Learning Channels and Verbal Behavior

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This article reviews the basics of learning channels and how specification of stimuli can help enhance verbal behavior. This article will define learning channels and the role of the ability matrix in training verbal behavior.
Descriptors: Learning channels; learning channel matrix; verbal behavior; generic extension; The ABLLS

Behavior analysis has long relied on precise, descriptive accounts of behavior. When discussing the terms stimulus and response, Keller and Schoenfeld (1950) submit: "…whenever we try to describe either the behavior or the environment of an organism, we are forced to break it down into parts. *Analysis* is essential to description, in our science as well as others" (p. 3). Skinner has also articulated the importance of accurately describing behavior for the science of behavior (Skinner, 1953, 1957, 1974). While contemporary behavior analysts, e.g., Catania (1998), Cooper, Heron, & Heward (1987), Pierce & Epling (1999), still encourage good descriptions of behavior, many professionals outside of behavior analysis have yet to embrace sound operational definitions.

Haughton (1980) criticized terms such as "knows," "understands," or "is able" because they do not delineate learning well. "Jessica knows her subtraction facts" tells very little of what Jessica can do regarding subtraction. With the advent of PL 94-142, the federal law required more objective criteria for instructional objectives, long and short term goals, evaluation procedures, and monitoring progress in special education (Underwood & Mead, 1995). The mandate for more specific operational definitions still did not resolve all problems. Descriptive words such as "calculates," "writes," and "responds" (Haughton, 1980) appeared but still translated into ambiguous descriptions of behavior. "Miles can calculate subtraction facts," provides additional information that Miles is performing a mathematical operation. The definition, however, fails to offer essential information such as the response form (i.e., oral or written).

To add precision and provide more information Lindsley suggested teachers use "learning channels." A learning channel represents the "input" or the sensory modality involved with a stimulus and an "output" or the behavior contained in the response (Haughton, 1980; Lindsley, 1998). If a learner orally reads a book, "see" would signify the "input" and "say" the "output". The combination of the "see" and "say," added before the action-object "reads a book," is called a learning channel set (Haughton, 1980). Figure 1 shows an example of a learning channel matrix.

Haughton (1980) indicated that learning channels can assist teachers and other professionals in education avoid vague descriptions of behavior. Kubina and Cooper (2000) list the following general advantages of using learning channels: (a) use multiple learning channels with the same target performance will add variety to instruction and practice; (b) extend skill applications by teaching and practicing many exemplars of the skill area; (c) facilitate planning for instruction and practice; (d) communicate with others in plain English; (e) remind us that learners learn and respond in many ways; (f) help us select instructional and practice activities for learners with special needs, and (g) make learning more exciting and fun.

How to use the Learning Channel Matrix

A basic learning channel matrix includes two major parts, the input and output channels or, as in Figure 1, shortened to "in" and "out." The adapted learning channel matrix shown in

Figure 1 comes from Haughton (1980) and Binder and Haughton (2002). Nevertheless, behavioral analysts do not have to limit themselves to the present format. A useful matrix should add precision to any behavior outcome specified for a learner. Haughton (1980) originally developed three matrices, the Mobility Matrix, the Academic/Personal/Social Development Matrix, and the Activity Matrix, for use with a variety of behaviors. The following section is a guide for using the learning channel matrix shown in Figure 1.

LEARNING CHANNEL MATRIX

IN	DO (D)	DRAW (Dr)	MARK (Mk)	POINT/ TAP (PT)	THINK (T)	TYPE (Ty)
HEAR (H)	Motor imitation (from peer)				Write essay with story starters	
TOUCH (To)						
TASTE (Ta)						
SNIFF (Sn)						
SEE (Se)	Motor imitation		Ta-S Identify flavors of liquids			
FREE (F)						

OUT

***Figure 1*. A Learning Channel Matrix with examples of single and/or multiple in and out channels.**

Learner behavior. Lindsley (2002) emphasized that learning channels refer to the learner's behavior rather than the teacher's. For instance, if a teacher models a response and asks the learner to imitate, a see-do learning channel (see the teacher's model and do the response) occurs. If the teacher says and the learner does “touch your arm”, then a hear-do channel occurred. Specifically, the learner heard the command and did it. The learning channel details the request and the desired behavior, but the teacher should be aware of what the learner actually attends to. Even though the desired behavior emerges, such as doing the teacher's model, the learner may have used a different learning channel.

