Teaching Advanced Verbal Behavior

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Manding for Information
MANDING FOR INFORMATION

Skinner (1957) states “A question is a mand which specifies verbal action”.

• In other words, there are stimulus conditions under which a verbal response (information) has been established as a reinforcer and therefore evokes a question (mand), the answer to which in the past has produced some form of reinforcement (e.g., more effective action by the asker).

• Sundberg, Loeb, Hale, and Eigenheer (2002) demonstrated that mands for information regarding location (where) and specific information about a person (who) could be taught to children with autism by manipulating motivating operations.

• Using the analysis of the CMO-T, where access to a reinforcer is blocked or interrupted, you can contrive conditions under which verbal information is conditionally conditioned as a reinforcer and will evoke behavior that has led to information in the past.

• For example, if a child would like to play with a certain toy and a teacher says “sure, lets play with it” but the location of the toy is unknown to the child then INFORMATION about the location of the toy is now valuable and the teacher can now teach the child to say “where” as a mand for information.

• The CMO-T has also been used to teach mands for information to kids with autism (Betz, Higbee, & Pollard, 2010; Endicott & Higbee, 2007; Lechago, Carr, Grow, Love, & Almason, 2010; Williams, Donley, & Keller, 2000).
General Teaching Procedures:

• Contrive motivation for information (e.g., hide an item that the learner needs, interrupt a pre-established routine).
• As soon as the learner declares motivation for “who,” “what,” “which,” “where,” “why,” “how,” or “can/does/do/will” information (e.g., looks for the missing item), prompt the mand by saying, “Ask me, ‘mand for information?’” (e.g., “Ask me, ‘Where is the pencil?’”)
• Immediately following the learner echoing the prompted mand, transfer stimulus control by recontriving motivation and implementing a 3-second time delay to wait for the learner to repeat the mand for information.
• After the learner repeats the mand for information, reinforce the mand by delivering the INFORMATION requested.

Teach the following:

**What:** when the names of people, places, things, and actions would be reinforcing information

**Where:** when location would be reinforcing information

**Who:** when the name of a specific person would be reinforcing

**Whose:** when the name of a person who possesses something would be reinforcing

**When:** when information regarding time would be reinforcing

**Why:** when information for the causes of events would be reinforcing

**How:** when information for instructions and the functions of things would be reinforcing

Adapted from Sundberg (2002)
• Let’s now look at a video example of manding for information. Notice how the instructor must prompt some forms of the appropriate mands for information (questions) when the MO is strong but when the learner does not have the form of the response in his repertoire.

4. Kellen - Manding for Information

2. Diego Manding for Information

Chain Of Mands For Information
Diego Video

**Manding Why?**
Watching the video is effective as reinforcement. Kim says to Diego, “Press stop.”

**ESTABLISHES**
An explanation of her request as a reinforcer.

**EVOkses**
Diego to say, “WHY?”
Reinforcer: Kim says, “Because we are going to go play with some toys.”

**Manding Where?**
“Because we are going to play with some toys.”

**ESTABLISHES**
Additional information about the location of the toys as a reinforcer.

**EVOkses**
Diego to say, “WHERE?”
Reinforcer: Kim says, “Over at the other table.”
**Manding How?**
Placing parts on Mr. Potato Head is effective as reinforcement. Diego tries, but can not put the backpack on Mr. Potato Head.

ESTABLISHES
Instructions about how to do it as a reinforcer.

EVOSES
Diego to say with an echoic prompt, “HOW DO I DO IT?”
Reinforcer: Kim tells him how to do it.

**Manding Where?**
The nose on Mr. Potato Head is effective as reinforcement. Diego cannot find it.

ESTABLISHES
Information about its location as a reinforcer.

EVOSES
Diego to say, “WHERE IS IT?”
Reinforcer: Kim says, “On the shelf.”

**Manding Which?**
Kim says “On the shelf.” There are several shelves.

ESTABLISHES
Information regarding a specific shelf as a reinforcer.

EVOSES
Diego to say, “WHICH ONE?”
Reinforcer: Kim says, “The one over there.”

**Manding Where?**
Mr. Potato Head eyes are effective as reinforcement. Diego cannot find them.

ESTABLISHES
Information about the location of the eyes as a reinforcer.

EVOSES
Diego to say, “WHERE ARE THE EYES?”
Reinforcer: Kim says, “I don’t know but I know someone who does.”
Manding Who?
Kim’s information about someone who knows.

ESTABLISHES
Information about a specific person as a reinforcer.

EVOKES
Diego to say with an echoic prompt, “WHO?”
Reinforcer: Kim says, “Emily.”

Manding Where?
Emily's information regarding the location of the desk.

Establishes
Information about the location of the desk as a reinforcer.

Evokes
Diego to say, “WHERE’S THE DESK?”
Reinforcer: Emily says, “Right over there.”

Manding How?
Kim says, “Make it pop.”
Diego is not sure how.

ESTABLISHES
Information about how to make Mr. Potato Head pop as a reinforcer.

EVOKES
Diego to say, “HOW?”
Reinforcer: Kim says, “You have to push a button.”

Manding Which?
Kim says, “You need to move a button.”
There are several buttons

ESTABLISHES
Information about a specific button as a reinforcer.

Evokes
Diego to say, “WHICH ONE?”
Reinforcer: Kim says, “Under here.”
TYLER MANDING FOR INFORMATION

- Tyler’s repertoire of manding for information is strong and therefore requires no prompting. The contrived MOs evoke all of the appropriate mands.
- Note how Jimmy contrives the motivation to increase the value of information as a reinforcer for Tyler.

3. TYLER VIDEO

Sample Lesson Plan

<table>
<thead>
<tr>
<th>Contrived MO (MOTIVATION)</th>
<th>What Now Becomes a Reinforcer?</th>
<th>What should you teach the learner to say?</th>
<th>Teacher’s Response</th>
<th>Data Recording of Promted and Unprompted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guess what?</td>
<td>Info about what they are going to do</td>
<td>________</td>
<td>I want to play with something...</td>
<td>Prompted</td>
</tr>
<tr>
<td>I want to play with something...</td>
<td>Info about what Jimmy wants to play with</td>
<td>________</td>
<td>I want to play with the trains</td>
<td>Prompted</td>
</tr>
<tr>
<td>(Goes to the trains) Not right now though...</td>
<td>Info about when Tyler can play with the trains</td>
<td>________</td>
<td>After you give me a high five</td>
<td>Prompted</td>
</tr>
<tr>
<td>We’ve got to turn it on...</td>
<td>Info about how to turn it on</td>
<td>________</td>
<td>We have to press that button</td>
<td>Prompted</td>
</tr>
<tr>
<td>(Button doesn’t work) I don’t know how to turn it on, but I know someone who does</td>
<td>Info about who knows how to turn on the trains</td>
<td>________</td>
<td>Danielle</td>
<td>Prompted</td>
</tr>
<tr>
<td>Danielle knows how to turn it on</td>
<td>Info from Danielle about how to turn on the trains</td>
<td>________</td>
<td>You press the lever</td>
<td>Prompted</td>
</tr>
<tr>
<td>(Knows how to turn on train)</td>
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</tr>
</thead>
<tbody>
<tr>
<td>Accidentally turn the train off</td>
<td>Info about why Jimmy turned the train off</td>
<td>Why did you do that?</td>
<td>It was an accident, but I want to play another game</td>
<td>Prompted Spontaneous Novel</td>
</tr>
<tr>
<td>I want to play another game...</td>
<td>Info about what game the teacher wants to play</td>
<td>What game?</td>
<td>Perfection</td>
<td>Prompted Spontaneous Novel</td>
</tr>
<tr>
<td>Lets go get Perfection</td>
<td>Info about where Perfection is</td>
<td>Where’s Perfection?</td>
<td>I don’t know where it is, but I know someone who knows</td>
<td>Prompted Spontaneous Novel</td>
</tr>
<tr>
<td>I know someone who knows where Perfection is</td>
<td>Info about who knows where Perfection is</td>
<td>Who? (Knows where Perfection is)</td>
<td>Kelly</td>
<td>Prompted Spontaneous Novel</td>
</tr>
<tr>
<td>Kelly knows where Perfection is</td>
<td>Info about where Perfection is</td>
<td>Where’s Perfection?</td>
<td>In the teacher’s room</td>
<td>Prompted Spontaneous Novel</td>
</tr>
</tbody>
</table>

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</thead>
<tbody>
<tr>
<td>The closet is locked and the key is missing</td>
<td>Info about where the key is</td>
<td>Where’s the key?</td>
<td>I don’t know where it is, but I know someone who knows</td>
<td>Prompted Spontaneous Novel</td>
</tr>
<tr>
<td>I know someone who knows where the key is...</td>
<td>Info about who knows where the key is</td>
<td>Who?</td>
<td>Danielle</td>
<td>Prompted Spontaneous Novel</td>
</tr>
<tr>
<td>Danielle knows where the key is</td>
<td>Info about where the key is</td>
<td>Where’s the key?</td>
<td>It is on top of the bookshelf</td>
<td>Prompted Spontaneous Novel</td>
</tr>
<tr>
<td>You need to open the door with one of the keys</td>
<td>Info about which key he should use</td>
<td>Which key?</td>
<td>This key</td>
<td>Prompted Spontaneous Novel</td>
</tr>
<tr>
<td>We’re not going to play the game here</td>
<td>Info about where to play the game?</td>
<td>Where are we going to play?</td>
<td>At the table</td>
<td>Prompted Spontaneous Novel</td>
</tr>
</tbody>
</table>
DATA RECORDING

Response Definitions:

• **Prompted**: Any mand for information evoked by an instructor’s vocal prompt

• **Spontaneous**: Any mand for information emitted 1) in the absence of an instructor’s vocal prompt and 2) in the context of a routine during which the same mand has been prompted at least once before

• **Novel**: Any mand for information emitted 1) in the absence of an instructor’s vocal prompt and 2) in the context of a routine or other situation during which the same mand has never been prompted

Criteria for mastery:

• 5 consecutive sessions with at least 5 novel mands for information

Data Collection:

<table>
<thead>
<tr>
<th>Who?</th>
<th></th>
<th></th>
<th>What?</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Prompted</td>
<td>Spontaneous</td>
<td>Novel</td>
<td>Prompted</td>
<td>Spontaneous</td>
<td>Novel</td>
</tr>
</tbody>
</table>

Novel Situations:  

<table>
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<tr>
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</tbody>
</table>
### Table

**What**

<table>
<thead>
<tr>
<th>What</th>
<th>Why</th>
<th>Where</th>
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</thead>
<tbody>
<tr>
<td><strong>Prompt</strong></td>
<td><strong>Prompt</strong></td>
<td><strong>Prompt</strong></td>
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<tr>
<td><strong>Instruction</strong></td>
<td><strong>Instruction</strong></td>
<td><strong>Instruction</strong></td>
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<tr>
<td><strong>Score</strong></td>
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<tr>
<td><strong>Reinforcement</strong></td>
<td><strong>Reinforcement</strong></td>
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<td><strong>Reinforcement</strong></td>
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<tr>
<td><strong>Reinforcement</strong></td>
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<td><strong>Reinforcement</strong></td>
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</tbody>
</table>

**Novel Situation**

- **Below**
- **Below**
- **Below**

### Frequency of大声 Mands per 30 minute session

**Frequency of大声 Mands**

**Date:**

**Learner Name:**

**Score for reading:**

**Score for writing:**

**Score for social skills:**

**Score for overall:**

**Score for independence:**

**Score for behavior:**
Manding “Where”

Present the child with a closed box that has a reinforcer (candy works best) in it and say, “This is for you.”
Present the box two times with the reinforcer in it. On the third time, the box will be empty.
Prompt, “Where?,” or “Where is my candy?”
Say, “Oh, I forgot, it’s in the pantry.”

