The Functional Analysis of Behavior: History, Applications, and Implications
Behavioral Wisdom

Don’t Judge a Book by Its Cover…

…or Behavior by Its Topography
THE BEHAVIOR OF ORGANISMS

1938
THE BEHAVIOR OF ORGANISMS
An Experimental Analysis

1938
Verbal Behavior

B.F. Skinner’s Functional Analysis of Language
• The demonstration that one variable changes as a result of changes in another variable.

There is a **functional relation** between task difficulty and disruptive behavior.

• The consequence that is produced by behavior that maintains (reinforces) the behavior.

The **function** of the disruptive behavior is escape.
Why Assess?

Depressed, not sleeping, low self esteem...still enough about me, what can I do for you?
Why Assess?

- Assessment is an integral part of any treatment, be it medical or behavioral.
- Before we can fix something, we must know what is broken.
- Sometimes, what we think is broken is not broken at all.
- Other times, those things that are seemingly fine turn out to be very wrong after all.
- How do we figure it all out?
What is Behavioral Assessment?

A Strategy to Identify:

- **General**
  - A General Problem
  - A Target for Treatment
  - Characteristic A-B-C s
- **Specific**
  - Functional Relations
What is **Functional** Assessment?

**A Strategy to Identify:**

**General**
- A General Problem
- A Target for Treatment

**Specific**
- Characteristic A-B-C s
- Functional Relations
Functional Assessment

Process of generating information about the antecedents and consequences reliably associated with the occurrence of a target behavior.

**Indirect Assessment**

*Interviews or Questionnaires*

**Direct Assessment**

*Direct Observation*
QUIZ QUESTION #1

In the typical functional assessment, the function of behavior refers to ___.

A) the effect the behavior has on the environment
B) the consequences that maintain the behavior
C) the conditions that evoke the behavior
D) what the behavior does for the person
Possible Functions of Behavior

- Biological Contexts
- Social Contexts
- Physical Contexts

- Escape
- Tangibles
- Sensory Feedback

- Social Attention

Source: Durand 1990
Escape / Avoidance

Social* Negative Reinforcement

• Behavior is established or maintained via contingent removal or reduction of an aversive stimulus or situation

• Examples
  – Giggling, making rude noises, and other sorts of tomfoolery result in the student being sent out of math class to sit in the Principal’s office
  – Tantrums result in the teacher’s aide cleaning up the play area of the classroom rather than the student cleaning up the area
Attention

Social Positive Reinforcement

• Behavior is established or maintained via contingent access to interaction (or increased interaction) with peers or adults.

• Examples
  – During independent class work, screaming or hitting a peer results in teacher attention
  – Inappropriate comments or disruptive behavior results in peer attention and approval
**Tangible (or Activity)**

**Social Positive Reinforcement**

- Behavior is established or maintained via contingent access to a preferred item or activity.

- **Examples**
  - Screaming and crying when a classmate is playing with a desired toy results in the toy being given to the screamer.
  - Whining and pestering results in the child being taken to McDonalds.
Automatic

Non-Social Pos./Neg. Reinforcement

• Behavior is established or maintained via response-produced ("sensory") stimulation.

• Examples
  – A child in a residential facility engages in head-banging during “rest periods” throughout the day and during late evening hours following dinner regardless of staff interaction, demands, etc.
QUIZ QUESTION #4

Which of the following categories of reinforcement does not belong?

A) Attention  
B) Escape  
C) Tangible/Activity  
D) Automatic
ASSESSMENT METHODS

Direct vs. Indirect

Determining What, How, and When To Observe
5 Steps to Functional Assessment *

1. Describe the problem behavior
2. Identify the possible predictors of occurrence
3. Identify the possible characteristic consequences
4. Develop a summary statement or hypothesis
5. Collect direct observation data based on the summary statement
Formulating Hypotheses

Antecedent
When Allison is prompted to wash her hands in preparation for lunch,

Behavior
she screams and tantrums, which is followed by…

Consequence
termination of hand washing and lunch by being sent to time-out.

