

## A Review of Training Intraverbal Repertoires: Can Precision Teaching Help?

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Intraverbal behavior is common in conversation and academic and professional settings. Many individuals with disabilities fail to acquire intraverbal repertoires. Some individuals who do acquire intraverbal behavior fail to acquire responses that are functional and complete. Research has examined procedures to establish or increase intraverbal repertoires of individuals with impaired verbal repertoires. Several of these studies integrate a precision teaching methodology with Skinner's (1957) conceptual framework. This paper reviews the literature on the most commonly examined methods of establishing or increasing intraverbal repertoires. Articles that incorporate precision teaching are emphasized. The review highlights the strengths (including the effectiveness) and limitations of each procedure. The review concludes with a discussion of the implications of using precision teaching to establish or increase an intraverbal repertoire and with suggestions for future research.

*Key words:* verbal behavior, intraverbal behavior, precision teaching.

Intraverbals are defined as verbal responses to verbal stimuli that have no point-to-point correspondence or formal similarity with the verbal stimuli that evoke the response. The intraverbal operant includes, for example, small talk, serious conversation, counting, addition, and fill-in responses on examinations (Skinner, 1957), and can constitute a large portion of an individual's verbal repertoire. The controlling variables and the intraverbal responses may be vocal or written: A vocal stimulus may evoke a written response, a written stimulus may evoke a vocal response, or the relations may be vocal-vocal or written-written. The same topography of response may come under the control of different verbal stimuli. For example, the response "green" may be emitted under the control of "yellow and blue make" or "the grass is." Intraverbal response forms may vary in size. The response may be as small as a single phonetic sound or as large as an entire paragraph.

Generalized conditioned reinforcers mediated by the verbal community maintain intraverbals. Formal prompts can provide

supplementary stimulation for intraverbal repertoires (Skinner, 1957) and include vocal (echoic) or nonverbal (textual, tact) control which strengthen a specific response form (Finkel & Williams, 2001; Watkins, Pack-Teixeria, & Howard, 1989). For example, one may be more likely to respond "spaghetti" to the question "What do you want to eat?" in an Italian restaurant. Research has suggested that tact or mand stimulus conditions may also strengthen an intraverbal response (Braam & Poling, 1983; Luciano, 1986; Partington & Bailey, 1993; Sundberg, San Juan, Dawdy, & Arguelles, 1990).

Impaired intraverbal repertoires can have serious consequences. For example, it could hinder access to general education settings, severely impede meaningful social interactions, result in decreased performance in school, or pose significant safety concerns (Finkel & Williams, 2001; Partington & Bailey, 1993). Researchers have examined procedures to establish, strengthen, and increase intraverbal repertoires. Procedures have targeted a variety of intraverbals including conversational language, math facts, reading comprehension, creative writing, and fill-in responses.

Current interventions may not yield comprehensive intraverbal repertoires. There are several plausible reasons for this. First, individuals with disabilities may not have strong imitation repertoires or respond to formal prompts. Second, individuals with disabilities may have limited verbal repertoires across other verbal operants. As a result, some training procedures

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that rely on formal prompts (e.g., transfer of stimulus control) may not be effective in generating intraverbal behavior. Third, tangible reinforcers are often necessary to teach and maintain new responses. If generalized conditioned reinforcers have not been established, the repertoires generated are rarely maintained. Consequently, many procedures fail to teach individuals with disabilities intraverbal repertoires that are functional and complete, that generalize, or maintain.

