

# **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).

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- 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).

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## 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 reconstriving 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.

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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)

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- 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](#)

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### 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.

EVOKES

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.

EVOKES

Diego to say, "WHERE?"

Reinforcer: Kim says, "Over at the other table."

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### **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.

#### EVOKES

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.

#### EVOKES

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

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### **Manding Which?**

Kim says "On the shelf."  
There are several shelves.

#### ESTABLISHES

Information regarding a specific shelf as a reinforcer.

#### EVOKES

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.

#### EVOKES

Diego to say, "WHERE ARE THE EYES?"  
Reinforcer: Kim says, "I don't know but I know someone who does."

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### **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."

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### **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."

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## 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](#)

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## Sample Lesson Plan

Contrived MO (MOTIVATION)	What Now Becomes a Reinforcer?	What should you teach the learner to say?	Teacher's Response	Data Recording of Prompted and Unprompted
Guess what?	Info about what they are going to do	<u>What?</u>	I want to play with something...	Prompted Spontaneous Novel
I want to play with something...	Info about what Jimmy wants to play with	<u>What</u> do you want to play with?	I want to play with the trains	Prompted Spontaneous Novel
(Goes to the trains) Not right now though...	Info about when Tyler can play with the trains	<u>When?</u>	After you give me a high five	Prompted Spontaneous Novel
We've got to turn it on...	Info about how to turn it on	<u>How</u> do we turn it on?	We have to press that button	Prompted Spontaneous Novel
(Button doesn't work) I don't know how to turn it on, but I know someone who does	Info about who knows how to turn on the trains	<u>Who?</u> (Knows how to turn on train)	Danielle	Prompted Spontaneous Novel
Danielle knows how to turn it on	Info from Danielle about how to turn on the trains	<u>How</u> do we turn it on?	You press the lever	Prompted Spontaneous Novel

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## Sample Lesson Plan

Contrived MO (MOTIVATION)	What Now Becomes a Reinforcer?	What should you teach the learner to say?	Teacher's Response	Data Recording of Prompted and Unprompted
Accidentally turn the train off	Info about why Jimmy turned the train off	<u>Why</u> did you do that?	It was an accident, but I want to play another game	Prompted Spontaneous Novel
I want to play another game...	Info about what game the teacher wants to play	<u>What</u> game?	Perfection	Prompted Spontaneous Novel
Lets go get Perfection	Info about where Perfection is	<u>Where's</u> Perfection?	I don't know where it is, but I know someone who knows	Prompted Spontaneous Novel
I know someone who knows where Perfection is	Info about who knows where Perfection is	<u>Who?</u> (Knows where Perfection is)	Kelly	Prompted Spontaneous Novel
Kelly knows where Perfection is	Info about where Perfection is	<u>Where's</u> Perfection?	In the teacher's room	Prompted Spontaneous Novel

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## Sample Lesson Plan

Contrived MO (MOTIVATION)	What Now Becomes a Reinforcer?	What should you teach the learner to say?	Teacher's Response	Data Recording of Prompted and Unprompted
The closet is locked and the key is missing	Info about where the key is	<u>Where's</u> the key?	I don't know where it is, but I know someone who knows	Prompted Spontaneous Novel
I know someone who knows where the key is...	Info about who knows where the key is	<u>Who?</u>	Danielle	Prompted Spontaneous Novel
Danielle knows where the key is	Info about where the key is	<u>Where's</u> the key?	It is on top of the bookshelf	Prompted Spontaneous Novel
You need to open the door with one of the keys	Info about which key he should use	<u>Which</u> key?	This key	Prompted Spontaneous Novel
We're not going to play the game here	Info about where to play the game?	<u>Where</u> are we going to play?	At the table	Prompted Spontaneous Novel

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## 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:

Who?			What?		
Prompted	Spontaneous	Novel	Prompted	Spontaneous	Novel
<b>Novel Situations:</b>			<b>Novel Situations:</b>		



## 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.

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## 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?”

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?”

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## 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)

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## 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?”

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## 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?”

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## 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.

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## 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.”

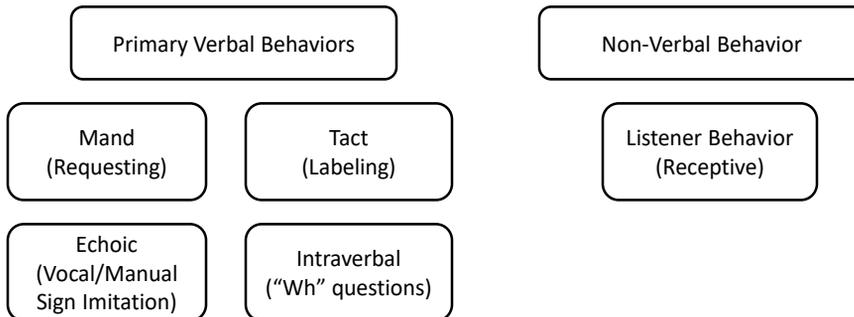
Prompt peer to put it down (reinforce peer for doing so) and teacher tells child, “Now you can have it.”

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## TEACHING INTRAVERBAL BEHAVIOR

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# Behavioral Classification of Language



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

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# 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).

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- 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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#### Examples of Intraverbal Responses

##### Verbal Stimulus

What's your name?  
 What's your favorite food?  
 Where do you live?  
 Something you cut with is a  
 What did you eat for Breakfast?

##### Verbal Response (Intraverbal)

Vince  
 Pizza  
 New York  
 Knife  
 Pancakes

I sure am hungry.  
 The party was great.  
 Most people like the food here.

I guess it's time to eat.  
 It was really nice to see everyone.  
 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](#)

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### 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?"

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- 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.



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.

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## “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.”p82

“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)

#### CHES -- 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.

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**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.**

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- 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

INTRAVERBAL		TOTAL SCORE:												
		<table border="1" style="float: right; border-collapse: collapse;"> <thead> <tr> <th colspan="4">Assessment</th> </tr> <tr> <th>1st</th> <th>2nd</th> <th>3rd</th> <th>4th</th> </tr> </thead> <tbody> <tr> <td style="width: 20px; height: 20px;"></td> </tr> </tbody> </table>	Assessment				1st	2nd	3rd	4th				
Assessment														
1st	2nd	3rd	4th											
<p><b>Does the child verbally respond to the content of the words of others?</b></p>														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>1st</th> <th>2nd</th> <th>3rd</th> <th>4th</th> </tr> <tr> <td style="width: 20px; height: 20px;"></td> </tr> </table>	1st	2nd	3rd	4th					<p>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) <b>(T)</b></p>					
1st	2nd	3rd	4th											
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>1st</th> <th>2nd</th> <th>3rd</th> <th>4th</th> </tr> <tr> <td style="width: 20px; height: 20px;"></td> </tr> </table>	1st	2nd	3rd	4th					<p>7. Provides first name when asked, What is your name? <b>(T)</b></p>					
1st	2nd	3rd	4th											
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>1st</th> <th>2nd</th> <th>3rd</th> <th>4th</th> </tr> <tr> <td style="width: 20px; height: 20px;"></td> </tr> </table>	1st	2nd	3rd	4th					<p>8. Completes 25 different fill-in-the-blank phrases (not including songs) (e.g., You eat... You sleep in a... Shoes and...) <b>(T)</b></p>					
1st	2nd	3rd	4th											
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>1st</th> <th>2nd</th> <th>3rd</th> <th>4th</th> </tr> <tr> <td style="width: 20px; height: 20px;"></td> </tr> </table>	1st	2nd	3rd	4th					<p>9. Answers 25 different what questions (e.g., What do you like to eat?) <b>(T)</b></p>					
1st	2nd	3rd	4th											
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>1st</th> <th>2nd</th> <th>3rd</th> <th>4th</th> </tr> <tr> <td style="width: 20px; height: 20px;"></td> </tr> </table>	1st	2nd	3rd	4th					<p>10. Answers 25 different who or where questions (e.g., Whose your friend? Where is your pillow?) <b>(T)</b></p>					
1st	2nd	3rd	4th											
<p>Comments/notes:</p>														

INTRAVERBAL		30-48 Months		ASSESSMENT			
				1ST	2ND	3RD	4TH
TOTAL SCORE:							
<b>Does the child verbally respond to the content of the words of others?</b>							
1ST	2ND	3RD	4TH	11. Spontaneously emits 20 intraverbal comments (can be part mand) (e.g., Dad says, I'm going to the car, and the child spontaneously says, I want to go for a ride!) (O)			
1ST	2ND	3RD	4TH	12. Demonstrates 300 different intraverbal responses, tested or obtained from an accumulated list of known intraverbals (T)			
1ST	2ND	3RD	4TH	13. Answers 2 questions after being read short passages (15+ words) from books, for 25 passages (e.g., Who blew the house down?) (T)			
1ST	2ND	3RD	4TH	14. Describes 25 different events, videos, stories, etc. with 8+ words (e.g., Tell me what happened... The big monster scared everybody and they all ran into the house.) (E)			
1ST	2ND	3RD	4TH	15. Answers 4 different rotating WH questions about a single topic for 10 topics (e.g., Who takes you to school? Where do you go to school? What do you take to school?) (T)			
Comments/notes:							

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### 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 prerequisite 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.**

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### 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.

