Evidence Based Practice Training:
## Differential Reinforcement of Alternative, Incompatible, or Other Behavior (DR)

Adapted from Sam, A., & AFIRM Team. (2015). Differential Reinforcement of Alternative, Incompatible, or Other Behavior. Chapel Hill, NC: National Professional Development Center on Autism Spectrum Disorder, FPG Child Development Center, University of North Carolina. Retrieved from
https://afirm.fpg.unc.edu/differential-reinforcement

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California Autism Professional Training and Information Network

SELPA Content Lead
EVIDENCE Based Practices —Autism—
MARIN COUNTY SELPA

What is CAPTAIN

The California Autism Professional Training And Information Network (CAPTAIN) is an interagency network developed to support the understanding and use of evidence based practices (EBPs) for individuals with Autism across the state of California
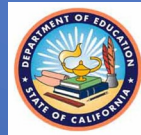
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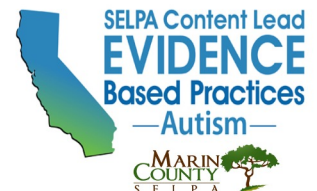—Autism—
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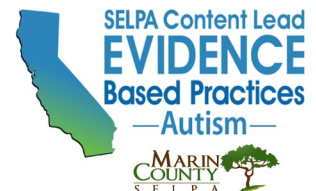
What is CAPTAIN

Marin County SELPA in partnership with CAPTAIN, are members of the Statewide System of Support as Special Education Content Lead for Autism.
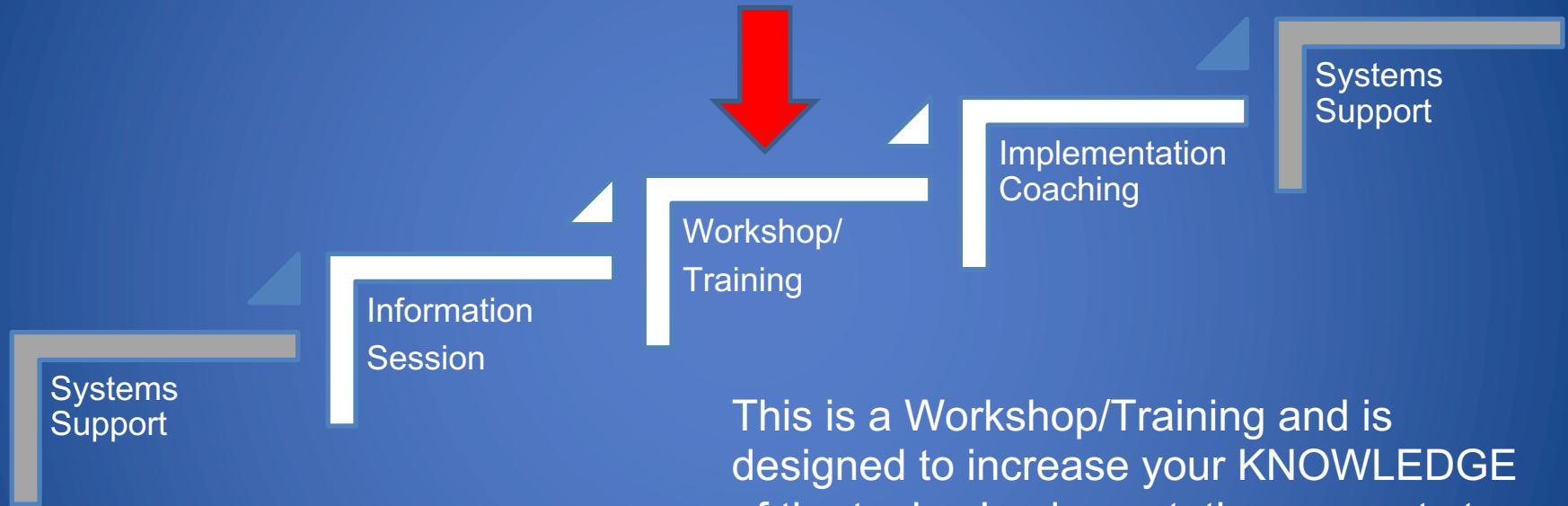
This project is funded by the California Department of Education and the California Collaborative for Educational Excellence.