Define input or in channels as the sensory modalities associated with antecedent stimuli. The in channels represent the sensory modalities the learner uses during the occurrence of the stimuli immediately preceding the response. Answering addition facts may involve "seeing" an addition problem (e.g., 6 + 2 = ?). The in channel, or the sensory modality used with the antecedent stimulus of a written addition problem is visual or see. The other potential in channels include hear, touch, taste, sniff, and free. The term “free” captures what many people call think or feel. Skinner (1953) wrote of thinking and pointed out that while it does exist, the behaviors involved with thinking are difficult to define rigorously. Free refers to “free from” external sensory modalities (i.e., hear, touch, taste, sniff, see). A young woman may record what happened on a particular day by writing in her diary. The in channel in effect during her writing is “free.” Free specifies the lack of an observable external stimulus. In other words, the young woman was "free from" the use of an external sensory modality during her writing behavior. Free is the only in channel which will not be combine with other in channels because it is free from other sensory modalities.

Define output or out channels as the response. The out channels are the learner's responses. A student answering addition problems by writing numbers uses the out channel of "write." Whether the student answers the question with a correct or incorrect response, the out channel is present. Stated differently, the form of the out channel has nothing to do with content of the response. Writing 7 to the stimulus “3 + 2= ?” involves the out channel write. Out channels include do, draw, mark, point/tap, think, type, say and write. Skinner (1957) noted that thinking addresses verbal responses accessible only to the thinker. As a broadly inclusive term, the out channel *think* describes behaviors accessible only to the learner. An example of the think channel happens in school when a teacher provides students with story starters and asks the students to think about something, e.g., "Think about your favorite summer vacation". The learning channel is hear-think. Because the think channel is accessible only to the learner, other learning channels and behaviors are used to assess behaviors that have think as an out channel. After the students think about their favorite summer vacation, they may then write an essay. Writing an essay offers an inference into the think out channel.

Use the learning channel matrix to determine in and out channels. Haughton (1980) called the in and out combination a "channel set." We use the term "learning channel" generically to refer to both the in and out. To find the learning channel for a behavior both the in and out channels must be identified. To return to the previous addition example of finding an in and an out channel, a learner was answering addition problems. Finding *see* from the row of in channels and then finding *write* from the column of out channels intersects to form the learning channel. Inside the cell write "addition math facts." The learning channel see-write precisely describes the behavior of answering addition facts.

Multiple in and out channels. Lindsley (1994) noted that some behaviors can have multiple in and/or multiple out channels. An example of a multiple in channel could occur with addition facts. The student could see the teacher writing the problem while hearing what the

teacher says. So the student sees the teacher writing "6" and hears the teacher say "six," sees the teacher write "+" and hears the teacher say "plus" and so on. The multiple in channel is “seehear.” If the student then writes down the answer the learning channel is “seehear-write" addition facts. A behavior may also have multiple out channels. If a student hears the number "8" then writes and says the number's name "eight", the out channel is writesay.

Learning channel conventions. Lindsley (2002) suggested the following convention for expressing learning channels. Use a hyphen (-) when a pause occurs between an in and an out channel. If a student sees a number "8" first and then writes the number “8" his learning channel would be expressed as "see-write." If multiple antecedents or multiple responses take place at the same time the multiple words are put together without a hyphen. As previously noted, a student that sees the teacher writing "6" and hears the teacher say "six" has a "seehear" in. Depending on the out, whether it has one or multiple responses, it would be separated from the in channel with a hyphen. The student that engages in the "seehear" in channel, then writes the answer would have a learning channel of "seehear-write."