Combining the features of Skinner's (1957) classification of verbal behavior with the guiding principles of precision teaching may yield better instructional outcomes. Proficient performance is one of the key features of precision teaching (PT). Precision teachers rely on rate of response as a measure of performance. Skinner (1957) suggested that an analysis of the controlling variables for each instance of a response is necessary to determine if the response meets the formal definition for the verbal operant of interest. Some researchers have attempted to bridge the measurement system of precision teaching to teaching intraverbal behavior (Albertson & Billingsley, 1998; Albrecht, 1981; Berens, Boyce, Berens, Doney, & Kenzer, 2003; Chase, Johnson, & Sulzer-Azaroff, 1985; Chiesa & Robertson, 2000; Killu, Weber, & McLaughlin, 2001; Lovitt, Rudsit, Jenkins, Pious, & Benedetti, 1985; Polson, Grabavac, & Parsons, 1997; Ritesman, Malanga, Seevers, & Cooper, 1996; Spaulding, Haertel, Seevers, & Cooper, 1995; Sweeney, Sweeney, & Malanga, 2001; Tennenbaum & Wolking, 1989).

PT strategies, when extended to instruction for establishing or increasing intraverbal repertoires, may lead to the acquisition and maintenance of more fluent intraverbal responding. However, a comparative analysis of strategies employed to increase or establish intraverbal repertoires has not been conducted. In addition, strategies that incorporate precision teaching have not been compared to strategies that do not incorporate precision teaching. This paper summarizes common methods of establishing or increasing intraverbal repertoires (e.g., transfer of stimulus control, peer mediated strategies, etc.) noting the strengths (including the effectiveness) and limitations of each procedure. The review concludes with a discussion of the implications of using precision teaching to establish or increase an

intraverbal repertoire and with suggestions for future research.

### *Intraverbal Behavior*

*Peer mediated interventions.* One approach to establishing intraverbal behavior includes peer mediated interventions. Three styles of intervention are included in this line of research: peers as prompters (Krantz, Ramsland, & McClannahan, 1989), peer tutoring (Bell, Young, Salzberg, & West, 1991; Kamps, Barbeta, Leonard, & Delquadri, 1994), and peer training (Kamps, et al., 2002). Peer prompting methods employ peers as conversational initiators for peers with disabilities, while peer tutoring methods employ peers as instructors for academically oriented skills. Peer training strategies incorporate a variety of instructional strategies for both typically developing and disabled peers. Peer training might include instruction on academic skills, instruction on group responsibilities, and instruction on social skills needed to work in groups. Peers with disabilities might be instructed in academic skills through modeling, choral and individual responding, practice with another student, and through review. Generally, reinforcement is contingent upon the use of the new skills groups (Kamps, et al., 2002).

Procedures that involve peers to increase intraverbal responding have resulted in increases in participants' intraverbal repertoires (Bell, et al., 1991; Kamps, et al., 1994; Kamps, et al., 2002; Krantz, et al., 1989). The literature on peer mediated interventions suggests gains in both academic and conversational intraverbal repertoires that were evoked across settings for extended periods of time (Bell, et al., 1991; Kamps, et al., 1994; Krantz, et al., 1989).

The quality and type of component intraverbal skills established in peer-mediated interventions is unclear. Researchers do not incorporate Skinner's (1957) analysis of intraverbal behavior. Data were often reported in terms of duration (with the exception of Bell, et al., 1991) and it is difficult to identify the frequency, quality, or type of responses established. Generalization conditions were often only slightly different than experimental conditions. For example, Krantz, et al. (1989) indicated that skills were generalized across settings but settings differed only on one variable

—room color. In addition, adults often maintained some stimulus control over responding (Kamps, et al., 1994; Kamps, et al., 2002; Krantz, et al., 1989). Skills that did generalize across conditions did not maintain at the same rates when new peers were introduced.

*Transfer of stimulus control.* Another strategy for training intraverbal responses involves the transfer of stimulus control. Researchers have attempted to transfer stimulus control from a vocal-verbal stimulus with point-to-point correspondence and formal similarity (i.e., echoic) or a non-verbal stimulus (e.g., tact or textual) to an intraverbal stimulus. These procedures emphasize thematic clusters of intraverbal responses (e.g., animals are cats, dogs, chickens, etc.; Braam & Poling, 1983; Finkel & Williams, 2001; Luciano, 1986; Miguel, Petursdottir, & Carr, 2005; Partington & Bailey, 1993; Sundberg, et al., 1990; Watkins, et al., 1989).