While doing an activity, the teacher will abruptly end the activity with no warning and say, “come on.”
The teacher should prompt, “Where are we going?” The teacher will then say, “To play on the computer (or name any reinforcing item or activity that is more reinforcing than the item they are leaving).”

The teacher should say, “Get the,” or “Give me the,” requiring the child to find an item necessary for a reinforcing task (e.g. “Go get your shoes so we can go outside”).
The necessary item will not be available or missing from its normal place.
Prompt the child to say, “Where are my shoes?”
The teacher should then give the location of the shoes.

Manding “Where” continued

Have the child come to sit, but have no chair for him/her.
Prompt, “Where is my chair?”

Have the child sitting and suddenly get up and say, “I will be right back.”
Prompt, “Where are you going?”
The teacher should say, “To get a gummy (or other reinforcing item) for you.”

Teacher will deliver lunch with no utensils.
Prompt, “Where is my spoon?” or “Where is my fork?”

Teacher will present crafts with one necessary item missing (i.e. glue) and say, “Okay, put some glue on it.”
Prompt, “Where is the glue?”

Have the child come to the table for a preferred activity (e.g. Legos) but have only one piece on the table.
Prompt, “Where are the rest?”
Manding “Why”

Teacher will put a chair on the table while the child is engaging in another activity. Then tell the child, “Go sit down.”
When the child returns to the table, the teacher should prompt, “Why is the chair there?”
Teacher can answer with something like, “I was cleaning the floor and look what I found under your chair” while handing the child a reinforcer.

Teacher says, “I am going outside to play.”
Prompt, “Why can’t I go?”
Teacher should say, “You can, follow me!”

At meal time, the teacher should put a NON food item on the child’s plate and give the plate to the child.
Prompt the child to say, “Why did you do that?”
Teacher should act as if they got mixed up and present the child with the correct plate.

The child is doing a reinforcing activity (e.g. watching television) and the teacher turns it off with no warning.
Prompt, “Why did you do that?” or “Why did you turn it off?”
Teacher should say, “So we can go to the playground.” (Remember the teacher must pick an activity that is MORE reinforcing to the child than what he/she was just doing)

Manding “How”

Teacher will have a see-through jar of desired items and the child will mand for the items. After manding, the teacher should acknowledge the mand by saying, “Oh, sure you can have it.”
At the same time, hand the tightly closed jar to the child.
The teacher will prompt, “How do I open the jar?” or “How do I open it?”
The teacher will show the child how to open the jar.

Teacher will say, “Let’s go outside and play” and take the child to a locked door and say, “Okay, open the door, let’s go.”
The teacher will prompt “How do I open the door?” when they see the child seems puzzled as to how to open the door.
Teacher will say, “Oh, like this.” while using a key.

Teacher will present the child with a task (e.g. Legos, train set, blocks) and say, “Let’s make a bulldozer.”
Prompt, “How do I build a bulldozer?” or “How do I build that?”
Teacher will respond, “Oh, here, let me show you.”
Remember to choose an activity that cannot be done by the child and an activity the child would want to participate in the completion of.

Play with a toy that the child cannot operate by themselves. Make the toy do something such as play music or make a noise.
Prompt the child to ask, “How did you do that?”
Manding “Which”

Teacher will set up a situation where two similar reinforcers are on the table and say, “Give me a gummy (one is red and one is blue).”
Prompt, “Which one?”
Teacher says, “The red one.”
The child should hand the red one to the teacher and the teacher should give the other item to the child.

Teacher should put a reinforcer in their hand and switch it back and forth, hiding the location.
With hands extended out, prompt, “Which hand?”
Say, “This one” and deliver the reinforcer from hand to the child.

Teacher will put out three containers that are the same and move them around with a reinforcing item under them.
Tell the child, “You can have the cookie.”
Prompt the child to ask, “Which one is it under?”

Teacher should offer the child two cookies and say, “You can only have one.”
Prompt, “Which one can I have?”

Manding “Who”

Have three people in the room and say, “Someone has a gummy for you.”
Prompt, “Who?” or “Who does?”
Give the name of the person and the child walks to the person and gets the reinforcer.

Teacher presents pictures of known people (e.g. mom, dad, grandparents) and unknown professionals.
The teacher holds up one picture and says, “Who is it?” Only ask one time when starting the game.
When an unknown person is held up, prompt, “Who is that?” and tell the child who it is.

Using toys that are reinforcing to the child, the teacher will hide a toy character behind a barrier and say, “Guess who is behind here?”
Prompt, “Who?”
Show the item and name the item and let the child have it.
Manding “When”

Place a highly desired item on the table and when the child mands for it, the teacher should say, “Not right now.”

Prompt, “When can I have it?” or “When is it my turn?”

The teacher should say, “After (name person) is done with it.”

Prompt peer to put it down (reinforce peer for doing so) and teacher tells child, “Now you can have it.”

TEACHING INTRAVERBAL BEHAVIOR
Behavioral Classification of Language

Primary Verbal Behaviors

- Mand (Requesting)
- Tact (Labeling)
- Echoic (Vocal/Manual Sign Imitation)
- Intraverbal ("Wh" questions)

Non-Verbal Behavior

- Listener Behavior (Receptive)

Other primary verbal responses include:
- copying text
- transcription
- Textual behavior

Intraverbal Behavior

**Definition:** Skinner (1957) defined the intraverbal as a verbal response controlled by a verbal stimulus and the response product does not have point to point correspondence with the verbal stimulus.

Skinner (1957) went on to discuss the function and form of the advanced intraverbal repertoire as follows: “The intraverbal relations in any adult repertoire are the result of hundreds of thousands of reinforcements under a great variety of inconsistent and often conflicting contingencies. Many different responses are brought under the control of a given stimulus word, and many different stimulus words are placed in control of a single response” (p.74).
The intraverbal is your intellectual repertoire that allows you to contact complex information and share it with others through reading, writing, presentations, conversations, etc.

Failure to acquire an intraverbal repertoire limits your social life as well since most social interactions require a back and forth verbal interactions that include mainly intraverbal responses.

Many persons with autism will acquire extensive mand, tact, and listener repertoires but will not acquire a functional intraverbal repertoire (Sundberg & Sundberg, 2011).

These other primary verbal operants, while pre-requisites for intraverbal behavior, do not contribute to a conversation the same way an intraverbal repertoire does.

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<thead>
<tr>
<th>Verbal Stimulus</th>
<th>Verbal Response (Intraverbal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What's your name?</td>
<td>Vince</td>
</tr>
<tr>
<td>What's your favorite food?</td>
<td>Pizza</td>
</tr>
<tr>
<td>Where do you live?</td>
<td>New York</td>
</tr>
<tr>
<td>Something you cut with is a</td>
<td>Knife</td>
</tr>
<tr>
<td>What did you eat for Breakfast?</td>
<td>Pancakes</td>
</tr>
</tbody>
</table>

I sure am hungry.                        | I guess it’s time to eat.     |
The party was great.                     | It was really nice to see everyone. |
Most people like the food here.          | I don’t understand why.       |

As a point of reference listen to the intraverbal behavior of a typically developing child of a few months younger than three years old.

Kellen Learning Tacts
Kellen Learning Intraverbal
Kellen Intraverbals
Refinements of Intraverbal

- David Palmer (2016) has recently suggested that the definition of intraverbal behavior may be too narrow.
- He suggests that only some responses to another’s verbal behavior meets Skinner’s definition.
- For example, questions such as “What is your name?” or “How old are you?” “What is the square root of 144?” meet the definition of intraverbal by Skinner.
- In other words responses that you have a history of making that have led to reinforcement in the past.
- However responses to questions such as “What did you eat for breakfast yesterday?” or “What did you do on your vacation last summer?”

- Responses to these type of questions are not solely controlled by the verbal stimulus and therefore should not be called intraverbal responses.
- Instead, these responses are the result of the additive effect of a cascade of stimuli generated by the question.

\[\text{S1 (Mediating Responses)} \rightarrow \text{Response}\]

Where did you go
On your vacation
Last year?

\[\text{Talk to yourself S2} \rightarrow \text{Ask yourself Qs S3} \rightarrow \text{Visualize S4} \rightarrow \text{Hear music S5} \rightarrow \text{Venice}\]

**Visualizing /imagining and perceptual Hearing- Doing what you did when the stimulus was present.** HEARING AND SEEING IN THE ABSENCE OF THE THING HEARD AND SEEN.
“Seeing in the Absence of Thing Seen”
About Behaviorism (1974)

“The environment affects an organism after, as well as before, it responds.” (p 73)

“After hearing a piece of music several times, a person may hear it when it is not being played, though probably not as richly or as clearly. So far as we know, he is simply doing in the absence of the music some of the things he did in its presence. Similarly, when a person sees a person or place in his imagination, he may simply be doing what he does in the presence of the person or place.” (p.82)

“A slight noise at night is heard as a burglar or a mouse by those who respond vigorously to burglars or mice. Level of deprivation makes a difference; one mistakenly “hears the telephone” if a call is important.” (p.75)

“Seeing in the absence of the thing seen is familiar to almost everyone, but the traditional formulation is a metaphor. We tend to act to produce stimuli which are reinforcing when seen. If we have found the city of Venice reinforcing (we refer to one reinforcing effect when we call it beautiful), we may go to Venice in order to be thus reinforced. “ (p. 82)

“All we need to say is that if we are reinforced for seeing Venice, we are likely to engage in that behavior —that is, the behavior of seeing Venice—even when there is very little in the immediate setting which bears a resemblance to the city.” (p.83)

“We may also see a thing in its absence, not because we are immediately reinforced when we do so, but because we are then able to engage in behavior which is subsequently reinforced. Thus, we may see Venice in order to tell a friend how to find his way to a particular part of the city. If we were together in the city itself, we might take him along a given route, but we can "take ourselves along the route visually" when we are not there and describe it to him. “ (p.83)

Operant seeing at the private level may be reinforced in other ways. The private response may produce discriminative stimuli which prove useful in executing further behavior of either a private or public nature. (Science and Human Behavior, 1953, p.223)

CHESS -- FINDING OBJECTS

Childhood Home

“In particular, he does not store copies of the stimuli which have played a part in the contingencies. There are no "iconic representations" in his mind; there are no "data structures stored in his memory"; he has no "cognitive map" of the world in which he has lived. He has simply been changed in such a way that stimuli now control particular kinds of perceptual behavior. “p.84

“Seeing does not require a thing seen”.p.86
• The response is the result of all the stimuli generated by the questions (S1) and not just the question.

• Therefore a response of this sort should be designated as a multiply controlled verbal response resulting from the additive effects of covert mediating responses (stimuli).

• This control for this response is best called Intraverbal Control and do not just rely on the variables that control Skinner’s intraverbal.

• This type of problem solving repertoire is needed to respond to complex social verbal stimuli presented by others during conversations.

• It is easy to see how difficult this would be for most children with autism.

TAKE AWAY POINT # 1: Private/Public mediation is responsible for complex intraverbal control and the responses that result. The mediation may be verbal, perceptual, etc. This should be referred to as Intraverbal Control.
The typical progression of intraverbal behavior is:

1. 18 months to 2 years - animal sounds, sing songs, fill-ins, etc.
2. 2 year olds - respond to simple questions, “what’s your name? word associations, “shoes and ________”,
3. 2-3 years old - rapid development of verbal repertoire and major changes in the intraverbal repertoire. Can respond to others questions “What do you want to eat?” and also spontaneous responses, someone says “Let’s go outside” and child responds, “I’ll put my shoes on”. Conversational exchanges occur.
4. By 4 years old child can describe past events, describe what they want to do, respond to many novel responses made by others in social context.

