THE EFFECTS OF DYNAMIC PROGRAMMING ON CHILD OUTCOME IN EARLY INTERVENTION
BY

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Abstract

In recent years there has been a dramatic increase in the number of agencies implementing organized service delivery systems to treat children with autism. Organizational management features designed to manage staff and child progress are critical in producing the highest quality outcomes in the children served (National Research Council, 2001). The current study seeks to identify a system for management of clinical outcomes. Four children diagnosed with an autism spectrum disorder (ASD) and the four teams of staff implementing their ABA treatment program participated in evaluating the effects of a system for management of clinical outcomes. During baseline, typical systems were in place to manage the children's learning. The clinical management system, known as Dynamic Programming was introduced via a multiple baseline design across children. Dynamic Programming is an intervention package that includes: (a) therapist self-monitoring while teaching new program exemplars, (b) therapist public posting of child mastery (c) probes of child behavior to "test" or confirm therapist self-monitoring and public posting (each therapist reports their results on the Dynamic Programming sheet and team members "check" one another). After treatment implementation, each child's rate of learning increased and maintained 5-10 weeks post treatment. Results suggest that the children's rate of learning was accelerated through the implementation of Dynamic Programming. The parents of the children were satisfied with the implementation and outcome for their children.

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Behavioral treatment involving operant conditioning procedures has been effective in helping to significantly improve the functioning of children with autism spectrum disorders (ASD) (Anderson & Romanczyk, 1999; Green, 1996; New York State Department of Health, 1999; Smith, Groen, & Wynn, 2000). As a result, the field has seen a dramatic increase in the number of agencies implementing organized service delivery systems (Jacobson, 2000). When these organized systems are evaluated, a number of common organizational management features are identified (Handlemann & Harris, 2001; Leaf, Taubman, & McEachin, 2008; Lovaas & Smith, 2003; National Research Council, 2001). Large-scale outcome studies have found that organizational management features designed to manage staff and child progress are critical in producing the highest quality outcomes in the children served (National Research Council, 2001). One common criticism of such studies, however, is that the actual implementation of the clinical programming is poorly specified (Strain, 1987). This is not only a weakness in the data produced, but it suggests a lack of rigor in the regular management of the clinical program. Strain (1987) called for more precise documentation of the details regarding what clients actually experience during intervention. Current trends in the literature suggest that more recent studies are designed to refine and analyze the factors related to treatment effectiveness (Matson, 2012).

Therefore it is the intent of the current study to clearly specify one part of the Early Intensive Behavioral Intervention (EIBI) and experimentally analyze this as a system for management of clinical outcomes. In pilot research this system has been called Dynamic Programming (Larsson, Riedesel, & Fouquette, 2006; Riedesel, Simon, Standal, & Larsson, 2003). Dynamic Programming is an intervention package that includes: (a) therapist self-monitoring while teaching new program exemplars, (b) therapist public posting of child mastery (c) probes of child behavior to "test" or confirm therapist self-monitoring and public posting

(each therapist reports their results on the Dynamic Programming sheet and team members "check" one another). There are eight effects on the multiple levels of clinician behavior that are hypothesized to result from this system. These are: increasing the accountability of staff and parent therapy behavior; increasing the functional importance of the clinical goals developed; increasing the acuity of the daily child learning goals implemented; increasing the rate of child learning; improving the continuity of therapy behavior during staff transitions; increasing the efficiency of supervision; improving the efficiency of the data collection system; and improving supervisor and therapist techniques by motivating good therapy skills as in effective reinforcement and rapid, but effective prompt fading.

Dynamic Programming can help increase the accountability of staff and parent therapy behavior because the various components prompt and reinforce the behavior of the staff and parents using it. As described below, one therapist may teach the child a skill, but child mastery is dependent on the child demonstrating the skill with a different therapist.

It is hypothesized that through Dynamic Programming, the child will receive more functional daily training, rather than random training wherein the child does not functionally master a target. Because mastery depends on child behavior with different individuals, the daily child learning goals need to be specific and attainable. This is a central concept of Dynamic Programming. The supervisor is responsible for task analyzing skills into teachable parts that can be mastered each day. Requiring the child to demonstrate the skill across multiple individuals increases the likelihood that the supervisor spends sufficient time probing child behavior at baseline and coming up with an individualized task analysis for each skill. The reader may assume this happens, but given the high demand for EIBI services, clinicians often do not have sufficient time for each child on their caseload. Therefore appropriately individualized task

analyses are not implemented and sometimes children only master one skill every few days or weeks. If the supervisor is able to determine appropriate task analyses, therapist's ability to shape behavior can also increase.

Dynamic Programming may also help increase the rate of child learning. In conjunction with appropriate task analyses child behavior would be more appropriately reinforced and thus learning can be increased. Through appropriate goals and task analyses the child may master more skills on a daily basis. As stated above, oftentimes skills can take a long time to master; however, breaking the skill down into more teachable parts that can be mastered daily can also result in the whole skill being mastered faster than when the task analysis is not set up in this manner.

Dynamic Programming can also improve the continuity of therapy behavior during staff transitions. When similar systems are implemented across clients, as with Dynamic Programming, staff transitions may be minimally disruptive to the children's learning. Dynamic Programming can facilitate this because the parts of the system help therapists and supervisors use the data and the system to improve and evaluate their technique with different types of learners.

Dynamic Programming could also increase the efficiency of supervision. As stated above, the high demand and cost for IEBI services can decrease supervision time so much so that even a skilled and well trained supervisor may be ineffective because of an inappropriately large caseload. As will be shown below, Dynamic Programming, including the Dynamic Programming sheet and the data summary systems, can help increase the salience of the data to be reviewed and clearly show the child learning areas that are in need of revision versus those

that are going well. This helps the supervisor prioritize their behavior within the time they can dedicate to the child.

Through the Dynamic Programming sheet and the data summary systems, the efficiency of data collection may increase. In Dynamic Programming data collection focuses on only collecting the data that facilitates appropriate therapist and supervisor decision making. This is in contrast to collecting so much data that ultimately is not ever evaluated due to time constraints or that prevents proper implementation of reinforcement and shaping because data collection is inappropriately taking priority in the teaching session.

Finally, we hypothesize that Dynamic Programming improves supervisor and therapist technique by motivating good therapy skills, as in effective reinforcement and rapid but effective prompt fading. The child's behavior is constantly changing and therefore the therapist's behavior must change in response. To this point Skinner (1953) indicated:

> Behavior is a difficult subject matter, not because it is inaccessible, but because it is extremely complex. Since it is a process, rather than a thing, it cannot easily be held still for observation. It is changing, fluid, and evanescent, and for this reason it makes great technical demands upon the ingenuity and energy of the scientist. But there is nothing essentially insoluble about the problems which arise from this fact (p.15).

The Dynamic Programming sheet below, is intended to motivate therapists to meet daily child goals and provides differential consequences to the therapists, without the supervisor needing to be present, about the effectiveness of their implementation of reinforcement and prompt fading on an ongoing basis throughout teaching sessions. During a previous implementation of Dynamic Programming in clinical practice outside of this research, therapists were always assumed to be working hard to implement functional reinforcement for the child. However,

when Dynamic Programming was introduced, the therapist's first questions often were questions such as "What will we use as reinforcers?" Questions like this suggest that, with the implementation of Dynamic Programming, it suddenly now mattered if functional reinforcers were actually identified by the therapists because they had to show that they could teach the child skills at the same rate as everyone else on the team.

The effects of Dynamic Programming on direct staff and parent therapy behavior are expected to be mediated through immediate differential consequences created from public posting and self-monitoring. The effects of this system on supervisory behavior are expected to be mediated through the focus on outcomes in the measurement tools and resulting differential consequences from staff, parent, and child behavior. For the purpose of this study we evaluated the effect of Dynamic Programming on the child's rate of learning and on therapist and supervisor technique.

The Contributing Variables to the Effectiveness of Early Intensive Behavioral Intervention

In EIBI the principles and procedures of Applied Behavior Analysis are comprehensively implemented and individualized to reduce excessive behaviors and increase deficit behaviors. Examples include stimulus control procedures (i.e., O'Connor, Prieto, Hoffmann, DeQuinzio, & Taylor, 2011), momentum and high probability command sequences (i.e., Ray, Skinner, & Watson, 1999; Romano & Roll, 2000), establishing operations (i.e., Gutierrez et al., 2007) various prompting and prompt fading procedures (i.e., Ingvarsson & Hollobaugh, 2010; Leaf, Sheldon, & Sherman, 2010), and differential reinforcement procedures (i.e., Karsten & Carr, 2009; Napolitano, Smith, Zarcone, Goodkin, & McAdam, 2010). These procedures are implemented in different models. One model, known as discrete trial training, involves breaking skills down into small teachable parts as directed by a therapist, teacher or parent (i.e., Lovaas,

1987). In this model, teaching is extended from the structured discrete trial training to the natural environment through incidental teaching (i.e., Hart & Risley, 1980). Incidental teaching includes the manipulation of motivating operations and likely facilitates generalization. The principles and procedures of applied behavior analysis are comprehensively implemented through other models. The fluency training model derives from precision teaching (i.e., Lindsley, 1992) and focuses on the accuracy and rate of responding. The pivotal response training model (i.e., Koegel, Koegel, & Carter, 1999) focuses on pivotal areas and uses natural stimuli and consequences. Finally, the verbal behavior model focuses on teaching language to children with autism via B.F. Skinner's analysis of verbal behavior (Partington & Sundberg, 1998).

Regardless of the model, the goal is to optimize each individual learner's overall functioning in all facets of life including communicative and social functioning (Lovaas & Smith, 2003). Curriculums designed to help the various elements mentioned above often focus on language acquisition, play, social, and academic skills, and self-care and self-control skills (e.g., Lovaas, 2003; Lovaas et al., 1981, Maurice, Green, & Foxx, 2001; Maurice, Green, & Luce, 1996; Leaf & McEachin, 1999). There is growing consensus that EIBI is effective (Matson et al., 2012). Benefits of EIBI typically include better adaptive functioning, statistically significant improvements in IQ, and less restrictive placements in school. Key contributing variables include the initiation of treatment before the age of four (though some results indicate EIBI is beneficial if treatment is initiated before the age of seven) and intensity of treatment ranging from an average of 18 to 42 hrs of one-to-one treatment per week over a period of 1 to 3 years (Mudford, Martin, Eikeseth & Bibby, 2001).

Lovaas (1987) conducted a long-term study investigating the outcome of EIBI for children with ASD over time. Lovaas found that 47% of children who received an average of 40

hrs per week of behavior therapy over more than two years achieved IQ scores within the normal range of functioning and functioned independently in typical public-school first-grade classrooms. A follow-up study indicated that 8 of the 9 best outcomes children maintained the gains until the average age of 13, at which point the research ceased (McEachin, Smith, & Lovaas, 1993). Since the Lovaas studies, numerous other studies have demonstrated the benefits of EIBI (e.g., Anderson, Avery, DiPietro, Edwards, & Christian, 1987; Birnbrauer & Leach, 1993; Cohen, Amerine-Dickens, & Smith, 2006; Eikeseth, Smith, Jahr, & Eldevik, 2002, 2007; Hayward, Gale, & Eikeseth, 2009; Howard, Sparkman, Cohen, Green, & Stanislaw, 2005; Sallows & Graupner, 2005).

Some variables that are germane to the present study are (a) staff training, (b) self-monitoring, and (c) public posting. These will be reviewed below. An additional feature of EIBI is a comprehensive staff training model. In particular, this present study investigated a comprehensive system of staff training which utilized public posting and self monitoring where differential consequences are central to staff training, self-monitoring, and public posting and likely contribute to the effects of such interventions and corresponding packages.

Staff Training

Staff training, as a means of improving client functioning, has been extensively researched. The literature on comprehensive EIBI tends to describe staff training as a key element facilitating child outcomes (e.g., Dyer, Martino, & Parvenski, 2006; Hayward, Gale, & Eikeseth, 2009). In particular, the quality of staff delivering and supervising the interventions (Hayward, Gale, & Eikeseth, 2009; Weinkauf, Zeug, Anderson, & Ala'i-Rosales, 2011) may be related to client improvements. The importance of staff training in EIBI is also supported by the

National Research Council (2001) and best practice recommendations (e.g., Sturmey, 2008). Thus staff training is an important element of the effects of EIBI.

In the single-subject staff training literature involving children with disabilities, effective training programs have typically involved treatment packages administered to individuals or groups of staff members. In general, the most common components of these packages include various combinations of instructions, discussion, modeling, rehearsal, prompting, graphing, and/or differential consequences from supervisors (e.g., Parsons, Schepis, Reid, McCarn, & Green, 1987; Ryan, Hemmes, Sturmey, Jacobs, & Grommet, 2008; Schepis, Reid, Ownbey, & Parsons, 2001; Weinkauf, Zeug, Anderson, & Ala'i-Rosales, 2011). One specific package typically called "behavioral skills training," consists of instructions, modeling, rehearsal, and differential supervisory consequences (e.g., Dib & Sturmey, 2007; Sarokoff & Sturmey, 2004, 2008). Advanced commonly available technology, such as Bluetooth technology, can facilitate immediate differential supervisory consequences from supervisors not in the same physical location as staff, and has also been evaluated as a component of such treatment packages (e.g., Nepo, 2010). Component analyses of any of the packages are rare. Multiple baseline experimental designs are most commonly used to evaluate the effects of staff training on staff and client behavior. Measuring client outcomes is occurring more frequently in this literature now than in the past but to date many studies do not show the effects of the package on client behavior (Jahr, 1998).

Self-monitoring. While staff training is thought to be vital to child outcome, self-monitoring can also improve staff behavior. Self-monitoring, which involves self-evaluation and recording, is one of several self-management techniques. Self- management involves the personal and systematic application of behavior change strategies to produce desired changes in

behavior. Self-management occurs on a continuum with varying degrees of personal management (Cooper, Heron, & Heward, 2007). Other self-management techniques include self-administration of reinforcement and punishment, goal setting, self-charting, and environmental rearrangement. These techniques are often combined to form self-management packages (Dalton, Martella, & Marchand-Martella, 1999).