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## 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<sup>D</sup>). 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<sup>D</sup>s. 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<sup>D</sup>s 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

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

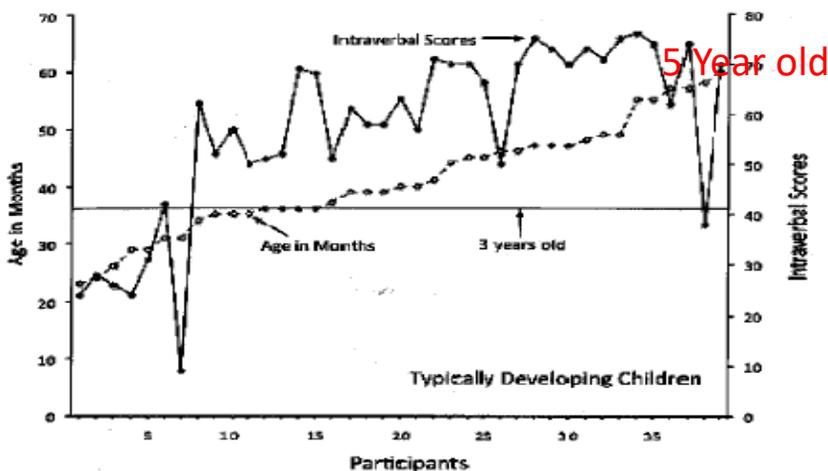


Figure 1. The age in months is presented on the left y axis and the scores on the intraverbal subtest is presented on the right y axis for typically developing children. A line is provided at three-years-of-age to provide a frame of reference.

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 2  
Samples of the Errors Made By Typically Developing Children and Children With Autism  
Whose Total Scores Were in the Same Bracket

Assessment total score	Intraverbal question	Typically developing child	Child with autism
20-29	What can fly?	"All gone shirt"	"Water"
	What can you sing?	"Yes"	No response
	What's outside?	"Outside"	"Outside"
30-39	What are some colors?	"1, 2, 3"	"Coloring"
	Why do you use a Band-Aid?	"On my finger"	"Happens"
	Where do you take a bath?	"Mommy and daddy"	"With toys"
40-49	What grows outside?	"Sand"	"Playground"
	What shape are wheels?	"Triangle"	"Cars"
	What do you wear on your head?	"A ear"	"Boo boo"
50-59	What do you eat with?	"Cheese"	"Pizza"
	What color are wheels?	"Circle"	"Red"
	Name some clothing.	"Clothing"	"Clothing"
60-69	What's in a balloon?	"It pops"	"String"
	What makes you sad?	"Cry"	"Cry"
	What grows on your head?	"A plant"	"Hats"
70-79	What day comes before Tuesday?	"Wednesday"	"Wednesday"
	What's your last name?	Gave full name	Gave full name
	What number is between 6 and 8?	"9"	"9"

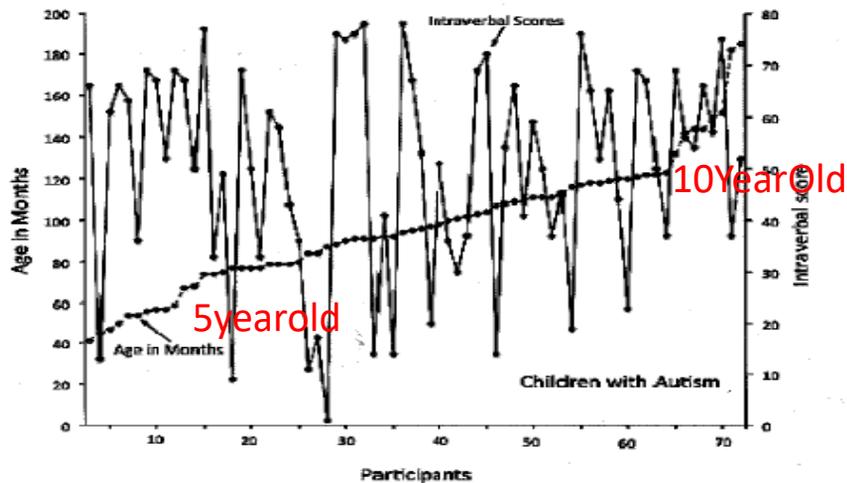


Figure 2. The age in months is presented on the left y axis and the scores on the intraverbal subtest is presented on the right y axis for children with autism.

### TYPICAL DEVELOPMENT OF INTRAVERBAL RESPONDING

N=	Age and range	IV scores	Error Analysis and Comments
3	2-year-olds Range = 23-27 months old	Mean= 26 Range= 24-28	<ul style="list-style-type: none"> <li>• Some simple intraverbal behavior, but no VC<sup>D</sup>.</li> <li>• Can do song fill-ins, reinforcing intraverbals (part maund), some associations, animal and object sounds, common fill-ins</li> <li>• Limited answers to WH questions (e.g., provides first name, or one word intraverbal answers)</li> <li>• Frequent echoic responding, pointing, or not responding</li> </ul>
4	2½-year-olds Range = 29-31 months old	Mean= 26.5 Range= 9-42	<ul style="list-style-type: none"> <li>• Some simple intraverbal behavior, getting some easy WH questions</li> <li>• Frequent echoic responding, or "What?" "Yeah!" "Things!" "Huh?"</li> <li>• When some intraverbal control was demonstrated it was often a simple intraverbal relation, minimal VC<sup>D</sup>s, the last, or prominent word was usually the source of stimulus control, for example...</li> <li>• "What do you smell with?" ... "Peopies"</li> <li>• "What grows on your head?" ... "Shoulders"</li> <li>• "What helps a flower grow?" ... "Up"</li> </ul>
9	3-year-olds Range = 34-38 months old	Mean= 58 Range= 50-69	<ul style="list-style-type: none"> <li>• Well established basic intraverbal repertoire, 1000s of intraverbal relations</li> <li>• But VC<sup>D</sup> errors were prevalent, for example...</li> <li>• "What grows on your head?" ... "Plants"</li> <li>• Many "WH" questions caused problems, for example...</li> <li>• "Where do you eat?" ... "Food"</li> <li>• Rote responses were evident, for example...</li> <li>• "What day is today?" ... "Rainy" (it was sunny)</li> <li>• Problems with prepositions and adjectives in VC<sup>D</sup>s, for example...</li> <li>• "What's under a house?" ... "roof"</li> <li>• Trouble with negation and personal information</li> <li>• "What's something you can't wear?" ... "Shirt"</li> <li>• "What is your last name?" ... "Noah," "Gabriella," "Sofia," "Neil"</li> </ul>
7	3½-year-olds Range = 39-44 months old	Mean= 62.9 Range= 57-71	<ul style="list-style-type: none"> <li>• Strong intraverbal repertoire, but VC<sup>D</sup> errors were still common, for example...</li> <li>• "What grows on your head?" ... "Hat"</li> <li>• "Name some clothing" ... "For the body"</li> <li>• "When do we set the table?" ... "After dinner"</li> <li>• Negation still a major problem</li> <li>• Still having problems with prepositions, adjectives, adverbs in VC<sup>D</sup>s</li> <li>• Still having problems with time concepts</li> <li>• Still emitting echoic responses when no intraverbal occurred</li> </ul>

N=	Age and range	IV scores	Comments and Error Analysis
10	4-year-olds Range = 45-49 months old	Mean= 69.7 Range= 50-75	<ul style="list-style-type: none"> <li>• Very strong intraverbal behavior VC<sup>D</sup> errors were still common, for example...</li> <li>• "What do you smell with?"... "A skunk"</li> <li>• But VC<sup>D</sup>s are clearly getting stronger, for example...</li> <li>• "What's above a house?"... "An airplane, and stuff that's on the roof"</li> <li>• Negation, time concepts, prepositions, and adjectives in a VC<sup>D</sup>s continued to be a problem for many children</li> <li>• Specific words and concepts like "different," "between," "take," "how," &amp; "why" caused problems</li> </ul>
6	5-year-olds Range = 55-60 months old	Mean= 65.7 Range= 38-76	<ul style="list-style-type: none"> <li>• Children at this age are generally more successful with VC<sup>D</sup>s, for example...</li> <li>• "What's in a balloon?" ... "Helium," "Air"</li> <li>• However, they still have problems with negation, time concepts, and prepositions</li> <li>• Many 5-year-old children missed "What day is today?" "What day is before Tuesday?" "What's your last name?" "How is a car different from a bike?" "What number is between 6 and 8?"</li> </ul>

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### 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.

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## On Intraverbal Control and the Definition of the Intraverbal

David C. Palmer<sup>1</sup>

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** Autoclitic frames · Grammar · Intraverbal · Intraverbal control · Skinner · Verbal behavior · Verbal operants

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## Verbal Stimulus Control and the Intraverbal Relation

Mark L. Sundberg<sup>1</sup>

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

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## **Intraverbal Behavior and Verbal Conditional Discriminations in Typically Developing Children and Children With Autism**

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

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*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.

*Key words:* 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. DeSouza<sup>1</sup> · Jessica S. Akers<sup>2</sup> · Wayne W. Fisher<sup>3</sup>

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**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

## Empirical Investigations of the Intraverbal: 2005–2015

Angelica A. Aguirre<sup>1</sup> · Amber L. Valentino<sup>1</sup> ·  
Linda A. LeBlanc<sup>1</sup>

Published online: 1 November 2016  
© Association for Behavior Analysis International 2016

**Abstract** Several papers have reviewed the literature based on Skinner's conceptual framework presented in his 1957 book, *Verbal Behavior*. These reviews have called for more research on the topic of verbal behavior generally and often for more research on particular verbal operants. For example, Sautter and LeBlanc (2006) urged the behavior-analytic community to conduct more research on the intraverbal because of the scant existing literature base at that time. In the current review, we replicate the procedures used by Sautter and LeBlanc focusing specifically on the intraverbal relation and on the literature published in the 10 years since their call for research. We summarize the publication themes, provide graphs of the trends and types of published articles, and offer ideas for future research specific to the intraverbal.

**Keywords** Intraverbal · Quantitative review · Skinner · Verbal behavior

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**TAKE AWAY POINT # 3:** Intraverbal behavior develops through increasing complexity of antecedent stimulus control.

### CONTROLLING WORDS

	<u>Antecedent</u>		<u>Response</u>
Simple--	1 Word		
	“Eat”	=	“Burger”
Complex--	2 Words		
	“Eat for Breakfast”	=	“Cereal”
Complex--	3 Words		
	“Eat for Breakfast Hot”	=	“Pancakes”

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## 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

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## 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).

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- 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.