18-30 Months

- Does the child verbally respond to the content of the words of others?
- 6. Completes 10 different fill-in-the-blank phrases of any type (e.g., song fill-ins, social games and fun fill-ins, animal or object sounds) (T)
- 7. Provides first name when asked, What is your name? (T)
- 8. Completes 25 different fill-in-the-blank phrases (not including songs) (e.g., You eat...You sleep in a...Shoes end...) (T)
- 9. Answers 25 different what questions (e.g., What do you like to eat?) (T)
- 10. Answers 25 different who or where questions (e.g., Whose your friend? Where is your pillow?) (T)

Comments/notes:
Pre-requisites for Teaching Intraverbal Behavior

- Teaching intraverbal behavior too soon can lead to rote and non-functional intraverbal behavior.
- Before teaching the intraverbal repertoire beyond fill-ins, animal sounds, etc., most children with developmental disabilities should have acquired a 2.5 year old level of primary and secondary verbal behavior. The following prerequisites skills are necessary before teaching intraverbal behavior:
  1. Acquiring mands without specific training.
  2. A tact repertoire of at least 200 nouns and verbs an overall vocabulary of about 300 words.
  3. A listener repertoire of at least 250 selection responses in every day situations and books.
  4. Responds as a listener to what, who, which and is tacting most of the items that are selected during this activity.
  5. Engages in social play with peers and responds to other children’s mands and initiates mands
TAKE AWAY POINT # 2: Teaching intraverbal behavior too early can be ineffective and therefore be aware of the prerequisites for teaching intraverbal behavior.

Development of the Intraverbal Repertoire
Sundberg & Sundberg, 2011

- The descriptive data showed that failures to come under the control of the increasing complexity of the antecedent verbal stimulus seems to contribute to poor intraverbal responding in children with autism.

- On the next few slides are some of the data.
With typically developing children you see this pattern:

1. Increase in intraverbal responses with age

2. At age 2.5 to 3 years see large increase in the repertoire

3. Errors of the younger children generally included not responding or just saying something they had said previously.

4. Older kids errors showed some discrimination but without the control of all parts of the verbal stimulus.

Examples- What do you smell with? POOPIES

In this example the two words “smell +with” did not combine to produce nose. Only the word “smell” controlled the response.
Children with autism showed a different pattern of responding:
1. Much greater variability within the age groups.
2. No large jump in responding around 3 years old.
3. Much more rote or simple echoic responding.

Sample of Response Errors

<table>
<thead>
<tr>
<th>Assessment total score</th>
<th>Intraverbal question</th>
<th>Typically developing child</th>
<th>Child with autism</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>&quot;All gone shirt&quot;</td>
<td>&quot;Water&quot;</td>
<td>No response</td>
</tr>
<tr>
<td></td>
<td>&quot;Yes&quot;</td>
<td>&quot;Outside&quot;</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>&quot;1, 2, 3&quot;</td>
<td>&quot;On my finger&quot;</td>
<td>&quot;Happens&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Mommy and daddy&quot;</td>
<td>&quot;With toys&quot;</td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>&quot;Sand&quot;</td>
<td>&quot;Playground&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;Triangle&quot;</td>
<td>&quot;Cars&quot;</td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td>&quot;A dot&quot;</td>
<td>&quot;Pizza&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;Circle&quot;</td>
<td>&quot;Red&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;Clock&quot;</td>
<td>&quot;Clothing&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;It pops&quot;</td>
<td>&quot;String&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;Cry&quot;</td>
<td>&quot;Cry&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;A plane&quot;</td>
<td>&quot;Fur&quot;</td>
<td></td>
</tr>
</tbody>
</table>
| 70-79                  | "What day comes before Tuesday?" | "Gave full name"       | "Gave full name"
|                        | "What's your last name?"   | "John"                     | "John"            |
|                        | "What number is between 6 and 8?" | "9"                    | "9"               |
TYPICAL DEVELOPMENT OF INTRAVERBAL RESPONDING

<table>
<thead>
<tr>
<th>No.</th>
<th>Age and range</th>
<th>IV scores</th>
<th>Error Analysis and Comments</th>
</tr>
</thead>
</table>
| 3   | 2-year-olds   | Mean= 26 Range= 24-28 | Some simple intra-verbal behavior, but no VC
|     | Range = 23-27 months old |           | may be too immature, can do song fill-ins, nonverbal associations, animal and object sounds, common fill-ins |
|     |               |           | Limited answers to WH questions (e.g., provides first name, or one word]|                   |
|     |               |           | Inter-verbal answers) |
|     |               |           | Frequent echoic responding, pointing, or not responding |
| 4   | 2½-year-olds  | Mean= 26.5 Range= 9-42 | Some simple intra-verbal behavior, getting some easy WH questions |
|     | Range = 29-31 months old |           | Frequent echoic responding, or “What?” “Yes” “Things” “Hum?” |
|     |               |           | When some intra-verbal control was demonstrated it was often a simple intra-verbal relation, minimal VC |
|     |               |           | The last or prominent word was usually the source of stimulus control, for example… |
|     |               |           | “What do you smell with?” “Poopies” |
|     |               |           | “What grows on your head?” “Shoulders” |
|     |               |           | “What helps a flower grow?” “Up” |
| 9   | 3-year-olds   | Mean= 58 Range= 50-69 | Well established basic intra-verbal repertoire, 1000s of intra-verbal relations |
|     | Range = 34-38 months old |           | But VC errors were prevalent, for example… |
|     |               |           | “What grows on your head?” “Plants” |
|     |               |           | Many WH questions caused problems, for example… |
|     |               |           | “Where do you eat?” “Food” |
|     |               |           | Rote responses were evident, for example… |
|     |               |           | “What day is today?” “Rainy” (it was sunny) |
|     |               |           | Problems with prepositions and adjectives in VC’s, for example… |
|     |               |           | “What’s under a house?” “roof” |
|     |               |           | Trouble with negation and personal information |
|     |               |           | “What’s something you can’t wear?” “Shirt” |
|     |               |           | “What is your last name?” “Noah,” “Gabriella,” “Sofia,” “Neil” |
| 7   | 3½-year-olds  | Mean= 62.9 Range= 57-71 | Strong intra-verbal repertoire, but VC errors were still common, for example… |
|     | Range = 39-44 months old |           | “What grows on your head?” “Hat” |
|     |               |           | “Name some clothing” “For the body” |
|     |               |           | “When do we set the table?” “After dinner” |
|     |               |           | Negation still a major problem |
|     |               |           | Still having problems with prepositions, adjectives, adverbs in VC’s |
|     |               |           | Still having problems with time concepts |
|     |               |           | Still emitting echoic responses when no intra-verbal occurred |

Figure 2. The age in months is presented on the left y axis and the scores on the intra-verbal subtest is presented on the right y axis for children with autism.
Published Papers on Teaching Intraverbal Behavior

- On the following slides are recent papers that describe the increasing complexity of intraverbal responding as children develop.

- The role of conditional discriminations in the development of the intraverbal is highlighted.
**On Intraverbal Control and the Definition of the Intraverbal**

David C. Palmer

Published online: 12 September 2016
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**Abstract** Behavior analysts should distinguish between the intraverbal, as a class of verbal operants, and intraverbal control, the potentiating effect, however slight, of a verbal antecedent on a verbal response. If it is to serve an explanatory function, the term intraverbal, as a class of verbal operants, should be restricted to those cases in which a verbal antecedent, as the result of a history of contiguous or correlated usage, is sufficient to evoke the putative intraverbal response. Intraverbal control is pervasive in verbal behavior, but since it is typically just one of many concurrent variables that determine the form of a verbal response, such multiply controlled responses are not usefully called “intraverbals.” Because intraverbals and their controlling variables have invariant formal properties, they are conceptually simple, but they nevertheless play a central role in the interpretation of complex phenomena such as the structural regularities in verbal behavior (i.e., grammar).

**Keywords** Autoelicited frames · Grammar · Intraverbal · Intraverbal control · Skinner · Verbal behavior · Verbal operants

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**Verbal Stimulus Control and the Intraverbal Relation**

Mark L. Sundberg

Published online: 21 October 2016
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**Abstract** The importance of the intraverbal relation is missed in most theories of language. Skinner (1957) attributes this to traditional semantic theories of meaning that focus on the nonverbal referents of words and neglect verbal stimuli as separate sources of control for linguistic behavior. An analysis of verbal stimulus control is presented, along with its distinction from nonverbal stimulus control and motivational control. It is suggested that there are at least four different types of increasingly complex verbal discriminations relevant to speaker and listener behavior: simple, compound, verbal conditional, and verbal function-altering (Eikeseth & Smith, 2013; Schlinger & Blakely, 1994). Separate but interlocking accounts of how these specific types of verbal stimuli produce different evocative and function-altering effects for the speaker and for the listener are provided. Finally, the effects of weakening verbal stimulus control and the loss of intraverbal behavior are considered, especially as they relate to dementia, aphasia, and traumatic brain injury.

**Keywords** Aphasia · Dementia · Evocative and function-altering effects · Intraverbal · Skinner · Verbal behavior · Verbal stimulus control
Intraverbal Behavior and Verbal Conditional Discriminations in Typically Developing Children and Children With Autism

Mark L. Sundberg, Sundberg & Associates
Cindy A. Sundberg, Parenting Partnerships

Individuals with autism often experience difficulty acquiring a functional intraverbal repertoire, despite demonstrating strong mand, tact, and listener skills. This learning problem may be related to the fact that the primary antecedent variable for most intraverbal behavior involves a type of multiple control identified as a verbal conditional discrimination (VC). The current study is a descriptive analysis that sought to determine if there is a general sequence of intraverbal acquisition by typically developing children and for children with autism, and if this sequence could be used as a framework for intraverbal assessment and intervention. Thirty-nine typically developing children and 71 children with autism were administered an 80-item intraverbal subtest that contained increasingly difficult intraverbal questions and VC. For the typically developing children the results showed that there was a correlation between age and correct intraverbal responses. However, there was variability in the scores of children who were the same age. An error analysis revealed that compound VC were the primary cause of errors. Children with autism made the same types of errors as typically developing children who scored at their level on the subtest. These data suggest a potential framework and sequence for intraverbal assessment and intervention.

Key words: autism, intraverbal, language assessment, language intervention, typically developing children, verbal conditional discrimination

Conditional Discrimination in the Intraverbal Relation: A Review and Recommendations for Future Research

Judah B. Axe, The Ohio State University

Conditional discrimination is inherent in the intraverbal relation when one verbal stimulus alters the evocative effect of another verbal stimulus and they collectively evoke an intraverbal response. Rarely in research on conditional discriminations have both conditional and discriminative stimuli been vocal verbal and rarely have the responses been topography-based. Making conditional discriminations in intraverbal behavior is a repertoire that is often delayed in children with autism and other developmental disabilities. Reviewed in this paper is research on teaching intraverbal behavior, auditory conditional discriminations, and restricted stimulus control. The purpose of these reviews is to identify the extent to which previous researchers examined conditional discriminations in the intraverbal relation and to recommend directions for research in this area.

Key words: intraverbal, conditional discrimination, verbal behavior, autism, developmental disabilities
An Analysis of Verbal Stimulus Control in Intraverbal Behavior: Implications for Practice and Applied Research

Svein Eikeseth, Oslo and Akershus University College
Dean P. Smith, UK Young Autism Project and Oslo and Akershus University College

A common characteristic of the language deficits experienced by children with autism (and other developmental disorders) is their failure to acquire a complex intraverbal repertoire. The difficulties with learning intraverbal behaviors may, in part, be related to the fact that the stimulus control for such behaviors usually involves highly complex verbal stimuli. The antecedent verbal control of intraverbal behavior may involve discriminative stimuli (i.e., discriminated operants), conditional stimulus control, and/or control by compound stimuli. Distinctions among these different types of antecedent control are presented, along with recommendations for intervention procedures that may facilitate the acquisition of intraverbal behavior.