The learning channel matrix has two-dimensions and may unintentionally encourage single channel sets such as “see-say” or “hear-write” (Lindsley, 2002). Therefore with multiple learning channels the following coding system suggests a way to move beyond the two-dimensional limitation. For "seehear-say" find the first part of the IN, "see," from the IN row and find the say in the OUT column and locate their intersection. In that cell write down the additional abbreviation of the second part of the IN followed by a hyphen, i.e., H-. Then write the behavior as in Figure 1. If a behavior has multiple out channels such as "hear-writesay" similar procedures are followed. Find the "hear" from the IN row and identify where it intersects with then first part of the OUT "write." In that cell write down the additional abbreviation of the second part of the OUT preceded by a hyphen, i.e., -S, and then write the behavior as displayed in Figure 1.

Some behaviors may have multiple in channels and multiple out channels. Students learning about different liquids may have opportunities to see liquids and taste them and then mark what flavor it has, e.g., bitter, sweet, salty, and say the response. The learning channel would be "seetaste-marksay." Find the intersection of the first in channel, see, and the first out channel, mark. Abbreviate the second part of the in channel and the out channel with a hyphen in between, i.e., Ta-S, and then write the behavior “identify flavors of liquids."

How Learning Channels Benefit the Analysis of Verbal Behavior

Skinner defined verbal behavior as behavior mediated by another organism. Within his analysis of verbal behavior specific verbal operants are classified as different types of relationships occurring between controlling variables and verbal responses (Skinner, 1957). Verbal operants and other aspects of the analysis of verbal behavior converge generally and practically with learning channels. Figure 2 presents one potential way that verbal behavior interacts with learning channels. While the verbal operants define a behavior functionally, learning channels add precision to the descriptions of the topography.

	Point-to-point correspondence: part or subdivisions of S^D control parts or subdivisions of R_v		Thematic correspondence: S^D does not resemble the R_v	
	Verbal Operants	Learning Channels	Verbal Operants	Learning Channels
Formal Similarity: $S^D = R_v$ in format	Duplic Echoic(auditory) Copy (visual)	 Hear-Say See-Write	 Intraverbal	 Hear-Say
No Formal Similarity: S^D R_v in format	Codic Dictation (auditory-visual) Textual (visual-auditory)	 Hear-Write See-Say	 Tact	 See-Say

***Figure 2*. Summary of Possible Interaction Between Verbal Behavior and Learning Channels. "S^D" represents the "discriminative stimulus" (controlling variable) and "R_V" expresses the "Verbal Response".**

General benefits

Learning channels can benefit behavior analysts who use the analysis of verbal behavior. The following section lists general ways learning channels contributes to verbal behavior. This section does not serve as an exhaustive list of positive benefits, but rather as a starting point for describing general benefits.

Define behavior precisely. One advantage of using learning channels is to improve the precision of behavioral definitions. Miltenberger (1997) points out that behavior can have multiple dimensions, e.g., frequency duration, intensity, and can be "observed, described, and recorded" (p. 3). The more objective and thorough the definition, the more likely the behavior can be measured accurately. Whether in the laboratory or applied practice, precise definitions facilitate measurement, observation, replication, analysis and interpretation.

When teaching a learner to tact animal pictures a behavior analyst may use a description for the target behavior: "tacting animal pictures." Tacting, however, can take place in a variety of learning channels. The learner may hear the prompt , e.g., Point to the cat, see the animal pictures, and then point to the cat. The learning channel combined with the behavior is "seehear-point tact animal pictures." The learner could also hear the prompt , e.g., What is this?, see the behavior analyst point to the animal picture and then say "cat." The learning channel is now "seehear-say tacting animal pictures." Additionally, the learner may hear the prompt (e.g., "Tell me which one is the cat"), see the animal pictures and then point and say "cat." The learning channel has changed to "seehear-pointsay tacting animal pictures." The addition of the learning channels to the target behavior impacts the accurate measurement of the behavior's occurrence.