Levels of Professional Development to Reach Implementation

Systems Support

Information Session

Workshop/ Training

Implementation Coaching

Systems Support

This is a Workshop/Training and is designed to increase your KNOWLEDGE of the topic. Implementation supports to assist you with use of this EBP will be outlined following the TRAINING/WORKSHOP

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Before We Begin…

Please complete the **Pre Training Survey** sent to your email

Learning Objectives

- Describe four types of differential reinforcement and the behaviors that can be addressed with each

- Identify outcomes supported by research that differential reinforcement can be used to address

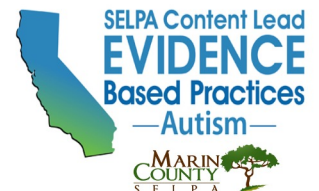# What are Evidence Based Practices?
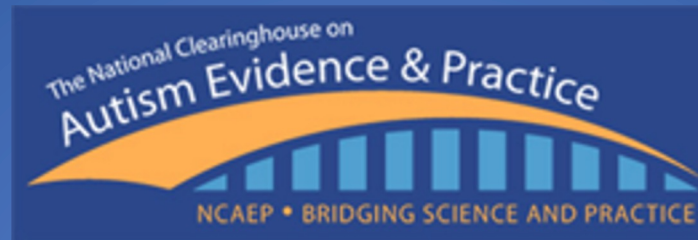
NCAEP definition of an EBP:

"Focused intervention practices that have evidence of efficacy in promoting positive outcomes for learners with ASD."

Steinbrenner, J. R., Hume, K., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., Szendrey, S., McIntyre, N. S., Yücesoy-Özkan, S., & Savage, M. N. (2020). Evidence-based practices for children, youth, and young adults with Autism. The University of North Carolina at Chapel Hill, Frank Porter Graham Child Development Institute, National Clearinghouse on Autism Evidence and Practice Review Team.

Evidence Based Practice Matrix (28 EBPs)

Table 3.7 Matrix of evidence-based practices, outcomes, and age categories

Selecting EBPs

Before beginning a new practice with a learner, it is important to follow four planning steps

1. Identify the behavior
2. Collect baseline data on the behavior
3. Establish an observable and measurable goal
4. Choose an EBP
   – Consider the child and family characteristics
   – Consider the teacher and team characteristics
   – Consider other available resources

Selecting an EBP Checklist

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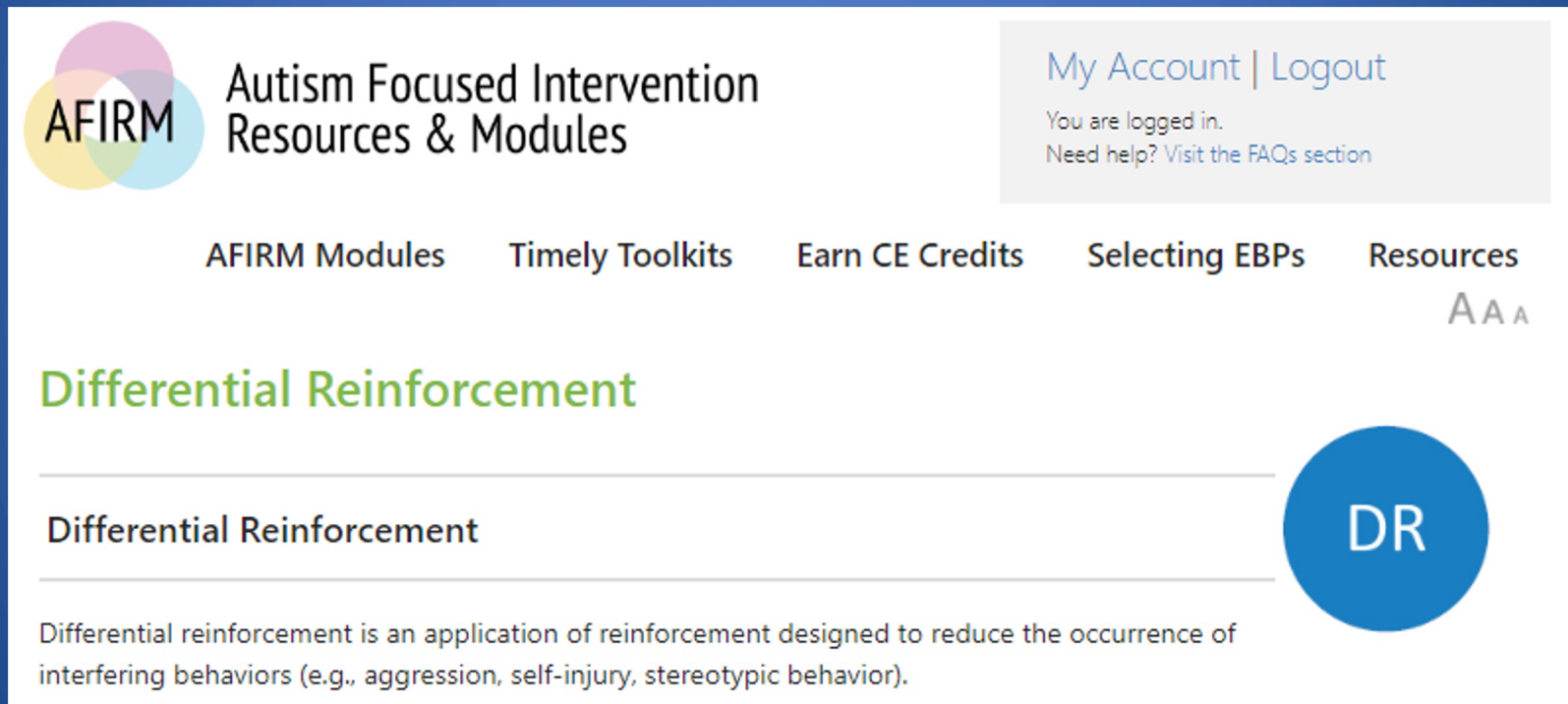
High Quality Training:
Autism Focused Intervention Resources and Modules (AFIRM)
Designed to help you learn the step-by-step process of planning for, using, and monitoring EBPs with learners with Autism from birth to 22 years of age

