The Use of Priming in Supported Inclusion of Children with Autism in General Education Classrooms

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The Effect of Priming Conducted at Home on Classroom Routine-Following

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Although we are clear about why we feel that children with disabilities should be included in general education, we are less clear on how to structure classrooms and prepare children with autism to make such a placement in general education successful.

In the past decade, the number of students with developmental disabilities who are being educated in general education classroom at least some of the time has doubled (Williamson, McLeskey, Hoppey, & Rentz, 2006).

The movement towards inclusion of children with autism has come about through political, legal, and social forces arguing for laudable principles such as normalization and equal access to life quality events.

The Effect of Priming Conducted at Home on Classroom Routine-Following

Joel Hundert: The Effect of Priming Conducted at Home on Classroom Routine-Following
Donna Chaney: Limitations in the Use of Embedded Instruction for Supported Inclusion of Children with Autism
Miranda Sim: The Use of Video Modeling with Social Script Training to Increase the Peer Interaction of Children with Autism
Nicole Walton-Allen: The Effect of Selected Parameters on the Effect of Priming for Children with Autism in a Classroom Setting

The Adjustment of Children with Autism in General Education Settings

- Placement of children with autism with typically-developing children, by itself will not result in spontaneous improvement in their academic (Kamps, Walker, Maher, & Rotholz, 1992) or social (Hundert et al., 1998) adjustment.
- Compared to their typically-developing classmates, children with autism in general education classrooms tend to:
  - pay attention to the teacher less often (Koegel, Koegel, Frea, & Fredlee, 2001),
  - be more disruptive (Koegel, Koegel, Hurley, & Frea, 1992),
  - be more demanding on teachers time (Hundert, Mahoney, & Hopkins, 1993); and,
  - interact with peers less often (Guralnick, 1996)
A Non-Preferred Arrangement

- Place and present with modified activities assigned for the rest of the class – does not address the IEP’s of the child with autism
- Only one-third of a group of children with developmental disabilities in kindergarten to grade three general education classrooms, received any instruction on their IEP objectives each day. The rest (two-thirds of the group) received instruction on less than half of their IEP objectives (Schuster, Hemmeter, & Ault, 2001)

Two Significant Challenges

1. How to deliver optimal learning environments so that the child with autism makes significant advances in relevant developmental areas.
2. How to do so in the company of typically-developing peers.

Promising Interventions to Teach Children with Autism in General Education Settings

- Demonstrated to improve the adjustment of children with autism in general education classrooms
- Targets instructional areas important for the child’s success in general education settings
- Practical for educators to implement

A Dilemma

<table>
<thead>
<tr>
<th>Preferred Learning Arrangements For Children With Autism</th>
<th>Typical Learning Arrangements in General Education Classrooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taught on a 1:1 or small group basis</td>
<td>Taught as a group</td>
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<tr>
<td>At own pace</td>
<td>Locked-step progression</td>
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<tr>
<td>At own level</td>
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<td>Individualized materials</td>
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<td>Individualized instruction</td>
<td>Group instruction</td>
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<tr>
<td>Frequent and direct measurement</td>
<td>Infrequent and indirect measures</td>
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</table>

“...it seems unlikely that inclusion will succeed unless general educators have strategies available to them in assuming a direct teaching role in meeting the educational needs of students with developmental disabilities in their classes” (Johnson, McDonnell, Holzwarth, & Hunter, 2004), pg. 226.

Two Promising Approaches

- Embedded Instruction (Polychronis, McDonnell, Johnson, & Jameson, 2004)
- Priming (Koegel, Koegel, Frea, & Green-Hopkins, 2003)
**Primming**

- a) pre-exposure of a child to a difficult situation;
- b) priming situation is low demand to the child and involves tasks that can be easily completed; and,
- c) there is no additional intervention introduced in the target setting.

