

# Motivating Operations: Practical Lessons from the Applied Research

**MO → B → SR+**

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# Introduction

Motivating operations are everywhere in our practice

MOs are sometimes criticized

- Not studied by Skinner, only Jack Michael & colleagues
- MOs are often invisible – what someone wants
- The word “value” is in the definition

We will be more effective practitioners if we study and analyze MOs

# Jack Michael

## WELCOME

Welcome to my official website. Feel free to navigate through this site by clicking on any of the links below.

## WHAT'S NEW?

New PowerPoint presentation given at the annual Mid-American Association for Behavior Analysis (MABA) conference.

October 26, 2006



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# Review

I reviewed all research articles in PsycInfo with title, abstract, keywords containing:

- “motivating operation”
- “establishing operation”
- “abolishing operation”

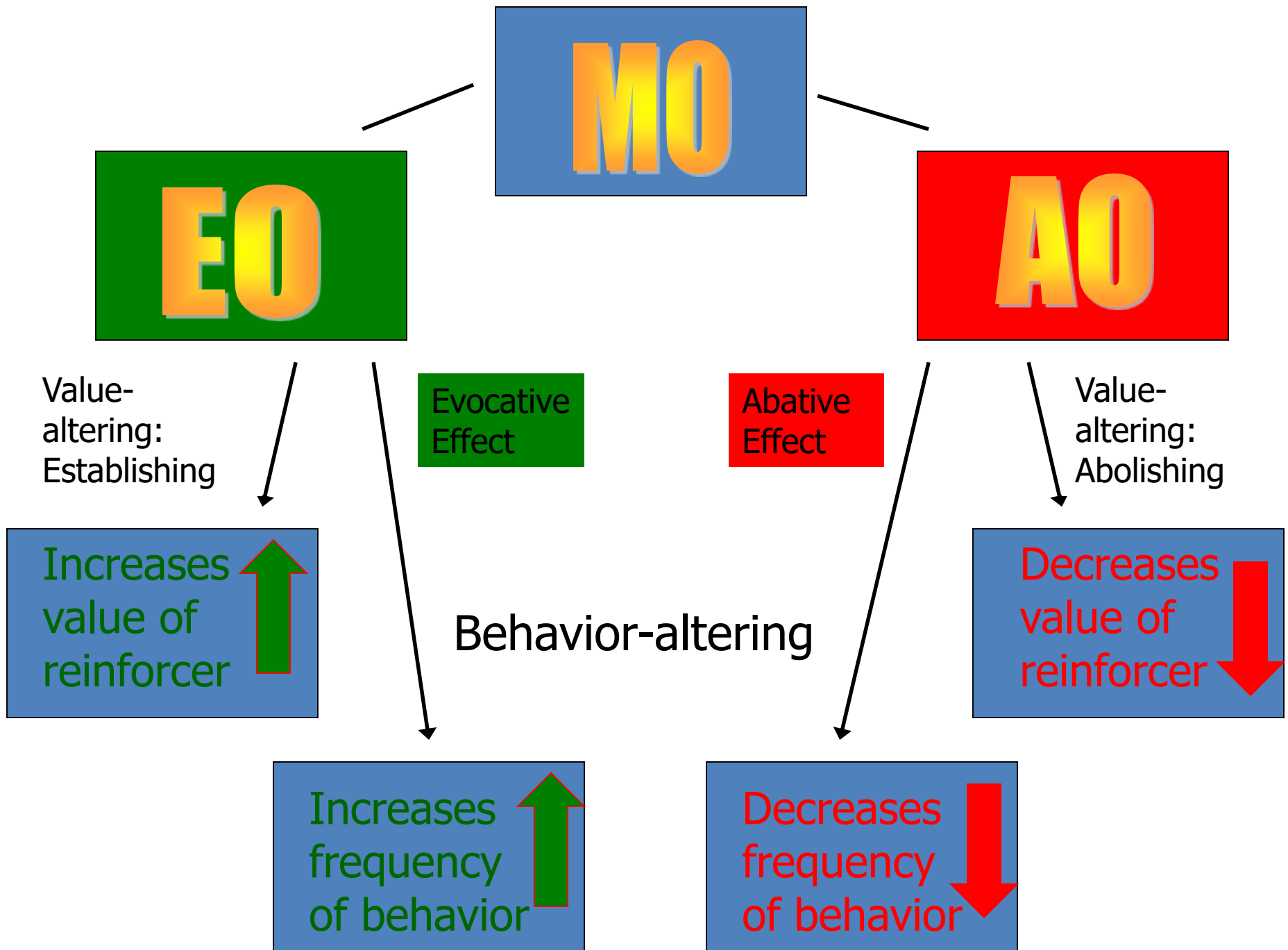
**Purpose:** Identify what we have learned from research explicitly using and analyzing the MO concept

# 8 Areas Influenced by MOs

	# of Studies
<b>Mand Training</b>	34
<b>Training Mands for Information</b>	16
<b>Social and Academic Behavior</b>	3
<b>Reinforcer and Preference Assessment</b>	9
<b>Functional Analysis – Pre-session Analyses</b>	15
<b>Functional Analysis – Within Session Analyses</b>	26
<b>Treating Problem Behavior</b>	49
<b>Other: Behavioral Medicine, OBM, Gambling</b>	5
<b>Total Empirical Articles</b>	<b>157</b>

# Definitions





# Establishing Operation (EO)

An EO is an antecedent and has 2 effects:

1. Increases the value of a stimulus as a reinforcer
2. Evokes behavior that has accessed that reinforcer in the past

Deprivation – no food for a while

1. Increases value of food
2. Evokes behavior that has produced food in the past (reaching, asking)

Aversive stimulation – e.g., a headache, demands

1. Increases the value of escape from pain/demands
2. Evokes behavior that has provided that escape in the past (e.g., taking a tylenol, aggression, asking for break)



Pre-MO

$S_{\text{neut}}$

B

$S_{\text{neut}}$

Pre-MO

$S_{\text{neut}}$

B

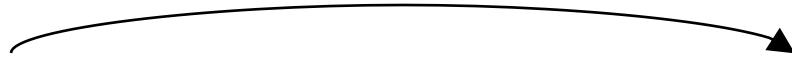
$S_{\text{neut}}$

Value  
Altering

MO

B

SR+



Pre-MO

$S_{\text{neut}}$

B

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Value  
Altering

MO

B

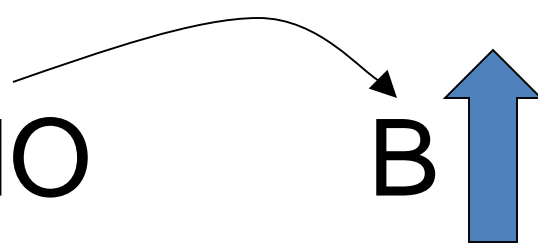
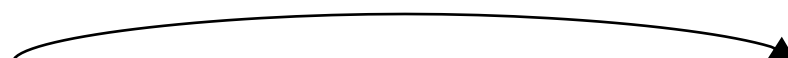
SR+

Behavior  
Altering

MO

B

SR+



# Abolishing Operations

Opposite effect of establishing operation; satiation

Abolishing operation has two effects:

1. Decreases the value of a stimulus as a reinforcer
2. Does not evoke behavior that has gotten that stimulus in the past



## Examples

- Just had a big meal – decreases value of food
- Just took a nap – decreases the value of sleep
- Have all my toys and food in front me

# More Subtypes of MOs

## **Unconditioned MOs**

- MOs in effect from the moment of birth

## **Conditioned MOs**

- MOs gained effect through learning
- 3 types:
  - Transitive Conditioned MOs (CMO-T)
  - Reflexive Conditioned MOs (CMO-R)
  - Surrogate Conditioned MOs (CMO-S)

# UMOs (Michael, 2007)

UMO	Reinforcer-Establishing Effect	Evocative Effect
<b>Food</b> deprivation	Increases effectiveness of <b>food</b> ingestion as SR+	Increases frequency of behavior previously reinforced with <b>food</b>
<b>Water</b> deprivation	Increases effectiveness of <b>water</b> ingestion as SR+	Increases frequency of behavior previously reinforced with <b>water</b>
<b>Sleep</b> deprivation	Increases effectiveness of <b>sleep</b> as SR+	Increases frequency of behavior previously reinforced with <b>sleep</b>
<b>Activity</b> deprivation	Increases effectiveness of <b>activity</b> as SR+	Increases frequency of behavior previously reinforced with <b>activity</b>
<b>Oxygen</b> deprivation	Increases effectiveness of <b>breathing</b> as SR+	Increases frequency of behavior previously reinforced with <b>oxygen</b>
<b>Sex</b> deprivation	Increases effectiveness of <b>sex</b> as SR+	Increases frequency of behavior previously reinforced with <b>sex</b>
<b>Too warm/cold</b>	Increases effectiveness of <b>temp decrease/increase</b> as SR+	Increases frequency of behavior previously reinforced with <b>cold/warm</b>
<b>Pain</b>	Increases effectiveness of <b>pain decrease</b> as SR+(-)	Increases frequency of behavior previously reinforced with <b>pain reduction</b>

# CMO-T

“An environmental variable that, as a result of a learning history, establishes (or abolishes) the reinforcing effectiveness of another stimulus and evokes (or abates) the behavior that has been reinforced by that stimulus.” (Michael, 2007)

# Example of CMO-T



→ “Screwdriver, please”

(Jack Michael)

Screw is CEO-T increasing the value of screwdriver

Screw is not  $S^D$ :

- Screwdrivers are always **available**
- They are just not always **valuable** until there is a screw



# CMO-R

“A stimulus that acquires MO effectiveness by preceding some form of worsening or improvement.

It is exemplified by the warning stimulus in a typical escape-avoidance procedure, which

1. Establishes its own offset as reinforcement and
2. Evokes all behavior that has accomplished that offset.”

(Michael, 2007)

Most common examples are aversive stimuli, such as work demands, loud noises

# CMO-S

“A stimulus that acquires is MO effectiveness by being paired with another MO and has the same value-altering and behavior-altering effects as the MO with which it was paired” (Michael, 2007)

Neutral stimulus paired with an MO becomes CMO-S

Example: Krispy Kreme sign (Sundberg, 2004)



# 8 Areas Influenced by MOs; 80 Lessons

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# General Features of Studies

Most studies with individuals with autism or other developmental disabilities

Most studies published in the *Journal of Applied Behavior Analysis* or other behavior analytic, single-subject-design journals

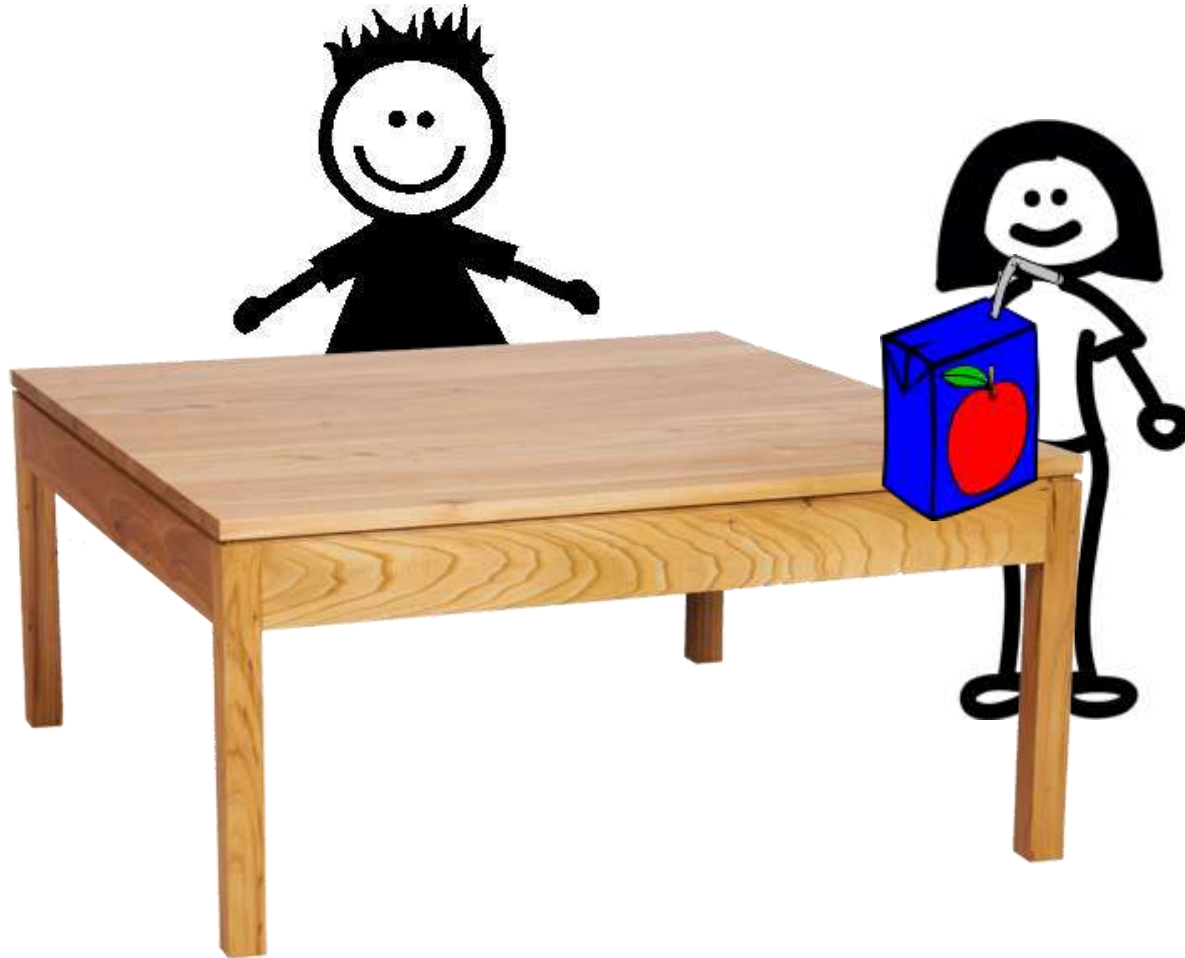
Mand training

- Prompt types: echoic, textual, imitative
- Prompt fading: time delay

# I. Mand Training

- Contriving EOs to Teach Mands
- Functional Independence between Mands and Tacts
- Additional Procedural Variables with Mand Training
- Maintenance and Generalization of Mands
- Mand Training with Other Populations, Teaching Caregivers to Conduct Mand Training

# Contriving EO's to Teach Mands



**To contrive EOs, put items in view but out of reach**

Can teach manding to peers

(Taylor et al., 2005)



# No EO



Taylor et al. (2005)

# EO



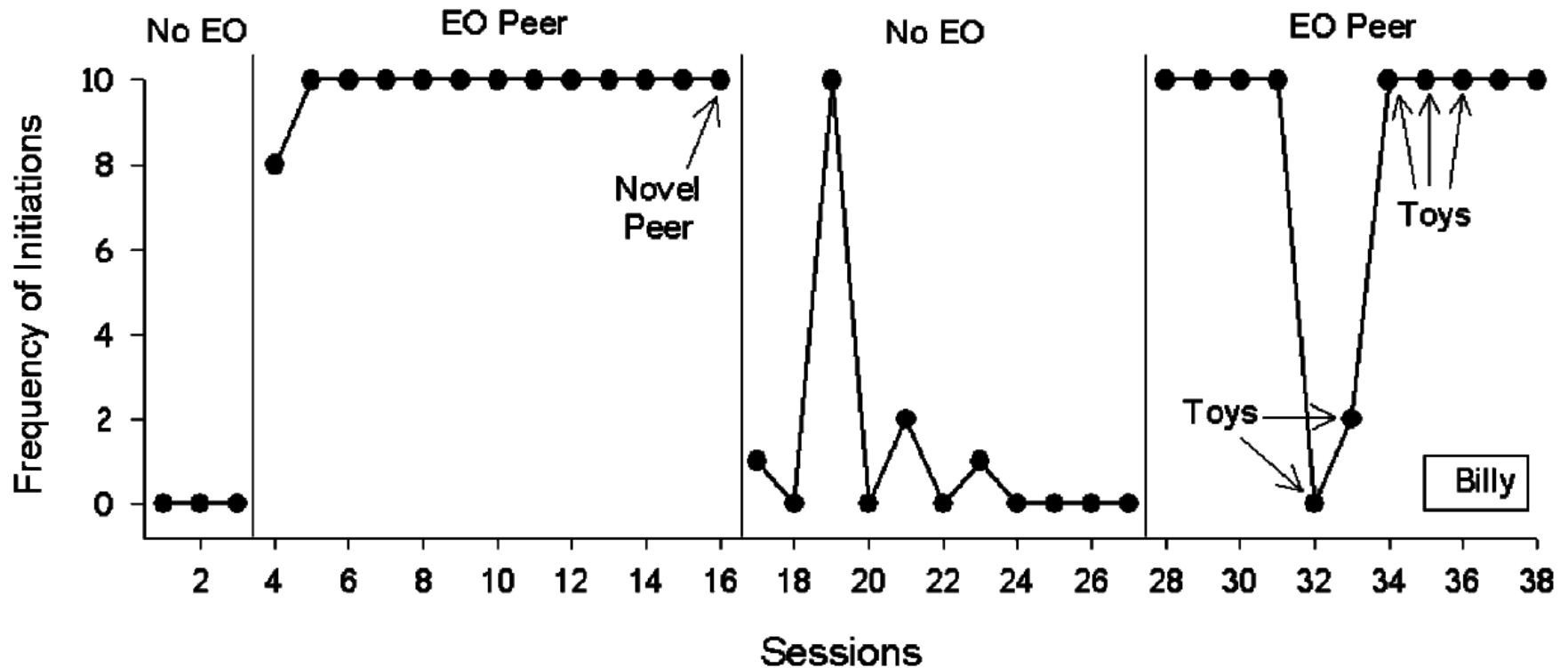
Snack  
please



We can contrive EOs by putting preferred items in view but out of reach

We can teach manding to peers





We can “turn EOs on and off” (EO/AO)

Taylor et al. (2005)

**The interrupted chain procedure is an effective way to contrive EOs**

(Hall & Sundberg, 1987)

(Albert, Carbone, Murray, Haggerty, & Sweeney-Kerwin, 2012)

## Interrupted Chain Procedure

Item	Package of instant soup
Behavior	Tear open package
Item	Bowl
Behavior	Pour soup into bowl
Item	Hot water <del>in pot</del>
Behavior	Pour hot water in bowl
Item	Spoon
Behavior	Stir soup
Item	Finished soup
Behavior	Eat soup



Captured  
EO

→ Mand

Train

- Participants could:
- Complete all chains
  - Tact all items

# Other Chains

## Hall & Sundberg (1987)

- Opening a can of fruit
- Wiping water spilled on table
- Operating vending machine to get candy
- Making instant coffee
- Coloring a picture

## Albert, Carbone, Murray, Haggerty, & Sweeney-Kerwin (2012)

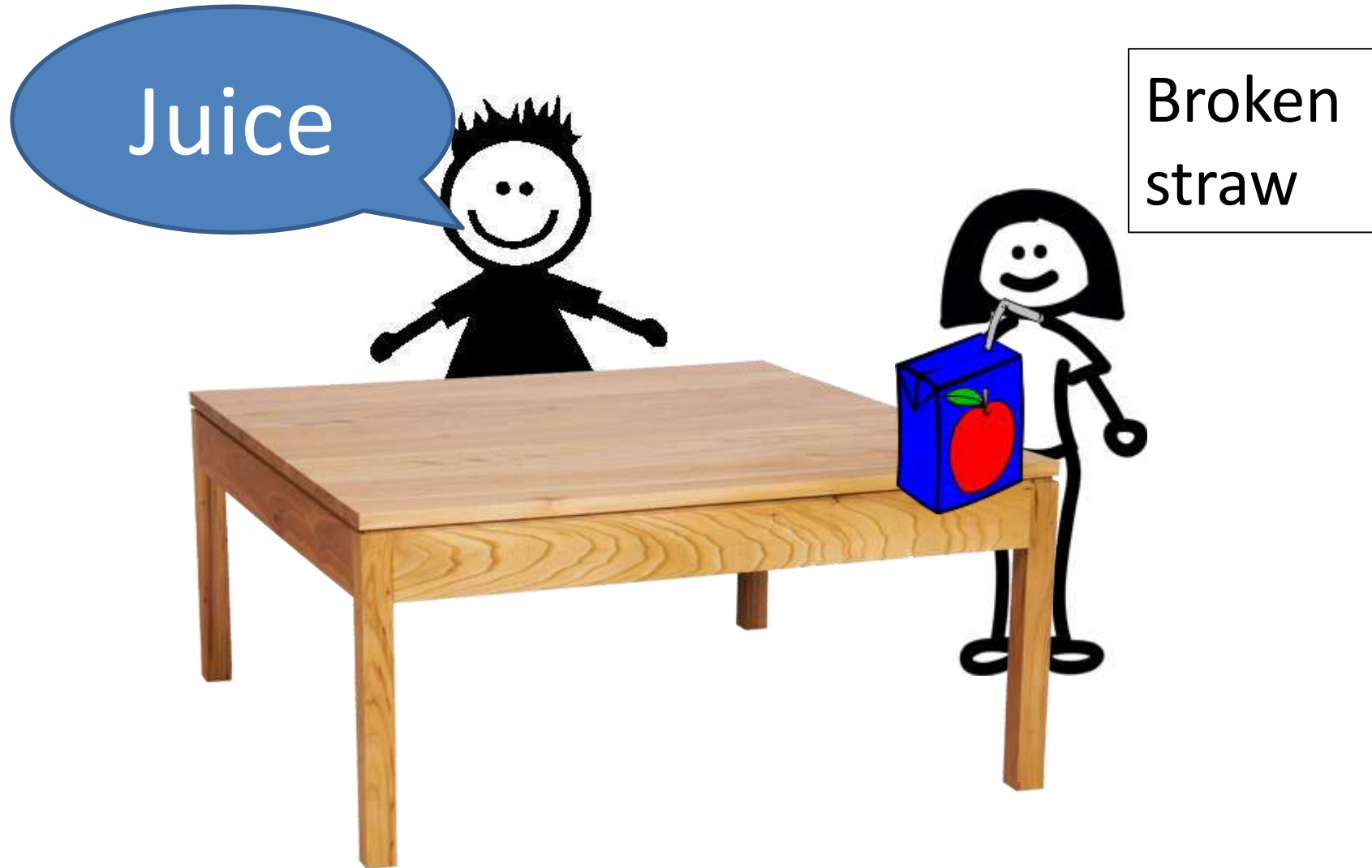
- Making an art project
- Making a sandwich
- Listening to music
- Science project



**We can contrive EOs by giving child a broken reinforcer**

(Szmacinski, DeBar, Sidener, & Sidener, 2018)

# Broken Item Procedure



Szmacinski, DeBar, Sidener, & Sidener (2018)

# Broken Item Procedure

- Other broken items
  - Puzzle piece broken
  - Marble on marble run flattened
  - DVD cracked
- Strength: mini MSWO before each session
- Strength: generalization across chains and stimuli within chains
- Limitation: item in view

Szmacinski, DeBar, Sidener, & Sidener (2018)

# We can transfer control of mands from EO + Item to EO only

Juice

EO: 30 min  
no juice



Sweeney-Kerwin et al. (2007)



# We can transfer control of mands from EO + Item to EO only

Juice

Rolling  
time delay:  
wait 2 min  
for MO-  
controlled  
mand



Sweeney-Kerwin et al. (2007)

# Should we Use “What Do You Want?”

(Bowen, Shillingsburg, & Carr, 2012)

**Benefit:** clear opportunity to mand

**Caution:** undesirable stimulus control – echoics, intraverbal

**Results:** No difference between conditions

**Conclusion:**

- Question did not produce undesirable stimulus control
- We can choose to use it or not

# **Missing items procedure and interrupted chains procedure has benefit over incidental teaching**

(Hall & Sundberg, 1987)

## Incidental teaching

- Contrive EO by putting preferred item out of reach
- Limitation: EO and nonverbal stimulus present

## Mand for missing items (puzzle pieces, crayon)

- Benefit is purer EO control
- No verbal antecedent – “What do you want”
- No nonverbal antecedent – the item is missing

# Functional Independence

**Just because a student emits a word as one verbal operant, he may not emit the word as another verbal operant**

(Hall & Sundberg, 1987)

Example: just because you can tact “book” does not mean you will mand for it

- Often need to teach each verbal operant separately

This is called “functional independence”

Mands and tacts are functionally independent

- (Lamarre & Holland, 1985; Twyman, 1995)

**Mands can emerge after tact training given multiple exemplar instruction with that transfer**

(Nuzzolo-Gomez & Greer, 2004; Singer-Dudek et al., 2017)

# Transferring Tacts to Mands

Juice

Tact →  
praise or  
other toy  
(GCSR)



Kooistra, Buchmeier, & Klatt (2012)

# Transferring Tacts to Mands

Juice

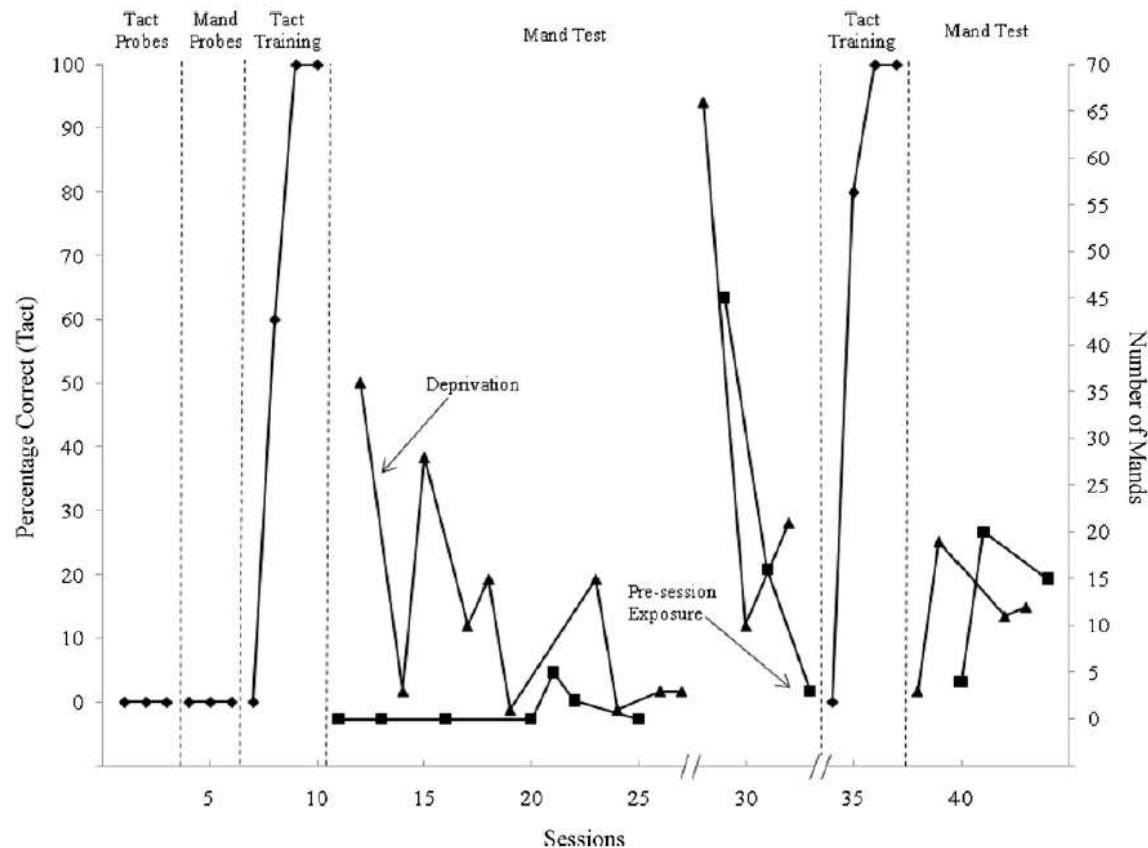
**Test  
mand:**  
in view  
but out  
of reach,  
EO vs. AO



Kooistra, Buchmeier, & Klatt (2012)



# Transferring Tacts to Mands



- EO: no access for 24 hours
- AO: pre-session access
- Prior tact → mand studies – maybe not tested under EO conditions
- Limitation: possible EO during tact training

**When transferring tacts to mands, we might need booster sessions on tact prior to mand probes**

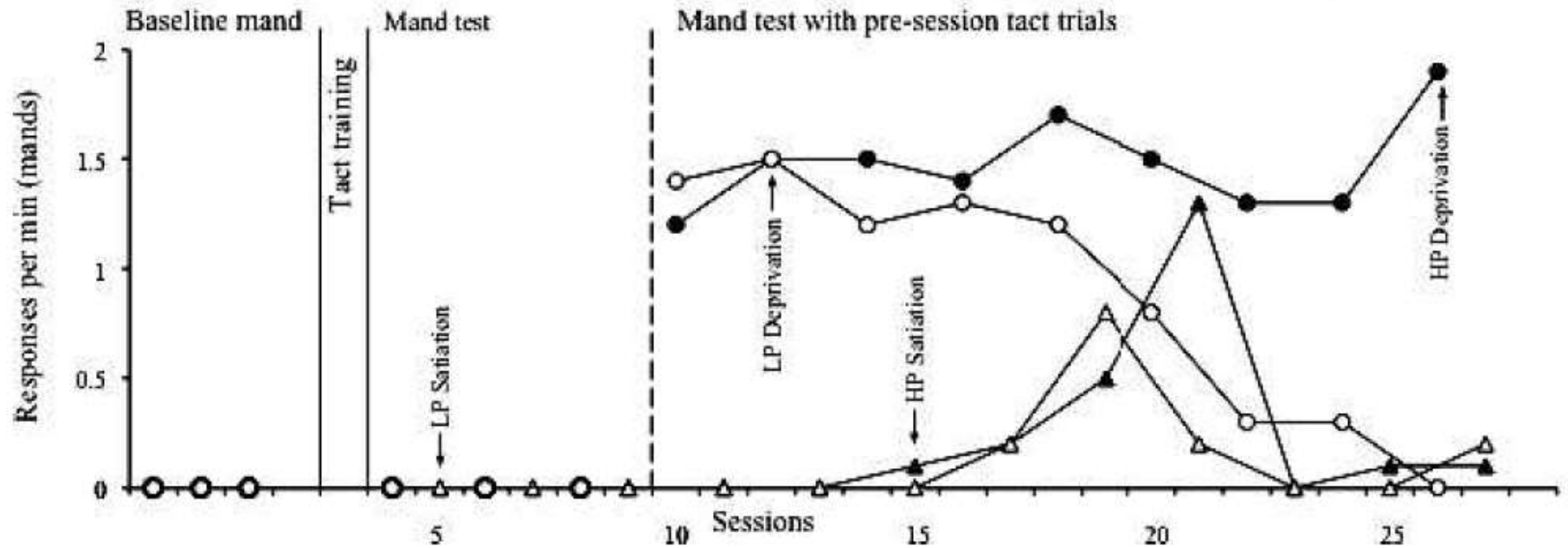
(Davis, Kahng, & Coryat, 2012)

# Transferring Tacts to Mands

Davis, Kahng, & Coryat (2012)

- Taught tacts for HP items → no mands with EO
- EO, pre-session tact trials → got mands
  - Primed the responses (review sessions)
- Manding maintained with HP items, not LP items
  - Need items that currently function as reinforcers

# Davis, Kahng, & Coryat, 2012

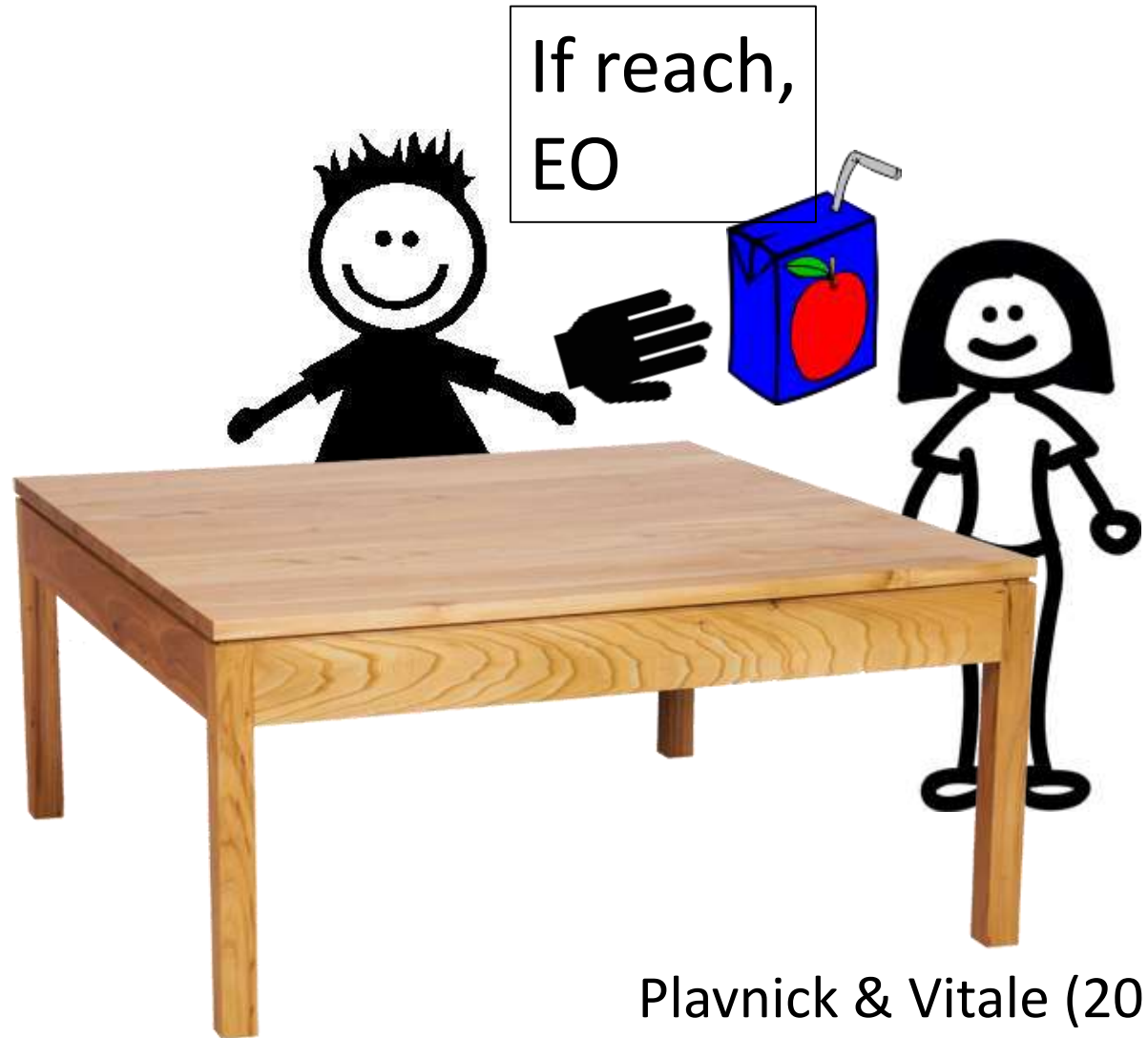


# Additional Procedural Variables with Mand Training

**Video modeling may be more effective than  
live modeling during mand training**

(Plavnick & Vitale, 2016)

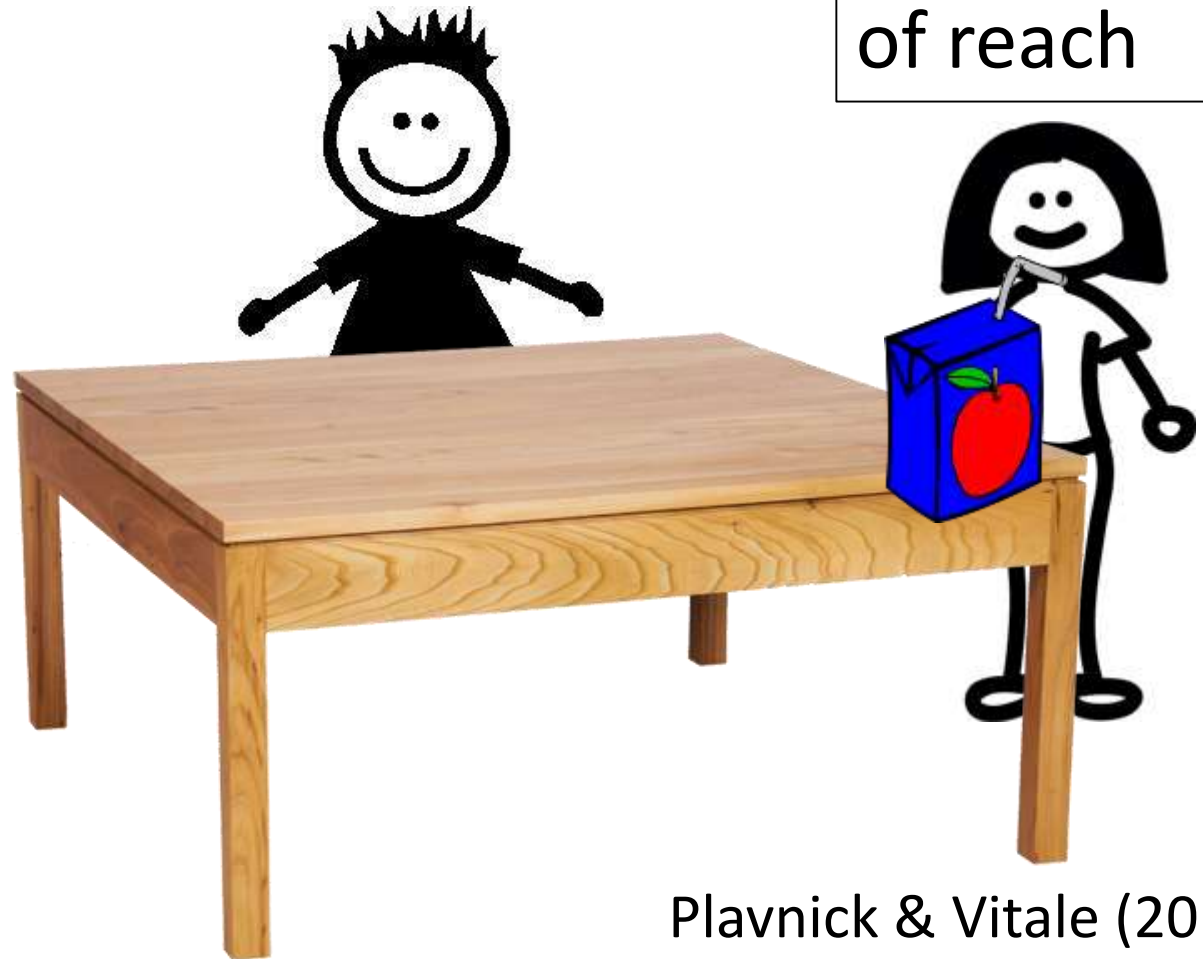
# Mand Training: Live or Video Modeling?



Plavnick & Vitale (2016)

# Mand Training: Live or Video Modeling?

In view, out  
of reach

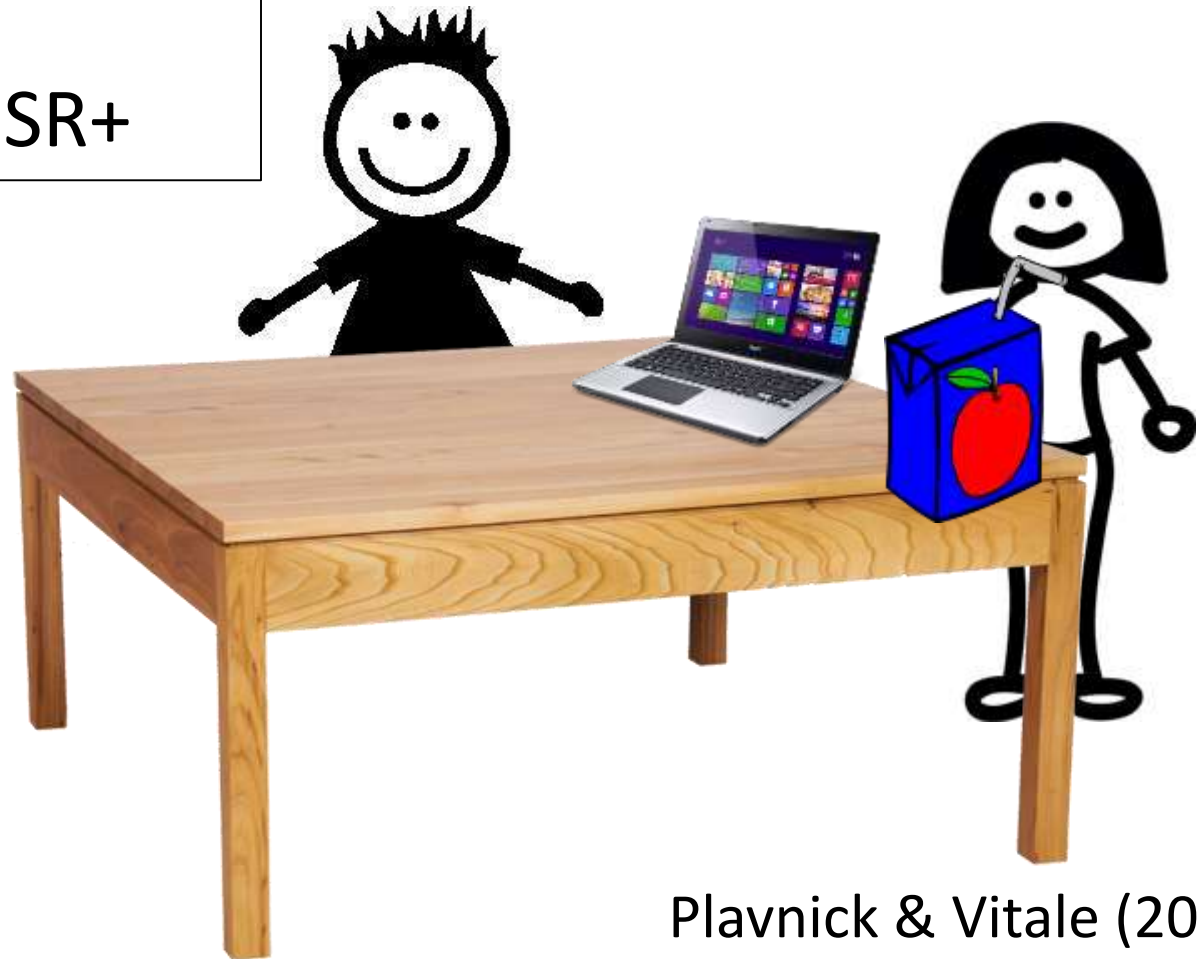


Plavnick & Vitale (2016)



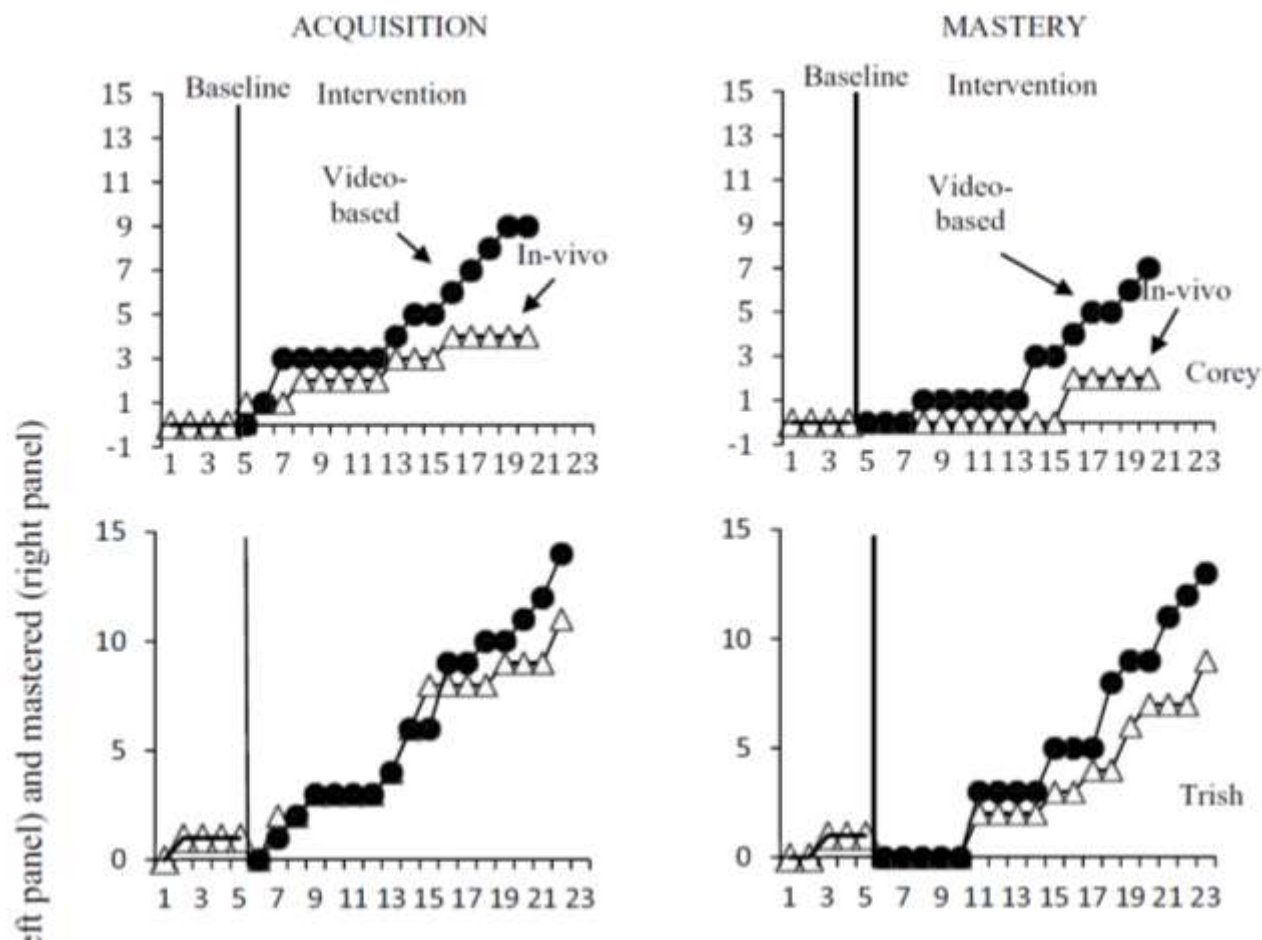
# Mand Training: Live or Video Modeling?

