

# Applied Behavior Analysis for Educational Settings

Christopher Ewing  
Behavior Intervention Consultant  
Arkansas Department of Education

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## Underlying Assumptions of ABA

- **Determinism**
  - The universe is a lawful and orderly place
- **Empiricism**
  - Behavior is objectively observed, described, and quantified
- **Scientific Manipulation**
  - Events are manipulated
- **Philosophic Doubt**
  - Data based decisions

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## Dimensions of ABA

- **Applied**
  - Basic principles of behavior
- **Behavioral**
  - Behavior as the target
- **Analytic**
  - Functional relations between the behavior and the environment
- **Technological**
  - Procedures are clearly defined and research based
- **Conceptually Systematic**
  - Procedures are linked to principles of behavior
- **Effective**
  - Changes in behaviors are significant and effective. Procedures program for generalization and maintenance
- **General**
  - Procedures that can be applied across individuals and settings.

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## Basic Principles of ABA

- Environment
- Stimulus
- Antecedents
  - S<sup>D</sup>
  - S<sup>Delta</sup>
  - S<sup>P</sup>
- Behavior
- Response
  - Response Class
    - Topographical
    - Functional
- Consequence

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## Three Term Contingency



**Antecedent = Stimuli present prior to the occurrence of the behavior**

**Behavior = Student's response**

**Consequence = Stimulus that followed the behavior**

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## Three Term Contingency

After the bell rings for class to begin Bobby is not in the classroom. Ms. Smith finds Bobby in the hall and tells him to come into the classroom. Bobby tells Ms. Smith he has to go to the bathroom. Ms. Smith tells Bobby he should have used the restroom between bells instead of hanging out with his friends. Bobby starts yelling at Ms. Smith about how mean she is for not letting him use the restroom and that she wants him to wet his pants. Ms. Smith tells Bobby to use the restroom.

A =  
B =  
C =

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## Basic Principles of ABA

### • Reinforcement

- **Positive Reinforcement**
  - The presentation of a reinforcer following the behavior increases the future probability of the behavior.
  - A stimulus is added following the behavior
- **Negative Reinforcement**
  - The removal or avoidance of a stimulus following the behavior increases the future probability of the behavior.
  - A stimulus is removed following the behavior

***\*\*Reinforcement always increases the rate of the behavior.***

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## Basic Principles of ABA

### Reinforcement

Sue yells and screams every day during math. One day Mary gave her candy and she stopped yelling and screaming. Now Mary gives her candy everyday during math.

A =  
B =  
C =  
Procedure =

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## Basic Principles of ABA

### Reinforcement

Jim rarely completes his work. When he does finish it he rushes through the assignment and turns it in with a lot of mistakes. After he turns in his assignment he bothers the other students. One day after Jim turned in his work, Ms. Smith told Jim he could play his favorite computer game for 1 minute for each correct answer. Now Jim always finishes his work correctly.

A =  
B =  
C =  
Procedure =

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**Basic Principles of ABA Effective Reinforcement**

- **DISC**
  - **Deprivation**
    - How long has it been
  - **Immediacy**
    - 3 seconds
  - **Size**
    - The amount must be worth the effort
  - **Contingent**
    - Only available when the desire behavior occurs

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**Basic Principles of ABA Reinforcer Effectiveness (DISC)**

Sue typically gets out of her seat and wanders around the room during seatwork activities. One day she remains in her seat on-task during the morning activity. Ms. Smith praised Sue for staying in her seat during the morning activity as Sue got on the bus to go home.

Which principle was not followed?

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**Basic Principles of ABA Reinforcer Effectiveness (DISC)**

When Tommy bites himself the assigned task is removed and he plays with his favorite truck. One day Tommy finishes his work without biting himself. Ms. Smith decides to try reinforcing completing work so she gives lets him play with is favorite truck.

Which principle was not followed?

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**Basic Principles of ABA Reinforcer Effectiveness (DSIC)**

John’s favorite edible is popcorn. His mom sent a bag of popcorn with his lunch. John ate ½ the bag of popcorn and threw away the rest of the bag. After lunch, Ms. Smith decided she would give John popcorn if he finished his work. John did not finish his work. Ms. Smith said, “reinforcement does not work with John.”

