Title: A comparative study of the effects of a developmentally based instructional model on young...

Authors: Rogers, Sally J.
DiLalla, David L.

Source: Topics in Early Childhood Special Education; 1991, Vol. 11 Issue 2, 1991 p. 29, 15p, 2 charts, 4 graphs

Abstract: Compares the effects of a developmentally based instructional model on children with autism and preschool children with other behavior disorders. Key features of the model; Examination of the children's functioning after 8 to 12 months; Development gains.

A Comparative Study of the Effects of a Developmentally Based Instructional Model on Young Children with Autism and Young Children with Other Disorders of Behavior and Development

The progress made by two different groups of preschool children, those with autism or related disorders and those with other emotional/behavioral and developmental disorders, in a particular instruction model was examined. The model was developmentally based and heavily influenced by Piaget's theory of cognitive development, pragmatics theory of language development, and Mahler's theory of development of interpersonal relationships. Both groups of children made greater progress than was predicted by their initial developmental rates in cognitive and language areas. An important and unexpected finding was the similar amount of progress made by the two groups: Specifically, the groups with autism did not make less progress than the comparison group, which ran contrary to our hypothesis.

The need for better research designs regarding the effectiveness of various instruction models in early childhood special education studies has been stressed by leaders in the field (Barnett & Escobar, 1988; Esposito, 1987; Strain, 1988; White & Mott, 1987). Strain (1988) pointed out the potential dangers of borrowing an instructional model that was developed for and validated with one group of children (e.g., children from low income families) and applying that model to children who differ in many ways from the group for whom the model was developed (e.g., children with Down syndrome) without having studied the effectiveness of the model on the second group of children. In order to help practitioners choose appropriate instructional models for children's individual needs, the field needs studies that examine the effects of specific instructional models on children with specific handicapping conditions, as exemplified by the work of Cole, Mills, and Dale (1989) in their comparison of curricula models.

The present article adds to this body of work by comparing the effects of one instructional model on the progress of children with two different handicapping conditions: children with autism and autistic-like disorders, and nonautistic children with behavioral and developmental disorders. The model, which has been described previously (Rogers, Herbison, Lewis, Pantone,

&: Reis, 1986; Rogers &: Lewis, 1989; Rogers, Lewis, &: Reis, 1987), was developed in 1981 to address the specific handicaps of young children with severe emotional/behavioral disorders, particularly impairments in symbolic thought and dramatic play, language and communication, impulse control, and relationships and social skills with adults and peers. The model recognized the tremendous interplay among social/emotional development, communication, and cognition in early childhood and was developed from the major developmental theories current at that time: (a) Piaget's experientially based theory of cognitive development (Piaget, 1954, 1962, 1966); (b) pragmatics theory of language development, particularly the INREAL model (Weiss, 1981), and (c) Mahler et al.'s (Mahler, Pine, &: Bergman, 1975) conceptualization of interpersonal development via the attachment-separation-individuation process.

Although the model was designed with the young child with emotional or behavioral handicaps in mind, the majority of children served in the program were those with handicaps in the autistic spectrum. Since the emphasis on social, cognitive, and communicative development appeared to be as appropriate for young children with autism as it was for young children with other emotional or behavioral disorders, the instructional model was provided to both groups of children.

The current chart review study was undertaken to examine the utility of this instructional model for two groups of children, those with handicaps in the autistic spectrum and those with emotional or behavioral disorders and developmental delays who were not autistic. Two hypotheses were generated:

(1) Both groups of children would demonstrate greater gains than would be expected by maturation alone in the areas of cognition, communication, and social skills as a result of this instructional model; and (2) the group with autism, being more severely handicapped than the group with behavioral disorders, would make less progress in this model than the latter group.

Method

Subjects

Charts were reviewed for 76 children served by the intervention program over a 9-year period. All children received psychological and developmental evaluations from a child clinical psychologist and an early childhood special educator. After 1984, all children also received speech and language evaluations; thus, speech and language test data were available for only two thirds of the total group. Psychiatric diagnoses were made and consensus reached by two psychologists using DSM-III and DSM-III-R (American Psychiatric Association, 1980, 1987) at the time of program entrance.

For the purposes of the present study, subjects were classified into two groups: those with diagnoses of Autistic Syndrome or other Pervasive Developmental Disorders (AUT group, n = 49) and those with other kinds of behavioral/emotional and developmental disorders (Reactive Attachment Disorder, Oppositional Disorder, Attention Deficit and Hyperactivity Disorder, and Adjustment Disorder) (B/D group, n = 27). Virtually all the children in the B/D group exhibited cognitive and language delays in addition to their psychiatric disturbances. Descriptive information, such as chronological age (CA), race, socioeconomic status (SES) based on the Hollingshead (1975) Five-Point Rating Scale, and sex are presented in Table 1.

Instructional Model

The instructional model was based on the premise that play is a primary vehicle for active learning in social/emotional, communicative, and cognitive arenas in early childhood. Cognitive, language, and social objectives were presented through various play modalities, with the role of the adult and the style and purpose of each play activity varying as the .learning

objective required.