Video model:  
EO, response, SR+



Plavnick & Vitale (2016)

# Mand Training: Live or Video Modeling?



- Live: therapist is speaker (prompt) and listener (reinforce)
- Limitation of video models: need to create many

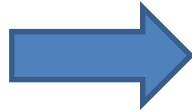
**We can get untrained mands using stimulus equivalence and other derived relational responding**

(Rosales & Rehfeldt, 2007; Still, May, Rehfeldt, Whelan, & Dymond, 2015)

# PECS Icon



mand

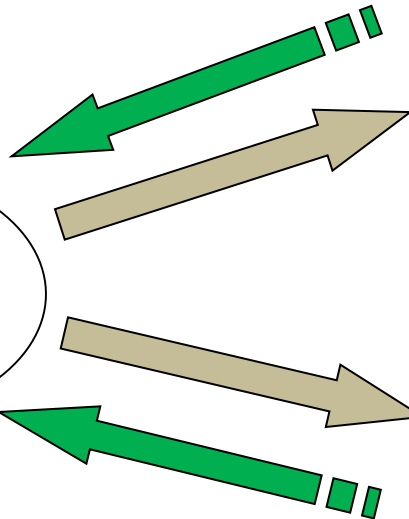
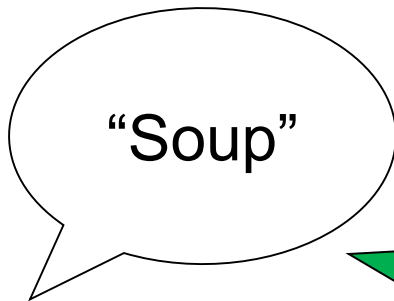


SOUP

Derived  
mand



SOUP



(Rosales & Rehfeldt, 2007; Still, May, Rehfeldt, Whelan, & Dymond, 2015)

**We can increase the likelihood mands are evoked by EOs by comparing EO and AO conditions**

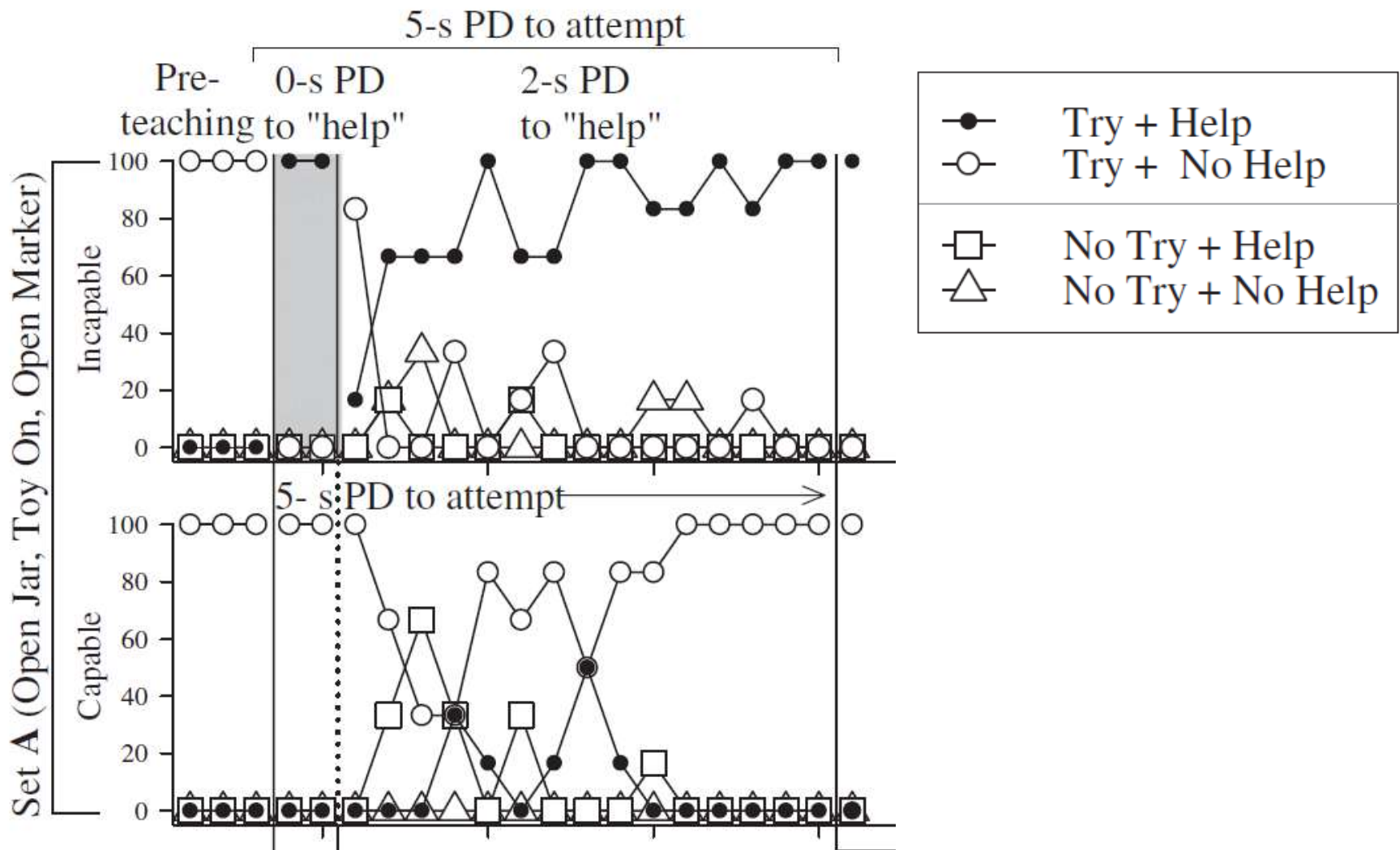
(Rodriguez, Levesque, Cohrs, & Niemeier, 2017)

# EO vs. AO in Interrupted Chain Procedure (Rodriguez, Levesque, Cohrs, & Niemeier, 2017)

**Target mand: “Help me, please”**

Target Behavior	Incapable (EO)	Capable (AO)	Instruction
Open glass jar	Lid screwed on tight	Lid screwed on loose	“Draw a heart” (crayons inside jar)
Take cap off marker	Cap glued on	Cap not glued on	“Draw a circle”
Operate toy	No batteries	Batteries	“Let’s play with the toy”
Operate mechanical pencil	No lead	Lead	“Write a B”

# EO vs. AO in Interrupted Chain Procedure (Rodriguez, Levesque, Cohrs, & Niemeier, 2017)



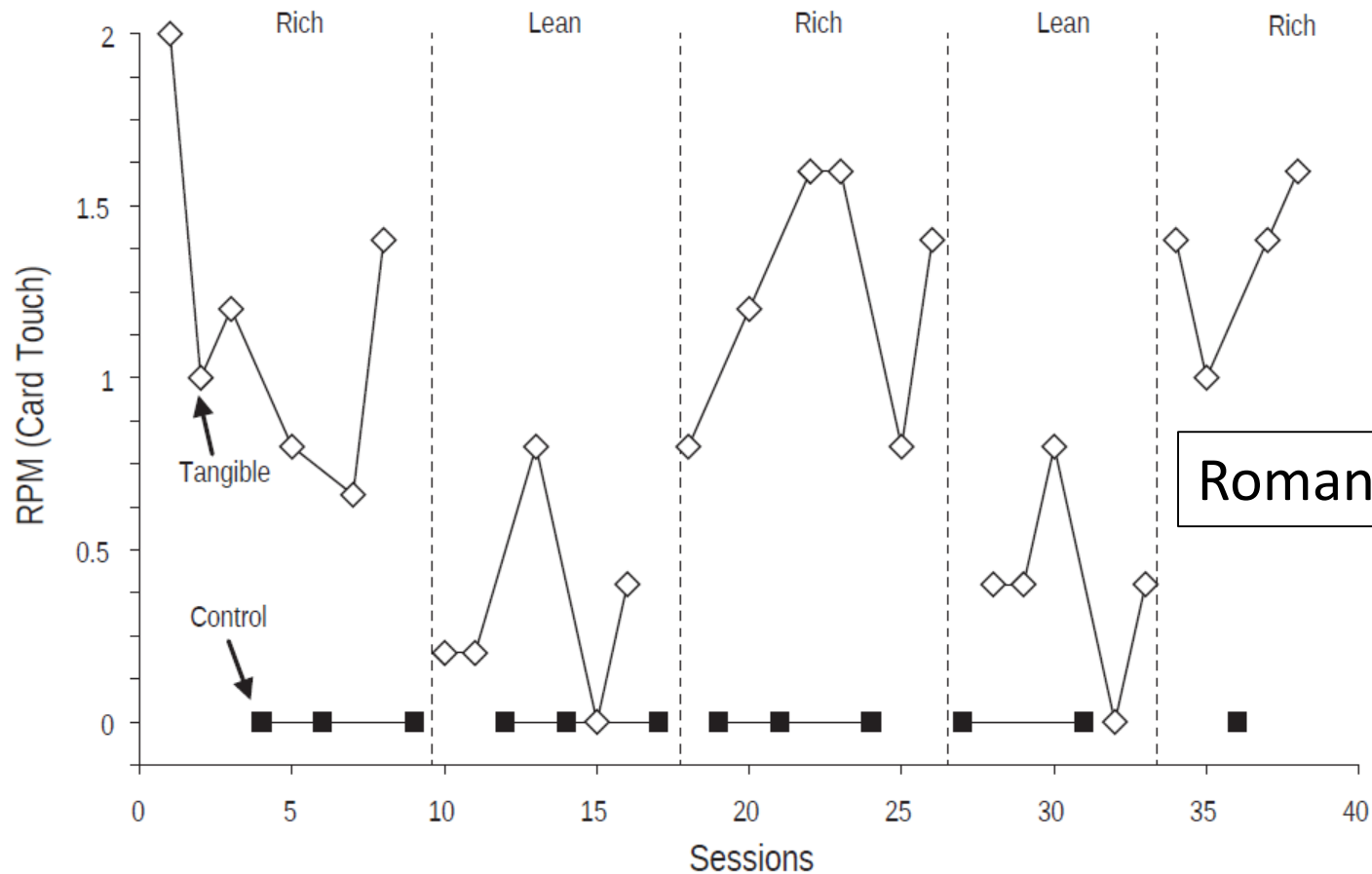
# Maintenance and Generalization of Mands



**If we implement more prompting of mands, we  
get better maintenance of mands**

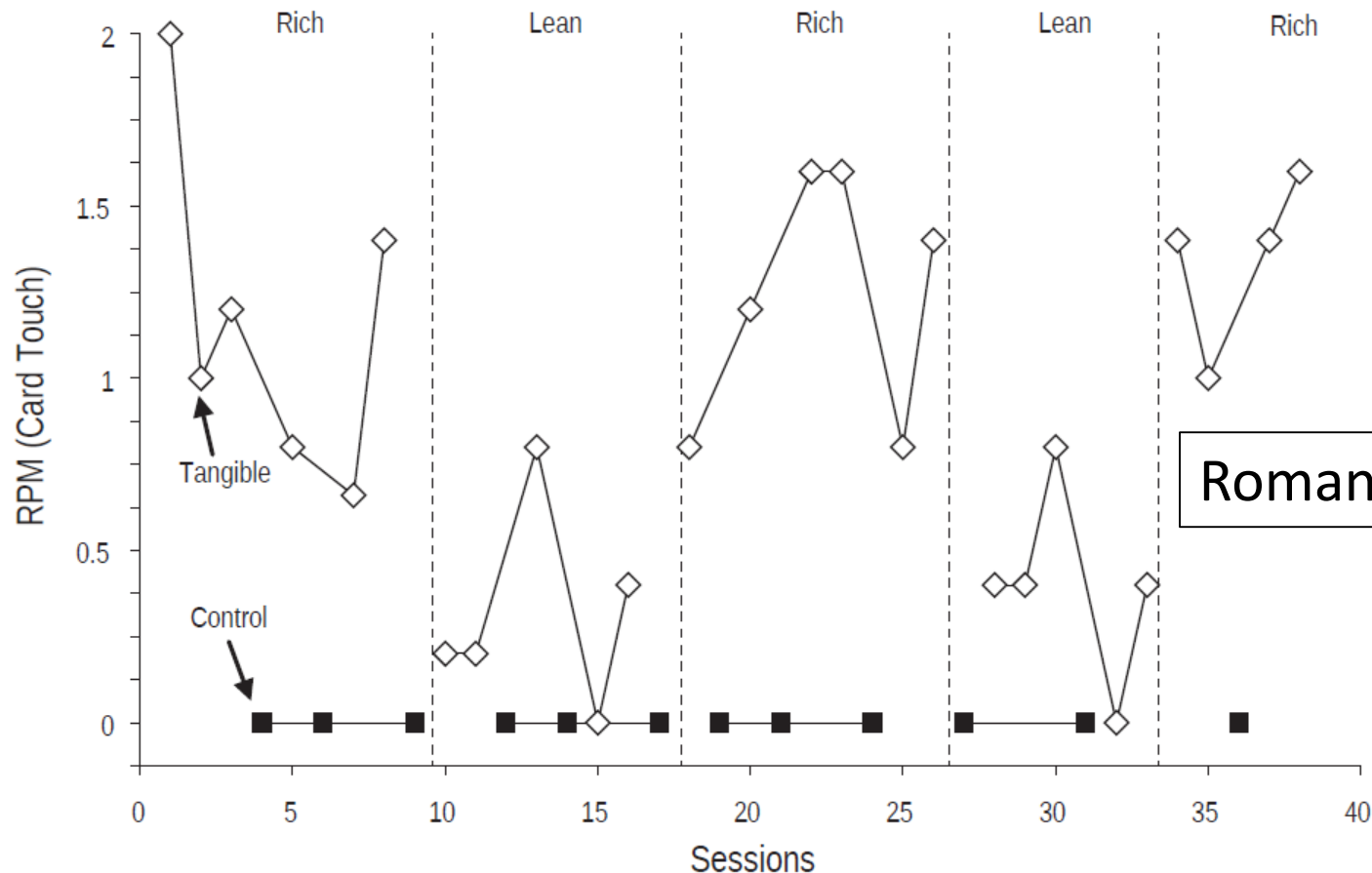
(Romani et al., 2013)

- Rich = prompt every 30 seconds
- Lean = prompt once at beginning of session
- Tangible = restricted access to SR+
- Control = pre-session access to SR+



Romani et al. (2013)

- More prompts → more manding
- Prompts + AO → less manding (no prompt dependency)
- More prompts = more reinforcement = longer maintenance and resistance to extinction
- Take away: do A LOT of mand training, prompting, reinforcement



Romani et al. (2013)

# Autoclitic Frames may Promote Generalization (Ingvarsson, 2011)

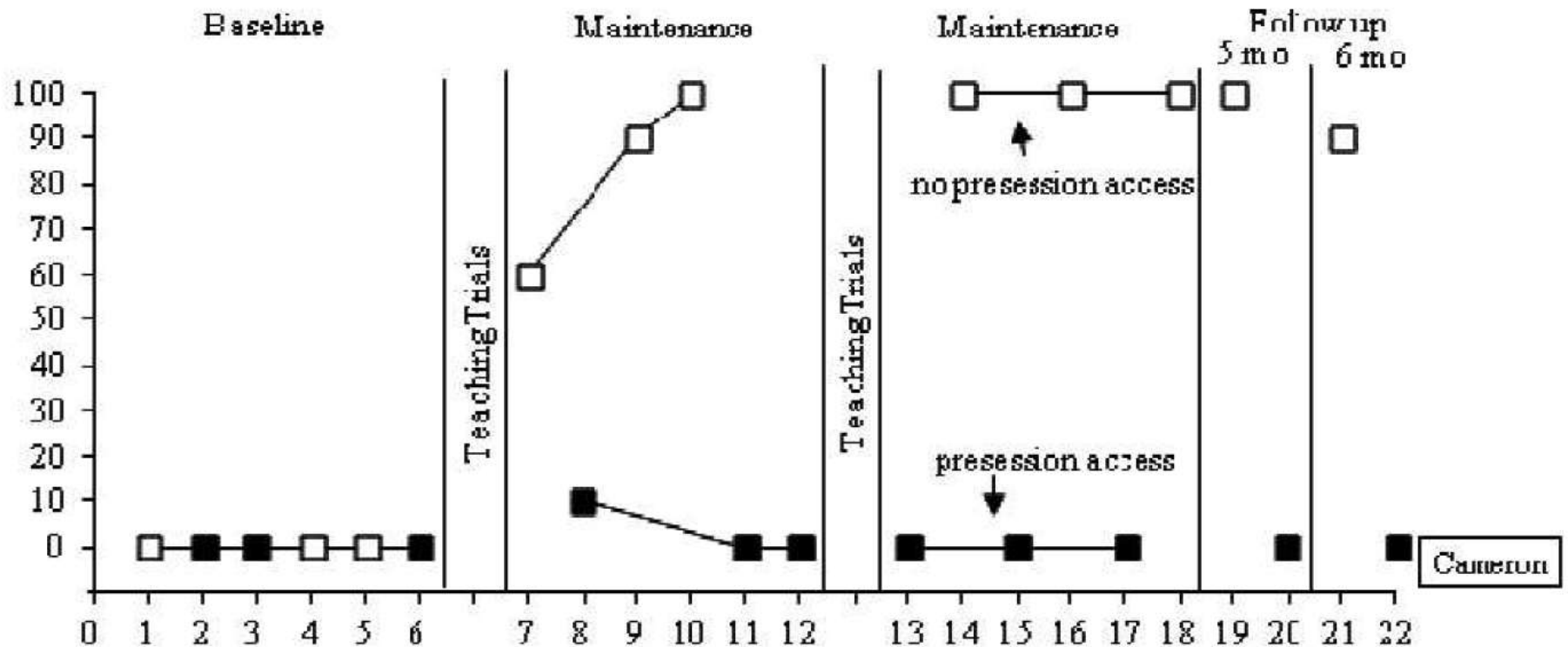
Best practice recommendations:

- Teach single-word mands early (e.g., “Car”)
- Do not teach autoclitic frames early (e.g., “May I have the cars please?”) – less functional (MO → mand)

However, the autoclitic frame may gain control over manding and result in more generalization

# Need EO for Maintenance of Mands

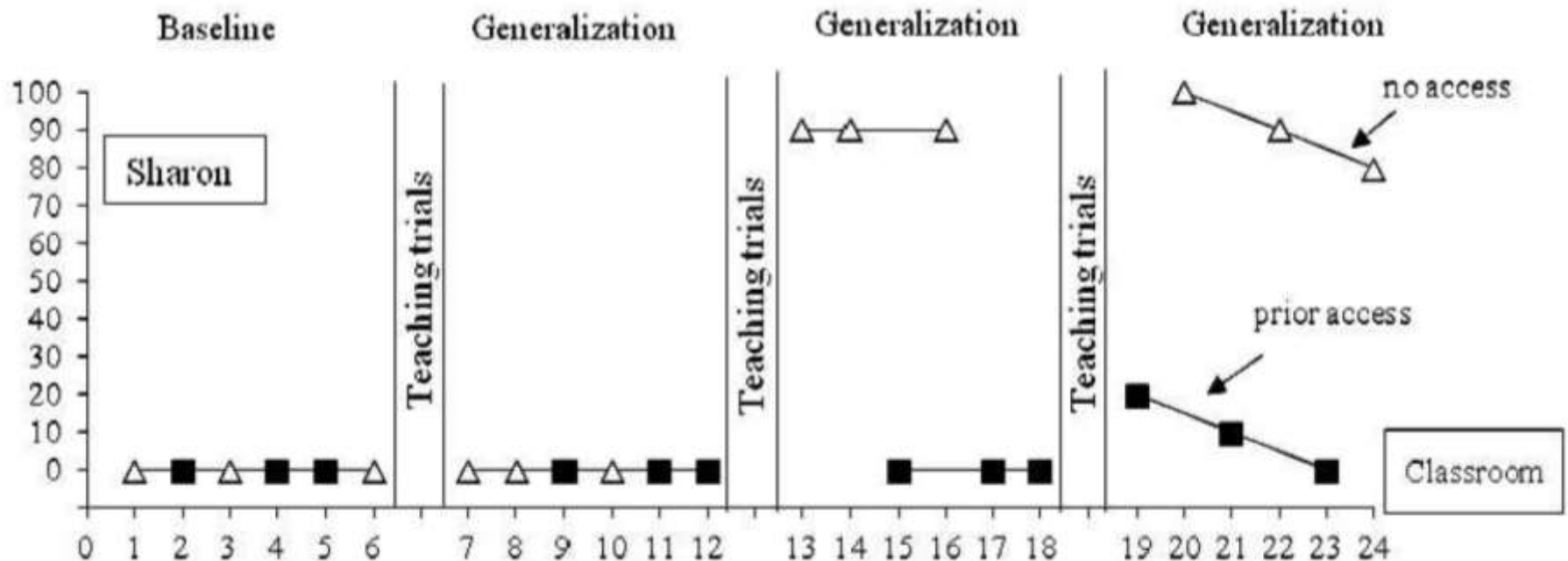
(O'Reilly et al., 2012)



- No pre-session access: no reinforcer for 24 hours
- Pre-session access: access until 3 times rejected
- Higher responding in no access condition

# Need EO for Generalization of Mands

(Fragale, O'Reilly et al., 2012)



- Pre-session no access – 23 hr
- Pre-session access – access until 3 rejections (about 20 minutes)
- If no generalization of mands across settings and people, do you (1) training, multiple exemplar instruction or (2) ensure EOs during generalization probes?

# Mand Training: Other Populations

Teaching Caregivers to  
Conduct Mand Training

# We can conduct mand training with infants and older adults

## Infants (Lee et al., 2014)

- Mimi: 4 months, 2 weeks, Anna: 5 months
- EO – food withheld for 1 hr
- Mand training: EO, afternoon snack time, vocalization → cereal
- Vocalizations increased

## Older adults with dementia (Oleson & Baker, 2014)

- Adults were 63 and 82 years old
- EOs: withhold attention, instructions: “Put a puzzle piece here” and “Color in here” with puzzle piece or colored pencil missing
- One participant: increased mands for puzzle and colored pencil
- Required rule: “If you want me to talk to you, let me know.”



# We can teach caregivers to conduct mand training (Loughrey et al., 2014)

## **Skills trained:**

- Preference assessment
- Pairing with SR+
- Capture/contrive MO (incidental teaching – in view but out of reach)
- Data collection
- Mand training

## **Behavioral Skills Training (BST):**

- Written and vocal verbal instructions
- Video and in vivo modeling
- Rehearsal
- Positive and corrective feedback

# We can teach caregivers to conduct mand training (Madzarhova & Sturmey, 2015)

Contrived MOs: gave preferred items needed for tasks to typical peers/siblings

Training (abbreviated BST):

- Feedback: positive and corrective from last sessions
- Video modeling: correct implementation of all steps

Second phase: if complete steps incorrectly, few mands

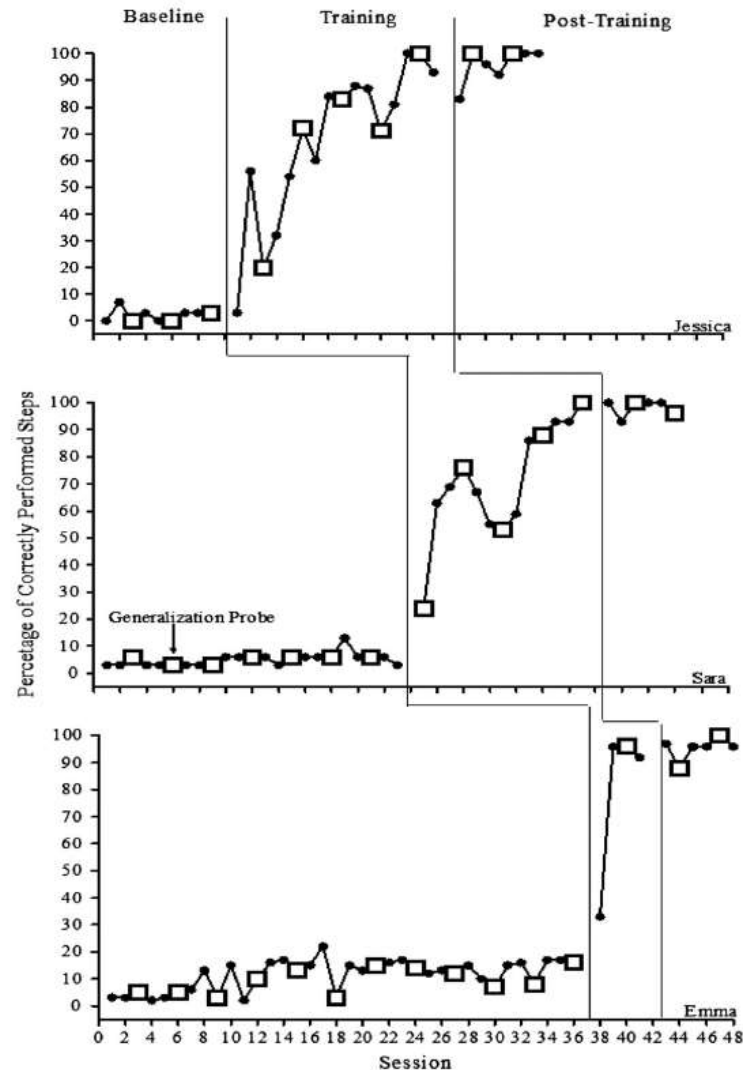
# We can teach caregivers to conduct mand training (Madzarhova & Sturmey, 2015)

- Contrived MOs: gave preferred items needed for tasks to typical peers/siblings
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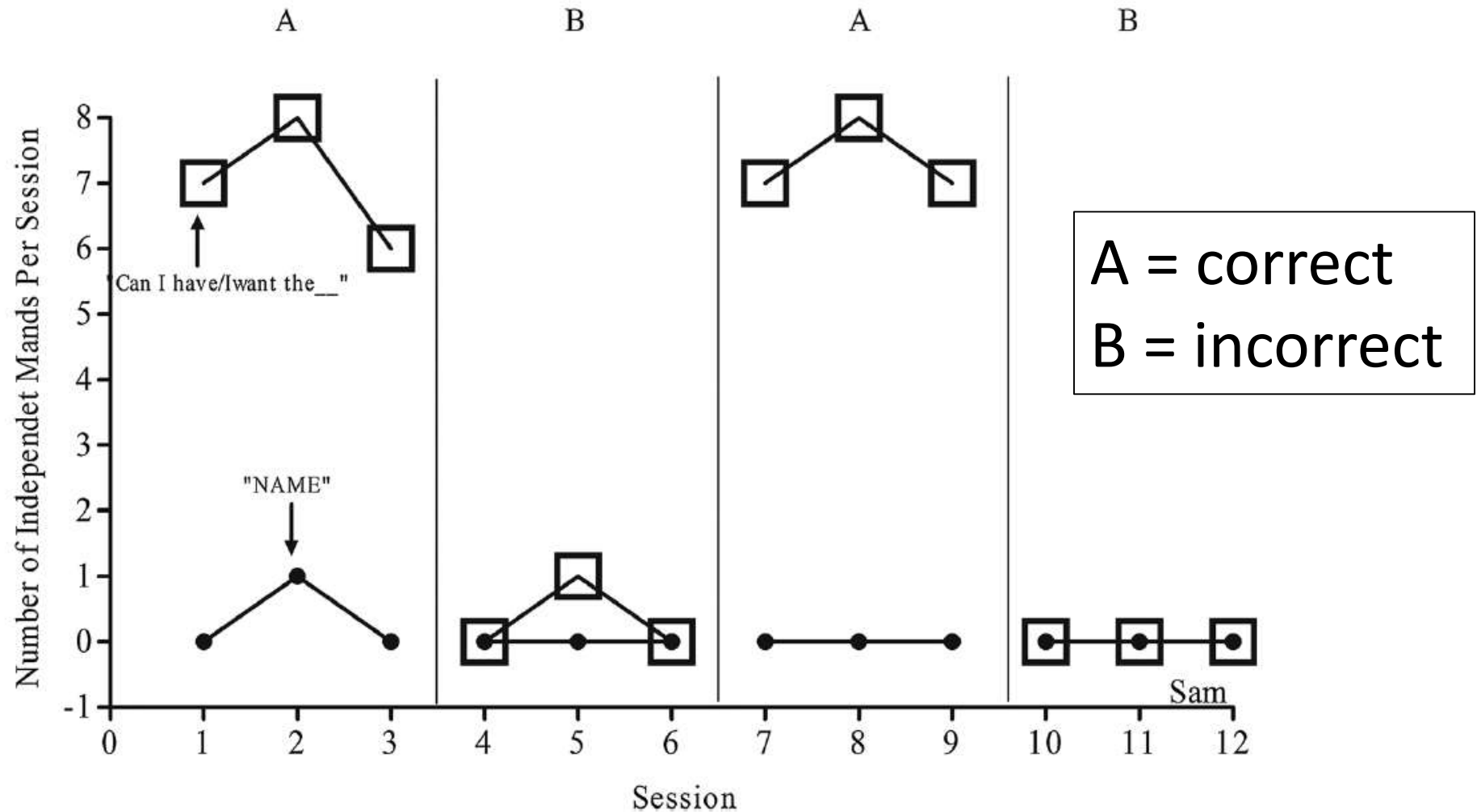
## **Abbreviated BST**

- Feedback: positive and corrective from last session
- Video modeling: correct implementation of all steps

# We can teach caregivers to conduct mand training (Madzarhova & Sturmey, 2015)



# We can teach caregivers to conduct mand training (Madzarhova & Sturmey, 2015)



# Conclusions: Contriving EOs for Mands

1. Contrive EO: put item in view but out of reach
2. Contrive EO: interrupted chain procedure – teach chain, one item missing
3. Contrive EO: present broken SR+
4. No negative impact of “What do you want?”
5. Rolling time delay to transfer from item to EO
6. “In view, out of reach” – good, but can’t fade item

# Conclusions: Functional Independence

7. Functional independence: need to teach each verbal operant separately (e.g., mands, tacts)
8. Mands emerge after tact training with multiple exemplar instruction
9. Need EO (deprivation) in mand tests after tact training
10. Might need tact booster sessions before mand tests
11. Tact training with SR+ - not pure tacts – EO present

# Conclusions: Add'l Proc., Mand Training

12.Video modeling with EO, response, SR+ may be more effective than live modeling of response

13.Untrained mands with derived relational responding

14.Ensure EO with also AO sessions for “Help”



# Conclusions: Maint & Gen of Mands

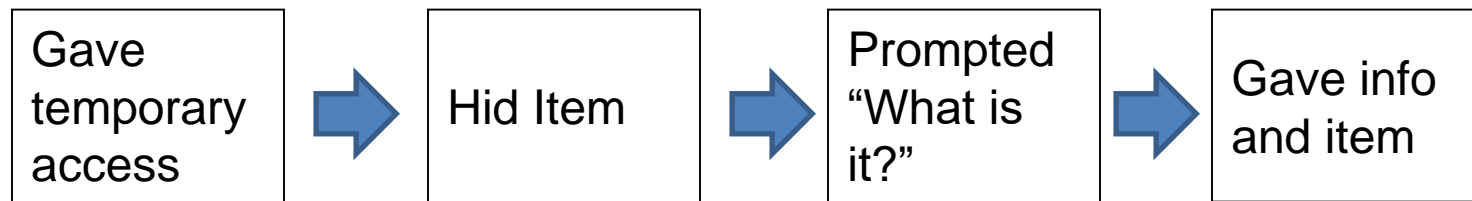
- 15. More prompting → more maintenance of mands
- 16. Mand frames → more generalization of mands
- 17. Need EO for maintenance of mands
- 18. Need EO for generalization of mands
- 19. Train mands to infants, older adults
- 20. Use behavioral skills training to teach caregivers to conduct mand training

## II. Mands for Information

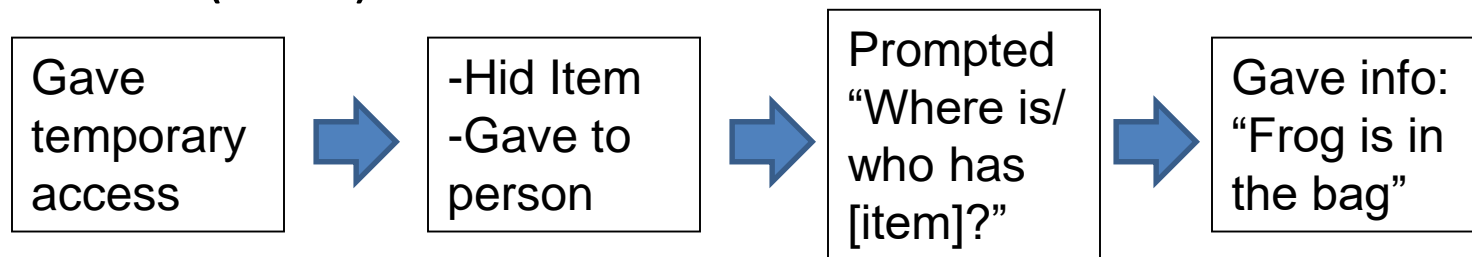
	# of studies
• What is it?	3
• Where is it?	8
• Who has it?	5
• How? How much? How many?	2
• Which?	2
• When?	2
• Social information	1

# Mands for Information

Roy-Wsiaki, Marion, Martin, & Yu (2010); Marion, Martin, Yu, & Buhler (2011)



Sundberg, Loeb, Hale, & Eigenheer (2002); Endicott & Higbee (2007); Howlett, Sidener, Progar, & Sidener (2011); Betz, Higbee, & Pollard (2010)



Consequence for mands for information:

- **The information must be the reinforcer**
- (Sundberg et al., 2002)

Therefore...

Antecedent for mands for information:

- **There must be an EO for information**
- (Sundberg et al., 2002)

**Teaching “What is it?” is more difficult than  
“Where is it?” or “Who has it?”**

(Marion et al., 2011)

## **Be careful with intraverbal control of mands for information (Betz et al., 2010)**

- “Get the crayons” → “Where are the crayons?”
- Empty crayon box → “Where are the crayons?”

## **Consider generalization setting/conditions**

- Gen: “It’s time to color,” paper, no crayons
- Training: with verbal cue (e.g., “Get the crayons”)
- Shillingsburg et al. (2014b)

# Mands for Info May Generalize Across EOs (Lechago, Carr, Grow, Love, & Almason, 2010)

With multiple exemplar instruction:

Train



Test



**Where's the spoon?**

**Where's the spoon?**

**There are multiple ways to contrive EOs for  
mands for information**

(Marion et al., 2012)



# Marion et al. (2012)

4 ways to contrive CMOs:

1. **Hide-and-seek:** while playing with toys (e.g., tea set), hide a preferred toy (e.g., a musical tea pot)
2. **Missing item:** set up activity, but hide an item needed to complete the activity (e.g., a puzzle piece needed to complete a puzzle was missing)
3. **Requiring more:** present an activity, but more of an item is needed to complete the activity (e.g., more liquid soap needed to blow bubbles)
4. **Surprise:** child is blindfolded, hide a preferred item under one of three boxes

# Marion et al. (2012)

- Contrived EO for “Where?”
  - Set up Hungry Hippos, no marbles → “Get the marbles”
  - Missing item: no vocalization related to item, but other vocalization (e.g., with missing fork, “Keep eating”)
- Trained on hide-and-seek CMO
  - Strong acquisition
- Tested generalization to other CMOs
  - Moderate generalization
- Consequence was information only

# We can teach “How do I?” and “How many?” (Lechago et al., 2013)

- Chains: put DVD into player, make volcano, make tornado
- Challenge of teaching “How?” – once a child learns how, AO for the information
  - Solution: teach one chain, probe additional chains
- Presented materials, delivered instruction:
  - “Let’s make a volcano” → “How do I?”
  - “You can buy the Doritos if you give me the right number of quarters” → “How many?”
- Generalization – within mand frames and across MOs

**We can ensure mand for information is evoked  
by an EO (and not an SD) by including an AO  
condition**

# We can teach “Which?”

(Shillingsburg, Bowen, Valentino & Pierce, 2014)

- Candy wrapper displayed to indicate availability
- Preferred item under a cup

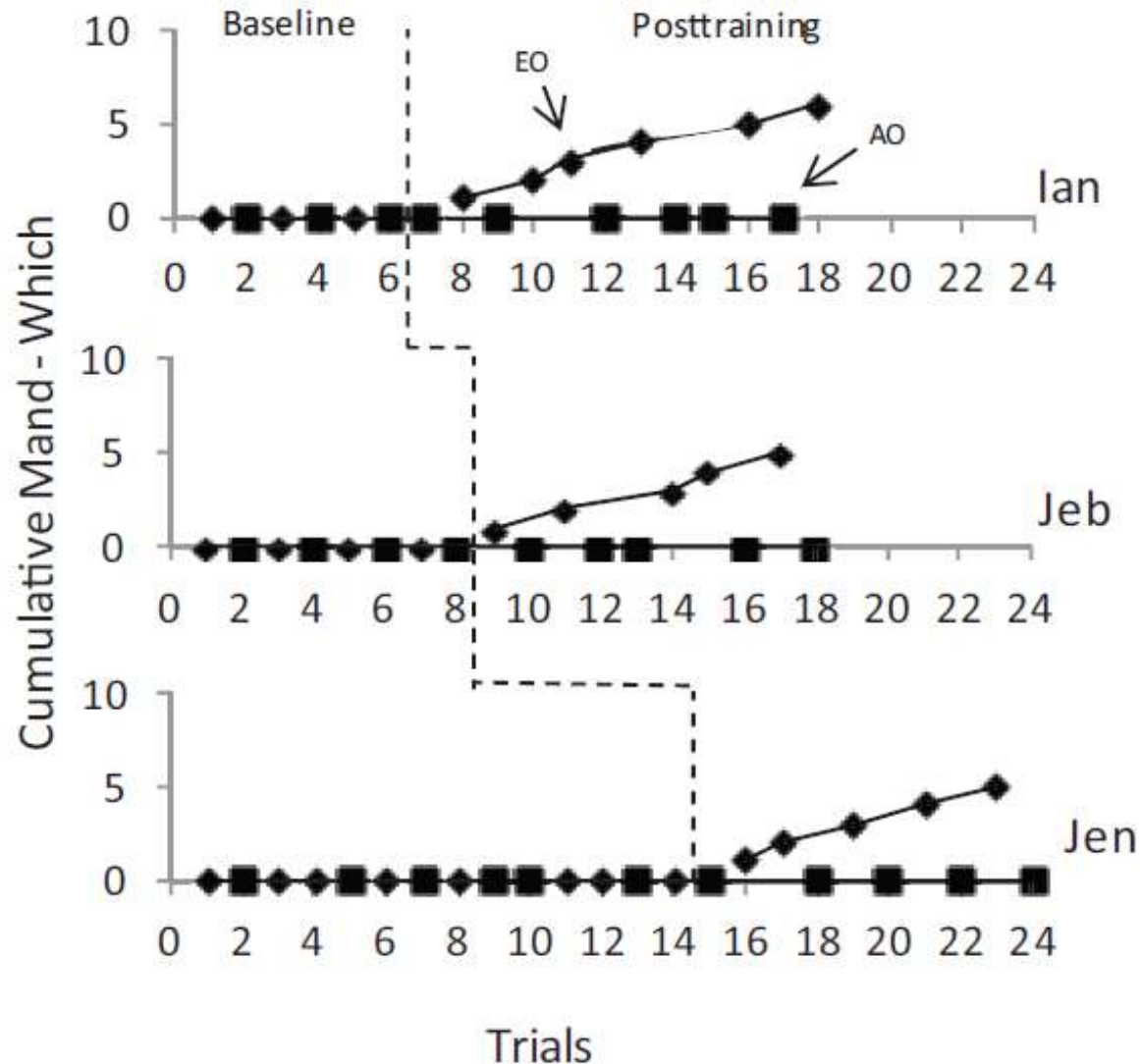


Trial started with a mand for an item (ensured EO)

- **EO Condition:** “You can have a Skittle. It’s under one of these cups”
- **AO Condition:** “Your Skittle is under the orange cup”

# We can teach “Which?”

(Shillingsburg, Bowen, Valentino & Pierce, 2014)



We need to measure 2 behaviors with MFI:

1. Mands for information
2. Listener responses evoked by the information

**EO:** Hidden treat

**Child:** “Which cup?” (mand for information)

**Therapist:** “Orange cup”

**Child:** pick up orange cup, eat (listener response)

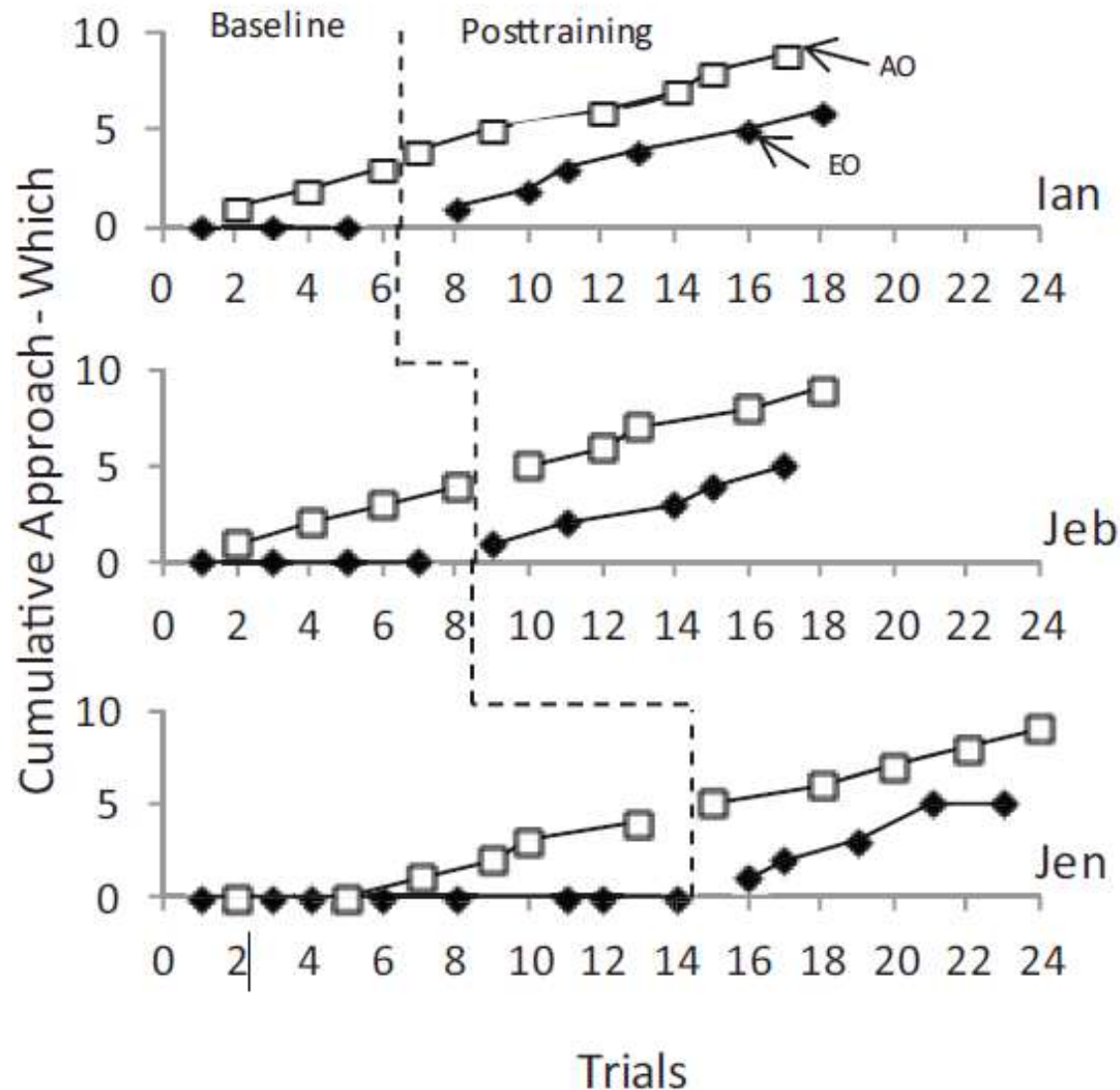
Consider listener response – these are different:

- “Orange cup” – consequence of mand for info
- “Touch the orange cup” – common in DTT

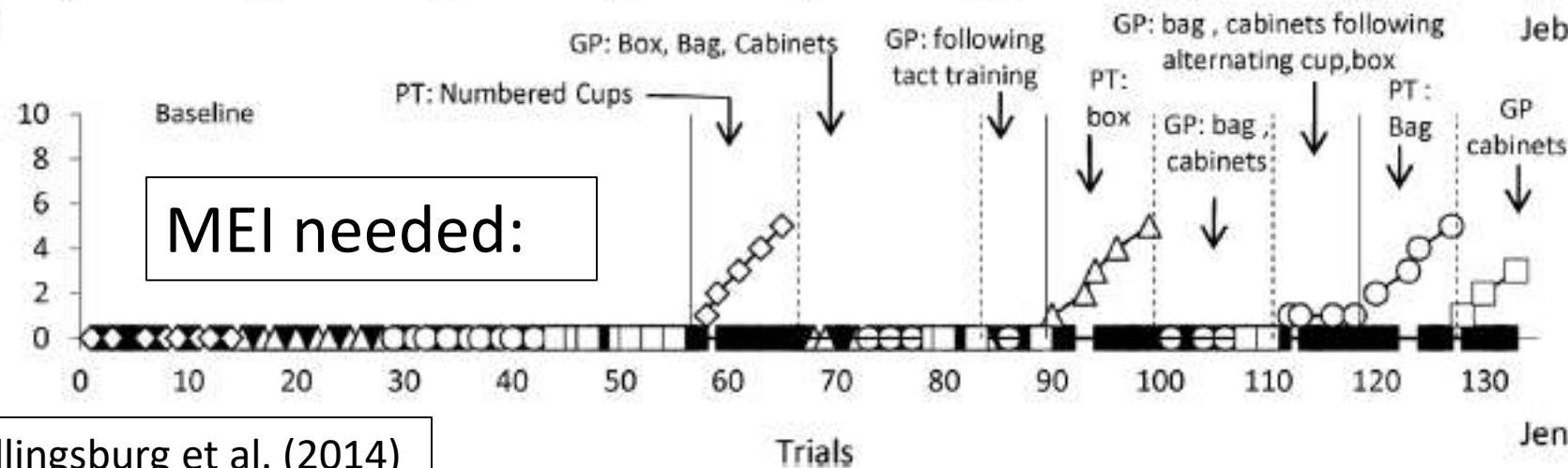
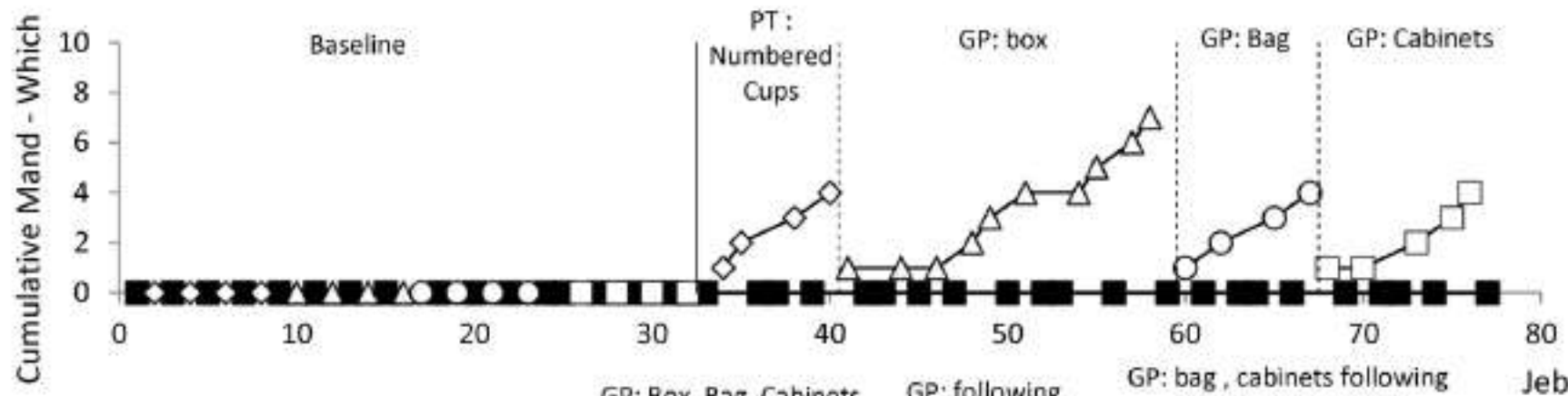
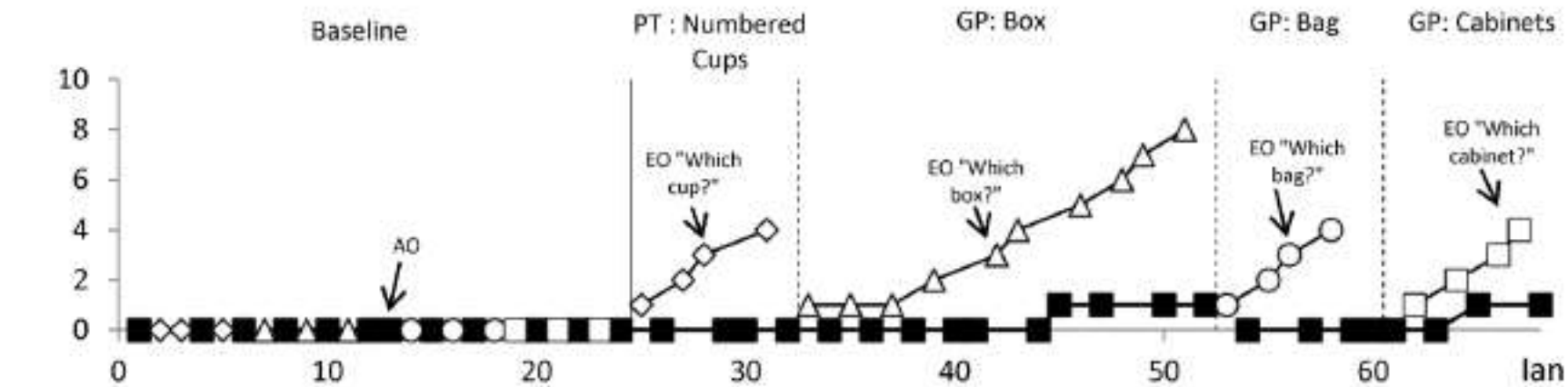
(Shillingsburg, Bowen, Valentino & Pierce, 2014)

# We can teach “Which?”

(Shillingsburg, Bowen, Valentino & Pierce, 2014)







MEI needed:

# We can teach “Who?”

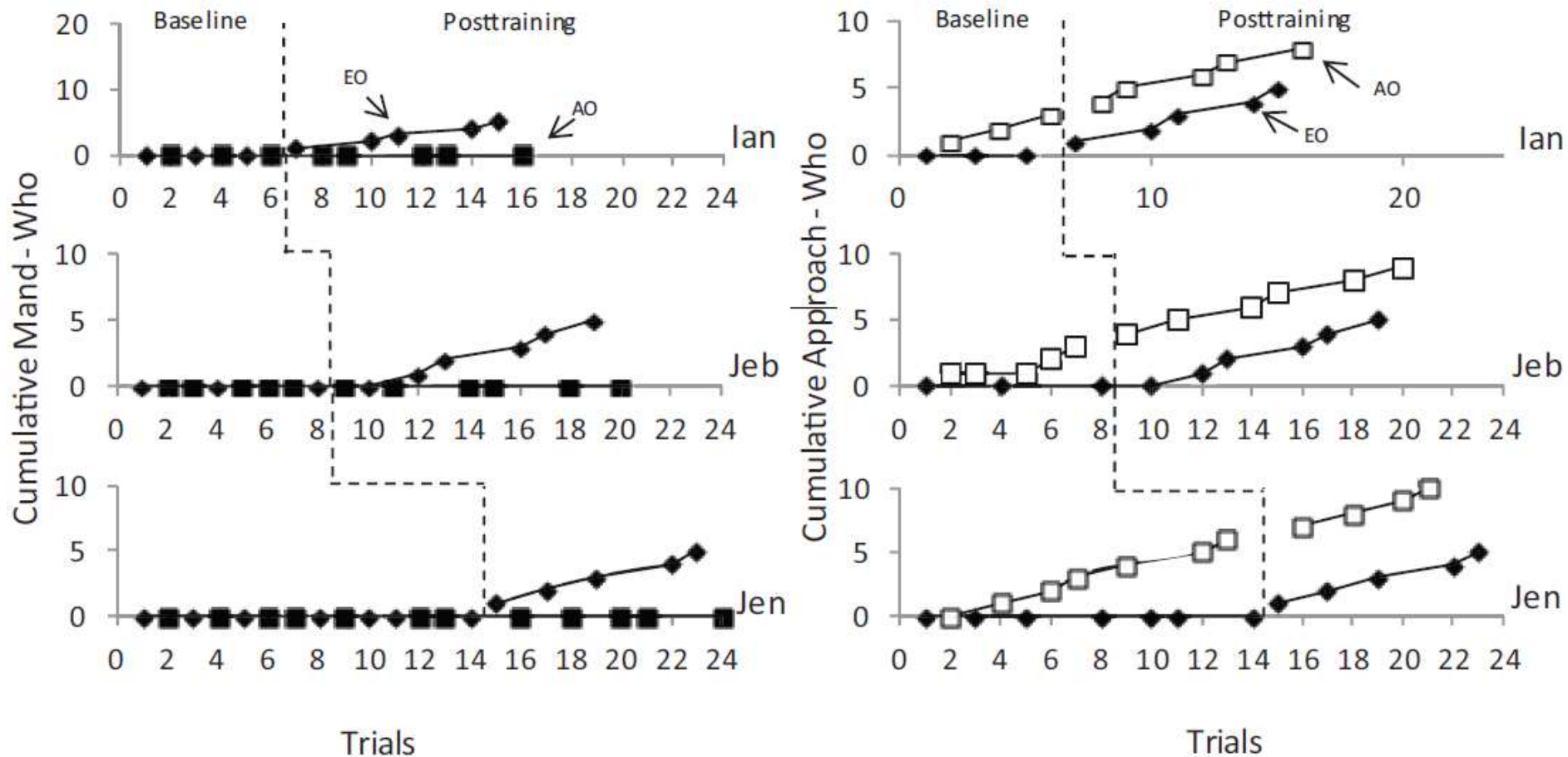
(Shillingsburg, Bowen, Valentino & Pierce, 2014)

- Candy wrapper displayed to indicate availability
- Preferred item with therapist



Trial started with a mand for an item (ensured EO)

- **EO Condition:** “One of your therapists has your candy”
- **AO Condition:** “Brittany has your candy”



Taught two mands simultaneously (“Which” & “Who?”)