Hypothesized function = escape from hand washing or lunch
Typical* Assessment Procedure

1. Informal Interview
2. Records Review
3. Structured Interview (e.g., FAI, MAS, FAST)
4. Direct Observation
   • Structured Descriptive Assessment
   • Descriptive (Probability) Analysis
5. Functional Analysis
   • Brief → Extended
Informant Methods

**Functional Analysis Screening Tool**

**Client:** ___________________________  **Date:** ___________________________

**Informant:** ___________________________  **Interviewer:** ___________________________

**To the Interviewer:** The FAST identifies environmental and physical factors that may influence problem behaviors. It should be used only for screening purposes as part of a comprehensive functional analysis of the behavior. Administer the FAST to several individuals who interact with the client frequently. Then use the results as a guide for conducting a series of direct observations in different situations to verify behavioral functions and to identify other factors that may influence the problem behavior.

**To the Informant:** Complete the sections below. Then read each question carefully and answer it by circling “Yes” or “No”. If you are uncertain about an answer, circle “N/A”.

**Informant-Client Relationship**
1. Indicate your relationship to the client: [ ] Parent  [ ] Instructor  [ ] Therapist  [ ] Paraprofessional  [ ] Residential Staff  [ ] Other
2. How long have you known the client? ______ years ______ months
3. Do you interact with client daily? [ ] Yes [ ] No [ ] N/A
4. In what situations do you usually interact with the client? [ ] Meals [ ] Academic training [ ] Leisure activities [ ] Work or vocational training [ ] Self care [ ] Other

**Problem Behavior Information**
1. Problem behavior [check and describe]:
   [ ] Aggression: ___________________________
   [ ] Self-injury: ___________________________
   [ ] Property destruction: ___________________________
   [ ] Disruptive behavior: ___________________________
2. Frequency:
   [ ] Hourly [ ] Daily [ ] Weekly [ ] Less
3. Severity:
   mild: disruptive but little risk to property or health
   moderate: property damage or minor injury
   severe: significant threat to health or safety
4. Situations in which the problem behavior is most likely:
   Days/Times: ___________________________
   Settings/Activities: ___________________________
5. Situations in which the problem behavior is least likely:
   Days/Times: ___________________________
   Settings/Activities: ___________________________
6. What is usually happening to the client right before the problem behavior occurs?
7. What usually happens to the client right after the problem behavior occurs?
8. How do you handle the behavior when it occurs?
9. Comments: ___________________________

**Scoring Summary** - Circle the number from above of each question answered “Yes”.

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<tr>
<th>Item</th>
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<th>Potential Source of Reinforcement</th>
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<td>3 4  Attention/Preferred Items [Social]</td>
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<td>5</td>
<td>6 7</td>
<td>8  Escape [Social]</td>
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<tr>
<td>9</td>
<td>10 11</td>
<td>12 Sensory Stimulation [Automatic]</td>
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<td>16 Pain Attenuation [Automatic]</td>
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- Little research exists to support the reliability of information obtained from indirect assessments.
- Not recommended as principal means of identifying functions of behaviors. Best used for hypothesis development.
Direct Observation

Purposes

• To identify possible antecedent and consequent variables related to the occurrence of the problem behavior.

• To validate, clarify, and revise hypotheses developed from informant methods and records review.
Guidelines

• Direct observation is an essential component to assessment. No behavioral assessment is complete with records review and/or informant methods alone.

• Both record reviews and informant methods should be used only to 1) inform your direct observation methods/arrangements and 2) to allow for a comparison/verification of your direct observation data.
DESCRIPTIVE ASSESSMENT

Best Practice?

Purpose, Utility, and Limitations
A-B-C Data Collection
Narrative A-B-C

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Narrative A-B-C

### Antecedent-Behavior-Consequence (ABC) Analysis

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<td>8:15</td>
<td>Bus</td>
<td>Getting teased</td>
<td>Aggr.</td>
<td>Got back at them</td>
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<td>9:25</td>
<td>Playground</td>
<td>Nothing</td>
<td>Aggr.</td>
<td>Got in trouble</td>
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(ABC) Descriptive Assessment

Observer ____________________
Date ____________________

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<th>Behavior</th>
<th>A/I Alone/Ignore</th>
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Problems with Descriptive Assessment

• Difficult to identify reinforcers delivered on a thin intermittent schedule
• Environments might be modified so as to minimize or eliminate potential controlling variables
• Unimportant, but frequent, variables might mask controlling variables
• Cannot establish functional relations
Is There Another Problem?

• You can observe only a correlation between the occurrence of a target response and antecedent and consequent events.

• You get no information about the correlation between the nonoccurrence of the behavior and these same antecedent and consequent events.
Conditional Probabilities
Probability Statements

• **Conditional Probability**
  The probability of a certain environmental event (antecedent or consequence) given the occurrence of the target behavior.