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Type of discrimination	Definition	Example
 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 <sup>D</sup> s that each independently evoke behaviors, but when they both occur in the same antecedent configuration, a different S <sup>D</sup> 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 "soap" 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.

Sundberg, 2016

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

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## 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.

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### Simple Discriminations:

Antecedent  
(SD + MO)

Response

Consequence

Verbal or Nonverbal Stimulus → Response → Reinforcer

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](#)

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## 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.

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The Analysis of Verbal Behavior

2011, 27, 75-93

### **Further Evaluation of Prompting Tactics for Establishing Intraverbal Responding in Children With Autism**

**Einar T. Ingvarsson,  
University of North Texas, Child Study Center, Fort Worth  
Duy D. Le, Child Study Center, Fort Worth**

We compared prompting tactics to establish intraverbal responding (question answering) in four boys with autism. Based on the results of intraverbal, textual, echoic, and tact pretests, we compared vocal and picture prompts with three participants, and textual, vocal, and picture prompts with one participant. We also evaluated repeated acquisition with different question sets, and included a concurrent-chains arrangement, in which initial link selections determined which prompting procedure occurred in the terminal link. All the prompting procedures were effective in establishing intraverbal responding, but vocal prompts resulted in the fewest trials to criterion for all four participants during the initial prompt comparison. However, the results were less consistent for the second comparison. The concurrent chains arrangement revealed a clear preference for picture prompts for one participant, but the results for the others were inconclusive.

*Key words:* autism, concurrent-chains assessment, intraverbal training, prompting procedures, transfer of stimulus control, verbal behavior

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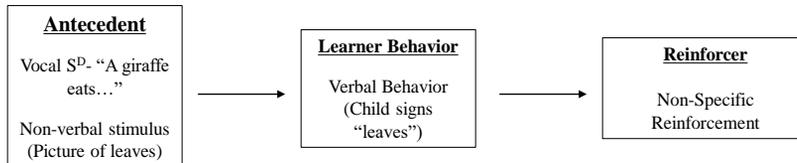
**All Prompting Procedures Worked- Echoics Most Effective**

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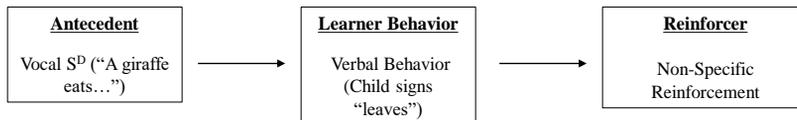
## DIAGRAM FOR TACT TO INTRAVERBAL TRANSFER

- Teach using a tact to intraverbal stimulus control transfer procedure
- Transfer of stimulus control from the non-verbal stimulus to the vocal S<sup>D</sup>

Prompt:



Transfer of stimulus control:



[9. Video – IFFC Step 1 Teaching Procedure](#)

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## 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](#)

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## 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.

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## 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

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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)

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- 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.

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EARLY INTRAVERBAL VIDEOS

- [16. Max early intraverbals](#)
- [11. Video – Katy early IVs during DTI](#)
- [17. Vincent Intraverbals](#)
- [Video – Intraverbal 4 3 - - BOBBY](#)
- [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- VC<sup>D</sup> With Pics And Intraverbal/Story](#)
- [Britt Early intraverbals](#)
- [15. Ian with Jean Marie](#)

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**III**  
**Multiple Control:  
Convergent and Divergent  
Stimulus Control**

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## The Multiple Control of Verbal Behavior

Jack Michael, Western Michigan University

David C. Palmer, Smith College

Mark L. Sundberg, Sundberg and Associates

Amid the novel terms and original analyses in Skinner's *Verbal Behavior*, the importance of his discussion of multiple control is easily missed, but multiple control of verbal responses is the rule rather than the exception. In this paper we summarize and illustrate Skinner's analysis of multiple control and introduce the terms *convergent multiple control* and *divergent multiple control*. We point out some implications for applied work and discuss examples of the role of multiple control in humor, poetry, problem solving, and recall. Joint control and conditional discrimination are discussed as special cases of multiple control. We suggest that multiple control is a useful analytic tool for interpreting virtually all complex behavior, and we consider the concepts of derived relations and naming as cases in point.

*Key words:* B. F. Skinner, joint control, mediating behavior, multiple causation, multiple control, naming, verbal behavior

- 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).

## Intraverbal Training for Individuals with Autism: The Current Status of Multiple Control

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Kenzie Gatewood<sup>1</sup>

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© Association for Behavior Analysis International 2017

**Abstract** Teaching complex intraverbal responding to children with autism spectrum disorder (ASD) can be challenging and often requires careful programming. Divergent and convergent multiple control are particularly important elements to incorporate into intraverbal training programs, as well as procedures to ensure responding is under control of both discriminative and conditional vocal verbal stimuli. The current study systematically reviewed research articles on intraverbal training methods for individuals with ASD published and available from 2005 to 2016. The purpose of the review was to assess the extent to which divergent and convergent control was incorporated into training and to determine whether systematic instruction ensured correct verbal conditional discriminations. Thirty-six studies met inclusion criteria and were included in this reviewed. A total of 5 studies taught intraverbal responding under divergent control and 21 taught responding under convergent control. Two studies sufficiently described procedures to ensure accurate verbal conditional discriminations across trials. The results highlight the need for additional research on systematic teaching procedures for complex intraverbal repertoires.

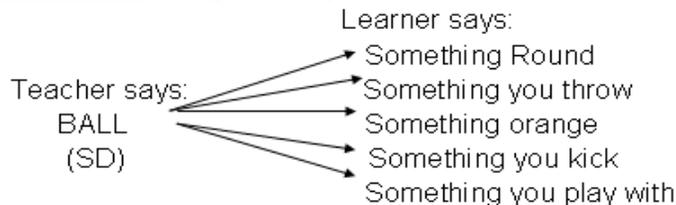
**Keywords** Autism spectrum disorder · Intraverbal · Divergent control · Convergent control

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### Convergent Multiple Stimulus Control



### RESPONSES Divergent Multiple Stimulus Control



### [18. Stimulus and Response Generalization](#)

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[Connor & JL](#)

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## 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.

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## 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<sup>D</sup>s) for each known tact that you will teach. Choose S<sup>D</sup>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”

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- When creating targets, remember that each word in the verbal S<sup>D</sup> 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<sup>D</sup> in a natural way; do not select awkward S<sup>D</sup>s just to force multiple responses.

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## INTRAVERBAL WEBBING: TEACHING THE 1<sup>ST</sup> 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.

84

INTRAVERBAL WEBBING ERRORLESS TEACHING PROCEDURES FOR 1<sup>ST</sup>  
MEMBER OF THE RESPONSE CLASS: 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.

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INTRAVERBAL WEBBING:  
TEACHING 1<sup>ST</sup> 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"

Run 1-5 distracters

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

**Learner:** Signs (or says) "lion"

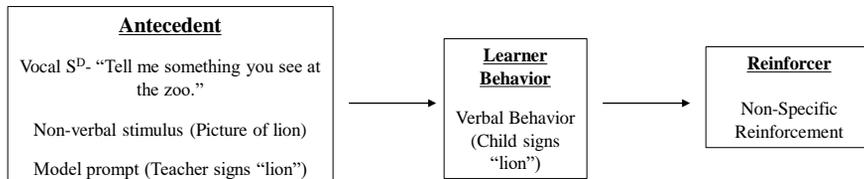
**Teacher:** "Nice job" while turning on the TV

86

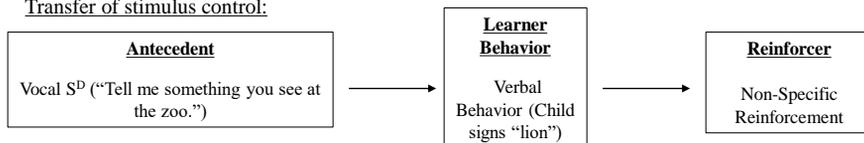
DIAGRAM FOR INTRAVERBAL WEBBING:  
TEACHING 1<sup>ST</sup> MEMBER OF RESPONSE CLASS EXAMPLE

- 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<sup>D</sup>

Prompt:



Transfer of stimulus control:



[19. IV Webbing: 1st Response](#)

87

DEFINING INCORRECT RESPONSES AND ERROR CORRECTION PROCEDURE FOR  
INTRAVERBAL WEBBING TEACHING 1<sup>ST</sup> 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.

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INTRAVERBAL WEBBING:  
TEACHING ADDITIONAL MEMBERS OF THE RESPONSE CLASS

- Present the learner with the  $S^D$  and allow the learner to fill-in previously mastered response(s). (Example: "Tell me a vehicle" learner says "car.")
- Repeat the  $S^D$  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).

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INTRAVERBAL WEBBING: TEACHING THE 2<sup>ND</sup>  
MEMBER OF THE RESPONSE CLASS

1st response: "apple" = previously mastered

2<sup>nd</sup> 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.

[20. Intraverbal webbing: 2nd 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

**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.

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**INTRAVERBAL WEBBING:  
TEACHING THE 3<sup>rd</sup> MEMBER OF THE RESPONSE CLASS**

1st & 2<sup>nd</sup> responses: "apple and "cookie" = previously mastered

3<sup>rd</sup> response.: "banana" = target response

**PROMPT:**

**Teacher:** "Tell me something you eat."

**Learner:** "Apple"

**Teaching:** "Tell me something else you eat."

[21. IV Webbing: 3rd Response](#)

**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.

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**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 4<sup>th</sup> and 5<sup>th</sup> 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.

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### 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.

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### 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).

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## INTRAVERBAL WEBBING: ERROR CORRECTION EXAMPLE

1<sup>st</sup> – 4<sup>th</sup> responses: “pants, hat, underwear, socks” = previously mastered

5<sup>th</sup> responses: “shirt” = current target

### PROBE:

**Teacher:** “Tell me something you wear.”

[24. Video-Webbing Error Correction](#)

**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 5<sup>th</sup> 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)

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## 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.

