_SVYBNWTE/](https://www.instagram.com/PCP_SVYBNWTE/)

## Denise and Dice

What behavior?

**Respondent view:**

**Operant view:**

What is learned?

S1: Say "out"

A1: Say "out"

What is the procedure?

S2: Say toy/throw toy

A2: Throw toy

Which is more useful?

S3: Toy access

B: Dog releases and turns away

C: Toy access

B: Dog retrieves toy

C: 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 correlated with reinforcement delivery (R). That is to say, the correlated stimuli come to mark those occasions upon which magazine behavior will be reinforced. When the stimuli occur, magazine approach is followed immediately by reinforcement.



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# 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 contingency develops, we can change the procedure
- With antecedent arrangement to reduce errors, we may not even need to
  - As antecedent to make behavior more likely
- Treat delivery can influence future reps
  - As reinforcer for additional behavior between stimuli

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

# Hannah and Spark

- As the dog approaches the boundary, click and toss a treat behind
- Click when the dog stops at the boundary
- Antecedent arrangement: dog is likely to come toward boundary
- Treat delivery: encourages weight shift backward



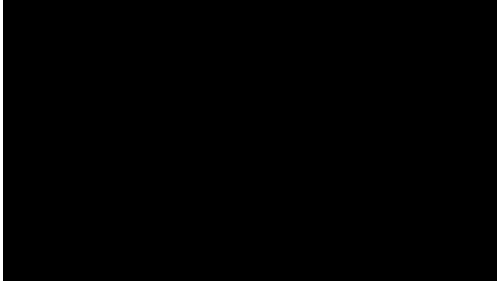
HANNAH BRANIGAN, [HTTPS://YOUTU.BE/SU1DLR8J0Q](https://youtu.be/SU1DLR8J0Q)

# Hannah and Spark

What behavior?	<b>Respondent view:</b>	<b>Operant view:</b>	<b>Contingency development:</b>
What is learned?	S1: Door jamb	A1: Hannah in room	A1: Hannah in room
What is the procedure?	S2: Click	B1: Dog walks toward Hannah	B1: Dog walks toward Hannah
Which is more useful?	S3: Treat tossed behind	A2: Door jamb	A2: Door jamb
	S4: Food in mouth	A3: Click	B2: Dog plants front feet
		A4: Treat behind	<b>C3: Click</b>
		B: Dog shifts weight backward	<b>C4: Treat behind</b>
		C: Food accessible	
		B2: Dog eats	
		C: Food in mouth	

## Sarah and a Client

- Say "ok" and put the bowl down by right foot
- Antecedent arrangement: dog probably has some reinforcement history for sitting on the doormat



SARAH OWINGS

## Sarah and Client

What behavior?

**Respondent view:**

**Operant view:**

**Contingency development:**

What is learned?

S1: "OK"

A1: Presence of mat

A1: Presence of handler, mat

What is the procedure?

S2: Put bowl down by foot

A2: Bowl down

B1: Dog sits

Which is more useful?

S3: Food in mouth

B: Dog gets up

C1/A2: "OK"

C: Access to bowl

B2: Dog gets up

C2/A1: Bowl down

B3: Dog goes to bowl

C3: Food

## Anthony at the Door

- Do x piece of opening the door, then mark and treat by my side
- When dog orients, mark and treat by my side
- Don't treat if he doesn't (?)—I would just treat now



## Anthony and the Door

What behavior?

**Respondent view:**

**Operant view:**

**Contingency development:**

What is learned?

S1: Open door (or some piece)/chime

A1: Open door/chime

A1: Open door/chime

What is the procedure?

S2: Mark

A2: Mark and reach into bag

B: Dog orients toward me for 1 s

Which is more useful?

S3: Reach into bag

B: Dog orients toward me

C: Mark, reach into bag, treat

S4: Treat in mouth

C: Treat

## 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

What behavior?	<b>Respondent view:</b>	<b>Operant view:</b>	<b>Contingency development:</b>
What is learned?	S1: Door chime	A1: Door chime	A1: Open door/chime
What is the procedure?	S2: Toss treat to mat	A2: Toss treat to mat	B: Go to mat and lie down
Which is more useful?	S3: Food in mouth	B: Orientation or movement toward the mat or lying down C: Treat	C: Mark and treat

## Archie at the Top of the Stairs

- Approach gate (from up or down) and toss treat to side of stairs
- Open gate and toss to side
- Open gate, if dog moves toward side, toss treat
- Mat with previous history added as target to toss treat



## Archie at the Top of the Stairs

What behavior?	<b>Respondent view:</b>	<b>Operant view:</b>	<b>Contingency development:</b>
What is learned?	S1: Approach gate	A1: Approach gate	A1: Approach gate
What is the procedure?	S2: Toss treat to side of stairs	A2: Toss treat to side	B: Dog goes to side of stairs
Which is more useful?	S3: Food in mouth	B: Dog goes to side of stairs C: Food	C: Toss treat to side