Packages that include a self-monitoring component, often combined with differential consequences and/or supervisor involvement, have been effective at altering staff performance to help dependent populations and individuals with disabilities (e.g., Burgio, Whitman, & Reid, 1983; Nepo, 2010; Petscher & Bailey, 2006). Studies involving children with ASD are limited (e.g., Pelletier, McNamara, Braga-Kenyon & Ahearn, 2010). Pelletier, McNamara, Braga-Kenyon & Ahearn (2010) used a video self-monitoring treatment package to help staff correctly implement procedures with a child with ASD. Staff watched themselves implement procedures on video and collected data on themselves. The staff's data was then compared to the experimenter's data. The experimenter then verbally explained why the staff was incorrect if the staff and experimenter disagreed in any areas. In a nursing home, Burgio et al. (1990) found that a package including staff self-monitoring, supervisor monitoring, and differential consequences improved continence with elderly residents. In a state residential facility, Burg, Reid, and Lattimore (1979), found self-monitoring and supervision to be effective at increasing the interactions between staff and residents. In trying to minimize supervisory behavior and isolate the effects of self-monitoring, Richman, Riordan, Reiss, Pyles, and Bailey (1988) used self-monitoring to increase on-task and on-schedule staff behavior. In this study, self-monitoring alone resulted in variability over time for both of these dependent variables for 5 of the 10 participants. As a result, Richman et al. (1988) added verbal supervisory consequences and

concluded that such consequences are likely a component of durable staff management procedures.

Public posting. In addition to staff training and self-monitoring, public posting is also another potentially effective intervention that might be used to enhance delivery of interventions for children with ASD. Public posting is an intervention that is implemented in many different forms such as charting, public graphing, histograms, small and large posters, and chalkboards (Nordstrom, Lorenzi, & Hall, 1991). It is a cost-efficient intervention that is relatively easy to implement (Galvan & Ward, 1998). For example, Kreitner, Reif, and Morris (1977) found that public posting of a memo significantly increased staff performance in an adult psychiatric unit. The memo included each staff member's name and their frequency of the target behaviors per week. Furthermore, Hutchison, Jarman and Bailey (1980) found that public posting increased the attendance and timeliness of professional staff (e.g., doctors and behavior specialists) at treatment coordination meetings in a residential treatment facility. The intervention consisted of graphs posted in the conference room where the treatment coordination meetings occurred. At the conclusion of each treatment coordination meeting, the group data for various departments was graphed and posted. All data remained on the posted graph and different departments could see how other departments performed on attendance and timeliness. In the first of two experiments, Green, Willis, Levy, and Bailey (1978) implemented public posting of a graph that included staff names and the percentage of time they were engaged with mentally retarded clients in a prompted voiding toileting procedure. The supervisor posted the graph and calculated the percentages for each staff member. They found improvements in staff performance and client gains. Furthermore, in a school setting, Whyte, Van Houten, and Hunter (1983) found public posting to increase teacher attendance at morning and after school activities.

Student academic performance has also increased as a function of public posting (e.g., Van Houten & Lai Fatt, 1981). Finally, on a different note, Van Houten, Nau, and Marini (1980) reduced driver speed by posting a sign on the side of a highway.

Public posting interventions have been administered to individuals and to a team or group of individuals. For example, Emmert (1978) evaluated the effects of group and individual public posting in the form of differential consequences from graphs. Performance increased in both the group and individual conditions but the increases were more substantial in the condition where differential consequences were individualized. Moreover, Jackson and Mathews (1995) implemented group public-posting in a grocery store to increase donations to a senior center (see also Rice & Lutzker, 1983). Finally, a study by Emmert (1978) indicated that individual differential consequences were an important component of public posting.

Like the staff training packages, most public posting interventions are evaluated as a package with other interventions such as prompting, differential consequences from supervisors (outside the consequences that are a component of posting), and/or goal setting (e.g., Anderson, Crowell, Doman, & Howard, 1988; Brobst & Ward, 2002, Galvan & Ward, 1998; Ward & Carnes, 2002). In their second experiment, Green et al. (1978) found public posting and supervisory differential consequences to be effective. Many public posting interventions include additional consequences that are not always conceptualized as package components.

Component analyses of treatment packages involving public posting generally provide evidence that the interventions were effective due to public posting. As a case in point, Gershater, Lutzker and Kuehnel (1997) found that, after a few different intervention conditions including a staff training condition, a public posting intervention was effective at further increasing staff-patient interactions at a residential facility for adults with schizophrenia. The

public posting condition consisted of poster boards showing the activities in which staff members were engaged with the clients. Staff members were responsible for manipulating the board as their engagement with different clients and activities changed throughout the day. In this condition, staff members also completed a checklist that described the activities. Supervisors collected the checklist weekly. In another example, Quilitch (1975) evaluated the effects of three different interventions to increase the frequency of activities made available to residents living at a mental health institute. Quilitch first evaluated a memo that was sent from the chief administrator stressing the importance of residents being engaged in activities and indicating when and where the activities could take place. This memo intervention was followed by a 4-hr group workshop with talks, discussion and slide presentations emphasizing the importance of resident engagement in various activities. The most successful intervention was implemented last. This intervention involved an activities schedule with the dates and location of specific activities set up for residents and the names of the staff assigned to each activity. This activities schedule was posted in the ward for everyone to see. The day following the scheduled activities, a poster was posted by the nursing station. This poster included the name of the activity leader from the previous day and the average daily activities each resident engaged in. A graph depicting the same information was also on the poster. This intervention produced a significant improvement over baseline and the other interventions.

In summary, public posting and packages incorporating a public-posting component have been shown to be effective in different formats across a variety of settings, behaviors, and individuals yet public posting is rarely evaluated in EIBI. Lovaas (2003) recommends a public posting component for EIBI programs.

Clinical Program Management in EIBI

Many EIBI outcome studies are accompanied by published treatment protocol manuals (e.g., Lovaas, 2003; Lovaas et al., 1981, Maurice, Green, & Foxx, 2001; Maurice, Green, & Luce, 1996; Leaf & McEachin, 1999). In clinical practice, the recommendations in these manuals guide many practitioners and parents in teaching specific skills (also referred to as "drills," "programs," or "objectives"), as well as provide general information about setting up and directing an EIBI program. Each of the manuals above provides examples of various skill targets, task analyses of these skill targets, and data collection systems and sheets.

In order to keep track of which skills have been targeted each day, the Lovaas (2003) manual contains an example of a "Program Checklist (322)." The Program Checklist is a table that has columns for each day of the week and rows indicating the various current skill targets. The boxes that are formed under each day of the week (and which correspond with each skill program) are large enough for the therapists working with a child to place their initials in the box. After a therapist engages in a teaching session for a specific skill target on a particular day, they place their initial in the box corresponding with the target and day of the week. They self-monitor and publicly post what they targeted with the child for other team members, including parents, to see. According to Lovaas (2003), the purpose of the Program Checklist is for other therapists to be able to quickly reference this table/data sheet and determine how many times a skill target has been implemented in a day. Leaf and McEachin (1999) also show an example of a potential Program Checklist in Appendix D of their manual but they do not describe any purpose or function.

Little else is found in the ASD literature that indicates the function of the Program Checklist. A study by Sheinkopf and Siegel (1998) (which was not based on direct observation

of the treatment procedures but instead on parental interviews describing therapy) indicated that, "forms were provided with which parents and therapists could keep detailed records of sessions and, within sessions, the child's responses to individual trials (p. 18)." These forms may or may not have included a version of a Program Checklist - it was not specifically mentioned.

There is evidence of widespread use of the Program Checklist online. An online Google search with the terms Autism and "Program Checklist" reveals samples of Program Checklists (e.g., Form menu, n.d; Model-aba-program, n.d.). Some samples are on the websites of service providers (e.g., Neary, n.d.) and others on parent support websites (e.g., Kathy, 2006). Some service providers do not show an example of a Program Checklist on their website but they do reference it in descriptions of their program (e.g., Autism Partnership, n.d.). None of these websites offer descriptions of use of the Program Checklist beyond that of Lovaas (2003) except one. The South Carolina Pervasive Developmental Disorder Waiver/State Funded Program Manual for Service Coordinators and Early Interventionists (found online at http://ddsn.sc.gov/serviceproviders/waivers/pdd/pddmanualchap.htm) indicates in Chapter 3 that a Program Checklist be submitted to a Service Coordinator once per month to demonstrate that the current skill programs are being conducted as scheduled. According to this manual, if an ABA consultant does not submit the Program Checklist (in addition to other data) future EIBI therapy services may be prevented.

Although use of the Program Checklist is not often described in detail in reports of EIBI, it seems to be utilized in practice in EIBI programs designed to meet the needs of children with ASD. The literature on the Program Checklist does not indicate any supervisory function. In fact, no empirical studies were located that specifically evaluated the use of the Program Checklist. It does however seem reasonable to anticipate that a supervisor could periodically

review the "Program Checklist" to evaluate which skill targets have been targeted in any given 1:1 therapy session or for the purpose of supplementing other data.

Further, the sequence of therapy programs, and the forms of behavior management and skill training are always described as being individualized in order to produce the most cost effective results (e.g., Handlemann & Harris, 2001). However, the manuals cited above lack a systematic approach to individually determining the sequence of therapy programs, behavior management, skill training, and target mastery. No systematic approach for utilizing the data to manage child progress was found. Not only does this weaken the conclusions to be drawn from outcome studies, but it suggests a weakness in clinical management.

A key focus of clinical management would be to have systematic criteria for target mastery, and to use the data yielded to determine the pace of program introduction. A review of the EIBI manuals, however, found no instances in which mastery criteria, beyond suggesting criteria for the number or percentage of trials correct, or management procedures were described. For example, Leaf and McEachin (1999) dedicate a few paragraphs to program evaluation and effectiveness however specific procedures are not described. They do, however, suggest that the rate of learning, once treatment has commenced, is a predictor of child outcome. Lovaas (2003), alludes to the fact that mastery should include independent responding and suggests that mastery probes are dependent on the teachers judgment, but provides no other parameters or recommendations. Leaf, McEachin, and Taubman (2008) state that prompts should be faded in a teaching session but do not elaborate on techniques (such as differential reinforcement) to facilitate or manage such prompt fading not do they tie the prompt fading to daily mastery of targets.

Purpose

The use of the Program Checklist described above does not set the occasion for differential consequences or goal-setting mechanisms found to be important in public posting interventions. It also does not seem to functionally incorporate the effective, cost efficient, technique of self-monitoring. Therefore the purpose of this research is to evaluate the effect of a package of components, based on the Program Checklist that includes self-monitoring, public posting, and probes of child behavior. Further, differential consequences are provided about the effectiveness of teaching essential functional goal behaviors rather than spurious outcomes of treatment. This package will be referred to as Dynamic Programming.

Method

Participants

Child participants. Four children receiving EIBI (e.g., Lovaas, 1981; Lovaas, 2003) in New Brunswick, Canada were studied. Children received an average of 13 to 16 direct teaching hours per week throughout baseline and treatment. A maximum of 20 hrs per week per child was funded by the Canadian government. Although this may not seem intensive, the literature reveals different variations of intensity. This level of intensity falls within the parameters that have produced positive effects (e.g., Luiselli, Cannon, Ellis, & Sisson, 2000; Sheinkopf & Siegel, 1998). Children were selected on the basis of the following criteria: (a) were diagnosed with an Autism Spectrum Disorder which was sufficient for them to qualify for public funding in New Brunswick, (b) were between the age of 2 and 5 years, (c) had a legal guardian who provided written consent for the child to participate in this research, (d) had behavior therapists that also consented. In addition to parent consent, assent was obtained throughout the research from child participants. Exclusionary criteria for children included: (a) children whose therapists

did not consent, (b) children, who, were engaged in competing treatments and activities which would prevent the implementation of the EIBI intervention and, (c) children whose parent or guardian did not consent to participate in this research. Table 1 summarizes the results of psychological testing conducted by a licensed psychological evaluator independent of this research.

Table 1

Participant External Assessment Results

Child	Age at Assessment	Diagnosis	Merrill-Palmer* Revised Scales of Development Age Equivalence	Vineland Adaptive Behavior Scales** Standard Scores (Range)	Month Entered EIBI Treatment
1	3 Years, 2 Months	PDD-NOS	2 Years	76-94	March 2010
2	3 Years, 3 Months	Autism	1 Year, 6 Months	71-84	August 2009
3	3 Years, 7 Months	Autism Spectrum Disorder	1 Year, 9 Months	66-88	May 2009
4	2 Years, 11 Months	Autism	1 Year	61-79	April 2010

* Roid & Sampers, 2004
**Sparrow, Balla, & Cicchetti, 1984

Therapy team participants. Therapy team participants were: (a) between the age of 19 and 43, (b) gave written consent to participate, (c) and all had 4-year bachelor's level degrees except one who had a 2 year specialty degree. Clinical supervisors passed an in house training course in relation to behavioral principles as applied with children with ASD. All hold a Master's Degree in a related field (e.g., Speech Language Pathology, Special Education) with

one exception (the clinical supervisor for Child 1). Each clinical supervisor also had at least two years of experience supervising ABA programs for children with ASD. The director of the agency held a Master's degree in Speech Language Pathology and had 15 year of experience with children with ASD. The experimenter was a Ph.D candidate and Board Certified Behavior Analyst with 12 years of experience working with children with ASD. The experimenter consulted with the director about this research and other clients weekly. Finally, the Licensed Psychologist, held a Ph.D in developmental and child psychology, was a Board Certified Behavior Analyst, and had over 30 years of experience working with children with ASD.

Setting and Materials

Therapists and supervisors were in the family's home or in the EIBI center where therapy and probe sessions occurred. The therapy team utilized discrete trial and incidental teaching. The therapy and probe sessions for Child 1 and 3 were always in the home. The probe sessions for Child 2 periodically took place at the center because the home was over one hr from the center. All therapy sessions for Child 2 took place at the home. Child 4 had half of her therapy at her home and half at the center. Probes were all conducted at the center. The EIBI team consisted of: (a) two therapists who engaged in therapy sessions with the child for approximately 13 to 16 hours per week, (b) a clinical supervisor who provided an average of 8 of 10 hours per month of supervision (see Appendix A). An adult care provider was also typically present during therapy or probe sessions in the home.

A closet or other organizational structure in one room of the home or center stored potential reinforcers and stimuli. The therapists used stimuli specific to the program exemplars they implemented. Stimuli varied for each child participant. Examples included (a) two-

dimensional cards with pictures of objects and/or subjects and/or (b) three-dimensional objects and subjects.