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## 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.

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FFC Summary Sheet				
<hr/> <hr/> <hr/> <hr/> <hr/>				
<hr/> <hr/> <hr/> <hr/> <hr/>				
<hr/> <hr/> <hr/> <hr/> <hr/>				

98

<b>Dog</b> #7 pet #8 #10 tail #9 #10 legs #9 #12 animal #11	<b>Ball</b> #7 play with #8 #10 round #9 #12 toy #11	<b>Juice</b> #7 drink #8 #10 pour #12 drink #11	<b>Fish</b> #7 pet #8 #10 tail #10 fins #9 #12 animal #11	<b>Chip</b> #7 eat #8 #10 crunchy #9 #12 food #11
<b>Shoes</b> #7 wear #8 #10 laces #9 #12 clothing #11	<b>Car</b> #7 drive #8 #10 windows #9 #10 door #9 #10 wheels #9 #10 trunk #9 #12 vehicle #11	<b>Soda</b> #7 drink #8 #10 pour #9 #12 drink #11	<b>Puzzle</b> #7 play with #8 #10 pieces #9 #12 toy #11	<b>Shirt</b> #7 wear #8 #10 sleeves #9 #12 clothing #11
<b>Popcorn</b> #7 eat #8 #10 crunchy #9 #12 food #11	<b>Cat</b> #7 pet #8 #10 tail #9 #10 legs #9 #12 animal #11	<b>TV</b> #7 watch movies #9 #10 screen #9 #10 buttons #9	<b>Horse</b> ride #10 tail #9 #10 legs #9 #10 lives on farm #9 #12 animal #11	<b>Cookie</b> #7 eat #8 #10 food #11

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<b>Bubbles</b> play with #8 pop #8 #10 blow toy #11	<b>Book</b> #7 read #8 #10 pages #9 #10 cover #9	<b>Bicycle</b> #7 ride #8 wheels #9 #10 pedals #9 handlebars #9 seat #9 toy #11	<b>French Fries</b> #7 eat #8 #12 food #11	<b>Potatohead</b> play with #8 #10 pieces #9 toy #11
<b>Water</b> pour #9 #12 drink #11	<b>Pants</b> #7 wear #8 clothing #11	<b>Bed</b> #7 sleep in #8 #10 pillow #9 blanket #9 furniture #11	<b>Train</b> #10 pieces on tracks #9 #10 wheels #9 #12 vehicle #11	<b>Chair</b> #7 sit in #8 legs seat back furniture #11
<b>Markers</b> #7 draw with #8 cap #9 point toy #11	<b>Noodles</b> #7 eat #8 food #11	<b>cake</b> eat #8 candles has pieces food #11	<b>Airplane</b> #7 flies in sky #8 ride #8 wheels wings windows tail vehicle #11	<b>Bird</b> flies in sky #8 wings beak legs animal

100

## FILL OUT THE CONCEPT SUMMARY SHEETS

- Review your FFC Summary Sheet and begin to group targets/S<sup>D</sup>s 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.

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Concept Summary Sheet

"Tell me a _____"	Learner says "_____"
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

"Tell me a _____"	Learner says "_____"
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

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THINGS THAT FLY

SP: Tell me something that flies.	Present S <sup>D</sup> below
Learner says...	Learner says "Flies"
1 Bird	A bird is something that
2 Airplane	An airplane is something that...
3 Helicopter	A helicopter is something that

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wear		drive	
H7	H8	H7	H8
"Tell me a"	"Learner says"	"Tell me a"	"Learner says"
1 shoes	shoes	1 car	car
2 shirt	shirt	2	
3 pants	pants	3	
4		4	
5		5	
6		6	
7		7	
8		8	

watch movies on		ride	
H7	H8	H7	H8
"Tell me a"	"Learner says"	"Tell me a"	"Learner says"
1 TV	TV	1 bicycle	bicycle
2		2	airplane
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	

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H10 Tail H9

"Tell me a"	Learner says"
1 dog	dog
2 fish	rat
3 cat	horse
4 horse	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

H10 Legs H9

"Tell me a"	Learner says"
1 dog	dog
2 car	rat
3 horse	horse
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

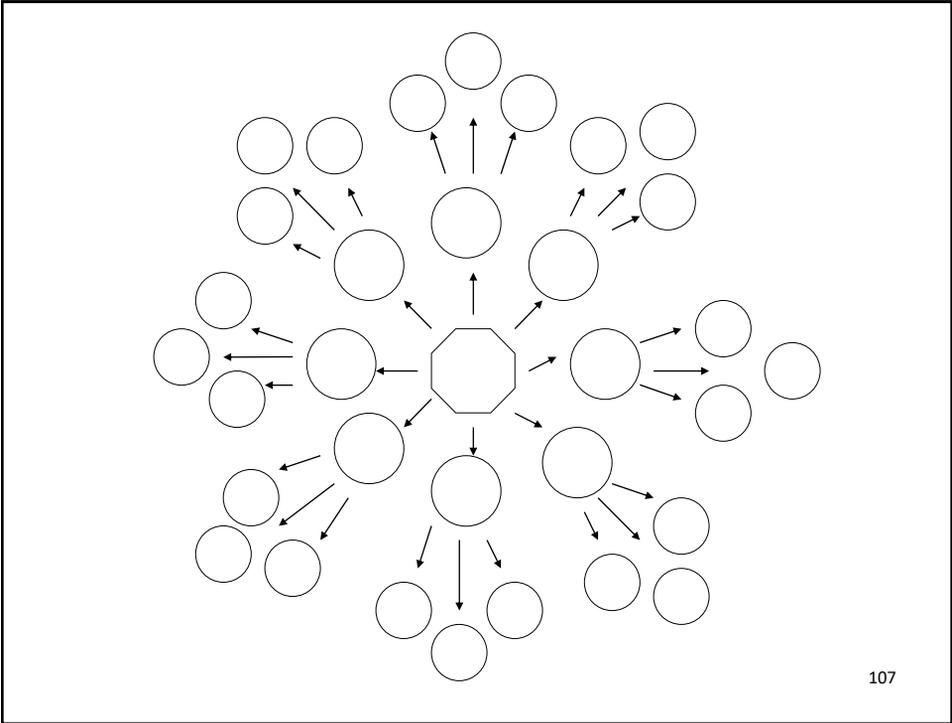
H10 features  
H9 feature reversals

105

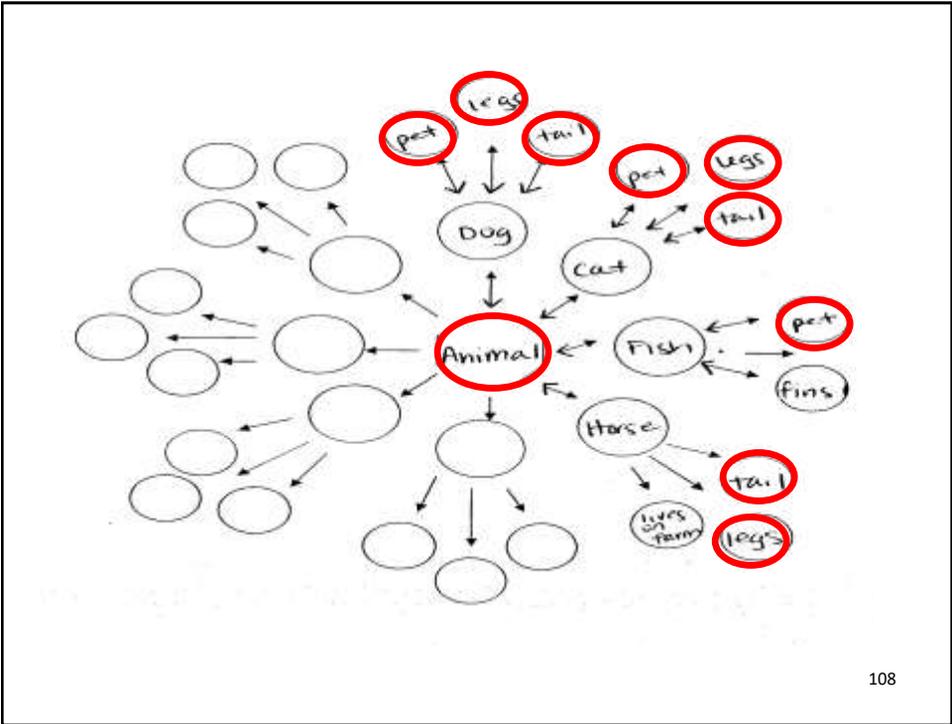
## FILL OUT THE CONCEPT MAPS

- 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.