Which principle was not followed?

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**Basic Principles of ABA Reinforcer Effectiveness (DISC)**

Betty will work on mastered tasks for short periods of time with frequent praise. Ms. Smith only praises Betty when she is working. As long as Ms. Smith praises Betty she will continue to work on a simply task. Ms. Smith gives Betty a new task that is very difficult. Ms. Smith praises Betty for working on the new task. Betty stops working on the new task even though Ms. Smith praised her when she was on-task. Ms. Smith says, “reinforcement on works on Betty for easy tasks.”

Which principle was not followed?

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**Basic Principles of ABA**

- **Reinforcement**
  - Positive Reinforcement
  - Negative Reinforcement
- **Differential Reinforcement**
  - Differential Reinforcement – One member of a response class is reinforced while previously emitted members of the same response class are not reinforced.

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## Basic Principles of ABA

### Differential Reinforcement

#### DRI - Differential Reinforcement of Incompatible Behavior

- The reinforcement of a replacement behavior that is topographically incompatible with the aberrant behavior.

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## Basic Principles of ABA

### Differential Reinforcement

#### DRA - Differential Reinforcement of Alternative Behavior

- The reinforcement of an alternative behavior. The behaviors are not topographically incompatible.

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## Basic Principles of ABA

### Differential Reinforcement

#### DRO - Differential Reinforcement of Other Behavior

- The reinforcer is delivered when a specific behavior does not occur for a specified period of time.

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## Basic Principles of ABA

### Differential Reinforcement

#### DRL - Differential Reinforcement of Low Rates of Responding

- The reinforcer is delivered if the rate of responding is less than a specified rate.

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## Basic Principles of ABA

### Differential Reinforcement

#### DRH - Differential Reinforcement of High Rates of Responding

- The reinforcer is delivered if the rate of responding is greater than a specified rate.

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## Basic Principles of ABA

- Reinforcement
  - Positive Reinforcement
  - Negative Reinforcement
- Differential Reinforcement
- Punishment
  - Type I Punishment
  - Type II Punishment

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## Basic Principles of ABA

### Punishment

- **Type I Punishment**
  - **Positive Punishment** – A stimulus immediately follows a behavior and decreases the probability of that behavior occurring in the future.
  - A stimulus is added following the behavior
- **Type II Punishment**
  - **Negative Punishment** – A stimulus immediately removed following a behavior and decreases the probability of that behavior occurring in the future.
  - A stimulus is removed following the behavior

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## Basic Principles of ABA

### Reinforcement & Punishment

	Contingent Presentation	Contingent Removal
Increase in Rate of Behavior	Positive Reinforcement	Negative Reinforcement
Decrease in Rate of Behavior	Type I Punishment	Type II Punishment

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## Basic Principles of ABA

- **Reinforcement**
  - Positive Reinforcement
  - Negative Reinforcement
- **Differential Reinforcement**
- **Punishment**
  - Type I Punishment
  - Type II Punishment
- **Extinction**

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## Basic Principles of ABA

### Extinction

- **Extinction** – The withholding of a reinforcer for a previously reinforced behavior.
- **Ignoring** – Attention maintained behavior
- **Escape Extinction** – Escape maintained behavior

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## Five Steps for Developing a Behavior Intervention Plan

- **Define the behavior of interest**
- **Collect baseline data**
- **Identify the function of the behavior of interest**
- **Develop function based behavior plan**
- **Monitor and revise as needed**

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## Defining the Behavior of Interest

- **Observable and measurable**
- **Dimensions of behavior**
  - Rate
  - Frequency
  - Duration
  - Latency
  - Intensity
- **Data collection methods**
  - Permanent Products
  - Event Recording
  - Duration Recording
  - Interval Recording
  - Momentary Time Sampling

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## Defining the Behavior of Interest