Dependent Variable and Data Collection

DV: The primary dependent variable was the number of new exemplars mastered per hour of therapy by the child. To determine the number of exemplars mastered per hour, the number of mastered child exemplars was divided by the number of therapy hours. For most exemplars, mastery was defined as the child demonstrating a correct response on the first probe trial of the day and 3 of 4 consecutive target trials, which were randomly interspersed with distracter (S-delta) trials. For exemplars that were frequency or duration based (e.g., play programs), one correct trial was required for mastery. A secondary dependent variable was the percent of first day mastery accurately determined by the therapist.

Pre-Baseline

Approximately 9 months before the baseline, the director attended a 2-day workshop given by the licensed psychologist who supervises the experimenter and made a site visit where she observed treatment utilizing the treatment variables described below. Pre-baseline also consisted of the experimenter, the director, and the team determining and agreeing on the programs and exemplars (i.e., targets) that would be implemented with the child in the experimental phases. See Appendix B for a list of the elements required in each program. The experimenter and director independently assessed reliability on each program element for each child in baseline and treatment with the exception of Child 1 in baseline. Table 2 indicates the percentages of reliability on the presence or absence of the elements required in each program.

Table 2

Reliability of Program Elements

Child	Reliability on Program elements in Baseline	Reliability on Program elements in Treatment
1	NA	98% (122 of 125)
2	96% (24 of 25)	97% (105 of 108)
3		98% (106 of 108)
4	91% (75 of 82)	97% (70 of 72)

The experimenter spent 4 to 7 hours observing the child (in person or via video) and consulting with the team about the programs for each child participant. In addition, the director spent approximately 5 to 10 additional hours developing the programs and exemplars and training the team on accurate implementation. Prior to the intervention, the parent's of Child 1 received verbal recommendations in relation to behavior management techniques and the parents and grandmother participated in programming for generalization of items mastered in therapy. The mother of Child 2 participated in making treatment decisions and observed treatment implementation in her home. The parent of Child 3 was coached on how to promote pretend play in the natural environment and best practice recommendations. Prior to this study, communication and staff training was the primary focus for Child 4. Child 4 had long intense challenging behaviors and little functional communication.

Baseline: Program Checklist

In this condition, the team used the Program Checklist. The Program Checklist is a data sheet that includes a table that has columns for each day of the week and rows indicating various programs that each therapist is responsible for teaching the child. Boxes are listed under each day of the week (and which correspond with each skill program) for the therapists to place their initials. To use the Program Checklist, the therapist engaged the child in a teaching session and

then self-reported on the program they implemented with the child. The therapist placed their initials in the box on the Program Checklist that corresponded to the program they targeted and the day of the week in which they targeted it (see sample in Appendix C). During the first teaching session of each new week, a therapist would place a new Program Checklist in the front of the child's logbook where the supervisors, therapists and the parent could see it (Lovaas, 2003).

The curriculum consisted of a combination of popular curriculums found in manuals mainly derived from the work of Lovaas and Sundberg. Language programming was guided by developmentally appropriate speech and language expectations. Overall program implementation consisted of a combination of discrete trial training and incidental teaching. Programs were individualized for each child however the mastery criterion was uniform across children. Generally, the mastery criterion was 80-90% correct over one or two days. Parent's were encouraged to participate in their child's EIBI program, but the government or agency did not have specific requirements or contingencies in terms of dosage of parent implementation or competency. In terms of this study's participants, the parents of Child 3 and Child 4 were more involved than the parents of Child 1 and Child 2.

Prior to this study each therapist received training on ethics, confidentiality, the various elements of a discrete trial such as the discriminative stimulus, prompt fading, reinforcement and so forth, data collection, incidental teaching, reading programs (protocols), task analyses, shaping, and chaining. Therapists were trained on procedures with their client via supervisor observations (that occurred approximately two times per month for each child) and verbal coaching/consequences, although no structured system existed. The Clinical Supervisors all participated in a training program created by the University of New Brunswick College of

Extended Learning which included online modules about theory, 12 days of practicum, five weeks of advanced theory readings, two weeks of advanced practicum, and three professional development workshops. Upon completion of the training program, each Clinical Supervisor also engaged in ongoing professional development by attending approximately four days of behavior-analytic based workshops per year and agency wide training days approximately two days per year. The director would consult with each Clinical Supervisor as needed for complex cases throughout the year.

Treatment: Dynamic Programming

The experimenter or director trained each team on the goals and use of an enhanced program checklist entitled "Dynamic Programming" (see the sample in Appendix D). Dynamic Programming is an intervention package that includes: (a) therapist self-monitoring while teaching new program exemplars, (b) therapist public posting of child mastery on a sheet in the child's logbook rather than hanging on a wall as with most public posting interventions (c) probes of child behavior to "test" or confirm therapist self-monitoring and public posting (each therapist reports their results on the Dynamic Programming sheet and team members "check" one another). Like the Program Checklist, the Dynamic Programming sheet was placed at the front of the child logbook where supervisors, therapists, and parents could see it.

Training on the Dynamic Programming intervention consisted of the following package: (a) the experimenter trained the director on strategies to effectively train the staff in regular supervisory overlaps / training sessions (see materials in Appendix E) and (b) the therapy team of each child participant attended a 5 hr workshop where the therapists and the clinical supervisors were introduced to Dynamic Programming. Supervisor training of the therapist was different in treatment than in baseline because it was more structured and systematic and focused

on producing therapist competency by the end of the training session. The supervisor began the training with a direct observation "probe" of the therapist implementing procedures with the child (see the column titled "probe" on the overlap sheet in Appendix E). During this time, the Clinical Supervisor evaluated specific therapist competencies related to data analysis and collection, differential reinforcement, prompt fading and discrimination training. If the therapist was not demonstrating any such competencies, the supervisor would try to evaluate why and then decide on a plan for the rest of their home visit. The supervisors evaluated if competency was not being demonstrated because more time was needed to see the teaching sequence, because the therapist needed training on a particular competency, or because the program/drill needed to be revised. If more time was needed, the supervisor would continue the observation and then score the "overall" column of the overlap sheet (Appendix E). If the therapist needed training, the supervisor would implement a training package, in order to produce therapist competency by the end of the session, and then observe the therapist with the child again after the training to determine therapist competency. The supervisor then scored the "overall" column after the second observation with the goal of all of the therapist competencies being a plus (+) if the training was effective. If the program needed to be revised, then the supervisor would spend their time revising the program and probing, with the therapist's assistance. If the revisions were successful, the supervisor would be able to score the "overall" column of therapist competencies with pluses (+) as the revisions would have helped the therapist demonstrate competency.

During the 5 hr workshop to introduce Dynamic Programming, the experimenter or director implemented a package of instructions, role – play, and in – vivo turn taking while implementing with the child participant (see Appendix F for the Power Point slides used). The experimenter implemented this treatment package for Child 1 while the director observed and

later had the opportunity to ask questions. In order to ensure consistency in the delivery of the package, the director then implemented this treatment package in the presence of the experimenter for Child 2. The director correctly implemented the training package (see Appendix G). The director then independently implemented the treatment package for Child 3 and Child 4. The director also provided 1 to 2 hrs of consultation on programming changes needed at the time of treatment implementation for each child. Each therapist on the team received one training session overlap with a therapist who had previously demonstrated competency within Dynamic Programming and with either the CS or director for a total of 2 to 4 training overlaps. Training continued until each therapist could help the child achieve daily child learning goals and have mastery of those goals confirmed in at least 50% of the child's programs. Finally, the experimenter trained each clinical supervisor on the Clinical Review Prep Notes (see Appendix H) for approximately 1 hour each.

During the Dynamic Programming condition, therapists taught to a pre-specified criterion in the program(s) and accessed differential consequences related to achieving the criterion through self-monitoring and public posting. In advance of the teaching sessions, the clinical supervisor set a written functional goal for the therapists to achieve during each session without a supervisor needing to be present. The therapists used this criterion in the program to help determine if the exemplar would be mastered by the end of the first teaching session during which it was introduced. The therapist determined when to complete training on the first day based on their history with the child and the teaching session data. Then, at the end of a teaching session, the therapist marked if the child mastered the exemplar or not by writing a "Y" in the introduced column on the Dynamic Programming sheet if it was mastered and an "N" in the introduced column of the sheet if the exemplar was not mastered. The therapist also posted the

total percent of exemplars that the child mastered in the session on the Dynamic Programming sheet. After this initial mastery session, the next therapist or parent coming in to conduct a teaching session with the child reviewed this data. As described below, the next therapist or parent would need to review this data in order to determine what to work on in their teaching session. Parents, who were not setting up a teaching session, could also review this data to quickly see what the previous therapist accomplished in the teaching session with their child.

An independent probe of child behavior occurred next. The day after a therapist's initial teaching session, a probe of the child's behavior, related to the exemplar taught the previous day, was conducted by that same therapist or by the other therapist on the team, in order to further determine mastery. If the child demonstrated mastery on this second day, then the previous days mastery would be confirmed by writing a "Y" in the confirmation column on the Dynamic Programming sheet. If the child did not demonstrate mastery in the probe, confirmation did not occur and the therapist would have written an "N" in the confirmation column. If, in contrast, the therapist from the previous day had an "N" indicated in the introduced column, a probe would not be conducted and a "Y" or "N" would not be written in the confirmation column. Although it seems reasonable to probe to determine the validity of an "N," this was not done because often times a "N" indicated that prompting and discrimination training was not completed on the previous day. N's were not confirmed in order to keep the child successful with an errorless teaching approach where the child's success is paramount to the learning process.

In subsequent sessions, therapists would check the Dynamic Programming sheet, to determine, if applicable, if child mastery was confirmed on the second day. At this time, the therapist posted/wrote the percent of child mastery programs that were confirmed on the

Dynamic Programming sheet. This calculation provided the therapist with differential consequences about the accuracy of their first day exemplar mastery. If a therapist indicated that an exemplar was mastered and if this was confirmed, the next therapist would begin teaching the next exemplar. If a therapist indicated the exemplar was not mastered, the next therapist would begin their next teaching session by fading prompts while working toward child mastery of the exemplar.

It is through this process by which each person's child-based data on the Dynamic Programming sheet was posted and reviewed by team members and parents. The permanent product produced by the above process, which was the Dynamic Programming Sheet, with the programs and a number of Y's and N's on it, provided the Clinical Supervisor with a systematic tool to reference and analyze and plan from in their work with the child. Furthermore, the therapists learned to adjust their own behavior to facilitate child learning and meet the daily goal (and thus be able to write Y's on the Dynamic Programming Sheet). Through the systems introduced in treatment, the Clinical Supervisors and therapists were able to more effectively respond to the data, which was a change from baseline.

The final step in the Dynamic Programming package was the clinical supervisor data analysis and plan. Each week the clinical supervisor would conduct a review of the child's data including the percent of exemplars confirmed on the Dynamic Programming sheet. The data and analysis and plan for each individual program was entered into an Excel spreadsheet entitled the "Clinical Prep Notes." The elements of this spreadsheet are indicated in Appendix I and a sample is in Appendix H. Through email, the experimenter periodically requested copies of the Clinical Prep Notes from each clinical supervisor throughout the treatment condition to determine if this element of the package was being correctly implemented. In some incidents,

the clinical supervisor spontaneously sent the Clinical Prep Notes to the experimenter (indicating they were indeed being implement/used as intended). Table 3 shows the percent of Clinical Prep Notes collected and the percent of correct use based on the elements indicated in Appendix I.

Table 3

Clinical Prep Notes

Child	Percentage of Treatment Data Points Prep Notes Collected	Overall % of Items Scored "Yes" on Checklist
1	37.5% (9 of 24)	95% (111 of 117)
2	33% (5 of 15)	100% (65 of 65)
3	20% (3 of 15)	85% (33 of 39)
4	29% (2 of 7)	96% (25 of 26)

Booster sessions.

The experimenter implemented booster sessions with the clinical supervisor of each Child 1, 2, and 3. The booster sessions were implemented after low data points in the Dynamic Programming treatment condition. During the booster sessions, the experimenter and clinical supervisor reviewed Dynamic Programming sheet samples. Sample Clinical Prep Notes were also utilized to cross reference weekly data with the weekly Dynamic Programming sheets. Different possible weekly analyses and plans were reviewed through discussion. For example, if there was a pattern of N's across a particular program and all therapists, these N's suggested the program procedure or exemplars needed to be modified. In contrast, if there was a pattern of N's across an individual therapist, but not others, then perhaps more training was needed for that particular therapist. Initially the experimenter modeled different potential analyses and plans for the clinical supervisor. Then the clinical supervisor generated examples. Finally, the clinical supervisor and experimenter discussed the strengths and challenges of the supervisor's examples.

This training averaged 1 hr per person and continued until the clinical supervisor was able to generate reasonable analyses and plans without experimenter having to correct the supervisor with a novel sample. Finally, since each child participant was in early to middle programming phases, the experimenter gave each clinical supervisor a handout outlining potential programs to target during the respective phases (see Appendix J).

Probe sample (Child 1).

During the Dynamic Programming treatment condition for Child 1, the observers began to sample data. Child 1 was mastering more exemplars each week and thus more exemplars had to be probed for the sole purpose of this research study. These weekly probes were taking upwards of 3 hrs during the treatment condition, further reducing the intensity of the child's ABA program. The weekly intensity for Child 1 averaged 16 hrs in both baseline and treatment. During the weekly probe, none of the child participants were being introduced to new exemplars (rather exemplars that were mastered were being confirmed by observers). Thus 3 hrs being dedicated to this research, without being able to learn new exemplars, was deemed excessive. As can be seen in the results, the percent of exemplars confirmed in the weekly probe for Child 1 was high prior to implementing the sample procedure (thus indicating most of the exemplars that were taught by the team were confirmed as mastered in this weekly research probe). During the sample probes, the primary observer selected some number of exemplars from each program and then probed all of the exemplars possible within 1 hr. Due to the fact that baseline probes took about one hr, the experimenter considered the 1 hr sample to be representative. For the purpose of keeping the data collection the same, all exemplars the child mastered within the week were considered mastered unless an exemplar was not confirmed in the probe. While the sample

procedure was in effect, 93 of 101 exemplars were confirmed, thus 8 of 101 were not confirmed in the weekly research probe.