- Need to discriminate
- Better teaching
- No overuse

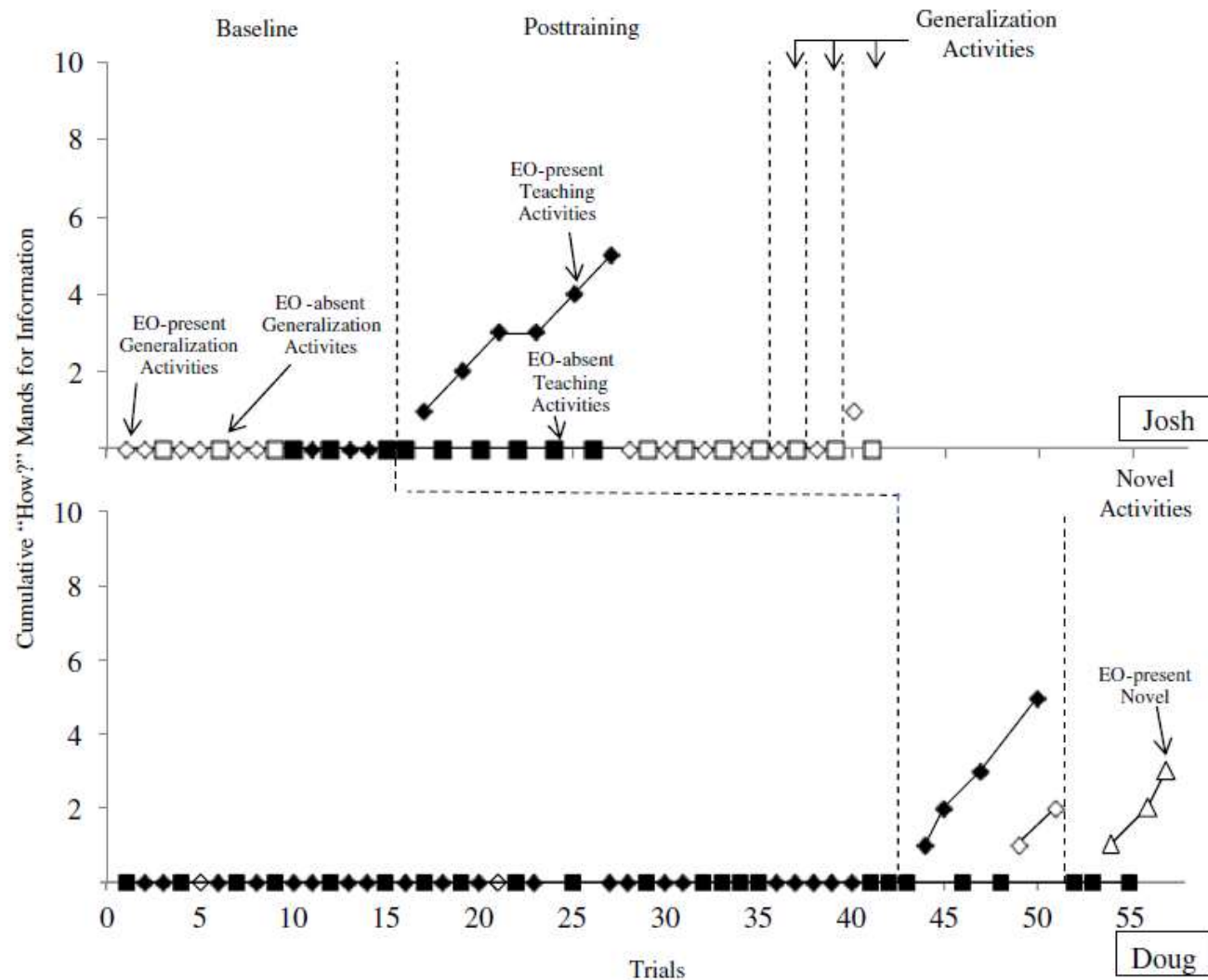
# We can teach “How?” (and “How do I do it?”) (Shillingsburg, Bowen, & Valentino, 2014)

Trial began with mand for activity

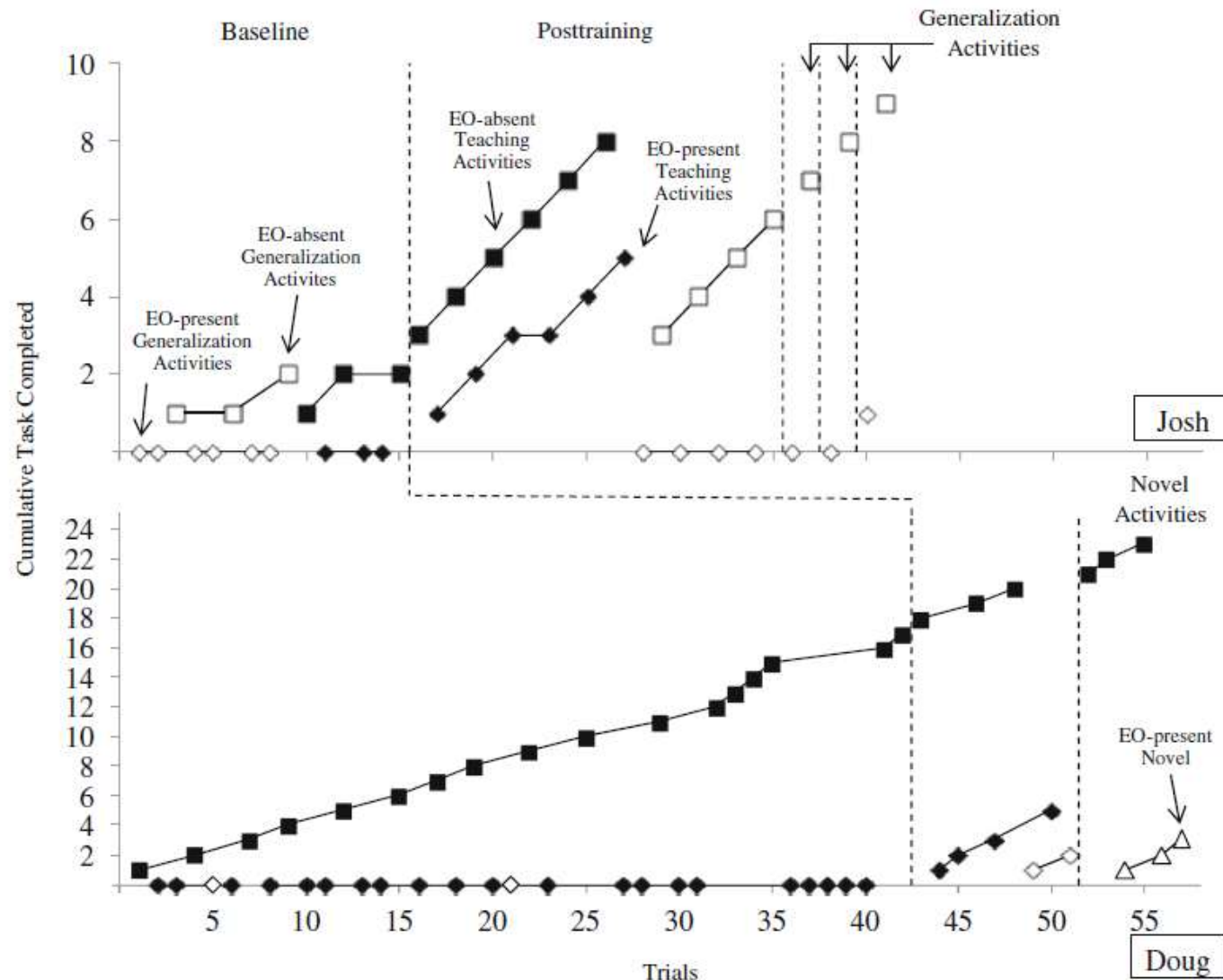
	EO Present	EO Absent
Teaching	Unknown spelling words	Known spelling words
Generalization	Remote, no batteries	Making popcorn
	Use walkie talkie	Opening Capri Sun
	Opening locked cabinet	Change TV volume with remote

# We can teach “How?” (and “How do I do it?”)

(Shillingsburg, Bowen, & Valentino, 2014)



# We can teach “How?” (and “How do I do it?”) (Shillingsburg, Bowen, & Valentino, 2014)



We can teach “How?” (and “How do I do it?”)  
(Shillingsburg, Bowen, & Valentino, 2014)

- Consequence for EO absent was end the trial
  - Maybe put mands on extinction
- Consider same SR+ for EO present and absent to ensure MOs are responsible for manding

When teaching “Who?” mand for information:

**EO:** Therapist holding toy

**Child:** “Who has my toy?” (mand for information)

**Therapist:** “Brittany”

**Child:** Walk to Brittany (listener response)

**Child:** “Toy, please” (mand – to Brittany)

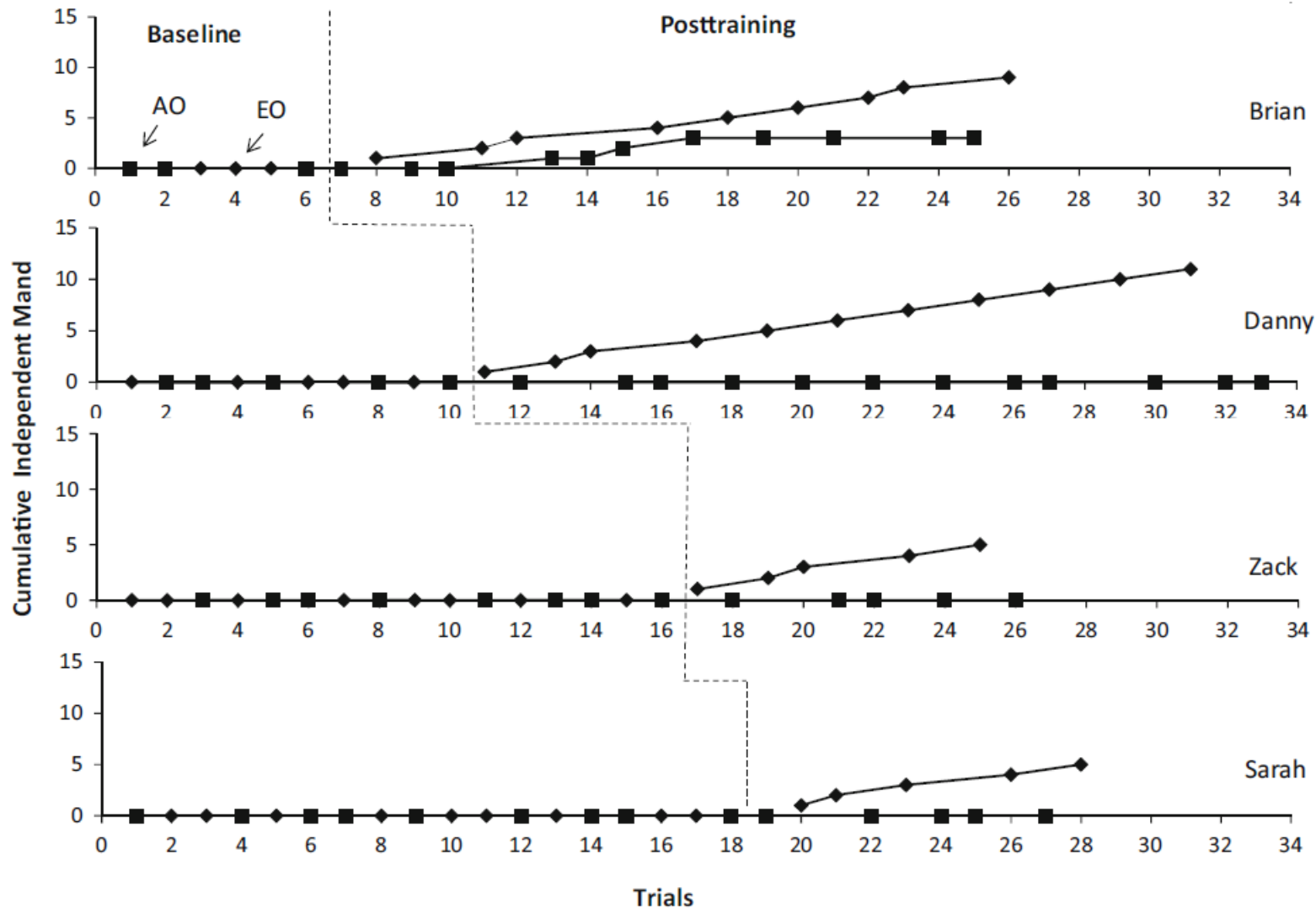
**We need to ensure child mands to person after being told who has SR+**

(Shillingsburg, Gayman, & Walton, 2016)



# Teaching “Who?”

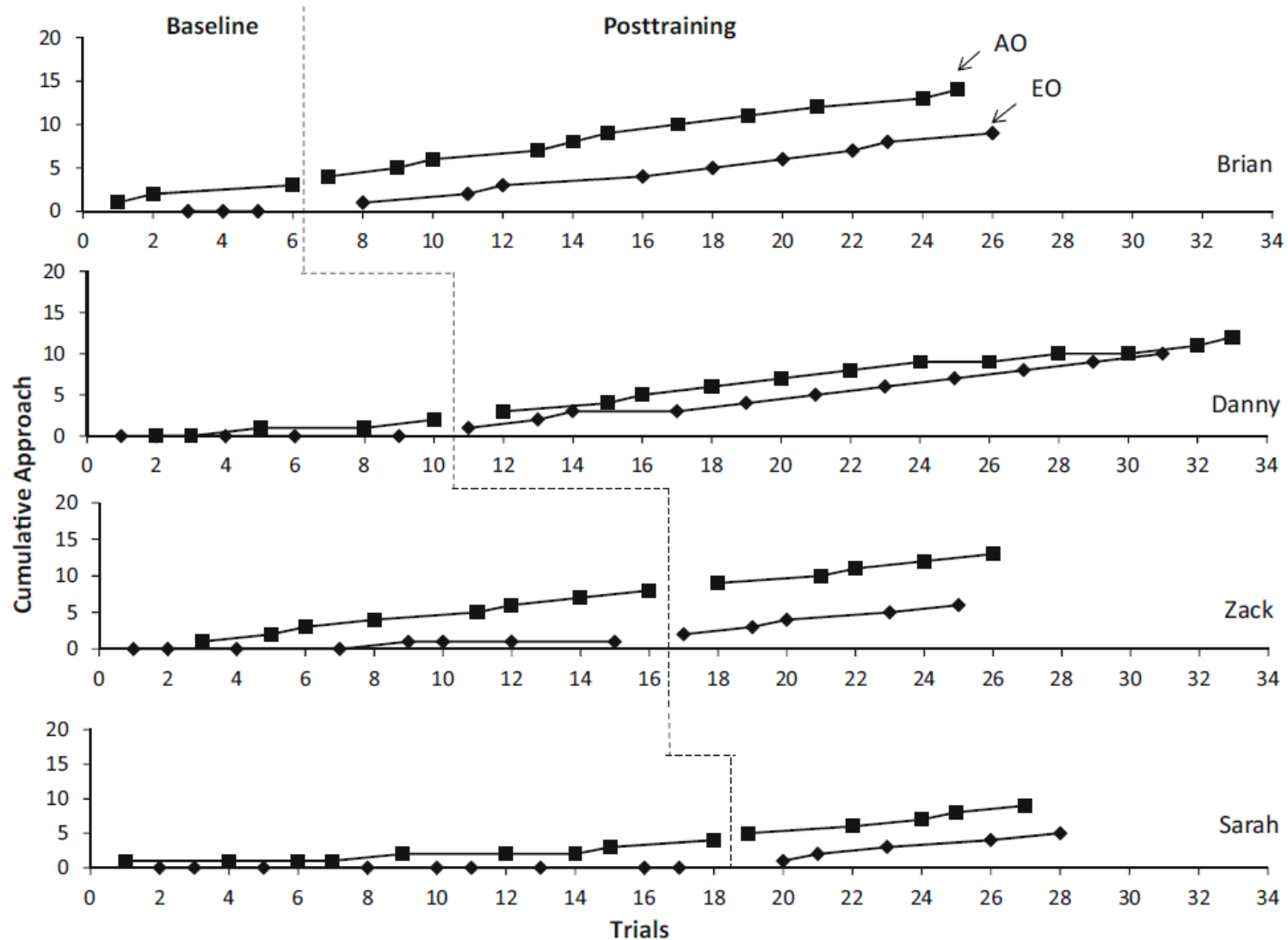
(Shillingsburg, Gayman, & Walton, 2016)



# Approaches

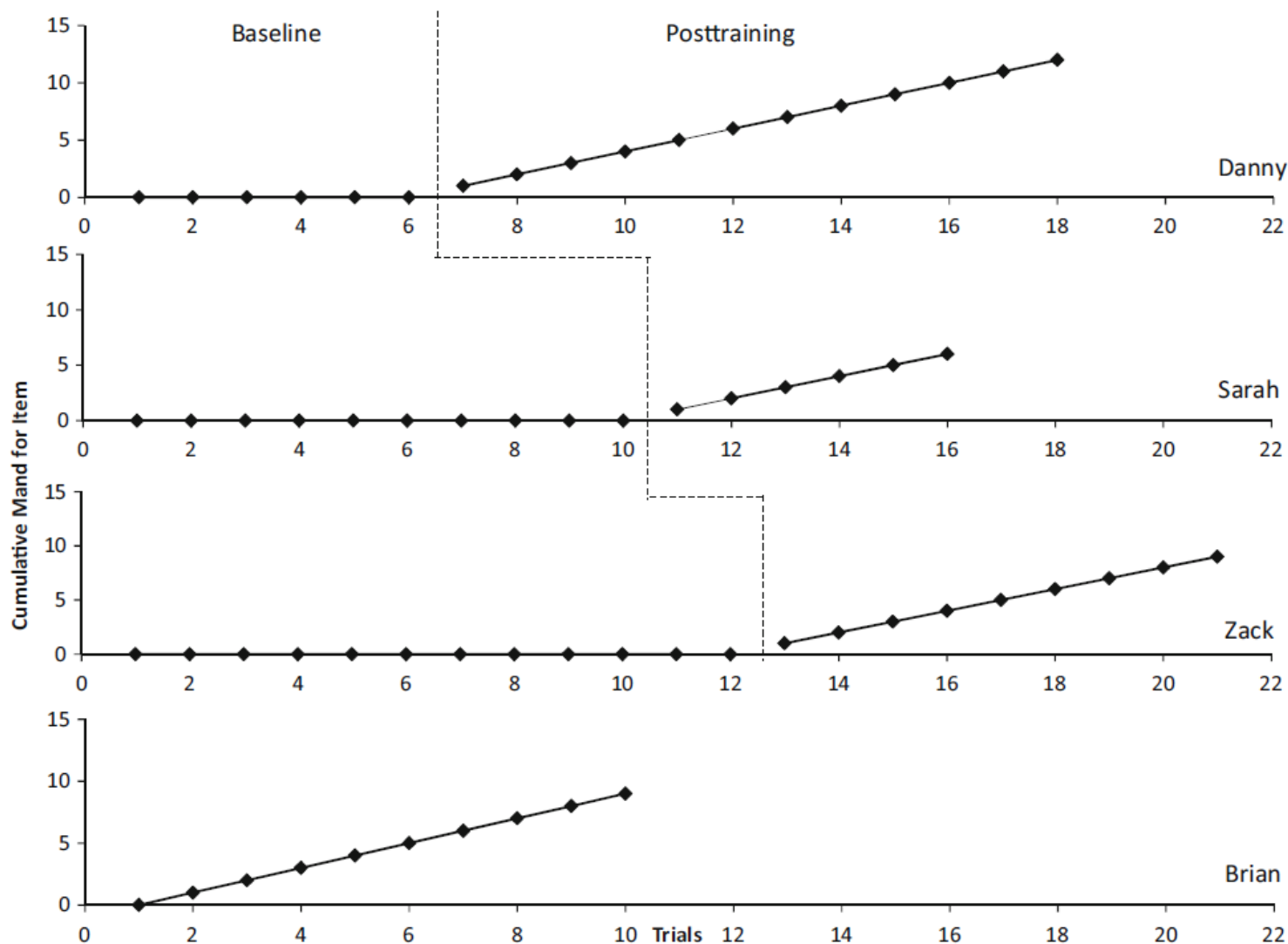
## Teaching “Who?”

(Shillingsburg, Gayman, & Walton, 2016)



# Teaching “Who?”

(Shillingsburg, Gayman, & Walton, 2016)



# Teaching “Who?”

(Shillingsburg, Gayman, & Walton, 2016)

- EO – no information on location of item
- AO – has information on location of item
- $S^D$  – “Someone has it”
- $S^\Delta$  – “John has it”
  - Want to show control by MO, but often MOs and  $S^D$ s in natural situations

# We can teach “When?”

(Landa, Hansen, & Shillingsburg, 2017)

## **Possible antecedents for “When?”**

- Parent: “Can’t play right now” → “When?”
- Raining → “When may I play outside?”
- Child playing with toy → “When can I play with toy?”

## **Consequences for “When?”**

- Contingency-specifying information (e.g., “After homework”)
- Time-specifying information (e.g., “In 15 minutes”)
- Event-specifying information (e.g., “After I finish cooking,”)
- Inaccurate prediction of reinforcer availability (e.g., “I don’t know,” “later”)

# We can teach “When?”

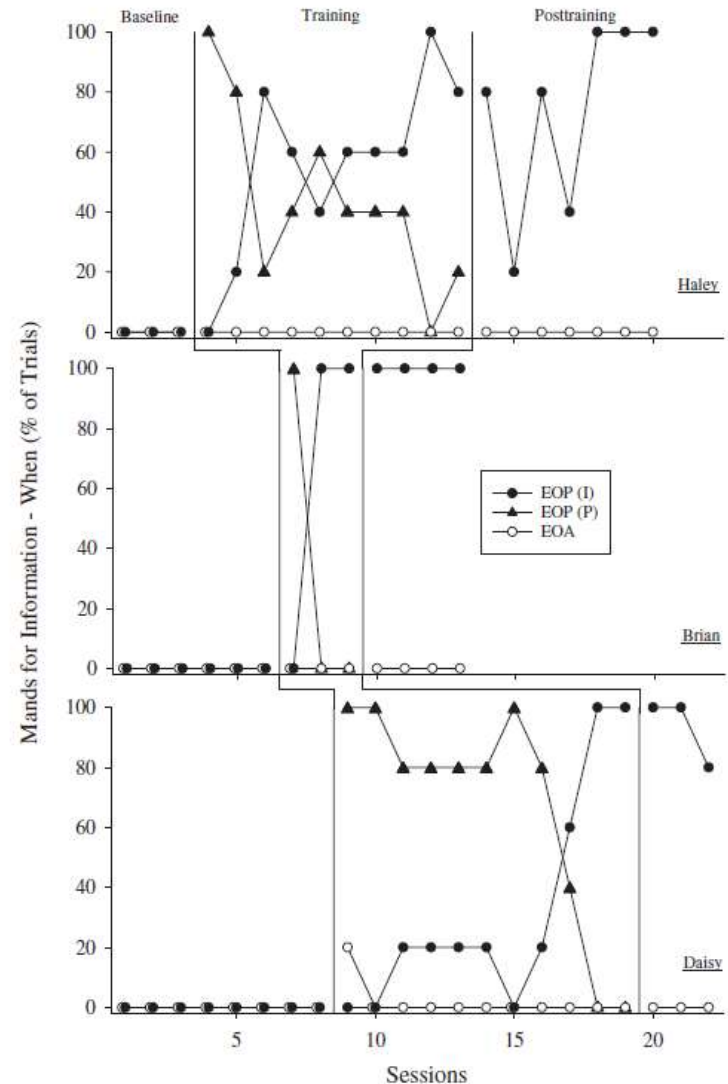
(Landa, Hansen, & Shillingsburg, 2017)

## EO Present (EOP)

- Manded for item →  
“Not right now” →  
“When” → “After you wash your hands”

## EO Absent (EOA)

- Manded for item →  
“Not right now. After  
you wash your hands”



# We can teach “When?”

(Landa, Hansen, & Shillingsburg, 2017)

- Participants also complied with contingencies, increased manding, and decreased grabbing
- Stimulus discrimination?
  - “Not right now” is  $S^D$  evoking “When?”
  - “After you X” is  $S^\Delta$  for “When?” and  $S^D$  for engaging in X
- MO?
  - Absence of rule increased value of info, evoked the mand
  - Presence of rule was AO
- Rationale for MO interpretation
  - All trials followed by mand for item
  - Completed behavioral requirement and then manded for item
  - No differential consequences for “When”

# We can teach mands for social information (Shillingsburg, Frampton, Wymer, & Bartlett, 2017)

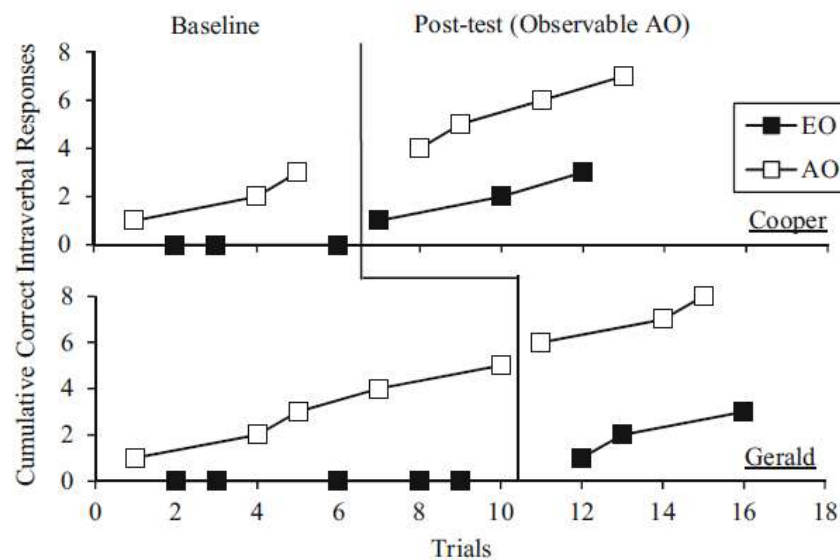
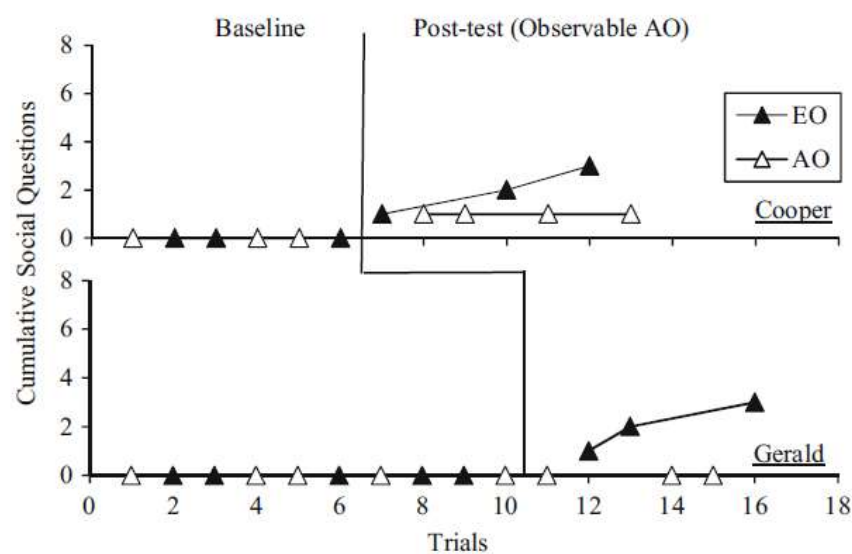
- Asked therapists 100 questions
- Asked same questions to participants:
  - Known answers (questions in AO condition)
  - Unknown answers (questions in EO condition)
- Training: asked question, guided to therapist to mand for the information, returned to researcher who asked again, reinforced correct response, faded prompts
  - Part intraverbal, part echoic



# We can teach mands for social information (Shillingsburg, Frampton, Wymer, & Bartlett, 2017)

- **AO change:** asked questions based on clothing or something the therapist was holding
  - Part tact
- **Another AO change** for 1 P: no information provided
  - Hypothesized maintained by social attention

# We can teach mands for social information (Shillingsburg, Frampton, Wymer, & Bartlett, 2017)



- Some AO manding – even though they knew the information, still manded to confirm the answer
- What should we do/say when children ask us known information? “You already know that” or give the answer?

# Conclusions: Mands for Information

- 21.Reinforcer must be information (not tangible)
- 22.Antecedent must EO for the information
- 23.Teaching “What is it?” is difficult
- 24.Analyze antecedent for “Where?” – verbal or nonverbal
- 25.May get mands to generalize across EOs

# Conclusions: Mands for Information

26. Put SR+ in certain location → “Where?”

27. Present new activity → “How?”

28. Put SR+ in a certain container → “Which?”

29. Give SR+ to certain person → “Who?”

30. After mands, “Not right now” → “When?”

31. Unknown question → mand for social info.

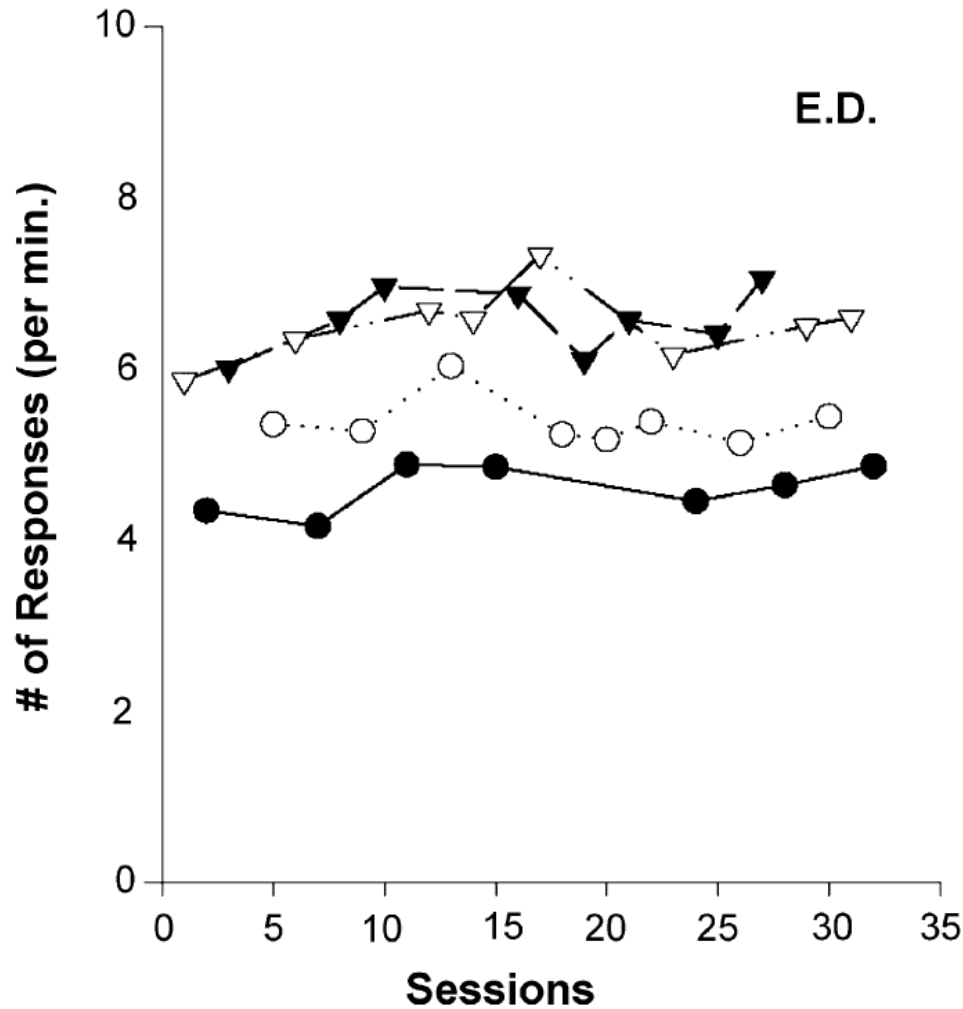
# Conclusions: Mands for Information

- 32. Once answer “How?” – no more trials with that activity
- 33. After “Which?” – need to respond as listener to the information
- 34. After “Who?” – need to mand to person after given information

### **III. Academic and Social Behavior**

# MOs affect skill acquisition

(Zayac & Johnston, 2008)

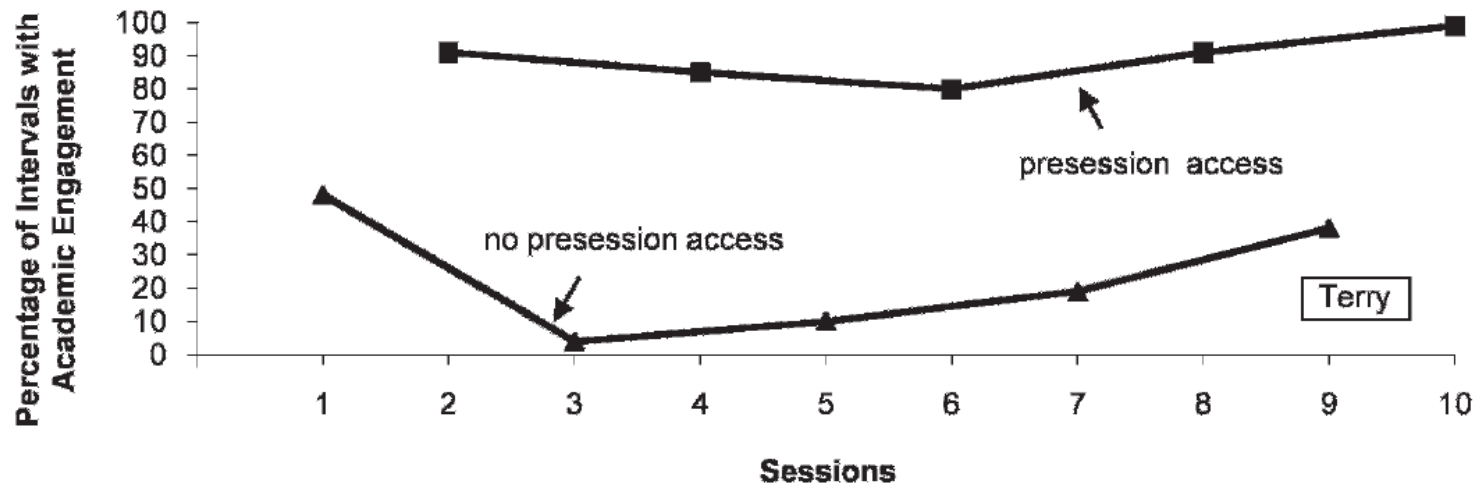
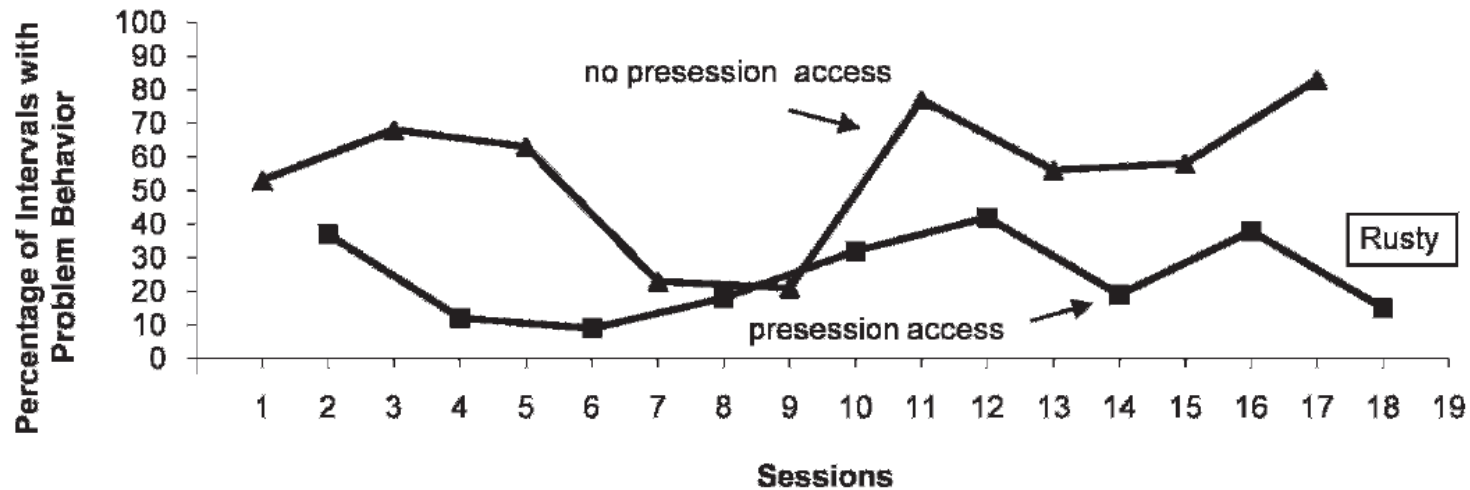


Skill: chain of symbols  
SR+: computer games

● 15 Min.  
○ 2 Hr.  
▼ 1 Day  
▽ 2-3 Days

Also fewer errors  
with longer  
deprivation  
periods

# Pre-session access/no access to reinforcers for problem affect PB and academic engagement (Rispoli et al. 2011)



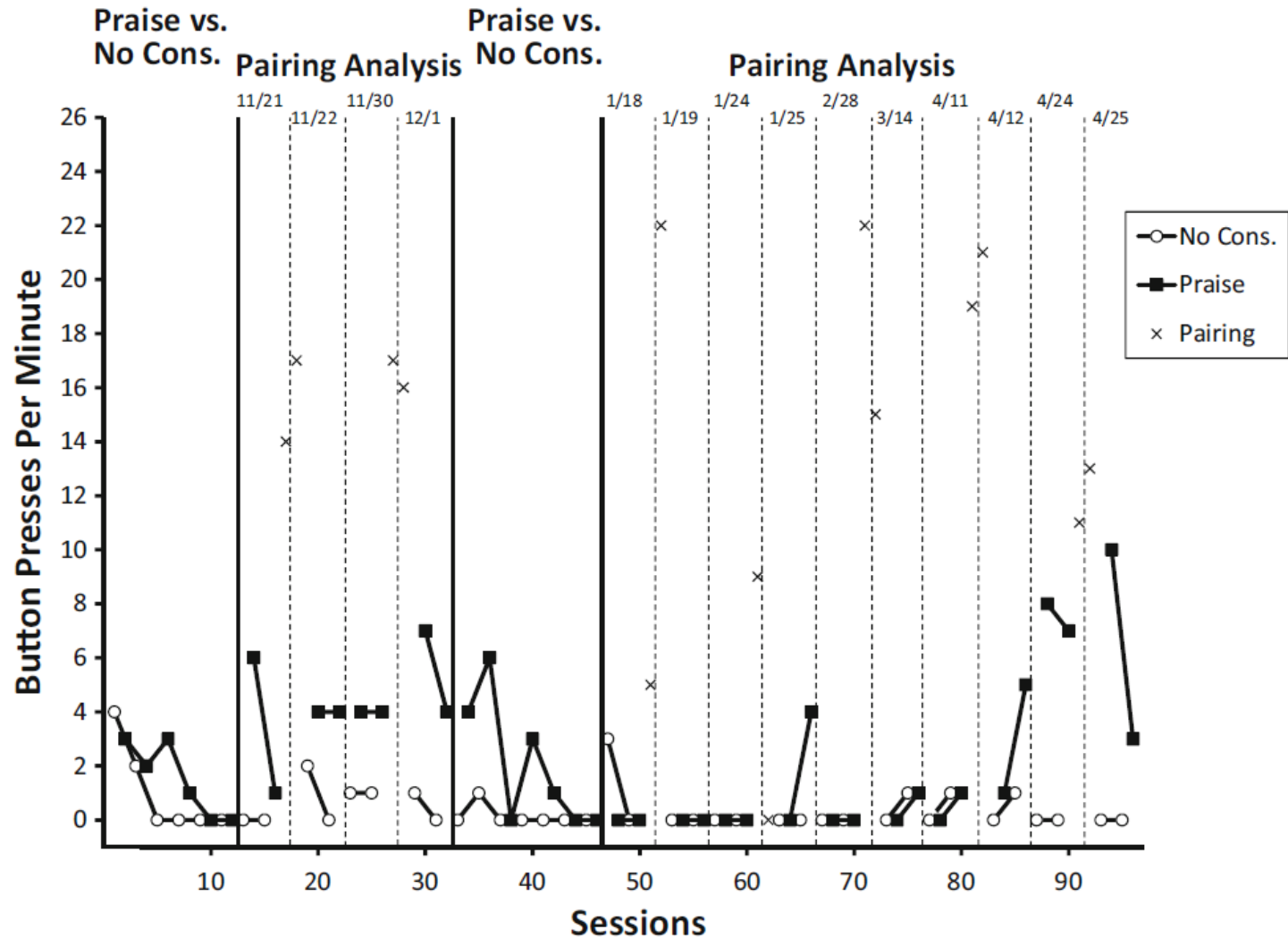


# We can teach responding to disguised mands (Najdowski et al., 2017)

- Disguised mand: EO, but mand does not specify the reinforcer
  - Ex: look at plate of cookies, say, “Those cookies look good”
- Trained rule: “when someone wants something, they are not always direct” – examples, one role play example with modeling
- Training: rules, disguised mands, prompting, mult. exemplar training
- Acquisition, generalization X novel disguised mands, people, locations
- Responding to disguised mands requires inferring another’s EO, correlated with the verbal stimulus and environmental conditions
  - Ex: It’s cold in here + coldness – infer an EO for warmth and offer it
  - RFT explanation: “It’s cold in here” is in frame of coordination with jacket – evokes same response from listener

# We can pair attention with SR+ to establish attention as SR+

(Axe & Lapprime, 2017)



# Conclusions: Academic & Social Beh.

- 35. Need EO (depr.) for SR+ for academic behaviors
- 36. Pre-session access to SR+ may decrease problem behavior and increase academic engagement
- 37. We can teach responses to disguised mands, may be inferring another's EO
- 38. We can pair praise with SR+ to establish praise/attention as a SR+ - increase social behavior

## **IV. Reinforcer Assessment and Preference Assessment**

# Pre-session Access to Reinforcers (MO) Affects Within-Session Responding

JOURNAL OF APPLIED BEHAVIOR ANALYSIS

1991, 24, 279-291

NUMBER 2 (SUMMER 1991)