### Permanent Products

**Measure:** The product can be measured after the behavior has occurred.

**Dimension:** Numerical

**Considerations:** Use when only the behavior of interest can produce the product.

**Examples:** *Academic, pre-vocational, and vocational skills.*

Cooper, Heron, Heward (1987). *Applied Behavior Analysis*. Macmillan Publishing Company

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## Defining the Behavior of Interest

### Event Recording

**Measure:** The count of behavior as it occurs.

**Dimension:** Numerical

**Considerations:** Discrete response, short duration, low to high rates

**Example:** Number of times student hits

Cooper, Heron, Heward (1987). *Applied Behavior Analysis*. Macmillan Publishing Company

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## Defining the Behavior of Interest

### Duration Recording

**Measure:** The length of time the behavior occurs.

**Dimension:** Temporal

**Considerations:** Duration of each occurrence and total duration

**Examples:** Time out-of-seat, time on-task

Cooper, Heron, Heward (1987). *Applied Behavior Analysis*. Macmillan Publishing Company

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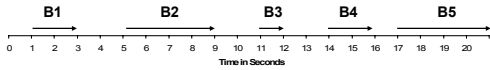
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## Duration Recording



→ = Duration of Occurrence  
**B** = Behavior

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## Duration Recording

Behavior	Duration in Seconds
1	
2	
3	
4	
5	

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## Defining the Behavior of Interest

### Latency Recording

**Measure:** The time from the presentation of the stimulus to the occurrence of the behavior.

**Dimension:** Temporal

**Considerations:** Increasing/decreasing latency

**Examples:** Following instructions or waiting

Cooper, Heron, Heward (1987). *Applied Behavior Analysis*. Macmillan Publishing Company

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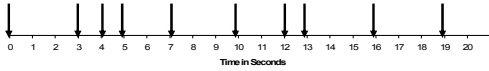
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# Latency



↓ = SD  
↓ = Behavior

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# Latency Recording

Behavior	Duration in Seconds
1	
2	
3	
4	
5	

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# Defining the Behavior of Interest

## Interval Recording (Whole Interval)

**Measure:** The behavior occurs throughout the entire interval.

**Dimension:** Numerical & temporal estimate

**Considerations:** Slight underestimation of occurrences, increasing duration of behavior

**Example:** Time on-task

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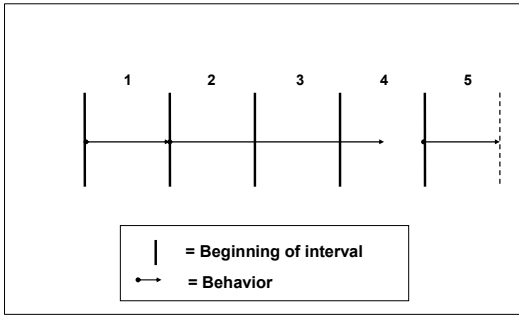
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## Whole Interval Recording




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## Whole Interval Recording

Interval	Behavior
1	
2	
3	
4	
5	

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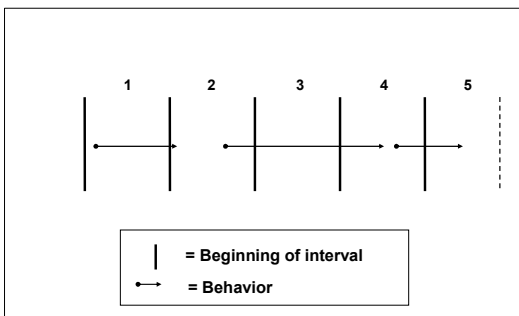
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## Whole Interval Recording




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## Whole Interval Recording

Interval	Behavior
1	
2	
3	
4	
5	

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## Defining the Behavior of Interest

### Interval Recording (Partial Interval)

**Measure:** Any time during the interval

**Dimension:** Numerical & temporal estimate

**Considerations:** Slight overestimate of occurrences, behavior reduction

**Examples:** Interrupting the teacher

Cooper, Heron, Heward (1987). *Applied Behavior Analysis*. Macmillan Publishing Company