Interobserver Agreement

Inter-observer agreement on exemplars mastered. Prior to each probe session, two observers independently reviewed the weekly child data and independently and simultaneously determined which exemplars the child mastered each week, including any exemplars that the child probed out of (thus not requiring teaching). Reliability was calculated for occurrence and non-occurrence. We scored an agreement if both observers wrote down the same exemplar or had no exemplars written under the header of a specific response class (i.e., program or short-term objective). Reliability was calculated for 75% of baseline sessions and 92% of treatment sessions for Child 1, 100% of baseline sessions and 100% of treatment sessions for Child 2 and Child 3, and finally 100% of baseline sessions and 86% of treatment sessions for Child 4. Reliability was assessed for the maintenance session for each child. Agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and then multiplying by 100 to yield the percent of agreement. In the event of a disagreement, the primary observer's data was utilized for the weekly probe. Table 4 shows the mean agreement on exemplars mastered with the range as applicable.

Table 4

Mean Inter-observer Agreement on Exemplars Mastered

Child	Baseline	Treatment	Maintenance
1	91% (range 86-94%)	100%	100%
2	100%	100%	100%
3	98% (range 88-100%)	99% (range 88-100%)	100%
4	97% (range 80-100%)	98% (range 86-100%)	100%

Inter-observer agreement on dependent variable. Inter-observer agreement was also assessed to determine if the independent observers agreed that an exemplar was mastered or not mastered during the weekly probe session. Exemplar mastery agreement was defined as each observer circling "yes" the exemplar was mastered in the probe session or "no" the exemplar was not mastered in the session. Reliability was calculated for 50% of baseline sessions and 92% of treatment sessions for Child 1, 100% of baseline sessions and 100% of treatment sessions for Child 2 and Child 3, and finally 100% of baseline sessions and 86% of treatment sessions for Child 4. Reliability was assessed for the maintenance session for each child. Agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and then multiplying by 100 to yield the percent of agreement. This IOA was calculated for occurrence and included exemplars that the child probed out of (so if 7 exemplars were probed, 7 would be the denominator). Table 5 shows the mean agreement, with the range as applicable, on exemplar mastery.

Table 5

Mean Inter-observer Agreement on Dependent Variable

Child	Baseline	Treatment	Maintenance
1	100%	99% (range 86-100%)	100%
2	97% (range 88-100%)	97% (range 79-100%)	100%
3	95% (range 66-100%)	95% (range 69-100%)	100%
4	98% (range 75-100%)	95% (range 69-100%)	94%

Since the primary dependent variable of exemplars mastered was divided by the number of therapy hours each child received to yield the rate of exemplars mastered per hour, we retroactively assessed reliability on the 1:1 therapy hours administered each week to each child for a sample of weeks. Two months after the completion of the experiment, the director reviewed the employee agency timecards and determined the total number of therapy hours each

client received. The director did this for every second week of data for each child. The director collected data for the number of sessions the experimenter required (to yield an appropriate sample above 30%). For example, for Child 1, the experimenter told the director to determine the total number of 1:1 therapy hours for two baseline probes and eight treatment probes. The director then collected data on the first and third baseline probe sessions (and so forth). The director emailed this information to the experimenter who independently cross referenced the total number of 1:1 hrs the director determined from the agency timecards with the data written on the weekly probes to determine the reliability levels. Reliability was assessed on 50% of baseline probes for Child 1 and 33% of treatment probes. For Child 2, reliability was assessed for 33% of baseline and 46% of treatment probes. For Child 3, reliability was assessed for 33% of baseline and treatment probes. Finally, for Child 4, reliability was assessed for 35% of baseline and 43% of treatment probes. Table 6 indicates the retroactive reliability of therapy hours for each child in baseline and treatment. The three incidents of unreliability were unreliable by .5 hours each.

Table 6

Reliability on 1:1 Therapy Hours

Child	Baseline	Treatment
1	100% (2 of 2)	88% (7 of 8)
2	100% (3 of 3)	86% (6 of 7)
3	100% (5 of 5)	100% (5 of 5)
4	100% (7 of 7)	66% (2 of 3)

Inter-observer agreement on child correct responding. Immediately after each probe trial, each observer independently and simultaneously recorded the child's correct or incorrect response onto a non-electronic data sheet. Trial agreement was defined as two independent observers agreeing that the child's behavior for each trial was correct or incorrect. A correct

response was generally defined as occurring when the child would initiate the response within 5 s of the presentation of the discriminative stimulus and accurately complete the response within 10 s although teams were allowed to individualize this definition if needed. Reliability was calculated for 50% of baseline sessions and 92% of treatment sessions for Child 1, 100% of baseline sessions and 100% of treatment sessions for Child 2 and Child 3, and finally 100% of baseline sessions and 86% of treatment sessions for Child 4. Reliability was assessed for the maintenance session for each child. Agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and then multiplying by 100 to yield the percent of agreement. Reliability was calculated for occurrence (meaning if there were not trials recorded this was not calculated in the reliability). Table 7 shows the mean agreements, with the range as applicable, on correct child responding.

Table 7

Mean Inter-observer Agreement on Child Correct Responding

Child	Baseline	Treatment	Maintenance
1	90% (range 90-91%)	99% (range 95-100%)	100%
2	95% (range 87-100%)	97% (range 86-100%)	100%
3	90% (range 63-100%)	92% (range 81-100%)	100%
4	96% (range 75-100%)	97% (range 91-100%)	98%

Fidelity.

Dependent variable. Since the experimenter was not the primary observer, fidelity was assessed on the dependent variable (i.e., number of new exemplars mastered by the child). The experimenter or director conducted fidelity assessments one time for Child 1 in baseline, one time for Child 2 in treatment, two times for Child 3 in baseline and one time in treatment, and two times for Child 4 in baseline and one time in treatment. Inter-observer agreement between the primary observer (i.e., clinical supervisor) and the experimenter or

director was calculated by dividing the total number of trial agreements (both observers recording the same response as correct or incorrect) by the total number of trial agreements plus disagreements and then multiplying by 100. Agreement averaged 99% across all children and conditions.

Fidelity of DV measurement procedure. Since the experimenter was not the primary observer, fidelity was also assessed on correct implementation of the probe sessions (from which data were gleaned). The elements assessed are presented in checklist form in Appendix K. The experimenter or director conducted fidelity assessments one time for Child 1 in baseline and treatment, one time for Child 2 in baseline and treatment, three times for Child 3 in baseline and one time in treatment, and two times for Child 4 in baseline and one time in treatment. The percentage of fidelity across all children and conditions averaged 100%.

Experimental Design

In order to analyze the effect of the Dynamic Programming on the rate of child exemplars mastered, a multiple baseline design across children was implemented. Conditions included the following:

1) PROGRAM CHECKLIST: This was the baseline condition and evaluated the impact of the Program Checklist on rate of mastery.
2) DYNAMIC PROGRAMMING: This condition evaluated the effects of Dynamic Programming on rate of mastery.

Results

Figure 1 depicts the number of child exemplars mastered per hour of therapy. On the average the children mastered an average of 0.18 exemplars per hour during baseline, 0.67 during treatment, and during maintenance 0.93. Thus the children's mastery increased from

baseline to treatment. In addition the gains were maintained during maintenance. During the program checklist baseline condition, Child 1 mastered nine exemplars in 65 hrs for an average mastery rate of 0.14 exemplars per hour. In the Dynamic Programming treatment condition, Child 1 mastered 254 exemplars in 397.5 hrs for an average mastery rate of 0.64 per hour. Eight weeks later, in the maintenance condition, Child 1 mastered 29 exemplars in 22 hrs for a mastery rate of 1.32 exemplars per hour. During the program checklist baseline condition, Child 2 mastered 27 exemplars in 126 hrs for an average mastery rate of 0.21 exemplars per hour. In the Dynamic Programming treatment condition, Child 2 mastered 110 exemplars in 207.25 hrs for an average mastery rate of 0.53 exemplars per hour. Nine weeks later, in the maintenance condition, Child 2 mastered 4 exemplars in 7 hours for a mastery rate of 0.57 per hour. During the program checklist baseline condition, Child 3 mastered 23 exemplars in 236 hrs for an average mastery rate of 0.10 exemplars per hour. In the Dynamic Programming treatment condition, Child 3 mastered 208 exemplars in 248.5 hrs for an average mastery rate of 0.84 exemplars per hour. Eight weeks later, in the maintenance condition, Child 3 mastered 11 exemplars in 20 hours for an average mastery rate of 0.55 exemplars per hour. During the program checklist baseline condition, Child 4 mastered 68 exemplars in 275 hrs for an average mastery rate of 0.25 exemplars per hour. In the Dynamic Programming treatment condition, Child 4 mastered 79 exemplars in 114 hrs for an average mastery rate of 0.69 exemplars per hour. Five weeks later, in the maintenance condition, Child 4 mastered 12 exemplars in 11 hrs for a mastery rate of 1.09 exemplars per hour. Overall the average mastery rate of each child more than doubled in the Dynamic Programming treatment condition.

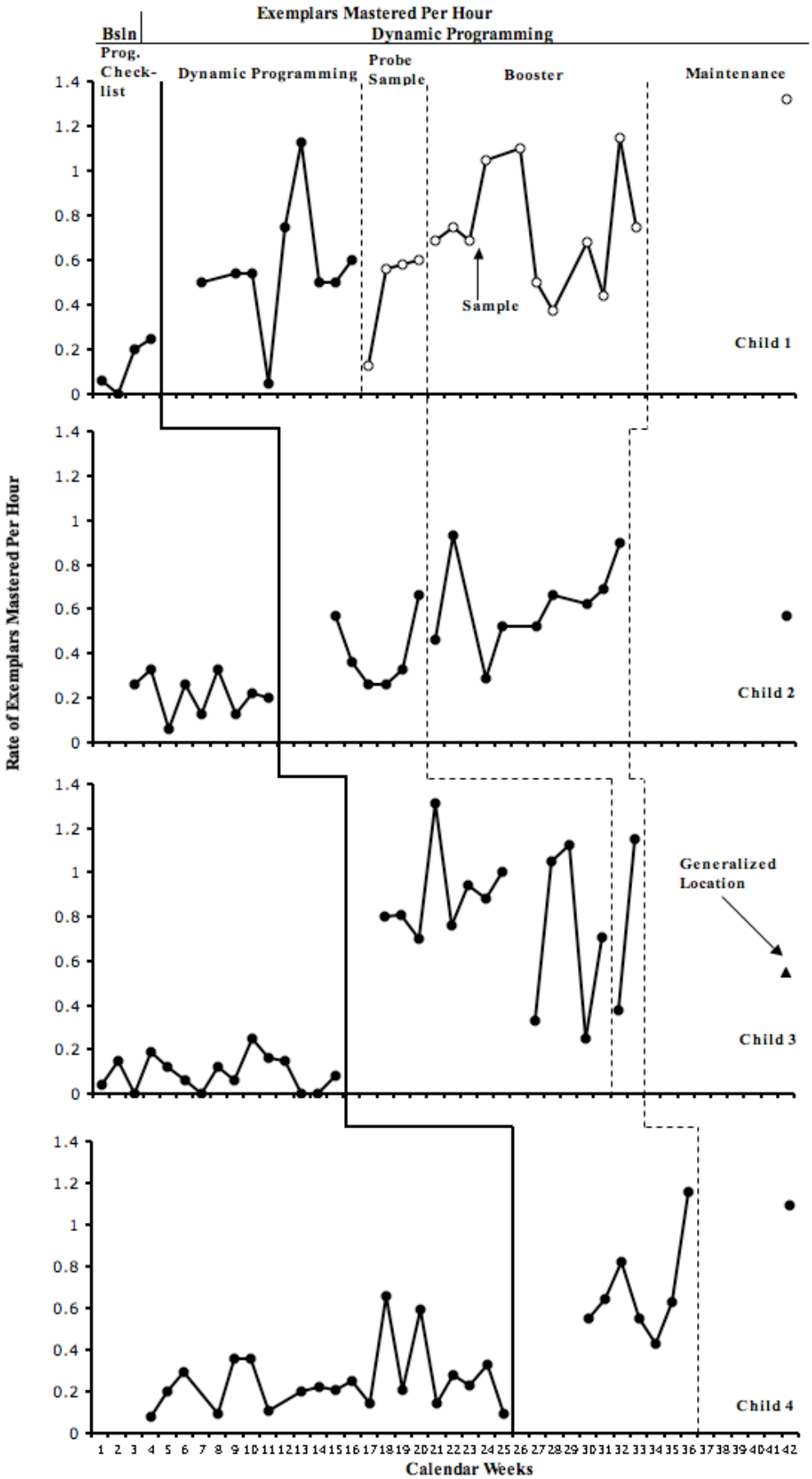


Figure 1. The number of child exemplars mastered per hour of therapy.