**Examples of Priming**

- The evening before at home, a tutor pre-taught material that the child with autism was to receive in the classroom the next day (Wilde, Koegel, & Koegel, 1992)
- Parents at home pre-taught academic work 5 yr old child with autism at home (Koegel, Koegel, Frea, & Green-Hopkins, 2003)
- Special education pre-taught 15 year youth with autism in a separate room in high school assignments for the next day (Koegel, Koegel, Frea, & Green-Hopkins, 2003)

**Examples cont’d**

- Increased play initiations of preschoolers with autism (Zanolli, Daggett, & Adams, 1996)
- Toilet-training of three-year old boy with autism (Bainbridge & Smith Myles, 1999)
- Reduced severely disruptive behavior during transitions in community sessions (Schreibman, Whalen, & Stahmer, 2000)

**Purpose of the Study**

- To examine the effectiveness of priming to teach classroom readiness skills at home for two children with autism attending general education classrooms

**Participants**

- Kathy 4 yr 9m girl with ASD, receiving EIBI for 2 years. Areas of need included communication, peer interaction, verbal stereotypy.
- James aged, 5yr 10m who was attending Grade 1 in community school on a full-time basis and receiving a home-based ABA program. Had been receiving a mean of 30 hours/week of ABA for the previous 3 yrs.
Method

- 20 min observation sessions in day care and school.
- Observations were conducted on a 10 sec momentary time sampling basis.
- Kathy
  - percent of observations in which she participated during calendar time
  - the percent of correct responses to teacher-delivered gross motor imitation trials.

Method cont’d

- Mean inter-rater reliability was 96.4%
- Non-concurrent multiple baseline design with phases of: baseline, priming, and follow-up.

Priming Procedures: Kathy

- Gross-Motor Imitation: 3 videos of day care teacher providing a set of 10 gross-motor imitation instructions. Prompted and reinforced from behind. Response-dependent prompt fading.
- Calendar: Use of identical materials, and questions (e.g., “What day is it today?”). Reinforcement and response-dependent prompt fading.
- No interventions introduced in preschool.

Priming Procedures: James

- 3 days per week for approximately 2 months
- Class discussion: mock circle time simulation
- Language seat work assignment: Class assignment for the following day pre-viewed and praise for assignment completion

Follow-up

- One month later, no priming at home was continued
Conclusions

- Conducting priming at home produced an increase in the routine-following for two children with autism at school without a specific intervention being introduced in that setting.
- During follow-up, with the removal of priming at home, there was a decrease in children's routine-following at school.

Discussion

- It is possible that even greater effects may be obtained if a reinforcement contingency was introduced on the primed behavior at school.
- We need to understand what variables of priming are involved in its effectiveness (e.g., amount of delay between the priming and the classroom use of the primed skill; the similarity of the priming setting to the target setting; the similarity of the priming activity to the target activity).
Challenges

- Instructional targets for children with autism often differ from their typically-developing peers (Johnson, & McDonnell, 2004)
- Children with autism have difficulty learning in the traditional group instructional format associated with general education settings (Koegel, Koegel, Frea, & Fredeen, 2001)

Embedded Instruction as a Strategy

- One of 27 interventions identified as having scientific support (Division of Early Childhood of the Council for Exceptional Children)
- Allows practice of IEP goals in classroom

What is Embedded Instruction?

- Embed IEP targets into classroom routines (e.g., transitions, lessons or seatwork)
- Unlike priming as a teaching strategy (re: setting)
- Implemented by experimenters, paraprofessionals, and general education teachers
- Used in early childhood settings (Daugherty, Grisham-Brown, & Hemmeter, 2001), elementary settings (Johnson & McDonnell, 2004; Johnson, McDonnell, Holzwarth, & Hunter, 2004), and middle schools (Jameson et al., 2007; McDonnell et al., 2006).