Keywords: intraverbal behavior, stimulus control, verbal behavior, conditional discriminations, compound stimuli

Empirical Application of Skinner’s Verbal Behavior to Interventions for Children with Autism: A Review

Andresa A. DeSouza¹ · Jessica S. Akers² · Wayne W. Fisher³

Published online: 21 November 2017
© Association for Behavior Analysis International 2017

Abstract Sundberg and Michael (2011) reviewed the contributions of Skinner’s (1957) Verbal Behavior to the treatment of language delays in children with autism spectrum disorder (ASD) and discussed several aspects of interventions, including mand training, intraverbal repertoire development, and the importance of using Skinner’s taxonomy of verbal behavior in the clinical context. In this article, we provide an update of Sundberg and Michael’s review and expand on some discussion topics. We conducted a systematic review of studies that focused on Skinner’s verbal operants in interventions for children with ASD that were published from 2001 to 2017 and discussed the findings in terms of journal source, frequency, and type of verbal operant studied.

Keywords: Autism spectrum disorder · Language intervention · Skinner · Systematic review · Verbal behavior · Verbal operants
TAKE AWAY POINT # 3: Intraverbal behavior develops through increasing complexity of antecedent stimulus control.

**CONTROLLING WORDS**

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple-- 1 Word</td>
<td>“Eat” = “Burger”</td>
</tr>
<tr>
<td>Complex-- 2 Words</td>
<td>“Eat for Breakfast” = “Cereal”</td>
</tr>
<tr>
<td>Complex– 3 Words</td>
<td>“Eat for Breakfast Hot” = “Pancakes”</td>
</tr>
</tbody>
</table>
SEQUENCE OF METHODS FOR TEACHING INTRAVERBAL BEHAVIOR

I. Teach early intraverbal discriminations through fillins, songs, nursery rhymes and associations.
II. Teach many tact to intraverbal responses
III. Emphasize the development of convergent and divergent multiple stimulus control by forming stimulus and response classes. A webbing procedure can be helpful in developing flexible and avoiding rote responding
IV. Teach verbal conditional discriminations to overcome rote responding
V. Use various teaching methods to increase verbal conditional discrimination responses and novel responding.
VI. Teach problem solving to increase intraverbal control

Teaching Intraverbal Responding

• The development of intraverbal behavior progresses from simple stimulus control to complex stimulus control.

• Sundberg & Sundberg (2011) point out that the type of stimulus control involved in intraverbal behavior is particularly complex and may explain the difficulty in acquiring the repertoire.

• First of all, the verbal stimulus once presented is gone and therefore requires close attention to the relevant aspects of the auditory environment to effectively control the intraverbal responses. Tacts and other verbal and nonverbal operants that rely upon visual stimuli are therefore easier to acquire.

• Second, the intraverbal response is controlled by complex conditional discriminations that involve influences by multiple stimuli. Any one of these stimuli in isolation would not control a response scheduled for reinforcement (correct response).
• Consequently, there appears to be a sequence of increasingly more complex stimulus control that ultimately controls the intraverbal response.

• The antecedent verbal stimulus that ultimately controls advanced intraverbal behavior is very complex with several components that combine to control the response.

• On the following slide is a description of the initial sequence of the development of intraverbal behavior.

---

<table>
<thead>
<tr>
<th>Type of discrimination</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>A single-component verbal stimulus that evokes a response</td>
<td>Speaker: Saying “meow” after hearing “A kitty says…” Listener: When asked to “jump,” a child emits jumping behavior.</td>
</tr>
<tr>
<td>Compound</td>
<td>A verbal stimulus that involves two or more S’s that each independently evoke behaviors, but when they both occur in the same antecedent configuration, a different S’s function is generated</td>
<td>Speaker: Saying “blue” after hearing “Red, white, and…” Listener: When asked to “clap fast” and “clap slow,” “walk fast,” and “walk slow,” the corresponding nonverbal behavior is emitted.</td>
</tr>
<tr>
<td>Verbal conditional</td>
<td>A verbal stimulus that alters the evocative and functional effects of another verbal stimulus in the same antecedent configuration</td>
<td>Speaker: Saying “spoon” and “soup” respectively when asked, “What do you eat with?” versus “What do you wash with?” Listener: Pointing to spoon and soup when asked the same questions presented above.</td>
</tr>
</tbody>
</table>

• This table from Sundberg describes the steps toward the development of intraverbal behavior in typical children.
## I. SIMPLE DISCRIMINATIONS

**Intraverbal Fill-in Songs**

1. Very early intraverbals (1.5 years) include simple song, nursery rhyme, etc. type fill-ins.
2. This may be a pre-requisite for more advanced intraverbal responding.

### Simple Discriminations:

<table>
<thead>
<tr>
<th>Antecedent (SD + MO)</th>
<th>Response</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal or Nonverbal</td>
<td>Response</td>
<td>Reinforcer</td>
</tr>
<tr>
<td>Stimulus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Most early skills such as tacting, listener commands, song fill-ins, animal sounds, word associations.

One Stimulus---------Evokes Response----------Reinforcer

**Max - Cat2**

**MAX**

**Mattie Video**
II. Teaching Early Intraverbals

- Teaching early intraverbals may include teaching intraverbals through prompting procedures and differential reinforcement.

- This method may lead to mainly “rote” intraverbals but many early intraverbals acquired during typical development may be rote.

- These rote responses may make more complex intraverbal behavior more likely and easier to teach.
TEACHING IFFCS

Verbal Discriminations

- Teach single response intraverbal fill-ins or “wh” questions using a tact to intraverbal transfer procedure whenever possible (Goldsmith, LeBlanc, & Sautter, 2007; Ingvarsson & Hollobaugh, 2011).

- Vocal prompts should not be used just because the learner has not been taught the tact. Teach the tact first, then teach the intraverbal.

Verbal Phrase--------Tact Stimulus-----R
(“You cut with a…….”) (object – knife) “knife”
(“What to you cut with?) (object – knife) “knife”

FADE

Verbal Phrase------------------------R
(“You cut with a…..”) “knife”
(“What do you cut with?”) “knife”

16. Max early intraverbals
### Intraverbal STEP 1 and 2 ERRORLESS TEACHING PROCEDURES:

**PROMPT – TRANSFER/FADE – DISTRACTERS – PROBE**

1. **Prompt:** Present the instructional demand ($S^D$) and immediately (0-second time delay) prompt the learner to respond.

2. **Transfer/Fade:** Represent the instructional demand and fade some dimension of the prompt (e.g., fade from a physical to a gestural prompt, use a phonemic prompt instead of a full word, decrease physical guidance) or implement a 2-second time delay and allow the learner to respond.

3. **Distracters:** Require 1-5 easy, mastered responses.

4. **Probe:** Represent the instructional demand and further fade the prompt or probe by waiting 3 seconds for the response to be emitted.

5. **Reinforce or Error Correct:**
   - If the learner’s response is correct, deliver a reinforcer.
   - Differentially reinforce as appropriate.
   - If the learner’s response is incorrect, run the error correction procedure.

**MODIFY THESE PROCEDURES AS NEEDED BASED UPON INDIVIDUAL LEARNER PERFORMANCE.**

### INTRAVERBAL TARGET SELECTION

- Select functional targets

- Try to select multiple targets related to one stimulus (e.g., shirt) across several skill areas simultaneously
  - H7 – Something you wear is a ... **shirt**
  - H8 – A shirt is something you ... **wear**
  - H9 – A shirt has ... **sleeves**
  - H10 – Something with sleeves is a ... **shirt**
  - H11 – A shirt is a type of ... **clothing**
  - H12 – Tell me a type of clothing ... **shirt**
For example, in order to fluently answer intraverbal questions such as “What grows on your head?” “What grows in a garden?” “What do you wear on your head?” it is usually valuable that a child can already emit the words “grow,” “head,” “wear,” “garden” as tacts and respond correctly to those verbal stimuli as a listener (e.g., “Can you find something that grows?” (Sundberg, 2011)

• Make sure that the words in the fill-in statement or “wh” question and the words required as the response are both previously mastered across other operants, at least as tacts and preferably as listener responses as well.
  – In “A magazine is something you ... read,” magazine should be mastered as a tact of a common object/picture and reading should be also be mastered as a tact of an ongoing action or an action in a picture.
  – In “Something you read is a ... magazine,” reading should be mastered as a tact of an ongoing action or an action in a picture and magazine should be mastered as a tact of a common object/picture.
  – In “Tell me something that comes in many flavors ... ice cream,” the learner should the tact the flavors (e.g., chocolate, vanilla, etc.) when eating different flavors of ice cream and should tact ice cream. Also preferable, although not essential, is that the learner tact the class of flavors.
EARLY INTRAVERBAL VIDEOS

16. Max early intraverbals
11. Video – Katy early IVs during DTI

17. Vincent Intraverbals
Video – Intraverbal 4.3
Intraverbal MAX echoic Prompt

14. Britt and Jean Marie

13. Video – Andre IVs during DTI
12. Video – Katy IVs during DTI
Josh- Tact to Intraverbal
Noah- VCD With Pics And Intraverbal/Story
Britt Early intraverbals

15. Ian with Jean Marie

III

Multiple Control: Convergent and Divergent Stimulus Control
Perhaps the most complex aspect of establishing the verbal stimulus control necessary for intraverbal behavior is that multiple control is almost always involved. Skinner (1957) describes two types of multiple control: “(1) the strength of a single response may be, and usually is, a function of more than one variable and (2) a single variable usually affects more than one response” (p. 227). An example of the first type of multiple control was suggested above, where the interaction among the multiple verbal stimuli in the question, “What grows in a garden?” play a role in evoking a correct response, while the second type of multiple control is demonstrated by the behavior of listing a variety of things that can grow. These two types of multiple control have been termed convergent multiple control and divergent multiple control, respectively (Michael, Palmer, & Sundberg, 2011).

Sundberg, 2011, pp 5-6
Convergent Multiple Stimulus Control

**SD**  
Teacher says:
Something Round  
Something you throw  
Something orange  
Something you kick  
Something you play with

**STIMULUS CLASS**

Learner says:
BALL
(Start)

**RESPONSE CLASS**

Divergent Multiple Stimulus Control

Learner says:
Something Round  
Something you throw  
Something orange  
Something you kick  
Something you play with

18. Stimulus and Response Generalization

Connor & JL
TEACHING INTRAVERBAL WEBBING

• The name of this step/protocol is: Intraverbal Webbing Protocol (Semantic Feature Mapping)

• It includes teaching convergent and divergent stimulus control by teaching stimulus and response classes.

• The purpose of the intraverbal webbing procedure is to teach advanced intraverbal skills which will facilitate stimulus and response generalization and increase responding correctly to complex verbal antecedents that require more advanced conditional discriminations.

• The recommended teaching procedures are designed to develop flexibility and avoid rote responding.

TARGET SELECTION

• Select functional targets
• Pick 2-4 mastered, functional tacts (each from a different class)
• Develop 4-6 feature, function, and class (FFC) fill-in phrases or “wh” questions (i.e., S^D_s) for each known tact that you will teach. Choose S^D_s that can later be grouped into “concepts” (e.g., “things you wear,” “things with sleeves,” “types of clothing”) so as to simultaneously teach stimulus and response classes. For example, for shirt:
  – H7 – “Something you wear is a ... shirt”
  – H8 – “A shirt is something you ... wear”
  – H9 – “A shirt has ... sleeves”
  – H10 – “Something with sleeves is a ... shirt”
  – H11 – “A shirt is a type of ... clothing”
  – H12 – “Tell me a type of clothing ... shirt”
• When creating targets, remember that each word in the verbal $S^D$ should be mastered as a tact.
  – Before teaching, “A shirt has... sleeves,” “shirt” should be a mastered tact and “sleeve(s)” should be a mastered tact (part of a shirt).
  – Before teaching, “A magazine is something you ... read,” “magazine” and “reading” should be mastered as tacts.
  – Before teaching, “Tell me something that comes in many colors ... markers,” various colors (e.g., red, green, yellow, blue, purple) and “markers” should be mastered as tacts.
• Word the $S^D$ in a natural way; do not select awkward $S^D$s just to force multiple responses.