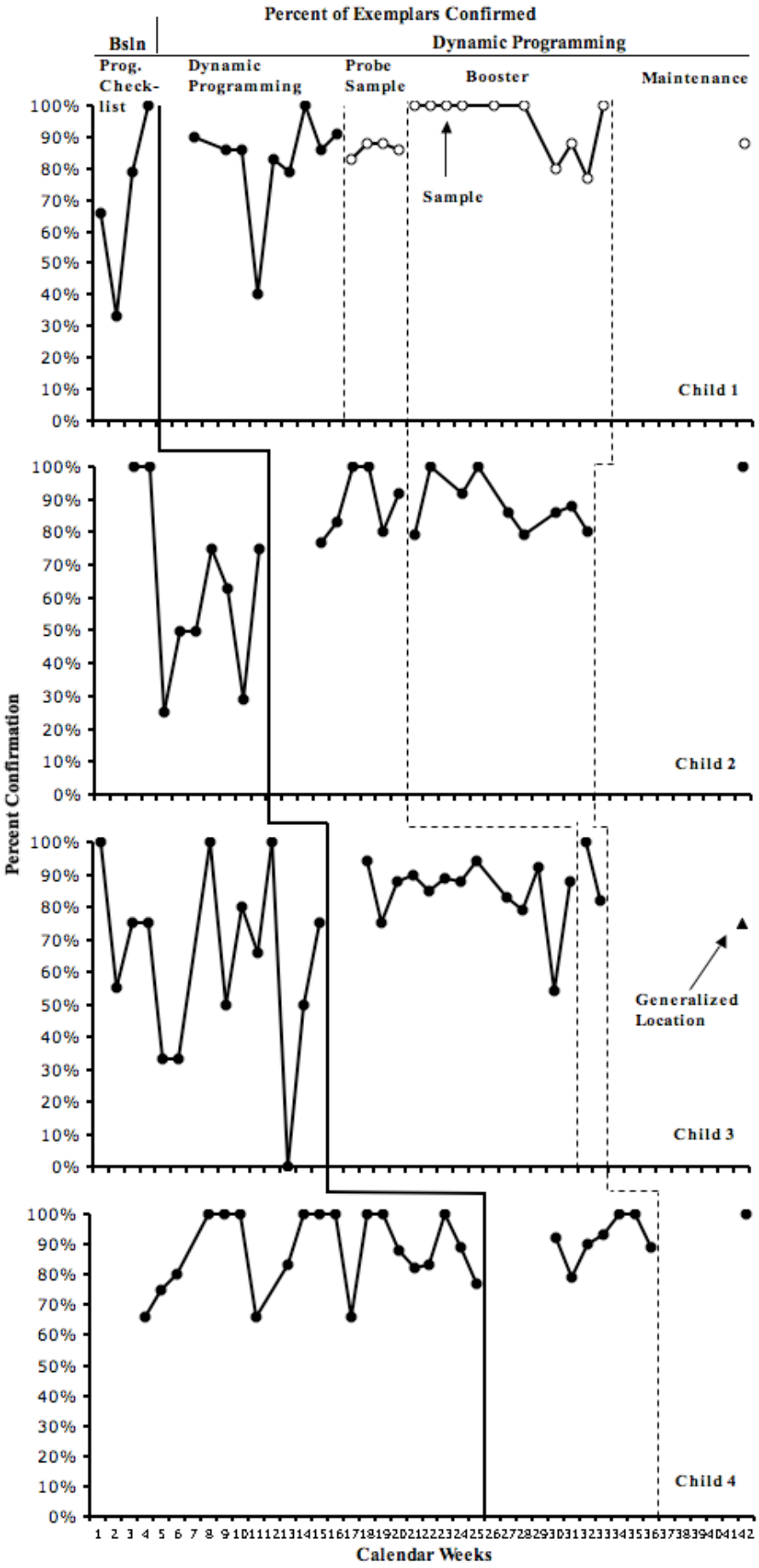


Figure 2. The percentage of exemplars confirmed in each weekly probe.

Figure 2 depicts the percentage of exemplars confirmed in each weekly probe. On average 71% of exemplars were confirmed in the weekly probe in baseline, 87.3% during treatment, and 90.7% during maintenance.

During the program checklist baseline condition, Child 1's average confirmation was 76% (range = 33% to 100%). In other words, when the team determined that an exemplar was mastered during the week, 76% of the time, on average, the child also demonstrated mastery in the weekly probe days later with a different adult conducting the trials. In the Dynamic Programming treatment condition, Child 1's average confirmation was 87% (range = 40% to 100%). The percent confirmation maintained eight weeks later at 88%. In baseline, Child 2's average confirmation was 55% (range = 25% to 100%) while in the Dynamic Programming treatment condition it averaged 87% (range = 77% to 100%). The percent confirmation maintained nine weeks later at 100%. In baseline, Child 3's average confirmation was 65% (range = 0% to 100%) while in the Dynamic Programming treatment condition, it averaged 85% (range = 54% to 100%). Eight weeks later the percentage of confirmation was 75%. Finally, in the program checklist baseline condition, Child 4's confirmation averaged 88% (range = 66% to 100%) while in the Dynamic Programming treatment condition, it averaged 90% (range = 79% to 100%). The percent confirmation maintained five weeks later at 100%.

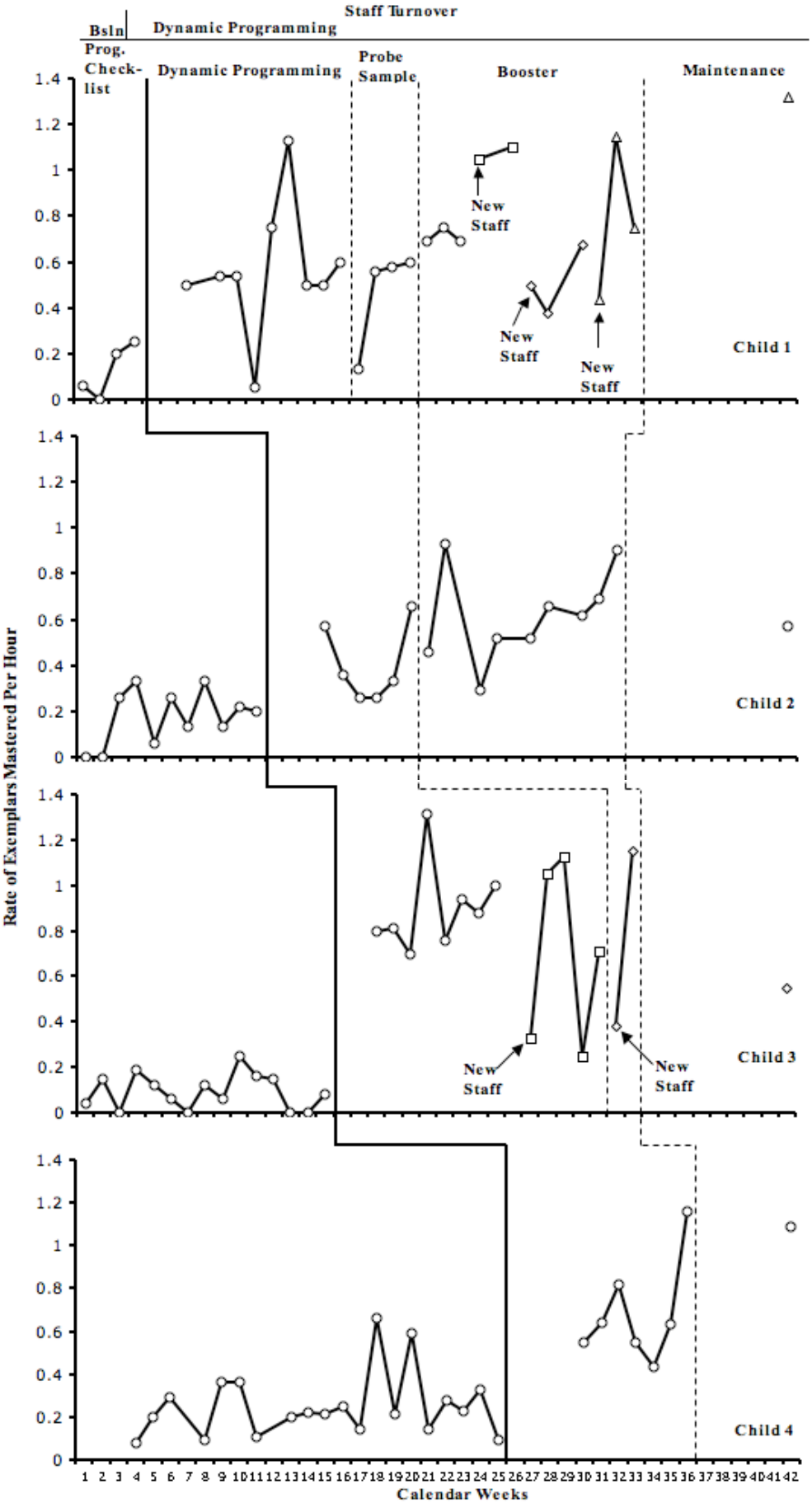


Figure 3. The number of child exemplars mastered per hour with staff turnover. Different symbols represent new staff.

Figure 3 depicts the primary data of the number of child exemplars mastered per hour of therapy with additional labels indicating staff turnover. Staff turnover for Child 1 & 3 was related in time to lower Dynamic Programming treatment data points.

Tables 8 and 9 show examples of the number of exemplars mastered in baseline and treatment on the same program. Table 8 shows that in the drawing imitation program, Child 1 mastered an average of .5 exemplars per week when the Program Checklist baseline was in effect and an average of 1.4 exemplars per week when Dynamic Programming was in effect (including maintenance). Table 9 shows that in the verbal imitation program, Child 1 mastered an average of .5 exemplars per week with the Program Checklist baseline was in effect and an average of 2.1 exemplars per week when Dynamic Programming was in effect (including maintenance). The EIBI teams were free to adjust the programs as they typically would have throughout the experiment and given that the experiment was several months, many of the programs for many of the children changed throughout. These examples however are examples of programs that remained constant throughout baseline and treatment.

Table 8

Child 1: Number of Exemplars Mastered in Drawing Imitation Program

Baseline Week	Number of Exemplars Mastered in Drawing Imitation	Treatment Week	Number of Exemplars Mastered in Drawing Imitation
1	0	7	1
2	0	9	2
3	2	11	0
4	0	12	0
		13	2
		14	2
		15	0
		16	2
		17	1
		18	1
		19	2
		20	1
		21	3
		22	2
		23	2
		24	1
		25	3
		27*	2
		28	0
		29	1
		31*	3
		32	1
		33	0
		34	3
		Maint.	4

* = Two week calendar period

Table 9

Child 1: Number of Exemplars Mastered in Verbal Imitation Program

Baseline Week	Number of Exemplars Mastered in Verbal Imitation	Treatment Week	Number of Exemplars Mastered in Verbal Imitation
1	0	7	2
2	0	9	1
3	1	11	0
4	1	12	0
		13	1
		14	1
		15	1
		16	1
		17	1
		18	0
		19	2
		20	2
		21	4
		22	0
		23	2
		24	5
		25	4
		27*	3
		28	1
		29	2
		31*	4
		32	2
		33	5
		34	4
		Maint.	9

* = Two week calendar period

Exemplars within individual programs progressed and became more difficult over time. The only exemplars that were included in all of the above data were exemplars that had to be taught to the child. Exemplars where mastery may have occurred due to generalization were not included. It would not have been possible for the supervisor to simply make the exemplars easier in treatment so that the child would master more because the child would have likely not needed to be taught such exemplars and then they would not be part of the above data.

In order to also illustrate that the exemplars were not made easier in treatment, this author evaluated the exemplars and matched, when possible, similar items on the Early Learning Accomplishment Profile (E-LAP) (Glover, Preminger, & Sanford, 1981). The E-LAP helps assess skills for children birth through 36 months and the Learning Accomplishment Profile (Revised Edition) (Sanford & Zelman, 1981) helps assess children 30-72 months of age. Table 10 shows the developmental age of mastered exemplars for each child in baseline. Table 11 shows the developmental age of mastered exemplars for each child in treatment.

Table 10

Developmental Age of Mastered Exemplars for Each Child in Baseline

Child	Gross Motor	Fine Motor	Pre-Writing	Cognitive	Receptive Language	Expressive Language	Personal/Social
Child 1			27 Mo.		19-24 Mo.	13 Mo.	
Child 2	10-16 Mo.	10-22 Mo.		10 Mo-22 Mo.		21 Mo.	
Child 3		9 Mo.		10-48 Mo.			16 Mo.
Child 4	10-16 Mo.			12 Mo.			

Table 11

Developmental Age of Mastered Exemplars for Each Child in Dynamic Programming Treatment

Child	Gross Motor	Fine Motor	Pre-Writing	Cognitive	Receptive Language	Expressive Language	Personal/Social
Child 1		11 Mo.	72 Mo.	36-42 Mo.	48 Mo.	42 Mo.	
Child 2	16-24 Mo.	36 Mo.		36-48 Mo.	24-30 Mo.	24 Mo.	
Child 3			30-72 Mo.		30-36 Mo.	24 Mo.	
Child 4	16-24 Mo.	11-48 Mo.		22 Mo.		9 Mo.	16 Mo.

Table 12 shows sample data on the percentage of Ys that were confirmed when an independent therapist engaged in the second day mastery probe of child behavior versus when the same therapist both introduced the exemplar and confirmed it the next day in the second day mastery probe (non-independent confirmations). Child 3 had all independent confirmations. This data is based on sample data from over 85% of the treatment days for each child and is different data than the primary data graphed above. While the primary data was collected in a weekly "research" probe where the behavior of the child had to generalize to a new person and across time, this data was collected from the weekly implementation of the intervention by evaluating the Dynamic Programming Sheets.

Table 12

Percentage of Independent and Non-Independent Y Confirmations

Child	Percentage of Y's Confirmed with Independent Confirmations	Percentage of Y's Confirmed with Non-Independent Confirmations
Child 1	80% (118/148)	94% (130/138)
Child 2	80% (12/15)	88% (102/116)
Child 3	87% (186/213)	NA
Child 4	91% (53/58)	94% (15/16)

In order to assess the parent's satisfaction with the process and outcome of this research study, parents were asked to answer yes or no to five questions. At least one parent of each child participant completed the questionnaire. The grandmother of Child 1 also completed the questionnaire as she was the primary caretaker during the day (while the parents worked) and observed the process and outcome of the research study on a daily basis. The parent satisfaction results are displayed in Table 13.

Table 13

Parent Satisfaction Results

Question	Percentage of "Yes" Answers	Percentage of "No" Answers
1. Has your child's progress improved since the Dynamic Programming intervention was started?	100%	0%
2. Did your child benefit from the Dynamic Programming procedures?	100%	0%
3. Would you like your therapy team to continue to use the Dynamic Programming procedures in the future with your child?	100%	0%
4. Was it easy to integrate the Dynamic Programming procedures into your child's treatment program?	100%	0%
5. Did you find the Dynamic Programming procedures and techniques acceptable?	100%	0%

In order to assess the therapist and clinical supervisor satisfaction with the process and outcome of this research study, staff members were asked to answer yes or no questions. All four Clinical Supervisor surveys were returned and eight therapist surveys were returned. All therapists that still worked for the agency returned their surveys and one therapist that no longer worked for the agency agreed to complete one as well. The results are summarized in tables 14 and 15.