Examples of Instructional Targets Using EI

- Science questions (Johnson, McDonnell, Holzwarth, & Hunter, 2004)
- Reading sight words (Johnson & McDonnell, 2004; Wolery et al., 2002)

Practicality

- Rated by teachers and paraprofessionals as both effective and easy to implement (Jameson, McDonnell, Johnson, Riesen, & Polychronis, 2007; Johnson & McDonnell, 2004)

Limitations of EI

- Studies in which EI has been used tended to have focused on few instructional targets only (e.g., 1 - 3 skills, presented 1 - 3 times per day) (e.g., Johnson, McDonnell, Holzwarth, & Hunter, 2004; Johnson & McDonnell, 2004)
- Student with autism may only receive 10 - 15 trials per day compared to discrete trial teaching, which may present up to 12 trials per minute and hundreds of trials per day (Smith, 2001).
Trial Distribution
Polychronis et. al. (2004)

- Examined same number of EI trials distributed over 30 vs. 120 minutes, and effects on learning
- Both conditions lead to skill acquisition
- Students generalized skills to natural stimuli in classroom
- No significant difference in rate of acquisition in two conditions.

Two questions to examine....

1. Will increasing the number of EI trials per day increase the child's rate of learning targeted skills? Hypothesis: yes
2. Even if more effective, is it feasible to run a high number of EI trials in a general education classroom?

Study 1:

- Looks at the effect of high vs. low EI trials on the learning of a child with autism in a general education classroom.

Participant

Nick
- 12 years of age
- Diagnosis: PDD-NOS
- Verbally competent
- Mild stereotypy (hair spinning, ear bending)
- EIBI since age of 3 years at varying intensities
- Difficulty maintaining focus on work, emerging social skills, academically: working approx. 2-3 years behind grade level

Setting

Private School
- 1:1 paraprofessional support for Nick
General Education classroom (grade 5):
- 20 students in class
- 1 general education teacher
Tutoring Classroom:
- Nick also received 2 hours tutoring per day with a special education teacher

Design

- Alternating Treatment Design
- Targeted 20 math facts (multiplication)
- Two sets of 10:
  - Set A: High frequency (60 trials per day)
  - Set B: Low frequency (30 trials per day)
- Sessions approx. 5 minutes
- Run in Nick’s classroom
Procedures

- Inter trial interval = minimum of 30 seconds
- 0 sec constant time delay prompt then move
to 3 sec constant time delay prompt
- **Correct** = praise
- **Incorrect** = re-administer / 2-3 high probability
instructions / re-administer
- **Mastery** = 100% accuracy across 2
consecutive presentations
- Probes of all 20 targets are take twice daily
by the paraprofessional

Study 1: Results

![Graph showing study results]

Study 2

- Comparison of number of EI trials
implemented by a special education
teacher vs. general education teacher
to DTT
- Even if EI is effective, is it possible to
run a high number of EI trials in a
general education classroom?

Participant & Settings

**Participant:** Nick

**Settings:** Private school
- General Education Classroom
- Special Education Classroom
Design

Alternating Treatments Design

Instructional Targets: word definitions from IEP related to science, religion and geography

15 items divided into 3 sets of 5 randomly assigned to either general education teacher, special education teacher, or paraprofessional

Design cont.

- Teachers asked to fit in as many trials as possible each day
- Asked to space each trial a minimum of 1 minute apart
- 0 sec constant time delay prompt until entire set mastered (100% correct 2 presentations consecutively) then move entire set to 3 sec constant time delay
- Paraprofessional implemented DTT with his set of targets (5 min. sessions no limit to number of trials)

Teacher training

Consisted of:
- Written hand-out
- Modeling of EI procedures
- Teacher practice with feedback until performance at 100% on all components

Data

- Probe data taken by paraprofessional on all targets daily (no feedback given)
- IRR taken on 20% of observations (Results: 100% IRR)
- Fidelity checks taken on both teacher’s implementation of EI procedures and paraprofessional’s DTT (Results: average 97%)

Results

- Mean # trials/day:
  - Special Education Teacher: 16.5
  - Paraprofessional: 17.5
  - General Education Teacher: 3.5
- General Education Teacher never mastered set
- Faster learning occurred with Special Ed. Teacher and Paraprofessional (not in General Ed. Class)
- Limits: one teacher/student may not be representative

Results cont.
General Conclusions

- EI did not produce faster learning when the number of trials are increased
- General Education Teachers did not implement more than a few EI trials per day
- Overall, EI may have limited utility as a strategy to support children with autism in a general education setting.