INTRAVERBAL WEBBING: TEACHING THE 1ST MEMBER OF THE RESPONSE CLASS

• For the first member of each response class use the errorless teaching procedures previously described:
PROMPT – TRANSFER/FADE – DISTRACTERS – PROBE.
INTRAVERBAL WEBBING ERRORLESS TEACHING PROCEDURES FOR 1ST MEMBER OF THE RESPONSE CLASS: PROMPT – TRANSFER/FADE – DISTRACTERS – PROBE

1. **Prompt**: Present the instructional demand (S\(^0\)) and immediately (0-second time delay) prompt the learner to respond.

2. **Transfer/Fade**: Represent the instructional demand and fade some dimension of the prompt (e.g., fade from a physical to a gestural prompt, use a phonemic prompt instead of a full word, decrease physical guidance) or implement a 2-second time delay and allow the learner to respond.

3. **Distracters**: Require 1-5 easy, mastered responses.

4. **Probe**: Represent the instructional demand and further fade the prompt or probe by waiting 3 seconds for the response to be emitted.

5. **Reinforce or Error Correct**: - If the learner’s response is correct, deliver a reinforcer. Differentially reinforce as appropriate.
   - If the learner’s response is incorrect, run the error correction procedure.

MODIFY THESE PROCEDURES AS NEEDED BASED UPON INDIVIDUAL LEARNER PERFORMANCE.

---

**INTRAVERBAL WEBBING:**

**TEACHING 1ST MEMBER OF RESPONSE CLASS EXAMPLE**

**Teacher**: Says “Tell me something you see at the zoo...” and immediately presents a picture of a lion, and simultaneously models (or says) the sign (or word) for “lion” (PROMPT)

**Learner**: Signs (or says) “lion”

**Teacher**: Says “Tell me something you see at the zoo...” and waits 2 seconds to allow learner to respond (TRANSFER) or fades some aspect of the prompt, perhaps by quickly flashing the picture (FADE)

**Learner**: Signs (or says) “lion”

**Teacher**: Says “Tell me something you see at the zoo...” without prompts (PROBE)

**Learner**: Signs (or says) “lion”

**Teacher**: “Nice job” while turning on the TV
DIAGRAM FOR INTRAVERBAL WEBBING:
TEACHING 1ST MEMBER OF RESPONSE CLASS EXAMPLE

- Teach using a tact (plus mimetic or echoic) to intraverbal stimulus control transfer procedure
- Transfer of stimulus control from the non-verbal stimulus (plus vocal or model prompt) to the vocal $S^0$

Prompt:

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Behavior</th>
<th>Reinforcer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocal $S^0$ (&quot;Tell me something you see at the zoo.&quot;)</td>
<td>Verbal Behavior (Child signs &quot;lion&quot;)</td>
<td>Non-Specific Reinforcement</td>
</tr>
<tr>
<td>Non-verbal stimulus (Picture of lion)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model prompt (Teacher signs &quot;lion&quot;)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Transfer of stimulus control:

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Behavior</th>
<th>Reinforcer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocal $S^0$ (&quot;Tell me something you see at the zoo.&quot;)</td>
<td>Verbal Behavior (Child signs &quot;lion&quot;)</td>
<td>Non-Specific Reinforcement</td>
</tr>
</tbody>
</table>

19. IV Webbing: 1st Response

DEFINING INCORRECT RESPONSES AND ERROR CORRECTION PROCEDURE FOR INTRAVERBAL WEBBING TEACHING 1ST MEMBER OF THE RESPONSE CLASS

- An incorrect response is defined the same as it was for IFFC Step 1 skills.
- Use the same error correction procedure as previously described for IFFC Step 1 skills.
INTRAVERBAL WEBBING:  TEACHING ADDITIONAL MEMBERS OF THE RESPONSE CLASS

- Present the learner with the S^0 and allow the learner to fill-in previously mastered response(s). (Example: “Tell me a vehicle” learner says “car.”)
- Repeat the S^0 and prompt the next target response using a 0-second time delay with a picture card (i.e., tact).
- Immediately following the learner’s correct response, briefly reinforce.
- Repeat this at least once (and up to two additional times as necessary to modify for the individual learner). On each additional presentation, fade some aspect of the prompt (e.g., fade from holding the card up for a full 1-2 seconds to quickly flashing the card).
- After the prompted trials, run a probe trial during which you do not prompt the target response.
- If the learner provides all previously mastered responses along with the target response, reinforce abundantly.
- Repeat the probe step additional times as necessary based upon the individual learner. Always provide large magnitude of highly preferred items for independent responding (i.e., differentially reinforce).

INTRAVERBAL WEBBING:  TEACHING THE 2ND MEMBER OF THE RESPONSE CLASS

1st response: “apple” = previously mastered
2nd response: “cookie” = target response

PROMPT:
Teacher: “Tell me something you eat.”
Learner: “Apple”
Teacher: “Tell me something else you eat” and displays picture of a cookie
Learner: “Cookie”
Teacher: “Good job” while turning on the TV for about 10 seconds.

PROMPT:
Teacher: “Tell me something you eat.”
Learner: “Apple”
Teacher: “Tell me something else you eat” and displays picture of a cookie
Learner: “Cookie”
Teacher: “Good job” while turning on the TV for about 10 seconds

PROBE:
Teacher: “Tell me something you eat.”
Learner: “Apple”
Teacher: “Tell me something else you eat” and does not display picture of cookie
Learner: “Cookie”
Teacher: “Good job” while delivering a candy and turning on the TV for about 30 seconds

Learner specific adjustments: Repeat additional probes as needed. Use greater magnitude or variety of reinforcers as needed.
INTRAVERBAL WEBBING:
TEACHING THE 3rd MEMBER OF THE RESPONSE CLASS

1st & 2nd responses: “apple” and “cookie” = previously mastered
3rd response: “banana” = target response

PROMPT:
Teacher: “Tell me something you eat.”
Learner: “Apple”
Teaching: “Tell me something else you eat.”
Learner: “Cookie”

Teacher: “Tell me something else you eat” and displays picture of banana
Learner: “Banana”
Teacher: “Good job” while turning on the TV for about 10 seconds.

PROMPT:
Teacher: “Tell me something you eat.”
Learner: “Apple”
Teaching: “Tell me something else you eat.”
Learner: “Cookie”

Teacher: “Tell me something else you eat” and displays picture of banana
Learner: “Banana”
Teacher: “Good job” while turning on the TV for about 10 seconds.

PROBE:
Teacher: “Tell me something you eat.”
Learner: “Apple”
Teaching: “Tell me something else you eat.”
Learner: “Cookie”

Teacher: “Tell me something else you eat” and does not display picture of banana
Learner: “Banana”
Teacher: “Good job” while delivering a candy and turning on the TV for about 30 seconds

Learner specific adjustments: Repeat additional probes as needed. Use greater magnitude or variety of reinforcers as needed.

21. IV Webbing: 3rd Response

INTRAVERBAL WEBBING:
PROBE FOR NOVEL RESPONSES

• Once you have taught two to three members of a response class, probe to see if the learner will emit novel (i.e., generalized or untrained) responses.

• If the learner emits novel responses, differentially reinforce with a large magnitude of highly preferred reinforcers.

22. Video-Webbing Probe for Novel Responses

• If the learner does not emit novel responses, continue teaching 4th and 5th members of the response class.

23. Video-Webbing Teaching 4th and 5th Responses

• If novel responses are not emitted after 5 members of the response class have been taught, do not continue to teach additional members of that response class. Instead, begin teaching responses within a different response class.
INTRAVERBAL WEBBING:
DEFINING INCORRECT RESPONSES

• Four types of responses will be considered errors (i.e., incorrect responses).
  – Incorrect responses (Example: “Tell me a vehicle” and the learner says “bird”).
  – Repeated responses (Example: “Tell me a vehicle” the learner says “car” “Tell me another vehicle” the learner says “car”).
  – Emitting multiple members of the response class (Example: “Tell me a vehicle” the learner says “car, boat, airplane”).
  – Failure to respond within 2-3 seconds.

INTRAVERBAL WEBBING:
ERROR CORRECTION PROCEDURE

• If the learner emits an error at any point during instruction, use the following error correction procedure:
  – Provide a 5-second time out which includes turning face away from learner and withholding attention. This is when you should gather your materials (i.e., non-verbal stimuli/pictures) with which to prompt.
  – Restart the trial following the teaching procedures listed previously.
  – Prompt at the numbered response on which the learner erred. For example, if the learner emitted two correct responses and erred on the third response, be ready to prompt the third member of the response class.
  – If the learner has previously mastered additional members of the response class (e.g., mastered four responses and now teaching fifth response, but erred on third response), go through the teaching procedure building up one member at a time (i.e., to restrengthen the response class) until the learner is emitting all previously mastered members of the response class (and the current target response if the error occurs during teaching).
INTRAVERBAL WEBBING:
ERROR CORRECTION EXAMPLE

1st – 4th responses: “pants, hat, underwear, socks” = previously mastered
5th responses: “shirt” = current target

PROBE:
Teacher: “Tell me something you wear.”
Learner: “Hat”
Teacher: “Tell me something else you wear.”
Learner: “Underwear”
Teacher: “Tell me something else you wear.”
Learner: “Socks”
Teacher: “Tell me something else you wear.”
Learner: “Shirt”
Teacher: “Tell me something else you wear.”
Learner: “Underwear” (ERROR)

ERROR CORRECTION:
Teacher: 5 second time out without attention given to learner
Teacher: Follows the teaching procedure for teaching a 5th member of the response class (i.e., represent “Tell me something you wear” and allow learner to emit first four members of response class, probe fifth member; repeat; probe all five responses; repeat if necessary)

24. Video-Webbing Error Correction

INTRAVERBAL WEBBING:  NEXT STEPS

• Fill out the FFC Summary Sheets.
• Fill out the Concept Summary Sheets.
• Fill out the Concept Maps.
• Practice “webbing” across the related Concept Maps.
FILL OUT THE FFC SUMMARY SHEETS

• Write abbreviations for all of your targets on the FFC Summary Sheets.