## *ESTABLISHING OPERATIONS AND REINFORCEMENT EFFECTS*

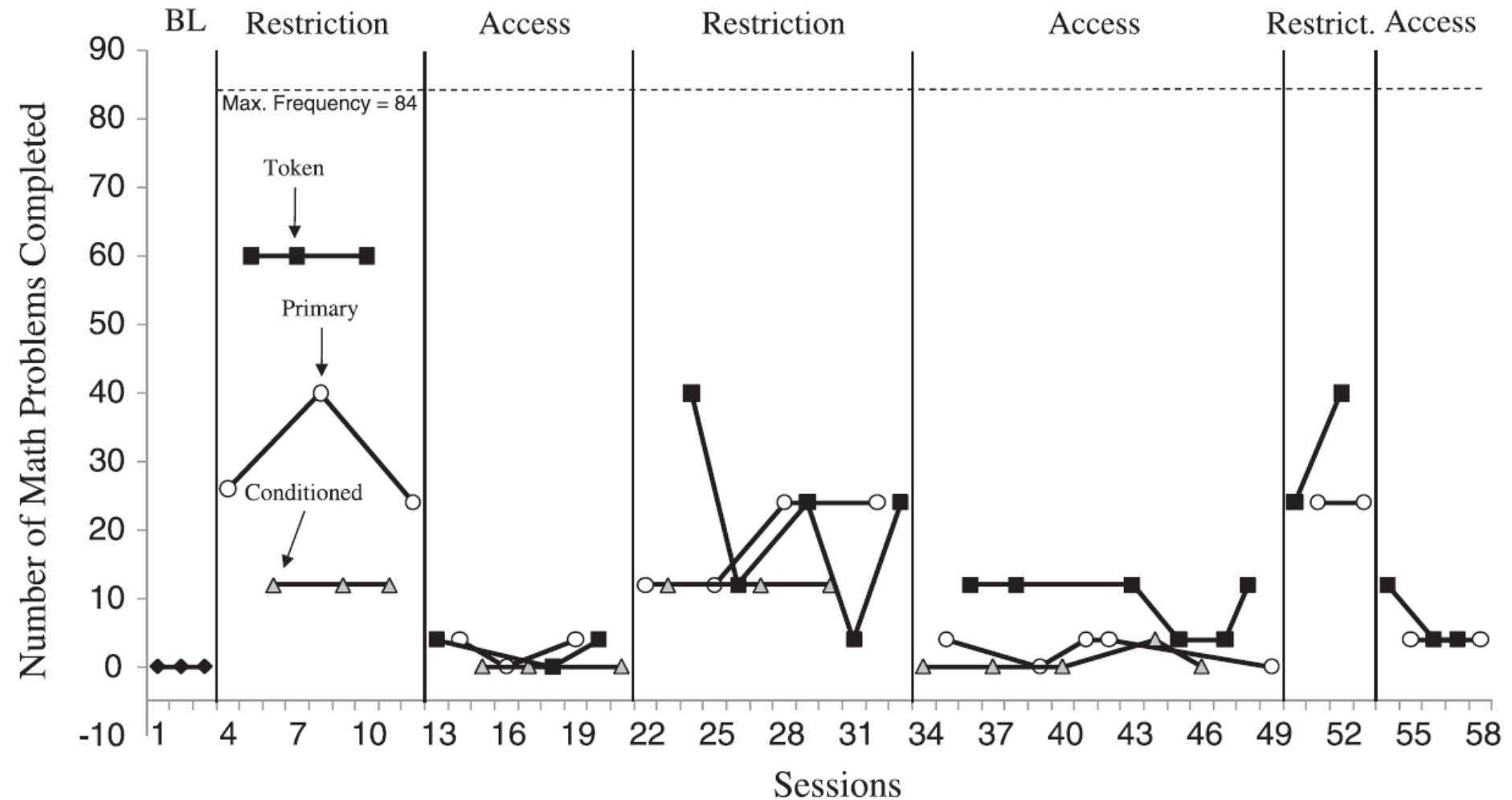
TIMOTHY R. VOLLMER AND BRIAN A. IWATA

THE UNIVERSITY OF FLORIDA

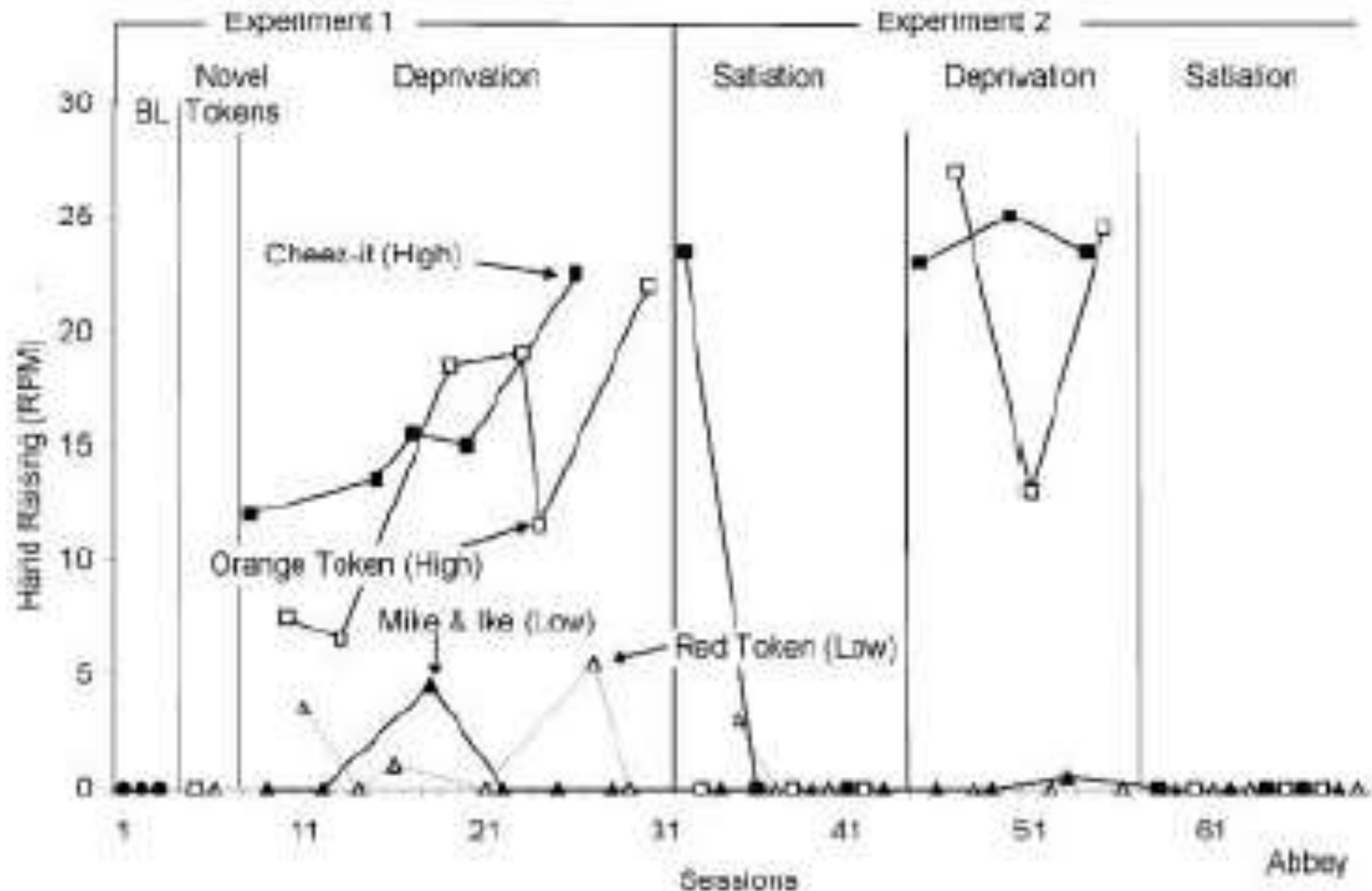


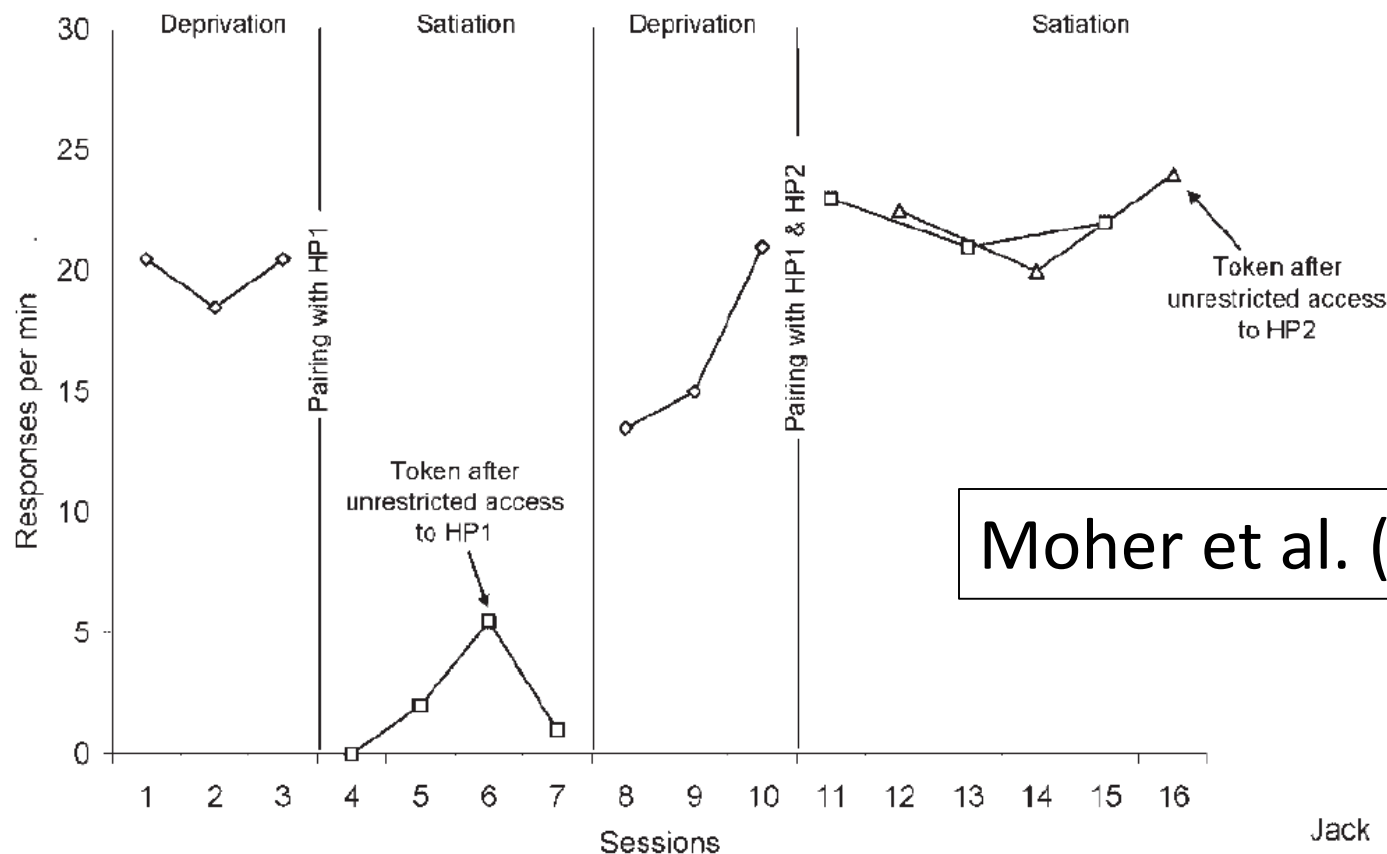
# MOs may affect types of reinforcer

(Ivy et al., 2015)



# Generalized conditioned reinforcers are effective under multiple EOs (Moher, Gould, Hegg, & Mahoney, 2008)





Moher et al. (2008)

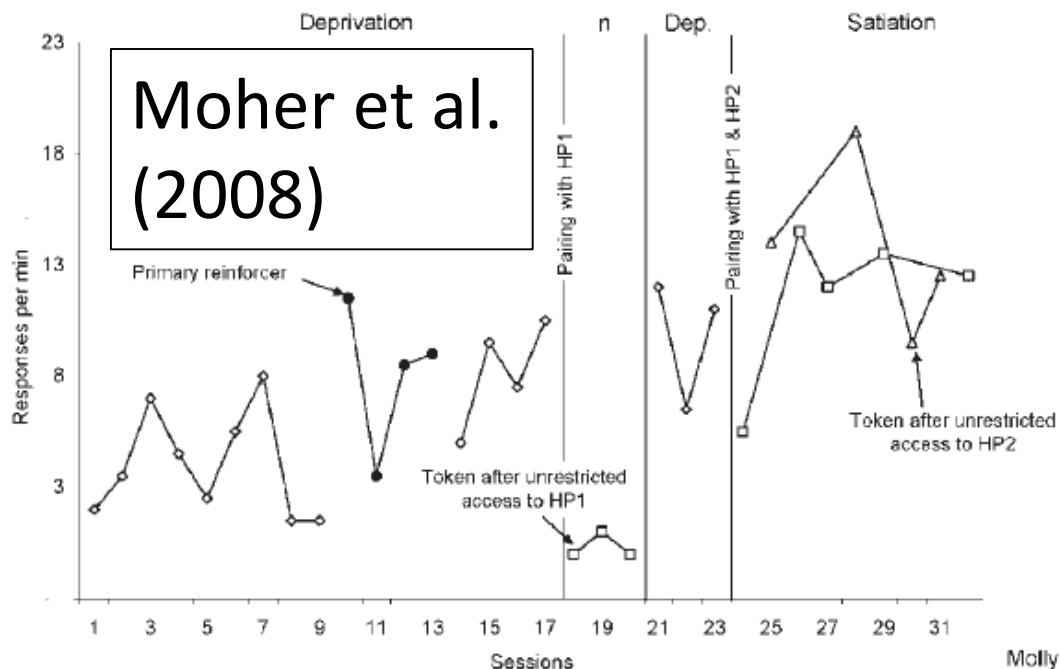
### Experiment 3:

Pairing with 1 → little responding when satiated

Pairing with 2 → high responding when satiated

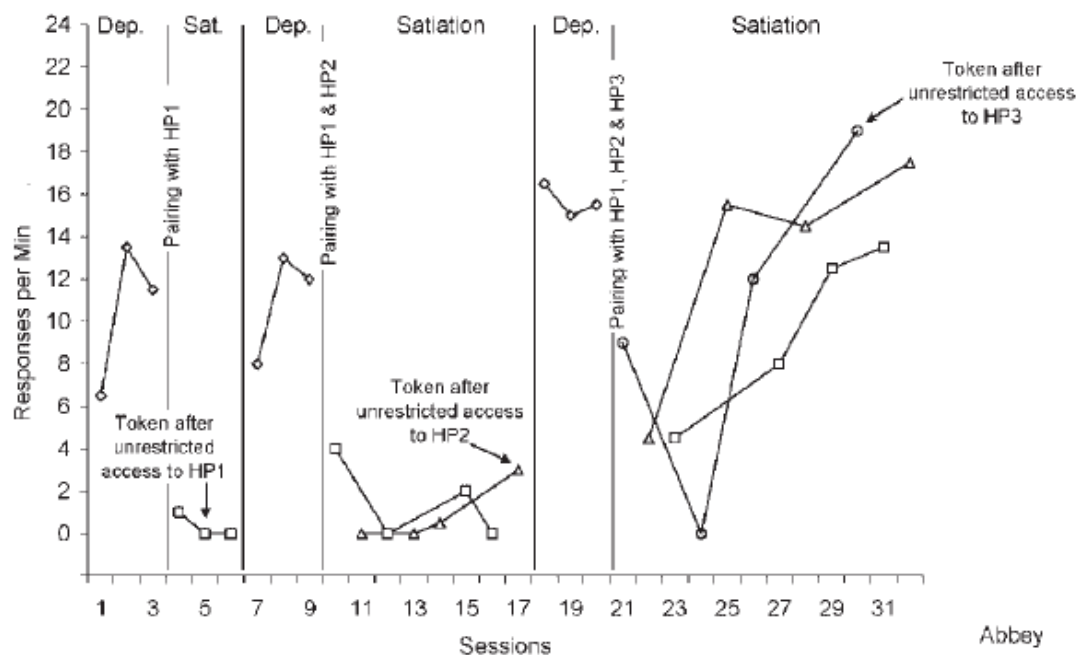
Pairing with 2 → token is generalized conditioned reinforcer –  
less sensitive to MOs





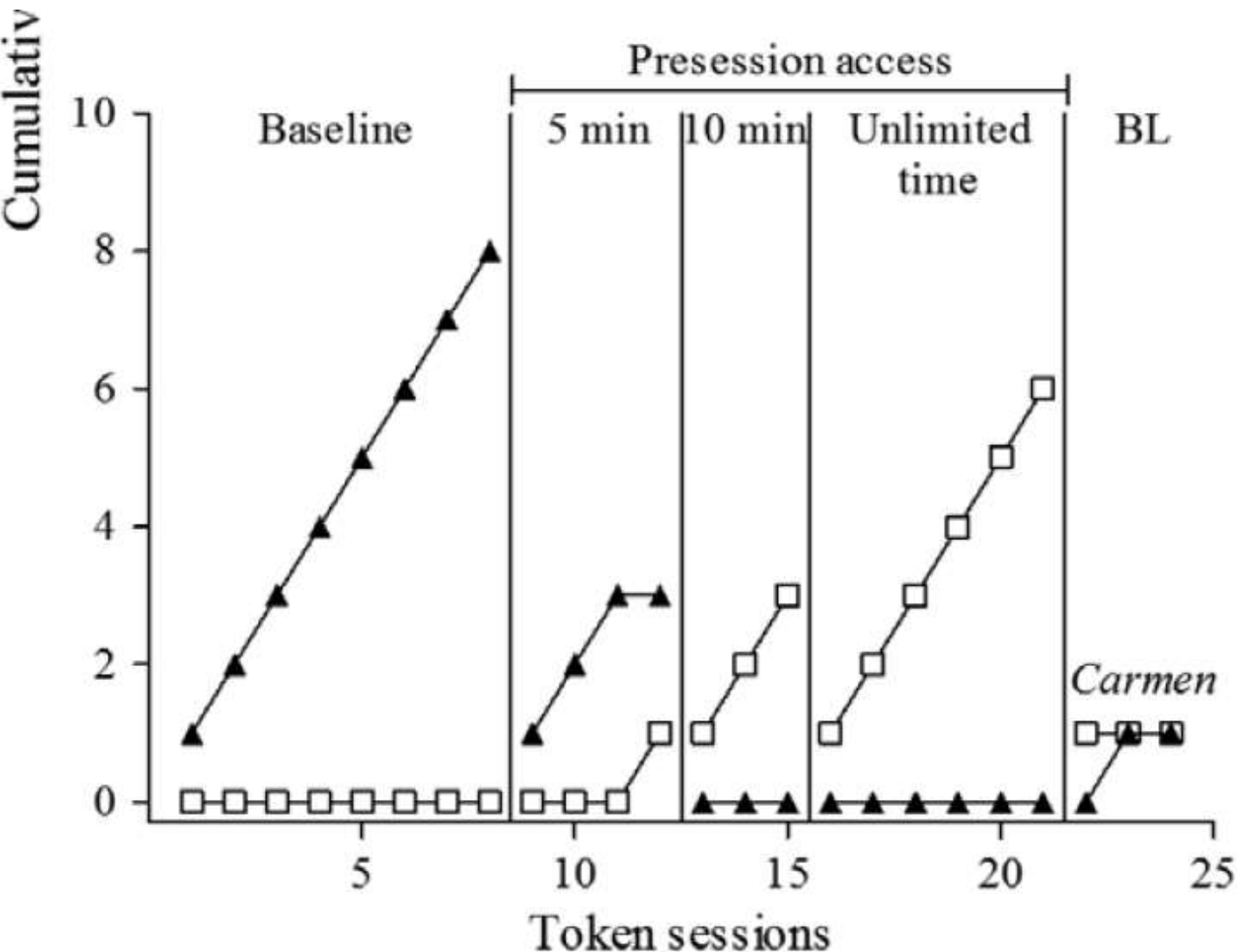
Abbey needed pairing with 3 HP reinforcers before high responding with satiation (generalized token)

Jack and Molly – token paired with 1 edible and 1 drink – varied reinforcers, less sensitive to MOs



Abbey – token paired with all edibles – more sensitive to food deprivation (EO)

# Generalized conditioned reinforcers are insensitive to one AO (Russell et al., 2018)



Baseline (no  
presession  
access) →  
chose tokens  
exchangeable  
for edibles

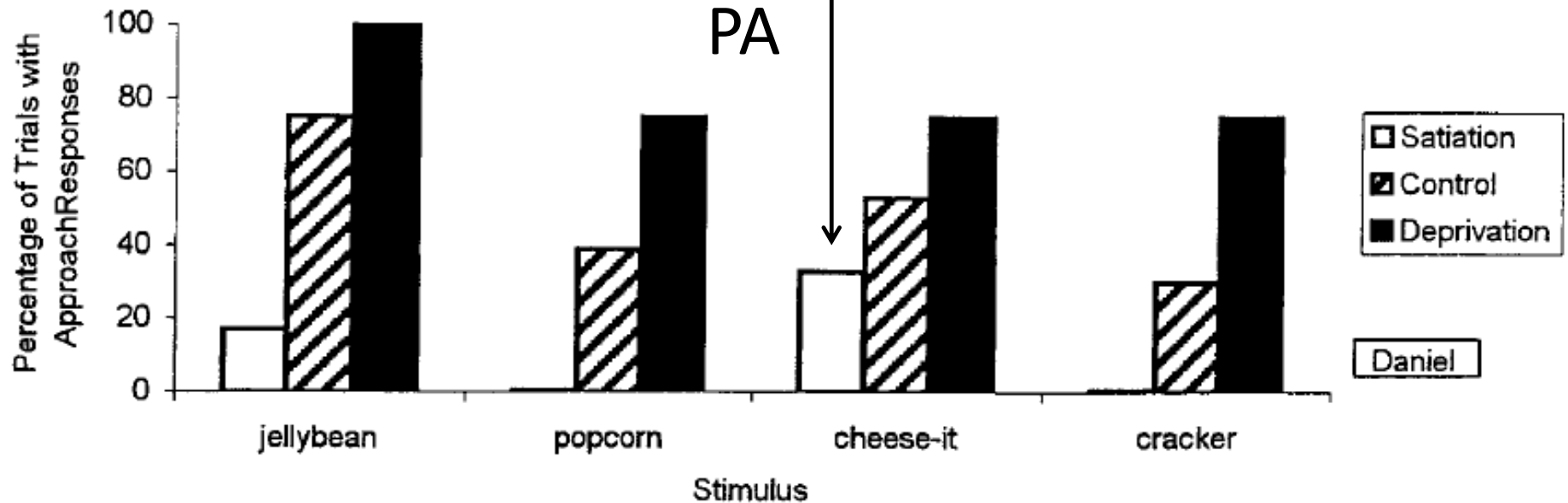
Presession  
access to  
edibles (AO) →  
chose tokens  
exchangeable  
for leisure items

# MOs Affect Preference Assessments

Gottschalk, Libby, & Graff (2000)

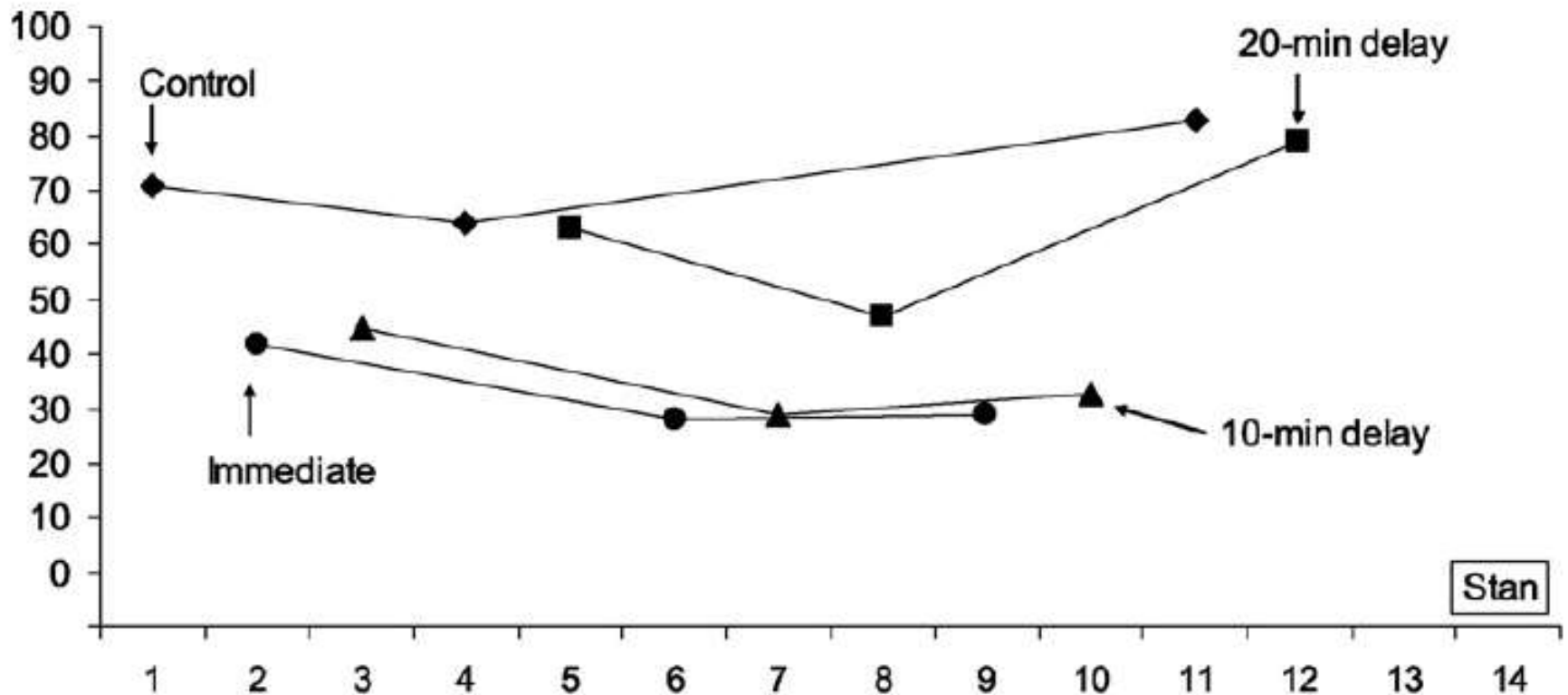
48 hours  
no access

Free access  
10 min before  
PA



(Paired Stimulus)

# Chappell, Graff, Libby, & Ahearn (2009)

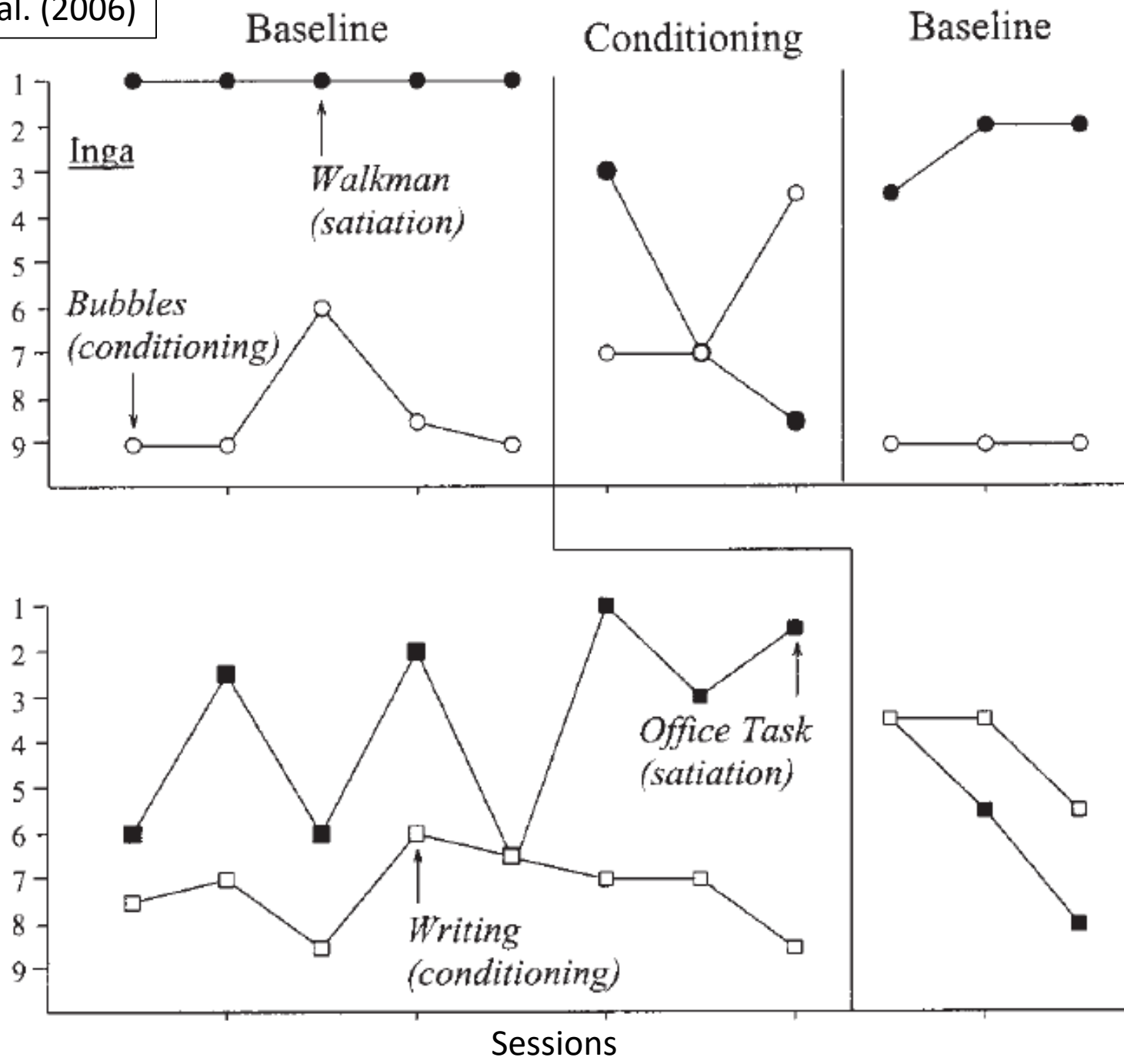


Stan

# Conditioning Can Alter Value of Stimuli (Hanley, Iwata, & Roscoe, 2006)

- Sometimes preference are stable; sometimes they shift
- Satiation (AO) and conditioning can affect preference levels

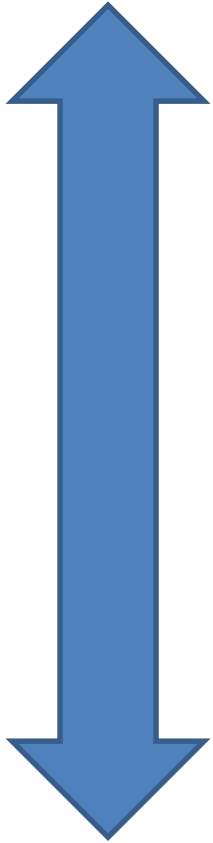
Rank Order



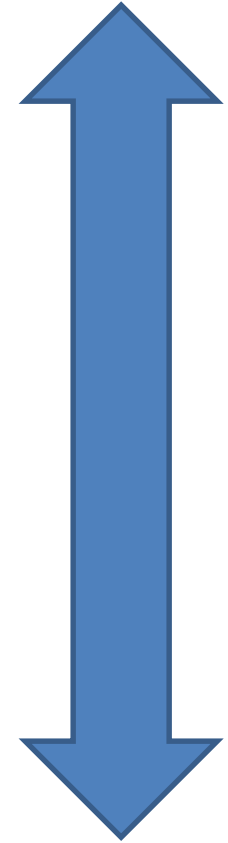
# Conclusions: SR+/Pref. Assessment

- 39. Deprivation/satiation impacts SR+ efficacy
- 40. Tokens become generalized conditioned reinforcers when still effective under AO conditions – not dependent on one EO
- 41. Deprivation/satiation impacts preference assessment results – keep MO variables consistent
- 42. Preferences are not always static – can condition items as preferred

# When Assess Preferences/Reinforcers?



- Once per year
- Once per 6 months
- Once per month
- Once per week
- Once per day
- Before each session
- Within each session



**MOs may continually change**

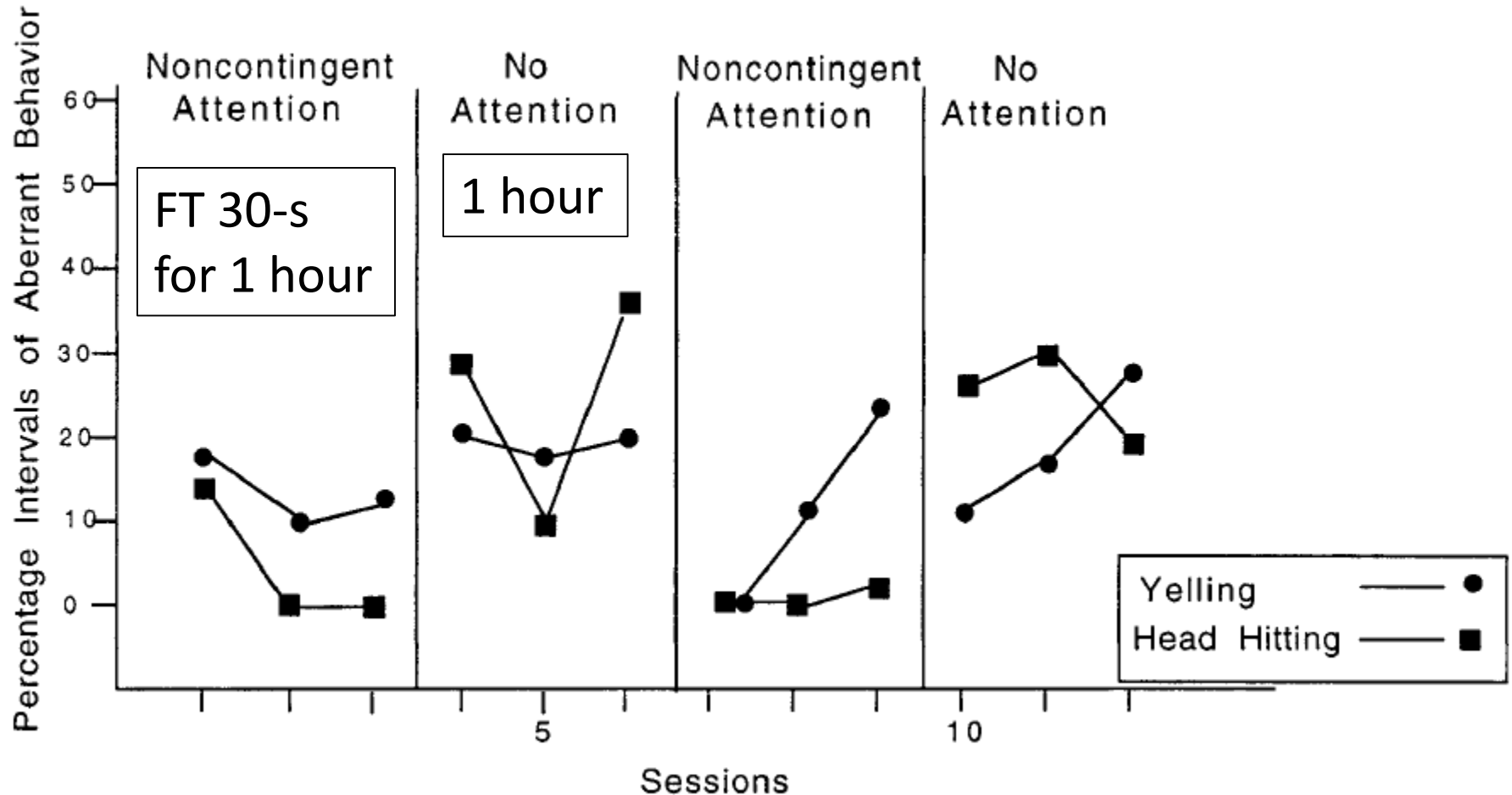


# **V. Functional Analysis of Problem Behavior:**

## **Pre-session Analyses**

# MOs Affect Functional Analyses

(O'Reilly, 1999)



*Behavioral Interventions*

*Behav. Intervent.* **21**: 195–204 (2006)

Published online 26 May 2006 in Wiley InterScience  
([www.interscience.wiley.com](http://www.interscience.wiley.com)). DOI: 10.1002/bin.215



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# ISOLATING THE EVOCATIVE AND ABATIVE EFFECTS OF AN ESTABLISHING OPERATION ON CHALLENGING BEHAVIOR

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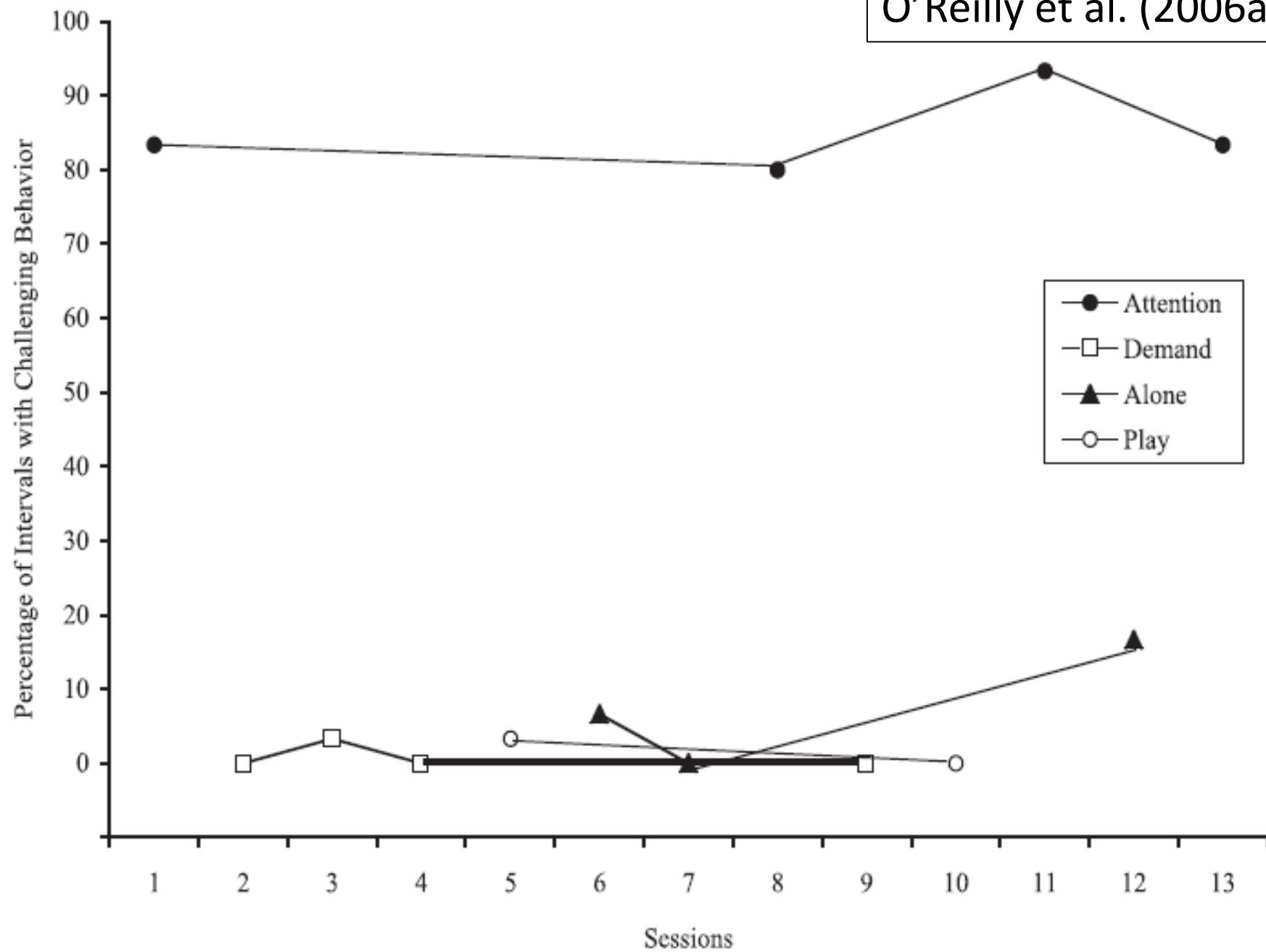
**Mark F. O'Reilly<sup>1\*</sup>, Chaturi Edrisinha<sup>1</sup>, Jeff Sigafoos<sup>2</sup>,  
Giulio Lancioni<sup>3</sup> and Alonzo Andrews<sup>4</sup>**

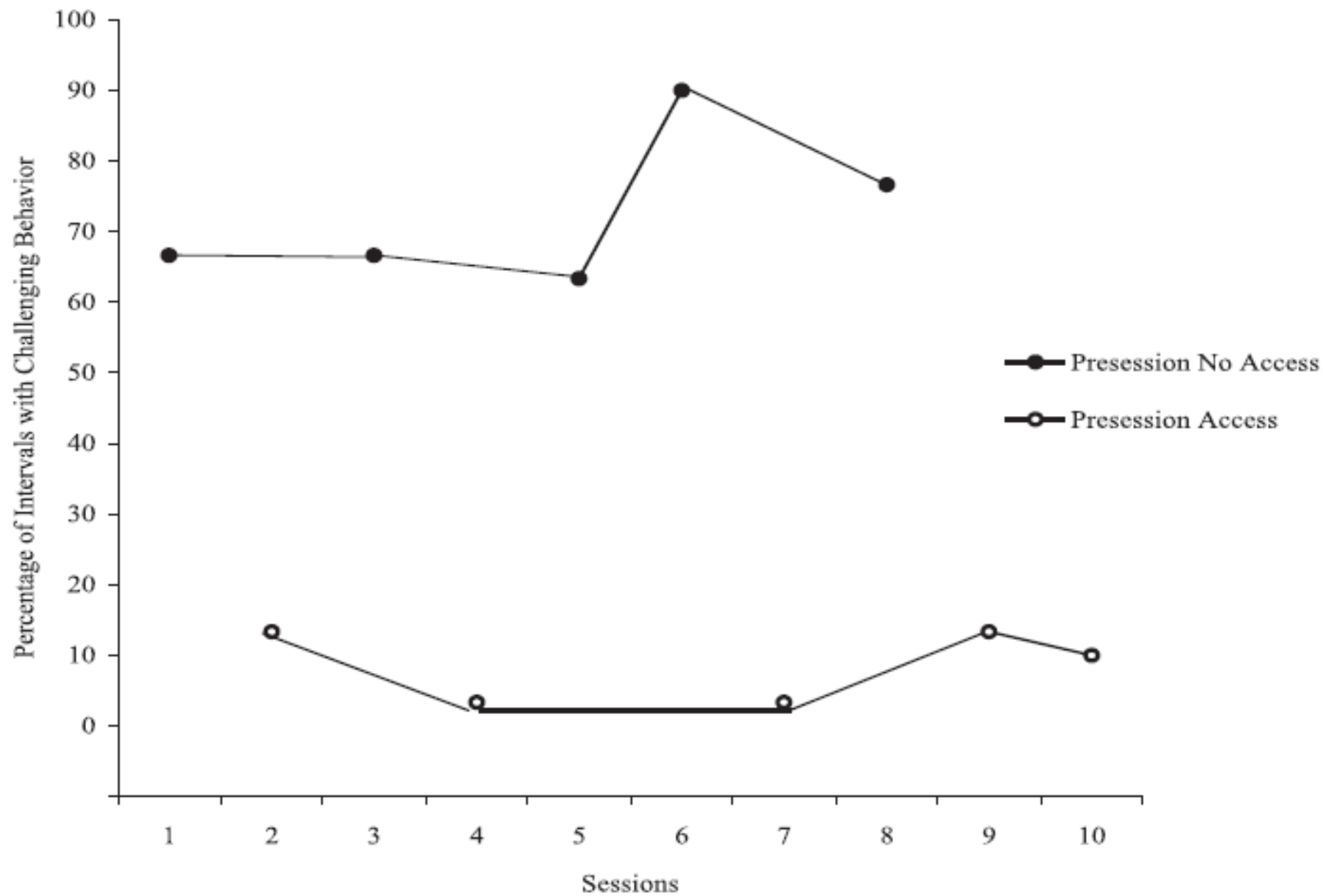
<sup>1</sup>The University of Texas at Austin, USA

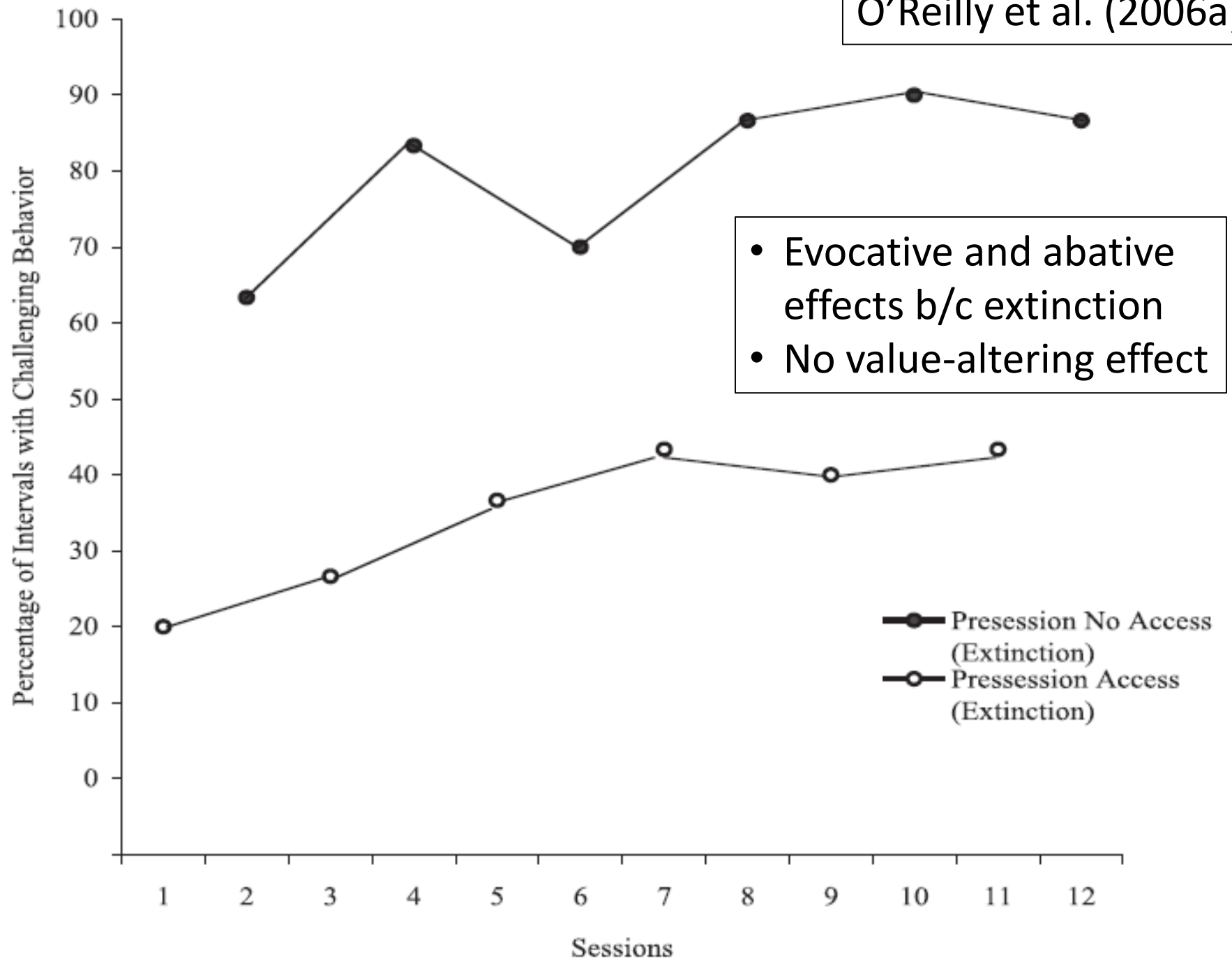
<sup>2</sup>University of Tasmania, Tasmania

