# PRACTICAL AND ETHICAL ISSUES IN CURRENT FUNCTIONAL ANALYSIS METHODOLOGY: POTENTIAL SOLUTIONS

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# **Functional Analysis**

"the external variables of which behavior is a function provide for what may be called a causal or functional analysis. We undertake to predict and control the behavior of the individual organism" (Skinner, 1953, p. 35)



### Functional Analysis of Problem Behavior

Research identified different contingencies of reinforcement maintaining problematic behaviors:

### (1) Socially mediated

- a. Positive Reinforcement (Loovas, et al, 1965; Carr, 1977)
- b. Negative Reinforcement (Ferster, 1958; Carr, et al 1976)
- c. Tangible (Iwata, et al, 2000)

(2) Automatic reinforcement (does not depend on the behavior of someone else Skinner, 1957)

See Dixon, Vogel, & Tarbox, 2012 for a review

### **Functional Analysis in Practice**

Conducting functional analysis prior to intervention is becoming standard best clinical practice and a requirement for interventions targeting behavior reduction

#### BACB Professional and Ethical Compliance Code for Behavior Analysis

#### 3.01 Behavior-Analytic Assessment. RBT

- (a) Behavior analysts conduct current assessments prior to making recommendations or developing behavior-change programs. The type of assessment used is determined by client's needs and consent, environmental parameters, and other contextual variables. When behavior analysts are developing a behavior-reduction program, they must first conduct a functional assessment.
- (b) Behavior analysts have an obligation to collect and graphically display data, using behavior-analytic conventions, in a manner that allows for decisions and recommendations for behavior-change program development.

### Functional Assessment Methodology

- At least two-step process:
  - Raising Hypotheses
  - Direct (Experimental) Testing
    - Typically called "Functional Analysis"
    - Tests often designed based on the hypotheses raised



# **Raising Hypothesis**

- Indirect data
  - Unstructured Interview
  - Structured Interview
    - Motivation Assessment Scale (MAS)
    - Functional Analysis Screen Tool (FAST)
- Direct Observation
  - Descriptive
  - Antecedent-Behavior-Consequence (ABC)

# Direct (Experimental) Testing



Analysis and Intervention in Developmental Disabilities Volume 2, Issue 1, 1982, Pages 3-20



#### Toward a functional analysis of self-injury

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#### TOWARD A FUNCTIONAL ANALYSIS OF SELF-INJURY

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# **Direct (Experimental) Testing**

### Procedure

Manipulations of antecedents and consequences across 4 conditions:

Attention	
Escape	
Play	
Alone	
Escape Play Alone	



# Direct (Experimental) Testing

### Procedure

Condition	Antecedent	Behavior	Consequence
Attention	Removal of attention	SIB	Access to verbal and physical attention
Escape	Introduction of high rates of demand	SIB	Removal of the demand
Play	Access to toys and delivery of attention in the absence of SIB	SIB	Ignore
Alone	No social environment or toys	SIB	Ignore

# Outside of the "Laboratory"...

 Conclusions for the majority of functional assessments outside of highly specialized environments rely primarily on indirect data

#### Problems

- a. Known to be inaccurate (describes the perception of an untrained observer)
- b. Extrapolation of the results as if it is the identified function (misuse of the instrument)
- c. Conclusions are susceptible to the influence of factors unrelated to the actual function

Barton-Arwood, et al (2003) Sigafoos, et al (1993)

Green, et al, (1991) Green, et al (1988) Sturmey (1994)

# Outside of the "Laboratory"...

• Conclusions may also rely on direct observation but those often provide limited treatment value

### Problems

- a. Descriptions do not always rely on actual facts
- b. Little to no summarization statements of the data occur

# Outside of the "Laboratory"...

- Direct (Experimental) Tests as described are concerning
  - Ethical concerns
    - Reinforcement of problematic behaviors even if it is for short periods of time
  - Practical concerns (specially when used on typical environments such as schools, home, community)
    - Requires specialized training, environment, monitoring
    - Social acceptance (parents, other service providers)
    - Conditions of testing do not typically match those of natural environment
  - Theoretical Concerns
    - Antecedent conditions are not manipulated independently of the consequence conditions (e.g., Instruction signals attention vs. escape)

### Symposium Presentations

### **Presentation 1**

Introduce an alternative solution for raising hypotheses using a direct-observation structured instrument

### **Presentation 2**

Describe three alternative procedures to test hypotheses regarding the function of problematic behaviors

# DIRECT OBSERVATION OF CONSEQUENCES TOOL FOR RAISING HYPOTHESIS ABOUT FUNCTION OF PROBLEMATIC BEHAVIORS

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# Goals

### Phase 1

Evaluate and compare hypotheses regarding function of problematic behaviors from the FAST and MAS to a tool that relies on direct observation of consequences that follow problematic behaviors (Beacon Consequence Analysis Form - BCAF)

### Phase 2

Evaluate accuracy of predicted hypotheses from FAST, MAS, and BCAF by contrasting the hypothesized function with results from a discrimination training functional assessment test.