Transfer of stimulus control is generally effective in teaching intraverbal behavior (Braam & Poling, 1983; Luciano, 1986; Miguel, et al., 2005; Partington & Bailey, 1993; Sundberg, et al., 1990; Watkins, et al., 1989). However, response type was limited to thematic clusters. Furthermore, tangible reinforcers were often required to maintain responding. Dependent variables were consistent with Skinner's (1957) analysis of verbal behavior. Training procedures often generated novel or untrained intraverbal responses (Braam & Poling, 1983; Luciano, 1986; Miguel, et al., 2005; Partington & Bailey, 1993; Watkins, et al., 1989). Miguel, et al. (2005) noted the strength of transfer of stimulus control procedures relative to multiple tact training and receptive discrimination training in establishing intraverbal repertoires.

*Video modeling.* Researchers have investigated the effects of video modeling to generate intraverbal repertoires (Sherer, et al., 2001). Video modeling uses videos as teaching tools. Participants watch videos depicting the target behaviors prior to measurement of the dependent variable. Recent investigations on video modeling have focused on the components of training that lead to acquisition of responses.

Sherer, et al. (2001) focused on conversational intraverbals (i.e., responding to questions). However, they did not report significant gains in intraverbal repertoires. Because support for other classifications of verbal behavior or non-verbal behavior have been demon-

strated using video modeling (see Ayres & Langone, 2005, for a review) additional research maybe need to refine the procedure for intraverbal behavior.

*Conversation skills training programs.* Conversation skills training programs focus on increasing the quality of intraverbal repertoires. Some strategies included in the conversation skills training programs were behavioral rehearsal, modeling, performance feedback (Whitehill, Hersen, & Bellack, 1980), role-playing, shaping (Lewis, Roessler, Greenwood, & Evans, 1985), communication books (Hunt, Alwell, & Goetz, 1988), direct instruction, discrimination training, and reinforcement (Young, Morgan, & Peterson, 1988). Overall data indicated success across the various conversation skills training programs for improving intraverbal responding (Hunt, et al., 1988; Lewis, et al., 1985; Whitehill, et al., 1980; Young, et al., 1988).

Conversation skills training programs were effective in generating intraverbal repertoires. Training emphasized conversational intraverbals. Participants were required to attend for long periods of time (Lewis, et al., 1985); possibly limiting the applicability of the interventions to certain populations. Generalization and maintenance data were collected via anecdotal report and some responses were may have represented extended tact repertoire rather than an intraverbal repertoires due to the controlling stimuli (Hunt, et al., 1988).

*Discrete Trial Training.* Discrete trial training (DTT) procedures have been implemented to develop intraverbal responding. Wong and Woolsey (1989) taught four participants with chronic schizophrenia simple conversational skills. Each target response was trained sequentially with repeated trials. The data indicate that DTT procedures were effective in generating the target skills.

While Wong and Woolsey (1989) successfully established intraverbal responding, response and setting generalization are noted limitations of DTT procedures (Maurice, Green, & Luce, 1996). In addition, individuals with schizophrenia have had prior contact to reinforcement contingencies for intraverbal responding. Populations who may not have had this history may not respond as favorably to DTT.

*Direct Instruction.* Direct Instruction (DI) is a research-based approach to instructional de-

Table 1  
*Summary of strengths and limitations of procedures for establishing intraverbal repertoires.*