THE USE OF VIDEO MODELING, SOCIAL SCRIPT TRAINING AND A PEER-BUDDY SYSTEM TO INCREASE THE PEER INTERACTION OF CHILDREN WITH AUTISM

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Introduction

- Children with autism often have profound deficits in social behavior
- Social script training (SST) has been used to teach play routines to children with autism and their peers
- Has been shown to increase the social and communicative interaction among children with and without disabilities in general education classrooms
- Demonstrated generalization to other social behavior and novel play settings

Social Scripts

- Social Script - A structured play interaction in which children engage in an activity through role playing – using roles common to a particular theme
- SST often uses adult-delivered prompts, modeling, and reinforcement

Limitations of Social Script Training

- Can require intense adult involvement
- SST may help children learn how to sustain play interactions with peers; however, it may not address the problem of initiating interactions (McConnell, 2002)
- SST may be most effective as one component of a combined intervention…
Video Modeling

- Video priming contains no model (Schreibman, Whalen, & Stahmer, 2000)
- Video modeling (VM) consists of showing the observer a videotape of adults, peers, or the observer engaging in a targeted behavior
  - Observer is then directed to perform the behavior(s) shown on the video without any additional teaching.
- VM has been used to introduce social scripts that involved play actions and verbalizations (MacDonald, Clark, Garrigan & Vangala, 2005)
- Has also been demonstrated to promote social initiations and reciprocal play among children with autism (Nickopolous & Keenan, 2004)

Peer Buddy Approach (Laushey & Hefflin, 2000)

- Used a classwide peer-mediated approach
- Students were trained to interact in pairs called “Peer Buddies”
  - Rules: 1. Play with your buddy 2. Stay with your buddy 3. Talk to your buddy
  - Children with autism demonstrated significantly higher social interaction and rates of turn-taking in the peer buddy condition

Purpose

- To explore the use of social scripts introduced via video modeling to reduce the amount of adult prompting and reinforcement.
- To investigate the use of social scripts in the general education classroom with typically developing peers
- To probe for generalization outside of theme-specific activities

Method

Participants: 3 children with autism
- Noah (4 yrs, 8 months)
  - Receiving EIBI for 7 months
  - Areas of need included expressive language, independent play, peer interaction, toilet training
- Katie (5yrs 10 months)
  - Receiving EIBI for 3 years
  - Areas of need included expressive communication, peer interaction, generalized receptive language, academics, writing
- Molly (5 yrs 11 months)
  - Receiving EIBI for 19 months, school support for 8 months
  - Areas of need included reduction of vocal stereotypy, language comprehension, decoding & written expression, independent play

Settings
- Noah
  - Attended JK level general education classroom five mornings a week, EIBI conducted at home in the afternoons
  - 15 kids in class, 1 teacher, no additional paraprofessional support
- Katie
  - Attended general education SK classroom part-time, preschool 2 half-days/week, EIBI conducted at home
  - 15 kids in preschool, part-time support by private ITs
- Molly
  - Attended private general education SK classroom full-time
  - 12-14 children in class, part-time paraprofessional support for all students, full-time support by private ITs

Interactive Play during free play periods

Definition: The child being engaged in a play activity within 2 m of at least one other child, and is interacting whether verbally (e.g. talking) or nonverbally (e.g. allowing another child to take turns, listening when another child is talking specifically to him/her) with another child (Hundert et al., 1998)
Data Collection

- **Training sessions**: Data were collected via momentary time sample at preschool during pre-established 15 minute free play periods. Measures taken following the delivery of the intervention while props are present in the environment.
- **Generalization sessions**: Same as above, except measures taken while props are absent from the play environment.
- Each of the daily play sessions were randomly assigned to be a training or generalization session and was counterbalanced throughout the study.

Training Sessions

- Coders were trained to follow the data collection procedure through didactic teaching, practice, and feedback.
- Coders were required to achieve a minimum of 80% on fidelity checks prior to beginning the study.
- Treatment fidelity checks were conducted through all phases of the study.

