Verbal Operants as Predictors for Children with Autism in Inclusive Settings

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Abstract

This study examined verbal operant scores obtained from the Assessment of Basic Language and Learning Skills (ABLLS) to identify predictors for two groups of students with autism following Applied Behavior Analysis treatment. The two groups of children with autism consisted of an inclusion with neuro-typical peers and non-inclusion with neuro-typical peers group. ABLLS scores on specific verbal operant categories of 42 children diagnosed with autism were retrospectively reviewed and analyzed to determine if the preschoolers' verbal operant skills could be used to predict their placement in an inclusive environment. A logistic regression was conducted to assess if tact, intraverbal, and mand operants correctly classified inclusion. Results of theregression were significant, $\chi2$ (3) = 11.20, p < .01 (Nagelkerke R2 = .329). Thus, on the basis of the data analysis, the null hypothesis was rejected.

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Introduction

- Although the most promising treatment to address skill deficits in autism is behavioral intervention, the outcomes for children with autism are quite variable (Schreibman, 2005, McClannahan & Krantz, 1994; Olley, Robbins, & Morelli-Robbins, 1993; Weiss, 1999; Sallows & Graupner, 2005).

- Possible explanations for treatment outcome variability could include:

  - behavioral treatment relies too heavily on developmental explanations of language rather than Skinner's functional analysis of verbal behavior (Sundberg and Michael, 2001).

  - reliance upon standardized tests and parental reports instead of paying close attention to specific child characteristics as prognostic indicators of outcome (Charman, Drew, Baird, & Baird, 2003).

- Charman (2004) recommended a *post hoc* statistical analysis of a composite score made up of combined language measures to identify which measures contribute most to prediction of task performance for children with autism.

Introduction

- The functional mand, tact, and intraverbal repertoires are needed for successful peer interactions in inclusive settings (Sundberg & Michael, 2001)

- Communicating wants and needs is a "survival skill" for inclusion (Powers, 1992)

- ABLLS is common tool to measure language for children with autism in ABA treatment (Paul & Sutherland, 2005)

- Only 12% of children with autism receive their education in inclusive educational settings (Smith, Donahoe, & Davis, 2007) and Inclusion is considered a goal of special education research and practice (Koegel et al, 2001)

- Those children with autism who spend more time in inclusive settings have more positive outcomes later in life (Handleman, Harris, & Martins, 2005)

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Intro: Predictors of Outcome

- Imitation
  - (McEachin, Smith, & Lovaas, 1993; Sallows & Graupner, 2005; Smith, Zaidman-Zait, & Mirenda, 2005; Charman et al., 2005)

- Age & IQ scores
  - (Harris &Handleman, 2000; Stone, Turner, Pozdol, & Smoski, 2003; Gabriels,Hill, Pierce, Rogers, & Werhner, 2001)

- Early Diagnosis and Treatment
  - (Dawson & Osterling, 1997; Freeman, 1997)

- Effective Speech before age 5, Pragmatic language
  - (Tager-Flusberg, Paul, & Lord, 2005, Sigman & Ruskin, 1999)

- Nonverbal Communication Rate
  - (Charman et al., 2005)

Purpose

- The purpose of this study was to investigate whether verbal operant scores (ABLLS) could be used to predict whether children with autism can be placed in an inclusive educational setting following ABA treatment.

- This study used a retrospective analysis of data to investigate the predictor role of these verbal operants.

Research Questions

Research Hypothesis: Verbal operants do predict whether children with autism can be placed in an inclusive educational setting following ABA treatment.

Null hypothesis: *Verbal operants do not predict whether children with autism can be placed in an inclusive educational setting following ABA treatment.*

Method: Participants and Setting

- Participants: 42 Children diagnosed with autism or PDD-NOS ages 2-6 years old who had attended ABA clinic and were subsequently placed in

  – inclusion with neuro-typical peers
  - 21 participants   (4 females, 17 males)
  - 3.4 yrs mean
  - About 50/50 Autism and PDD

  – non-inclusion with neuro-typical peers group
  - 21 participants (3 females/18 males)
  - 4.4 yrs mean
  - about 60/40 Autism and PDD

Method

- The research design was quantitative and correlational, employing a logistic regression of the data.

- A Logistic Regression was used to determine significant differences between the inclusion and non-inclusion groups.

- A logistic regression is ideal when the dependent variable is a dichotomy (inclusion; non-inclusion) and the independent variables are of any type.

Method: Variables

- Dependent Variable: placement following ABA intervention-inclusion in private or public school settings, or self-contained placement

- The independent variables included verbal operants as defined on ABLLS

  - Four predictor variables-Mand, Tact, Intraverbal, & Echoic

  - verbal operants were given a score that included a scale from more simple to complex to demonstrate the basic definition of the verbal operant

  - Age and clinic were used as matching variables to increase the comparability of the two groups

Results

Table 2 presents the means and standard deviations of Tact, Intraverbal, Echoic and Mand.