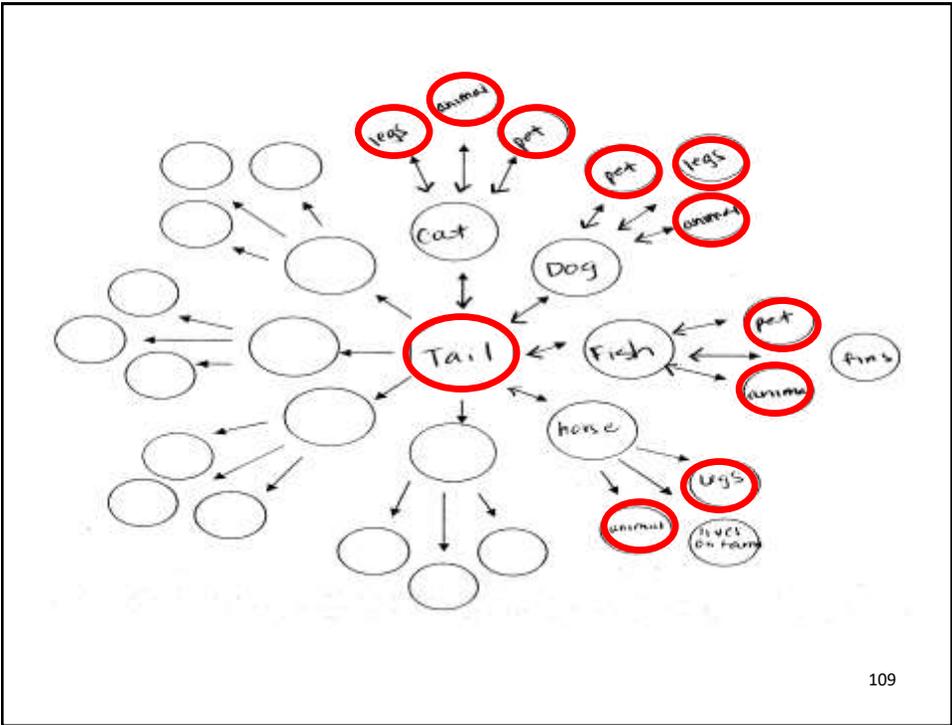
106



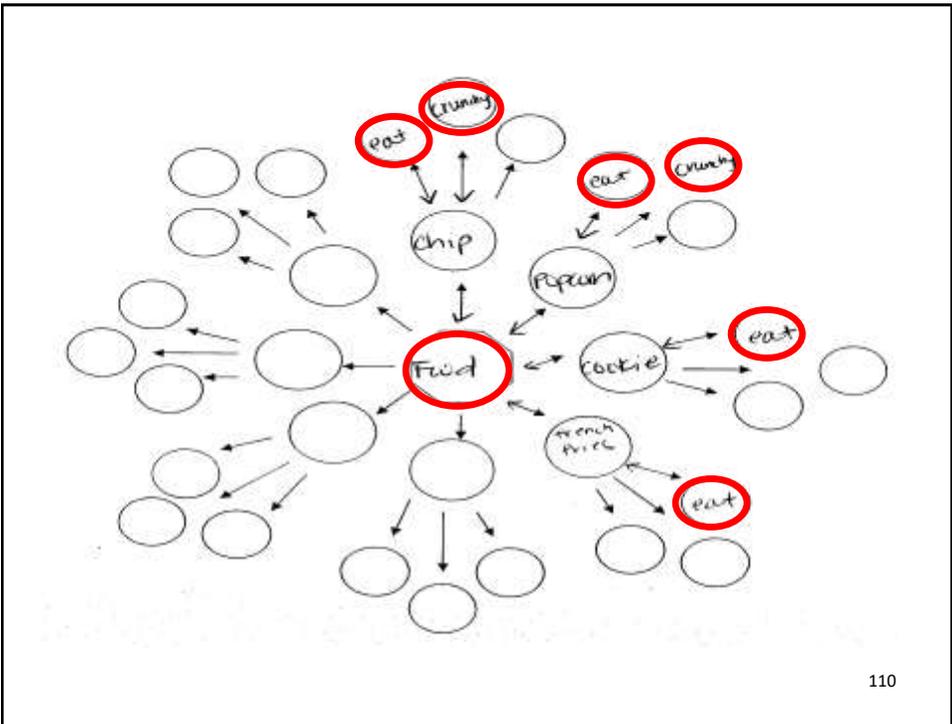
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## PRACTICE WEBBING ACROSS THE RELATED CONCEPT MAPS

- 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 <sup>D</sup> : “Tell me an animal”	R: “Dog”
S <sup>D</sup> : “And, how about another animal”	R: “Bird”
S <sup>D</sup> : “And one more animal”	R: “Cat”
S <sup>D</sup> : “And a cat has a...”	R: “Tail”
S <sup>D</sup> : “Right, and something with a tail is a...”	R: “Cat”
S <sup>D</sup> : “And a cat is an...”	R: “Animal”
S <sup>D</sup> : “So, tell me an animal”	R: “Dog”
S <sup>D</sup> : “And another animal...”	R: “Cat”
S <sup>D</sup> : “How about another animal”	R: “Bird”
S <sup>D</sup> : “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](#)

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**TAKE AWAY POINT # 4- Teach many rote intraverbal responses before attempting to develop a complex intraverbal repertoire.**

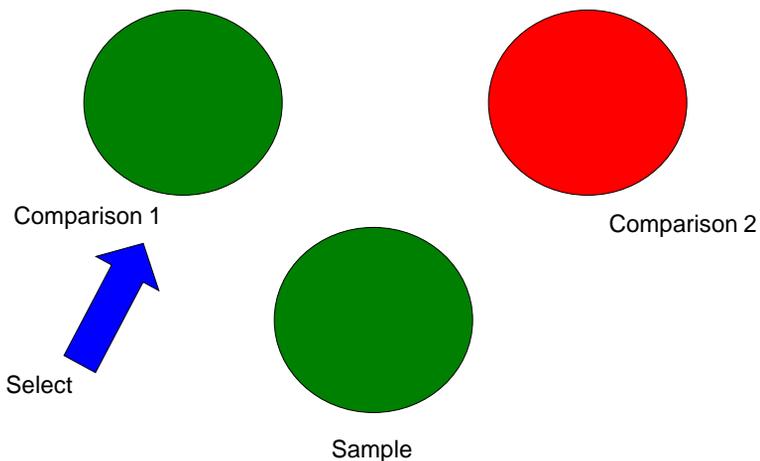
112

#### 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.

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#### Conditional Discrimination (MTS) Visual-Visual (non-arbitrary)



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## Conditional Discrimination (MTS) Auditory-Visual (arbitrary)



Shoe



Select

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Type of discrimination	Definition	Example
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 <sup>D</sup> s that each independently evoke behaviors, but when they both occur in the same antecedent configuration, a different S <sup>D</sup> function is generated <a href="#">Naryan</a>	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 "soap" 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.

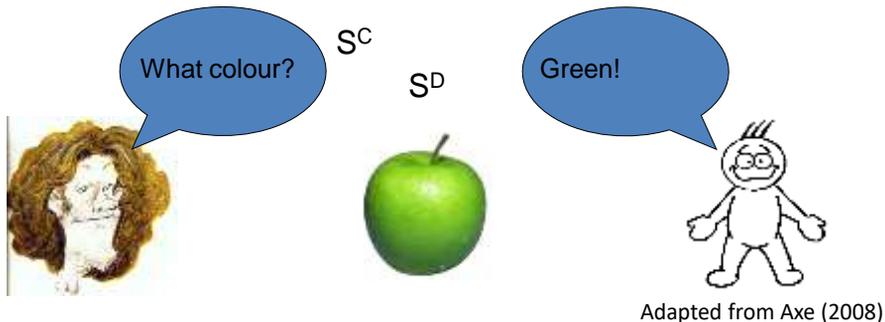
Sundberg, 2016

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

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## 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)



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## 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)*

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## 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)*

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## 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)*

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# 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.

[NEXT SLIDE #102](#)

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## Compound Verbal Discriminations

### Antecedent

Tell me some  
Red Fruits

### Response

List of Foods ( But only those  
That are both a fruit and  
red.

### Consequence

Reinforcer

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

Vehicle Flies in Sky----- “CAR” Simple

[Time & Order](#)

Vehicle Flies in Sky----- “BIRD” Simple

Tell me something that is not a food.

[Naryan ERROR](#)

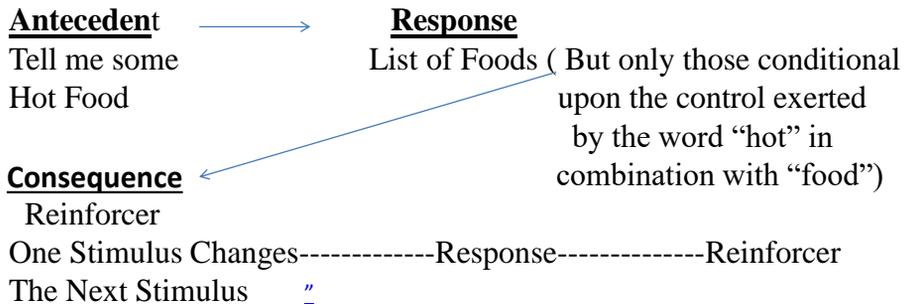
Vehicle Flies in Sky-----”Cloud” Simple

[More Errors Naryan](#)

Vehicle Flies in Sky-----”Airplane” Conditional

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## Verbal Conditional Discriminations



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" Intraverbal Errors **BRAVE**  
 Name a Vehicle that goes on **Road**-----"STREET"  
 Name a **Vehicle** that goes on **Road**-----"CAR" CONDITIONAL

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- 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 S<sup>D</sup> 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<sup>D</sup>).
- 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.

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Table 2  
*Sets of Questions From Three Studies*

Sundberg et al., 1990	Finkel & Williams, 2001	Jahr, 2001
1. What do you do to connect a three pronged plug into a two-pronged socket? (adapter)	1. What's your name?	1. What do you like to eat?
2. What do you use to clean the bottom of a deep jar? (bottle brush)	2. How old are you?	2. What do you like to drink?
3. What do you put food in to keep it fresh? (plastic bag)	3. When's your birthday?	3. What do you like to play with?
4. What do you use to pour oil into your car so you won't spill any? (funnel)	4. What do you like to eat?	4. Who do you like to play with?
5. What do you use to fix a hole in your radiator hose? (tape)	5. Where do you live?	5. Who do you live with?
	6. What's your telephone number?	6. Who do you sing with?
	7. What's your address?	7. Where do you buy a snack?
	8. What's your favorite movie?	8. Where do you play football?
	9. What's your mother's name?	9. Where do you swim?
	10. Where do you go to school?	10. Why do you wash your hands?
	11. What's your favorite color?	11. Why do you eat?
	12. How are you?	12. Why do you drink?

