Philosophy 101

How Do We Know About Things?

Some Thought Experiments (and music) Follow

How Do You Know...

that the person sitting next to you is real?

that you know that YOU are real?

Maybe you’re listening to music and I’m not here.

Is it possible that YOU are part of a dream that somebody is having and when s/he wakes up you’ll be gone?

Maybe it’s an alien shape-shifter posing as a human (you know, like in Star Trek.)

Maybe you’re just hallucinating.
How Do You Know...

that your students learned last year?

A belief?

An observation?

A test?

Maybe s/he already knew those things or "matured" or finally "got the concept."

that your student's tests evaluations are reliable?

Would s/he get the same evaluation if you gave the test again?

that your teaching was responsible for a student's learning?

that your students learned last year?

that student grades are an accurate measure of what was learned!

Teaching and Knowing

What's teaching?

It's what the teacher does.

It's an art.

It's a science.

A functional definition:

Doing something that changes behavior (that which is learned)
Knowing involves...

Truth v. Belief
Fact v. Fiction

pix: unicorn and elephant
pix: flat earth v. planet

Teaching and Knowing

Knowing and Teaching

Science is a method of knowing

Behaviorism is the science of knowing how behavior changes

Interesting Causes

World view:
- Behavior is a product an organism’s capacity and the environment.
- Environmental stimuli change and organism’s behavior (within its capacity)
- Selectionism and survival of a species/group
  - Insects v. insecticides and genetically modified seeds (GM)
  - Bacteria v. antibiotics
  - Moriori cultural practices v. Maori cultural

Diamond, Jared (1997), Guns, Germs, and Steel
Interesting Causes

Applied Behavior Analysis: the methodology of behaviorism

- Discriminate "truth" from "belief"; "fact" from "fiction"
- Guidelines for determining important behaviors and determining who decides what's important (i.e., ethics, social validity and generality)
- Identifying environmental principles that change behavior
- Using principles to develop procedures to change behavior
- Guidelines for determining what responses to teach and take data on (i.e., dependent variables, DV)
- Methods to determine accuracy of data (i.e., reliability of DV)
- Methods to determine if a teaching procedure was correctly done (i.e., fidelity/integrity of procedures)
- Guidelines: graphic displays, interpretation, evaluation of data and teaching decisions (i.e., continue, modify, or find a different procedure)

A brief history of Applied Behavior Analysis (ABA)

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1903</td>
<td>John Watson &quot;Behaviorism&quot;</td>
</tr>
<tr>
<td>1920-50s</td>
<td>Animal research establishing Principles of Behavior</td>
</tr>
<tr>
<td>1959</td>
<td>Ayllon &amp; Michael Psychiatric Nurse (JAB)</td>
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<tr>
<td>1968</td>
<td>BABA incorporated credentialing behavior analysts</td>
</tr>
<tr>
<td>1998</td>
<td>BACB incorporated credentialing behavior analysts</td>
</tr>
<tr>
<td>2014</td>
<td>~12000 BCBA &amp; BCBC in world. Most providing ASD services</td>
</tr>
</tbody>
</table>

Diamond, Jared (1997), Guns, Germs, and Steel

- Moriori
- Maori
- Diamond, Jared (1997), Guns, Germs, and Steel
Behavior Analysis: 1920s-1940s

Not Applied:

- Scientists interested in behavior changes
  - rats running mazes
  - what environmental events make them run faster
  - how teach a pigeon to peck a red light v. a white light
  - what environmental events are useful to teach a selection response (discrimination training)
  - environmental events that make an animal "work" longer (intermittent schedules of reinforcement)

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**Pigeons Playing Ping Pong**

What controls game playing behavior?

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**Baer, Wolf, & Risley (1968)**

Defined the Field of Behavior Analysis
(changing behavior a.k.a., "teaching" and "learning")

7 Dimensions of Applied Behavior Analysis

- Applied
- Behavioral
- Conceptual Systems
- Analytical
- Technological
- Effective
- Generality
How are today’s professional Behavior Analysts doing with respect to the 7 dimensions?