What is DR?

- Differential reinforcement (DR) is an application of reinforcement designed to reduce the occurrence of interfering behaviors (e.g., tantrums, aggression, self-injury, stereotypic behavior).

- The rationale for differential reinforcement is that by (a) reinforcing the nonoccurrence or decreased occurrence of interfering behaviors *or* (b) reinforcing behaviors that are more functional or incompatible with the interfering behavior, then interfering behaviors will decrease.

Evidence-base for DR

Early Intervention	Preschool	Elementary	Middle	High
(0-2 years)	(3-5 years)	(6-11 years)	(12-14 years)	(15-22 years)
No studies	Social	Social	Social	
		Communication	Communication	
		Joint Attention		
	Behavior	Behavior	Behavior	Behavior
	School-Readiness	School-Readiness	School-Readiness	
		Play		
			Motor	
		Adaptive		Adaptive
		Academic		

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DR Goals

- Decrease aggression and self-injurious behavior
- Decrease disruptive behavior
- Decrease inappropriate touching
- Decrease inappropriate verbalizations (e.g., talk outs, comments)
- Decrease non-compliance
- Decrease off-task behavior
- Decrease stereotypy

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How Can DR Help Learners?

- When using differential reinforcement procedures, learners with Autism are being reinforced for…
  - Not engaging in the interfering behavior (**DRO**)
  - Spending less time engaging in interfering behavior (**DRL**)
  - Spending time engaged in more appropriate behavior choices (**DRA/DRI**)

Example

Example:

A learner with ASD might have difficulty staying seated during independent seat work. If we select a behavior that is incompatible with being out of his seat (being in his seat) and provide a reinforcer when the learner is engaging in the incompatible behavior of being in his seat, the learner is much more likely to stay in his seat and reduce the amount of time being out of his seat.

Differential Reinforcement Procedures

- Differential Reinforcement of **Other Behaviors** (DRO)
- Differential Reinforcement of **Low Rates of Behavior** (DRL)
- Differential Reinforcement of **Alternative Behavior** (DRA)
- Differential Reinforcement of **Incompatible Behavior** (DRI)

DRO

Procedure	Purpose	Definition	Example
Differential Reinforcement of Other Behaviors (DRO)	Reduce interfering behavior to zero occurrences by increasing the amount of time between occurrences	Reinforcement is provided when the learner is *not* engaging in the interfering behavior	Student receives a reinforcer when he goes without hitting himself for five minutes

DRL

Procedure	Purpose	Definition	Example
Differential Reinforcement of Low Rates of Behavior (DRL)	Reduce the number of interfering behavior occurrences to acceptable levels	Reinforcement is provided if learner engagement in the interfering behavior was at or below a predetermined criterion	Student receives a reinforcer when she uses the water fountain 5 or less times during the school day