Table 2. Means and Standard Deviations on Study Variables

Study Variables	Min.	Max.	M	SD
Echoic	0.00	12.00	4.95	4.34
Tact	0.00	16.00	5.98	6.22
Intraverbal	0.00	16.00	4.52	5.39
Mand	0.00	12.00	5.24	3.96

Note. $N = 42$.

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Table 3. Pearson Correlations Among Echoic, Tact, Intraverbal and Mand

	Echoic	Tact	Intraverbal	Mand
Echoic	--	.882**	.805**	.716**
Tact	--	--	.783**	.807**
Intraverbal	--	--	--	.782**
Mand	--	--	--	--

Note. ** $p < .001$. $N = 42$.

Table 4. *Collinearity Diagnostics Among Echoic, Tact, Intraverbal and Mand*

			Variance Proportions				
Dimension	Eigenvalue	Condition Index	(Constant)	Echoic	Tact	Intraverbal	Mand
1	4.32	1.00	.01	.00	.00	.01	.01
2	0.404	3.27	.52	.00	.01	.06	.00
3	0.130	5.76	.01	.12	.18	.54	.05
4	0.103	6.47	.12	.15	.05	.20	.55
5	0.041	10.33	.34	.72	.75	.19	.39

Note. Echoic ($VIF = 5.45$); Tact ($VIF = 6.26$); Intraverbal ($VIF = 3.76$); and Mand ($VIF = 3.54$).

Results

Table 5. Classification Table of Tact, Intraverbal, and Mand Classifying Inclusion

		Predicted		
		Inclusion		
Observed		Non-included	Included	Percentage Correct
Inclusion	Non-included	15	6	71.4
	Included	8	13	61.9
Overall Percentage				66.7

Table 6. Logistic Regression of Tact, Intraverbal and Mand Classifying Inclusion

						95% *C.I.*for *EXP(B)*	
Predictors	*B*	*S.E.*	*Wald*	*Sig.*	*Exp(B)*	Lower	Upper
Tact	.256	.127	4.07	.044	1.29	1.01	1.66
Intraverbal	.007	.123	0.01	.955	1.01	0.79	1.28
Mand	-.131	.177	0.55	.460	0.88	0.62	1.24

Note. df = 1. C.I. = confidence interval.

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Results

• The results supported that the additive effect of the tact, mand, and intraverbal operants were significant predictors of inclusion for children with autism following ABA treatment. Results of the regression were significant, χ^2 (3) = 11.20, $p < .01$ (Nagelkerke R2 = .329).

Consequently, the null hypothesis was rejected.

• The data, therefore, supported that the intraverbal, mand, and tact verbal operants can be used to predict whether children with autism can be placed in an inclusive educational setting following ABA treatment.

• The findings of this study also revealed that the tact operant was the strongest predictor of outcome for children in inclusion placement following intensive ABA therapy.

• Intraverbal and mand did not individually classify whether participants were included or not.

Discussion

- The results of this study support the previous findings of the Sallows & Graupner (2005) study demonstrating that early echoic behavior (2 of 20 sounds) was predictive of "best outcomes" for children with autism.

- The results of this study support previous findings that younger children with autism in early intensive behavioral treatment achieve better outcomes than older children with autism (Fenske et al., 1985; Harris & Handleman, 2000).

- This study may provide preliminary support for the validity of the ABLLS, an instrument based on Skinner's theory, in predicting whether

  children with autism can be placed in inclusive educational environments following ABA treatment.

- ABA is a costly Intervention and its important to prioritize treatment goals based upon predictors for outcome could have a significant impact on both treatment providers and consumers of behavioral treatment

- Inclusion is a controversial outcome measure

- Most language studies for children with autism have only included higher functioning children

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Limitations

- Multicollinearity assumption was not met

- Statistical Analysis; The number of participants was limited to the number of total placements of children with autism into inclusion settings, 60 cases would have yielded stronger results

- ABLLS is not an standardized assessment nor are there validity studies to show that the ABLLS does in fact measure verbal operants also the ABLLS is not necessarily scaled in developmental order

- Heterogeneity of Autism Diagnosis
    - Children in the Inclusion group had more children diagnosed with Autism

- Treatment Integrity, drift could occur with varying levels of staff and supervision, not all children were in full time ABA, hours varied

- Inclusion environments and acceptance standards varied for the children

- Outside interventions as a potential confound; however, children in the Non-inclusion group received more outside treatments than those in the inclusion group

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