What would ASD treatment look like when 7 dimensions are applied?

My job: Teach ASD children in a classroom in a public school using ABA (the 7 dimensions-whatever they mean).

“How do I know my teaching is?”

Applied

Applied: Interested in Important behaviors

A person A culture

What behaviors are important?
Increased health cost for obesity and smoking behaviors

Cultural discussion still going on

Climate change a major problem?

97% of scientists agree it's a major threat.

What are important behaviors in education?

How can we identify important behaviors?
Is “important” defined by a topography?

Can’t define “important behaviors” a topography

Context is important: age, location, audience

Adverse affect on person or culture: truancy, literacy, computer and social competence

Applied: Important behaviors

What behaviors are important?

Not all bothersome behaviors are important

Applied: Important behaviors

What About: Stereotypy

- Motor:
  - hand flapping
  - rocking
- Vocal:
  - scripting
  - humming
- Visual:
  - waving fingers
  - tracking lines
  - spinning object

Considerations:
- Context: age, location, audience
- Treatment is often time consuming and ineffective
- What other reinforcers?
- will reducing object spinning eliminate the only Sr?
- can other stimuli be conditioned as competing reinforcers?
- can access to stereotypy be used as reinforcer?
- Will treatment interfere with skill acquisition programs?
- is reducing stereotypy more important than learning to mand?
Ethical issues:

What behaviors are important and when they are important?

Choosing between deceleration and acceleration targets

What’s more important?
• Reduce injurious head hitting or teaching child to write his name?
• Teach attending to teacher or reducing ear playing?
• Reduce hand flapping or teach motor imitation/mands to a non-verbal child?
• Reduce vocal stereotypy or increase the number of reinforcing activities for a person?

How do I know if my teaching is (ABA) “Applied?”

• Education is dealing with this: Core curriculum v. local control
• Cultural value v. value of local control
• Burden and cost to society
  • skilled workers, scientists, doctors,
• ASD children
  • cost to culture v personal value to child
• Outcomes: immediate v. deferred outcomes (behavioral cusps)
  • behavioral cusps: looking at person, mand training
• language skills v. skills of daily living
• academic v. custodial programs

Ok, I’m teaching a behavior (skill) that’s important to the culture and person, but....

How do I know my teaching is Behavioral
Behavioral means: A response is Observable
- walking, typing, reading aloud
- opening a peanut bag
- naming things, conversing

Countable
- Observable
- Countable

Some Response Examples
- walking, typing, reading aloud
- opening a peanut bag
- naming things, conversing

Some Response Measurements
- Frequency: how many
- Rate: number/time unit
- Durations: how long a response lasts
- Latency: time before a response starts
- Magnitude: force, loudness, intensity

Behavioral means: A response is

Precise operational definitions is a critical component

How many goals does the black rat make?

Applied Behavioral is Observable and Countable

Culturally
- value

Personal
- value

How many unassisted steps taken?
Operational definitions

Defining what to count

Defining when to count it

Behavioral

Knows animals, numbers
Understands class rules
Expresses feeling appropriately
Is socially confident in groups

Academic operational definitions

Knows animals:
- Mand: request something
- Tact: name something
- Echoic: repeat an audible sound
- Intraverbal: talk about something in its absence

Knows letter sounds:
- Vocal: say, name
- Write
- Sign
- Select: point, give
- Other motor responses

Knows numbers:
- Knows how to play:
- Knows the classroom rules:
**Academic operational definitions**

What does “know” mean?

“Knowing” as doing
- say names of numbers when asked
- responding to “count to 100!”
- reads numbers to 100 on number line
- selects numbers to 100 when asked
- follows classroom rules in classroom

“Knowing” as saying
- state classroom rules when asked
- says numbers in a song, e.g., “5 little monkeys”

**Operational definitions of problem behavior**

*Self-injurious behavior:* Any forceful hand hit to the body

*Property destruction:* Any destruction of materials

*Aggression:* Any forceful and unwanted contact or attempted contact with another person

Operational definitions should include response examples and non-examples.