# Method

### Participants

Twenty-two children diagnosed with ASD ranging in age from 3-8 years old. The participants engaged in one or more topographies of problematic behavior, including but not limited to tantrum, property destruction, self-injury, and elopement.

### Tests and Materials

Hypothesis development tools: FAST, MAS, BCAF

# Functional Assessment Screening Tool (FAST)

Iwata & DeLeon, 2005; Iwata, DeLeon, Roscoe, 2013

### Sixteen yes/no questions

1. Does the client usually engage in the problem behavior when he/she is being ignored or when caregivers are paying attention to someone else? Scoring Summary - Circle the number from above **IYes** of each question answered "Yes". Does the client usually en for preferred activities [game: are taken away? Potential Source of Reinforcement Items circled "Yes" Total lYes 3. When the problem behavior or 2 3 1 4 Attention/Preferred Items [Social] calm the client down or try to eng lYes 5 7 6 8 Escape [Social] Is the client usually well be attention or when preferred it 9 11 12 Sensory Stimulation [Automatic] 10 lYes 5. Is the client resistant wher 13 15 16 Pain Attenuation [Automatic] 14 group activities? lYes 6. Does the client usually engage in the problem behavior when asked to

### Functional Assessment Screening Tool (FAST)

Iwata & DeLeon, 2005; Iwata, DeLeon, Roscoe, 2013



# Motivation Assessment Scale (MAS)

Durand & Cummins, 1988

 Sixteen questions about the likelihood an individual may behave in certain ways scored on a 0 (never) to 6 (always) scale

		Sensory	Escape	Attention	Tangible
		1	2	3	4
1. Would the bel		5	6	7	8
person were l		9	10	11	12
several hours		13	14	15	16
2. Does the beha					
difficult task?	Total Score =				
3. Does the beha	Mean Score =				
other persons	(divide the total score by 4)				
4. Does the beha	Relative Ranking				
this person ha	(high score to low score)				
5. Would the beh	avior occur repeatedly	, in the same	way, for	0 1 2 3	4 5 6
yory long peri	ds of time if no one i	vere ground?	(For all rights reserved		
$\sim\sim\sim\sim\sim$	Copyright 2015 Beacon	ADA Services, Inc.	, att rights reservea.		

# Motivation Assessment Scale (MAS)

Durand & Cummins, 1988



# Beacon Consequence Analysis Form (BCAF)

- Direct-observation of objective and pre-determined list of consequences following each instance of the problem behavior
- Goal is to narrow the scope of consequences to be observed reducing training and increasing accuracy



#### BEACON CONSEQUENCE ANALYSIS FORM (BCAF)

Target Behavior: \_\_\_\_\_

Operational Definition (must be observable and measurable with clear onset and offset criteria):

Record whether or not the behavior specified below occurred immediately after the target behavior occurred

	Occurrence of the Target Behavior's Immediate Effect on the Environment																				
Consequence Description		1	2	3	4		6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Did a second second state during as within 20 seconds often the																				
<b>1</b> A	bid a person speak to them during or within 20 seconds after the																				
																0	cc	ur	rer	nce	
	Consequence D	es	cri	pti	ion								1		2	Τ	3	Τ	4	Τ	
	-																	T		T	
1 ^	Did a person speak to them durin	g o	or v	vith	in 2	20 :	sec	ono	ds a	fte	er tl	ne						Τ		Τ	
IA	behavior occurs?																				
1B	Did a person speak to them u	ısin	ig 1	L-5	wo	ords	s?														
10	Did a person speak to them u	ısin	ig 6	5 or	mo	ore	wo	ord	s?												
	Did the half of the second in a second			r - I.			1		4		r I-										
6A	being completed																				
7A	A tangible (e.g., toys, electronics, edibles) item is presented immediately following the behavior																				
7B	7B The behavior results in the person obtaining and keeping a tangible item for more than 1 minute																				
7C	7C The behavior results in the person obtaining and keeping a tangible item for less than 1 minute																				
8A	No one touched, talked to, looked at them or moved any items    or materials in the environment (0-60 seconds) after the behavior occurred and the behavior did not END with an intervention																				

### Beacon Consequence Analysis Form (BCAF)



# Beacon Consequence Analysis Form (BCAF)











# Method

### Participants

Twenty-two children diagnosed with ASD ranging in age from 3-8 years old. The participants engaged in one or more topographies of problematic behavior, including but not limited to tantrum, property destruction, self-injury, and elopement.

### Tests and Materials

Hypothesis development tools: FAST, MAS, BCAF

### Procedure

Participant's parents completed the FAST and MAS based on the most significant problem behavior occurring at home. Direct observation of consequences were collected and summarized by the staff on the case using the BCAF.



# Method

### Measures

Measures of **specificity** of predictions and **correspondence** across predictions from the 3 instrument were calculated.

### They were:

- **Specificity**: Average number of predictions and percentage of a single prediction per administration of each instrument
- **Correspondence**: Percentage of times a number of instruments agreed on one common function or did not agree at all

### Results

• Specificity

		# of predicted functions per administration	% of times only 1 function was predicted
	FAST	1.82	6%
	MAS	1.45	14%
$\langle$	BCAF	1.36	14%

# Results

- Correspondence
  - All three instruments predicted at least one common function 36% of the time.
  - Two instruments predicted at least one common function
    55% of the time.
  - The percentage of times that the instruments had no agreements was 9%.