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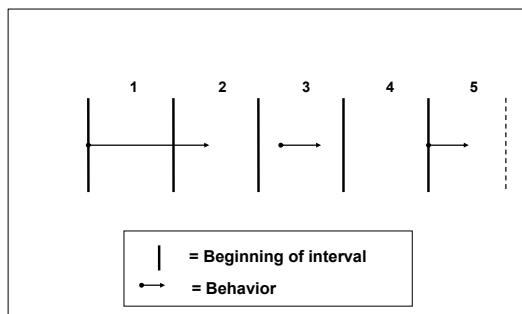
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## Partial Interval Recording




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## Partial Interval Recording

Interval	Behavior
1	
2	
3	
4	
5	

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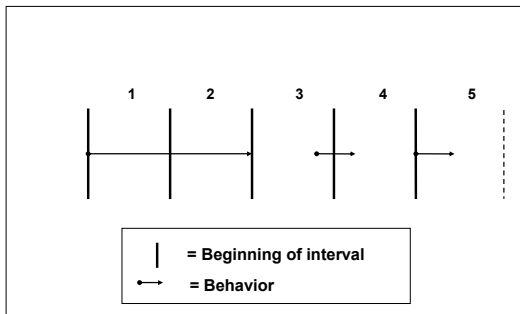
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## Partial Interval Recording




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## Partial Interval Recording

Interval	Behavior
1	
2	
3	
4	
5	

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## Defining the Behavior of Interest

### Momentary Time Sampling

**Measure:** The occurrence/nonoccurrence of the behavior following specified time period.

**Dimension:** Numerical estimate

**Considerations:** Easily used, not appropriate for low rate-behaviors

**Examples:** Stereotypic behaviors

Cooper, Heron, Heward (1987). *Applied Behavior Analysis*. Macmillan Publishing Company

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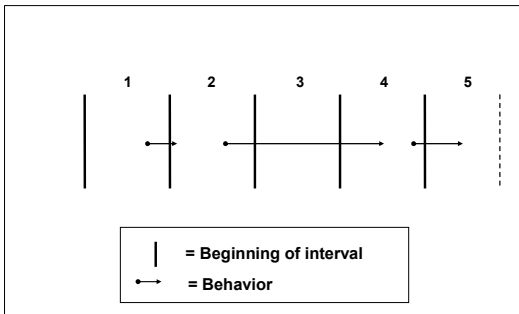
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## Momentary Time Sampling




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## Momentary Time Sampling

Interval	Behavior
1	
2	
3	
4	
5	

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## Baseline Data Collection

- **Purpose**
  - To evaluate the effects of the intervention.
  - Identifying the schedule of reinforcement
- **Length of Baseline**
  - A minimum of 5 days
  - Stable responding

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## Identifying the Function of the Behavior of Interest

- **ABC Event Record Data Collection**
  - Direct observation
  - Antecedents, Behavior, & Consequences
- **Functional Assessment**
  - Questionnaire
  - Survey
- **Functional Analysis**
  - Analog setting
  - Controlled manipulation of stimuli

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## Identifying the Function of the Behavior of Interest

- **Common Functions of Behavior**
  - Attention
  - Escape
  - Escape with Access
    - Tangibles
    - Activity
    - Person/Attention
  - Automatic Reinforcement

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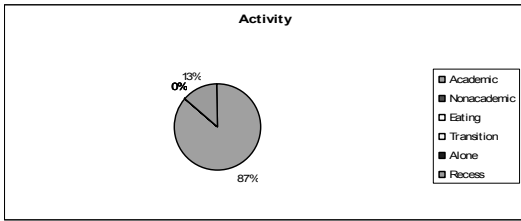
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## Functional Assessments Using ABC Data



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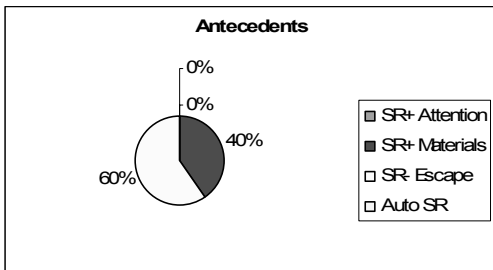
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## Functional Assessments Using ABC Data