• Label each target on the FFC Summary Sheet with the correlating ABLLS goal. List the “forwards” (e.g., “Tell me an animal... dog; H7, H10, H12) on the left and the “reversals” (e.g., “A dog is an... animal; H8, H9, H11) on the right.
<table>
<thead>
<tr>
<th><strong>Dog</strong></th>
<th><strong>Ball</strong></th>
<th><strong>Juice</strong></th>
<th><strong>Fish</strong></th>
<th><strong>Chef</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>tail m</td>
<td>tail m</td>
<td>toy m</td>
<td>fin m</td>
<td>food m</td>
</tr>
<tr>
<td>legs m</td>
<td>legs m</td>
<td>drink m</td>
<td>fin m</td>
<td>food m</td>
</tr>
<tr>
<td>no pet #</td>
<td>no play with #</td>
<td>no four #</td>
<td>no pet #</td>
<td>no eat #</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Shoes</strong></th>
<th><strong>Car</strong></th>
<th><strong>Soda</strong></th>
<th><strong>Puzzle</strong></th>
<th><strong>Shirt</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>wear #</td>
<td>driver</td>
<td>drink #</td>
<td>play with #</td>
<td>wear #</td>
</tr>
<tr>
<td>shoes m</td>
<td>window m</td>
<td>drink m</td>
<td>piece m</td>
<td>sleeve m</td>
</tr>
<tr>
<td>footwear m</td>
<td>door m</td>
<td>four m</td>
<td>toy m</td>
<td>sleeve m</td>
</tr>
<tr>
<td>no pet #</td>
<td>no run</td>
<td>no four m</td>
<td>no four m</td>
<td>no four m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Popcorn</strong></th>
<th><strong>Cat</strong></th>
<th><strong>TV</strong></th>
<th><strong>House</strong></th>
<th><strong>Cookie</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>eat m</td>
<td>pet m</td>
<td>watch m</td>
<td>ride m</td>
<td>eat m</td>
</tr>
<tr>
<td>crunch m</td>
<td>tail m</td>
<td>channel m</td>
<td>trail m</td>
<td>food m</td>
</tr>
<tr>
<td>food m</td>
<td>legs m</td>
<td>button m</td>
<td>legs m</td>
<td>food m</td>
</tr>
<tr>
<td>no pet #</td>
<td>no four m</td>
<td>no four m</td>
<td>no four m</td>
<td>no four m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Balloons</strong></th>
<th><strong>Book</strong></th>
<th><strong>Bicycle</strong></th>
<th><strong>French Fries</strong></th>
<th><strong>Potatoes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>play with m</td>
<td>read m</td>
<td>ride m</td>
<td>eat m</td>
<td>play with m</td>
</tr>
<tr>
<td>pop m</td>
<td>page m</td>
<td>wheel m</td>
<td>four m</td>
<td>piece m</td>
</tr>
<tr>
<td>blow m</td>
<td>cover m</td>
<td>pedal m</td>
<td>four m</td>
<td>toy m</td>
</tr>
<tr>
<td>no pet #</td>
<td>no cover m</td>
<td>no pedal m</td>
<td>no pet #</td>
<td>no pet #</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Water</strong></th>
<th><strong>Plants</strong></th>
<th><strong>Bed</strong></th>
<th><strong>Train</strong></th>
<th><strong>Chair</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>pour m</td>
<td>wear m</td>
<td>sleep m</td>
<td>track m</td>
<td>set on m</td>
</tr>
<tr>
<td>drink m</td>
<td>clothing m</td>
<td>pillow m</td>
<td>wheels m</td>
<td>back m</td>
</tr>
<tr>
<td>no pet #</td>
<td>no clothing m</td>
<td>no pillow m</td>
<td>no wheels m</td>
<td>back m</td>
</tr>
<tr>
<td>no pet #</td>
<td>no clothing m</td>
<td>no pillow m</td>
<td>no wheels m</td>
<td>back m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Markers</strong></th>
<th><strong>Noody</strong></th>
<th><strong>Cake</strong></th>
<th><strong>Airplane</strong></th>
<th><strong>Bird</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>draw m</td>
<td>eat m</td>
<td>candles m</td>
<td>flies in sky m</td>
<td>flies in sky m</td>
</tr>
<tr>
<td>cap m</td>
<td>fruit m</td>
<td>four m</td>
<td>ride m</td>
<td>wings m</td>
</tr>
<tr>
<td>paint m</td>
<td>food m</td>
<td>has piece m</td>
<td>has four m</td>
<td>wheels m</td>
</tr>
<tr>
<td>no pet #</td>
<td>no pet #</td>
<td>fruit m</td>
<td>four m</td>
<td>book m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Train</strong></th>
<th><strong>Car</strong></th>
<th><strong>Food</strong></th>
<th><strong>Wings</strong></th>
<th><strong>Legs</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>seat m</td>
<td>vehicle m</td>
<td># food m</td>
<td>wings m</td>
<td>legs m</td>
</tr>
<tr>
<td>back m</td>
<td>vehicle m</td>
<td># food m</td>
<td>wings m</td>
<td>legs m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Wheels</strong></th>
<th><strong>Book</strong></th>
<th><strong>Wings</strong></th>
<th><strong>Animal</strong></th>
<th><strong>Tail</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>no pet #</td>
<td>no pet #</td>
<td>no pet #</td>
<td>no pet #</td>
<td>no pet #</td>
</tr>
<tr>
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<td>no pet #</td>
<td>no pet #</td>
<td>no pet #</td>
<td>no pet #</td>
</tr>
</tbody>
</table>
FILL OUT THE CONCEPT SUMMARY SHEETS

• Review your FFC Summary Sheet and begin to group targets/S0s into “concepts” that will contain multiple exemplars (e.g., things that go, food, vehicles, etc.).

• Write these concepts on the Concept Summary Sheets.

• Once a target has been retained you will write that target under the corresponding “concept” on the Concept Summary Sheet.
THINGS THAT FLY

<table>
<thead>
<tr>
<th>S&lt;sup&gt;D&lt;/sup&gt;: Tell me something that flies.</th>
<th>Present S&lt;sup&gt;D&lt;/sup&gt; below</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learner says…</td>
<td>Learner says &quot;Flies&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Bird</th>
<th>A bird is something that</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Airplane</th>
<th>An airplane is something that…</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Helicopter</th>
<th>A helicopter is something that</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FILL OUT THE CONCEPT MAPS

• Once concepts have been identified write those concepts (e.g., “things that fly”) on the Concept Maps.

• As targets within each concept are mastered, add those to the Concept Maps.

• Add novel responses to the Concept Maps as well.

• Use the arrows to indicate directionality of the responses.

• Highlight separate concepts that web off from the central concept on each map.
PRACTICE WEBBING ACROSS THE RELATED CONCEPT MAPS

- Once enough exemplars have been taught within each stimulus and response class that you can begin to web (i.e., make connections) across several different maps, begin to web across concepts using the Concept Maps.
- For example, if a learner has mastered “Tell me an animal... dog/cat/bird” as a multiple response, “A cat has a... tail,” “Something with a tail is a... cat,” “A cat is an... animal,” and “A bird flies in the... sky” as individual intraverbal targets, an early intraverbal web might expand as follows:

  S\(^D\): “Tell me an animal”  R: “Dog”
  S\(^P\): “And, how about another animal”  R: “Bird”
  S\(^D\): “And one more animal”  R: “Cat”
  S\(^D\): “And a cat has a...”  R: “Tail”
  S\(^D\): “Right, and something with a tail is a...”  R: “Cat”
  S\(^D\): “And a cat is an...”  R: “Animal”
  S\(^D\): “So, tell me an animal”  R: “Dog”
  S\(^D\): “And another animal...”  R: “Cat”
  S\(^D\): “How about another animal”  R: “Bird”
  S\(^D\): “And a bird flies in the...”  R: “Sky”

SAME LAST WORD DIFFERENT PRIOR WORDS

Vincent Videos on Webbing across Concept Maps - 25, 26, 27, 28

TAKE AWAY POINT # 4 - Teach many rote intraverbal responses before attempting to develop a complex intraverbal repertoire.
IV. Overcoming Rote Responding: Teaching Conditional Discriminations

- The progression toward more complex intraverbals includes the development of verbal conditional discriminations and responding to compound stimuli.

- On the next slide are descriptions of these stimulus control variables.

---

**Conditional Discrimination (MTS)**  
Visual-Visual (non-arbitrary)
Conditional Discrimination (MTS)
Auditory-Visual (arbitrary)

Shoe

Reproduced with Permission of Dr. Judah Axe

<table>
<thead>
<tr>
<th>Type of discrimination</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
</table>
| Simple                 | A single-component verbal stimulus that evokes a response | Speaker: Saying “meow” after hearing “A kitty says...”
|                        |            | Listener: When asked to “jump,” a child emits jumping behavior. |
| Compound               | A verbal stimulus that involves two or more S’s that each independently evoke behaviors, but when they both occur in the same antecedent configuration, a different S function is generated | Speaker: Saying “blue” after hearing “Red, white, and...”
|                        |            | Listener: When asked to “clap fast” and “clap slow,” “walk fast,” and “walk slow,” the corresponding nonverbal behavior is emitted. |
| Verbal conditional     | A verbal stimulus that alters the evocative and functional effects of another verbal stimulus in the same antecedent configuration | Speaker: Saying “spoon” and “soup” respectively when asked, “What do you eat with?” versus “What do you wash with?”
|                        |            | Listener: Pointing to spoon and soap when asked the same questions presented above. |

- This table from Sundberg describes the steps toward the development of intraverbal behavior in typical children.

Sundberg, 2016
Conditional Discrimination in Verbal Behaviour

• Inherent in all verbal operants as probabilities of verbal responses vary with the presence of conditional and discriminative stimuli (Catania, 1998)

   What colour? SC S0 Green!

   Adapted from Axe (2008)

Conditional Discriminations

• “The nature or extent of operant control by a stimulus condition depends on some other stimulus condition”

   Michael (2004, p. 64)

• “That is, one discriminative stimulus (SD) alters the evocative effect of a second stimulus in the same antecedent event (or vice versa), and they collectively evoke a response”

   Sundberg and Sundberg (2011, p. 25)
Verbal conditional discriminations

- An adult shows a green apple to a child and asks “what colour is it?”
- The auditory verbal stimulus colour strengthens a variety of intraverbal responses related to colours (blue, yellow, red, and green) and the non-verbal stimulus strengthens related tacts (round, small, you eat it, sweet, and green). The response green is under the control of both antecedent variables

Michael, Palmer, and Sundberg (2011)

The problem with directly training intraverbal responses

- “[...] researchers are able to establish small and somewhat restricted categorization repertoires by directly training the responses using stimulus control transfer procedures. However, some have suggested that the resulting responses may differ from how most verbally competent individuals answer categorization questions”

D. C. Palmer, personal communication, September 12, 2006, as cited in Sautter, Leblanc, Jay, Goldsmith, & Carr (2011, p. 228)
Considerations

- The trap of teaching intraverbal responses through an echoic/tact to intraverbal transfer before tact conditional discriminations are acquired
  - “What do you eat?”: “Fork” (what do you eat with?)
  - “What is a cat?”: “Miao” (what does a cat say?)
  - “What do you do with food?”: “Pizza” (What is a type of food?)

- Using such procedures risks turning a response that should occur under multiple control (i.e., a conditional discrimination) into one that occurs under simple discriminative control only (i.e., a pure intraverbal). Because it has temporal contiguity, by definition, a pure intraverbal cannot be a variable response.

Compound Verbal Discriminations

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tell me some Red Fruits</td>
<td>List of Foods (But only those That are both a fruit and red.)</td>
</tr>
</tbody>
</table>

Consequence

- Reinforcer

Two or More Stimuli Combine--------Evoke Response-------Reinforcer

<table>
<thead>
<tr>
<th>Vehicle Flies in Sky---------- “CAR” Simple</th>
<th>Time &amp; Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Flies in Sky---------- “BIRD” Simple</td>
<td>Tell me something that is not a food. Naryan ERROR</td>
</tr>
<tr>
<td>Vehicle Flies in Sky---------- “Cloud” Simple</td>
<td>More Errors Naryan</td>
</tr>
<tr>
<td>Vehicle Flies in Sky---------- “Airplane” Conditional</td>
<td></td>
</tr>
</tbody>
</table>
Verbal Conditional Discriminations

**Antecedent**  
Tell me some Hot Food

**Response**  
List of Foods (But only those conditional upon the control exerted by the word “hot” in combination with “food”)

**Consequence**  
Reinforcer

One Stimulus Changes------------Response------------------Reinforcer

The Next Stimulus "

Name a **Vehicle** that goes on Water ---------“CAR”
Name a **Vehicle** that goes on Water---------“DRINK”
Name a **Vehicle** that goes on Water--------“BOAT” CONDITIONAL

Name a **Vehicle** that goes on Road---------“PLANE”
Intra-Verbal Errors **BRAVE**
Name a **Vehicle** that goes on Road---------“STREET”
Name a **Vehicle** that goes on Road---------“CAR” CONDITIONAL

- For example, compare the stimulus control for the response “A cat says______” versus “What are some hot foods?”

- Note the complex nature of the verbal stimulus where the word “hot” alters the evocative effect of the word “food.” Hot and food must combine to evoke the response for example “oat meal.” Food becomes an SD for saying “oatmeal” conditional on the control exerted by “hot”.

- If control is exerted by only one of these stimuli (words) then an incorrect response may occur, e.g. only food = fruit, only hot = stove, etc.

- Sundberg & Sundberg (2011) suggest that this type of multiple control should be called Verbal Conditional Discrimination (VC\textsuperscript{D}).