• **Background Probability**
  The overall probability of certain environmental events.
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Figure 2. Results of Chris’s descriptive analysis. Panel A: the proportion of event intervals concurrent with SIB (left) and the proportion of SIB intervals concurrent with these events (right). Panel B: proportions of staff response intervals antecedent to SIB (left) and proportions of SIB intervals following instances of staff responses (right). Panel C: proportions of staff response intervals consequent to SIB (left) and proportions of SIB intervals preceding instances of staff responses (right).

Source: Lerman & Iwata, 1993
FUNCTIONAL ANALYSIS
BEST PRACTICE

Experimental Demonstration of Functional Relationships
Pre-Treatment Functional Analysis

• The term **functional analysis** denotes empirical demonstrations of cause-effect relationships (Skinner, 1953).

• Remember, in behavior analysis, function typically refers to 1) the effect behavior has on the environment or 2) a relationship between two or more variables.

• In ABA, functional analysis typically refers to an experimental methodology used to determine the maintaining variables for (problem) behavior.
Observation is a passive science, experimentation an active science.

Claude Bernard
TOWARD A FUNCTIONAL ANALYSIS OF SELF-INJURY

BRIAN A. IWATA, MICHAEL F. DORSEY, KEITH J. SLIFER, KENNETH E. BAUMAN, AND GINA S. RICHMAN
THE JOHN F. KENNEDY INSTITUTE AND
THE JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

This study describes the use of an operant methodology to assess functional relationships between self-injury and specific environmental events. The self-injurious behaviors of nine developmentally disabled subjects were observed during periods of brief, repeated exposure to a series of analogue conditions. Each condition differed along one or more of the following dimensions: (1) play materials (present vs absent), (2) experimenter demands (high vs low), and (3) social attention (absent vs noncontingent vs contingent). Results showed a great deal of both between and within-subject variability. However, in six of the nine subjects, higher levels of self-injury were consistently associated with a specific stimulus condition, suggesting that within-subject variability was a function of distinct features of the social and/or physical environment. These data are discussed in light of previously suggested hypotheses for the motivation of self-injury, with particular emphasis on their implications for the selection of suitable treatments.
FA: General Strategy

- Target behavior selected
- Several analogue conditions run
  - Attention
  - Escape (Demand*)
  - Tangible
  - Alone
  - Control (often “Play”)
- Look for differentiation across conditions
Figure 1. Problem behaviors per minute during the functional analyses for Jay (top) and Betty (bottom).
Figure 1. Percentage of intervals in which bizarre vocalizations occurred across all conditions of the brief functional analysis (top panel) and percentage of intervals in which bizarre and appropriate vocalizations occurred during baseline and treatment phases of the treatment evaluation (bottom panel).

Source: Wilder et al., 2001
FUNCTIONAL ANALYSIS
PRACTICAL PRACTICE
Progressing From Brief to Extended Analyses
Brief Functional Analysis with Contingency Reversal

Rate of Behavior per Min

Sessions

Control
Cont. Attn.
Cont. Esc.
Esc. for Req.
Cont. Esc.
Esc. for Req.

Requests
Problem Behavior
Figure 1. Performance of Curtis across conditions during the analogue and contingency reversal phases of assessment.

Source: Northup et al., 1991
Figure 6. Minute-by-minute analysis of signing and aggression for Genia during the contingency reversal phase of assessment.

Source: Northup et al., 1991
USE OF A SHORT-TERM INPATIENT MODEL TO EVALUATE ABEVARIANT BEHAVIOR: OUTCOME DATA SUMMARIES FROM 1996 TO 2001

Jennifer M. Asmus, Joel E. Ringdahl, Jennifer A. Sellers, Nathan A. Call, Marc S. Andelman, and David P. Wacker

The University of Iowa

Previous outcome studies have provided descriptions of functional analyses conducted in outpatient clinics (Derby et al., 1992), long-term inpatient programs (Iwata, Pace, et al., 1994), and home environments (Wacker et al., 1998). This study provides a description of 138 children and adults with and without developmental disabilities who were evaluated and treated for aberrant behaviors on a short-term inpatient unit. The results indicated that the functional analyses conducted during a short-term inpatient evaluation were successful for 96% of the participants in identifying maintaining reinforcers of aberrant behavior and leading to an 80% or greater reduction in aberrant behavior for 76% of the participants in an average of 10 days.