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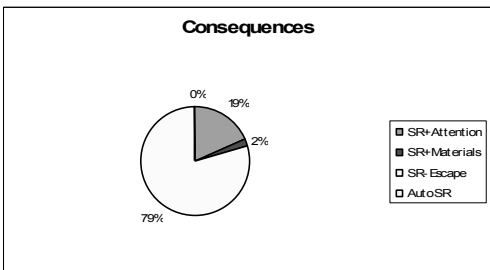
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## Functional Assessments Using ABC Data



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## Functional Assessments Using ABC Data

	SR+ Attention	SR+ Materials	SR- Escape	SR Auto
Antecedents	0%	40%	60%	0%
Consequences	19%	2%	79%	0%

87% of inappropriate behaviors occurred during academic tasks  
Function =

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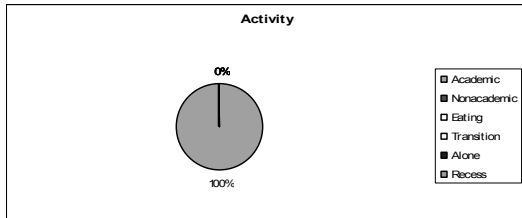
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## Functional Assessments Using ABC Data




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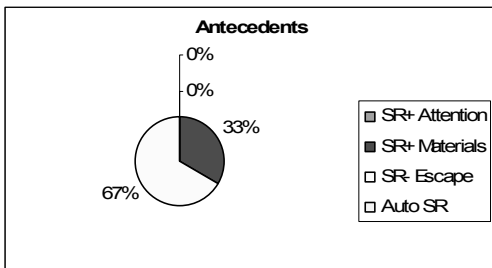
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## Functional Assessments Using ABC Data




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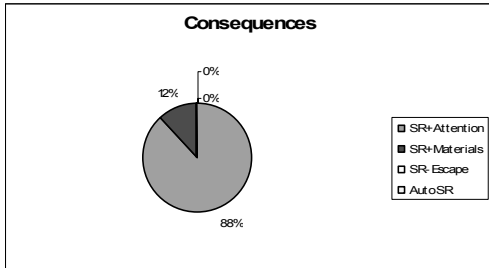
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## Functional Assessments Using ABC Data




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## Functional Assessments Using ABC Data

	SR+ Attention	SR+ Materials	SR- Escape	SR Auto
Antecedents	0%	33%	67%	0%
Consequences	88%	12%	0%	0%

100% of inappropriate behaviors occurred during academic tasks  
Function =

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## Functional Analysis Standard 4 Conditions

- **Attention**
  - Tests for attention maintained behavior
  - Attention is contingent on the occurrence of the inappropriate behavior
- **Demand**
  - Tests for escape maintained behavior
  - Materials/demand removed for 30 seconds contingent on the occurrence of the inappropriate behavior
- **Alone**
  - Test for automatic reinforcement (self stim.)
  - No demands & no attention available
- **Play**
  - Control condition
  - No demands and non-contingent attention

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## Functional Analysis Modified Conditions

- Escape with Access
- Competition/Divided Attention
- Mastered vs. non-mastered tasks
- Academic vs. non-academic tasks
- Task reduction

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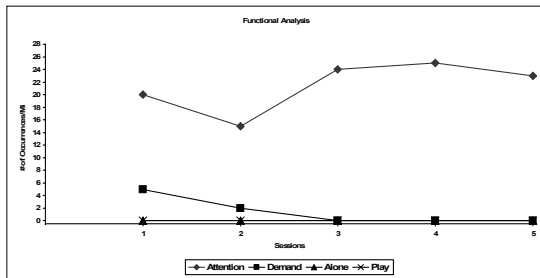
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## Functional Analysis Data Analysis



Function =

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## Identify Procedure and Function

One day Tommy yelled and screamed when his teacher gave him a worksheet. His yelling and scream was so loud and disruptive his teacher sent him to time-out. Now every time his teacher gives him a worksheet he yells and screams until she sends him to time-out.