DRA

Procedure	Purpose	Definition	Example
Differential Reinforcement of Alternative Behavior (DRA)	Reduce the interfering behavior by reinforcing a functional alternative behavior	Reinforcement is provided when the learner is engaging in a specific desired behavior other than the interfering behavior	Student receives a reinforcer when he raises his hand to answer the teacher's question

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DRI

Procedure	Purpose	Definition	Example
Differential Reinforcement of Incompatible Behavior (DRI)	Reduce the interfering behavior by reinforcing a functional incompatible behavior	Reinforcement is provided when the learner is engaging in a behavior that is physically impossible to do while exhibiting the interfering behavior	Student receives a reinforcer when she walks in the hallway

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Getting Started

Have you…?

– Identified the behavior

– Collected baseline data through direct observation

– Established a goal or outcome that clearly states:

  • When the behavior will occur

  • What the target skill is

  • How the team will know when the skill is mastered

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Select a DR Procedure

Procedure	When to Use	Examples of Interfering Behavior
DRO	*Main goal is to eliminate the interfering behavior:* • The behavior is unacceptable • Student has other appropriate behaviors in his/her repertoire	• Hitting peers • Self-injurious behaviors • Elopement
DRL	*Main goal is to reduce the interfering behavior:* • The behavior is irritating or disruptive at high frequency, but could be tolerable or even appropriate if displayed less frequently • The behavior is non-violent • The behavior is not self-destructive	• Asking questions • Burping • Cursing

Select a DR Procedure

Procedure	When to Use	Examples of Interfering Behavior
DRI	*Main goal is to substitute the interfering behavior:* • There is an appropriate behavior that can't co-exist with the interfering behavior	• Out of seat • Screaming • Verbal aggression
DRA	*Main goal is to substitute the interfering behavior:* • There is an appropriate alternative behavior, but it could co-exist with the interfering behavior	• Screaming • Talk outs • Hitting

Incompatible Behavior

- If you are using a DRI procedure, a behavior that is **incompatible** with the interfering behavior must be chosen

- If there is not an appropriate behavior that is opposite and/or incompatible with the interfering behavior, go back and select a different differential reinforcement procedure

Examples

Let's Practice!

Interfering Behavior	Incompatible Replacement Behavior
Out of seat	In seat
Screaming	?
Running	?
Inappropriate verbal statements	?

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Alternative Behavior

- The alternative behavior:
  - must serve the same function as the interfering behavior being replaced
  - should require equal or less physical effort and complexity
  - should result in the same type, quantity, and intensity of reinforcement (otherwise, the learner will result back to the interfering behavior to receive reinforcement)
  - is reinforced on the same schedule (frequency and consistency)
  - efficiency is enhanced if it's already in the learner's repertoire. For learners with limited behavior repertoires, additional evidence-based practices may be needed to teach appropriate behaviors such as functional communication training

Examples

Let's Practice!

Interfering Behavior	Function	Potential Alternative Behaviors
Speaking out	Get attention	Raising hand
Screaming	Escape task	?
Hitting peers	Get attention	?

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Collect Baseline Data

- Collect data in a variety of settings and activities to determine how often the learner with Autism is using the interfering behavior
- Select frequency recording, duration recording, or partial interval recording

3 Data Collecting Procedures for DR

PROCEDURES	DEFINITION	WHEN TO USE
FREQUENCY RECORDING	Record every instance the target behavior occurs (e.g. tally each occurrence)	Best to measure low frequency behaviors such as greeting a peer or using the toilet
DURATION RECORDING	Records how long a learner engages in a particular behavior or skill	Best for behaviors that are ongoing such as remaining seated
PARTIAL INTERVAL RECORDING	Record if the target behavior occurs at any point during	Best to measure high frequency behaviors such as tantrums and self-injurious behaviors

Identify Reinforcers

- Team members must identify reinforcers for each individual learner with Autism to ensure the reinforcers are motivating and lead to a decrease in the interfering behavior

- If choosing a **DRO or DRL** strategy, the reinforcer should be of at least equal strength or motivating value at which is currently maintaining the interfering behavior. Otherwise, the learner is likely to continue engaging in the interfering behavior.