Enhanced communication. Information (e.g., behavioral descriptions, data) can be shared among multiple audiences. Take the example of an Individual Education Program (IEP) team that discusses particular behavioral objectives. The IEP team may consist of a variety of professionals

such as speech therapists, general and special education teachers, school psychologists, behavior analysts, and parents. Each team member will have different backgrounds and experiences. The divergent backgrounds oftentimes translate to professional vernacular specific to each team member which can potentially cause miscommunication. Learning channels provide all team members with a common set of descriptive terms. A behavioral objective that includes a learning channel offers terms more clearly understood regardless of the background of the person. A behavior analyst may suggest “tacting colors” as an important objective for the student. A speech therapist may agree that the objective “tacting colors,” or in her words labeling, is an important goal. While other professionals may not understand the exact meaning of the term tact, adding see-say to the objective clarifies the target behavior. By specifying “see-say tacting colors” the learning channel enhances communication because it uses what Lindsley (1991) calls “plain English.” Plain English uses words that most people understand because they occur frequently in our everyday language.

Transfer of stimulus control. Cooper, Heron, and Heward (1987) list a number of ways that stimulus control can be transferred from supplementary stimuli to natural stimuli. Fading, errorless learning, and different types of response prompts (e.g., most-to-least-prompting) allow a behavior analyst to transfer stimulus control. When used with verbal behavior, learning channels further describe how and what kind of supplementary stimuli occur.

Sundberg and Partington (1998) established a useful procedure for transferring stimulus control for a vocal tact of an object. In the first step, the learner sees a nonverbal stimulus, a car, and hears a verbal stimulus, "What is that?" and then hears an echoic stimulus "car." The behavior analyst reinforces the learner’s correct response. In the second step, the learner again sees a nonverbal stimulus, car, and hears the verbal stimulus, "What is that?" and then hears a part of the previous echoic stimulus "ca." The behavior analyst reinforces correct responses. The third step calls for the learner to see the nonverbal stimulus car and hear the verbal stimulus, "What is that?" The tacting response is reinforced if correct. The fourth step has the learner see the nonverbal stimulus car with the behavior analyst reinforcing the correct tact, car.

The inclusion of learning channels with the previous example provides additional information in regards to the target behavior. In Figure 3, a diagram shows how the stimulus control transfers from supplementary stimuli to a natural stimulus. The learning channel diagram shows the current status of the learner’s performance in "plain English" and goals for the target behavior. For current status in plain English, the learning channels in Figure 3 communicates to all professionals or members of the intervention team an easily understood and identified level of stimulus control change.

The first step in Figure 3 shows multiple in channels, seehearhear, and one out channel, say. The learner sees a nonverbal stimulus and hears two different supplementary stimuli, a verbal stimulus and an echoic stimulus, and makes an echoic response. In the second step, the learner again sees a nonverbal stimulus and hears a verbal stimulus, then a different echoic stimulus. We suggest using a plus sign whenever a change occurs in transferring stimulus control with either in or out channels. At this point the learner does engage in an echoic response but also starts to tact. The third step shows a withdrawal of the echoic stimulus and has only two in channels, seeing a nonverbal stimulus and hearing a verbal stimulus. The learner now tacts the response. The fourth step has only a nonverbal stimulus and a tact response.

1. Seehearhear-Say	
In: See- Nonverbal stimulus: car (Natural Stimulus) Hear- Verbal stimulus: "What is that?" (Supplementary stimulus) Hear- Echoic stimulus: "Car" (Supplementary stimulus)	Out: Say- "Car" (response)
2. Seehear+hear-say	
In: See-Noverbal stimulus: car (Natural stimulus) Hear- Verbal stimulus: "What is that?" (Supplementary stimulus) Hear-Echoic stimulus: "Ca" (Fading supplementary stimulus)	Out: Say- "Car" (response)
3. Seehear-say	
In: See-Nonverbal stimulus: car (Natural stimulus) Hear-Verbal stimulus: "What is that?" (Supplementary stimulus)	Out: Say- "Car" (response)
4. See-Say	
In: See-Nonverbal stimulus: car (Natural stimulus)	Out: Say- "Car" (response)

***Figure 3*. Application of Learning Channels in Transfer of Stimulus Control. A tacting common object response is under the control from natural stimulus combined with supplemental stimuli to natural stimulus solely.**