Procedure =

Function =

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### Identify Procedure and Function

John gets out of his seat and wanders around the classroom every time his teacher is working with another student. His teacher uses verbal prompts to get John to return to his seat. He will remain in his seat and complete his work if his teacher provides repeated verbal prompts until the task is completed.

Procedure =  
Function =

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### Identify Procedure and Function

Sue yells and screams whenever her teacher takes away a toy. Her teacher tries to get Sue to work on the assigned activity but Sue continues to yell. After about 5 minutes of yelling, the teacher gives Sue her toy.

Procedure =  
Function =

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### Identify Procedure and Function

Tommy teacher never says anything to Tommy when he turns his work in on time. One day Tommy turned in his work late. His teacher lectured him on the importance of turning in his work on time. Now Tommy always turns in his work late and his teacher lectures him on the importance of turning in his work on time.

Procedure =  
Function =

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## Identify Procedure and Function

Sammy typically turns in incomplete work. One day Sammy turned in a completed assignment. His teacher praised Sammy in front of the other students for completing his working. Sammy never completed another assignment.

Procedure =  
Function =

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## Developing Behavior Intervention Plans -- Increasing Behavior

- Positive Reinforcement
- Negative Reinforcement

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## Positive Reinforcement

- Precautions
  - DISC
- Programming
  - Initially use a continuous schedule
  - Intermittent schedule
    - Resistant to extinction
    - Use a variable ratio schedule
      - Exceptions – DRL and DRH
  - Vary the reinforcers to prevent satiation

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## Developing Behavior Intervention Plans -- Decreasing Behavior

- Differential Reinforcement
- Extinction
- Punishment
- Time-Out from Reinforcement
- Response Cost

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## Differential Reinforcement

- Precautions
  - Careful selection of reinforcers
  - Requires consistent implementation
- Programming
  - Identify reinforcer to be withheld for behavior targeted for reduction
  - Identify reinforcer for behavior targeted for increase
  - Identify type of differential reinforcement procedure to be used
  - Identify schedule of reinforcement

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## Extinction

- Precautions
  - Must be implemented consistently
  - Extinction bursts
  - Involves more than ignoring the behavior
- Programming
  - Identify reinforcer maintaining behavior
  - Implement procedures for withholding the reinforcer.

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## Monitor

- **Data Collection**
  - Data must be graphed
  - Graphs must be reviewed
- **Consistent data collection**
  - Intervention data collection must match baseline data collection method
  - Data collection must be consistent across all settings
- **Use data to determine the effectiveness of program**
- **Program Implementation**
  - Observe implementation of program across all settings
  - Provide regular feedback to others implementing the program

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## Monitor Data Analysis

Behavior			Baseline
1	25		Baseline
2	22		Baseline
3	20		Baseline
4	23		Baseline
5	24		Baseline
6		20	Intervention
7		18	Intervention
8		23	Intervention
9		20	Intervention
10		13	Intervention
11		15	Intervention
12		12	Intervention
13		18	Intervention
14		12	Intervention
15		13	Intervention

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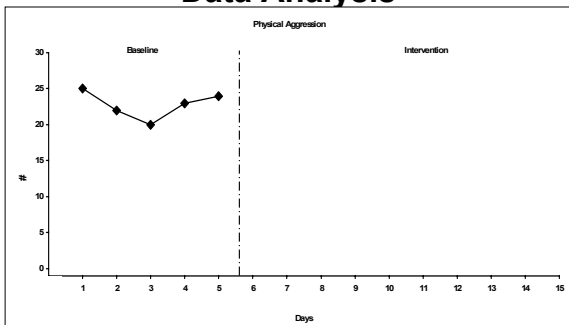
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## Monitor Data Analysis




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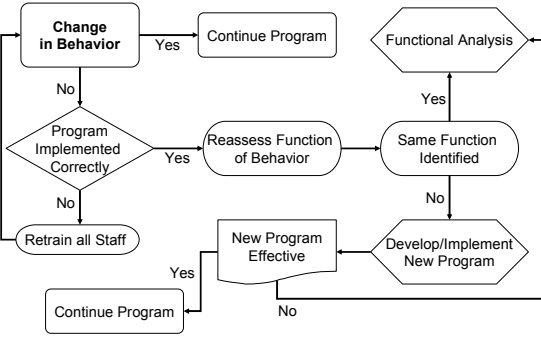
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# Program Revisions



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# BASIC TERMS & PROCEDURES

## Reinforcement/Reinforcer

Reinforcement increases the chance of a behavior occurring in the future. A reinforcer is anything that follows the behavior and **INCREASES** the chance of that behavior occurring again. This can be the removal of something the client does not like or giving the client something he/she like.