Table 14

Clinical Supervisor Satisfaction Results

Question	Percentage of "Yes" Answers	Percentage of "No" Answers
1. Did your client's progress improve when the Dynamic Programming intervention was started?	100%	0%
2. Did your client benefit from the Dynamic Programming procedures?	100%	0%
3. Did your skills as a supervisor improve from the Dynamic Programming procedures?	100%	0%
4. Did you continue to use the Dynamic Programming procedures with this client after the research project ended?	100%	0%
5. Was it more effortful to integrate the Dynamic Programming procedures into your client's treatment program?	100%	0%
6. If it was more effortful to integrate the Dynamic Programming procedures into your client's treatment program, were the benefits to your client worth the extra effort on your part?	100%	0%
7. Did you find the Dynamic Programming procedures and techniques acceptable?	100%	0%
8. Will you use the Dynamic Programming procedures with other clients in the future?	100%	0%
9. Did you find the public posting (in the logbook) of the Dynamic Programming sheet to be an important part of the Dynamic Programming package?	100%	0%

Table 15

Therapist Satisfaction Results

Question	Percentage of "Yes" Answers	Percentage of "No" Answers	Percentage of "Not Applicable" Answers
1. Did your client's progress improve when the dynamic programming intervention was started?	100%		
2. Did your client benefit from the Dynamic Programming procedures?	100%		
3. Did your skills as a therapist improve from the Dynamic Programming procedures?	100%		
4. Was it more effortful to integrate the Dynamic Programming procedures into your client's treatment program?	50%	50%	
5. If it was more effortful to integrate the Dynamic Programming procedures into your client's treatment program, were the benefits to your client worth the extra effort on your part?	50%		50%
6. Did you find the Dynamic Programming procedures and techniques acceptable?	100%		
7. Were you comfortable with the parents and other team members being able to review your data in the baseline with the Program Checklist?	100%		
8. Were you comfortable with the parents and other team members being able to review your data in the treatment with Dynamic Programming?	100%		

Clinical supervisors commented that participating in the research made a positive impact on their clients, motivated the therapists, and was an enjoyable and an excellent learning opportunity. When applicable, they continued to implement Dynamic Programming with the research participant and they have all implemented it with their other clients on their own initiative. One clinical supervisor also commented that the Clinical Prep Notes were very helpful, but that it was challenging to access them before an in home child visit. Another indicated that with their current caseload, completing the Prep Notes every other week was a more acceptable schedule (as opposed to weekly during this research) and that was being implemented after this research. Therapists commented that they learned a great deal and that the Dynamic Programming procedures made them a better therapist. All were excited for the opportunity to participate in the research and described the child's program as improved. One therapist said the procedures were easy to learn while a different therapist commented that it was harder to be consistent with the other therapist on the team. However, because of the overlap and training systems described above, therapist were likely as consistent as needed for the child to master targets. The children may also have benefited from "training loosely" (Stokes & Baer, 1977, p. 357). Upon completion of this research, the Director also offered a one day workshop to all other clinical supervisors in the agency on Dynamic Programming. In addition, she is systematically training all clinical supervisors in the agency to implement Dynamic Programming with their clients.

Discussion

This study evaluated the effects of Dynamic Programming, a clinical management system that incorporated self-monitoring and public posting, on the rate of learning of four children with

ASD. The rate of learning increased for all four children when Dynamic Programming was introduced. Each child's learning increased only after the introduction of the treatment, and this introduction occurred after different lengths for each child. This suggests that Dynamic Programming caused the increase in child learning.

Although limited, maintenance data suggested that continued use of Dynamic Programming resulted in rates of learning at or above treatment levels for each child. These maintenance effects are not surprising when one considers that self-monitoring and public posting, components of Dynamic Programming, are two interventions that have facilitated maintenance of behavior across a wide range of individuals and settings (e.g., Briesch & Chafouleas, 2009; Van Houten, Nau, & Marini, 1980). Given the high cost of EIBI, clinical management systems that can increase a child's rate of learning and maintain that rate are beneficial from a cost analysis standpoint.

The findings from this study show preliminary evidence that Dynamic Programming can be an effective clinical management system that helps children with ASD to acquire skills faster. In this study, faster skill acquisition also often occurred while exemplars became more complex (see Tables 10 and 11). It is conceivable that the Dynamic Programming intervention was effective because of the antecedents and consequences built into the system. Dynamic Programming incorporates self-monitoring and public posting which yield differential consequences about staff competencies and child learning. Self-monitoring involves antecedent and consequence manipulation wherein reinforcers and punishers are arranged by the individual. Dynamic Programming may promote better therapist behavior because therapists learn to manipulate antecedents (in terms of teaching techniques such as prompt fading and the context and/or environment in which the child learns). Supervisors and perhaps parents (the consumer)

are in control of some of the consequences, which tie in social support, a key component of self-monitoring. Finally, the self-monitoring component of Dynamic Programming is also reactive in that therapist or supervisor behavior may change because it is being monitored. The daily criteria set forth in the exemplar task analysis and the independent probe of child behavior (i.e., Y confirmation probe) provides immediate differential consequences in the form of feedback, which has been shown to improve staff performance (Schepis & Reid, 1994). Depending on the independent variable, feedback is conceptualized in the literature as differential reinforcement, a conditioned reinforcer or punisher, or discriminative stimuli (Peterson, 1982). Depending on the independent variable, feedback is often confounded with other principles including the actions of others in public posting interventions (Nordstrom, Lorenzi, & Hall, 1990). The daily criteria may be similar to the daily goals shown to be effective, in combination with other procedures, by Burgio, Whitman and Reid (1983). Others have shown that public posting, goal setting (the daily criteria in Dynamic Programming), and reinforcement can be combined to increase work production (Nordstrom, Lorenzi, & Hall, 1990). Dynamic programming also combines these interventions. It is conceivable that public posting could be punishing rather than reinforcing. If the Dynamic Programming system has good face validity on fairness or appropriateness, then staff members are less likely to resist it, but if the staff view the system as unfair or the rewards unattainable, then they may find it more punishing than reinforcing. The effectiveness of Dynamic Programming also likely increases satisfaction for both staff and parents (consumers). Through the public posting element of the Dynamic Programming package, the parents are able to easily evaluate staff effectiveness which may motivate staff. The survey results above suggest good face validity and that the rewards are attainable in Dynamic Programming. In regards to

public posting, it could be that Dynamic Programming seems to involve more salient consequences than the Program Checklist.

It is also noteworthy that the whole intervention, outside of the pre-baseline, only took approximately 6-9 hrs of total time to train each individual team member despite his or her varying competencies and positions.

When discussing staff training needs in the area of service delivery to children with ASD, Weinkauf, Zeug, Anderson, and Ala'i-Rosales (2011) called not only for staff training but also for objective assessments to evaluate staff procedural implementation. The independent probe of child behavior (Y confirmations) in Dynamic Programming is perhaps one objective evaluation and is an extension of the current literature. The independent probe of child behavior extends the current literature in these main ways (a) it is a measure of the validity of the previous therapist's determination of mastery, (b) it could be seen as an indirect reliability assessment, and (c) it is a more substantial mastery measure than most common measures, such as percent correct, because it shows mastery across time, people, and most often stimuli (i.e., generalization). One main concern of percent correct as a primary measure is that it can be an invalid measure. For example, if an errorless training approach is being implemented to teach a child, and prompt fading is not successful, the child may not actually be learning any new exemplars and yet the data would show a high percent correct (with prompted trials counted as correct responses). Therefore, the independent probe of child behavior is a benefit of Dynamic Programming. This probe provides information about staff competence (i.e., the therapists ability to use effective prompts and fade them quickly enough to prevent prompt dependence) and true child mastery. Given that this independent probe is typically the conducted the day after (or a few days) the session in which an exemplar was taught (i.e., prompts faded) without momentum but with

generalized stimuli/exemplars, mastery is more clear and the percent correct data is more valid because issues such as insufficient prompt fading/prompt dependence are ruled out. The data presented in Table 12 suggests the importance of this independent probe of child behavior. More specifically evaluating this probe in terms of staff and child behavior would be an interesting area of future research related to Dynamic Programming.

When Dynamic Programming was introduced, the average percentage of exemplars that were confirmed in the weekly probes increased for all four of the children's teams. These findings suggest that Dynamic Programming can perhaps facilitate therapist technique. Like the flexible prompt fading evaluated by Soluaga, Leaf, Taubman, McEachin, and Leaf (2008), with Dynamic Programming, therapist behavior generalizes to novel child S^Ds. In Dynamic Programming, the child gives a novel S^D to the therapist and the therapist behavior has to generalize from trained exemplars to the current child exemplar. The therapists are learning to generalize successfully to novel child S^Ds from differential mastery confirmation consequences. These consequences can be reinforcers. Good therapist technique is imperative because it eases some of the need for supervision and can contribute to clinical effectiveness and perhaps to cost effectiveness as well.

In terms of continuity of therapy behavior during staff transitions, this data does not show that staff transitions have less impact on child learning when Dynamic Programming is in effect, another potential benefit of Dynamic Programming. The data shows that lower treatment data points were associated with staff transitions for Child 1 and 3 in all but one incidence. Often times the child's overall rate of learning increased the week following the lower data. This data perhaps suggests that the new therapists experienced the consequences built into Dynamic

Programming and changed their behavior so as to facilitate the child's overall learning within one week.

The results shown here do not provide evidence that Dynamic Programming directly increases the accountability of staff and parent therapy behavior or that Dynamic Programming is an efficient supervisory tool. It does however seem possible that supervising, in part, based on rates of confirmation, could help improve accountability (especially when the supervisor is not present) while at the same time reducing supervision time and increasing efficiency. Nepo (2010) argued that the on-site supervision and supervisory consequences, shown in the literature to effectively improve staff performance, are not always feasible, especially for community-based programs. Demchak and Neisworth (1992) and Welsh, Miller, and Altus (1994) documented the need to explore treatments that will allow staff behavior to maintain when the researcher, consultant, or expert is not present in the environment. Finally, Parsons and Reid (1995) also called for more research on supervisory behavior and the variables that affect supervisors continued use of functional supervisory skills. Future research could evaluate if Dynamic Programming is such a treatment.

The effect that Dynamic Programming improves the efficiency of the data collection system is not directly supported by the data presented here. At this point there is not sufficient evidence to suggest that the Dynamic Programming sheet is a more efficient data collection system than other published data collection methods. More efficient data collection systems could save therapist time so that more time could be dedicated to direct teaching time with the child, which, in turn, would hopefully increase the amount learned. This issue of continuous and discontinuous measurement in EIBI is increasingly being addressed in the literature in recent years (e.g., Cummings & Carr, 2008). If the Dynamic Programming package prompts therapists

learn to analyze their own teaching behavior, in conjunction with child responding, the need for large amounts of detailed data may not be necessary. The independent probe of child behavior built into Dynamic Programming, could be an additional measure not considered within the current literature on this topic. This potential benefit of Dynamic Programming could be specifically addressed in future research.

This experiment contributes to research showing that staff training directly contributes to child outcome. Little other research exists on staff management by child outcome. This is particularly lacking in staff training studies with children with ASD. In fact, child outcome sometimes is not measured at all (i.e., Leblanc, Ricciardi, & Luiselli, 2005; Nepo, 2010; Weinkauf, Zeug, Anderson, & Ala'i-Rosales, 2011). Child outcome is an important consideration when judging the value of a staff training intervention (Ingham & Greer, 1992). Evaluating the rate of child learning, as was done here, also extends the literature as many staff training studies do not evaluate the rate of learning but instead look at percent correct (e.g., Sarokoff & Strurmey (2004, 2008) or frequency counts (e.g., Ryan et al., 2008).

This study extends previous research related to self-monitoring, public posting, and staff training. First, this research extends the self-monitoring literature to include more children with ASD. The self-monitoring literature seems limited as related to this particular population. Second, the effectiveness of public posting based on staff self-monitoring to increase the rate of learning has not been widely evaluated elsewhere.

The great extent of data collected as well as the duration of treatment is also a contribution to the literature. Many studies also tend to focus on a limited relevant sample of the child's treatment programs whereas this study included data from all of the child's programs over many months. Finally, this research extends previous research because substantial data was

collected over time thus showing generality of the results. Data was collected on a weekly basis and it showed continued use of Dynamic Programming, by staff, over several months.

The timing of treatment implementation for Child 1 is a limitation of this research. Because the overall baseline trend for Child 1 was increasing, there is no way of knowing if it would have continued to increase without Dynamic Programming. The decision to move into treatment for Child 1 was made for logistical reasons. Child 1 had already been receiving the baseline condition for one month. Given that the other children needed to be in baseline longer for experimental control, the decision was made to move into the treatment phase despite the increasing baseline so that the study could be completed before any participants had to drop out as they moved on to school interventions in the fall of 2011. Furthermore, the experimenter needed to implement the training package for Child 1 yet was only able to visit the research site every other month. Therefore the treatment was implemented to prevent prolonged baselines.

An additional limitation is that Dynamic Programming data for Child 2 would have shown an overall higher rate of learning, however the behavior of Child 2 began to generalize beyond treatment procedures in the Dynamic Programming condition. Therefore, Child 2 probed out of a significantly higher number of exemplars (which was not captured in the DV) in the Dynamic Programming condition. As a case in point, in the baseline Program Checklist condition, Child 2 probed out of nine exemplars in nine weeks for an average of one per week. In contrast, in the Dynamic Programming condition, Child 2 probed out of 86 exemplars in 15 weeks for an average of 5.7 exemplars per week.

Another limitation or this study is that the effects of the booster sessions were not clear. It was assumed that the clinical supervisors would adequately develop the daily child learning goals, after instructed to do so in the treatment package, however this did not always occur

especially if the behavior of the child began to generalize. In treatment, aside from staff transitions, low data points often occurred due to (a) not having the right type or level of exemplar as just described or (b) the clinical supervisor was not properly analyzing if there was a problem with a particular program or, in contrast, (c) if there was a staff training issue that needed to be addressed. When the decision to implement the booster sessions was made, the data for the respective children was close to baseline levels, however, by the time the booster sessions were actually implemented, the children had regained their previous treatment levels of mastery. Therefore, these data do not clearly indicate the need for the booster sessions. It is however interesting to note that, based upon only the treatment data, Child 1 and 2 showed a higher rate of mastery, on average, than before the booster sessions (not including the maintenance data). In contrast, Child 3 did not show a higher average rate of mastery than before the booster session. Given these results the decision was made not to implement the booster with the supervisor of Child 4. Child 4's rate of learning in the Dynamic Programming phase continued on an upward trend.

The limited DV fidelity data is a limitation of this research as more data would contribute to enhanced believability of the primary data. Fidelity data was not collected for Child 1 in the treatment phase and Child 2 in baseline due to logistical reasons such as travel distance, staff illness, and child family dynamics. Future research would be strengthened by collecting a larger sample of such data.