<sup>3</sup>University of Bari, Italy

<sup>4</sup>Autism Treatment Center, San Antonio, USA







Children with problem behavior reinforced by **tangible reinforcers** – pre-session access to tangible reinforcers matter

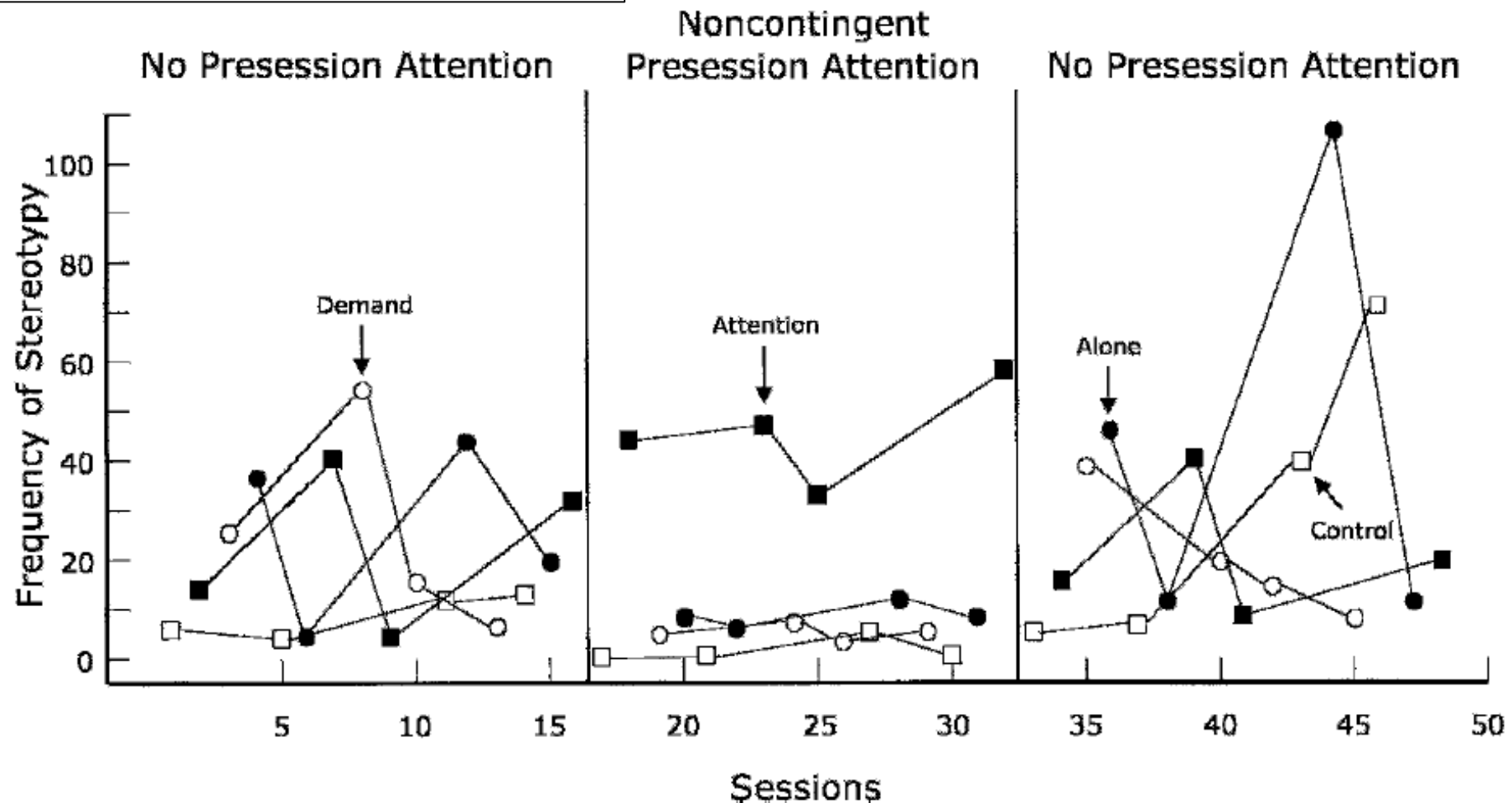
– (O'Reilly et al., 2006b)

Children with problem behavior reinforced by **edible reinforcers** – pre-session access to edible reinforcers matter (when child was engaged in classroom instruction in which preferred foods were visible but unavailable)

– O'Reilly et al. (2007a)

Roantree & Kennedy (2006)

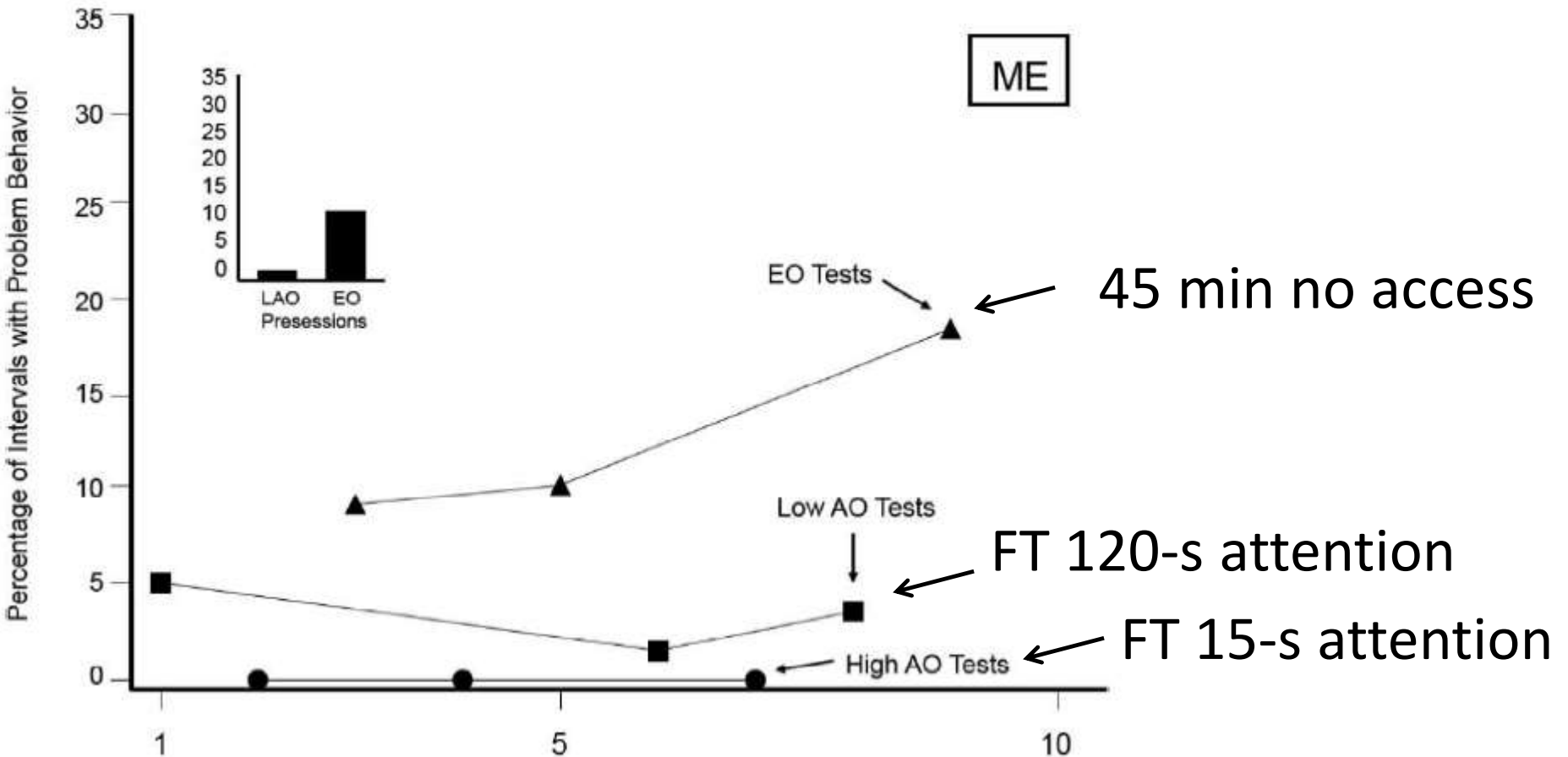
## Priming Reinforcer Sampling



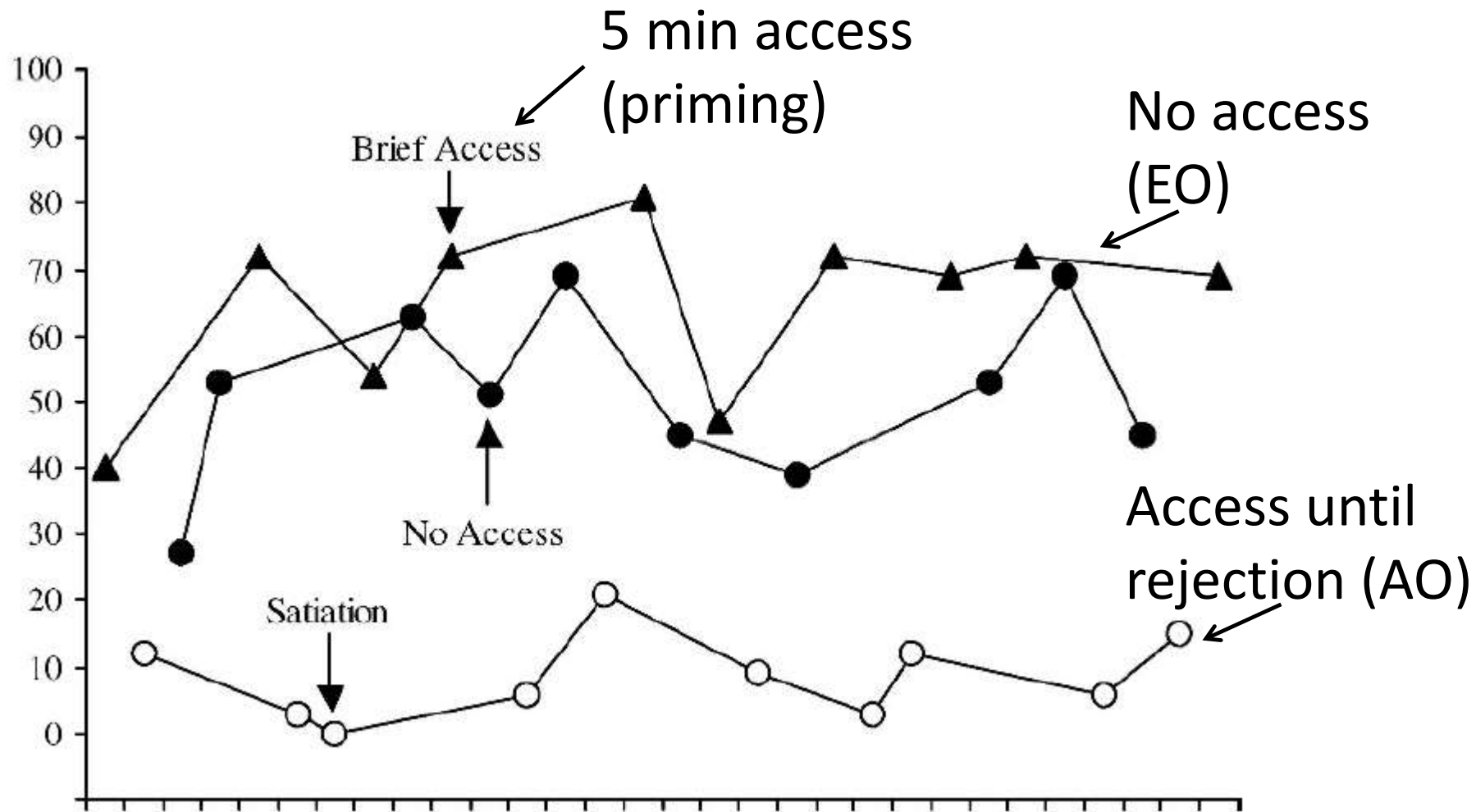


# Levels of MOs Matter

McGinnis et al. (2010)



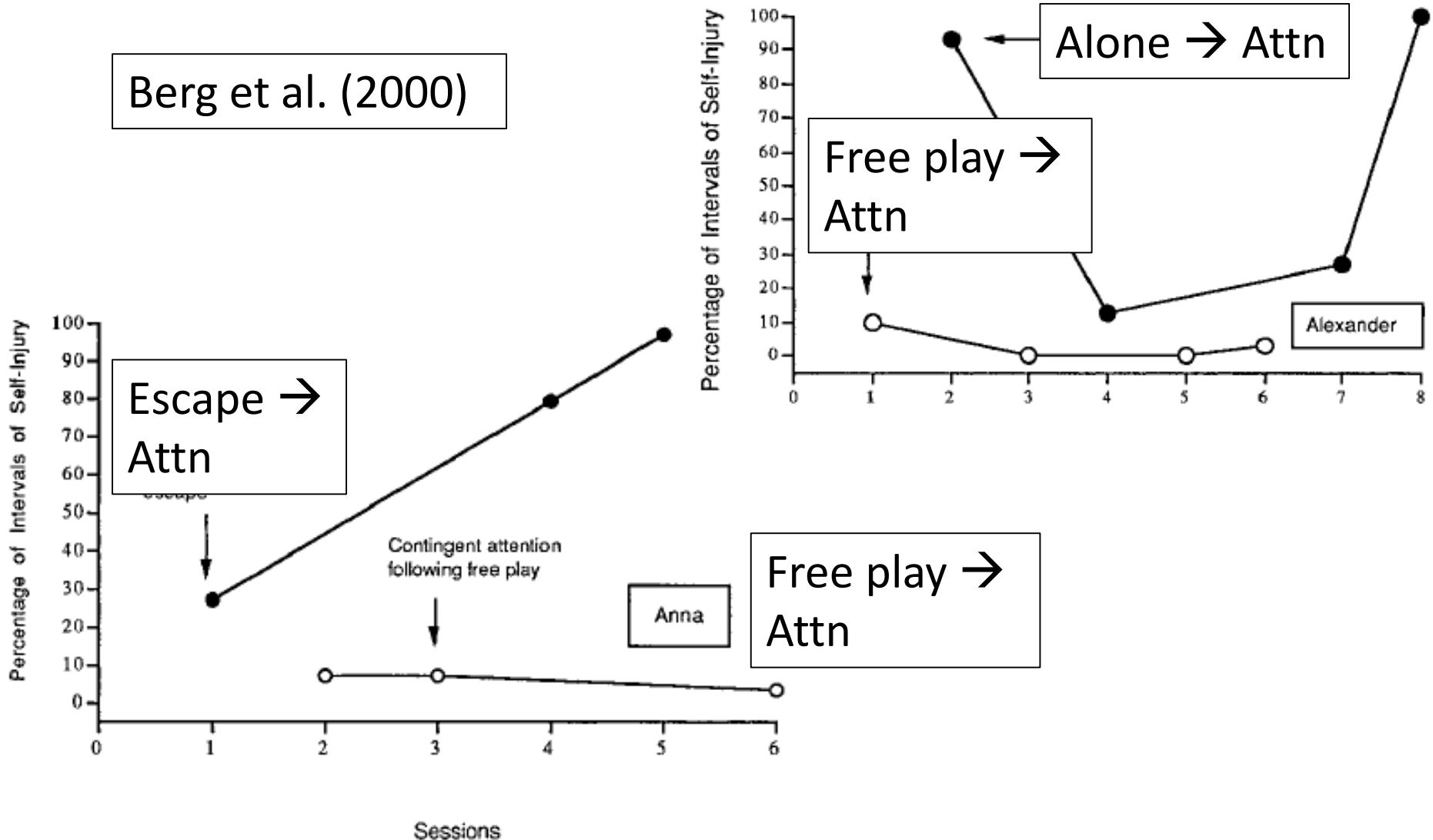
O'Reilly et al. (2009)



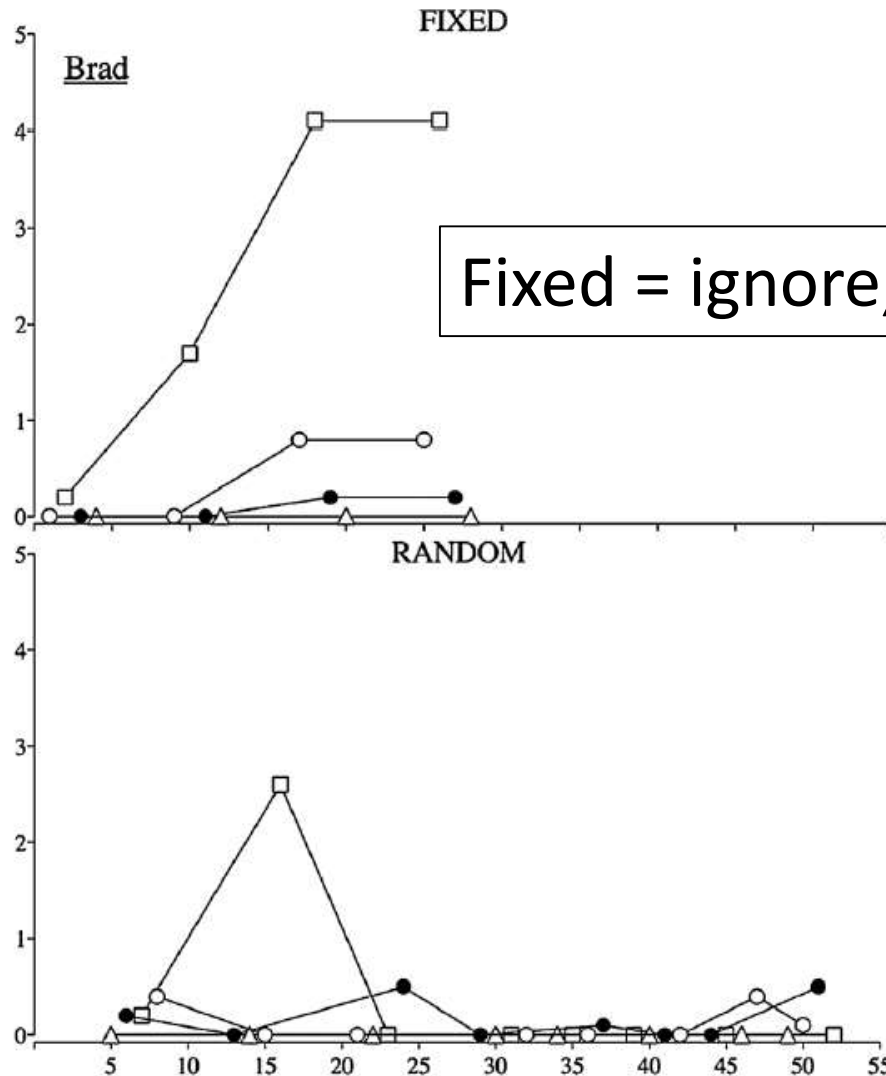
**The order of conditions in a functional analysis  
has implications for MOs and levels of problem  
behavior**

# Prior Sessions Affect Current Sessions

Berg et al. (2000)



# Condition Order Matters



Hammond et al. (2013)

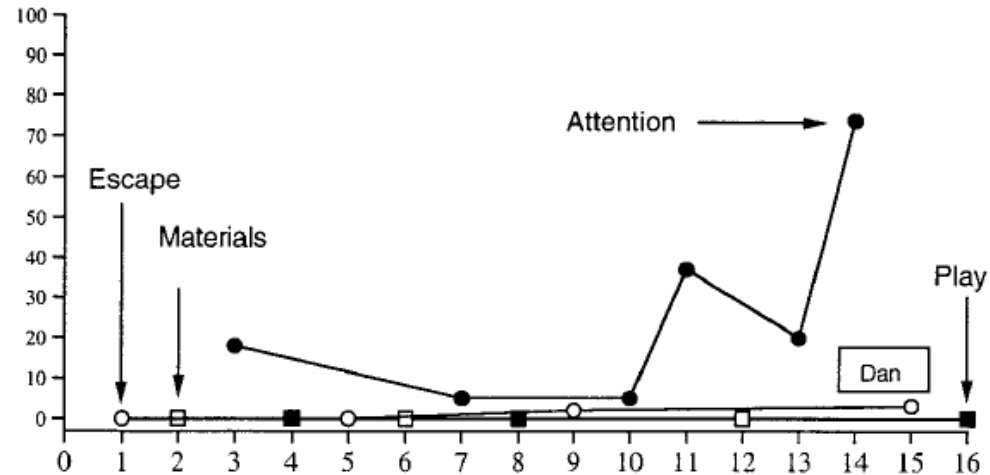
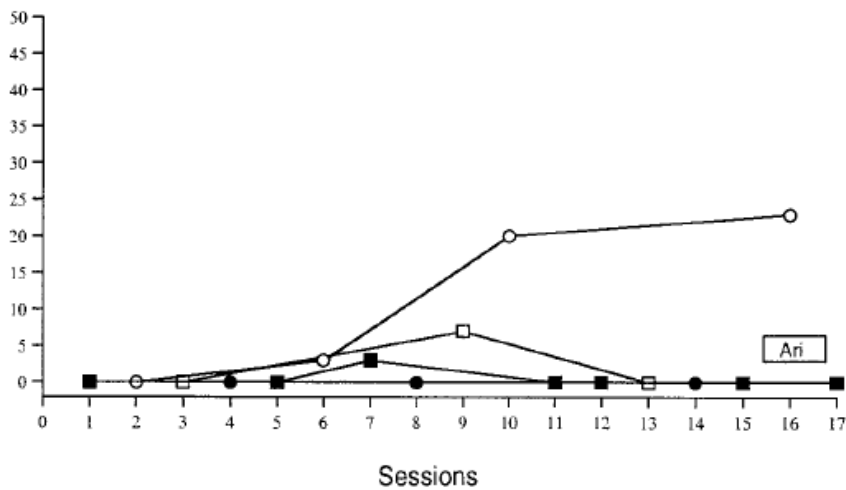
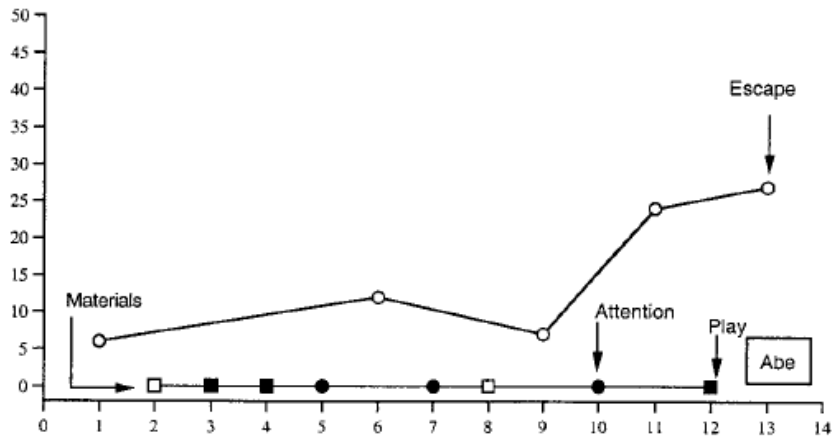
Fixed = ignore, attention, play, demand

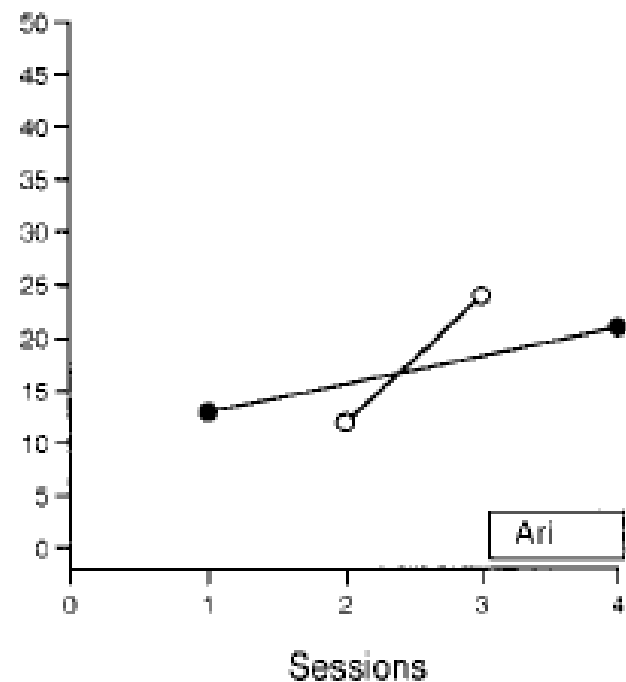
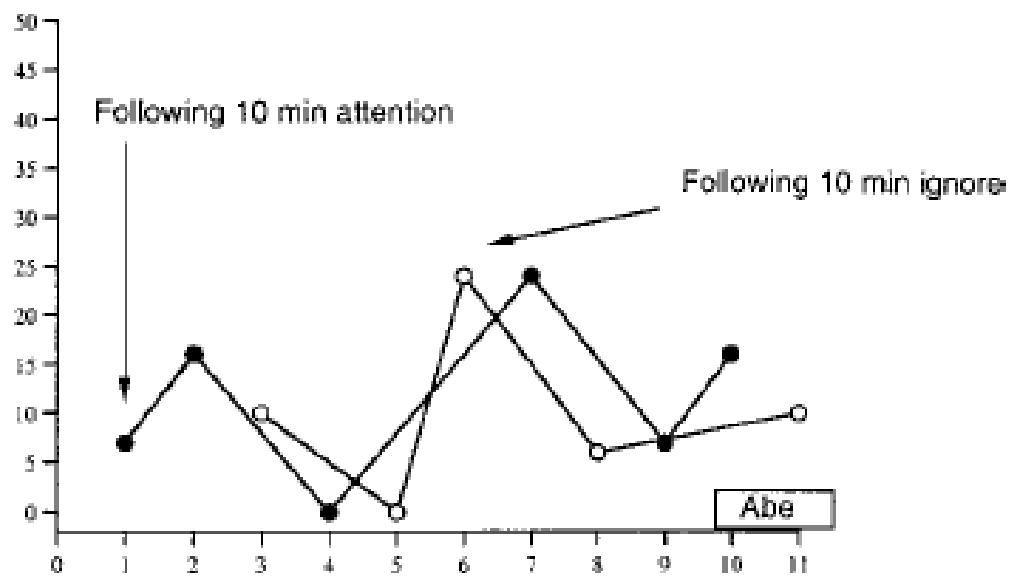
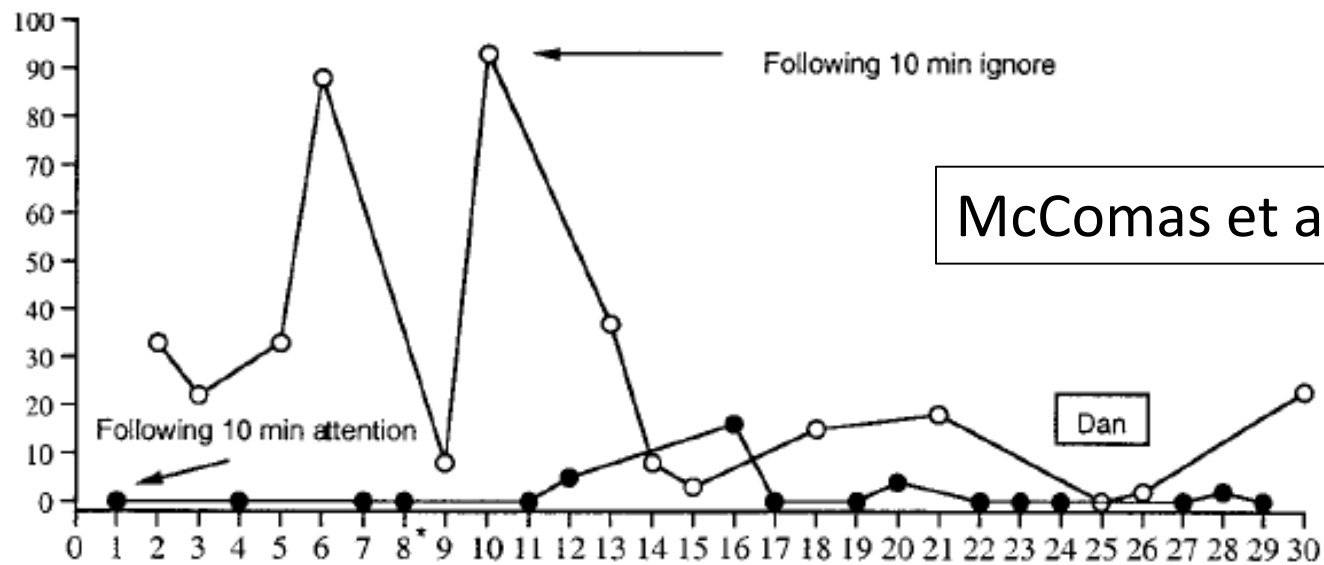
- Order made a difference for 4/8 participants
- More difference with attention than escape (build up of EO with attn)

# Functions Matter in Relation to MOs

McComas et al. (2003)

Percentage of Intervals with Problem Behavior





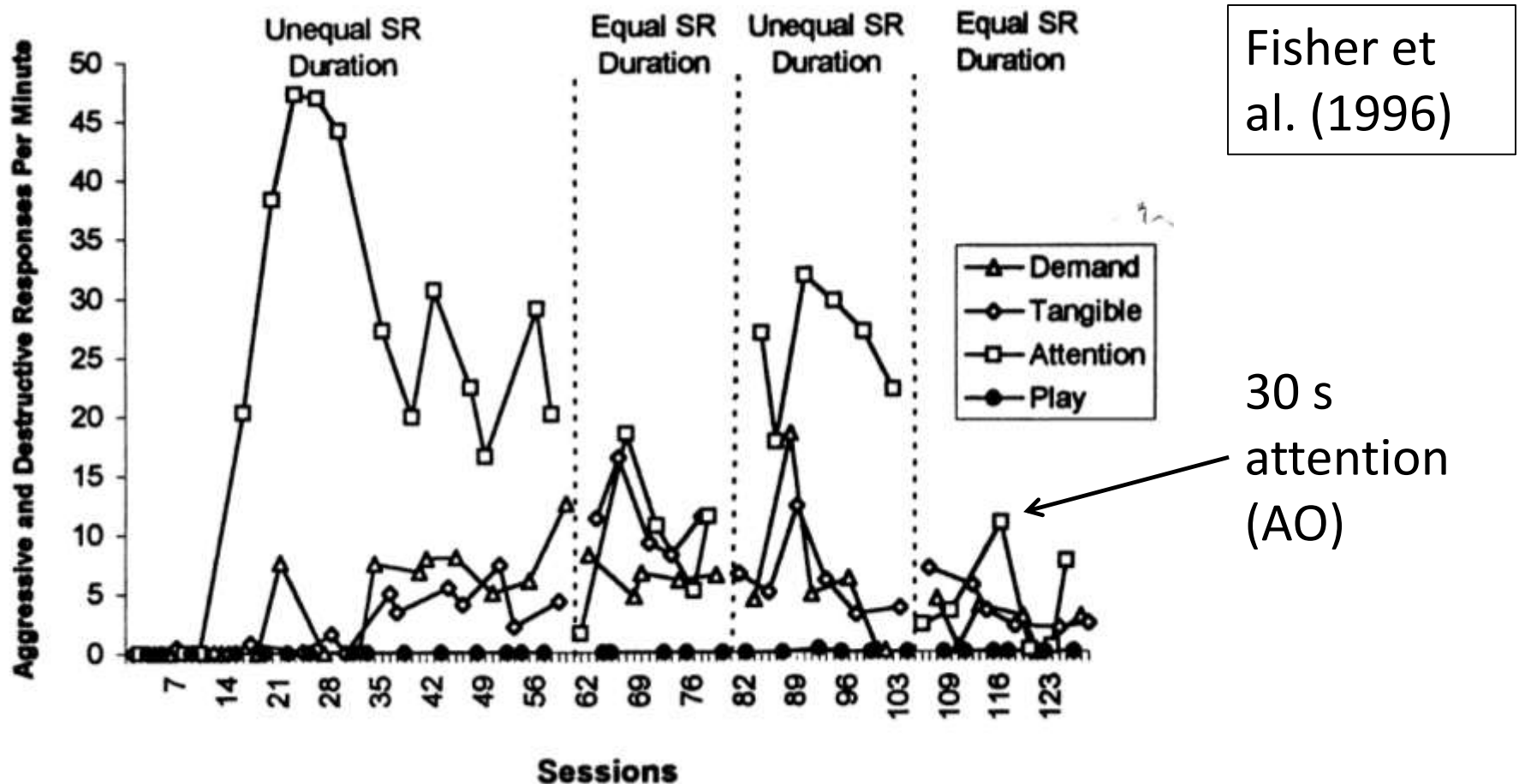
# **VI. Functional Analysis of Problem Behavior:**

## **Within-Session Analyses**



# Durations of Reinforcer Consumption as AO Affect FAs

Original FA: Attention (2-5 s); Escape (30 s)



# MOs and SR+ Affect Behavior

Fischer et al. (1997)

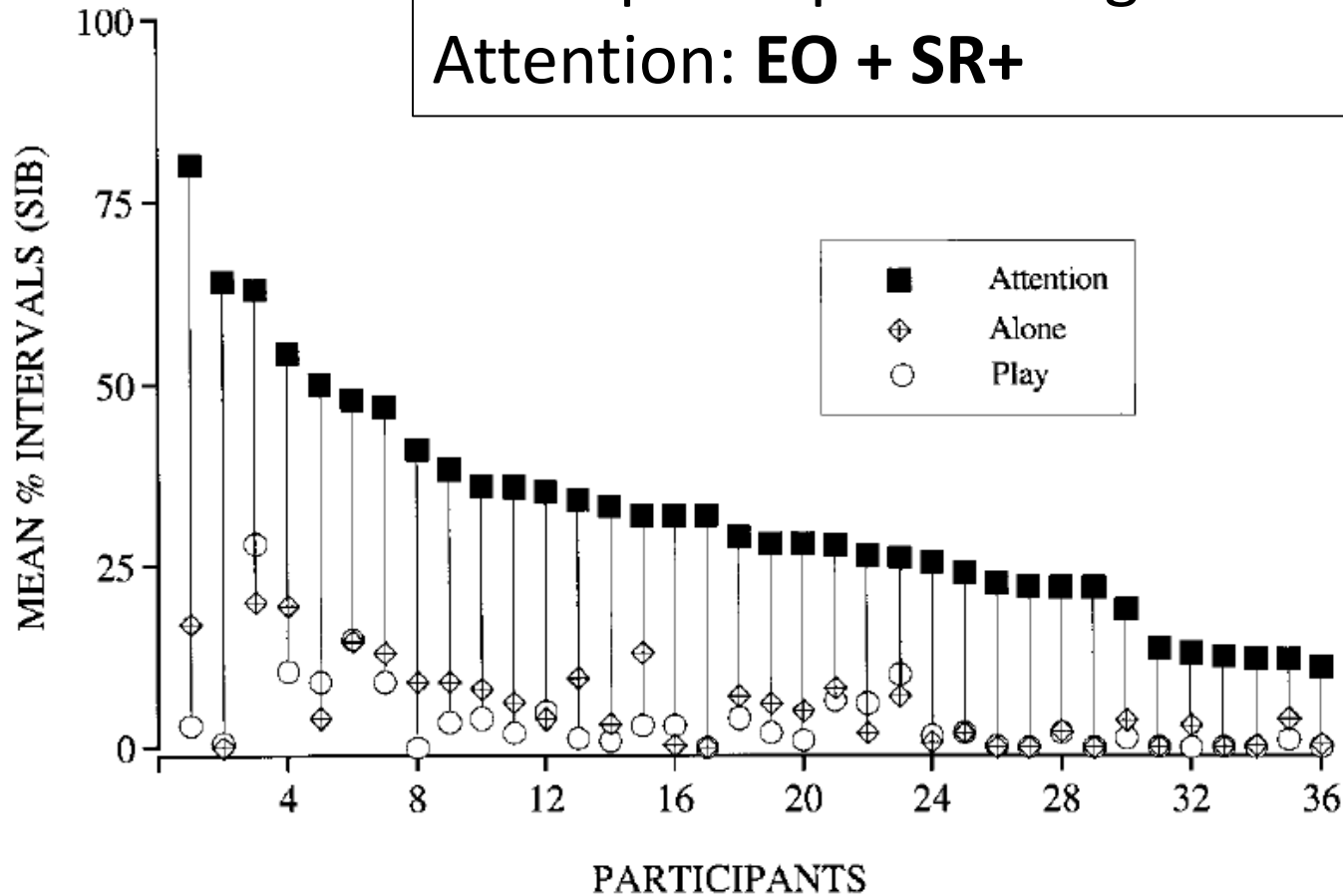
Attention condition: EO (withheld attention) and reinforcer (attention)

Alone condition: EO only, no reinforcer

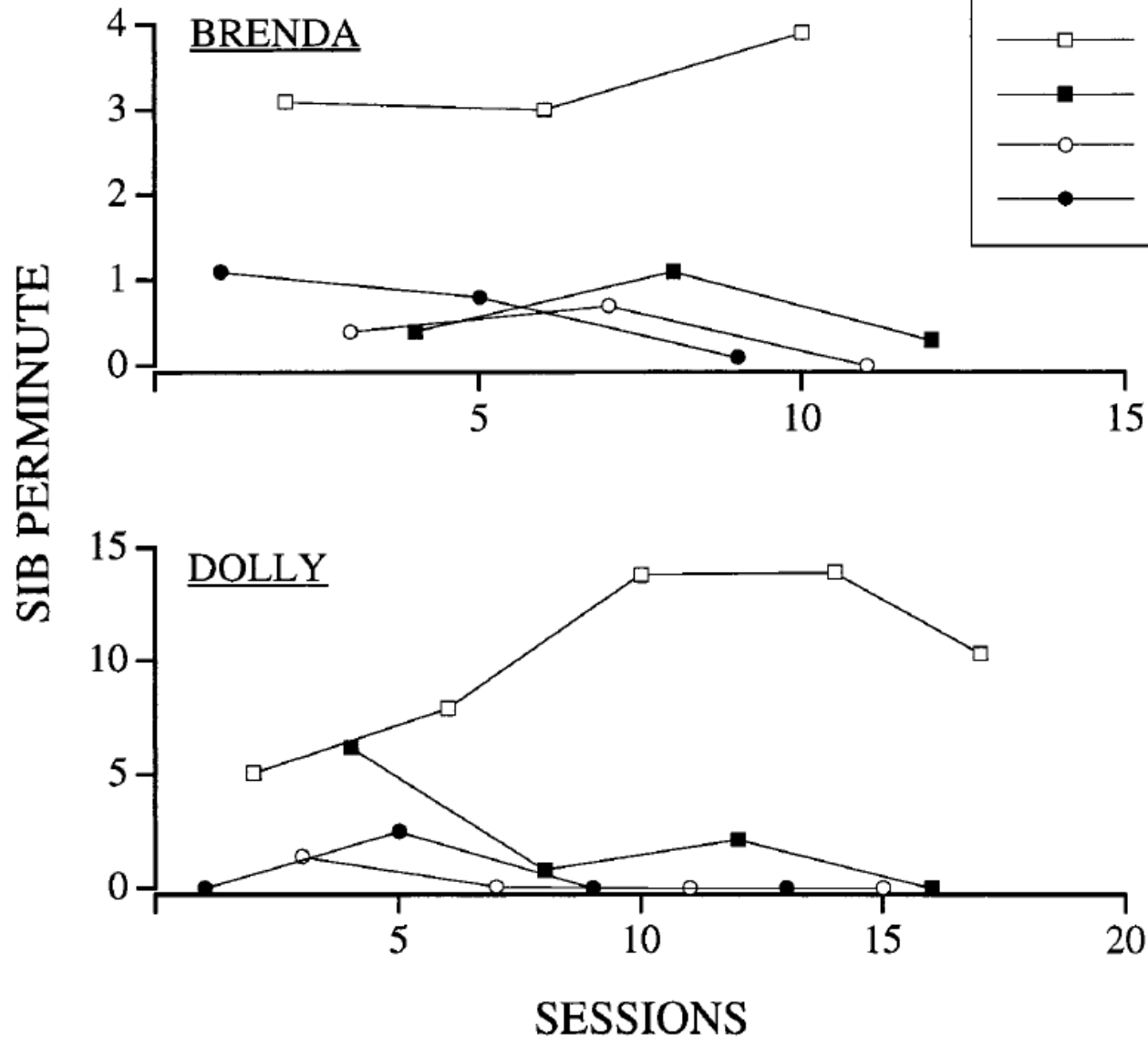
Play condition: no EO or reinforcer

Fischer et al. (1997)

All 36 participants – highest PB in  
Attention: **EO + SR+**

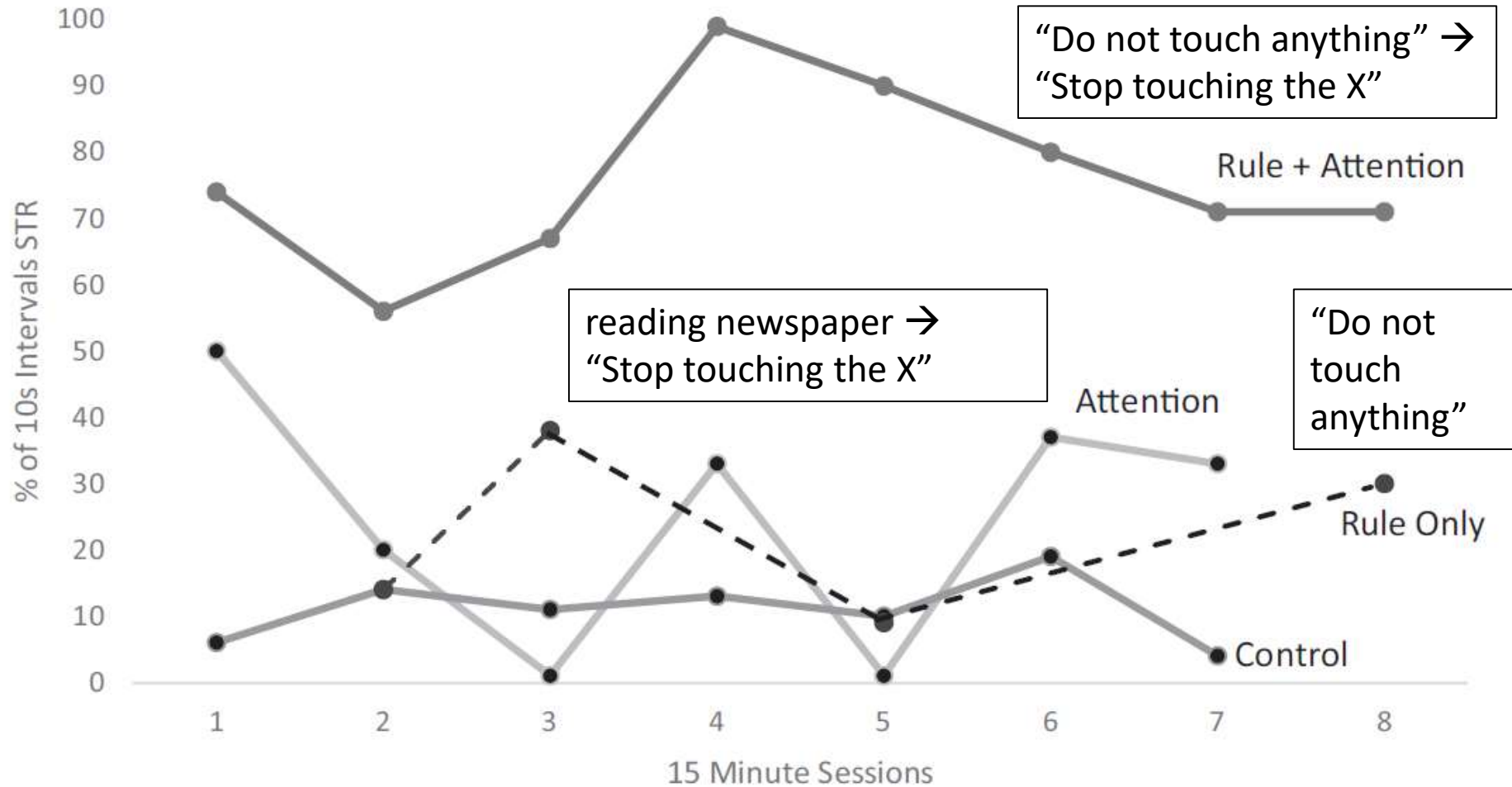


Worsdell et al. (2000)



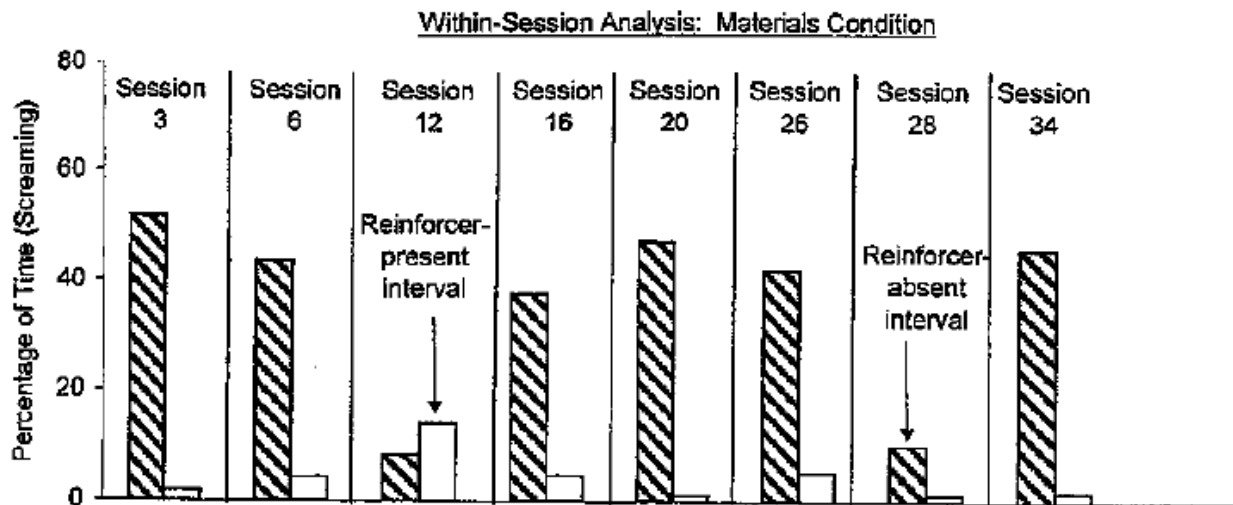
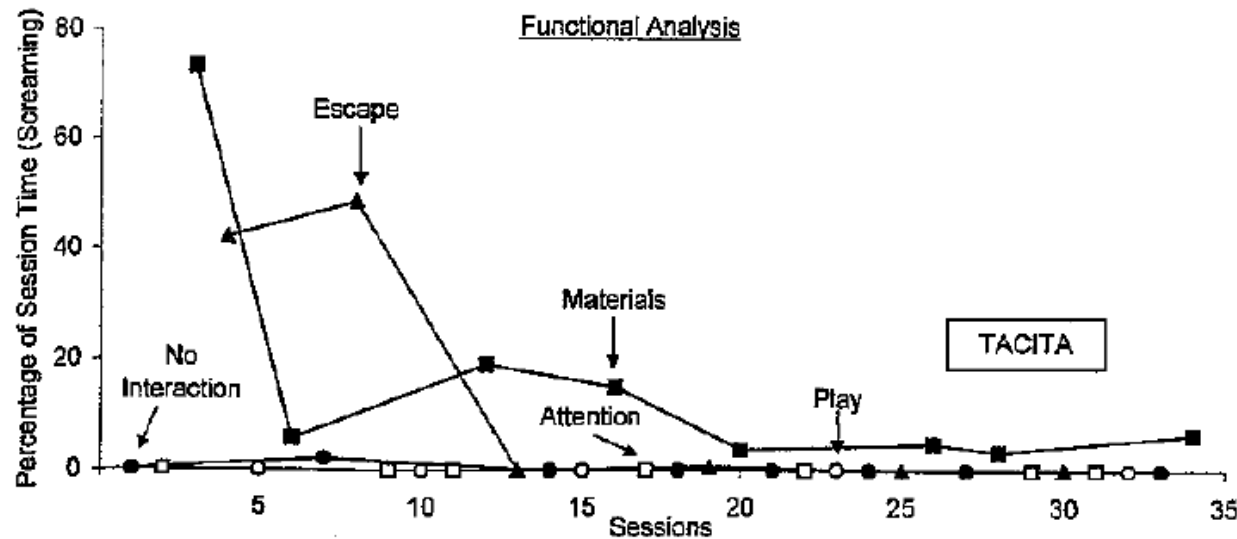
EO/SR+  
AO/SR+  
AO/Ext  
EO/Ext