## Differential Reinforcement

Differential Reinforcement is the reinforcement of one behavior but not another. There are several types of differential reinforcement. Differential Reinforcement of Other behavior (DRO) is the reinforcement of the nonoccurrence of a behavior you are trying to decrease. Differential Reinforcement of Alternative behavior (DRA or ALT-R) is the reinforcement of an alternative behavior. Differential Reinforcement of Incompatible behavior (DRI) reinforces a behavior incompatible with another behavior. DRO, DRA, and DRI all increase one behavior and decrease another behavior. DRO, DRA, and DRI consist of reinforcing one behavior and extinguishing (see extinction below) another behavior.

## Vicarious Reinforcement

Vicarious reinforcement involves the reinforcement one person's behavior to change the behavior of a different person. The person whose behavior is being reinforced must be in close proximity to the person whose behavior you want to change.

## Punishment/Punisher

Punishment decreases the chance of the behavior occurring in the future. A punisher is anything that follows the behavior and **DECREASES** the chance of that behavior occurring again. This can be the removal of something the client likes or presenting something the client does not like.

**\*\*REMEMBER:** Reinforcement/Reinforcers **INCREASE** the chance of the behavior occurring in the future and Punishment/Punishers **DECREASE** the chance of the behavior occurring in the future.

## Extinction

Extinction is the withholding of a reinforcer for a previously reinforced behavior. It decreases the chance of the behavior from occurring.

## Planned Ignoring

Planned ignoring is an extinction procedure that is used when the behavior is maintained by staff attention. The inappropriate behavior **MUST** be maintained by staff attention. When using planned ignoring the staff person simply ignores the inappropriate behavior.

## Three Term Contingency



**A** = Antecedent (What is happening before the behavior occurs)

**B** = Behavior (The behavior of interest –target behavior)

**C** = Consequence (What happened immediately following the behavior)

### What is an Antecedent?

An antecedent can be anything that occurs before the behavior.

### What is a behavior (of interest)?

The behavior of interest can be an inappropriate behavior or an appropriate behavior. The behavior will be identified and defined on the Interdisciplinary Behavioral Acquisition (IBAS) data sheet or behavior data sheet.

### What is a consequence?

A consequence is anything that follows the behavior and either increases or decreases the chance of the behavior occurring again in the future (i.e., increasing/decreasing the number of times the behavior occurs, increasing/decreasing the intensity of the behavior, increasing/decreasing the length of time the behavior occurs, etc.).

## DELIVERING CONSEQUENCES FOR CORRECT RESPONSES

### Deprivation

Deprivation is how long it has been since the client has had the preferred item (food, toy, radio, etc.). The longer it has been the better. This is why it is important to have a variety of reinforcers. You do not want to use the same reinforcer for every correct response. You want to vary the use of the preferred reinforcers. In addition, the client should not have free access to the item(s).

### Immediate

The reinforcer should be given to the client immediately following the correct response. You should give the reinforcer to the client within 3-seconds of the correct response. The faster you can get it to the client the better.

### Size

Size refers to amount of effort required by the client to complete the task. Is it worthwhile to the client? The reinforcer should equal the amount of effort required to complete the task. Size refers to things like: amount of food, length time allowed to play, length of time allowed to listen to the radio, and number of tokens.

## **Contingent**

Reinforcers should only be given for the correct response. You do not want to give the item to the client the response was incorrect.