- He suggests that changes over time in the antecedent verbal stimulus from fairly simple to complex that may explain the problems persons with autism and related disabilities have in acquiring this repertoire

- On the next slide are diagrams that show the difference among simple and compound and conditional discriminations.
Teaching Conditional Discriminations

• Once several tacts of adjectives and nouns are acquired, learners with autism still make errors when required to tact some aspect of a stimulus under the control of a verbal stimulus. (Conditional Discriminations)

• For example, when shown an object and asked to tact its size, color or name the object many learners will error because the controlling stimulus (word) in the request does not alter the evocative effect of a specific aspect of the stimulus.

• This type of conditional discrimination requires the learner’s behavior to be controlled by an auditory stimulus, “What color is it,” and then a specific visual stimulus in the form of the color of the item.

• A typical error that might occur when shown a pencil and asked, “What color is this?” The learner will say, “yellow pencil,” or even, “pencil.” Both of these errors indicate a problem related to the formation of a conditional discrimination.

• When the correct response occurs it does so because the word “color” changes the color of the pencil into a discriminative stimulus for the name of the color.

5. Video of Errors
**Conditional Discriminations**

**COLOR EXAMPLE**

$S^D$ Response Reinforcer
What Color is It? Looking Response Seeing the object

$S^D$ Response Reinforcer
Seeing the object "RED" "That’s Right"

**Common Error**
If the word color does not exert any control over the response the child names (tacts) the object or size.

Kieran error

**SIZE EXAMPLE**

$S^D$ Response Reinforcer
What Size is It? Looking Response Seeing the object

$S^D$ Response Reinforcer
Seeing Object "BIG" "That’s Right"

**Size color error Kieran**
Developmentally When This Skill is Acquired in Typical Children

TACT

Does the child emit a wide variety of tacts, and do they contain several different parts of speech?

11. Tacts the color, shape, and function of 5 objects (15 trials) when each object and question is presented in a mixed order (e.g., What color is the refrigerator? What shape is the valentine? What do you do with the ball?) (This is part tact and part intraverbal.) (T)

12. Tacts 4 different prepositions (e.g., in, out, on, under) and 4 pronouns (e.g., I, you, me, mine) (E)

13. Tacts 4 different adjectives, excluding colors and shades (e.g., big, little, long, short) and 4 adverbs (e.g., fast, slow, quietly, gently) (E)

14. Tacts with complete sentences containing 4 or more words, 20 times (E)

15. Has a tact vocabulary of 1000 words (nouns, verbs, adjectives, etc.), tested or from an accumulated list of known tacts (T)

Comments/Notes:

Teaching Verbal Conditional Discriminations Advanced Tacting Skills

- To overcome the difficulties associated with teaching rote responses the following procedures have been suggested.
Conditional Discrimination

Phase 1

Same Item-Different Questions

Pre requisite skills:

- Tacts of adjectives
- 150 – 200 tacts (nouns and verbs)

Step 1: Gather materials (objects) that are known tacts.

Step 2: Present 6 items in random order following the data sheet. For example, present item 1, and ask, “What is it?” (score a + or – depending on the response). If the learner responds with an incorrect response, keep presenting the SD until the learner responds correctly, then immediately present “What color?” (score a + or – depending on the response).

DO NOT ERROR CORRECT

Step 3: Run through all 10 trials across all 6 items and calculate the data as a % correct score for the day. (120) If you don’t get through all the trials in the day, score a % correct for whatever you got through.

Criteria: >90% correct across 2 days in order to move onto Phase 2.

6. VIDEO Phase 1
Phase 2

Different Item - Different Question

Step 1: Use the same materials as you did in Phase 1, but break the materials up into 3 sets each containing 2 objects. So in Set 1, you will have Item 1 & 2, in Set 2, you will have item 3 & 4 and in Set 3, you will have Item 5 & 6.

Step 2: Present in each item in the set according to the data sheet. For example, present item 1 and ask, “What is it?” (score a + or – depending on the response). If the learner responds with an incorrect response, keep presenting the SD until the learner responds correctly, then immediately present item 2 and ask, “What color?” (score a + or – depending on the response).

DO NOT ERROR CORRECT

Step 3: Run through all 10 trials across all sets and calculate the data as a % correct score for the day. (180) If you don’t get through all the trials in the day, score a % correct for whatever you got through.

Criteria: ≥90% correct across 2 days in order to move onto Phase 3.

8. VIDEO Phase 3 (Novel Stimuli)
Phase 3
(novel stimuli)

Different Item-Different Questions & Same Item-Different Question

Step 1: Gather 6 novel objects that are known tacts.

Step 2: Present item and either ask name or color according to data sheet. If the learner makes an error, **do not correct or repeat just move on**.

Step 3: Run through all 30 trials randomly presenting the 6 items and score a % correct for the day.

Step 4: If above 90% correct, repeat steps 1-3 next day with 6 different novel stimuli.

Criteria: ≥ 90% correct across 2 days in order to consider this conditional discrimination mastered. If the learner did not score 90% correct on either set of stimuli, use those stimuli and start over at Phase 1.

7. Video Phase 2

Connor Examples
Alternative Method Recommended by:
Dr. Francesca degli Espinosa

https://autism.outreach.psu.edu/archive/conference-schedule-2014
degli Espinosa (in preparation)

- Subjects: 5 children with autism, 3 English-speaking, 2 Italian-speaking
- Baseline:
  - Show, e.g., a green bottle. “What is it?”
  - Response: “Bottle”
  - “What color?”
  - “Bottle”

We see a tendency for “What---” to control the name of the item (a “label” tact).

- Intraverbal control: Words that are often heard together or said together are “intraverbally related.”
- One word evokes the next, as in a memorized poem, or word associations:
  - “To be or....” (not to be)
  - “Four score and....” (seven years ago)
  - “Bread and...” (butter)
  - “Cheddar...” (cheese)
• Training of intraverbal control, Part 1:
  – “What is it?”
  – “It’s a bottle”
• First intraverbal:
  • “What is it?” evokes the frame “It’s a —”.
• Second set of intraverbals
  – “It’s a —” evokes a label tact, e.g. shoe.
• At the end of extensive training “It’s a —” exerts intraverbal control over a whole set of possible responses (bottle, shoe, car, etc.)
  – That is, when child says “It’s a —” a variety of possible responses are potentiated, just as “city” evoked a variety of potential responses in the intraverbal game.

• Summary:
  – “What is it?” intraverbally evokes “It’s a —”
  – “It’s a —” intraverbally evokes a set of labels.
  – The particular object also evokes its label.
  – That tact is emitted under joint control.
Training of intraverbal control, Part 2:
- She presented color swatches
- “What color?”
- She then shaped and evoked
  - “Color green,” “Color red,” “Color blue,” etc.
- Result:
  - “What color?” intraverbally evokes the frame “Color ---”.
  - “Color---” intraverbally evokes a wide variety of color tacts.
  - Prevailing stimulus evokes a particular color tact.
  - That tact is emitted under joint control.

Now:
- “What is it?” --- “Bottle”
- “What color?” --- “Green”
Additional pairs

• What is it? It’s a object name
• What colour? Colour green
• What animal? It’s a cat
• What does it say? It says meow
• Who is it? It’s mummy
• What is she doing? She is swimming
• What do you eat? Eat spaghetti
• What do you eat with? With fork

National Autism Conference Link
Teaching question discrimination to children with autism

- Procedure based on manipulating relevant conditions to evoke intraverbal control between the word “colour” and a colour name (i.e., the example being presented) and the word “number” and a number name (i.e., the example being presented).
- By training responding to single elements using autoclitic frames it may be possible to bring the response under multiple echoic, intraverbal and tact control in a tact conditional discrimination without specifically teaching it.

*degli Espinosa and Brocchin (in preparation)*

---

Procedure: Teaching steps (run concurrently)

1. **Echoic priming**
   - “Colour green”, “colour red”, “colour blue”, etc., and “number 3”, “number 5”, “number 4”, etc., to increase intraverbal control of the verbal stimulus “Colour” and the name of a colour, “number” and the name of a number

2. **Establish tacts (or intraverbals if you prefer...) of numbers with the autoclitic frame “Number [X]”**
   - Stimuli are black numbers on white paper. Ask “What number?” in each presentation. The response is partly an echoic, partly intraverbally controlled, and partly a tact (specific sample), thus establishing multiply controlled responding

3. **Establish tact of colour swatches with the autoclitic frame “Colour [X]” (in separate trial blocks from Step 2)**
   - Ask “What colour?” in each presentation. The response is partly an echoic, partly intraverbally controlled, and partly a tact (specific sample), thus establishing multiply controlled responding
Procedure: Testing

4. When these groups of tacts are established in this way, begin testing for tact conditional discrimination using a continuous schedule of reinforcement for each correct response
   a) Run echoic trials as a priming session
   b) Present five coloured numbers on the table and randomly ask one of the two questions on a single stimulus (do not ask two questions about the same stimulus). Use an intraverbal filler, so when you point to the relevant sample and ask “What number? Say “Number…”. The child should then say “Number” and the number name (e.g., “Number three”). Note: The intraverbal filler is used to establish intraverbal control over the whole class with the tact as the specific sample, so it does not function as a prompt for the tact. Use the same procedure for the “What colour?” question, then randomise colour and number questions

TAKEAWAY POINT # 5 To develop sophisticated intraverbal behavior that is acquired without specifically being taught, the learner must come under the control of an increasingly greater number and more complex configuration of words presented in the antecedent verbal stimulus. The combination of those words form a uniquely different stimulus than any one of the words in isolation, e.g. “hot foods you eat in the morning only.”
V. Teaching Method for Increasing Conditional Discriminations:
After the preceding methods have produced a complex interverbal repertoire the next step in teaching intraverbal behavior is to present complex verbal antecedents in an increasingly complex manner. When presenting these antecedents the following methods may support the acquisition of novel responding without formal prompting.

**EMPHASIS, PROLONGATION AND DOUBLE WORD**
- Emphasis, prolongation or double-word presentations may help to support development of verbal conditional discriminations
  - **Emphasize Verbal Stimulus**  Double Word
Teaching Method for Increasing Conditional Discriminations:

OBSERVING RESPONSE
(Kisamore, et al. 2013)

Observing response- Echo the verbal stimulus before making the response, e.g. “What is the opposite of cold?” The opposite of cold is HOT.

Echo Verbal Stimulus

Teaching Method for Increasing Conditional Discriminations:

RESPONDING TO MULTIPLE STIMULI

Instructor says: Which one is a red fruit?
Listener Responding by Feature, Function, and Class (LRFFC)

Request to select item/picture without saying name of item/pictures

Feature: “Which one has wings?”

Function: “Which one do you eat?”

Class: “Which one is an animal?”

Teaching Method for Increasing Conditional Discriminations:

LISTENER RESPONDING BY FEATURE, FUNCTION AND CLASS (LRFFC)

- Present objects or pictures of objects and ask the learner to select and item.
- If the learner produces the tact at the same time there is a greater likelihood that the intraverbal will be acquired.

Britt
Josh
Josh and Noah  Negation and time

M-LRFFC
Saud with Tacts
Teaching Method for Increasing Conditional Discriminations: ACTION-OBJECT MATRIX TRAINING

Instructor Says: “Tell me something you eat that is red, then yellow, then green. “Tell me something you drink that is red, then yellow, then green...
Teaching Method for Increasing Conditional Discriminations:
TACTING BY FEATURE, FUNCTION AND CLASS

- Tacting by Feature, Function and Class is more complex than LRFFC and may closely approximate the intraverbal response.
- After acquiring a complex LRFFC extend to TFFC.

Vincent Video

M-TFFC

NOAH WITH PICTURES & STORY

Teaching Method for Increasing Conditional Discriminations:
INTRAVERBAL RESPONDING BY MULTIPLE DIMENSIONS

- Presented verbal antecedent stimuli that require conditional discriminations to evoke the response scheduled for reinforcement.