TAVB, 2008

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## Teaching Conditional Discriminations

- Once several facts 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](#)

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Developmentally When This Skill is Acquired in  
Typical Children

TACT		TACT		TOTAL SCORE:		Assessment					
1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
<b>Does the child emit a wide variety of tacts, and do they contain several different parts of speech?</b>											
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 shapes (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:											

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## Teaching Verbal Conditional Discriminations Advanced Tacting Skills

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

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**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](#)

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Connor  
Set 2  
Items: Purple paintbrush,  
Blue Bear, yellow dinosaur,  
Green sock, Pink balloon, red bowl

**Conditional Discrimination Data: Phase 1**

Name of item and colour within items -

Date: 2/4/15

Trials		1	2	3	4	5	6	7	8	9	10
Item 1	Paintbrush	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 2	Bear	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 3	Dinosaur	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 4	Sock	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 5	Balloon	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 6	Bowl	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+

120  
120 = 100%

Name of item and colour within items -

Date: 2/5/15

Trials		1	2	3	4	5	6	7	8	9	10
Item 1	Bowl	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 2	Sock	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 3	Paintbrush	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 4	Balloon	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 5	Bear	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+
Item 6	Dinosaur	+	+	+	+	+	+	+	+	+	+
	Colour	+	+	+	+	+	+	+	+	+	+

120  
120 = 100%

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## 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:**  $\geq 90\%$  correct across 2 days in order to move onto Phase 3.

### [8. VIDEO Phase 3 \(Novel Stimuli\)](#)

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Control  
Set 2  
Third Stage Introduction  
Final Goal: 90% correct  
Phase 2: 90% correct for 180 trials

Conditional Discrimination Data: Phase 2

Name of item and colour within item - Date: 1/1/15

Trial	Item	1	2	3	4	5	6	7	8	9	10
Item 1	Plasticine	Item	+	+	+	+	+	+	+	+	+
	Plasticine	Colour	+	+	+	+	+	+	+	+	+
Item 2	Spur	Item	+	+	+	+	+	+	+	+	+
	Spur	Colour	+	+	+	+	+	+	+	+	+
Item 3	Green	Item	+	+	+	+	+	+	+	+	+
	Green	Colour	+	+	+	+	+	+	+	+	+
Item 4	Green	Item	+	+	+	+	+	+	+	+	+
	Green	Colour	+	+	+	+	+	+	+	+	+
Item 5	Spur	Item	+	+	+	+	+	+	+	+	+
	Spur	Colour	+	+	+	+	+	+	+	+	+
Item 6	Spur	Item	+	+	+	+	+	+	+	+	+
	Spur	Colour	+	+	+	+	+	+	+	+	+

180

Name of item and colour within item - Date: 2/1/15

Trial	Item	1	2	3	4	5	6	7	8	9	10
Item 1	Spur	Item	+	+	+	+	+	+	+	+	+
	Spur	Colour	+	+	+	+	+	+	+	+	+
Item 2	Spur	Item	+	+	+	+	+	+	+	+	+
	Spur	Colour	+	+	+	+	+	+	+	+	+
Item 3	Plasticine	Item	+	+	+	+	+	+	+	+	+
	Plasticine	Colour	+	+	+	+	+	+	+	+	+
Item 4	Plasticine	Item	+	+	+	+	+	+	+	+	+
	Plasticine	Colour	+	+	+	+	+	+	+	+	+
Item 5	Spur	Item	+	+	+	+	+	+	+	+	+
	Spur	Colour	+	+	+	+	+	+	+	+	+
Item 6	Spur	Item	+	+	+	+	+	+	+	+	+
	Spur	Colour	+	+	+	+	+	+	+	+	+

180

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**Phase 3  
(novel stimuli)**

**Different Item-Different Questions & Same Item-Different Question**

**Step 1:** Gather 6 novel objects that are known facts.

**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:**  $\geq 90\%$  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](#)

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Connor

2/8/13

**Conditional Discrimination Data: Phase 3 Novel Responses**

Novel

Item	Colour	Colour	Item	Item	Item	Colour	Item	Colour	Colour
+	+	+	+	+	+	+	+	+	+
Item	Colour	Colour	Item	Item	Colour	Colour	Item	Colour	Item
+	+	+	+	+	+	+	+	+	+
Colour	Item	Item	Colour	Colour	Colour	Item	Item	Colour	Item
+	+	+	+	+	+	+	+	+	+

Items: Set one

- ① Pink Duck
- ② Blue Pencil
- ③ Yellow Duck
- ④ Purple grapes
- ⑤ Black Cat
- ⑥ Yellow Bus

$$\frac{30}{30} = 100\%$$

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Conditional Discrimination Data: Phase 3 Novel Responses

## Novel

+	+	+	+	+	+	+	+	+	+
Item	Colour	Colour	Item	Item	Item	Colour	Item	Colour	Colour
+	+	+	+	+	+	+	+	+	+
Item	Colour	Colour	Item	Item	Colour	Colour	Item	Colour	Item
+	+	+	+	+	+	+	+	+	+
Colour	Item	Item	Colour	Colour	Colour	Item	Item	Colour	Item
+	+	+	+	+	+	+	⊖	+	+

Items: Set Two

- ① Red Hammer
- ② yellow Feather
- ③ White Tissue
- ④ Blue Beads
- ⑤ orange camera
- ⑥ Green Marker

$$\frac{29}{30} = 97\%$$

**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, eg, 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).

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- 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)

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- 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.

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- 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.

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- 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.

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

[CONNOR – COLOR &Name](#)

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- Replicated for
  - “What animal is it?”
  - “What does it say?”
  - “What shape?”
  - “What function?”
- In each case, the procedure quickly leads to correct responding, whereas standard procedures often fail, take longer, or lead to extinction-induced disruptive behavior.
- This example is the least obvious of the procedures I have seen to date.

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## 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

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## 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)*

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## 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

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## 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

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**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.”

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### Emergent Intraverbal Forms may Occur as a Result of Listener Training for Children with Autism

Dean P. Smith<sup>1,2</sup> · Svein Eikeseth<sup>2</sup> · Sarah E. Fletcher<sup>1</sup> · Lisa Montebelli<sup>1</sup> · Holly R. Smith<sup>1</sup> · Jennifer C. Taylor<sup>1</sup>

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© Association for Behavior Analysis International 2016

**Abstract** The purpose of the present study was to assess whether intraverbal behavior, in the form of answers to questions, emerges as a result of listener training for five children diagnosed with autism. Listener responses were targeted and taught using prompting and differential reinforcement. Following successful acquisition of listener responses, the intraverbal form of the response was probed. Data were evaluated via a nonconcurrent multiple-baseline design that included a control series. Results showed listener-to-intraverbal transfer for four of the five participants. One participant required additional teaching that involved teaching the items selected during listener training.

**Keywords** Autism · Emergence · Intraverbal behavior · Listener training · Stimulus control

The target emergent intraverbal behavior was to answer questions, such as answering “tomato” when presented with the instruction, “What do you eat that is red?” Listener training consisted of teaching participants to select the object tomato when presented with the instruction, “What do you eat that is red?” Before entering the study, participants emitted the target in tact and echoic form, but not as an intraverbal. That is, participants correctly named the object tomato and said “tomato” when presented with the auditory stimulus, “tomato,” but did not say “tomato” in response to the verbal antecedent, “What do you eat that is red?”

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### 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](#)

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Teaching Method for Increasing  
Conditional Discriminations:  
OBSERVING RESPONSE  
(Kisamore, et al. 2013)

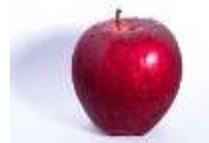
Observing response- Echo the verbal stimulus before making the response , e.g. “What is the opposite of cold?” The opposite of cold is HOT.

[Echo Verbal Stimulus](#)

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Teaching Method for Increasing  
Conditional Discriminations:  
RESPONDING TO MULTIPLE STIMULI

Instructor says: Which one is a red fruit?



[Rayan](#)  
[Rayan Compound Stimuli](#)

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## 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?”



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## 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](#)

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## Teaching Method for Increasing Conditional Discriminations: ACTION-OBJECT MATRIX TRAINING

CONDITIONAL DISCRIMINATION IN INTRAVERBAL OBJECTS 167

ACTIONS	Clam	Acorn	Ice	Ball	Cup	Plate	Clay	Screen	Football	Fork	Hammer	Block
Push												
Drop												
Blow on												
Hold out												
Point to												
Wave												
Tap												
Pound with												
Smell												
Elevate												
Turn												
Encircle												

*Figure 2. A 12 x 12 action-object matrix adapted from Striefel et al. (1978).*

[Ryan Action-Object](#)

AXE, 2008

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## 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 gree..."

	Red	Yellow	Green	White
Eat				
Drink				
Play with				
See at school				

[Matrix Intraverbals](#)

COMBINE THIS WITH SLIDE # 149

Pettursdottir, 2013

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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](#)

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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](#)

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Teaching Method for Increasing  
 Conditional Discriminations:  
 TEACH SAME LAST WORD WITH DIFFERENT  
 PRIOR WORDS  
 (Axe, 2008)

RAYAN

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Table 4  
*Sets of Verbal Stimuli Requiring Conditional Discriminations*

A	B	C
1. What do you write with?	1. What is a brown animal?	1. Kite and Bird
2. What do you eat with?	2. What is a green animal?	
3. What do you write on?	3. What is a brown food?	2. Dog and Bird
4. What do you eat on?	4. What is a green food?	
5. What do you eat that's red?	5. What is a red food?	3. Fork and Knife
6. What do you play with that's red?	6. What is a red drink?	
7. What do you eat that's round?	7. What is a yellow drink?	4. Saw and Knife
8. What do you throw that's round?		

Axe, TAVB, 2008  
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## 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](#)

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### USING LAG SCHEDULES TO STRENGTHEN THE INTRAVERBAL REPERTOIRES OF CHILDREN WITH AUTISM

BETHANY P. CONTRERAS AND ALISON M. BETZ

FLORIDA INSTITUTE OF TECHNOLOGY AND THE SCOTT CENTER FOR AUTISM TREATMENT

Previous research has demonstrated the utility of using lag schedules of reinforcement to increase response variability of children with autism. However, little research has evaluated whether the lag schedule promotes variability from within an already-established repertoire or expands the current repertoire by promoting the use of new responses (i.e., those not previously demonstrated). Thus, the purpose of the current study was to evaluate the extent to which lag schedules of reinforcement produced already-established intraverbal responses or novel responses for 3 children with autism. Results showed that lag schedules alone were sufficient to increase the number of different responses emitted for 2 participants, whereas brief variability training was needed for 1 participant. Further, some participants emitted novel responses throughout the experiment, suggesting that lag schedules may be an effective method for expanding a response class.