When possible CALL A RESPONSE by its topography, not a presumed class, e.g., head hitting v. SIB.

**Defining what to count**
- mand (things, information)
- tact (feature, function, class)
- echoic
- intraverbal
- Vocal, written, signed responses
- Other motor Rs

**Defining how to count it**
- cumulative frequency
- duration/latency
- intensity/force
- rate (frequency/time)
- # of different topographies
- percentage correct
Teaching practices: Assessing progress

**Common teaching practices** (letter names and sounds)
- Pre-test
- Post-test
- percent (80%) mastery

**Behavioral teaching practices** (letter names and sounds)
- Baseline (# correct)
- Repeated measures
- graphic displays of progress
- goal: 100% correct

**Graphic Displays**

- Common teaching practice
- Behavioral teaching practice

**Commonality of Applied Behavior Analysis and Teaching**

- Changing important behavior
- Personally and culturally value
- the dependent variable (DV) of our teaching procedures
- Response (DV) is observed and counted in some way
- *changes in the DV may our validate teaching (procedure)*
  - Or the results may show that our (teaching) procedure was ineffective.
Behavioral: A response is observed and counted

**Whose responses are counted?**

- The Teacher?
- The Student?

Things that affect our observing and counting of our DV

**Who's behavior is counted?**

- FAR
- FAR
- FAR

**Who's behavior was counted?**
Who’s behavior was counted?

- McGurk Effect
- Tritone Illusion
- Shepard Tone Illusion

Weak operational definitions

Poorly trained observers
Observer Motivation

So What? Data are data?

What could go wrong?

Data Reliability
Reliability of DV (IOA): A Case Study

Teaching Challenge: Non-vocal child
- Sign language: not evoking vocal responding
- Echoic training / not effective
- Stimulus-stimulus pairing / not effective

Rapid Motor Imitation Antecedent (RMIA)
- Procedure:
  - “do this”: 6 rapid motor imitation responses
  - show picture, give an echoic model

"Eeyore"

Target vocal facilitation: "Eeyore"

<table>
<thead>
<tr>
<th>Session</th>
<th>Correct</th>
<th>Incorrect</th>
<th>IOA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>C</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>6</td>
<td>C</td>
<td>X</td>
<td>Y</td>
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<tr>
<td>7</td>
<td>C</td>
<td>X</td>
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<td>8</td>
<td>C</td>
<td>X</td>
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<tr>
<td>9</td>
<td>C</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>10</td>
<td>C</td>
<td>X</td>
<td>Y</td>
</tr>
</tbody>
</table>
Behavioral: Weak operational definitions

“Eeyore”: too difficult and not defined well. We decided to shape “Eeyore”

1. Dependent VARIABLE: first vocalization within 5s following either teacher model and lasting 1-2s,
   a. EE-OH
      i. Examples. ee-oh, ee-uh must glide together without break and last 1-2s
      ii. Non-examples. separation ee…oh; repeats: ee-ee, oh-oh; wrong vowel ee-ai
### Instructions:

Circle "C" correct or "X" if incorrect.

**IOA %** (Percent Interobserver Agreement) Circle "Y" if match and "N" if no match. Calculate 

\[ \text{IOA} = \frac{\#Y}{\#Y + \#N} \]

### Session 1

<table>
<thead>
<tr>
<th>1</th>
<th>C</th>
<th>Y</th>
<th>2</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

- # correct = 2
- # incorrect = 2
- IOA = \( \frac{2}{2 + 2} = \frac{1}{2} = 0.5 \)

### Session 2

<table>
<thead>
<tr>
<th>1</th>
<th>C</th>
<th>Y</th>
<th>2</th>
<th>X</th>
<th>Y</th>
</tr>
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<tbody>
<tr>
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</table>

- # correct = 2
- # incorrect = 2
- IOA = \( \frac{2}{2 + 2} = \frac{1}{2} = 0.5 \)

### Not waiting to Respond:

"Ee-Oh" as we were saying it.