| Procedures                          | Strengths   | Limitations  |
|-------------------------------------|---|--|
| Peer mediated interventions         | Effective<br>High social validity<br>Effective across subclasses intraverbals<br>Generalization data reported   | Loose operational definitions<br>Weak data collection procedures<br>Use of contrived reinforcement contingencies   |
| Transfer of stimulus control        | Effective<br>Untrained responses emerged<br>Good operational definitions and measurement systems<br>Limited to categorical intraverbals   | Target behaviors not always intraverbals<br>Generalization outside of sessions<br>Use of contrived reinforcement contingencies   |
| Video modeling                      | Focus on conversational intraverbals  | Little generalization to novel stimuli   |
| Conversation skills training        | Effective   | Required extended participant attending<br>Little generalization or maintenance data<br>Responses under the control of non-verbal stimuli rather than verbal stimuli in some studies<br>Procedures not described in detail |
| Discrete trial training (DTT)       | Effective   | Generally reported concerns with DTT procedures (e.g., rote responses, generalization, etc.)   |
| Direct Instruction Instruction (DI) | Effective for academic intraverbal repertoires<br>Teaches more in less time<br>Fills in gaps<br>Maximizes time spent on instruction   | Not commonly employed to teach non-academic intraverbal repertoires<br>Programmed and scripted lessons<br>No demonstrated effectiveness with individuals without some intraverbal repertoires                              |
| Precision Teaching (PT)             | Effective in establishing intraverbal repertoires regardless of the form of the stimuli controlling the response<br>Employed with a variety of instructional strategies<br>Employed across a variety of populations and age ranges<br>Investigations specific to retention, endurance, application, and stability | Data not well documented and published<br>Not descriptive in specific PT components used in interventions<br>Focus on academic intraverbals  |

sign and implementation that is supported by the basic principles of behavior analysis (Becker & Carnine, 1980; Binder & Watkins, 1990; Englemann & Carnine, 1982; Weisberg, Packer, & Weisberg, 1981). DI encompasses an instructional approach in which the primary focus is rapid skill acquisition in the core academic subject areas: math, reading, and language arts. The DI curriculum entails a specific sequence of examples and non-examples selected through a general case strategy. This approach sequentially builds intraverbal repertoires (Binder & Watkins, 1990; Englemann & Carnine, 1982).

DI is effective for teaching basic academic intraverbal repertoires, yet it is not commonly used to teach other intraverbals such as conversational language. In addition, DI has not been widely adopted in educational settings. Concerns with DI focus on the programmed and scripted lessons. Curricula are scripted for the instructor and the lessons include directives for when to ask the learners questions, when to expect individual or choral responding, and how to respond to student errors. DI generally requires a strong initial intraverbal repertoire prior to implementation. Researchers have not investigated the effectiveness of DI strategies for establishing intraverbal repertoires.

*Precision Teaching.* Pennypacker, Koenig, and Lindsley (1972) developed the standard celeration chart to record count over time (for the history of the development of precision teaching, see Potts, Eshleman, & Cooper, 1993). They emphasized evaluation and revision of teaching strategies through visual inspection of charted data. Some PT philosophies and strategies that have driven both research and practice include: (a) that “the child knows best”—based on Skinner’s “the rat is always right,” exemplifying that it is the teacher’s job to alter variables controlling behavior until they produce preferred behaviors, (b) daily measurement of performance, (c) self-recording and sharing discoveries, (d) functional and descriptive definitions of the variables occurring or changing behavior, and (e) assessing “behavior tracks” the results of performing the behavior (an extension of the functional approach used in operant conditioning laboratories; Binder & Watkins, 1990).

Precision teachers contend that brief time samples are sufficient for making data based decisions and monitoring student gains. The

most common time sample is 1 min timings. PT implementers also incorporate the use of fluency, or accuracy plus speed (Binder, 1988). Furthermore, precision teachers found that students performing at “below average” levels had lower rates of responding than higher performing students.

Binder (1996) has highlighted some of the key developments of PT. Frequency aims, established through careful evaluation of specific skills performed at specified rates, are said to improve retention and endurance. Aims were subjected to experimental evaluation leading to another unique feature of PT: retention, endurance, application, and stability (REAPS) criterion. REAPS ensures that target behaviors are retained over time and are performed at proficiency criteria for long durations (Berens, et al., 2003; Binder, 1996). Some precision teachers suggest skills that meet REAPS criteria may result in the emergence of untrained skills.