*Key words:* autism, intraverbal, lag schedules, response variability, rigid responding, novel responding

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## 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](#)

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Analysis Verbal Behav (2016) 32:205–224  
DOI 10.1007/s40616-016-0071-5



SPECIAL SECTION: THE INTRAVERBAL RELATION

### Evaluation of a Blocked-Trials Procedure to Establish Complex Stimulus Control over Intra-verbal Responses in Children with Autism

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Heather Macias<sup>1</sup>

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**Abstract** We evaluated the use of a blocked-trials procedure to establish complex stimulus control over intra-verbal responses. The participants were four young boys with a diagnosis of autism who had struggled to master intra-verbals. The blocked-trials procedures involved presentation of stimuli in separate trial blocks. The trial blocks gradually reduced in size contingent upon correct responding, until the stimuli were presented in quasi-random order. All participants acquired multiple discriminations with the blocked-trials procedure, although additional procedures were needed to teach the first discrimination with two participants. Following acquisition of multiple discriminations, two participants acquired a novel discrimination with quasi-random presentation of stimuli, and a third participant demonstrated discriminated responding in intra-verbal probes.

**Keywords** Autism · Blocked-trials procedure · Conditional discrimination · Intra-verbal · Stimulus control · Verbal behavior

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## 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?

[Ryan](#)

[Ryan Conditional Discriminations](#)

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## 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)

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**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.

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## **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).

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### **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) .

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- 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. (Sutter, 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.

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THE ROLE OF PROBLEM SOLVING IN COMPLEX  
INTRAVERBAL REPERTOIRES

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We examined whether typically developing preschoolers could learn to use a problem-solving strategy that involved self-prompting with intraverbal chains to provide multiple responses to intraverbal categorization questions. Teaching the children to use the problem-solving strategy did not produce significant increases in target responses until problem solving was modeled and prompted. Following the model and prompts, all participants showed immediate significant increases in intraverbal categorization, and all prompts were quickly eliminated. Use of audible self-prompts was evident initially for all participants, but declined over time for 3 of the 4 children. Within-session response patterns remained consistent with use of the problem-solving strategy even when self-prompts were not audible. These findings suggest that teaching and prompting a problem-solving strategy can be an effective way to produce intraverbal categorization responses.

*Key words:* categorization, intraverbal, mediating response, multiple tact training, problem solving

constant across phases. Finally, behavior analysts should begin to investigate the utility of other problem-solving strategies to establish various types of complex responding. Strategies such as visual imagining or observing the nearby environment for potential response options have been touted as potentially beneficial strategies (V. Carbone, personal communication, August 29, 2004; Palmer, 1991).

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[Problem Solving](#)

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## 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.

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*TRAINING PRESCHOOL CHILDREN TO USE VISUAL IMAGINING AS A  
PROBLEM-SOLVING STRATEGY FOR COMPLEX  
CATEGORIZATION TASKS*

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AND

JAMES E. CARR AND LINDA A. LEBLANC  
AUBURN UNIVERSITY

It has been suggested that verbally sophisticated individuals engage in a series of precurent behaviors (e.g., covert intraverbal behavior, grouping stimuli, visual imagining) to solve problems such as answering questions (Palmer, 1991; Skinner, 1953). We examined the effects of one problem solving strategy—visual imagining—on increasing responses to intraverbal categorization questions. Participants were 4 typically developing preschoolers between the ages of 4 and 5 years. Visual imagining training was insufficient to produce a substantial increase in target responses. It was not until the children were prompted to use the visual imagining strategy that a large and immediate increase in the number of target responses was observed. The number of prompts did not decrease until the children were given a rule describing the use of the visual imagining strategy. Within-session response patterns indicated that none of the children used visual imagining prior to being prompted to do so and that use of the strategy continued after introduction of the rule. These results were consistent for 3 of 4 children. Within-session response patterns suggested that the 4th child occasionally imagined when prompted to do so, but the gains were not maintained. The results are discussed in terms of Skinner's analysis of problem solving and the development of visual imagining.

*Keywords:* intraverbals, mediating response, tact training, problem solving, visual imagining

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[Visual Imagery](#)

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### Visual Imagining

1. Typical children taught to tact item and its category, e.g. vehicles, kitchen items and vehicles along with sub-categories.
2. Then asked to name the items in the categories and subcategories
3. 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.
4. The method included a power point presentation in which the items appear as they are stated.
5. 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.

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## The Effects of Auditory Tact and Auditory Imagining Instructions on the Emergence of Novel Intraverbals

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Ruth Anne Rehfeldt<sup>2</sup>

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**Abstract** The current research investigated whether intraverbals would emerge following auditory tact instruction. Participants were first taught to tact auditory stimuli by providing the name of the item or animal that produces the sound (e.g., saying “eagle” when presented with the recording of an eagle cawing). Following test probes for simple intraverbals as well as intraverbal categorization participants were taught to tact what each auditory stimulus is (e.g., saying “caw” when presented with the recording of an eagle cawing). Following both tact instructional phases, the effects of an auditory imagining instruction procedure on target intraverbals were examined. Results indicate that following both tact instructional phases, intraverbals increased for three of four participants. Auditory imagining instruction was sufficient for two of four participants to reach mastery criterion, and two of four participants needed some direct instruction. Low covariation between simple intraverbal and categorization was also observed. Functional interdependence between tacts and intraverbals and the possible role of a conditioned hearing response are discussed.

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## 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 require 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 seems to reduce the certainty that perceptual hearing was involved in successful responding.

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## INTRAVERBAL 30 to 48 Months

INTRAVERBAL				TOTAL SCORE:															
				<table border="1" style="float: right; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center; background-color: #0070c0; color: white;">Assessment</th> </tr> <tr> <th style="background-color: #e6f2ff;">1ST</th> <th style="background-color: #e6f2ff;">2ND</th> <th style="background-color: #e6f2ff;">3RD</th> <th style="background-color: #e6f2ff;">4TH</th> </tr> </thead> <tbody> <tr> <td style="width: 20px; height: 20px;"></td> </tr> </tbody> </table>				Assessment				1ST	2ND	3RD	4TH				
Assessment																			
1ST	2ND	3RD	4TH																
<b>Does the child verbally respond to the content of the words of others?</b>																			
1ST	2ND	3RD	4TH	11. Spontaneously emits 20 intraverbal comments (can be part mand) (e.g., Dad says, I'm going to the car, and the child spontaneously says, I want to go for a ride!) (O)															
□	□	□	□																
1ST	2ND	3RD	4TH	12. Demonstrates 300 different intraverbal responses, tested or obtained from an accumulated list of known intraverbals (T)															
□	□	□	□																
1ST	2ND	3RD	4TH	13. Answers 2 questions after being read short passages (15+ words) from books, for 25 passages (e.g., Who blew the house down?) (T)															
□	□	□	□																
1ST	2ND	3RD	4TH	14. Describes 25 different events, videos, stories, etc. with 8+ words (e.g., Tell me what happened... The big monster scared everybody and they all ran into the house.) (E)															
□	□	□	□																
1ST	2ND	3RD	4TH	15. Answers 4 different rotating WH questions about a single topic for 10 topics (e.g., Who takes you to school? Where do you go to school? What do you take to school?) (T)															
□	□	□	□																
Comments/notes:																			

VB-MAPP Milestones Assessment: Level 3 21

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## 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.

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- 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.”

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- 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.

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## 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 facts.
  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.

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Lesson Cody Date 9.6.07

Mixed "WH" Questions		Questions With Video or Book	Questions Without Video or Book
VideoBook <u>Blue is the Warmest Color</u>			
Pages <u>9</u>			
1. What shape is the sun? (circle)		+	+
2. Where are the windows & computer monitor? (ceiling/wall)		+	+
3. Which are his & computer monitor on the ground? (ceiling)		+	+
4. Does the window take off his shoes? (no)		+	+
5. Why does the computer screen his shoes? (ground is off)		+	+
6. How does he get the sand out? (cup/broom)		+	+
7. Where does the cup fall? (ground/ceiling)		+	+
8. What has a cone? (ceiling)		+	+
9. What does the computer screen up in his hand? (wood)		+	+
10. Where does the computer screen (ground in hand)		+	+
11. What makes the window? (ceiling)		+	+
12. Which are screen a computer? (ceiling)		+	+
13. What gets covered by wood? (computer)		+	+
14. What does the computer hold in his hand? (broom)		+	+
15. Why does the computer make noise? (ceiling/monitor)		+	+
16. How does the computer get out of the wood? (ceiling/monitor)		+	+
17. Does the window get covered w/ sand? (no)		+	+
18. Where does the computer hand fall when his up? (hand? (no))		+	+
19. Does the computer see any other under water? (no)		+	+
20. When do the cycles close? (see computer)		+	+
21. How does the computer make? (broom)		+	+
22. Why does the window make noise in the? (hand in cycle)		+	+
23. Which do the cycles get? (ceiling/wall/ground)		+	+
24. Which are cycle hit w/ the cone? (computer)		+	+

Newel Questions		Date: <u>9/3/07</u>
1. What do the windows & computer make on? (ceiling)		+
2. What has a monitor? (ceiling)		+
3. When does the computer hold the wood? (in his hand)		+
4. Which are gets covered by wood, computer on, ground? (computer)		+
5. Does the computer get out of the wood? (no)		+
6. How does the window get the computer out of the wood? (cup/broom)		+
7. When does the computer get covered? (see ceiling)		+
8. Why do the cycles close? (see window)		+