Possible Solutions
- Implement "wait" program
- Use concurrent R to strengthen accuracy

1. **Dependent VARIABLE:** **Concurrent** vocalization with either teacher model and lasting 1-2s,
   a. **Ee-Oh**
      i. **Examples.** ee-oh, ee-uh must glide together without break and lasting 1-2s
      ii. **Non-examples.** separation ee-oh, repeats: ee-ee, oh-oh; wrong vowel ee-ai
Concurrent ECH/Tact Model: Ee-Oh glide

Target: vocal Tact/Echoic  "Eeyore"

Instructions:
Circle "C" correct or "X" if incorrect.

IOA % (Percentage Interobserver Agreement)
Circle "Y" if match and "N" if no match. Calculate
IOA = #Ys / #Ys + #Ns

Session 1
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N

# correct
IOA

Session 2
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N
C      X      Y      N

# correct
IOA

number is our session data. Goes on a graph.
percentage tells how reliable the data on that session is.

Ee-Oh Tact Follow up
Target vocal Tact/Echoic "Eeyore"

**Instructions:**
Circle "C" correct or "X" if incorrect.

**IOA %** (Percentage Interobserver Agreement).
Circle "Y" if match and "N" if no match.
Calculate IOA = #Ys / #Ys + #Ns.

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<th>Session</th>
<th>IOA 1</th>
<th>IOA 2</th>
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<td>C X</td>
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<td>10</td>
<td>C X</td>
<td>Y N</td>
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</tbody>
</table>

This number is our session data. Goes on graph.

**Reliability (IOA)**

Interobserver Agreement (IOA) acceptability:
- Few correct responses
- More correct responses

Is the child’s ECH responding improving?

Have we asked: Are the data reliable?

Correct Echics

Can 2 people observing the same ECH behavior get the same results?
**Reliability of Observed Behavior**

**Why is Reliability Important?**

Can’t interpret graphic displays without it.

Without IOA

- Believability of data and graph is uncertain
- Graphic display may be false
- What was observed?
- Is operational definition clear?
- Were “expectation” influencing IOA
- Can’t make program changes without good IOA
Threats to dependent variable (DV) reliability

- Ambiguous operational definition
  - staff saying, “looks like SIB,” “I think that’s a correct ee”

- Poorly designed data sheet
  - too complicated, incomplete (e.g., no instructions)

- Poor staff training
  - can’t identify a target response
  - inaccurate take data

- Poor staff oversight
  - don’t take data
  - make up data to fill in data sheet at end of day

- Organizational values, unawareness, or indifference
  - it’s not important to the organization

Effects on Teaching....

Rule: Can’t evaluate graphic displays without evidence of the believability of the data, i.e., IOA.

Can’t can’t make informed program decisions without believable data

Did they say we have to collect IOA on every session!
No Way!

How much IOA?
- research standard: 33%
- no APBA practice standards
Possible IOA Outcomes

Collecting IOA suggestions

Acquisition Targets
- (# of mands and tacts, play duration)

Deceleration Targets
- (SIB, Pica, disruptive behavior, PA, tantrum)

Difficult without:
- Dedicated trained staff
- BCBA Supervisor
  - possible with
  - Instructional data collection
    - 10 trial data
    - daily probes

Target most likely:
- later in acquisition training
- earlier with problem behavior
  - and
  - Brief samples
    - Lead teacher/consult
    - short video tape

Behavioral: IOA Tip

Look at IOA percentage.

More frequent IOA observations

<table>
<thead>
<tr>
<th>Percentage Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>More frequent IOA observations</td>
</tr>
<tr>
<td>0%</td>
</tr>
<tr>
<td>100%</td>
</tr>
</tbody>
</table>

Less frequent IOA observations
### Behavioral: IOA Tip

**Look at** *Occurrence of target behavior*

<table>
<thead>
<tr>
<th>Less frequent IOA observations</th>
<th>More frequent IOA observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fewer target responses</td>
<td>More target responses</td>
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</table>

**Believable data/graphic displays:**

- It's a professional ethics issue!

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