In regards to the reliability on the DV, it would have been ideal to have the observers assess reliability on the total number of therapy hours during the weekly probe instead of retroactively as was done. However the retroactive procedure was more complex (i.e., harder to

be reliable) yet still produced high levels of inter-observer agreement. The reliability of hours was only off by .5 hours in the 3 incidents of unreliability.

Given that this is the first systematic evaluation of Dynamic Programming, we offer a word of caution about replication as well as additional directions for future research. In order to replicate this study, the experimenter would very likely need to identify an organization that would not be using the Dynamic Programming system in baseline. This author tried, in pilot research, to evaluate Dynamic Programming with staff who had already been introduced to the system. However, carryover from the staff's previous clinical experience prevented evaluation of a true baseline. Furthermore, in trying to get around this challenge, the logistical considerations of staff placement and drive time, and child staffing needs, among others, made controlling exposure to Dynamic Programming for multiple staff in the same organization very challenging. If these logistical considerations were addressed, future research could more easily evaluate different dependent variables such as the frequency or rate of inappropriate and appropriate child behaviors and / or the percentage of daily Y's confirmed.

Evaluating the cost effectiveness of Dynamic Programming would be an important future research topic. Cost effectiveness is an important goal of Dynamic Programming. Dynamic Programming aims to reduce wasted discrete trials while at the same time ensuring mastery and maintenance of child exemplars and skills. Furthermore, Dynamic Programming could be cost effective if it enables acceleration in child learning. Addressing if children learn more complex skills in less amounts of time with Dynamic Programming could be an interesting extension of this research. Finally, cost effectiveness should come from reducing the amount of direct staff training (and supervisory travel time for training) because of the differential consequences built

into the Dynamic Programming system (hence the behavior of staff generalizes to new exemplars).

Future research yielding information on the effects of Dynamic Programming with children who are receiving more intensive programs could yield valuable information for that specific population. Replication via telemedicine would also help evaluate ease of implementation and contribute to external validity. More replications across different types of children, supervisors, and agencies would also contribute to external validity as would including parents as therapists. Finally, component analyses, including close evaluations of staff and child consequences in the Dynamic Programming package, would yield important information about the most relevant components of Dynamic Programming and could help make this intervention more cost effective which is paramount given the high cost of EIBI. As a case in point, in looking at the components of Dynamic Programming, the results of the correct use of the Clinical Prep Notes by the clinical supervisor for Child 3 were lower than other's. Despite this less accurate use, the rate of learning for Child 3 increased significantly in treatment suggesting that this element of the Dynamic Programming Package may not be necessary or only necessary at some level.

In summary, Dynamic Programming is a novel procedure with components that are embedded in behavior analysis. The Dynamic Programming treatment package increased the rate of learning for four children with ASD and gains were maintained several weeks later. This experiment has generated several questions for future research that could ultimately benefit children with autism spectrum disorders.

Appendix A

Experimental Framework

Position	Intensity	Competencies	Behavior Therapy	Role in Experiment
Experimenter	As Needed	○ Demonstrate clinical director, clinical supervisor, and behavior therapist clinical, case management, and professional competencies	○ Overlap with director, clinical supervisor, and behavior therapists	Primary Investigator
Director	As Needed	○ Demonstrate clinical director, clinical supervisor, and behavior therapist clinical, case management, and professional competencies	○ Overlap with clinical supervisor, and behavior therapists	Investigator
Clinical Supervisor	Average 8 to 10 hours per month	○ Demonstrate clinical supervisor, and behavior therapist clinical, case management, and professional competencies	○ Overlap behavior therapist/ parent twice per month ○ Direct Clinical Review Meeting (i.e., develop and detail programming)	Primary Observer / Participant
Parent:	Varied	○ Demonstrate behavior therapist clinical, case management, and professional competencies	○ Direct instruction (i.e., implement programming) ○ Attend Clinical Review Meeting (i.e., demonstrate current responding) ○ 24-hour environment	Participant
Behavior Therapist	Average 13 to 16 hours per week total	○ Demonstrate behavior therapist clinical, case management, and professional competencies	○ Direct instruction (i.e., implement programming) ○ Clinical Review Meeting (i.e., demonstrate current responding)	Reliability Observers / Participant

Appendix B

Program Required Elements

Short-Term Objectives: Each Program/STO in the research contained the following elements in baseline and treatment unless NA		Yes	No	NA
1. Behavioral Objective/Short Term Objective	1.			
2. Short-Term Objective / Program written in behavior analytic language.	2.			
3. Behavioral momentum trial OR prompt written in behavior analytic language	3.			
4. Timing of prompt included in prompt	4.			
5. S^D written in behavior analytic language	5.			
6. Correct response written in behavior analytic language	6.			
7. Correct response includes timing	7.			
8. Incorrect response written in behavior analytic language	8.			
9. Incorrect response includes timing (incorrect after so many seconds/non-response)	9.			
10. Incorrect response includes incorrect example	10.			
11. Incorrect includes self-correct	11.			
12. Consequence for correct responses	12.			
13. Consequence for correct response includes differential reinforcement criteria	13.			
14. Consequence for incorrect responses	14.			
15. Mastery criteria per exemplar	15.			
16. Context or physical orientation	16.			
17. In treatment (only), DPDRS priorities/rules	17.			
18. In treatment (only), teaching procedure	18.			

Appendix C

Program Checklist

Program	Date Program Targeted						
	M	T	W	Th	F	Sa	Sun

Appendix D

Dynamic Programming Sheet

Lovaas Institute Midwest **Program Organization/Dynamic Programming Daily Record Sheet** **Date:** _____

Child: _____ **Location:** _____ **ITP Date:** _____ **Page:** _____

Typical Mastery Criteria Per Objective:

Int: Mark Y if introduced and mastered today; N if introduced and not mastered today.
Conf: On the next day, initial the box and mark Y if mastery is confirmed for the previous day's item; N if mastery is not confirmed.

Initials of Staff Introducing:																	
Introduction Date:																	**Total**
Objective	**Int**	**Conf**	**Int**	**Conf**	**Int**	**Conf**	**Int**	**Conf**	**Int**	**Conf**	**Int**	**Conf**	**Int**	**Conf**	**Int**	**Conf**	**%**
Total Percentage:																	

Appendix E

Feedback (Overlap) Sheet

Child: _____ Date: _____
Supervisor: _____
Therapist: _____ Location: _____

Targets Evaluated	Therapy Sequence	Comments
Structured 1:		
Structured 2:		
Structured 3:		
Incidental / Natural / Spontaneous:		

Therapist Competencies	Probe	Overall	Comments
Review Dynamic Programming Daily Record Sheet to identify targets.	+ - na	+ - na	
Review Short-Term Objective Sheets for procedure and specific exemplars.	+ - na	+ - na	
Review Data Sheets for data on specific exemplars.	+ - na	+ - na	
Implement Core-Clinical Competencies to achieve daily criterion.	+ - na	+ - na	
Accurate Data Analysis.	+ - na	+ - na	
Identify potential reinforcement.	+ - na	+ - na	
Implement potential reinforcement.	+ - na	+ - na	
Evaluate potential reinforcement.	+ - na	+ - na	
Mass with errorless training.	+ - na	+ - na	
Discriminate with errorless training.	+ - na	+ - na	
Expand with errorless training.	+ - na	+ - na	
Accurate Data Collection.	+ - na	+ - na	

In the Probe, a "-" was given due to (check one):		Lack of time available		Clinical skill deficit		Need to revise programming

Feedback Given: Staff: _____ Date: _ Evaluator: ___ Date: _

Appendix F

Power Point Slides Used in Training Package

Dynamic Behavior Therapy

- Produce accelerating rate of acquisition
- Daily criterion: Master a minimum of one exemplar per day per objective

Dynamic vs. Static Programming

- Effective self-feedback mechanisms
  - Independent clinical judgment
- Functional Evaluation of Child Outcomes
  - Accountable clinical judgment

What are the dynamic decisions?

Questions in Teaching a Skill

- Massed Trials
  - Fade prompts and momentum
- Expansion
- Randomization
- Discrimination
- Generalization
  - Increase time systematically
  - Gradually increase complexity
  - Thin reinforcement

Questions in Errorless Learning

- Program is designed so that baseline is 80% correct
  - Prompting is 90% effective
  - Program is redesigned when falling below 80%
  - Use 80% criterion to judge appropriate fading skills
  - Stereotypy is a sign that program is not designed carefully enough
- Timing
  - Prompt within 1.8 seconds of S^D while massing
  - Present S^D as soon as child sits in chair
- Correction procedures are only used in maintenance
  - When maintenance drops below 90%, return to errorless teaching

Dynamic Programming

- Accountable management framework
- Sufficient staff and parent training
- Analyzing the therapy process (20-minute dynamic session)
  - Immediate therapist self-feedback
    - 80-90% evaluation window
  - Teaching procedures (fading, momentum and shaping) are immediate
  - Immediate reinforcement is differential and follow through occurs within the therapy session
  - Error practice and frustration are minimized
  - Stimulus control is managed to ensure consistency
  - Mastery requires generalization to novel exemplars
- Each therapist has a mechanism for developing clinical judgment at their level
- Optimum progress through dynamic evaluation
  - Daily, Weekly, Six-Month
- Continuous probing for learning level
- Developmental focus on long-term goals
- Optimal time is given to each objective daily
- Task analysis for daily success

The Essential Procedures of Behavior Therapy are Dynamic

- Reinforcement Schedules
- Modeling and Observational Learning
- Discrete and Incidental Trial Structure
  - Discrimination Learning
  - Errorless Learning
  - Prompting and Fading
  - Shaping and Chaining
  - Behavioral Momentum
  - Stimulus and Response Generalization
  - Expansion
  - Natural Environment Training
- Free Operant Reinforcement
- Behavior Reduction Procedures

Dynamic Programming Hierarchy

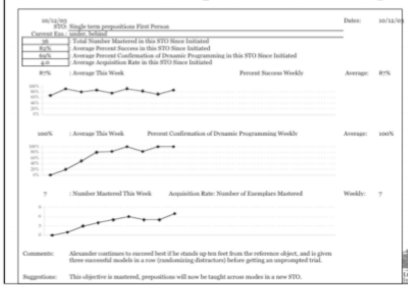
- Training to Establish Skills
- Ongoing Management of Optimum Clinical Decision Making
- Evaluation, Analysis, and Responsive Training
- At Each Level of Therapy and Staffing

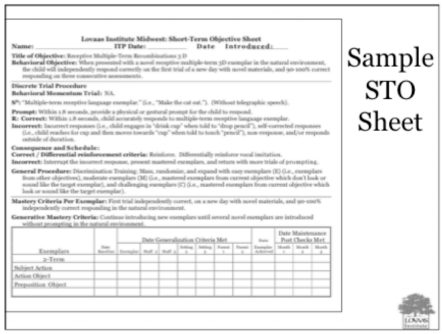
Evaluation of Weekly Progress Data

Clinical Review Prep Notes - Slow Progress


10/16/09 Dates: 10/2
STO: Single term prepositions First Person
Current Exs. under Achieved
47 : Total Number Mastered in this STO Since Initiated
87% : Average Percent Success in this STO Since Initiated
43% : Average Percent Confirmation of Dynamic Programming in this STO Since Initiated
3.5 : Average Acquisition Rate in this STO Since Initiated
87% : Average This Week Percent Success Weekly Average: 87%
43% : Average This Week Percent Confirmation of Dynamic Programming Weekly Average: 43%
3 : Number Mastered This Week Acquisition Rate: Number of Exemplars Mastered Weekly: 3
Comments: Alexander continues to succeed best if he stands up ten feet from the reference object, and is given three successful models in a row (randomizing distractors) before getting an unprompted trial.
Suggestions: Follow recommendations as above.

Clinical Review Prep Notes - Fast Progress


10/16/09 Dates: 10/12/09
STO: Single term prepositions First Person
Current Exs. under Achieved
58 : Total Number Mastered in this STO Since Initiated
89% : Average Percent Success in this STO Since Initiated
100% : Average Percent Confirmation of Dynamic Programming in this STO Since Initiated
4.0 : Average Acquisition Rate in this STO Since Initiated
87% : Average This Week Percent Success Weekly Average: 87%
100% : Average This Week Percent Confirmation of Dynamic Programming Weekly Average: 100%
7 : Number Mastered This Week Acquisition Rate: Number of Exemplars Mastered Weekly: 7
Comments: Alexander continues to succeed best if he stands up ten feet from the reference object, and is given three successful models in a row (randomizing distractors) before getting an unprompted trial.
Suggestions: This objective is mastered, prepositions will now be taught across modes in a new STO.