Identifying Reinforcers

- If choosing a **DRI or DRA** strategy, the reinforcer should be the same type and/or <u>equivalent</u> to the reinforcement they received when engaging in the interfering behavior

- If an external reinforcer is needed, then ideally it is selected by the learner to increase motivation and cooperation with the intervention program

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Determine Schedule of Reinforcement

- Schedules of reinforcement are patterns in timing for the delivery of reinforcers
- Schedules can be **continuous** (every instance of behavior is reinforced) or **intermittent** (reinforcer is delivered following some, but not all instances of behavior)
- The process for determining the schedule of reinforcement is different for each differential reinforcement procedure

Types of Intermittent Reinforcement Schedules

	Ratio Reinforcement Schedules	Interval Reinforcement Schedules
Fixed	Reinforcer is provided after a specified number of correct responses. For example, a teacher provides a learner with a reinforcer every third time the learner asks a peer a question.	Reinforcer is provided after a specified length of time. For example, a learner is reinforced after remaining seated for five minutes.
Variable	Reinforcer is provided based on an average number of correct responses. For example, if the average number of correct responses is three, then a teacher might provide a reinforcer when the learner asks a peer two questions and then again after the learner asks a peer four questions.	Reinforcer is provided after an average amount of time. For example, if the average amount of time is 5 minutes, then a teacher might provide reinforcement after remaining seated for four minutes and then at six minutes.

DRO

- Most applications of DRO involve a fixed-time schedule of reinforcement in which the interval of time remains the same across trials

- For example, a DRO fixed-time schedule of 1-minute means that reinforcement is delivered every 1 minute, contingent upon the absence of the interfering behavior during that minute

DRO

- Alternatively, a DRO variable-time 1-minute schedule of reinforcement may be used, in which the interval of time is set to vary across trials.

- For example, a variable DRO schedule might consist of 15, 30, 45, 60, and 90 seconds, arranged to occur in a random order, with an average interresponse time of 1-minute.

What is Interresponse Time (IRT)?

- The amount of time that elapses between two consecutive instances of the interfering behavior

- Provides a basic measure for implementing and evaluating the DRO intervention

- Initially determined under baseline conditions

$$R_1 \underline{\quad IRT \quad} R_2 \underline{\quad\quad IRT \quad\quad} R_3$$

Setting the initial DRO schedule:

- Determine the average IRT from baseline data

    For example, Ryan hit his peers 25 times during baseline sessions and data was collected from 8:30-9:30 on five different mornings. Here we have 25 instances of the behavior during a time frame of 5 hours. *On average*, he is hitting his peers 5 times per hour or, one hit every 12 minutes.

- Start with a slightly smaller interval than the average IRT for the initial DRO interval

    For example, if average baseline IRT time is 12 minutes, set the initial schedule of reinforcement at 11 minutes. If you set the interval at 11 minutes, the learner must go 11 minutes without engaging in the interfering behavior in order to receive the reinforcer.

DRL

- With DRL, an initial schedule for reinforcement is set based on baseline data

- Start the initial response criterion at the average occurrences from baseline. For example, if a learner sharpens his pencil 6 times per 40-minute class period, a good place to start would be to set the initial criterion to receive a reinforcer at 6 or fewer during each 40-minute class period

- The response criterion gradually decreases to further decrease the interfering behavior rate. Response criterion will continue to decrease gradually until the learner is continually engaging in the interfering behavior at the predetermined, more appropriate rate

- There are two procedural variations when using DRL: Full-session DRL and interval DRL

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Scheduling Procedure	Description	Examples
Full session DRL	Setting a response criterion for the entire session length	• On average, Kyle asks 60 questions during the 6-hour school day. The initial schedule is set at 60 or less questions per school day to receive the reinforcer. • During circle time (20 minutes), Jamie leaves the area an average of 12 times to sanitize her hands. The initial response criterion is set at 12 or less times during circle time to receive the reinforcer.
Interval DRL	Dividing a session into intervals, dividing the initial response criterion by the number of intervals. Behaviors that occur more frequently may require shorter DRL schedules.	• On average, Kyle asks 60 questions during the 6-hour school day. The school day is divided into 6 1-hour intervals and the initial criterion is set for 10 or less questions per hour to receive the reinforcer. • During circle time (20 minutes), Jamie leaves the area an average of 12 times to sanitize her hands. Circle time is divided into 4 5-minute intervals. The initial response criterion is set at 3 or less times per 5-minute interval to receive he reinforcer.

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Let's Watch This Example of DRL

DRI or DRA

- When first beginning to use a DRI or DRA procedure, it is important to use continuous reinforcement by providing the learner with ASD the reinforcer each time the learner uses the incompatible or alternative behavior.