PT uses “learning screening” procedures for assessing performance levels and celerations to identify risk for failure (see Magliocca, Rinaldi, Crew, & Kunzelmann, 1977). It has been suggested that PT is a method that has no racial or socioeconomic bias (see Koenig & Kunzelmann, 1981). PT offers extensive support on when and how to change variables to produce behavioral gains based on patterns of performance displayed on the standard celeration chart (Graff & Lindsley, 2002; Lindsley, 1992; Pennypacker, Gutierrez, & Lindsley, 2003). In addition, PT practitioners have suggested that suppressing errors can slow learning while increasing rates of responding can increase rates of acquisition (see Bower & Orgel, 1981; Lindsley, 1991).

The precision teaching methodology incorporates well-defined relations across stimulus conditions and performance (labeled learning channels). Precision teachers contend that improved performance will result, particularly if the standard celeration chart is used to chart performance (Cooper, 2005). PT principles are thought to be applicable across instructional strategies and behaviors. However, there are few publications emphasizing the outcomes of PT. Binder (1996) suggests three reasons that this has occurred. First, PT strategies are primarily implemented by practitioners, not those seeking publications to advance their careers. Second, journal and publication cycles did not

move fast enough to incorporate all of the findings of precision teachers. Finally, in lieu of publishing their findings, precision teachers rely heavily on events called “chart shares” during which students and teachers vocally share data charted on the Standard Celeration Chart.

The most cited PT study took place in Great Falls, Montana. In the 1970's, a school-wide project was conducted using the techniques of PT. On average, students advanced 19–40 percentile points and showed improvement of two or more grade levels per year. The Behavior Bank, a compilation of thousands of charts, showed that PT was an effective teaching strategy across skill areas. Some precision teachers concluded that there was no need for further research to support their findings (Brent, 1977). The lack of data shared in peer reviewed journals may have been one of the most critical mistakes made by precision teachers. While PT advanced itself as a teaching technology, the lack of research has led to many criticisms from practitioners and behavior analysts. More recent proponents of PT have suggested that data shared informally should be used as a basis for more formal research to support the claims of PT (Binder, 1996).

Some investigations have been conducted to support the effectiveness of PT, although few investigations have focused on supporting the specific claims of PT (e.g., REAPS, the use of fluency aims, etc.) or isolating the components of PT responsible for behavior change (e.g., standard celeration charts, examining data weekly, fluency aims, etc.). The support for these claims may be found in specific student data shared through chart shares, yet this practice provides little empirically validated support for those reviewing the literature and appeals to a very small audience. As such, it is difficult to analyze the strength of these claims. In addition, precision teachers may not see the need to identify which components of the technology are most effective, and as such, accept the technology as an entire package, so long as the standard celeration chart is used. Despite the lack of published research in PT, there are some investigations that have focused on using PT to establish intraverbal repertoires.

PT research suggested favorable outcomes for establishing intraverbal repertoires. These findings support the use of PT to establish academic intraverbal repertoires for skills such as

curriculum acquisition (Lovitt, et al., 1985), creative writing (Albertson & Billingsley, 1998; Albrecht, 1981; Spaulding, et al., 1995), math facts (Chiesa & Robertson, 2000; Sweeney, et al., 2001), learning a second language (Polson, et al., 1997), and reading comprehension (Killu, et al., 2001; Tennenbaum & Wolking, 1989). Essentially, PT research focuses on the acquisition of academic intraverbal repertoires. As a result, the effects of PT on establishing conversational intraverbal repertoires are not clear. In general, only a few articles noted the merger of PT and Skinner's (1957) analysis of verbal behavior (Chase, et al., 1985; Polson, et al., 1997; Tennenbaum & Wolking, 1989). The remaining articles included dependent variables that fit Skinner's (1957) definition of intraverbal behavior but were not labeled as intraverbal.