# Goals

### Phase 2

Evaluate accuracy of predicted hypotheses from FAST, MAS, and BCAF by contrasting the identified function from a discrimination training functional assessment test.



# Method

### Participants

Ten participants who had a functional analysis (test of hypothesized function) completed and at least one of the hypotheses generating tools completed were included in the analysis.

### Tests and Materials

Hypothesis development tools: FAST, MAS, BCAF Functional Analysis: Free-operant, Forced-choice, FCT



# Method

### Procedure

 Following the administration of the tests, an analysis of the hits, misses, false alarms, and correct rejections was conducted per instrument and per function





### Results

	INSTRUMENTS											
		FAST	MAS	BCAF								
S		(n=8)	(n=3)	(n=10)								
RA	Hits	75.0%	33.3%	100.0%								
CU	Correct Rejection	62.5%	77.8%	93.3%								
AC	Misses	8.3%	22.2%	0.0%								
	False Alarms	37.5%	22.2%	6.7%								

\* The highest score for Hits and Correct Rejection and lowest scores for misses and falsa alarms are in bold font to indicate the best instrument in each category

## Conclusions

- An ideal instrument should make the least number of predictions. Moreover the predictions need to be accurate.
   An analysis of accuracy should strive for high rates of hits and correct rejections and low rates of misses or false alarms.
- Both misses and false alarms lead the practitioner to pursue treatment in the wrong direction wasting clients and practitioners valued time and resources

### Conclusions

- Even though the FAST and MAS require less effort as they are obtained from interview and do not required direct observation, they had higher percentage of misses and false alarms
- The analysis supported the use of BCAF with the lowest number of predictions and the most accurate with higher rates of hits and correct rejections and lower rates of misses and false alarms

### Extended use of BCAF

Analysis of *differential consequences* delivered. For example:



#### **Following Instructions**

#### **Disruptive Behaviors**





### Extended use of BCAF

Analysis of differential consequences delivered. For example:

#### **Following Instructions**





#### **Disruptive Behaviors**





# EXPERIMENTAL METHODS FOR ASSESSING FUNCTION WITHOUT DIRECT REINFORCEMENT OF PROBLEMATIC BEHAVIORS

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# Introduction

Attempted to identify alternatives to conducting a functional analysis that involves teaching functional communication responses rather than reinforcing problematic behaviors.

Three alternatives used:

- Free Operant
- Forced Choice
- Teaching Functional Response

#### **Description**:

Student is presented an opportunity to choose between two locations (one in which they access demands and attention and one where demands are not present and attention is not available).

#### **Two Responses:**

Choose to spend time in location with no demands(escape) Choose to spend time in location with demands but attention available (attention)

#### Steps:

- ✓ Clearly discriminate boundaries of room
- Ensure environment can be as controlled as possible (distracting, competing variables stimuli, tangibles, siblings, parents, etc)
- ✓ Identify which location will have which consequence
- ✓ Identify measurement procedures and how data will be collected.

### Beacon Consequence Analysis Form (BCAF)









### Results



### Force Choice Functional Assessment

#### **Description**:

Student is presented an opportunity to choose between two responses (compliance or non compliance)

#### Two Responses:

- Choose with follow instruction
- Choose not to follow instruction

### Steps:

- ✓ Identify target responses
- Ensure environment can be as controlled as possible (distracting, competing variables stimuli, tangibles, siblings, parents, etc)
- Identify which response (compliance or non compliance) will have which consequence
- Identify measurement procedures and how data will be collected.

### Beacon Consequence Analysis Form (BCAF)



### **Force Choice Functional Assessment**



### Force Choice Functional Assessment



### Results



### **Force Choice Functional Assessment**





### Force Choice Functional Assessment



### Results



### Teaching Functional Response Functional Assessment

#### **Description**:

Student is able to choose between three responses all of this

#### **Three Responses**

- Choose to use known functional response (tap/"excuse me")
- Choose to use new functional communication response ("let's go play")
- Choose to engage in problematic behavior (grabbing, screaming, bumping, stealing seat)

Steps

- ✓ Identify target responses
- Ensure environment can be as controlled as possible (distracting, competing variables stimuli, tangibles, siblings, parents, etc)
- Identify which response will have which consequence (differential reinforcement)
- ✓ Identify measurement procedures and how data will be collected.
- Collect baseline data of current rate for 3 responses
- Expose to pre teach new target

### Beacon Consequence Analysis Form (BCAF)









### Results



# Discussion

- Direct observation data versus subjective caregiver reports
  - Discredited for preference assessments yet still widely used for FA
- Hypothesis development versus identification of function Why it testing the hypothesis omitted?
- Too many functions & missing actual function



# Discussion

- Ethical Hypothesis testing
  - Determining if the consequence is a reinforcer for similar response should not require you to reinforce problem behavior
  - Testing consequence conditions that do not occur is inefficient and unrelated to function
- Our technology of application must continue to improve
  - Social validity (settings, procedures and implementers)

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