- Continuous reinforcement helps the learner associate the replacement behavior with the delivered reinforcer and should be delivered immediately and consistently (e.g., within 5 seconds each time the learner uses the incompatible or alternative replacement behavior).

- When delivering the reinforcer, be sure to describe the replacement behavior after the learner has used it correctly. For example, a teacher might say, "You worked at your desk for 10 minutes, now you can listen to music."

Use Differential Reinforcement

- The process of using differential reinforcement is different for some of the differential reinforcement procedures.

DRO

- **To use DRO with fidelity, it is important to:**

  - Meet with the learner: Discuss the interfering behavior you want the learner to eliminate and explain how the learner can earn a reinforcer

  - Follow the reinforcement schedule

  - Expand the application of DRO to other settings and times of day

DRL

- **Steps for using DRL include:**

  - Meet with the learner: Discuss the interfering behavior you want the learner to decrease and explain how the learner can earn a reinforce

  - Follow the reinforcement schedule

  - Expand the application of DRL to other settings and times of day

DRI and DRA

- **Steps for using DRI and DRA include:**
  - Meet with the learner: Discuss the replacement (incompatible/alternative) behavior and how to get a reinforcer
  - If the interfering behavior occurs:
    - Put the interfering behavior on extinction; or
    - Interrupt and redirect the learner to the incompatible or alternative behavior
  - Deliver reinforcer when replacement behavior used based on reinforcement schedule
 - Expand the application of DRI/DRA to other settings and times of day

Collect and Analyze Data on Interfering Behavior

- Collect data using the same type of data collection and same data collection forms used during baseline data collection before the differential reinforcement intervention began

- By using the same data collection forms, team members can track a learner's use of the target skill/behavior before, during, and after differential reinforcement procedures are implemented

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S E L P A

What if the learner with ASD is <u>not</u> showing progress with DR?

- Is the behavior well defined?
- Is the behavior measurable and observable?
- Did a functional behavior assessment (FBA) indicate the function of the behavior?
- If using DRI or DRA, does the incompatible/alternative behavior need to be taught?
- Was differential reinforcement used with fidelity?
- If using DRO, DRL, or DRI, is the reinforcer strong enough?
- If using DRA, does the reinforcer provide the same function as the interfering behavior?
- Have you tried adjusting the reinforcement schedule?
- Are all team members using differential reinforcement consistently?

Think - Pair - Share
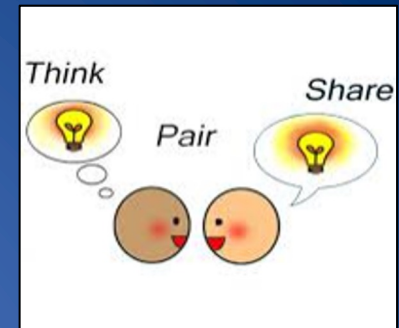
Think of a behavior that you would want to use Differential Reinforcement (DR) with and discuss what DR procedure you would use and why.

What Differential Reinforcement Procedure Am I?

A teacher wants the child to remain in his seat. Each time the student leaves his seat, the behavior is ignored. However, when the child remains seated, the teacher rewards him with a sticker.

Let's Practice!

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What Differential Reinforcement Procedure Am I?

Each time a child makes a demand for food, his parents would ignore him. Only when the child asks politely do the parents turn, acknowledge him, and satisfy his request.

Let's Practice!

What Differential Reinforcement Procedure Am I?

The problem behavior is identified as leaving seat during dinnertime. The parent would set a timer for ten minutes. If the child does not leave his seat during this time, he is rewarded with television time following dinner.

Let's Practice!

What Differential Reinforcement Procedure Am I?

The problem behavior is washing hands repeatedly before lunch. The teacher wants the child to wash his hands, but not more than once before lunch. The teacher would reward the child by allowing him to be first in line at lunch if he avoids washing his hands more than once.

Let's Practice!

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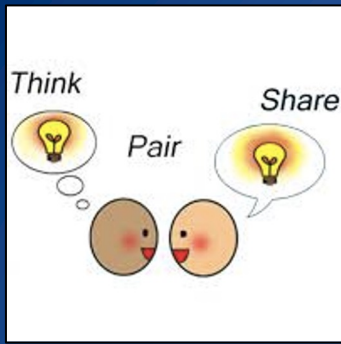
My Takeaways

- What are 4 things you remember from today's training?