Learning channels also benefit goals. The goal for any procedure transferring stimulus control is responding to a natural stimulus. In the vocal tacting of an object example, the goal is see-say. All steps prior to the goal are transitional steps. By examining the transitional steps in learning channels, a behavior analyst will likely see where the current status is and keep the learner moving toward his goal. Some individuals, such as those with autism, can become dependent on prompts (Anderson, Taras, & Cannon, 1993). Learning channels keep the behavior analyst aware of the current status of stimulus control and support procedural decision-making thereby potentially reducing reliance on prompts.

Generic extension. Generic extension occurs when a novel stimulus, which shares properties of a learned stimulus, controls the response (Skinner, 1957). An example of this happens when a child sees a novel car and calls it "car." The generic extension of the tact relationship develops from the new car sharing properties, e.g., four wheels, glass windows, size and shape, similar to the previously learned tact. Learning channels may offer additional information as to why a learner does not generically extend a response. Binder and Haughton (2002) present an example where a student learned to see-write answers to addition problems. When the teacher asked the student a similar addition problem vocally, a hear-say, the student could not respond correctly.

In Binder and Haughton's (2002) example, a student had difficulty generically extending an intraverbal relationship. The student originally learned the intraverbal in the see-write channel.

The student saw a problem, e.g., 2 + 2 = ? and wrote the answer, e.g., 4. The teacher asked the student to respond vocally to an auditory stimulus. Even though the intraverbals share common properties, e.g., addition computation and numbers, etc., the entire learning channel, both in and out channels, varied. The first intraverbal, see-write, differs from the second intraverbal hear-say. We discuss, below, in the practical application section, how to use learning channel to program for generic extension.

Practical application

The practical application section focuses on how learning channels can impact the use of the analysis of verbal behavior. Sundberg and Partington (1998) and Partington and Sundberg (1998a, 1998b) published a comprehensive approach for using the analysis of verbal behavior to help children with autism and other developmental disabilities. This section describes possibilities for embedding learning channels into Sundberg and Partington's approach.

Initial assessment and basic language and learning skill objectives. A behavior analyst would use *The Assessment of Basic Language and Learning Skills, The ABLLS,* to assess a student's language. *The ABLLS* has two components, *The ABLLS Protocol* (Partington & Sundberg, 1998a) and *The ABLLS Guide* (Partington & Sundberg, 1998b). *The ABLLS Protocol* "Provides both parents and professionals with criterion-referenced information regarding a child's current skills, and provides a curriculum that can serve as a basis for the selection of educational objectives" (p. i). It also includes a skill tracking system for recording and monitoring progress of important skills. *The ABLLS Guide* helps analyze data from *The ABLLS Protocol* and assists with creating educational priorities and objectives for an individual.

Figure 4 provides an example demonstrating how *The ABLLS* target behaviors could integrate learning channels. The first column lists task numbers found in *The ABLLS Protocol* (1998a). The second column specifies the learning channel of *The ABLLS* target behavior. Adding the learning channel to *The ABLLS* target behavior highlights the salient dimensions of the behavior. A1 reads “Take reinforcers when offered.” When adding the learning channel, the target behavior reads “See-do take reinforcers when offered.” The “see-do” means the learner “sees” the reinforcer offered by another person and takes the reinforcer. Taking the reinforcer indicates the person “does” something, i.e., the do out channel.

The addition of learning channels with behavioral descriptions may prevent the use of unnecessary supplementary stimuli. A behavior analyst presenting a toy ball might say “Would you like this ball?” While the behavior analyst’s action conforms with the A1 task, the learner’s in channel becomes “seehear.” A “seehear-do” learning channel differs from a “see-do.” The next time the behavior analyst offers the ball without saying anything, the learner may not take the ball. The reasons for not taking the ball may lie in the fact that stimulus control was formed jointly with the visual stimulus of “See the ball” combined with the auditory stimulus of hearing “Would you like this ball”. The learning channel specifies to all members of the intervention team to restrict the auditory stimulus and present the visual stimulus only.