Belfiore et al. (2016)



Rules may function as CEO-T increasing value of attention

# Examining Momentary MO Changes Can Clarify FA Results



Roane et al. (1999)

Initially  
undifferentiated  
results

Within-session  
analysis: more PB  
when reinforcer  
absent (EO)  
compared to  
reinforcer present  
(AO)

# Pay Attention to MOs Within FA Conditions

(Piazza, Hanley, Fisher, Ruyter, and Gulotta, 1998)

Problem behavior maintained by attention and escape

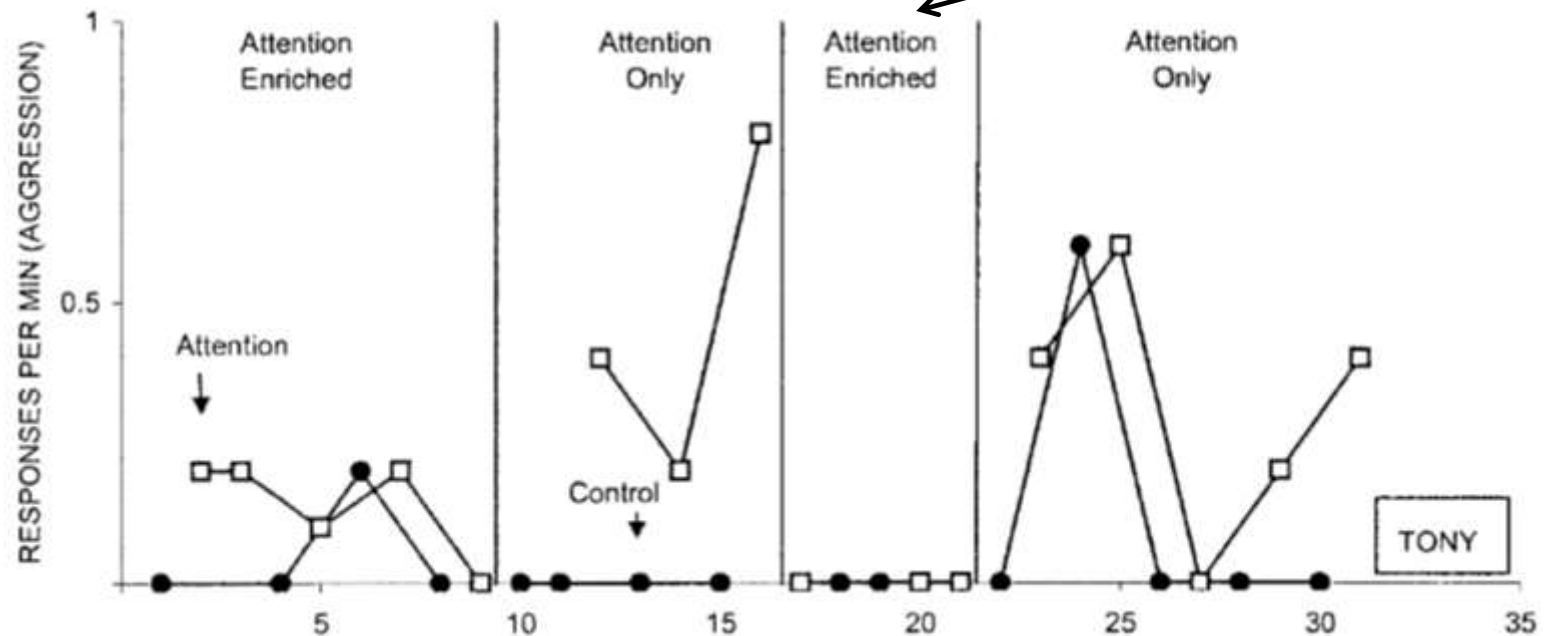
- Escape condition: remove demands →
- Remove demands: EO for attention

Treatment: Remove demands, add attention

# Additional Contingencies in FA Sessions may Serve as AOs

Ringdahl et al. (2002)

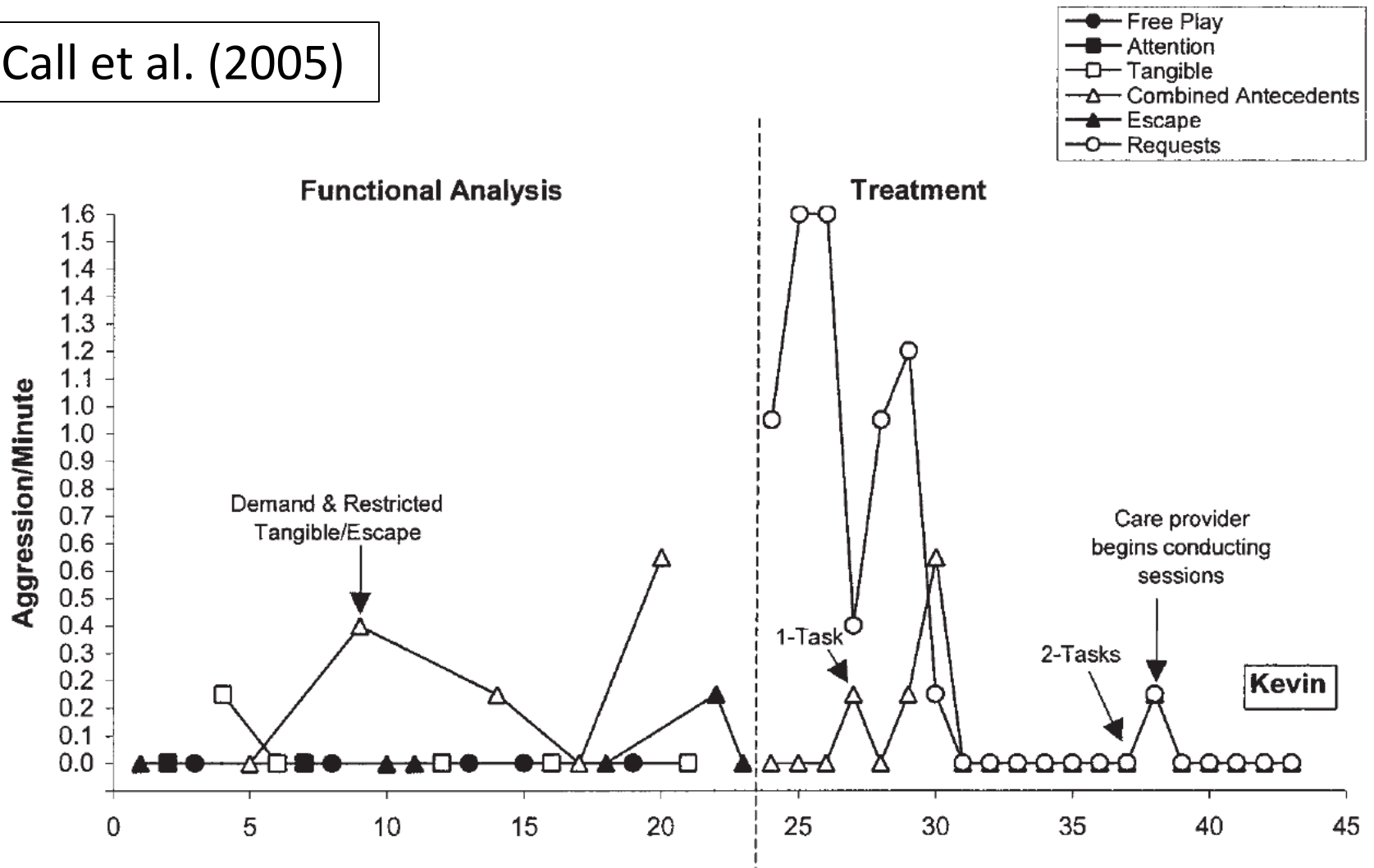
Noncontingent access to Preferred Tangibles



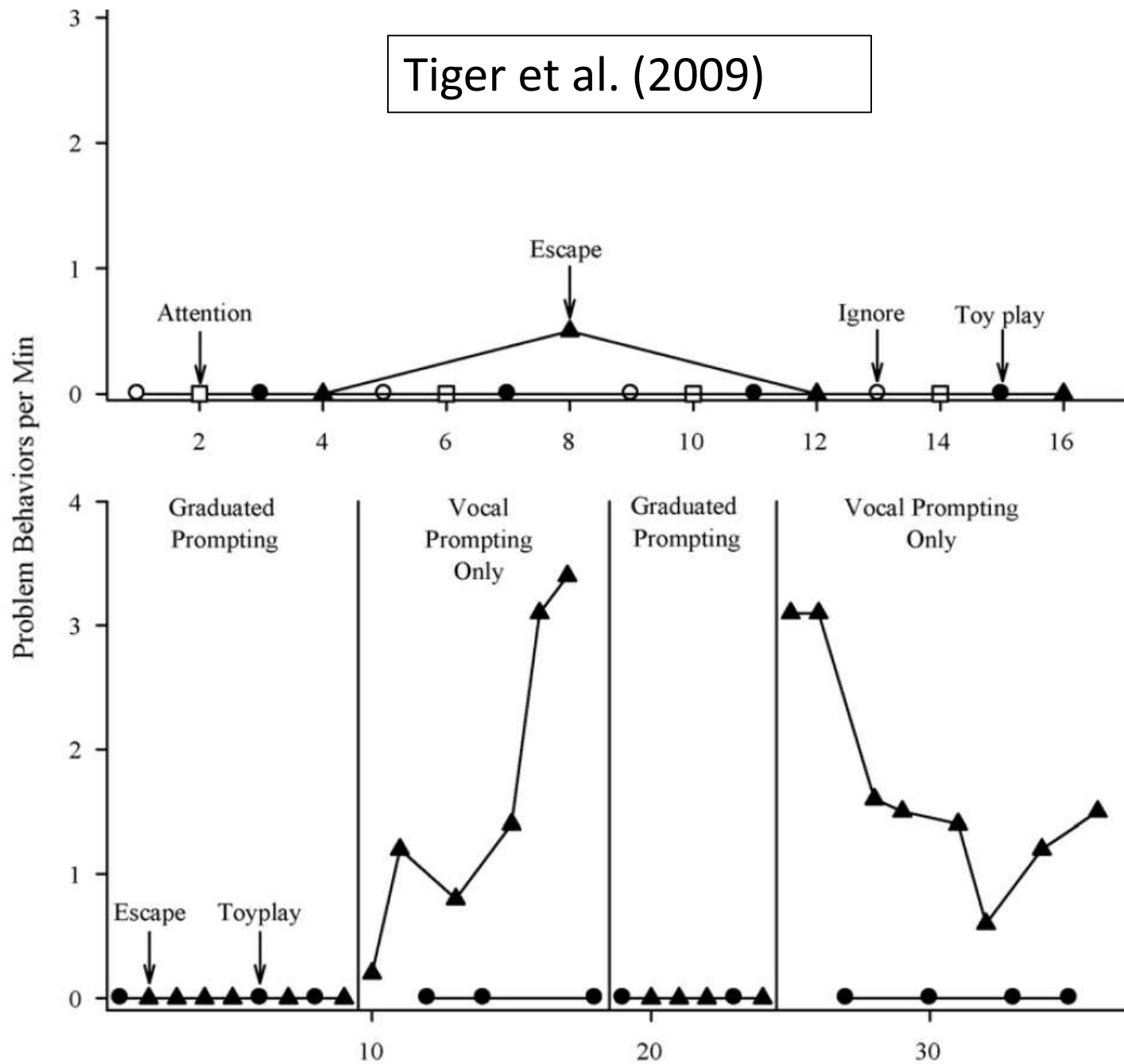


# Standard FA Conditions May be AOs

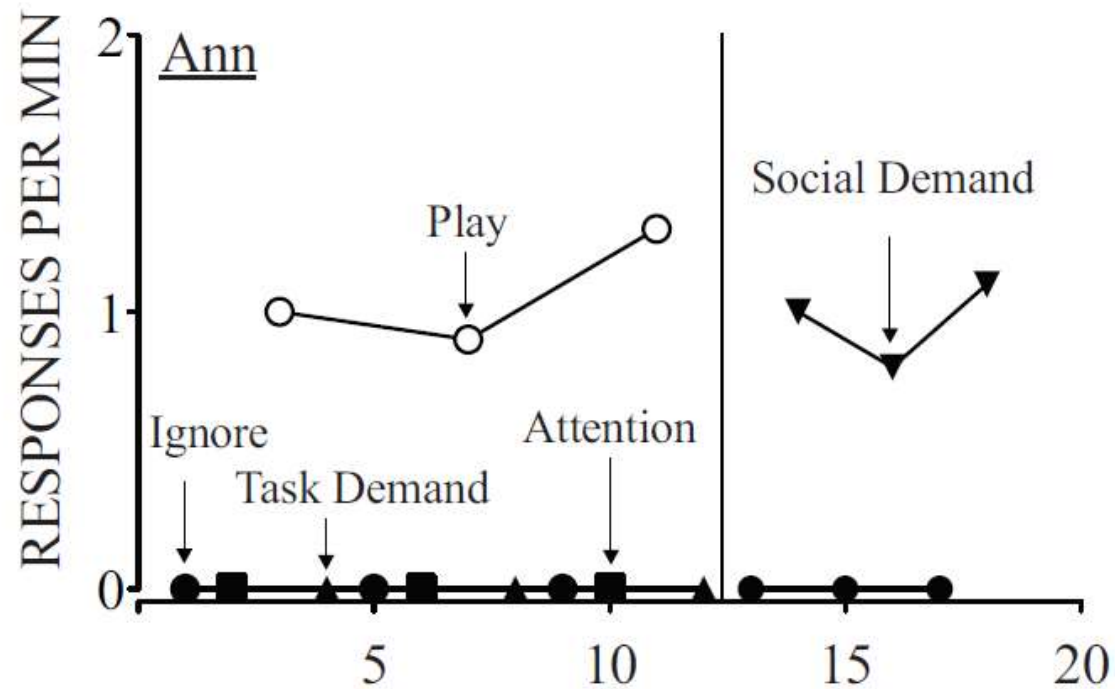
Call et al. (2005)

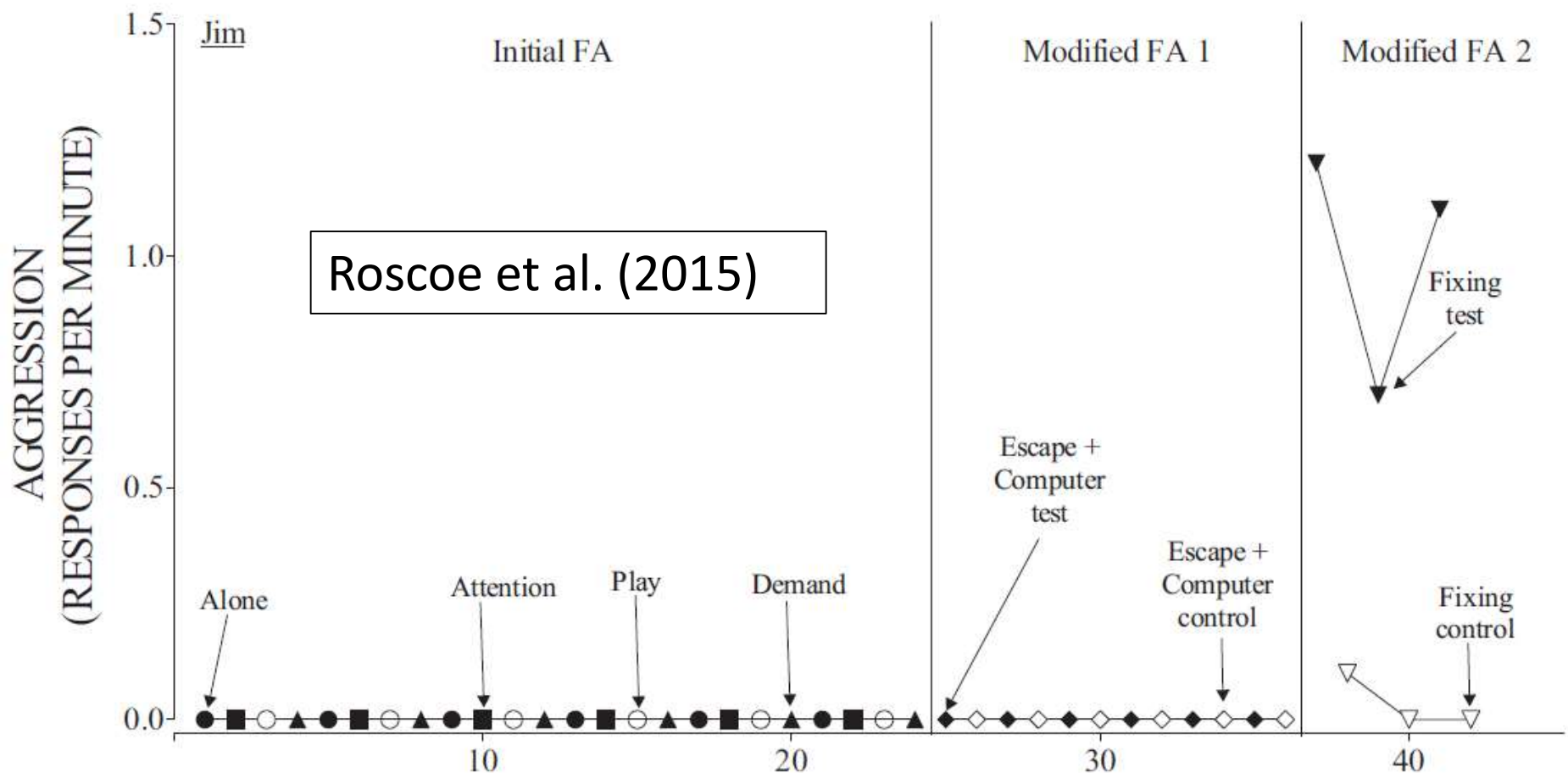


# Tiger et al. (2009)



Harper et al. (2013)





- Indirect assessment (close-ended, open-ended) → modified FA
- Questions about idiosyncratic variables identified EOs and SR+
- Recommendation: first standard FA, then interview-informed FA
  - I disagree – start with open-ended interview to inform FA

*PRODUCING MEANINGFUL IMPROVEMENTS IN PROBLEM  
BEHAVIOR OF CHILDREN WITH AUTISM VIA SYNTHESIZED  
ANALYSES AND TREATMENTS*

GREGORY P. HANLEY, C. SANDY JIN, NICHOLAS R. VANSELOW, AND  
LAURA A. HANRATTY

WESTERN NEW ENGLAND UNIVERSITY

Problem behaviors like self-injury, aggression, or disruption will likely require intervention at some point in the life of a person diagnosed with autism. Behavioral intervention has been proven to be effective for addressing these problems, especially when a functional assessment is conducted. Comprehensive treatment for problem behavior is, however, often fractured across studies, resulting in a dearth of studies that show socially validated improvements in these problem behaviors or illustrate the assessment and treatment process from start to finish. In this article, we describe an effective, comprehensive, and parent-validated functional assessment and treatment process for the severe problem behaviors of 3 children with autism. After an 8- to 14-week outpatient clinic consultation, no problem behavior was observed at the clinic and in the home. Furthermore, behavior that did not occur during baseline (e.g., functional communication, delay and denial tolerance, and compliance with instructions) occurred with regularity.

*Key words:* autism, compliance, delay tolerance, functional analysis, open-ended interviews, functional communication, severe problem behavior, social validity

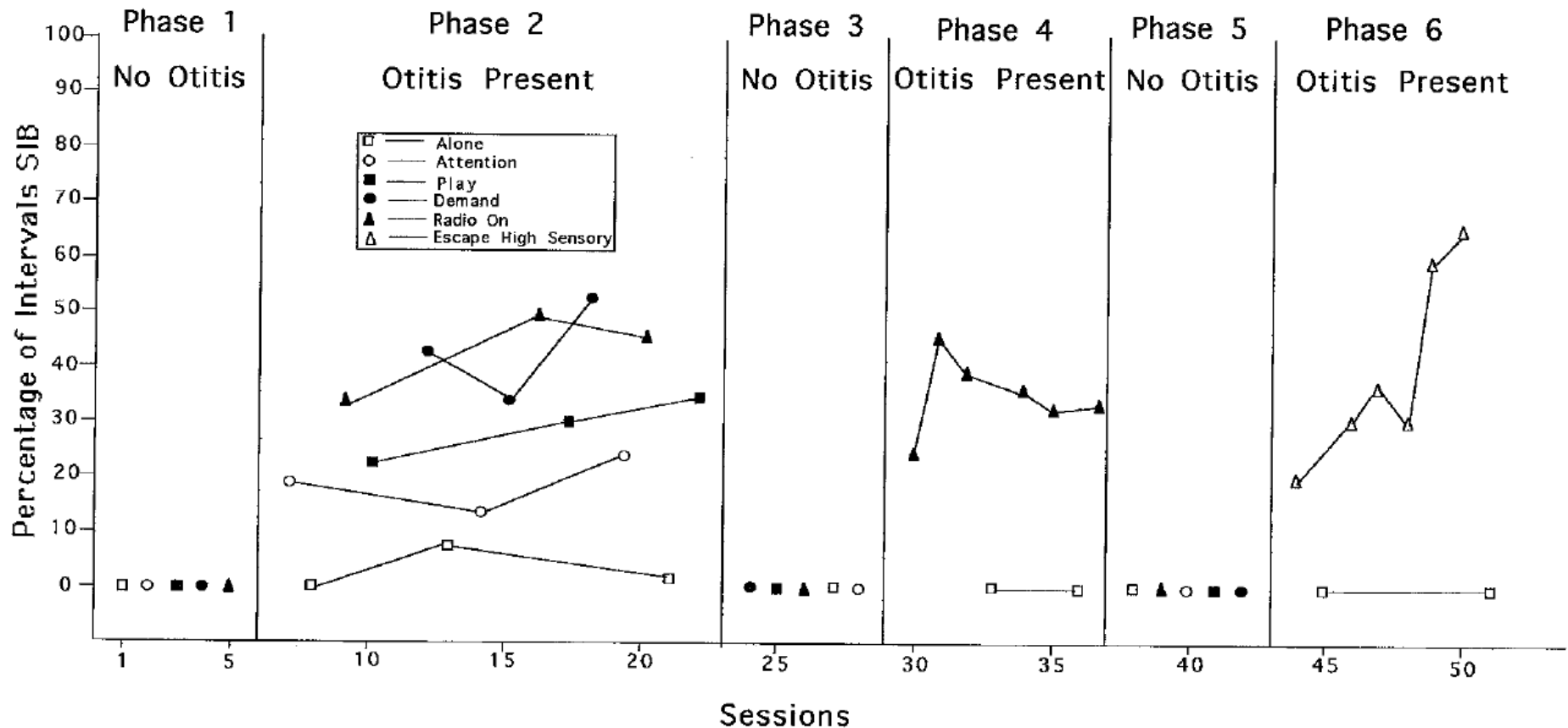
# Open-Ended Indirect Assessment

(Roscoe et al., 2015)

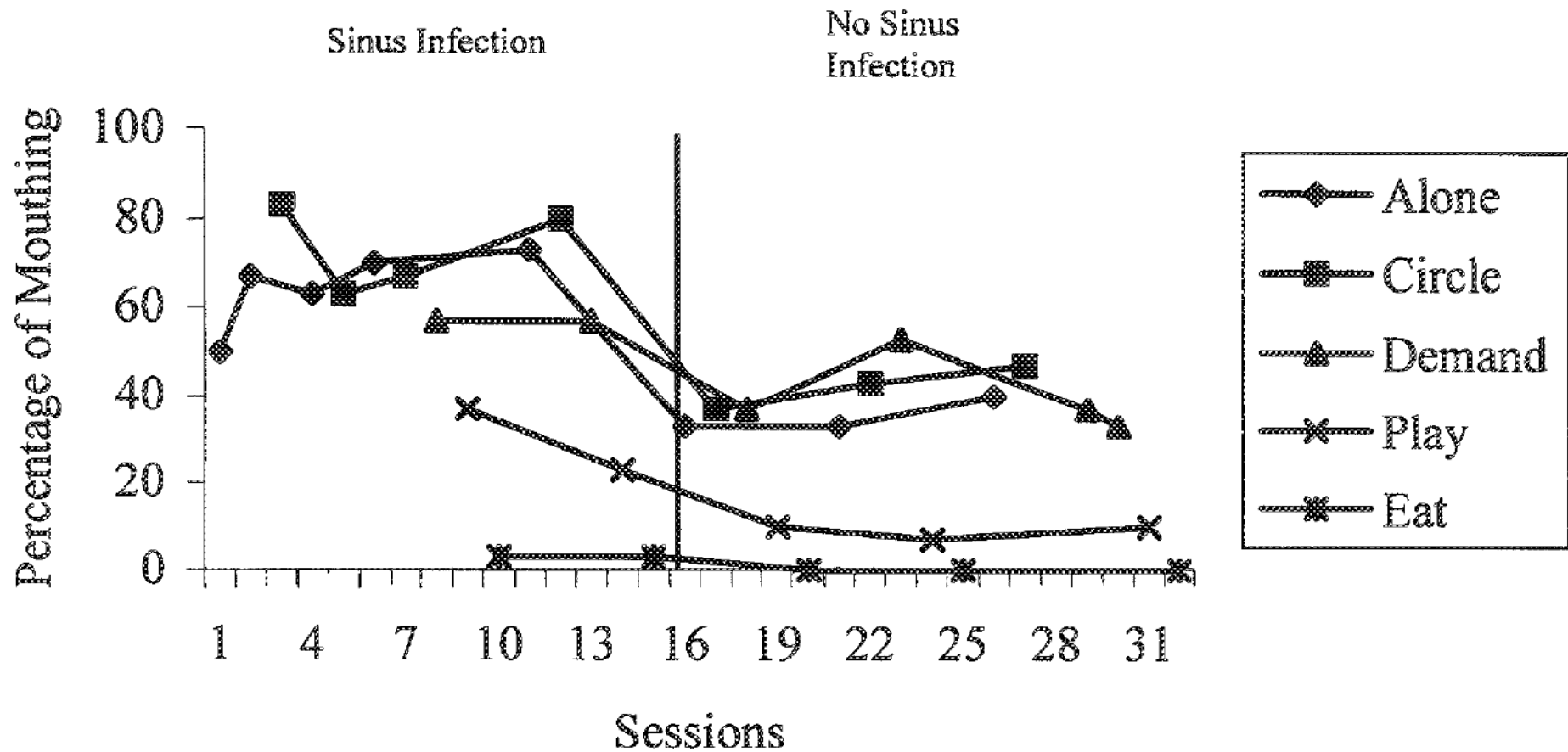
- What is the context in which [behavior] occurs most consistently?
- What is it about that context that seems to bring about or cause the behavior?
- When [behavior] occurs, how do you or others typically respond?
- When the individual exhibits [behavior], what do you or others do to help calm him or her?
- What do you think he or she is trying to communicate or achieve with his or her [behavior], if anything?

# Biological Variables May Function as MOs During FAs

O'Reilly (1997)



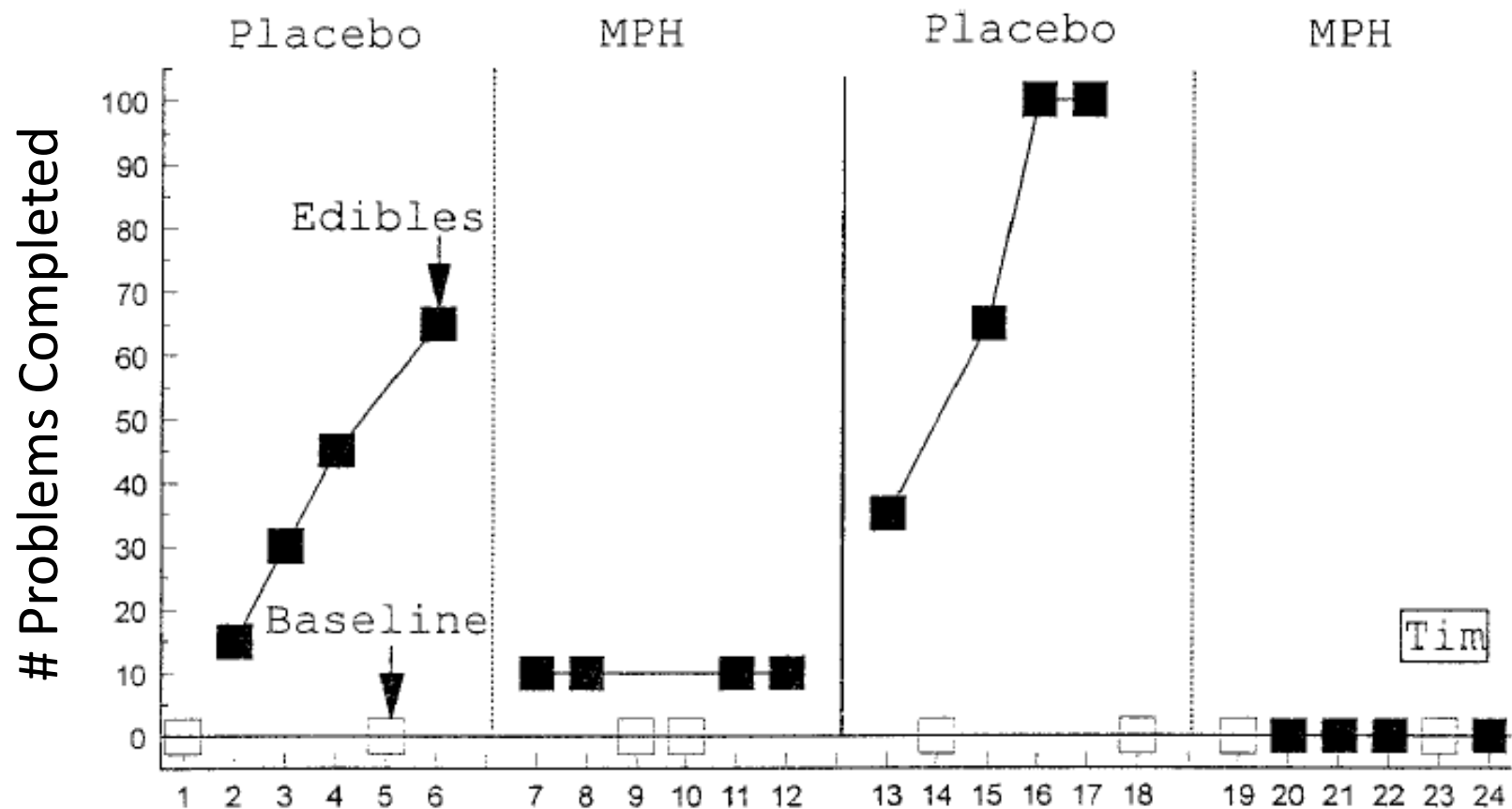
# Lohrmann-O'Rourke & Yurman (2001)



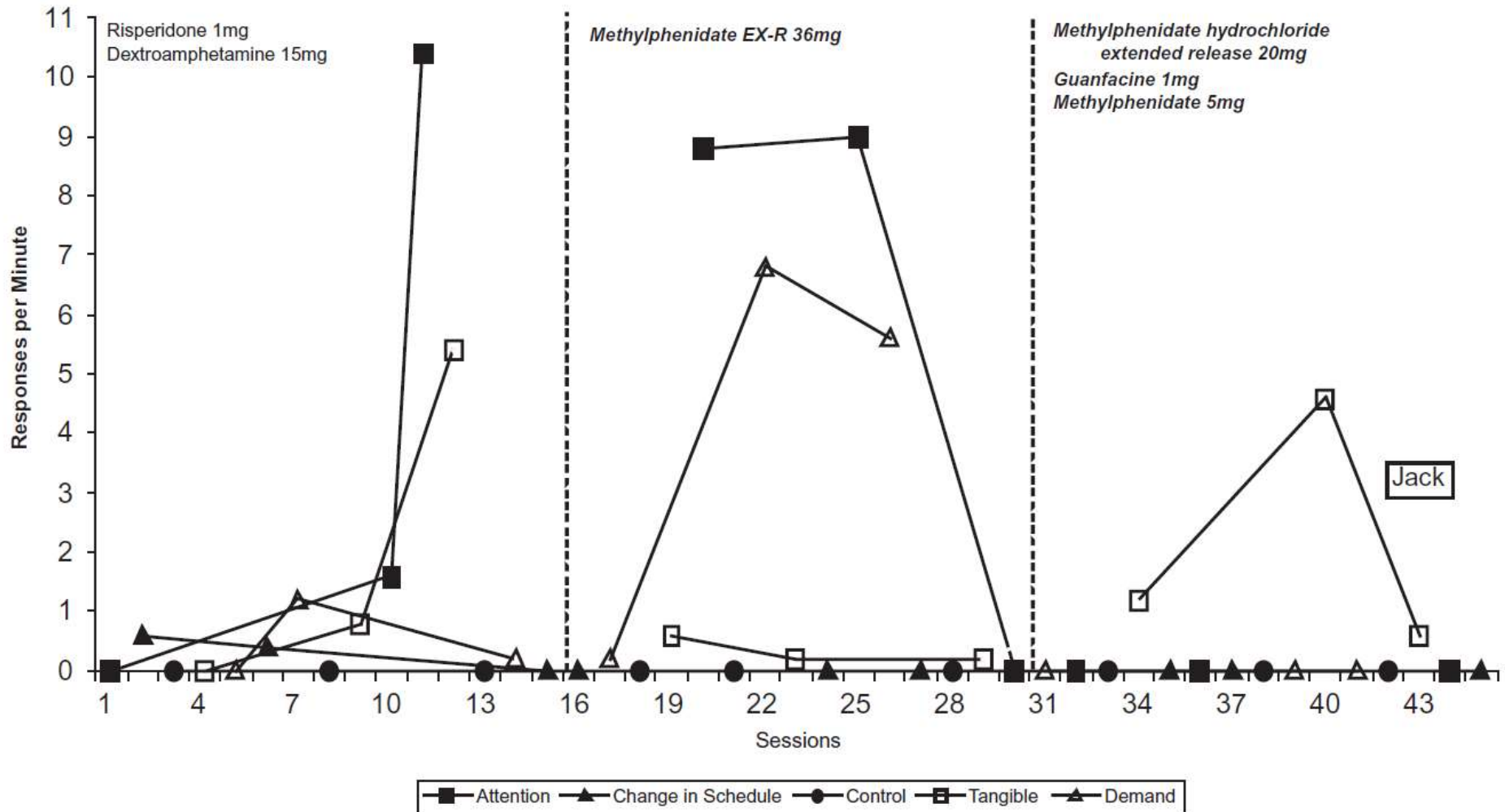


Northup et al. (1997)

Methylphenidate decreased the value of edibles as reinforcers in the context of math problem completion



# Valdovinos et al. (2009)



## On the Distinction Between the Motivating Operation and Setting Event Concepts

Melissa R. Nosik<sup>1</sup> · James E. Carr<sup>1</sup>

© Association for Behavior Analysis International 2015

**Abstract** In recent decades, behavior analysts have generally used two different concepts to speak about motivational influences on operant contingencies: *setting event* and *motivating operation*. Although both concepts still appear in the contemporary behavior-analytic literature and were designed to address the same antecedent phenomena, the concepts are quite different. The purpose of the present article is to describe and distinguish the concepts and to illustrate their current usage.

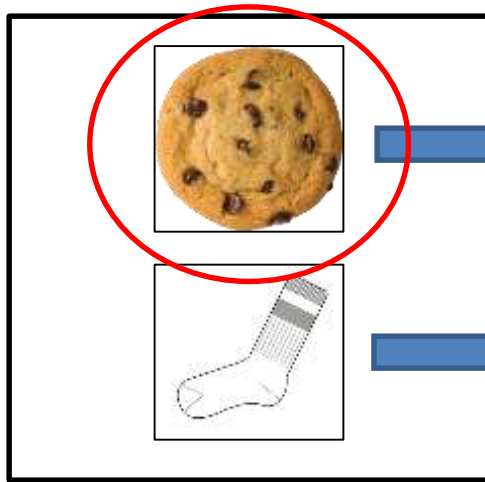
**Keywords** Abolishing operation · Establishing operation · Interbehaviorism · Motivating operation · Radical behaviorism · Setting event · Setting factor

**MOs are more influential than S<sup>D</sup>s**

(Mand Training and Functional Analysis)

# Need EO, Not Just $S^D$ , to Evoke Mands

Gutierrez et al., 2007; Gutierrez, Vollmer, & Samaha, 2010



Get a cookie



No cookie

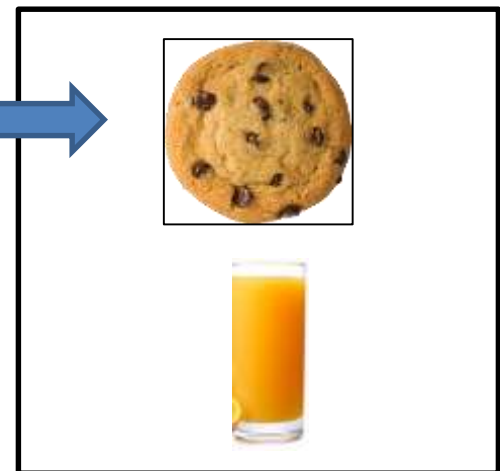
EO: Restricted  
access to cookie

AO: Free access  
to juice

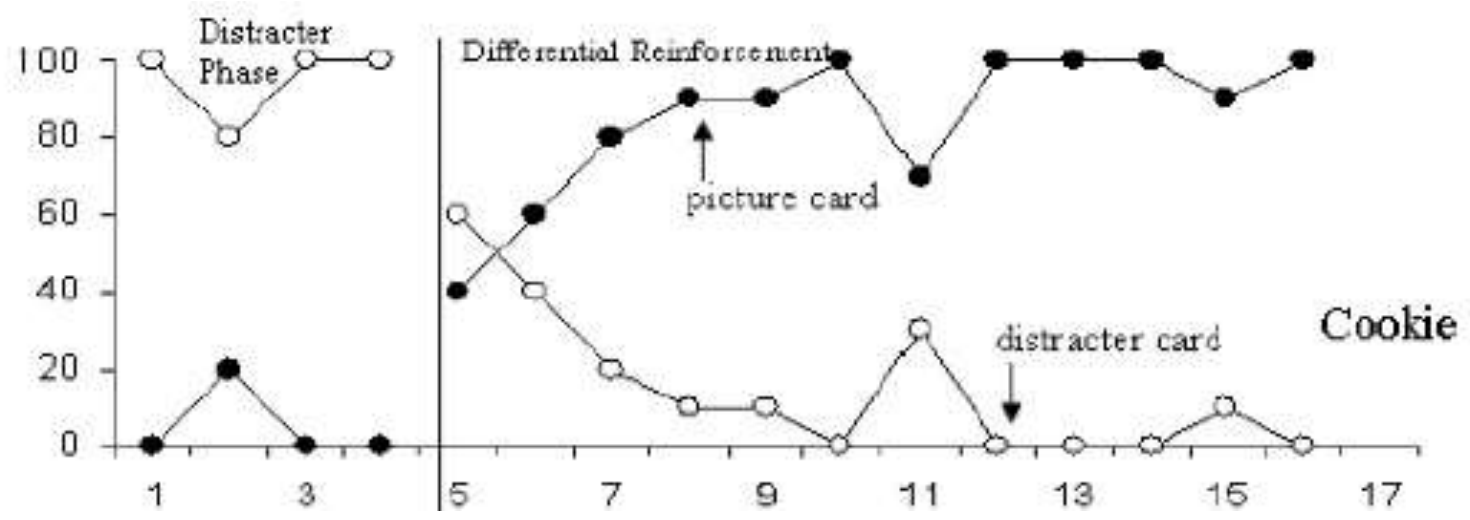
Mand



No mand

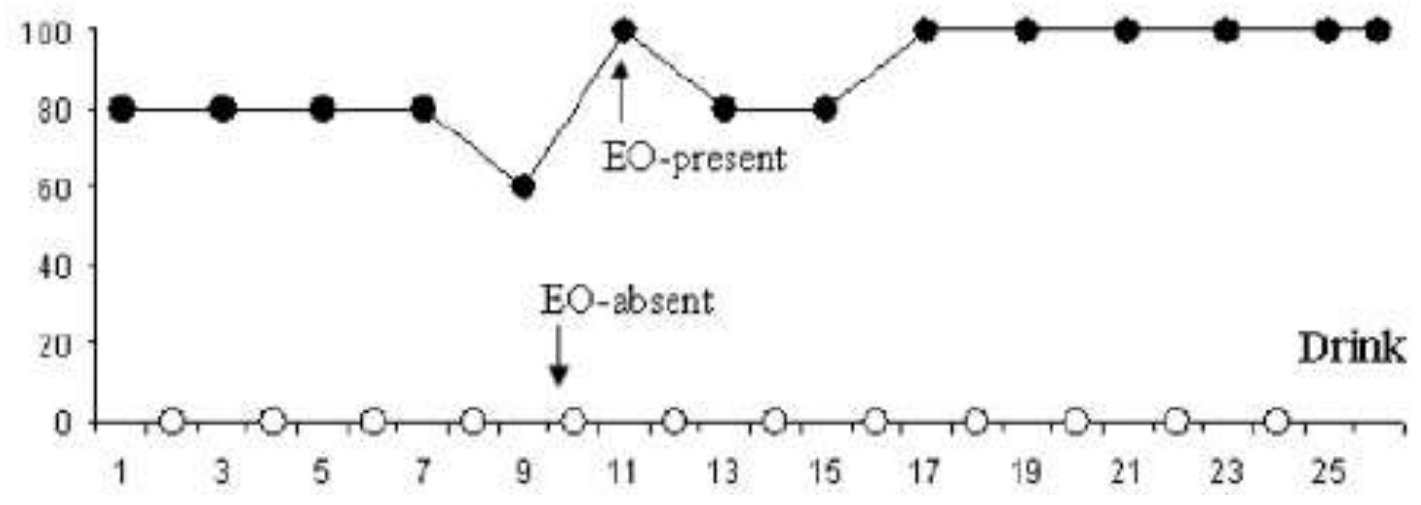


Percentage of Trials with

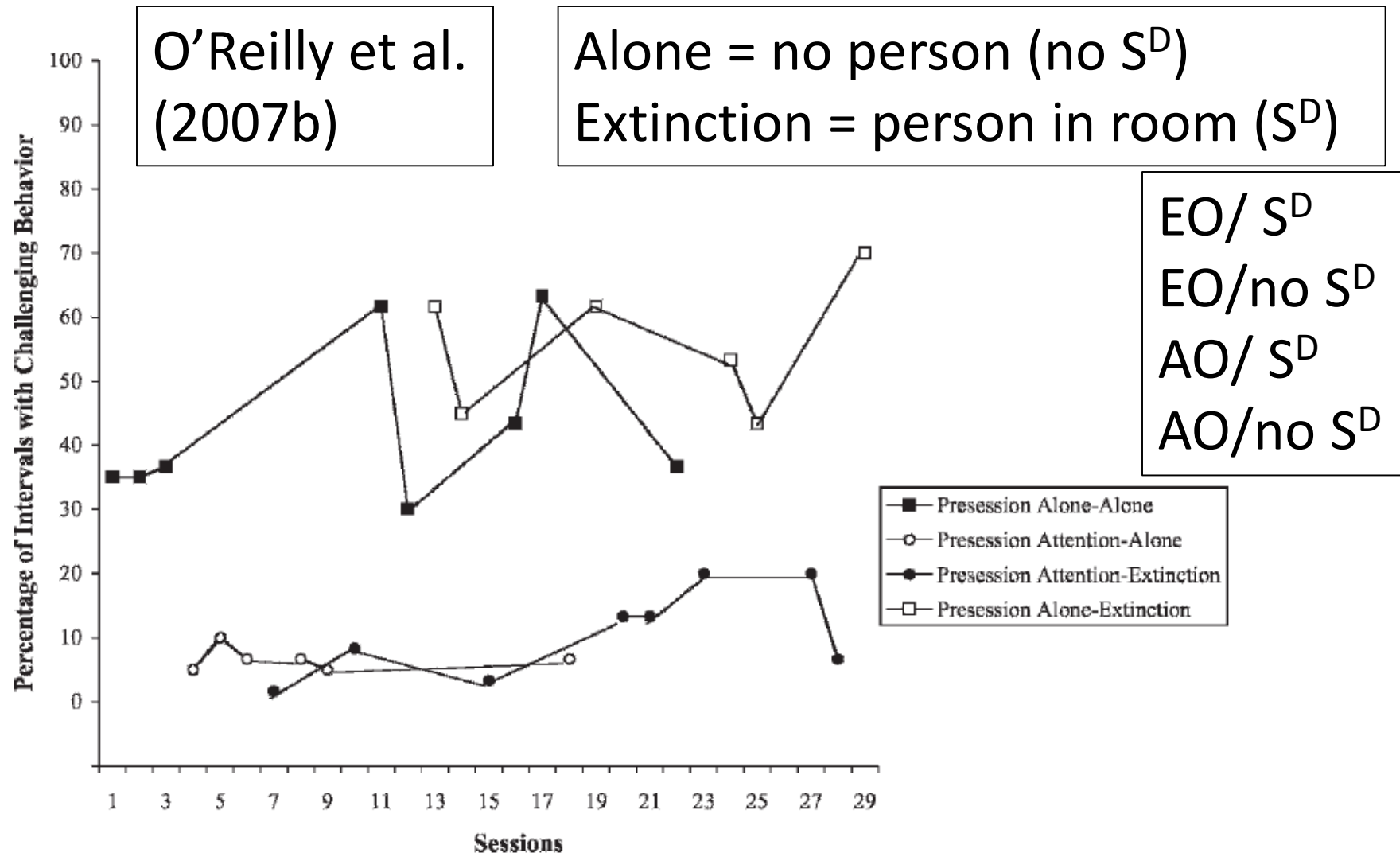


### Establishing Operations Manipulation

Percentage of Trials with



# MOs Exert More Control Over Problem Behavior than S<sup>D</sup>s



# Edrisinha et al. (2011)

## Motivative

- EO – no pre-session access
- AO – pre-session access

## Discriminative

- Green bowl → food
- Red bowl → no food
- Expectant → attn
- Busy → no attn

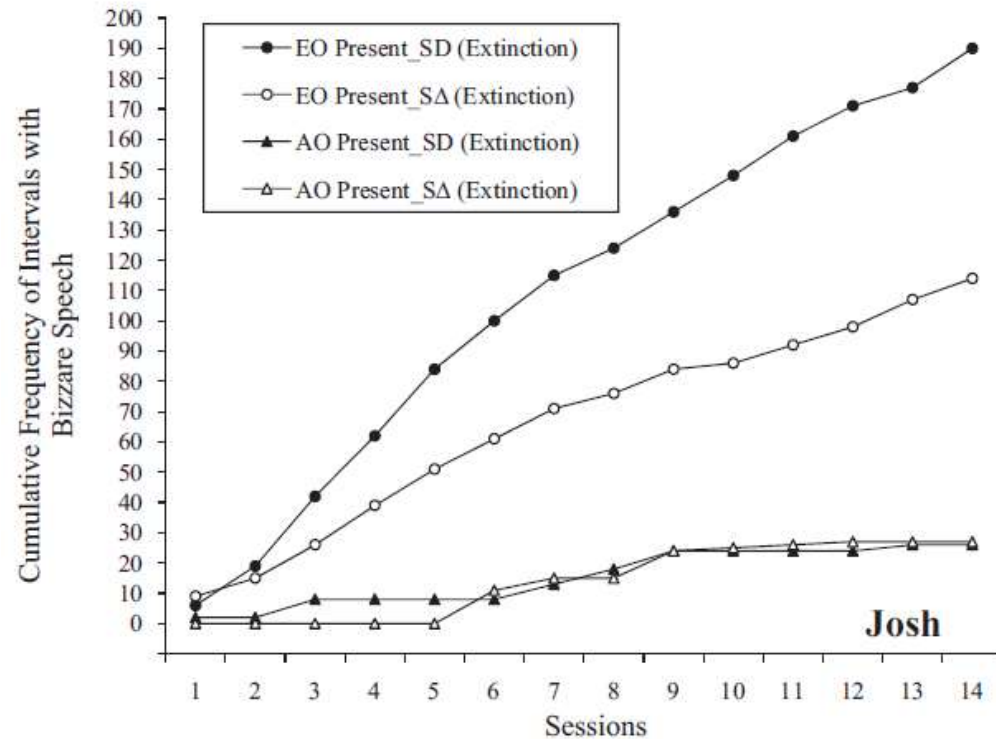


Fig. 6. Phase IV: Cumulative frequency of intervals with bizarre speech.