Lovaas Institute Midwest: Short-Term Objective Sheet
Name: ITP Date: Date Introduced:
Title of Objective: Receptive Multiple-Term Recombinations 3 D
Behavioral Objective: When presented with a novel receptive multiple-term 3D exemplar in the natural environment, the child will independently respond correctly on the first trial of a new day with novel materials, and 90-100% correct responding on three consecutive assessments.
Discrete Trial Procedure
Behavioral Momentum Trial: N/A
S^D: "Multiple-term receptive language exemplar." (i.e., "Make the cat eat.") (Without telegraphic speech).
Prompt: Within 1.8 seconds, provide a physical or gestural prompt for the child to respond.
R: Correct: Within 1.8 seconds, child accurately responds to multiple-term receptive language exemplar.
Incorrect: Incorrect responses (i.e., child engages in "drink cup" when told to "drop pencil"), self-corrected responses (i.e., child reaches for cup and then moves towards "cup" when told to touch "pencil"), non-response, and/or responds outside of duration.
Consequence and Schedule:
Correct / Differential reinforcement criteria: Reinforce. Differentially reinforce vocal imitation.
Incorrect: Interrupt the incorrect response, present mastered exemplars, and return with more trials of prompting.
General Procedure: Discrimination Training: Mass, randomize, and expand with easy exemplars (E) (i.e., exemplars from other objectives), moderate exemplars (M) (i.e., mastered exemplars from current objective which don't look or sound like the target exemplar), and challenging exemplars (C) (i.e., mastered exemplars from current objective which look or sound like the target exemplar).
Mastery Criteria Per Exemplar: First trial independently correct, on a new day with novel materials, and 90-100% independently correct responding in the natural environment.
Generative Mastery Criteria: Continue introducing new exemplars until several novel exemplars are introduced without prompting in the natural environment.
Date Generalization Criteria Met / Date Maintenance Post Checks Met
Exemplars | Date Baseline | Prompt(s) | Staff 1 | Staff 2 | Setting 1 | Setting 2 | Parent | Date Exemplar Achieved | Date Maintenance 1 wk | Date Maintenance 2 wks | Date Maintenance 3 wks
2-Term
Subject Action
Action Object
Preposition Object

Sample STO Sheet

Sample Program Organization Dynamic Programming Daily Record Sheet

Initials of Staff Introducing:	TdR		KR		TdR		TS		TdR		
Introduction Date:	8/16		8/17		8/17		8/18		8/18		Total
Objective	Ind	Conf	Ind	Conf	Ind	Conf	Ind	Conf	Ind	Conf	%
Categories											
Movie Characters	Y	Y KR	Y	Y TS			Y	Y KR	Y		100
Observational Learning											
Vocabulary	Y	N KR	Y	Y TS			Y	Y KR			67
Receptive Language											
Generative Actions 3"P	N		Y	YMM					Y	N KR	50
Act-Adj-Obj 3D/2D/1"P	Y	NTS			Y	NTS	Y	NKR			0
Expressive Language											
Sub-Act-Obj 3D	Y	Y KR	Y	YMM					Y	Y KR	100
Adj-Adj-Obj 3D					N		N		Y	N KR	0
Conversations											
Visual Reciprocals 1 X					Y	NTS	Y	Y KR			50
Play											
Creative Action Figures					Y	Y TS	Y	Y KR			100
Vehicle Play Duration	Y	Y KR	Y	MM					Y	NKR	33
Piano 6 Notes	Y	YMM			Y	YTS			Y	YKR	100
Observed											
2-Trm Exp New Com Loc			Y	YTS			Y	YKR			100
Self-Control											
Waiting two min			Y	MM					Y	NKR	0
Pro-Social											
Associative Play Sister	Y	YMM			Y	YMM			Y	YKR	100
Reinforcer Assessment											
"" Physical	Y		Y		Y		Y		N		
Maintenance Probes											
C-V-RT Imitation			Y								
Total Percentage:	88	71	100	71	83	60	86	86	100	43	

Dynamic Programming

- Analyzing the therapy process
- The dynamic session
  - 20 minutes
  - Immediate therapist self-feedback
    - 80-90% evaluation window
  - Teaching procedures (fading, momentum and shaping) are immediate
  - Immediate reinforcement is differential and follow through occurs within the therapy session
  - Error practice and frustration are minimized
  - Stimulus control is managed to ensure consistency
  - Mastery requires generalization to novel exemplars
    - Expansion

Dynamic Programming

- Clinical Judgment
  - Each therapist has a mechanism for developing clinical judgment at their level
  - Optimum progress through dynamic evaluation
    - Daily, Weekly, Six-Month
- Clinical Supervisor
  - Continuous probing for learning level
  - Developmental focus on long-term goals
  - Optimal time is given to each objective daily
  - Task analysis for daily success

Evaluate Dynamic Behavior Therapy

- Six-Month ITP Progress Review
- Clinical ITP Review Meeting Prep Notes
- Discrete Trial Observation Sheet
- Dynamic Daily Organization Sheet
- Short-Term Objective Sheet
- Dynamic Data Sheet

Training the Behavior Therapist

Effective Dynamic Data Sheet for Training: Receptive Prepositions

STO/Tx Phase: S^D: Behind – R: Place item in correct relation to reference item

Physical
P Reinforcer
1 2 3 5
6 7

Model/Gesture
P Reinforcer
4 8 9 10 11
12 13 14 16
17 18 19 20

Independent
P Reinforcer
15 21 22

Log Notes:
Had trouble placing behind bus. Did best when working on the floor. Receptive letters worked best for behavioral momentum. Check for mastery by introducing novel stimuli on first trial.

Expand by 1
P Reinforcer
23

Expand by 2 Trials
P Reinforcer

Expand by 3 Trials
P Reinforcer
24

Expand by 5
P Reinforcer

Expand by 7 Trials
P Reinforcer
25

Expand by 9 Trials
P Reinforcer
26

Ineffective Dynamic Data Sheet for Training: Receptive Prepositions

STO/Tx Phase: SD: Behind – R: place focal item in correct relation to reference item

Physical

P	Reinforcer			
	1	2	6	15

Fade Physical

P	Reinforcer			
5	3	4	7	8
	9	10	12	13
	16	17	18	19
	20	21	22	27

Independent

P	Reinforcer			
11	23	24	25	28
14				

Log Notes:
Had trouble fading physical prompt to independent.
Use imitation prompt?

Expand by 1

P	Reinforcer			
26				

Expand by 2 Trials

P	Reinforcer			

Expand by 3 Trials

P	Reinforcer			

Expand by 5

P	Reinforcer			

Expand by 7 Trials

P	Reinforcer			

Expand by 9 Trials

P	Reinforcer			

Simultaneous Structure

Expand Independent Successes and Maintain Engagement with Simultaneous Programming

Setup

- Prepare the session by setting up materials for all programs for 50 minutes ahead of time (usually takes 20 minutes (during which the child has a low rate of reinforcement in "downtime" to create a three-phase sequence).
- Set up the materials so that each is ready to go with the first trial in their own location, but vary the location at which each Program is addressed on a daily basis.
- Prepare necessary reinforcers and play activities as well.
- Set up around the house as much as is appropriate for the family.
- Plan for approximately five targets to be planned and mastered simultaneously.
- Structure each program sufficiently for 80-90 percent success, while using as much naturalization and variability as possible.

Simultaneous Structure Procedures

- Maintain the child's engagement throughout the 50 minute session, by rapidly moving to the appropriate next trial in alternating programs (staying within one Program as long as is necessary to be effective, but using alternating interspersed programs as easy distractors while massing and fading prompts within different programs.)
- Randomize within Programs to ensure attending to the essential dimension of the discrimination with the difficult distractors, while randomizing between programs to set up early easy distractors for the discrimination.
- Use the alternation between different programs to naturally expand into longer delays before coming back to target items.
- Ensure that the child can't predict when a target item will be delivered, just on the basis of returning to a location.
- Be prepared well enough to give each reinforcer within 1.8 sec.
- Go to play reinforcers with the instruction, "Let's go play," rather than treating it like a timeout from socials.
- Master each target to the randomized and expanded level that the target will be confirmed on the first trial of a new day with a novel exemplar in a new location.
- Collect data and reorganize materials while the child is engaged in longer duration trials (play, waiting, independent reinforcement).

Values of Simultaneous Structure

- Allows for expansion across easy discriminations and hard discriminations as needed to assure mastery.
- Gives simple stimulus control to different programs (location) to improve on the ease of the interspersed distractor programs (giving great flexibility to randomize between difficult or easy discriminations).
- Maintains engagement without allowing for the child to retreat from social control into stereotyped autistic behavior, by eliminating downtime.
- Allows for reinforcer sampling as an antecedent for the next trial to double as a consequence for the last trial.
- Ensures that materials are ready to go as soon as child approaches the trial.
- Sets up the three phase conditioned reinforcement paradigm.

Appendix G

Training Package Implementation

Date of Treatment Implementation: __1/18/11
Implementation Conducted by: _____DP__

Participant: __2_____ Experimenter Conducting Fidelity _CL_____

If applicable each of the below items were or were not completed/conducted at the probe:		Yes	No	NA
1. Instructions / PowerPoint is printed out and given to team members	1.	X		
2. Dynamic Programming data sheets are printed out and given to team members	2.	X		
3. Verbal instructions and rationales are provided	3.	X		
4. Team members are provided opportunity to practice filling out the Dynamic Programming sheet	4.	X		
5. Trainer models implementation across at least 2 programs (in role –play format)	5.	X		
6. Trainer implements turn-taking opportunities for each staff with the child participant.	6.	X		
7. Trainer provides verbal praise to each staff member	7.	X		
8. Trainer provides corrective feedback to each staff member	8.	X		
9. Workshop lasts 5 hours	9.	X		

Appendix H

Clinical Review Prep Notes

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ITP Clinical Review Meeting Progress Notes

Child: LW

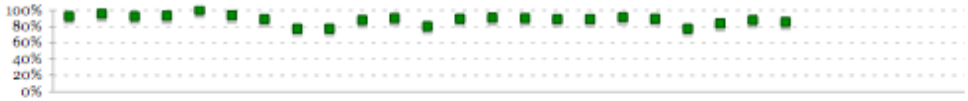
12/05/07	: Date

General

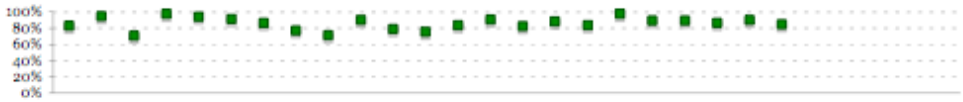
33.0	: Direct Covered 1:1 Hours by Staff This Week
2.0	: Staff Overlap Hours by Supervisors This Week
10.0	: Total Direct Plus Indirect Hours by Clinical Supervisor This Week
15.5	: Total Direct Plus Indirect Senior Behavior Therapist This Week
6.0	: Parent Overlap Hours by Staff This Week
8.5	: Actual Data-Based Treatment Hours by Mother This Week
7.0	: Actual Data-Based Treatment Hours by Father This Week
1,058	: Overall Total Number Mastered in Current STO's
88%	: Overall Average Percent Success in Current STO's
86%	: Overall Average Percent Confirmation of Dynamic Programming in Current STO's
5.0	: Overall Average Acquisition Rate in Current STO's

49 : Total Covered Hours This Week — Total Number Direct Covered 1:1 Hours Weekly

85% : Average This Week — Percent Success Weekly



85% : Average This Week — Percent Confirmation Weekly



4.8 : Average This Week — Acquisition Rate Weekly

12/05/07

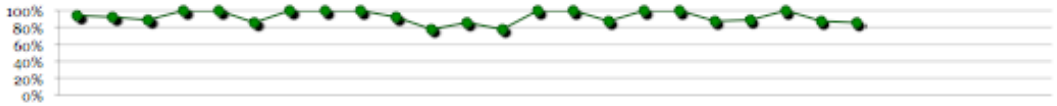
STO: Verbal Imitation

Current Exs.: 10 syllables, all normal speed exemplars - "Can we go downstairs to play Wii tennis?"

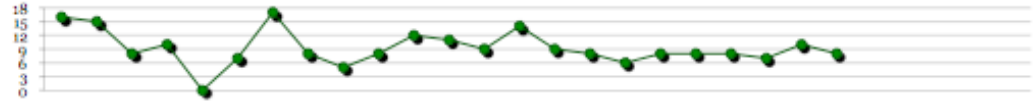
212	: Total Number Mastered in this STO Since Initiated
93%	: Average Percent Success in this STO Since Initiated
93%	: Average Percent Confirmation of Dynamic Programming in this STO Since Initiated
9.2	: Average Acquisition Rate in this STO Since Initiated

93% : Average This Week Percent Success Weekly

86% : Average This Week Percent Confirmation of Dynamic Programming Weekly



8 : Number Mastered This Week Acquisition Rate: Number of Exemplars Mastered



0 : This Week

0 : This Week

Analysis: Decreased rate of acquisition likely due to an increased number of teaching trial necessary for particular exemplars as well as a decrease in the number of successful probes (one of seven this week, 2 of 9 last week).

Plan: Continue with the same procedures until 10 syllable phrases are generative.

Appendix I

Elements of Clinical Review Prep Notes

Prep Notes Checklist		Yes	No	NA
1. Child's Name is on the general page in row 3	1.			
2. Intensity (hours) data is entered in for Direct Covered Hours (row 7)	2.			
3. Intensity (hours) data is entered in for Staff Overlap Hours by Supervisors (row 8)	3.			
4. Intensity (hours) data is entered in for clinical supervisor (row 9)	4.			
5. 85% of the average data is graphed on the general page (the 4 graphs)	5.			
6. As applicable, 85% of the Program Tabs have the percent success calculated in the cells	6.			
7. As applicable, 85% of the Program Tabs have the percent success graphed on the graph	7.			
8. As applicable, 85% of the Program Tabs have the percent confirmation of dynamic programming weekly calculated in the cells	8.			
9. As applicable, 85% of the Program Tabs have the percent confirmation of dynamic programming weekly graphed on the graph	9.			
10. As applicable, 85% of the Program Tabs have the acquisition rate: number of exemplars mastered calculated in the cells	10.			
11. As applicable, 85% of the Program Tabs have the acquisition rate: number of exemplars mastered graphed on the graph	11.			
12. 85% of the Program Tabs have something written in the analysis (row 48)	12.			
13. 85% of the Program Tabs have something written in the plan (row 50)	13.			

Appendix J

Booster Session Handout

Early Learner

single-term attending, matching (no sorting and no categorization), imitation, receptive language, expressive language, requesting

play: close-ended play 5-minutes duration

self-control/attending: wait for 30-seconds

self-help/community (operant reinforcement)

no language comprehension

no pronouns/possessive pronouns

mastery criterion includes demonstrating generative responding in the natural setting and spontaneously if applicable

Middle Early Learner

2-5-term, attending, matching, imitation, receptive language, expressive language, requesting

play: open ended to 10-minutes

self-control/attending: wait for 2-minutes

self-help/community: begin implementing self-help at the level of current responding

language comprehension at current level of responding visual (wh?)

pronouns/possessive pronouns introduced at single-term

sorting and categorization at current level of responding

5-minutes duration of response

mastery criterion includes demonstrating generative responding in the natural setting and spontaneously if applicable

Appendix K

Fidelity of DV Checklist

If applicable each of the below items were or were not completed/conducted at the probe:

	Yes	No	NA
1. Data sheets are printed for use by person doing probe.			
2. Reliability data sheets are printed.			
3. Reliability is conducted independently for the targets mastered by the team this week including PTO (probed out) exemplars			
4. Assent procedures are followed			
5. Probe exemplars are identified by looking at the child's weekly data			
6. The PC or DPDRS was used in the previous week			
7. Probe Procedures are followed: Reinforcer sampling occurs but does not last more than 5 minutes at one time			
8. Reliability is conducted independently for items / exemplars probed			
9. Reliability for tasks mastered was conducted independently			

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