The third column in Figure 4 suggests a number of in channels that can occur with supplementary stimuli. The in channel behavior serves as a reference for prompts or supplementary stimuli a behavior analyst could use to establish the behavior. In the previous example, a learner who sees a reinforcer and does not take it when offered may require a supplementary stimulus of a physical prompt. The learning channel seetouch-do describes an intermediary step to the terminal learning channel, see-do, with the addition of the supplementary stimulus, touch. In the last column, a general description for a list of potential materials for each

target behavior is presented. Figure 4 is intended to show only possibilities. The behavior analyst must decide which *ABLLS* target behavior, terminal learning channel, supplementary stimuli and materials for each individual learner.

ABLLS Target Behavior	Target Behavior LC	In Channel Associated with Supplementary Stimuli	Materials
A1 Take reinforcers when offered	See-Do	Touch-	Reinforcing objects
A2 Take a reinforcer from a choice of two	See-Do	Seetouch-	Reinforcing and non-reinforcing objects
B2 Match identical pictures to sample	See-Do	Seetouch-	Identical and non-identical pictures
C2 Follow instructions to do a preferred activity	Hear-Do	Seetouch-	Material for preferred activity
D1 Motor imitation with objects	Seehear-Do	Touch-	Objects for imitation
D2 Motor imitation with object discrimination	Seehear-Do	Touch-	Objects for imitation
E1 Imitate sounds on request	Hear-Say	Touchsee-	List of target sounds
E2 Imitate initial sounds of words	Hear-Say	Touchsee-	List of target words
F2 Multiply controlled requests	Seehear-Say	Heartouch-	Reinforcing objects
G1 Label reinforcers	Seehear-Say	Hear-	Reinforcing objects
G2 Label common objects	Seehear-Say	Hear-	Common objects

***Figure 4*. Examples of integration of *the ABLLS* and the Learning Channels.**

Generic extension. To facilitate generic extension the behavior analyst may provide multiple examples. As a learner tacts more and more examples of nonverbal stimuli, the probability increases that the learner may generically extend the tact to novel occurrences of the nonverbal stimulus. For instance, if a learner tacts a chocolate chip cookie, “cookie,” when the learner sees an Oreo cookie she may not tact it as a cookie. The Oreo cookie is a novel stimulus, and although it shares properties of a cookie, it does not share the major properties of a chocolate chip cookie. If the learner is provided with a variety of cookies beyond chocolate chip, the

probability increases that generic extension will occur because the learner will encounter major properties of a cookie and not features specific to chocolate chip cookies.

In the previous example, the learner has a greater likelihood to extend "cookie" to other cookies because of multiple examples tacted in the see channel. Another way to promote generic extension involves using different in channels or multiple in channels. A behavior analyst using the hear in channel, for instance, would provide a vocal description of a cookie, e.g., round, food, sweet tasting. To use multiple in channels, a learner could seetaste or seetastetouch a cookie. The behavior analyst increases the probability of generic extension by allowing the learner to come in contact with other relevant properties of the tact. The behavior analyst may also choose to specify the relevant properties to the learner, e.g., "That tastes sweet".

Data collection. Partington and Sundberg (1998b) recommend collecting data with basic language and learning skills. They advise users of *The ABLLS* to update the protocol and summary grid yearly. For fast learners Partington and Sundberg (1998b) suggest updating the data every 4 to 6 months. Cooper et al, (1987) indicate that direct and continuous data collection improves the detection of important features of a behavior. In addition to *The ABLLS*, including procedures that easily and reliably record data will help monitor behavior change on a more frequent basis. While behavior analysts may use their own daily data collection procedures when using Sundberg and Partington's (1998) approach to teaching language, we provide an example of a data collection sheet that also includes learning channels.