- What are 2 things you see yourself doing?

- What is the 1 thing you can implement tomorrow?

Next Steps
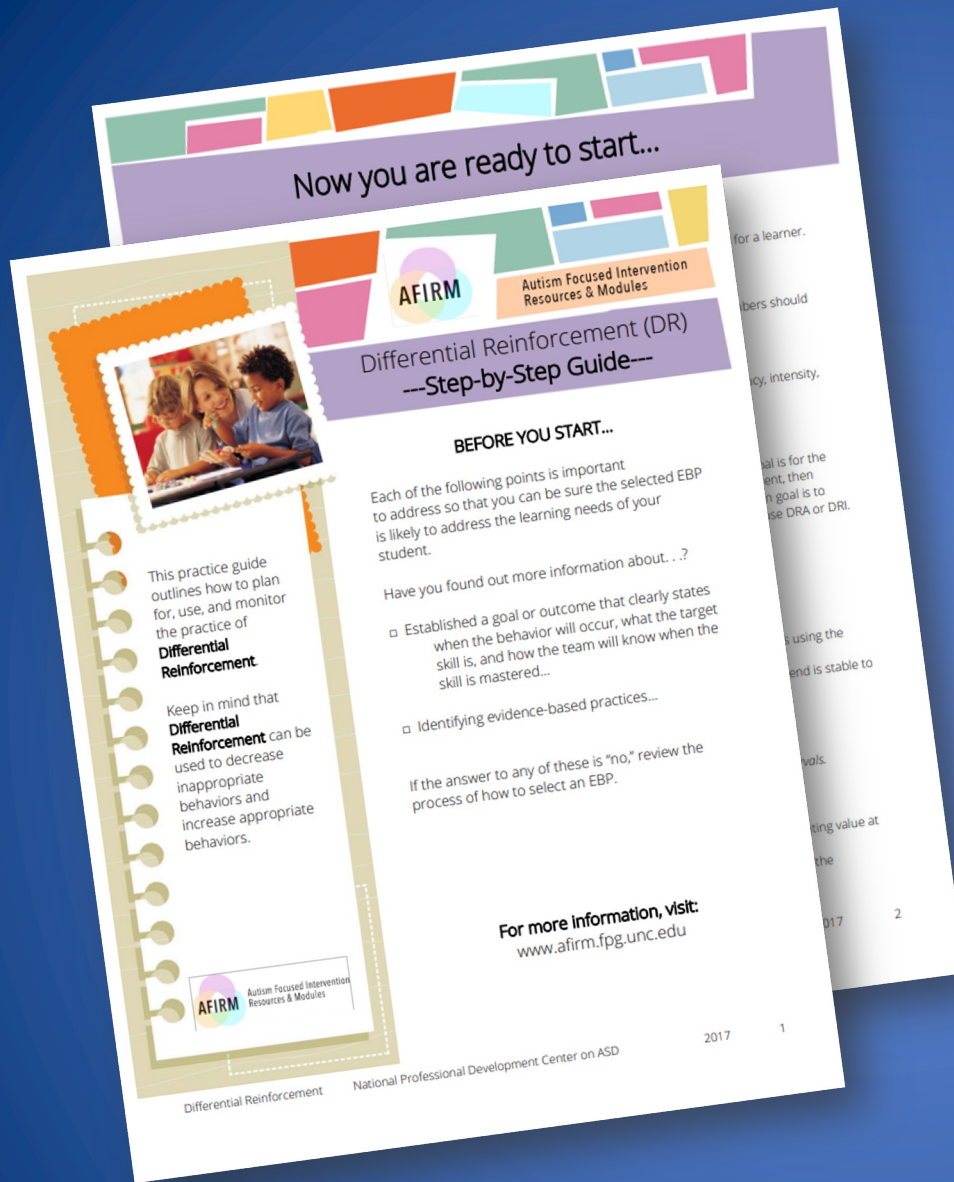
Use the **DR Step–by–Step Practice Guide** as an outline for how to plan for, use, and monitor DR. Each step includes a brief description as a helpful reminder while learning the process

Next Steps

Use the **DR Implementation Checklist** to determine if the practice is being implemented as intended

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Post Training Survey

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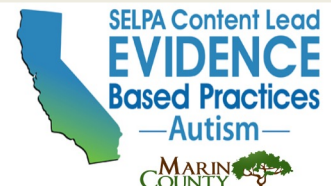
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