Results were favorable regardless of the form of stimuli controlling the response—vocal or visual and regardless of the form of the response—vocal or written. In addition, the techniques were applied across a variety of instructional strategies, although they were most commonly combined with DI (Lindsley, 1991; Sante & McLaughlin, 2001). Participants encountering PT interventions range in age from young children to adults and ranged in skill level from individuals with developmental disabilities to individuals in the gifted range of performance, thereby suggesting an additional strength of PT.

Berens, et al. (2003) provides support for REAPS. Their findings are important for training new repertoires and for strengthening intraverbal repertoires. Additional research extending the findings of Berens, et al. (2003) may be valuable. Polson, et al. (1997) found that participant rate of performance continued to improve after mastery criteria for accuracy were met. In addition, they suggested specific investigations examining fluency-based instruction and stimulus equivalence relations.

In general, researchers did not describe or analyze the components of PT that led to the treatment gains. Although PT can be described as a treatment package, each investigation included some components of PT and left out others. Few studies included all of the critical features of PT. Some of the interventions focused on bringing skills to rates of “fluency,” while others did not specify a fluency aim. It is possible that fluency-based instruction was re-

sponsible for the treatment outcomes. In addition, if REAPS is the criteria used to assess whether or not a skill has been brought to levels of fluency, few investigations subjected skill repertoires to experimental validation of REAPS. It was unclear if the procedures would have been more effective or produced longer lasting gains or stronger repertoires if researchers probed all components of REAPS. If all components of PT were included in the intervention, based on PT contentions, the gains in intraverbal repertoires would have been stronger.

Many of the limitations noted are characteristics of most PT practices. The data and principles are not well documented. Precision teachers rely heavily on chart shares to share their findings. Many clinicians and researchers are not exposed to what appears to be a powerful teaching technology. In addition, those who have been exposed to PT and wish to contribute to the existing body of literature may not find specific information relevant to intervention strategies such as suggested fluency aims, standard celeration charts, or previous experimentally validated findings.

## DISCUSSION

Each procedure employed thus far to establish intraverbal repertoires adds to the existing body of literature, yet each procedure also reveals several limitations. As clinicians search the literature to find effective strategies to employ in their day to day work with clients, they find little solace in the overwhelming number of articles and the variety of training procedures. The research supports the use of each procedure, yet only segmented pieces of intraverbal repertoires are established (Albertson & Billingsley, 1998; Albrecht, 1981; Bell, et al., 1991; Berens, et al., 2003; Braam & Poling, 1983; Chiesa & Robertson, 2000; Killu, et al., 2001; Lovitt, et al., 1985; Luciano, 1986; Miguel, et al., 2005; Ritesman, et al., 1996; Spaulding, et al., 1995; Sweeney, et al., 2001; Tennenbaum & Wolking, 1989; Watkins, et al., 1989) generally with contrived controlling variables (Braam & Poling, 1983; Hunt, et al., 1988; Kamps, et al., 1994; Kamps, et al., 2002; Krantz, et al., 1989) and contrived reinforcement contingencies (Braam & Poling, 1983; Kamps, et al., 1994; Kamps, et al., 2002; Krantz, et al., 1989; Luciano, 1986; Watkins,

et al., 1989). Clinicians seek to teach the intraverbal repertoire in its entirety and to establish this repertoire under naturally occurring stimulus control and reinforcement contingencies.

As researchers review the literature in order to extend or further develop a topic area, they find loosely defined target behaviors (Kamps, et al., 1994; Kamps, et al., 2002; Krantz & McClannahan, 1998; Krantz, et al., 1989; Whitehill, et al., 1980; Young, et al., 1988), fragmented or incomplete discussions of what component skills make up an intraverbal repertoire (Chase, et al., 1985; Skinner, 1957), and tension with respect to which line of research to follow and support (e.g., transfer of stimulus control, DI, PT, etc.). As a result, multiple distinct lines of research persist in the realm of establishing intraverbal repertoires. Little overlap of the strengths of one procedure in combination with the strengths of another procedure exists. Essentially, best practices with respect to establishing intraverbal repertoires have not been clearly identified and need to be further examined.