*Remember **DISC** (**D**eprivation, **I**mmEDIATE, **S**ize, **C**ontingent) when using reinforcers.*

# **DIMENSIONS OF APPLIED BEHAVIOR ANALYSIS (ABA)**

**Applied:** ABA focuses on the implementation of basic principles to behaviors of significance to the participants involved.

**Behavioral:** ABA focuses on behavior in its own right as a target for change.

**Analytic:** ABA seeks to identify functional relationships between behavior and environmental events through scientific study.

**Technological:** In ABA, procedures are completely and precisely defined.

**Conceptually Systematic:** In ABA, procedures are linked to, and described in terms of, the basic principles of behavior.

**Effective:** In ABA, the changes in behavior are significant to the participants involved, cost effective, and efficient. Behavior analysts attempt to use procedures that prompt generalization and maintenance of behavior change.

**Generality:** Behavior analysts attempt to discover procedures that can be applied effectively to many individuals and in many settings.

# BASIC PRINCIPLES OF BEHAVIOR

Behavior is the interaction of the muscles and glands of an organism and the environment.

A response is an instance of behavior.

A topographical response class is a collection of responses that share common functional relationships with classes of antecedent and consequent stimuli.

The properties of behavior are repeatability, occurrence in time and the combination of repeatability and occurrences in time. Response measures are derived from these properties.

Environment constitutes the entire constellation of stimuli that can affect behavior.

A stimulus is a change in the environment that can affect behavior.

A consequence is a stimulus that follows a behavior in time.

An antecedent is a stimulus that precedes a behavior in time.

## REINFORCEMENT

Reinforcement is defined functionally, including the operation and effect on the behavior.

Positive Reinforcement: A stimulus is presented after a response, and as a result, the future frequency of the response class increases.

Negative Reinforcement: A stimulus is attenuated or removed after a response, and as a result, the frequency of the response class increases.

Although these definitions refer only frequency, the effect of reinforcement may also be measured using latency, duration, and inter-response time.

### Effective Delivery of Reinforcers (DISC)

Deprivation – The individual must be deprived of the reinforcer

Immediacy – The delivery of the reinforcer must immediately follow the occurrence of the behavior.

Size – The reinforcer must be large enough to maintain the behavior but not result in satiation

Contingent – The individual only has access to the reinforcer following the desired behavior.

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## PUNISHMENT

Punishment is defined functionally, including the operation and effect on the behavior.

Positive Punishment: A stimulus is presented after a behavior, and as a result, the frequency of the response class decreases.

Negative Punishment: A stimulus is attenuated or removed after a behavior, and as a result, the frequency of the response class decreases.

Although these definitions refer only frequency, the effect of reinforcement may also be measured using latency, duration, and inter-response time.

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Stimulus Control is the extent to which a behavior changes as the result of the presentation and removal of an antecedent stimulus, which has been established through operant conditioning. Terms for various discriminative stimuli outlined below are inclusive of all stimulus control processes, but are not the only terms in the current literature used to describe the same.

SD: a stimulus that when present, evokes behavior because in the past, the behavior has been reinforced (positively or negatively) in its presence.

SDELTA: a stimulus that when present, weakens behavior because in the past, that behavior has been extinguished (or contacted a leaner schedule of reinforcement) in its presence.

SP: a stimulus that when present, weakens behavior because in the past, that behavior has been punished (positively or negatively) in its presence.

An Establishing Operation (EO) is a procedure that momentarily alters the effectiveness of the reinforcer and momentary frequency of the response class that has in the past produced this stimulus.

Contingency is a dependent relationship between a response class and one or more stimulus classes (operant), or between two or more stimuli (respondent).

A Functional Relationship exists when changes in an antecedent or consequent stimulus class consistently alter a dimension of a response class. Response dimensions might not be altered on each occasion of a change in a stimulus class.

Extinction a consequence is withheld (operation), and as a result, some extent of the occurrence of the response class is less likely to occur (effect).

Generalization is the spread of the changes in behavior engendered by a contingency to other stimulus conditions (stimulus generalization), or other responses (response generalization), that have not been exposed to that contingency. The extent of the effect is related to the similarity of the other stimulus or response class characteristics.