Noah VC<sup>DS</sup>

Naryan Videos of VC<sup>DS</sup> (Percussion)
Naryan- “with
Teaching Method for Increasing Conditional Discriminations:
TEACH SAME LAST WORD WITH DIFFERENT PRIOR WORDS
(Axe, 2008)

Table 4
Sets of Verbal Stimuli Requiring Conditional Discriminations

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What do you write with?</td>
<td>What is a brown animal?</td>
<td>Kite and Bird</td>
</tr>
<tr>
<td>2</td>
<td>What do you eat with?</td>
<td>What is a green animal?</td>
<td>Dog and Bird</td>
</tr>
<tr>
<td>3</td>
<td>What do you write on?</td>
<td>What is a brown food?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>What do you eat on?</td>
<td>What is a green food?</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>What do you eat that’s red?</td>
<td>What is a red food?</td>
<td>Fork and Knife</td>
</tr>
<tr>
<td>6</td>
<td>What do you play with that’s red?</td>
<td>What is a red drink?</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>What do you eat that’s round?</td>
<td>What is a yellow drink?</td>
<td>Saw and Knife</td>
</tr>
<tr>
<td>8</td>
<td>What do you throw that’s round?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Axe, TAVB, 2008
Teaching Method for Increasing Conditional Discriminations: EXTENSIVE TACT TRAINING

Teaching extensive tact repertoire has shown some benefit in developing more complex intraverbals (Pettusdottir, 2013)

It would seem that the more complex the tact, i.e. containing multiple controlling nonverbal stimuli the more likely this training is to produce conditional discriminations.

Britt Tacting Video
Teaching Method for Increasing Conditional Discriminations: LAG SCHEDULES

In a lag schedule reinforcement is contingent upon a response that differs from previous responses. If the contingency is that the response must be different from the last response it is a Lag 1, Lag 2 if the response is different from the last 2, etc. (Pettursdottir, 2013)

Video-Webbing Probe for Novel Responses
Teaching Method for Increasing Conditional Discriminations: TEACH IN BLOCKED TRIALS

- Teach responses to similar verbal stimuli.

  What do you sweep?
  What do you sweep with?

  What do you eat?
  What do you eat with?

Rayan
Rayan Conditional Discriminations

Emergence of Advanced Intraverbals
DeSouza, et al. 2017

- Sundberg and Sundberg 2011, suggested that teaching these skills will lead to advanced intraverbals without direct instruction.

  - Listener responding- give me the ball
  - Multiple tact training- Tact the name and the category
  - Intraverbal categories- Tell me an animal, tell me another animal, tell me another animal,
  - Listener compound discrimination- give me the hot food you eat in the morning.

    (DeSouza, et al. in press)
TAKEAWAY POINT # 6 There are various methods to teach verbal conditional discriminations. All or some combination of them can be used until novel responses are being evoked.

VI. The Role of Problem Solving in the Development of Intraverbal Behavior

• Typically, children with autism are taught to respond to a series of “wh” questions.

• These children may even develop a repertoire that includes hundreds of responses to specific questions.

• However, developing a repertoire that allows the child to respond to the statements of others that were never taught is the ultimate goal.

• This will require a method that leads to a problem-solving repertoire (Sautter, LeBlanc, Jay, Goldsmith, & Carr, 2011).
Complex Intraverbal Behavior
Adding to Skinner’s Analysis

- Intraverbal responses to novel and untaught verbal stimuli require some additional explanation and analysis.

- Palmer (1991) suggests that advanced intraverbal behavior (talking about past events) seems to require a problem solving repertoire.

- This problem solving repertoire is usually a covert private activity or overt activity that mediates or supplements the sources of control for the response.

- Problem solving (Skinner, 1953) involves acting in ways that make a response scheduled for reinforcement more likely.

- For example, a verbal stimulus “What did you eat for breakfast this morning?” might evoke a cascade of private events that could include organizing stimuli, private intraverbals or visual imagery, respondent behavior (conditioned seeing and hearing).

- In addition, the speaker might observe the surrounding environment for additional sources of the control for the response that is scheduled for reinforcement.

- These responses will supplement the control for the response and evoke it.

- There have been two recent studies in JABA with typically developing children that demonstrated the benefits of this analysis of the intraverbal as a response that is mediated by a problem solving repertoire. (Suatter, LeBlanc, Jay, Goldsmith & Carr, 2011; Kisamore, Carr, & LeBlanc, 2011)

- There is one recent study in TAVB, Mellor, et al. (2015)

- Over the last several years our clinic has developed a procedure based upon this analysis to teach advanced intraverbal behavior to children with autism.
Problem Solving

- Typical children asked to name categories of animals, vehicles and kitchen items and then sub-categories, e.g. zoo animals, land vehicles, kitchen appliances.
- Then taught verbal prompts in the form of rules to help evoke the responses when asked a question, e.g. “Name kitchen appliances”.
- Children did better when rules acted as problem solving strategy.
- Use of rules needed to be prompted by trainer for substantial effect.
- No generalization of rule use to novel circumstances.
Typical children taught to tact item and its category, e.g. vehicles, kitchen items and vehicles along with sub-categories.

Then asked to name the items in the categories and subcategories

The children were taught to name the items by showing them pictures of the places they are usually seen and the experimenter demonstrated a visual imagery method for responding.

The method included a power point presentation in which the items appear as they are stated.

Visual imagery seemed to improve the responding of the children but required prompting by the experimenter for the children to use the problem solving procedure.
Tacts to Intraverbal Transfer and Auditory Imagining

1. Four typically developing children were tested for the developmental of intraverbal behavior and categorization after tact training of sounds of animals.

2. Children were required to respond with the name of the animal or the sound based upon the test question.

3. Limited development of intraverbal behavior and categorization was found.

4. Prompting the participants to talk to themselves about the sounds to evoke perceptual hearing appeared to have some benefit.

5. Measures of lip movements and echoic responding seem to reduce the certainty that perceptual hearing was involved in successful responding.
ADVANCED INTRAVERBALS
ANSWERING “WH” QUESTIONS

- Our objective is to teach responses to “who,” “what,” “where,” “when,” “why,” “which,” “how,” and “can/do/does/will” questions.
- The way we go about teaching these skills is by using reinforcing videos or books.
- By using highly preferred videos or books, we relate the questions to typical life conversations, instead of teaching rote answers to questions.
- When using the video, we develop several questions across all the “wh” question forms.
- The questions are specific and related to the theme of the movie.
- Some tacting questions that will specifically relate to novel questions are also included.
- In addition, the non-verbal stimuli within the video are used to prompt the responses to the questions. The nonverbal stimuli serve as prompts because the child has already mastered these responses (e.g., colors, locations, prepositions) as tacts. This way, the learner produces his or her own responses without an instructor’s echoic prompt.
• Sometimes, just using the non-verbal stimulus (tact) may not be enough to evoke the response.
• In this case, we use thematic prompts.
• Skinner defined a thematic prompt as “a supplemental source of strength in the form of a tact or intraverbal response. It is better known as a ‘hint.’”
• Thematic prompts are best described as prompting around the answer but not actually giving the learner the answer, sometimes referred to as a “hint.” Example:
  • The question may be, “Why can’t the man open the locked door?”
  • The thematic prompt may involve asking, “What do you need to use when a door is locked?”
  • The response would be, “A key.”
  • The next thematic prompt might be, “And does the man have a key?”
  • The response would be, “No.”
  • You can then say, “Right,” and re-present the question, “So, why can’t the man open the locked door?”
  • The response would be, “Because he doesn’t have a key.”

• This is the beginning of using problem solving skills.
• This program requires preparation. The instructor needs to watch the video and develop questions based upon a segment of the video.
• In addition, it is important to be familiar with the points in the video at which you will rely on the non-verbal stimulus to evoke the response and to prepare potential thematic prompts to be used in the event that the learner errors.
ADVANCED INTRAVERBAL PROTOCOL

• Preparing the Lesson
  1. Select a preferred video segment to watch with the student. The video acts as a “conversation piece.”
  2. Prepare a list of questions to ask the student, ensuring that the student is fluent in the components of the responses as tacts.
  3. Be sure to include a variety of “wh” questions (i.e., “who,” “what,” “when,” “where,” “why,” “which,” “how,” and “can/do/does/will”).
  4. Questions should be asked approximately every 15 seconds.
ADVANCED INTRAVERBAL PROTOCOL

- Questions With Video
  1. Pause the video to ask the student a question.
  2. If the student answers correctly, continue with the video. Use additional reinforcers as necessary based on the individual student.
  3. If the student answers incorrectly, provide thematic prompts until the original question is answered correctly.
  4. Record correct (+) and incorrect answers (-).

- Questions Without Video
  1. Re-present the same questions after a time delay (duration of which depends on the learner) without the video.
  2. If the student answers correctly, reinforce according to his or her established reinforcement schedule.
  3. If the student answers incorrectly, provide thematic prompts until the original question is answered correctly.
  4. If repeated attempts at thematic prompting are unsuccessful, return to the nonverbal stimulus (i.e., the appropriate segment of the movie).
  5. Record correct (+) and incorrect answers (-).
• **Novel Questions**
  1. Ask the student 7-8 novel questions about the same video segment later in the session or the next day.
  2. If the student answers correctly, reinforce according to established reinforcement schedule.
  3. If the student answers incorrectly, provide thematic prompts until the original question is answered correctly.
  4. If repeated attempts at thematic prompting are unsuccessful, return to the nonverbal stimulus (i.e., the appropriate segment of the movie).
  5. Record correct (+) and incorrect answers (-).

29. Adv. IV VIDEO

• **Graphing**
  1. Graph percentage of correct versus incorrect responses for each “wh” question for with and without the video questions.
  2. Graph percentage of novel questions answered correctly.
TAKEAWAY POINT # 7 Teach a problem-solving repertoire that covertly mediates the response. This insures that intraverbal responses will not be rote and will be acquires through daily “experiences” without specific instruction much the way typical children learn these responses.
Final Notes


- The authors showed that as the verbal stimulus became more complex, e.g. “Name some animals” vs “Name some farm animals,” that all children made errors in their responses.

- The authors suggest that this is a problem related to the compound effect (additive) of verbal conditional discriminations with more complex verbal stimuli.

- They conclude that at least part of the solution to this problem is related to insuring that pre-requisite skills related to taction and listener behavior are well established before teaching an intraverbal repertoire.

- This study suggests some of the difficulties in teaching this repertoire.

Summary for Practitioners

1. Don’t teach the intraverbal repertoire too early or you may develop rote and restricted responding.

2. Begin teaching this repertoire after responding across listener, tact, early intraverbal responding, linguistic structure and social responding conforms to at least a 2.5 year typical child’s repertoire.

3. Teach rote intraverbals at first to “prime” the repertoire.

4. Consider the role of the development of the conditional discrimination and the additive effects of the components of the verbal stimulus on the intraverbal response.

5. After developing the initial intraverbal repertoire consider the role of problem-solving (Sautter et. al, 2011) and visual imagery (Kisamore et al., 2011 in the development of more complex intraverbal responding.
5. Consider lag schedules to produce divergent stimulus control, e.g. Tell me another African animal, and only reinforce novel responses.

6. Teach differential observing responses, i.e., teach to repeat part of the question in the answer, e.g., A hot food you eat at breakfast is oat meal. (Kisamore, 2013)

7. Teach in discrimination verbal stimuli with similar elements, e.g., what do you sweep and what do you sweep with? Einarsson, et al. (in preparation)

8. Extensive tact training may lead to some intraverbal responding.

9. Listenter by feature, function and class may only produce intraverbal when the tact is emitted simultaneously with the selection responses.

10. MET of intraverbals may produce some intraverbals but teaching either divergent or convergent stimulus control does not seem to produce the other. (Pettursdottir, 2008)


REFERENCES