Interrater Reliability

- Interrater reliability data were collected for 32% of Noah’s sessions, 26.5% of Katie’s sessions, and 20% of Maria’s sessions across all conditions.
- Noah’s IOA ranged from 81-100%, mean of 90.7%.
- Katie’s IOA ranged from 80-100%, mean of 91.2%.
- Molly’s IOA ranged from 90-100%, mean of 95.6%.

Experimental Design

- Non-concurrent multiple baseline design
  - Baseline (A): Interactive play data collected during sessions prior to implementation of treatment phases
  - SST via VM (B): Social Script Training introduced via Video Modeling
  - SST via P&R (C): Social Script Training with adult delivered Prompting and Reinforcement
  - Peer Buddy (D): Peer buddy approach

Social Script Training

- Materials:
  - Noah: Pirate game (e.g., toy treasure, cards, etc.)
  - Katie: Calendar teaching game (e.g., demonstration calendar, pointer, velcro-backed days of week, months, number dates, etc.)
  - Molly: Grocery shopping (e.g., cash register, money, shopping baskets, produce, etc.)
- Social scripts
  - Custom designed, description of all non-verbal behaviors/actions plus an example of verbal actions
  - Designed specifically to fit the child’s level of development and interests

SST via Video Modeling

- For each child, a 2-5 minute CD-ROM was created to introduce the social script
- Video model shown only prior the first play session with a live model using actual SST materials
- Children were given an opportunity to ask questions
- The target child and two additional children were selected to play the game (one peer was nominated the observer, and the 2nd peer the participant)
- No additional prompting was provided
- Tangible reinforcement was provided upon successful completion of the social script
SST via Prompting & Reinforcement
- During the training conditions, prompting was provided following a most-to-least hierarchy
- Prompts were faded according to competency-based criteria for each child
- Staff stood 1-2 meters behind the two players and provided prompts for the children to follow the actions
- Descriptive and enthusiastic praise was provided immediately following any scripted and spontaneous theme-related responses
- Neither prompting nor reinforcement was delivered during the generalization conditions

Peer Buddy System
- Materials:
  - “Buddy Board”: A bristol board divided into three columns.
    - Column 1 was for the initiator’s picture
    - Column 2 was labelled “Play Partner”
    - Column 3 labelled “Activity”.
  - Pictures were made of each child in the classroom, several of the available classroom activities, picture of the theme-specific materials.
- Initial session used a live model demonstration of how to initiate play, accept and invitation, and maintain play
- Rules: Play with your buddy, stay with your buddy, talk to your buddy
- Q&A period: Comprehension test of the 3 criteria for being a ‘good buddy’
- Praise was provided during the play session following the ‘3 rules’
- Review, feedback & reinforcement following play period

Results

Conclusions
- SST via Video Modeling was not associated with any increase in interactive play
- All three participants demonstrated marked increases in interactive play rates during the SST + PR - Phase only observed in Training setting
- Generalization to non-theme related materials were observed for all three children during the PB phase only after the SST phase had been experienced

Discussion
- Future directions
  - Plausibility of video-modeling with repeated exposure
  - Impact of teaching multiple social scripts
  - Additional dependent measures could include:
    - Occurrence of spontaneous (untaught) theme-related actions
    - Occurrence of spontaneous ‘related’ social actions
ACKNOWLEDGEMENTS

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Evaluation of Selected Parameters on the Effect of Priming for Children with Autism in a Classroom Setting

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INTEREST IN PRIMING

- Strategy to prepare child with autism to demand situations, routines, or stimuli that are socially acceptable or typical for the setting
- Specifically, priming has been advocated as a tool for:
  - Parent Training
  - Supported Inclusion

Advantages of Priming in Supported Inclusion

- Priming holds promise as an antecedent strategy to support children with autism in general education classroom because social and academic adjustment of children in the classroom may be initiated by an intervention that is introduced at:
  - another time, another place, other person

Previous Studies

- Studies specifically indicating the use of priming as an intervention have examined its efficacy in facilitating change in the following developmental targets:
  - Peer interaction (Zanolli, Dagget & Adams, 1992)
  - Social initiations
  - Self-care skills (Bainbridge & Myles, 1999)
  - Academic skills
Research Results