Incorporating the literature on PT further exacerbates the issue. PT is not widely used in clinical settings nor is it widely cited in peer reviewed journals, other than the *Journal of Precision Teaching*. PT is a methodology and data collection system that speaks largely to itself—in its own journal and through chart shares. Precision teachers have made some claims without providing adequate empirical support, such as when it has been suggested that PT leads to the emergence of untrained skills or that frequency measures have no racial or socioeconomic bias. Yet many precision teachers suggest the benefits of adding PT to existing training programs. For example, Kubina, Morrison, and Lee (2002) suggest that PT offers scientifically derived attributes from Skinner's experimental analysis of behavior, and uses frequency as a universal measure of behavior, Standard Celeration Chart for visual display of data, REAPS as a result of building fluency, precise descriptions of behavior, and guidelines for making daily chart-based decisions and flexibility. Fabrizio (2003) also supports these claims, suggesting that PT removes measurement defined ceilings imposed by percent correct measures, eliminates procedure imposed ceilings, and remediates deficit imposed ceilings with the use of component/com-

posite skill assessment. The application of PT to existing procedures to establish intraverbal repertoires suggests support for establishing some subclasses of the intraverbal, yet it has not been extended across other subclasses (e.g., conversational intraverbals, etc.) of the intraverbal.

The current review of the literature suggests a wide range of effective procedures for establishing subclasses of the intraverbal, yet this review does not extend easily into best practice, nor does it suggest how to best establish an intraverbal repertoire or an entire intraverbal repertoire. A comprehensive account of how to establish intraverbal repertoires will occur only if a precise unit of measurement is used. A further analysis of PT may be necessary to address this issue. Is frequency a more sensitive measure than percentage correct? Is it a more sensitive measure for some subclasses of the intraverbal (e.g., math facts) and not others (e.g., answering WH questions)? Is it a comprehensive measure that accounts for variations in intraverbal responding? A comprehensive account of how to establish intraverbal repertoires should include target behaviors that are well-defined. Further analysis of the intraverbal may aid researchers in better defining target behaviors. This analysis might begin by identifying subclasses of the intraverbal that may entail an extension of Skinner's *Verbal Behavior* (1957). Identification of functional relations among subclasses of the intraverbal may be useful. For example, controlling variables for oral reading comprehension may differ from written reading comprehension as might controlling variables for answering WH questions in conversation and making related statements during conversation. Further differences may emerge in answering questions to show knowledge of academic material as opposed to answering questions about past or upcoming events.

Once a more complete account of the operant class of intraverbals has been made, researchers should identify procedures that establish responding under the appropriate stimulus control that is maintained by naturally occurring reinforcement contingencies. The existing body of literature lends itself to many possible extensions that could generate a coherent account of how to establish a comprehensive repertoire of intraverbal behavior. Transfer of stimulus control procedures and DI

procedures could be extended to conversation skills. Conversation skills training packages can be analyzed to determine which variables are necessary for behavior change. DI could be attempted with individuals without extensive intraverbal repertoires.

Can precision teaching help? Does PT offer a technology that will result in the emergence of untrained intraverbals or that will expedite the acquisition of intraverbal repertoires? Additional research needs to be conducted. A first step might be to employ PT across each of the procedures examined to determine the benefits of PT. The techniques of PT need to be extended across subclasses of the intraverbal and across other procedures for establishing intraverbal repertoires. An analysis of the components within PT needs to be conducted to determine if portions of the technology can be applied to other procedures to produce significant gains or if the entire package needs to be applied. Is it possible that the intraverbals established in transfer of stimulus control procedures are brought to levels of fluency that untrained intraverbals may emerge? If mands, tacts, and echoes are taught to levels of fluency, does this result in untrained intraverbal behavior? Should the frequency of responses be charted on standard celeration charts, or is there a more accurate measure? It is only after more research is conducted that one can assert what is or is not, best practice for establishing an intraverbal repertoire and to what extent PT plays a role.

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