# Indirect Assessments, Descriptive Assessments, and Screenings

# Time with SR+ = Definition of MO

(Castillo et al., 2018)

Descriptive assessment of problem behavior during transitions

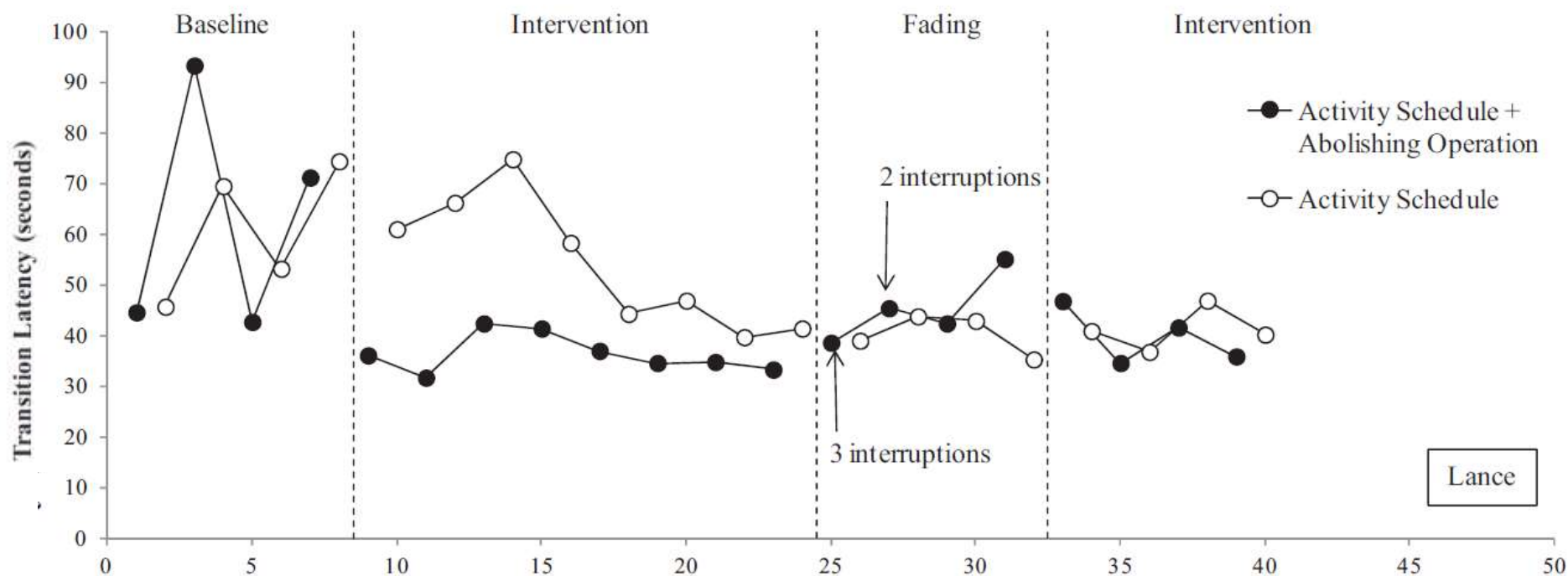
Reinforcer density (time of access to SR+ / total time):

- Rich-to-Lean → most PB
- Lean-to-Lean → high PB
- Lean-to-Rich → less PB
- Rich-to-Rich → less PB

Going to lean means less reinforcement, therefore stronger EO and problem behavior

- Defined MOs as reinforcer density (above)

- Baseline: HP for 2 minutes → “Time to go to work table”
- Activity schedule: same but 2 min prior to transition statement, showed picture of upcoming activity and said, “In a few min need to go to work table,” physical guidance
- Activity schedule + AO: interruption every 30 s – removed HP item for 3 s, tacted something about it, gave it back



# Evaluate EOs to Prevent Problem Behavior

(Fahmie et al., 2016)

- Screening procedure to gain information to prevent development of problem behavior
- Set up EO conditions for screening
  - A. Preferred items in view but out of reach
  - B. Brief access to preferred items then removed
  - C. Approach preferred item then physically blocked
  - D. Escape: presented sorting task
  - E. Request access: free access to items, therapist asked “Can I have?” “My turn”
- Results: minor problem behavior in screening → more severe problem behavior

# Conclusions: FA – Preession

43. FAs test the reinforcing effectiveness of certain consequences on levels of problem behavior
- If strong EO – no prior access → increased PB
  - If AO – preession access → decreased PB
  - A bit of access (SR+ sampling) → increased PB
44. The order of conditions has MO implications
- Esc → Attn higher than Free Play → Attn
    - Esc is withholding attention (EO)
    - Free play is preession access to attention (AO)

# Conclusions: FA – Within-Session

- 45. Durations of reinforcer consumption affect FAs
- 46. MO/SR+ combination more influential than MO or SR+ alone
- 47. Can examine within-session problem behavior in EO-present and EO-absent conditions
- 48. Shifting MOs within FA conditions – removing demands in escape condition is EO test in attention condition

# Conclusions: FA – Within-Session

- 49. Tangibles in attention condition compete with attention as SR+
- 50. Standard FA conditions may be AOs
  - If not testing contingencies present in natural environment, may not detect functions
  - Interviews can identify actual contingencies
- 51. Biological variables may function as MOs
- 52. MOs more influential than S<sup>D</sup>s – mand training, functional analysis

# Conclusions: FA – Descriptive, S<sup>D</sup>s

- 53. Rich-to-lean SR+ transition → EO for problem behavior in second location
  - Lean-to-rich transition → AO for problem behavior in second location
- 54. During transition, interrupting preferred activity may be AO → smoother transition
- 55. Brief screening with exposing child to different EOs predicts later, more severe problem behavior

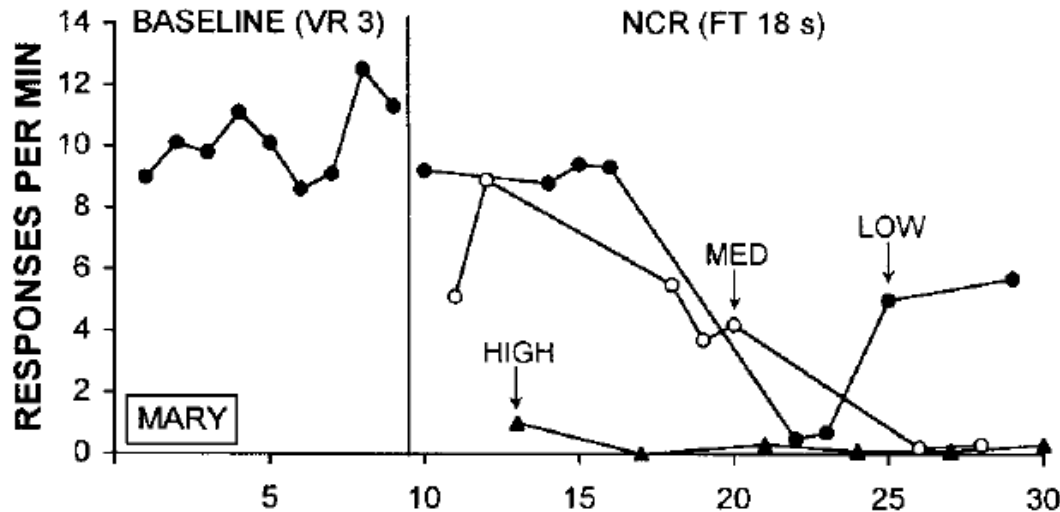


# **VII. Treatments for Reducing Problem Behavior**

- Noncontingent Reinforcement
- Functional Communication Training
- Antecedent Interventions for Escape-Maintained Problem Behavior
- Treating Feeding Challenges

# Noncontingent Reinforcement

# NCR Functions as an AO



Carr et al. (1998)

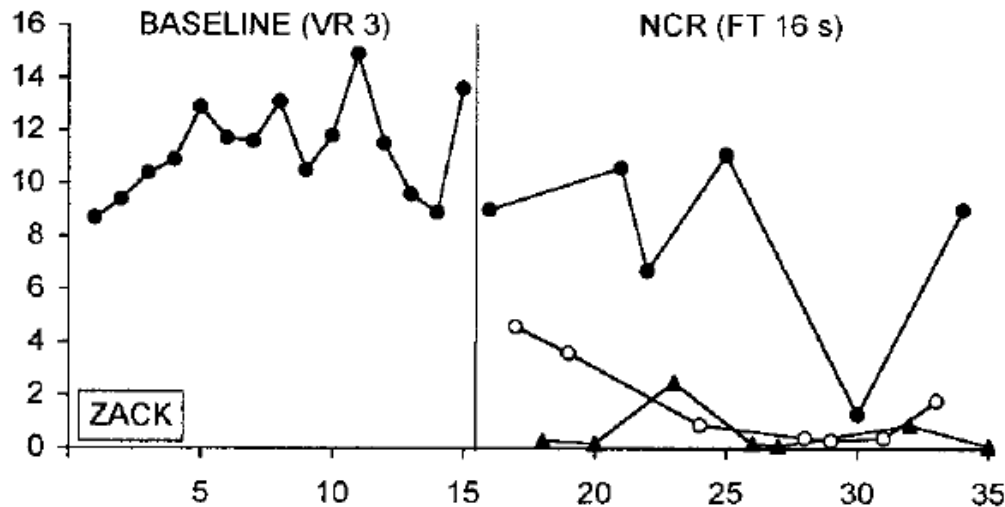
High = 2 cookies

Med = 1 cookie

Low = 1/3 cookie

Magnitude  
matters

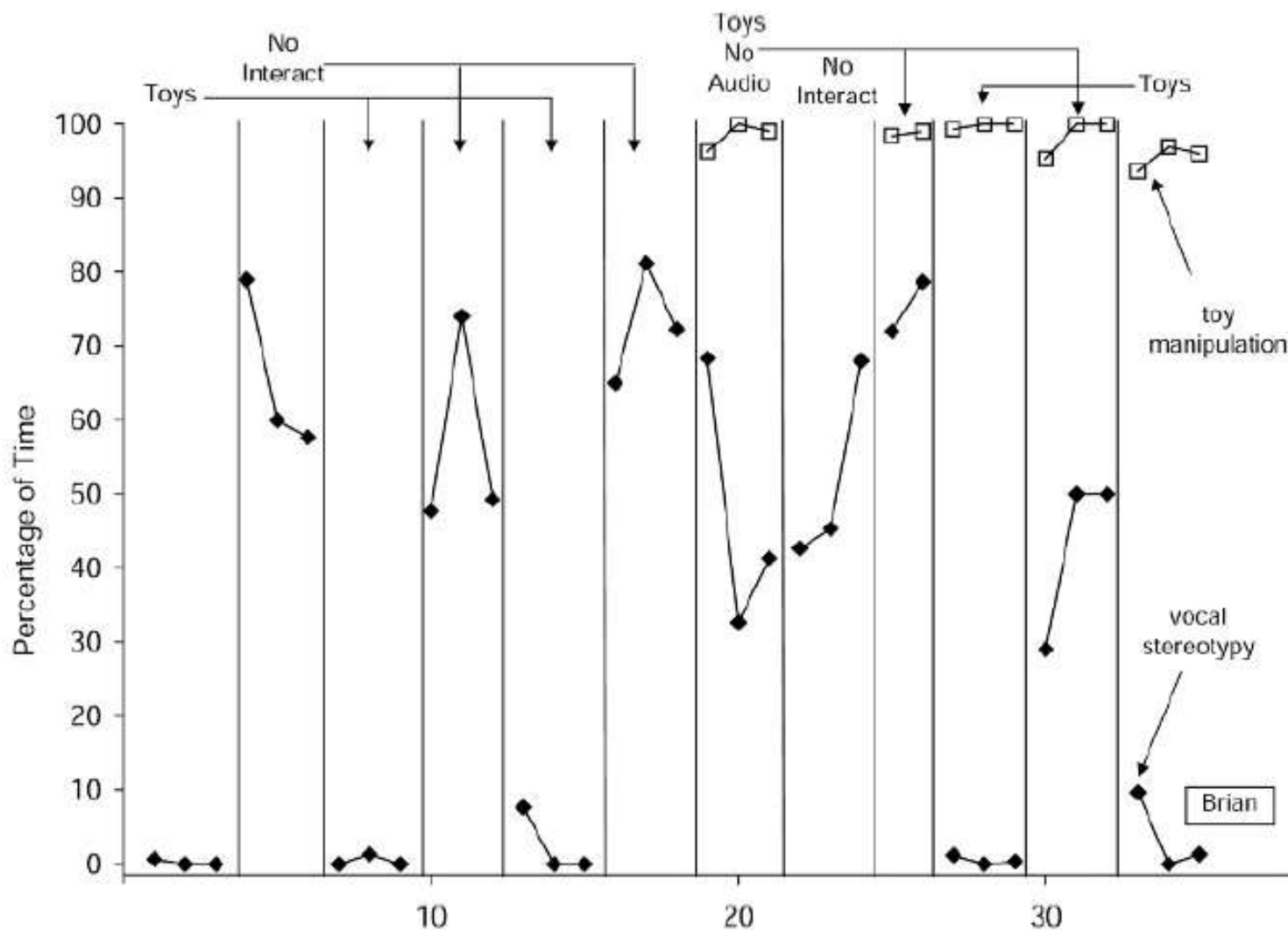
NCR: AO, not Ext



# Time of day has MO implications for NCR (Wilder, Carr, & Gaunt, 2000)

- NCR with food after lunch → more problem behavior
- NCR with food before lunch → less problem behavior

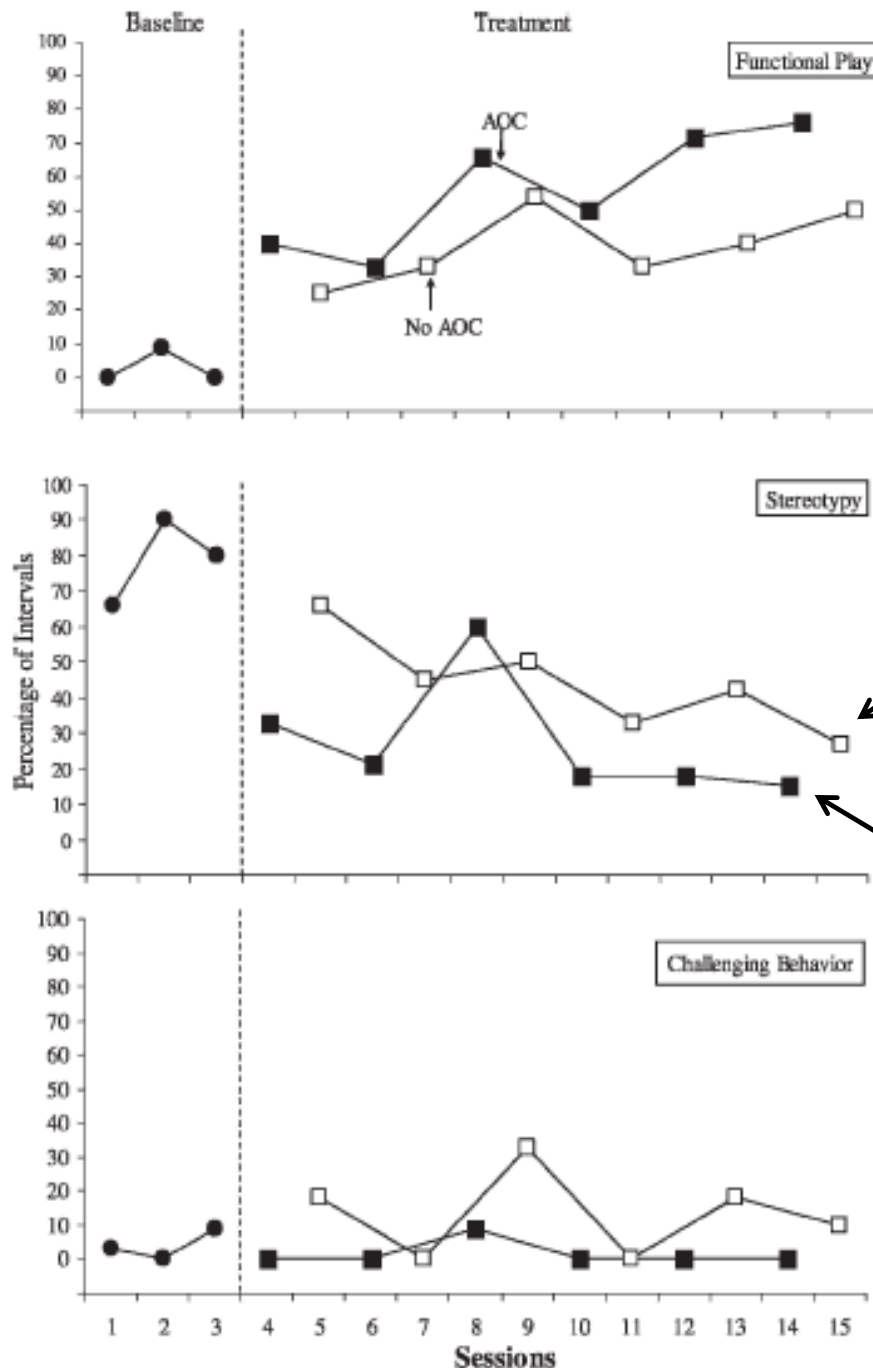
# NCR can be AO for Automatic Reinforcement



Rapp (2007)

Toys with audio abolished value of sounds produced by vocal stereotypy

# Presession Access to Motor Stereotypy Affects In-Session Motor Stereotypy



No free access;  
interrupting  
stereotypy (EO)

15 minutes free  
access to  
stereotypy (AO)

Lang et al. (2009)

Mancil et al. (2016)

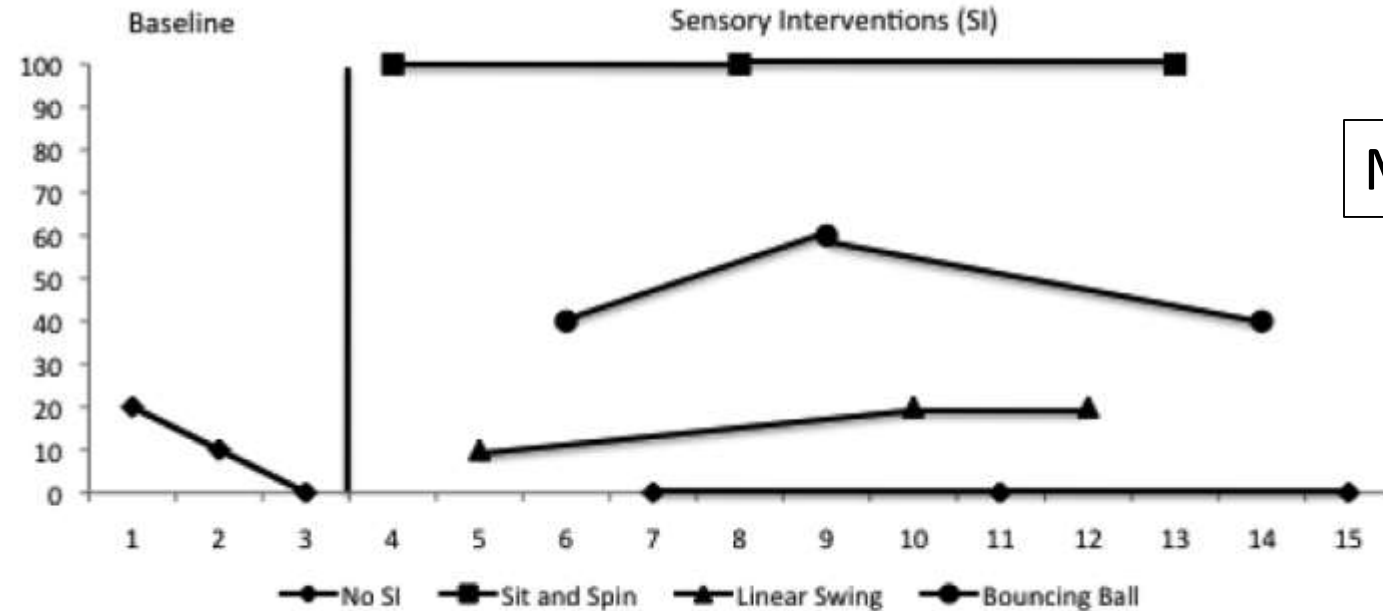
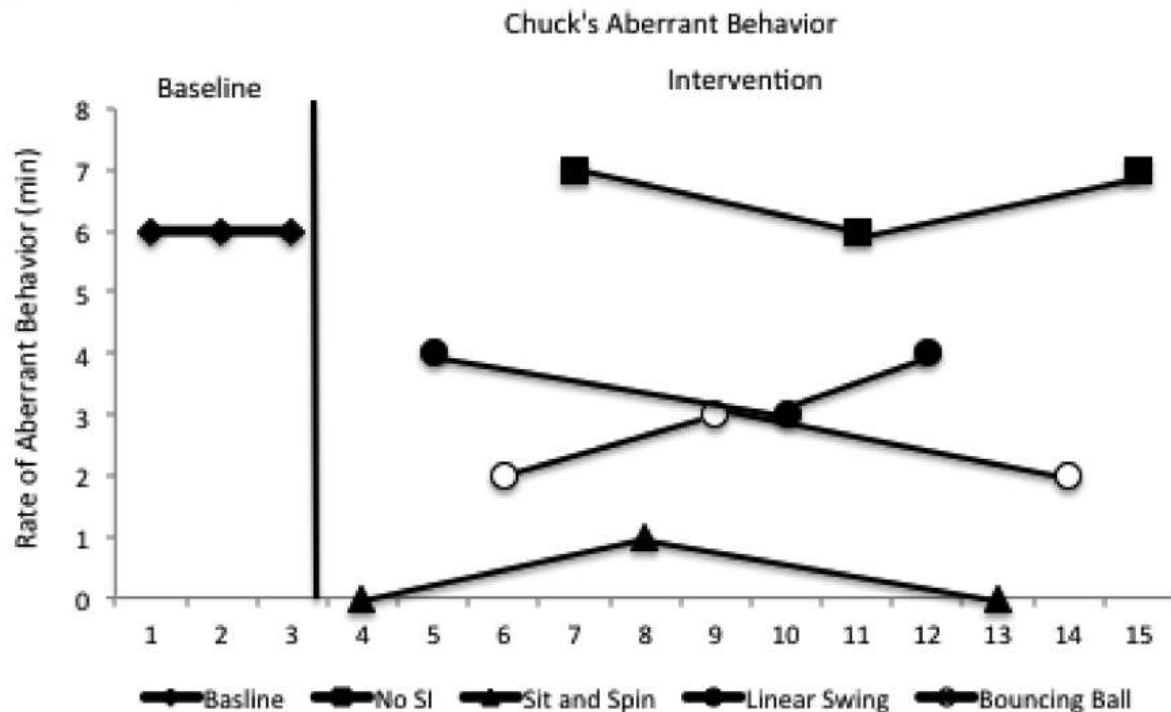


Figure 5. Chuck's Percentage of Correct Responses.

For automatically reinforced problem behavior, NCR of different sensory activities may be AO for problem behavior



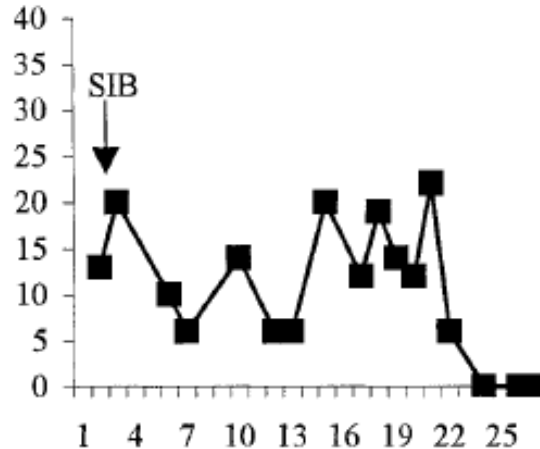
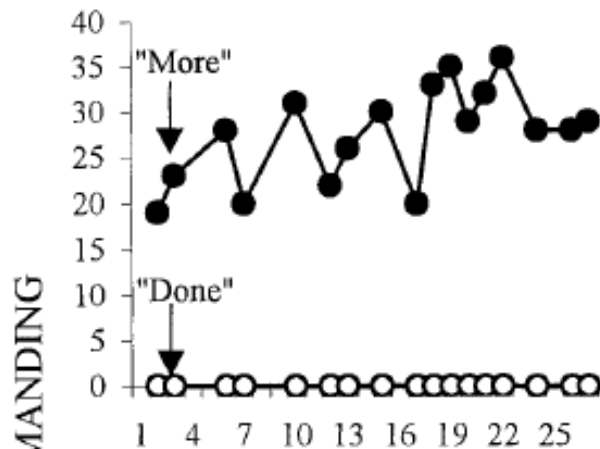
# Functional Communication Training (FCT)

Selecting Mand Topographies  
(vocal, sign, PECS, device)

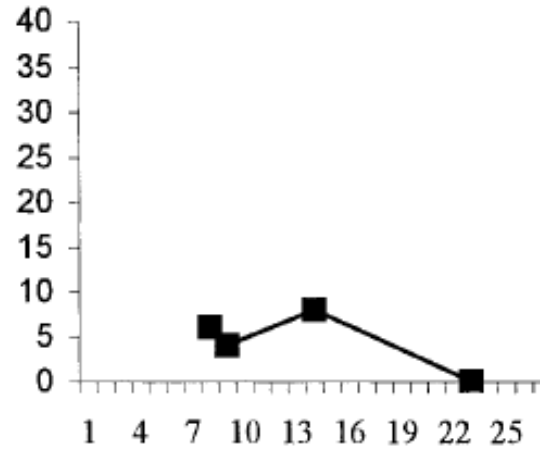
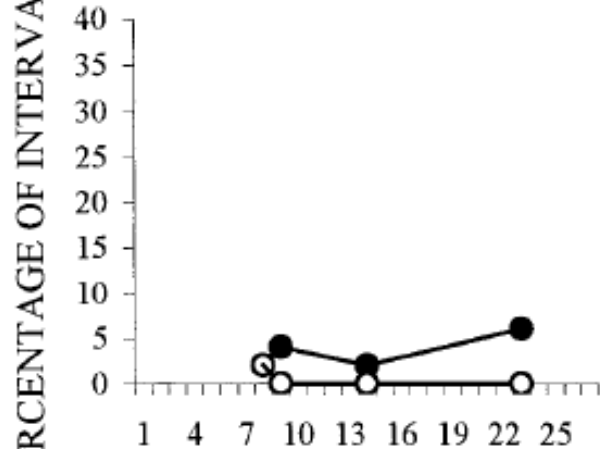


# MOs Affect FCT

## EO PRESENT (ATTENTION/TANGIBLE)



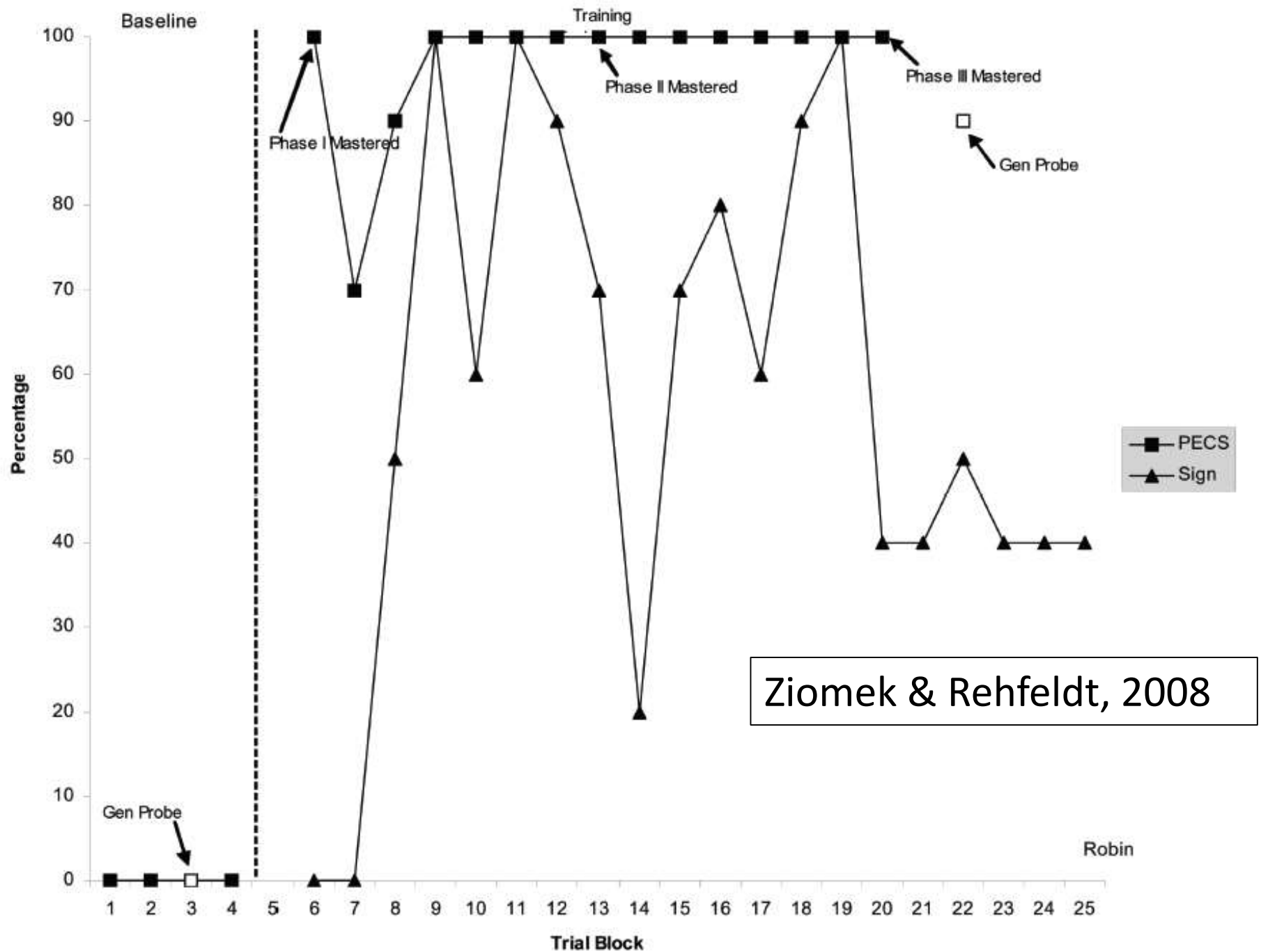
## EO ABSENT (ESCAPE)



Brown et al.  
(2000)

Function was  
attention

Mands for  
“more”  
occurred only  
in EO for  
attention/  
tangible; not in  
context of  
escape (AO)



# PECS vs. Sign

(Ziomek & Rehfeldt, 2008)

- PECS acquired more quickly than signs
- Hard to compare – different types of prompts
- If teaching sign, need imitation skills
- Assess prerequisites: imitation, picture discrimination, visual skills
- Selection-based VB easier than topography-based VB
- PECS binder may serve as S<sup>D</sup> evoking selection and exchange

# We can assess efficacy and preference for mand modalities in FCT (Torelli et al., 2016)

FA for aggression: tangible and escape function

FCT: PECS, iPad, GoTalk

Escape function, iPad was highest

- Correlated to concurrent chains preference assessment
- Correlated to mother's preference

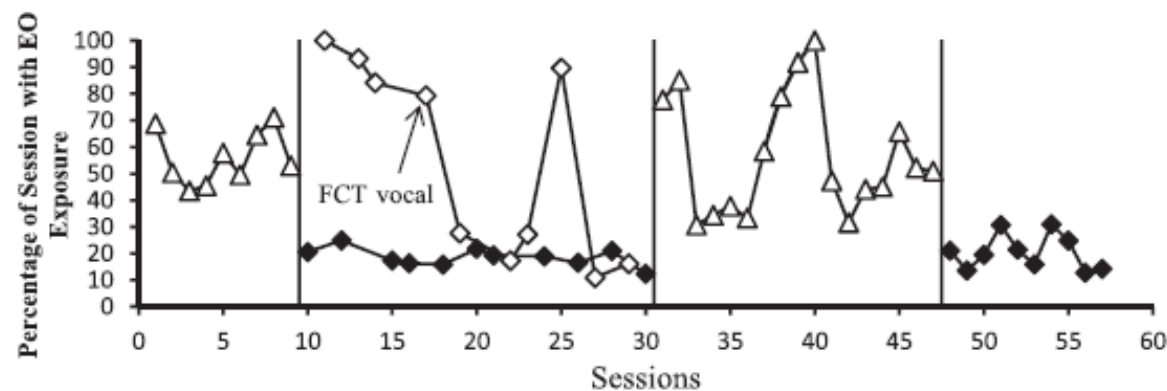
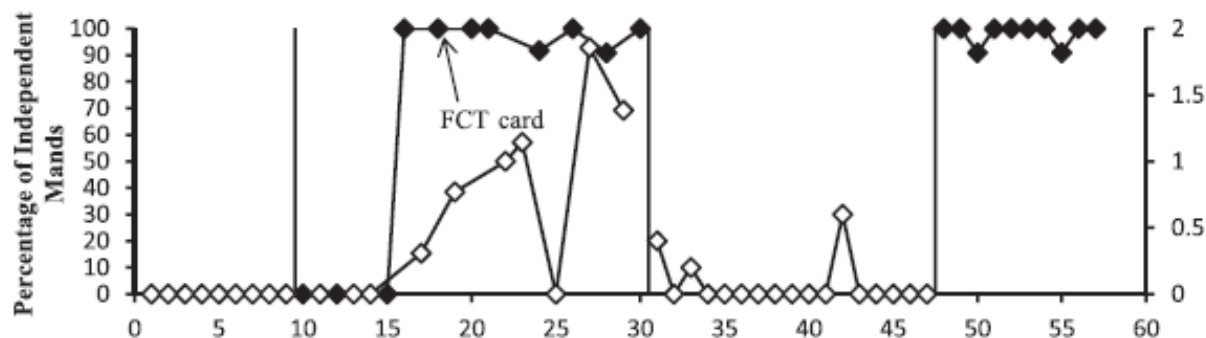
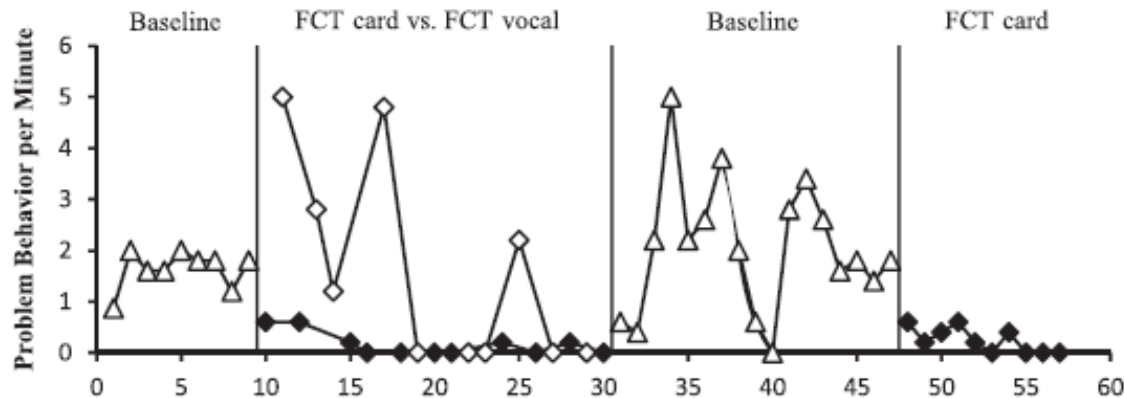
Aggression highest with PECS

- Potentially higher response effort, less fun than device

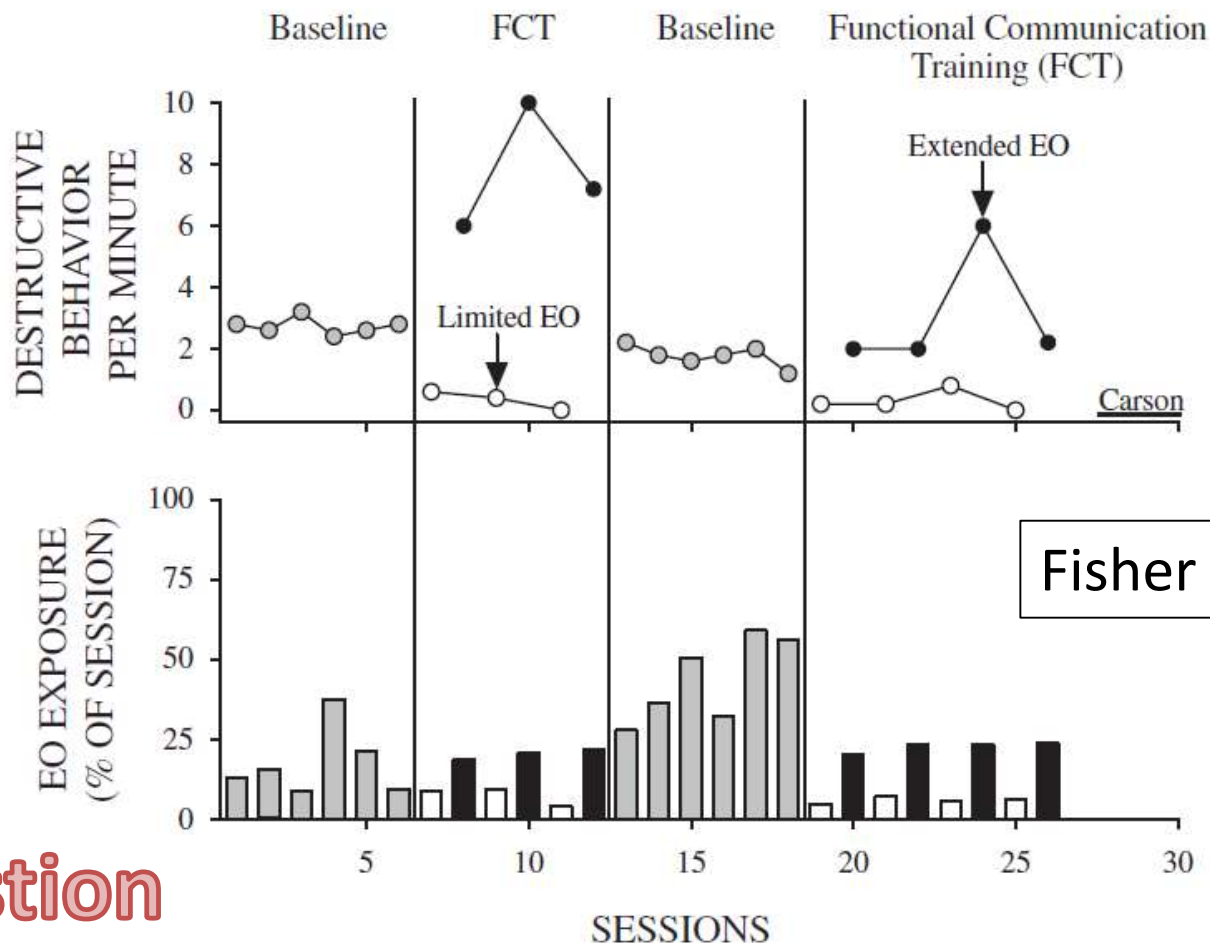
# Derosa et al. (2015)

For early training in FCT, pointing to card may be better than vocal

- Can phys. prompt
- Quicker response
- Quicker access to SR+
- Less time in EO
- Less problem behavior
- Faster mand acq.
- No EXT burst



Limited EO = present EO and immediately prompt FCR  
Extended EO = present EO and wait 5 seconds to prompt FCR



Suggestion

Most-to-least prompting is “limited EO” – immediate prompt  
Least-to-most prompting is “extended EO” – delayed prompt

# Treating Escape-Maintained Problem Behavior:

Intervening on the CEO-R

# Properties of Demands have MO Functions

Smith, Iwata, Goh, & Shore (1995)

More problem behavior, escape more valuable:

1. Task novelty was EO
2. Long demand sessions was EO
3. High rates of demands was EO



Instructional materials, choice of demands, and novel tasks may have MO functions

- (McComas et al., 2000)

Choice of staff people, clothing functioned as AO

- (Carlson et al., 2008; Jensen et al., 2012)

Interspersing easy and hard tasks functioned as AO

- (Ebanks & Fisher, 2003)

Interspersing breaks functioned as AO

- (Aikman et al., 2003)

Omitting physical prompts functioned as AO

- (Crockett & Hagopian, 2006)

# **The Role of the Reflexive-Conditioned Motivating Operation (CMO-R) During Discrete Trial Instruction of Children With Autism**

**Vincent J. Carbone,<sup>1</sup> Barry Morgenstern,<sup>2</sup> Gina Zecchin-Tirri,<sup>3</sup>  
and Laura Kolberg<sup>3</sup>**

## **Abstract**

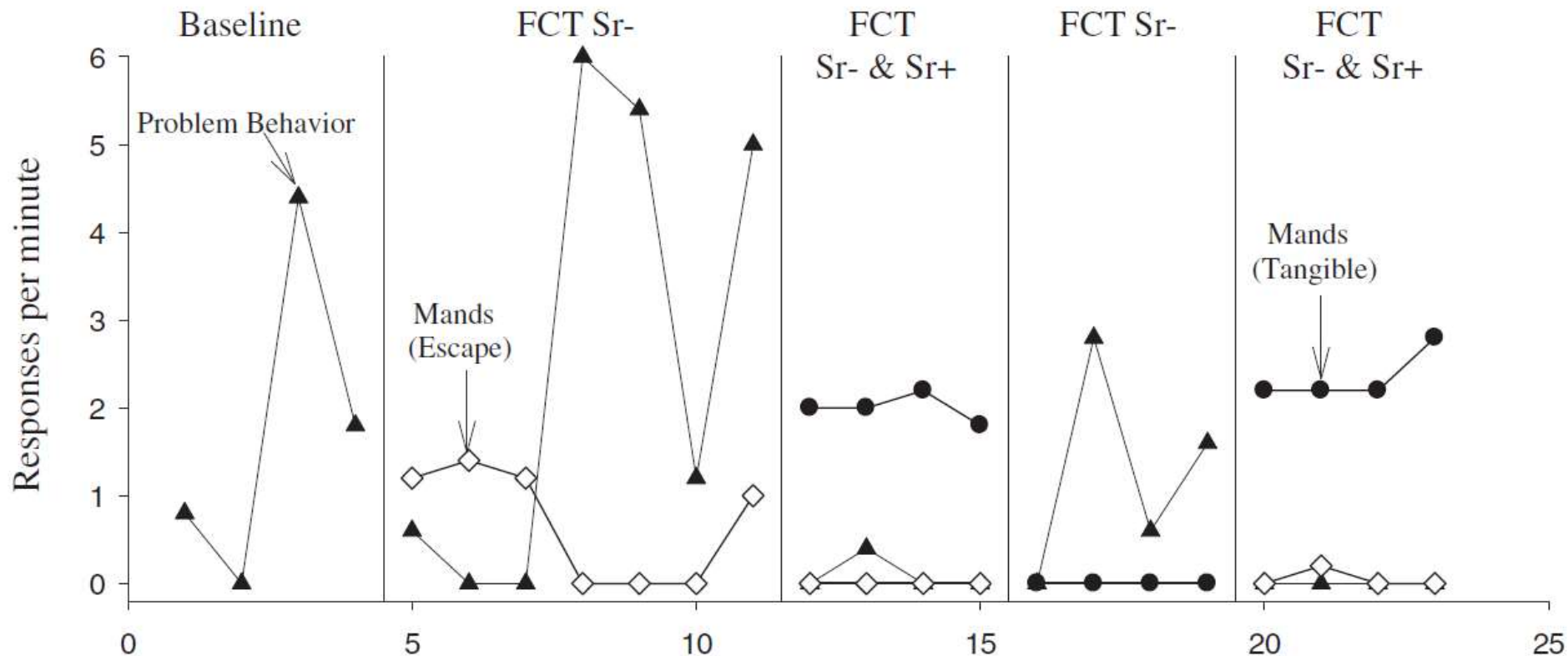
The principle of motivation has resurfaced as an independent variable in the field of behavior analysis over the past 20 years. The increased interest is the result of refinements of the concept of the motivating operation and its application to the learning needs of persons with developmental disabilities. Notwithstanding the increased emphasis upon modification of motivating operations to reduce problem behavior, there is limited recognition of this important behavioral variable in autism treatment literature. An overview of antecedent-based instructional modifications that lead to a reduction of escape and avoidance behavior of children with autism during instruction is provided. An analysis of these instructional methods as motivating operations is proposed. A conceptually systematic analysis of the influence of instructional methods is offered as a tool for improving the selection and implementation of effective teaching procedures.