DESCRIPTORS: aberrant behavior, epidemiological studies, functional analyses, inpatient evaluation, outcome, short-term treatment
The results indicated that the functional analyses...were successful for 96% of the participants...leading to an 80% or greater reduction in aberrant behavior for 76% of the participants in an average of 10 days.
INITIAL FUNCTIONAL ANALYSIS OUTCOMES AND MODIFICATIONS IN PURSUIT OF DIFFERENTIATION: A SUMMARY OF 176 INPATIENT CASES

LOUIS P. HAGOPIAN, GRIFFIN W. ROOKER, JOSHUA JESSEL, AND ISER G. DELEON
KENNEDY KRIEGER INSTITUTE AND JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

The functional analysis (FA) described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) delineated not only a set a specific procedures, but also a model that involves the use of analogue conditions wherein antecedent and consequent variables are systematically manipulated. This consecutive case-series analysis describes FAs of 176 individuals with intellectual disabilities who had been admitted to an inpatient unit for severe problem behavior. Following an initial standardized FA, additional modifications were performed in pursuit of differentiation. Ultimately, a function was identified in 86.9% of the 176 cases and in 93.3% of the 161 cases for which the FA, if necessary, was modified up to 2 times. All modifications were documented and classified as involving changes to antecedents, consequences, or design (or some combination of these). Outcomes for each type of modification are reported. The results support the utility of ongoing hypothesis testing through individualized modifications to FA procedures, and provide information regarding how each type of modification affected results.

Key words: functional analysis, undifferentiated, intellectual disabilities, self-injury, aggression
This consecutive case-series analysis describes FAs of 176 individuals with intellectual disabilities who had been admitted to an inpatient unit for severe problem behavior... Ultimately, a function was identified in 86.9% of the 176 cases and in 93.3% of the 161 cases for which the FA...was modified up to 2 times.
RESPONSES PER MINUTE (ABERRANT BEHAVIOR)

SESSIONS

Source: Vollmer et al., 1995
What is the function of Ron’s problem behavior?

A) Attention
B) Escape
C) Access to preferred items
D) Automatic
RESPONSES PER MINUTE (ABERRANT BEHAVIOR)

SESSIONS

Source: Vollmer et al., 1995
What is the function of Rick’s problem behavior?

A) Attention
B) Escape
C) Access to preferred items
D) Automatic
Source: Vollmer et al., 1995
Source: Vollmer et al., 1995
Source: Vollmer et al., 1995
What is the function of Robert’s problem behavior?

A) Attention
B) Escape
C) Access to preferred items
D) Automatic
Source: Vollmer et al., 1995
What is the function of Kevin's problem behavior?

A) Attention
B) Escape
C) Access to preferred items
D) Automatic
Source: Vollmer et al., 1995
Source: Vollmer et al., 1995
What is the function of Korey’s problem behavior?

A) Attention
B) Escape
C) Access to preferred items
D) Automatic
Source: Vollmer et al., 1995
What is the function of Guy’s problem behavior?

A) Attention
B) Escape
C) Access to preferred items
D) Automatic
Source: Vollmer et al., 1995
Informal Interview

Records Review

Structured Interview

Direct Observation

Brief FBA

Extended FBA

Vollmer et al. (1995)

Agree

Disagree

Differentiated

Undifferentiated

Intervene

Intervene

Intervene
In most clinical functional assessments, the term “function” refers to the _____ for behavior.
A functional assessment must include direct _____.

QUIZ QUESTION #3
Descriptive assessments can never reveal _____ _____.
A functional analysis demonstrates a _____ - _____ relation between environmental events and behavior.
When Allison is left alone with toys or work...

She hits others, which is followed by...

Attention in the form of a reprimand and discussion.
When Allison is left alone with toys or work...

She hits others, which is followed by...

Attention in the form of a reprimand and discussion.

Allison is provided with a peer buddy during work/play periods.

These are irrelevant because problem behavior is avoided.
Alter the Behavior

Antecedent: When Allison is left alone with toys or work...

Behavior: She hits others, which is followed by...

Consequence: Attention in the form of a reprimand and discussion.

Allison is prompted to ask a peer or adult to play/help, which is followed by...

Attention in the form of socialization and help.
When Allison is left alone with toys or work...

She hits others, which is followed by...

Attention in the form of a reprimand and discussion.

Neutrally blocking the hitting and ignoring Allison.