**With Video**

1. Who <sup>9</sup> ~~3~~ 2. What <sup>3</sup> ~~3~~ 3. When <sup>9</sup> ~~3~~ 4. What <sup>9</sup> ~~3~~ 5. Why <sup>9</sup> ~~3~~ 6. What <sup>9</sup> ~~3~~

7. How <sup>9</sup> ~~3~~ 8. Can/Do/De/Wil <sup>9</sup> ~~3~~

**Without Video**

1. Who <sup>9</sup> ~~3~~ 2. What <sup>3</sup> ~~3~~ 3. When <sup>9</sup> ~~3~~ 4. What <sup>9</sup> ~~3~~ 5. Why <sup>9</sup> ~~3~~ 6. What <sup>9</sup> ~~3~~

7. How <sup>9</sup> ~~3~~ 8. Can/Do/De/Wil <sup>9</sup> ~~3~~ 9. How <sup>9</sup> ~~3~~

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Video segment Unpreferred Annie scene 8-9  
 Date 12-25-04

Mixed "WH-" Questions		W/ video w/ video on Type Error	No video Correct Check Error
1. What are all the kids doing? cleaning		+	-
2. Who is Grace talking to? Mrs. Merigan		+	+
3. Who is in the closet? Annie		+	+
4. Why did Mrs. H slam the door? Annie leaving		-	+
5. What happened when Mrs. H went to sit down? Feet		+	+
6. How did she feel the night before? No		+	+
7. How did Annie feel? Happy		+	+
8. How did Mrs. H want Annie to go? No		+	+
9. What did Annie want to bring? Sunday		+	+
10. What did Sunday do? Spurred up		-	-
11. What is Mrs. H going to send Sunday? Packing		+	-
12. What is Annie's name? Tom		-	+
13. What is Sunday's name? Sunday		-	+
14. What did Annie's wife like best? Books		-	-
15. What did the people come to the front door for? Annie		-	-
16. What do you think the better name is? Sunday		-	+
17. What is the answering fool? Down the stairs		+	+
18. What happened at the door? No		+	+
19. What did Annie go back down stairs? Book		+	+
20. What did Sunday get the word with? From the dicto		+	+
21. What happened to Annie's play? Friends		+	+
22.			
23.			
24.			
25.			

Next Session Novel Questions

1. How old is Annie?	10		-
2. What color is the car that Annie is? black		+	-
3. What did Annie do when she got to the garage? ring bell		-	-
4. Who gave Sunday a book? The Butler		-	-
5. What is Annie's name when the friends are making the bed?		-	-
6.			
7.			
8.			
9.			

Mixed Intraverbals Procedure

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## 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 (-).

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- Novel Questions

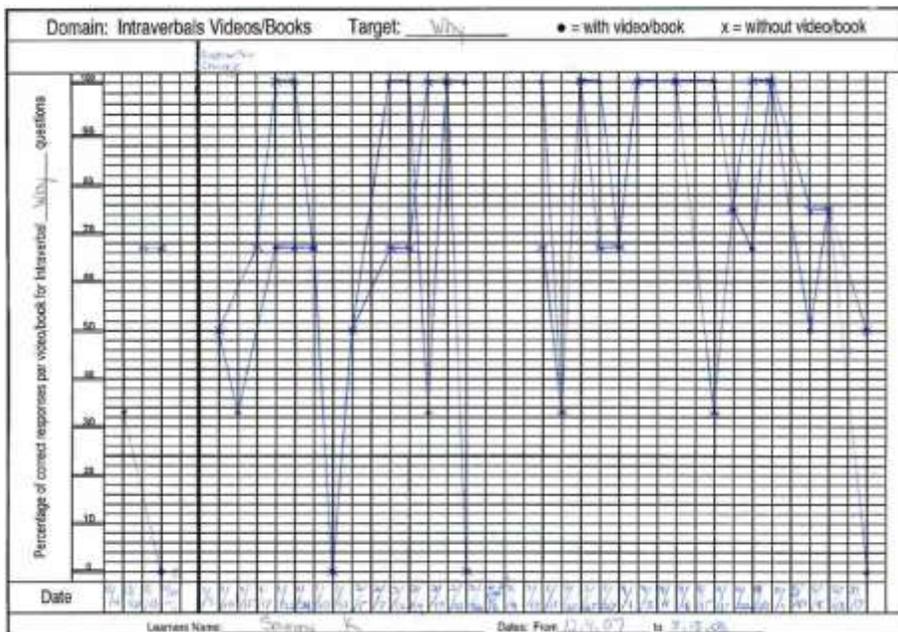
1. Ask the student 7-8 novel questions about the same video segment later in the session or the next day.
2. If the student answers correctly, reinforce according to established reinforcement schedule.
3. If the student answers incorrectly, provide thematic prompts until the original question is answered 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](#)

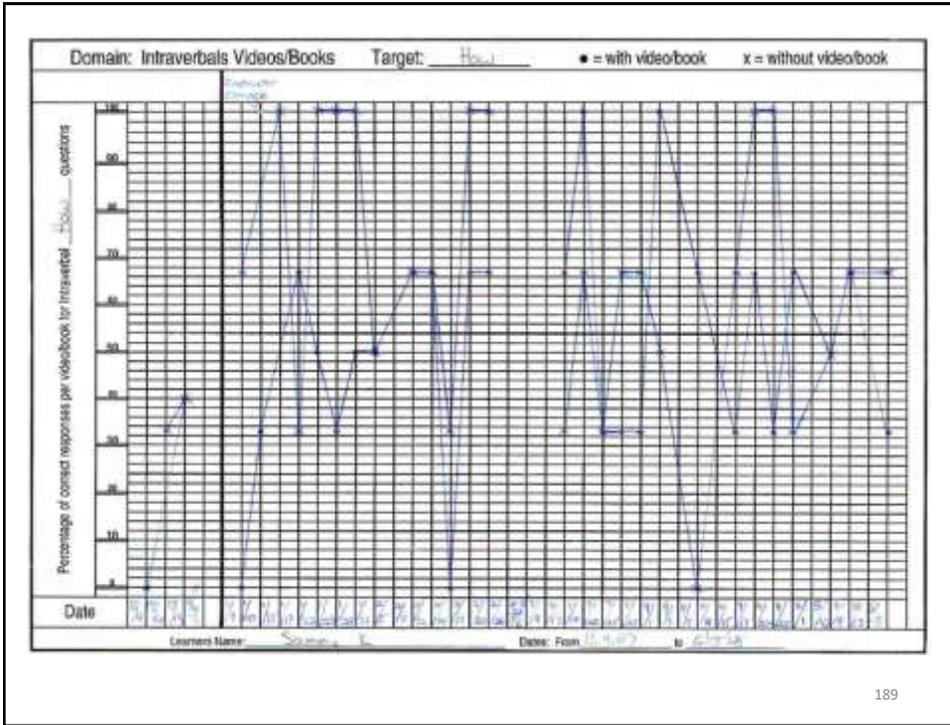
- Graphing

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.

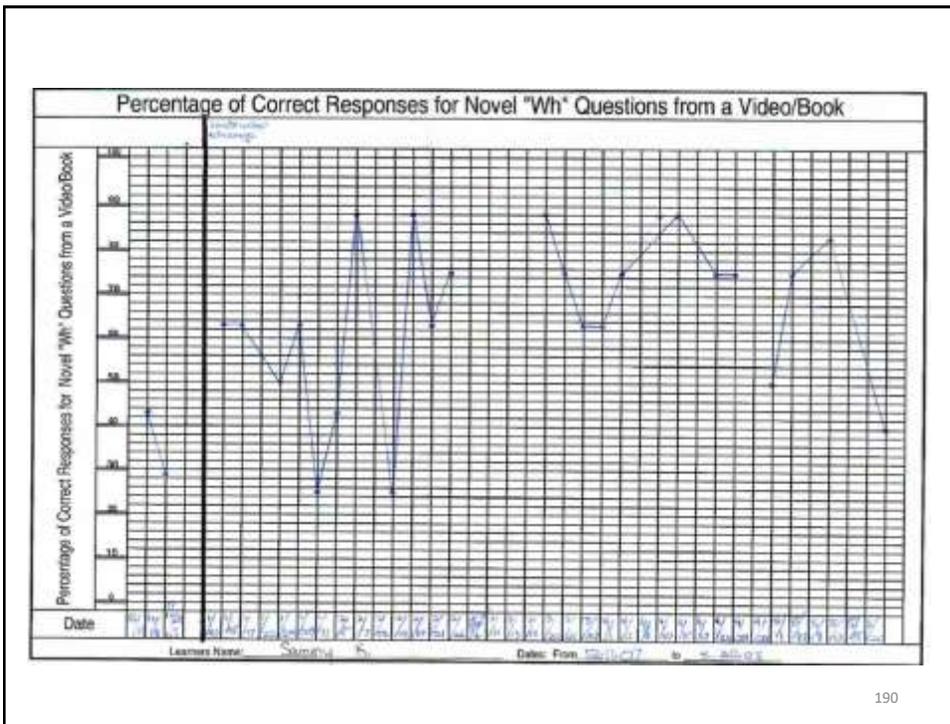
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# VIDEOS

[30. Sophia Manding Chicken](#)

[31. Sophia- Advanced Intraverbal Responding](#)  
[Kellen Intraverbals](#)

[Chameleon with Noah](#)

[Aaron Just Intraverbals](#)

[Case Study- Aaron- INT at End](#)

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**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 acquired through daily “experiences” without specific instruction much the way typical children learn these responses.

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#### Final Notes

- A recent paper by Sundberg & Sundberg (2011) in the *The Analysis of Verbal Behavior* discussed the development of the intraverbal repertoire in children with autism and typically developing children.
- 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 tacting and listener behavior are well established before teaching an intraverbal repertoire.
- This study suggests some of the difficulties in teaching this repertoire.

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#### 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.

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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. Listener 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)

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