Capitalizing on reinforcement history already associated with the mat

## 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

What behavior?	<b>Respondent view:</b>	<b>Operant view:</b>	<b>Contingency development:</b>
What is learned?	S1: Drop leash	A1: Drop leash	A1: Drop leash
What is the procedure?	S2: Click	A2: Click	A2: Click
Which is more useful?	S3: Treat by me	B: Dog orients to me C: Treat by me	B: Dog comes further toward me C: Treat by me

## Leash Dip

- In my other presentation this week, briefly:



## Leash Dip

What behavior?	<b>Respondent view:</b>	<b>Operant view:</b>	<b>Developing the contingency</b>
What is learned?	S1: Leash dips	A1: Leash dips	A1: Leash dips
What is the procedure?	S2: Marker	A2: Marker	B: Dog orients to me
Which is more useful?	S3: Treat by me	B: Dog orients to me C: Treat by me	A2: Mark, reach for treat, move B: Dog follows C: Treat by me



## Developing Multiple Contingencies: Petting Signal



## Location, Location, Location

- Where you put the appetitive stimulus (e.g., treat) when pairing can influence what behavior evolves between stimuli
- Sunny and the leash



## Location, Location, Location

- Behavior may also evolve before first stimulus
- Behavior that evolves between stimuli may start to occur before first stimulus—one way to get a start button
- Dolly and the leash



## Common Applications

### Look at That

Dog > click/treat  
 Dog > click > orient > treat  
 Dog > orient > click/treat

### Lindsay Wood Resource Guarding

Trainer approach > toss food  
 Trainer approach > dog lifts head > toss food

### Start Button

Small piece of procedure > treat  
 Some behavior > small piece of procedure > treat  
 Small piece of procedure > some behavior > treat

## Other Ideas

- Could we teach dogs to go in the direction of leash tension without waiting for them to “give”?

## Counterconditioning

- Is a “pure” respondent view suddenly more useful when the target behavior is “emotional”?
  - Are emotions respondent?
- How are we assessing whether CC has occurred?
  - “Anticipatory behavior”
  - Will the animal behave to produce the stimulus?
  - Is it a conditioned reinforcer?
- What are the parameters of effective pairing given these goals?

## 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 in the pairing trial. Compared to RCP, both RCP and GCT procedures often showed better results (Doster et al., 2012; Wildt et al., 2009) or were equally effective but preferred by participants (i.e., DCT procedure; Lepper et al., 2013). These results were consistent in different sets of stimuli: social stimuli administered via computer (Wildt et al., 2009), praise (Doster et al., 2012), and speech sounds (Lepper & Fernández, 2017; Lepper et al., 2013). Positive results for GCT, though, were not replicated in Rodriguez and Gutierrez’s study (2017), which reported “that the respondent procedure (pairing) resulted in more robust and enduring effects than the operant procedure (discriminative stimulus procedure)” (p. 190).

CLO & DOUNAVI, 2022

## Finn and Fire

- Touch lighter > food went fine
- Could not get treat in before bark once I started to light it
- Could have kept going but:
  - Not “under threshold”
  - Potentially turning light into cue to bark



## Finn and Fire

- Put mat under Finn
- Arranged environment to make responses I wanted more likely ("under threshold")
- He controls timing of next pairing—I don't do it if he isn't on the mat
- Competing behavior gives me time to show him what the lighter predicts



## Finn and Fire

- Faded mat



## Finn and Fire

- Reintroduced mat to work on grill



## Finn and Fire

- Gas fireplace
- Once again broke down into pieces and worked back up
- Each "fire" situation involved unique stimuli



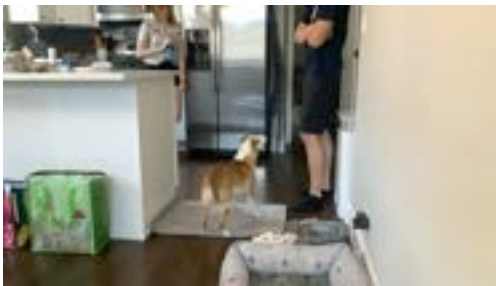
## Scout and the Ice Maker

- 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—same session!



## Scout and the Ice Maker

- Formalized "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)



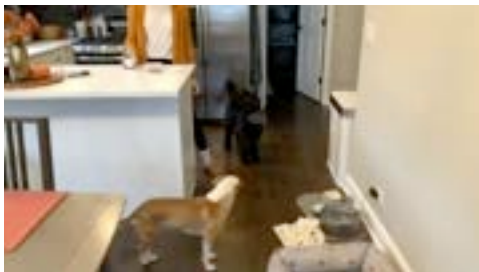
## Scout and the Ice Maker

- 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?

## Parting Thoughts

- When we pair stimuli, we may teach new elicitors for respondent behavior, evoke new operant behaviors, and teach new cues for operant behaviors (which may also serve as elicitors for respondent behavior)
- We can (and often do, whether aware of it or not) teach operant behavior during stimulus pairing procedures. In fact, that may help explain why they “work.”
- Arranging antecedents carefully makes it likelier that we will get the behaviors we want—both kinds
- Antecedents can include the delivery of the previous reinforcer/previous unconditioned stimulus
- Antecedents can include cues for behavior-reinforcer contingencies that compete with undesirable behavior
- 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

## Where to Find Me

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