Figure 5 shows a data sheet for collecting data, which includes verbal operants and learning channels. The top part of the data collection sheet has basic information: the learner's name, the date of the most recently completed *ABLLS*, the labeling task number from *The* ABLLS, the target learning channel and any potential supplementary stimuli. The in and out channels are also included as a reminder. And last, a coding system tells what symbols to use for observed responses. The data collection sheet in Figure 5 is designed for all of the tasks that fall under "labeling" in *The ABLLS*. A completed data collection sheet, Figure 5, appears for Yi-Wen who has begun to learn to label common objects, G2 in *The ABLLS* (see Figure 4). Under the column "Label," the behavior analyst has written a list of the common objects being introduced. Next to the Label column the date appears for the day of the observation. The data collection sheet captures probe data which the behavior analyst checks for each day at the beginning session.

To use this data collection sheet write in what in the date. Next, the first item "cup" will be presented to the learner with the question "What is it?" If the learner correctly responds "cup" write a check mark in the cell that intersects with the cup and date. If the learner gives an incorrect response, an "X" will go into the cell. The following day, 1/24, an "H " was written in the cell for "book" because an additional auditory prompt was presented and the learner responded correctly. If the learner responded incorrectly to the auditory prompt an "HX" would go into the cell to indicate a prompt but the learner did not respond to it correctly. When using delayed prompts, a +H goes into the cell followed by an "X" or a " " to express correct and incorrect responses. A blank on the data collection form means the label was not assessed for that day.

The data collection sheet facilitates the monitoring of daily and overall progress. By recording data daily, the performance data permits an analysis of instructional effectiveness. Some labels will be learned quickly while other labels may require prompts. The presence of a pattern of errors suggests planning for additional prompts or trying some other procedure that does not allow the learner to practice errors. The data collection sheet also can be used to

determine when the learner reaches some predetermined performance criterion. Different types of learning skills require separate criterion levels (Alberto & Troutman, 1999). For instance, a basic skill that will later be built on, or a skill that is a foundational to other learning, requires 100% accuracy. When using *The ABLLS*, the intervention team would decide what criterion levels to use with each objective. The data collection sheets, those sheets used beyond one specific task such as G2, also provide a more general picture of a learner's overall progress. A review of multiple data collection sheets would suggest a target time for updating *The ABLLS*.

Labeling Data Collection Sheet

Learner's name: Yi-Wen Date of last completed ABLLS: Jan, 22nd, 2003

Labeling Task Number: G2 Labeling common objects Target Learning Channel: SeH-S

Supplementary Stimuli: H (Echoic stimulus)

In channels: Free- FR, Hear-H, See-Se, Sniff-Sn, Taste-Ta, Touch-To; Out channels: Do-D, Draw-Dr, Mark, MK, Point/Tap-PT, Say-S, Think-T, Write-W.

Coding

- Correct Response; X- Incorrect Response; _H_ additional prompt (H for hearing the correct response.); +_H_ fading additional prompt (+H: wait three seconds without correct response, then provide modeling.)

Date / Label	1/22	1/23	1/24	1/25															
Cup																			
Book		X	H	H															
Chair		HX	+H																
Door																			
Rug			H	H															
Fork		H	+HX	+H															
Plate		HX																	
Shoes			X	X															
TV																			
Pen				X															
Soap																			
Table																			
Shelf																			

***Figure 5*. Objective list and data collection. An example of a student's ABLLS G2 data.**

Conclusion

The main function of learning channels is to supplement descriptions of behavior by specifying the in and out channels. Learning channels does not mean the same thing as "learning styles, learning preferences, or multichanneled sensory processing." Learning channels do not suggest what to teach, how to teach, or the best way of changing behavior. Instead, learning channels offers a more thorough description of behavior, and, in the hands of a behavior analyst, provide another tool for decision-making.

A developing body of research has demonstrated that the explicit application of learning channels to behaviors such as multiplication facts, addition facts, and learning Greek letters yields practical and experimental significance (Irish, 1998; Skulski, 1998; Zanatta, 2000). Lindsley (1998) suggests that learning channel research may supply new and powerful techniques for learning. When applied to Skinner's analysis of verbal behavior, learning channels can add precision to behavioral descriptions, enhanced analysis and communication, and augment the uses of verbal behavior in research and applied settings.

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