## **Keywords**

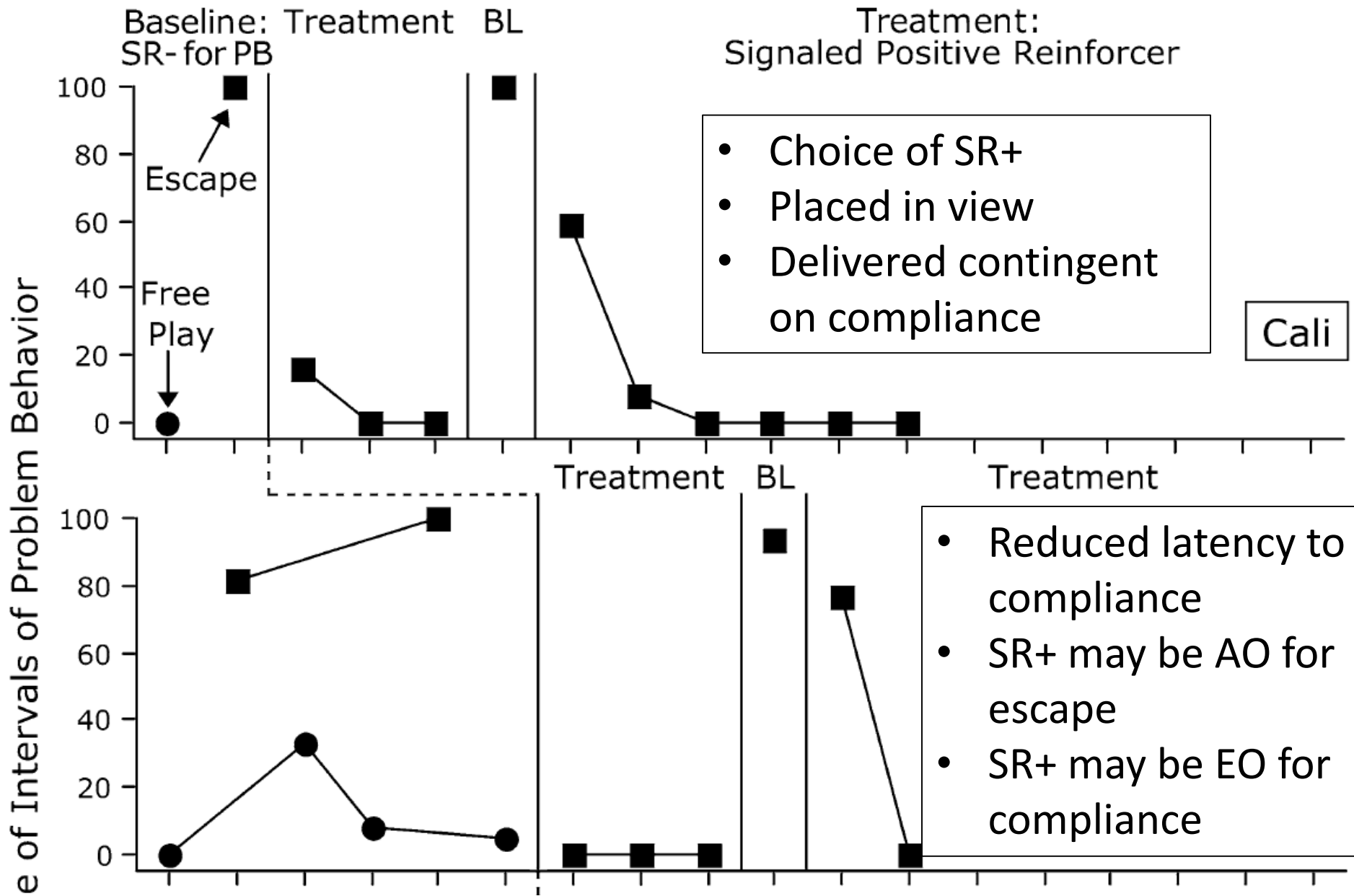
motivating operations, establishing operations, autism, escape and avoidance behavior, discrete trial instruction

# Many CEO-R Manipulations (Carbone et al., 2010)

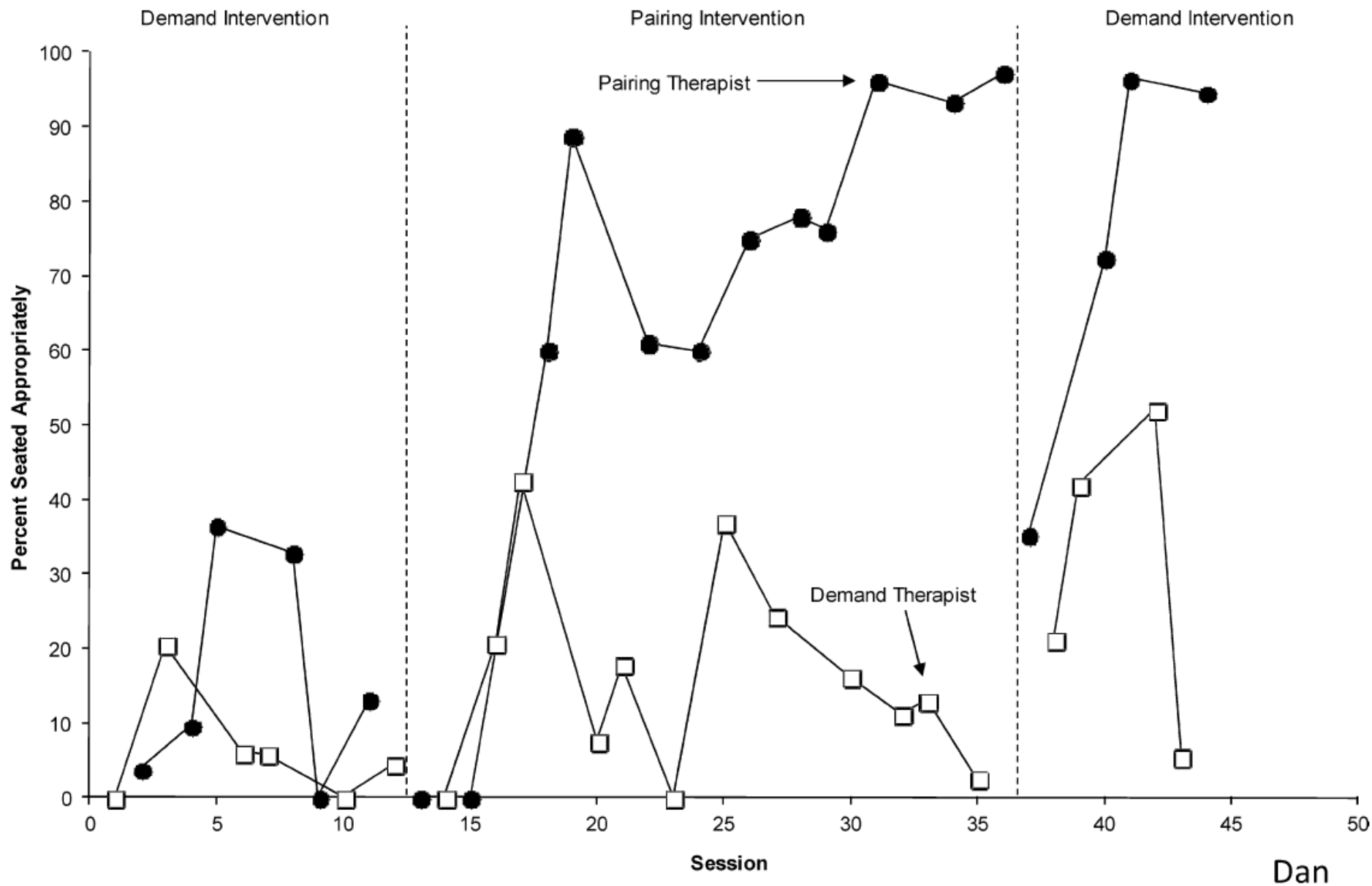
1. Program competing reinforcers – i.e., SR+
2. Pre-session Pairing
3. Errorless Teaching
4. Demand Fading
5. Task Variation
6. Fast Pace of Instruction
7. Providing Choices
8. Task Interspersal (easy and hard)
9. High-Probability Request Sequence

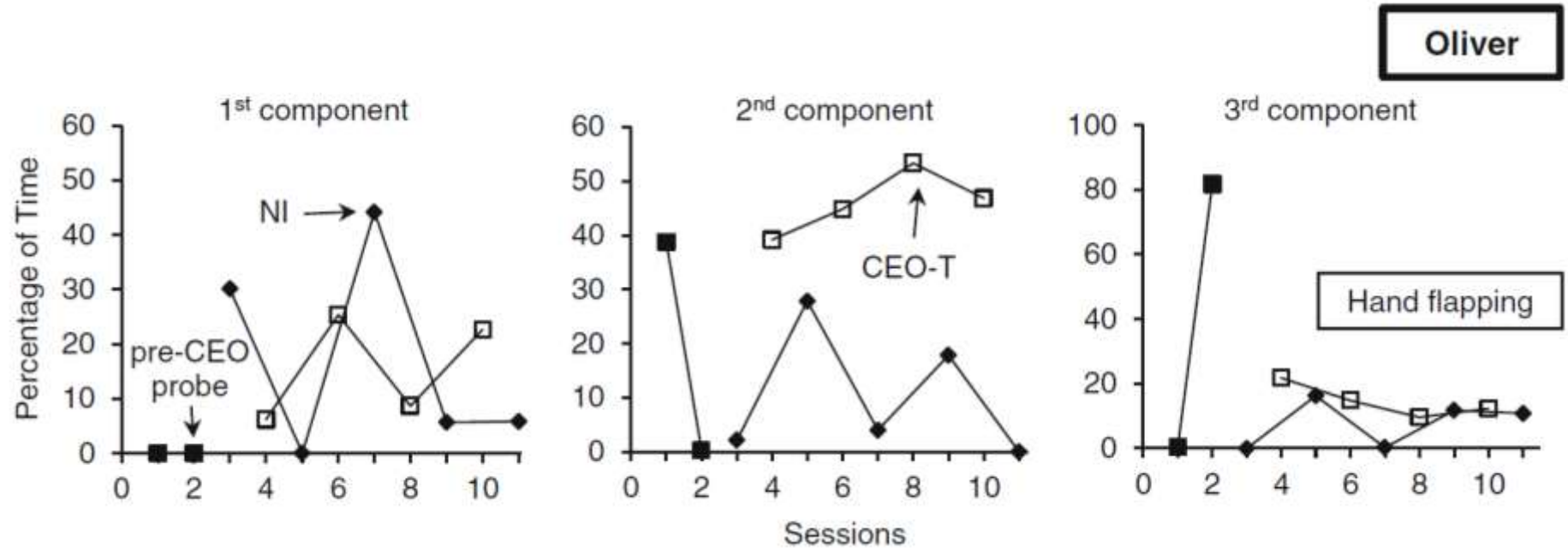


- For problem behavior maintained by escape and tangible
- FCT for escape alone not effective
  - FCT for escape + tangible more effective



Shieltz et al. (2017)





- Music → hand flapping, jumping, body rocking, finger moving
- Slinky → hand tapping
- Paired posters with those items, tested presence of posters
- Posters evoked stereotypy – some topographies, some subjects
- Posters paired with EOs became surrogate CEOs (CEO-S)
- If access to items that evoke stereotypy at the work table with work materials present, work materials may evoke stereotypy

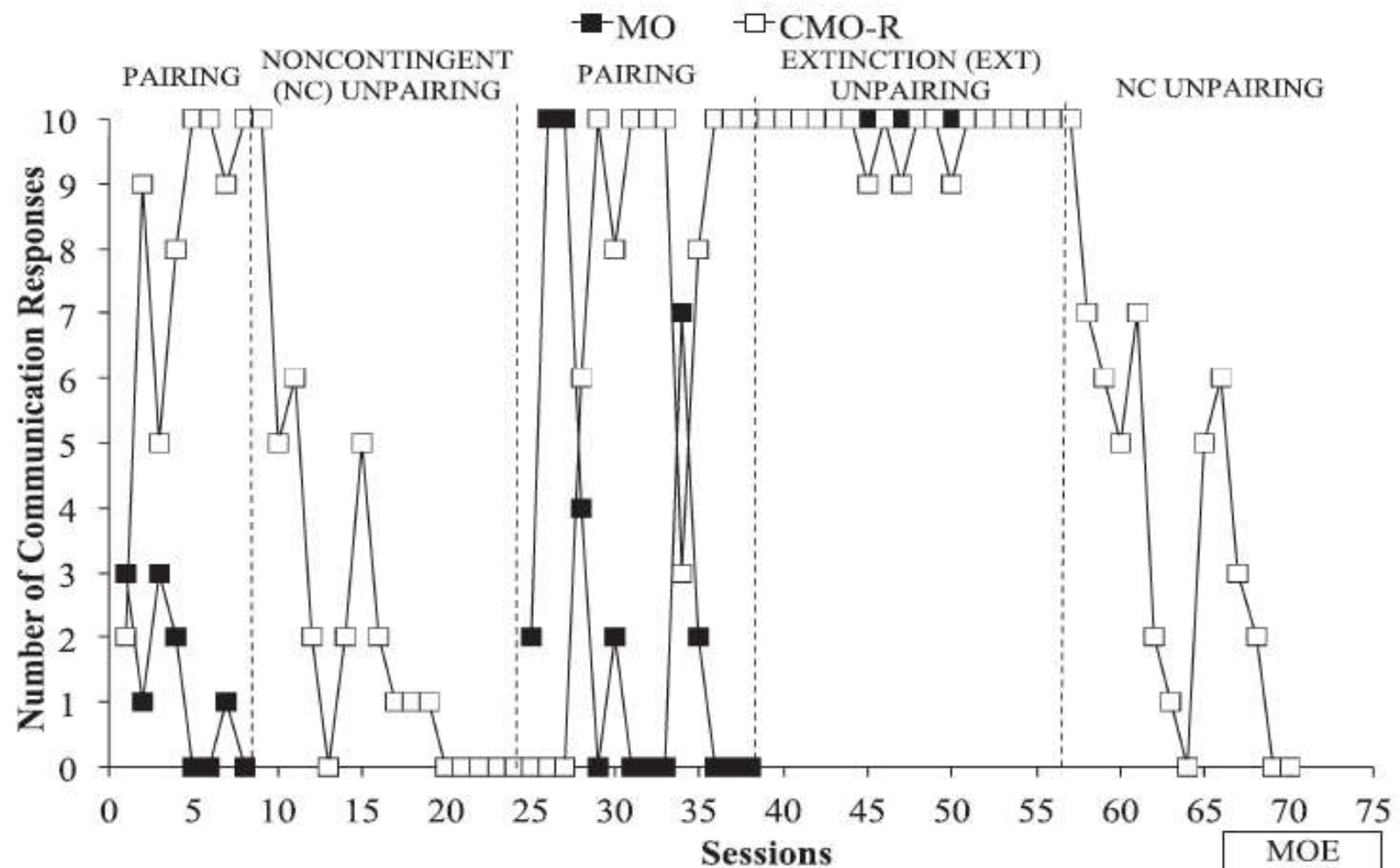
# Two ways to unpair a CEO-R

(Kettering et al., 2018)

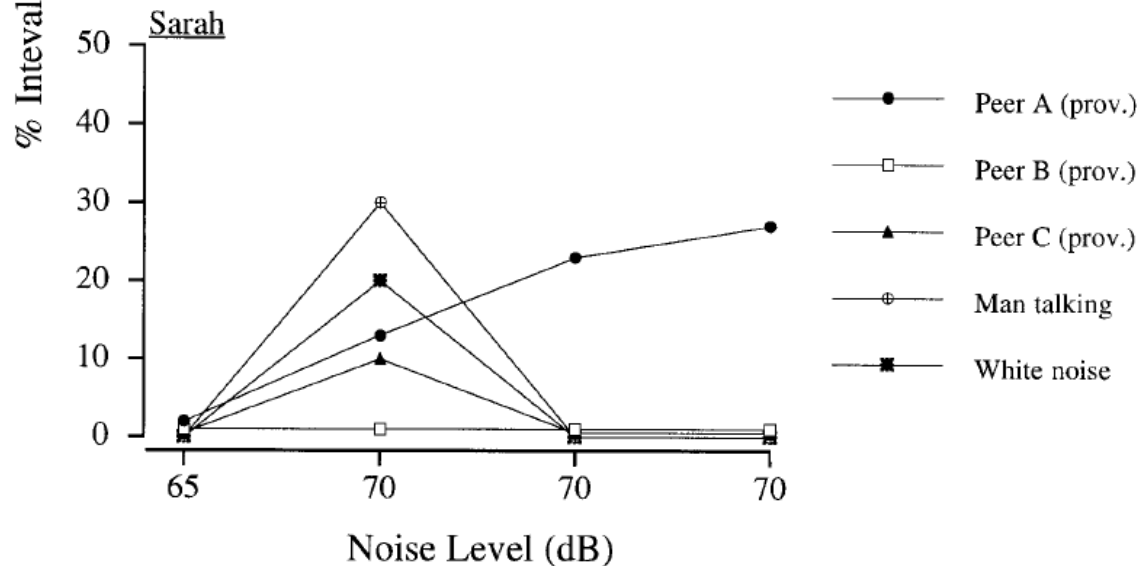
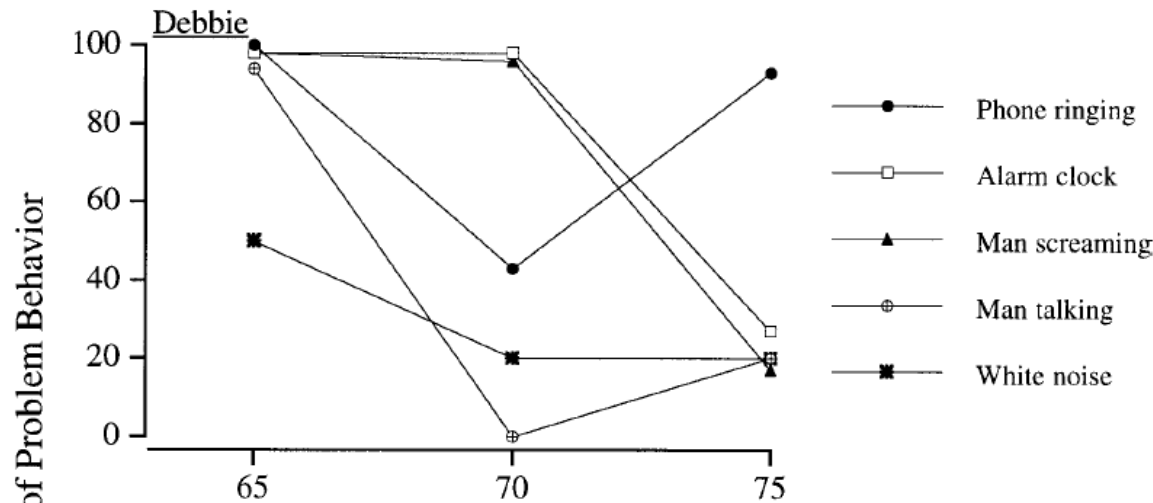
- Pairing: 10-s timer → 40 s demands
  - Timer established as CEO-R
  - Taught a mand: mand during timer, no demands
- Noncontingent unpairing:
  - Presented timer but no longer presented demands
- Extinction unpairing:
  - Presented timer and demands, but mand no longer avoided demands



# Two ways to unpair a CEO-R; noncontingent unpairing more effective (Kettering et al., 2018)



# Noise May Function as a CEO-R



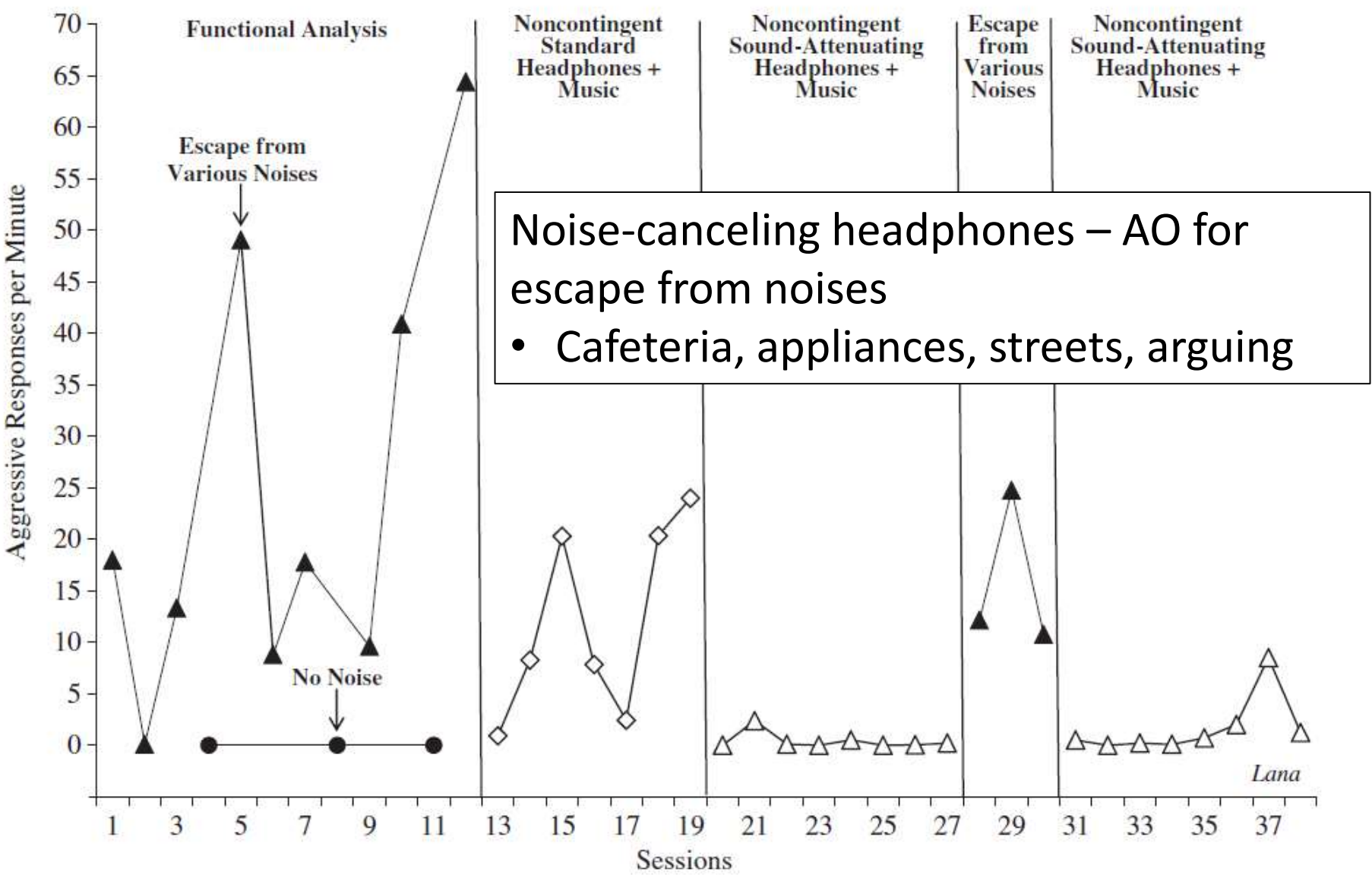
McCord et al.  
(2001)

A – certain  
noises

B – PB

C – remove  
noise

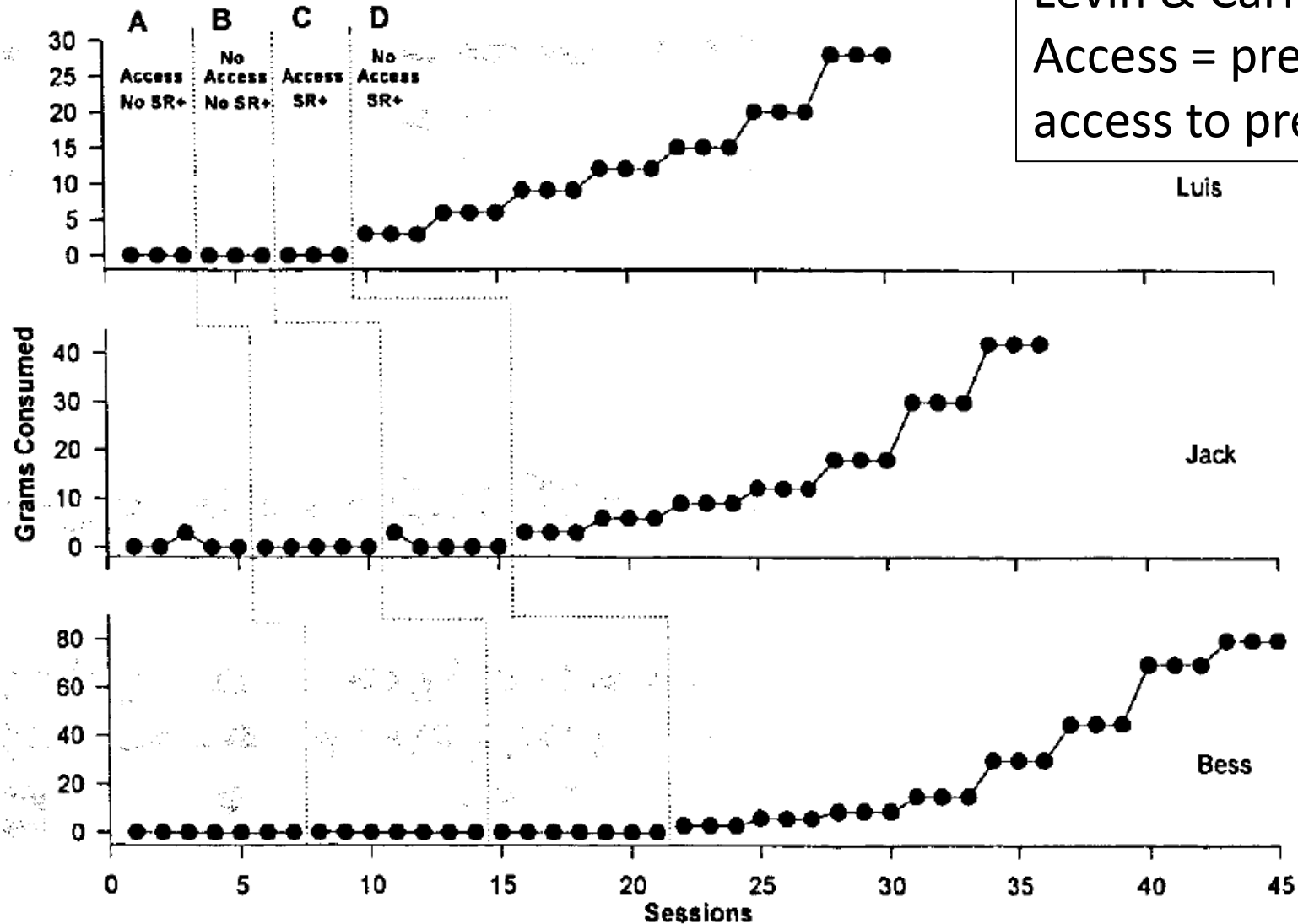
Trt: Ext,  
stimulus  
fading,  
DRO



# Treating Feeding Challenges

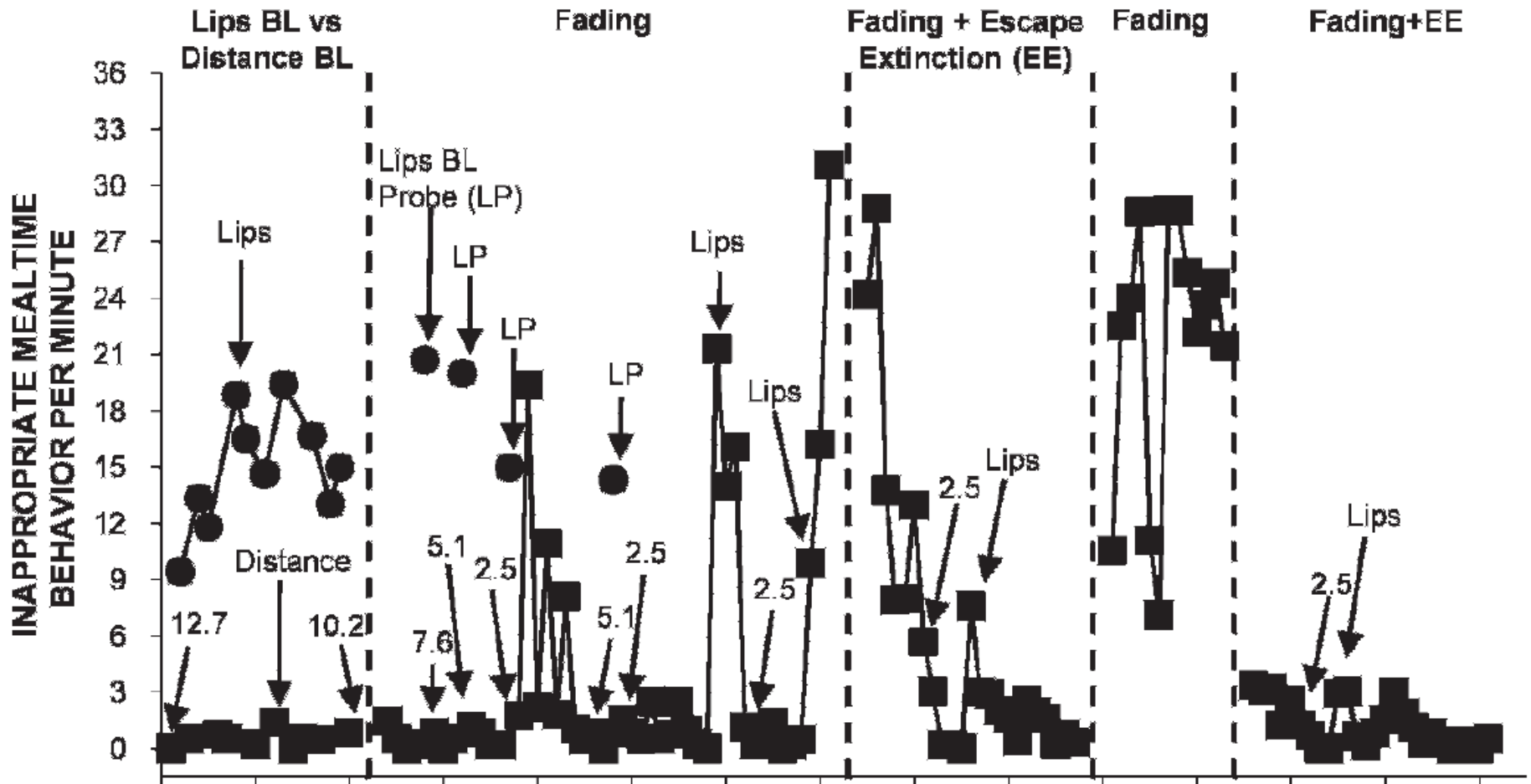
# MOs Affect Feeding

Levin & Carr (2001)  
Access = pre-session  
access to preferred

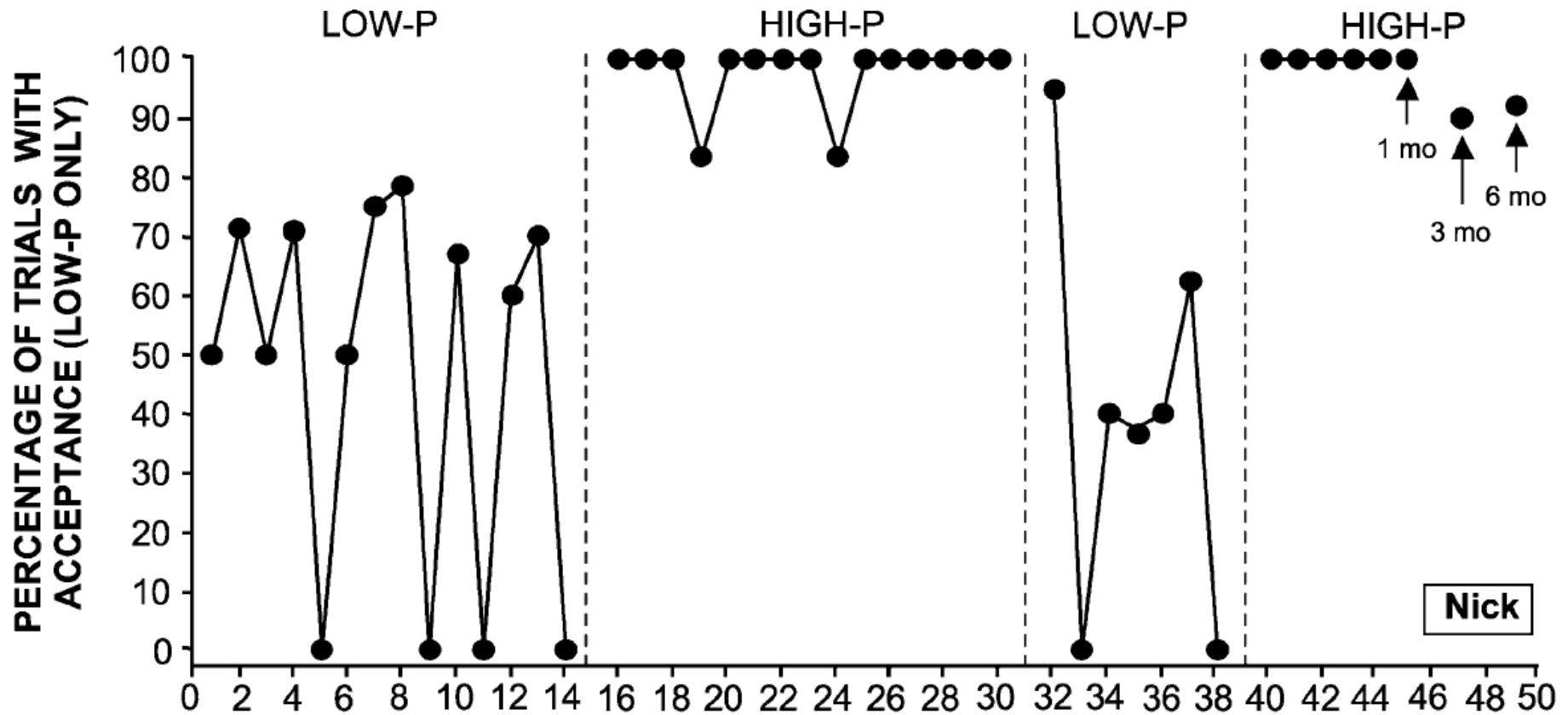


# Spoon distance to lips may function as MO

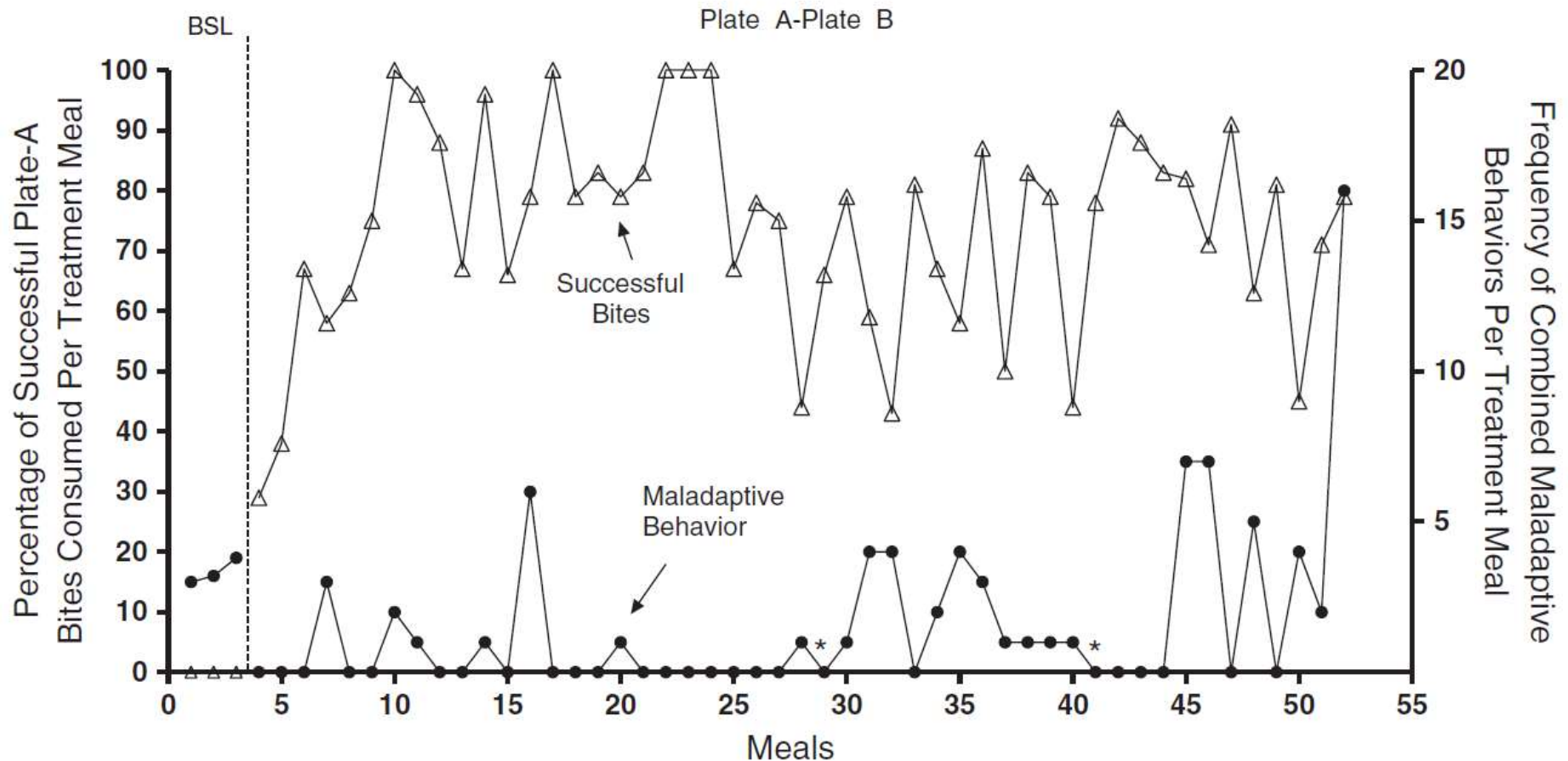
(Rivas et al., 2010)



# Hi-P request sequence is CAO-R for escape from feeding stimuli (Patel et al., 2006)

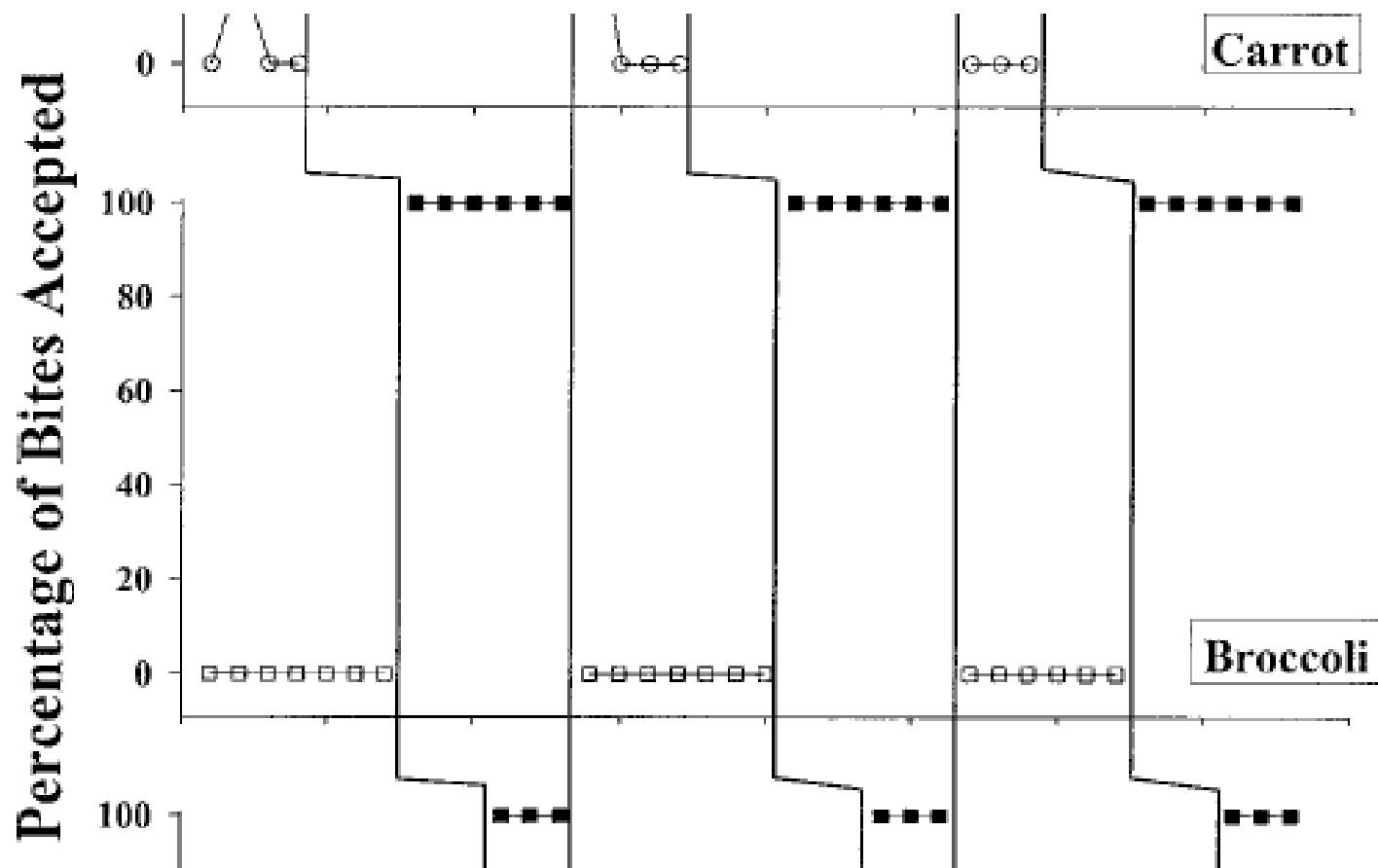


**Sequential presentation (non-preferred → preferred) may increase feeding, CAO-R (Pizzo et al., 2012)**

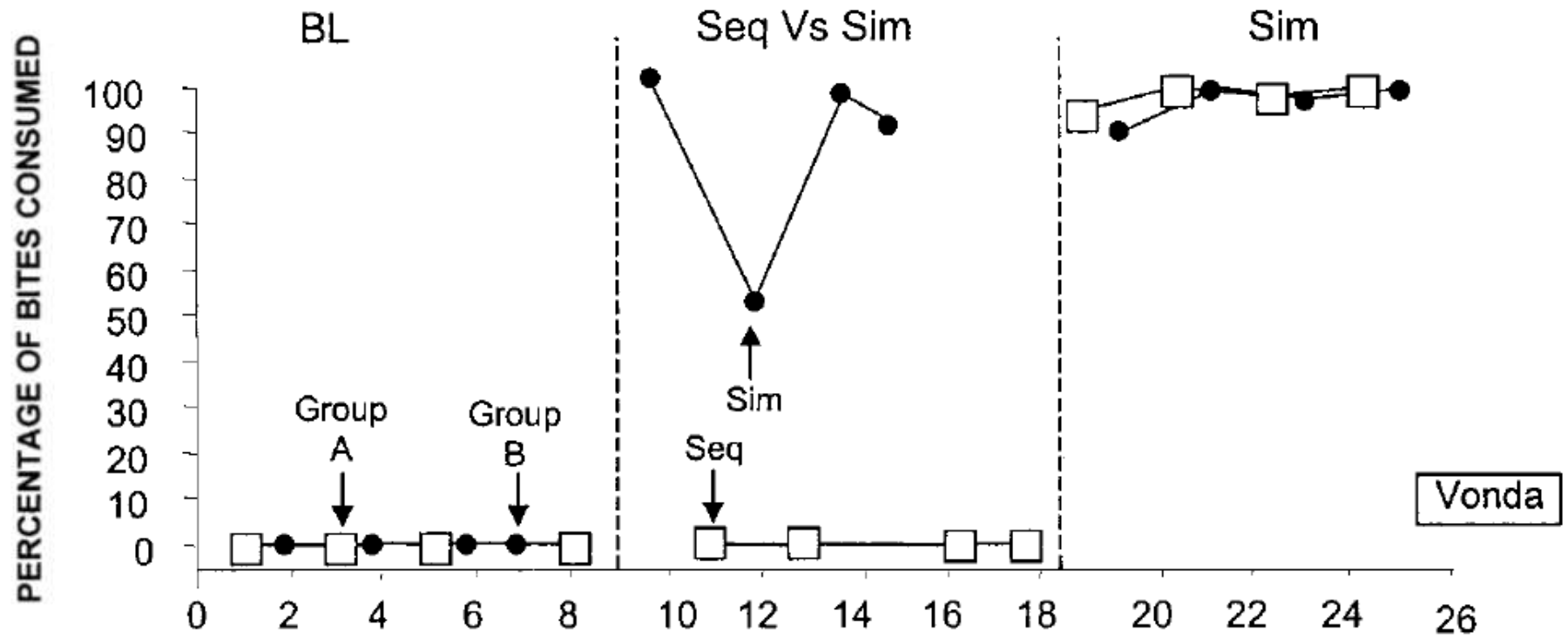




# Simultaneous presentation (non-preferred + preferred) may increase feeding, CAO-R (Ahearn, 2003)



# Simultaneous presentation more effective than sequential presentation (Piazza et al., 2002)



# Conclusions: MOs and NCR

56.NCR functions as an AO – satiate on SR+

57.NCR can be AO for tangible and automatically reinforced problem behavior

# Conclusions: MOs and FCT

58. MOs affect FCT:

- Deprivation → FCRs, Satiation → no FCRs

59. Sign vs. PECS:

- PECS may be easier to acquire
- Need imitation skills for learning sign

60. PECS vs. device: device may be more preferred

61. PECS vs. vocal: PECS may be better – easier to prompt (less time in EO)

# Conclusions: Reducing the CEO-R

62. Program competing reinforcers – i.e., SR+

63. Pre-session Pairing

64. Errorless Teaching

65. Demand Fading

66. Fast Pace of Instruction

67. Providing Choices

68. Task Interspersal (easy and hard)

69. High-Probability Request Sequence

Carbone et al. (2010)

# Conclusions: Reducing the CEO-R

- 70. Items at table when aversive demands placed may acquire MO properties
- 71. Unpair by presenting item without aversive demands
- 72. Noise may function as CEO-R
  - Reduce problem behavior with noise-canceling headphones

# Conclusions: MOs and Feeding

73. Withhold access to food → increase eating

74. Close spoon distance – CEO-R

75. Hi-p sequence → increase eating

76. Simultaneous presentation of preferred and non-preferred foods appear more effective than sequential presentation (preferred after non-preferred food)

## **VI. Other Areas:**

**Behavioral Medicine**

**Organizational Behavior Management**

**Gambling**



# Heart rate may be an indicator of EO

(Chok & Harper, 2016)

- EO for obsessive-compulsive behavior in individuals with ASD related to a state of distress and therefore heart rate
- Heart rate monitor to measure EO for OC behaviors (arranging pillows, arranging blinds, arranging light switches)
- Two conditions:
  - AO – pillows arranged as participant liked
  - EO – pillows scattered on the floor
- Results
  - Negligible difference in heart rate in EO/AO conditions
  - Blocking access to pillows reduced arranging

# MOs Influence Online Shopping Behavior

## Fagerstrom (2010)

Goal of designing an online shop: decrease value of exiting the shop without purchasing (i.e, a CAO-R for escaping the shop); 5 CMO-Rs:

- In-stock status – purchases more likely with 75 items in stock
- Price
- Customer reviews – more purchases if 96/100 points
- Order confirmation procedures – purchases more likely if no registration
- Donation to charity

# Can Manipulate MOs to Increase Seat Belt Use

Van Houten, Hilton, Schulman, & Reagan (2011)

Aimed to increase seat belt use in commercial drivers

Intervention: accelerator pedal back force (EO)

- Engaged when drivers exceeded a speed limit
- Disengaged when their seat belts were buckled

# MOs are useful in analyzing the impulsivity of gamblers

(Dixon et al., 2016)

- 9 participants at risk for disordered gambling
- **Typical:** I will ask you to make choices about money.  
Ex: “Rather have \$100 now or \$1,000 in 6 months?”
  - You will not get the money, but pretend you will
- **Double:** same, but your current salary is doubled
- **Half:** same, but your current salary is halved
- Results: half income, more impulsive
- Hypothetical salary analyzed as MO

# Conclusions: Other Areas

- 77.Heart rate may be indication of MO
- 78.Online shopping variables may be CAO-R – decrease value of exiting without buying
- 79.Accelerator pedal backforce may increase value of seatbelt fastened
- 80.Statements about salary affect gamblers' value of money

# Grand Conclusion

Motivating operations impact our work with individuals with disabilities:

- Mand training
- Preference assessments
- Functional analysis of problem behavior
- Treatment of problem behavior

➤ Study MOs

➤ Analyze MOs

# Thank you for attending!

Hope your EO for lunch is well satisfied 😊

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