- While limited number of studies have noted positive results in terms of acquisition of academic or self care skills or reduction in problem behavior.
- Research is still required on:
  - comparative efficacy of priming vs. other antecedent manipulations
  - what are the “active ingredients” or necessary components

Components of Priming

- Pre-exposure to problem situation (e.g., transition, novel situations/stimuli)
- Priming setting may be the Same or Different from the target setting in which the child with autism is to display the primed behavior.
- Time lag between priming and its application may range from Immediate to a Hours/Day before.

Possible Variable Affecting Impact of Priming?

1. Lag time interval

- Study 1: The Effect of Similarity of Setting on Priming

  - Target setting = a preparatory classroom in a special education school for students with autism; contains 7 children; academic and social skills programming for K-Gr 1, group instructional format.
  - Priming setting = either: a) Target setting; or, b) individual work area in another classroom.

Participants

- Child 1
  - Female Age 4-3
  - Dx of Autism; Full Scale IQ= 3rd percentile
  - Commenced EIBI at age 3-1
- Child 2
  - Female Age 5-3
  - Dx of ASD; Full Scale IQ= 8th percentile
  - Commenced EIBI at age 4 yr 4 mo
Design: multiple baseline design across participants with multi-element component

Priming Setting – Classroom or Individual work area

Target skills:
- Child 1: receptive discrimination of 10 numerals between 80 -100, randomly sorted into two sets of five
- Child 2: stating each of 10 words that is the opposite of a presented word, divided into two sets of five.

Priming Procedure

- 2 x 10 min sessions daily, order of instruction randomized
- Taught using 0 sec constant time delay prompt then a 3 sec constant time delay prompt
- FR1 token reinforcement / praise for correct response
- Correction procedure = model and then re-administered item

Training continued until the child correctly answered 5/5 of presented items three consecutive times.

One set of 5 items taught in an independent work area and the other set of 5 items was taught in the classroom.

Priming sessions occurred consecutively.

Dependent Measures

- Probes of children’s correct responding on items in the classroom, 1 hour after the training session. During each probe session, all ten items across the two sets of five were presented in a random order using embedded instruction within a 10 min interval.
- Probes also conducted in respective training settings
- Cumulative number of trials to mastery
- IOA= 93.4% on 20% of priming sessions

Results: Cumulative Number of Trials to Mastery

Probes in Classroom

Number of Correct Responses

Sessions
**Study 2: The Effect of Lag Time on Priming**

- **Setting**: Priming was conducted in individual work area to be applied in the classroom
- **Participants**: same
- **Design**: Noncurrent multiple baseline with multi-element component
- **Training materials**
  - Child 1: community helpers
  - Child 2: single-digit addition facts
- **Conditions**: a) 1 hr delay; b) 22 hr delay
  - Order of conditions, randomly determined each session
  - 2 x 10 min sessions, conducted 4 times a week
- **Dependent measures**
  - Cumulative number of trials to mastery
  - Classroom Probes conducted:
    - 9 am Tuesday to Friday for 22 hr delay
    - 10:40 am Monday to Thursday for 1 hr

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**Results: Cumulative Number of Trials to Mastery**

![Graph showing cumulative number of trials to mastery](image)

**Classroom Probes**

![Graph showing classroom probes](image)

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**Conclusion**

- Setting in which priming is conducted does not seem to make a difference on the effect of priming
- Lag time between priming and the implementation of primed skills does seem to make a difference with more transfer of skills with shorter lag times

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**Discussion**

- These results need to be replicated
- The significant advantage of priming is the ease of training in a more controlled setting than the classroom.
- The mechanism behind priming is unclear (Schriebman, Whalen, & Stahmer, 2000)
Future Research

For priming of academic work, is the mechanism:
- Exposure (respondent = desensitization),
- Practice (operant = learning), or
- some other factor:
  Reinforcement – Delay, Quality, Effort to Obtained (Schedule differences in priming vs target sessions)?