In addition, several other constructs were considered basic to the approach. These included:

1. The role of positive affect. The presence of moderately strong, positive affect during a learning activity was considered to increase the child's attention and motivation, to assist the development of strong interpersonal ties, and to make learning experiences more salient for children, which Piaget felt assisted short- and long-term memory (Flavell, 1963).
2. Communication. The use of a pragmatics approach to language development and other values in this instructional model were complementary in their emphasis on (1) communicative intent rather than product, (2) the child's self-directed activities in natural environments as the basis for communication, (3) the importance of nonverbal communication, and (4) the child as the integrator and organizer of language learning.
3. Social relationships. Building positive relationships with specific adults was facilitated by the assignment of a "primary teacher" for each child. Positive peer relationships were fostered by engineering the environment to bring children into close proximity to each other and to require them to interact in order to meet their own personal goals, with adults facilitating the interaction as needed so that the children's own goals were met in the social exchange. Adults modeled and prompted social skills and also highlighted the effect of one child's behavior on another in simple, affective, cause-and-effect statements, to assist the children in beginning to understand another person's emotions, behavior, and perspective.
4. Handling unwanted behaviors. The general goal was to increase the number, variety, and complexity of children's behavioral repertoires, rather than reducing their already deficient repertoires. Thus, positive approaches were the main processes used to manage unwanted behaviors. For behaviors that were injurious or destructive, mild procedures for decreasing them such as brief removal from a group, were occasionally combined with positive procedures for increasing alternative, desirable behaviors.
5. Classroom structure and routine. The classroom "choreography" involved precise planning and coordination of physical space, equipment, materials, activities, staff roles, and timing. The daily routine was communicated to each child at an appropriate level and consistently managed.

Children attended the program for 4 1/2 hours per day (3 hours per day for children attending in 1981-1984), 43 weeks per year. After 1984, two individual speech and language therapy sessions per week were provided for all children with significant language delays. In addition, some children received individual psychotherapy sessions (generally 2 half hours per week) using play techniques. The average length of time that children attended the program was approximately 18 months. In order to assure adherence to the model, staff were trained and informally assessed using the Playschool Observation Scale (Rogers et al., 1987) two to three times per year from 1984 to the present.

Measures

IQ and MA. Intelligence quotients (IQ) were assessed at the time of diagnosis by a psychologist using standardized psychological tests appropriate for the child's age, handicaps, and level of cooperation. IQ scores were not obtained for 3 subjects. For approximately 50% of the remaining subjects, IQ was measured with the Merrill-Palmer Test of Mental Abilities (Stutsman, 1948); approximately 25% of the remaining subjects were tested on the Mental scale of the Bayley Scales of Infant Development (Bayley, 1969), due to their mental age levels. The remainder of subjects were tested on other instruments. For uniformity, a ratio IQ score was calculated by determining the subject's mental age (MA) and dividing by his or her CA. Although standard procedures for administering and scoring each item were observed, the

optimal performance by each subject was sought by testing subjects in several short sessions and occasionally using material rewards in addition to social praise for cooperation. See Table 1 for IQs for both groups.

Early Intervention Developmental Profile and Preschool Profile (Schafer & Moersch, 1981). The Profiles assess development in the domains of cognition, language, perceptual-fine motor, gross motor, social/emotional, and self-care. Administration and scoring were carried out at 6-month intervals according to standard instructions by the child's classroom teacher (a special educator specifically trained on the instrument but who was not informed about the hypotheses of this study). For each of the six domains, a developmental age in months was calculated, based on the number of items passed in that domain. See Table 2 for means for both groups on all six domains at the time of program enrollment.

Childhood Autism Rating Scale (CARS) (Schopler, Reichler, DeVillis, & Daly, 1980). Behavioral ratings on the CARS concerning the presence and severity of symptoms commonly associated with autism were made at the time of enrollment. The CARS rates behavior on 14 subscales: relationships; imitation; affect; body use; peculiarities in handling objects; resistance to change; visual, auditory, and near-receptor responsiveness; anxiety; verbal and nonverbal communication; activity level; and intellectual ability. Each of these subscales is scored from 1 (within the normal range for subject's age) to 4 (most severe autistic symptomology), including midpoints. Individuals with total scores less than 30 are considered to be not autistic; scores of 30 to 36 are considered to reflect mild to moderate autism; and over 36 is considered indicative of severe autism.

The CARS was scored according to standard instructions from interactions with each child in a play interaction with a familiar adult that lasted from 20 to 30 minutes. Data from 4 subjects were unavailable. In 12 cases, the rater carried out the interaction with the child and scored the CARS after the play interaction. In all other cases the rater scored the CARS from videotapes of the play interactions. Inter-rater agreement was calculated using the videotapes on 33% of the subjects. The Pearson correlation coefficient among raters was .94 for total score. Raters were not aware of the hypotheses of this study. Mean CARS scores for the two groups appear in Table 1.

Language Quotient. Annual assessments of receptive and expressive language development using standardized instruments were carried out routinely by speech and language pathologists from 1984 to the present; these assessments involved 48 subjects. The instrument used for the majority of children (n = 34) was the Sequenced Inventory of Communicative Development (SICD) Hedrick, Prather, & Tobin, 1975); other standardized tests included the Preschool Language Scale (Zimmerman, Steiner, & Pond, 1979)(n = 1), the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981) (n = 7), the Test of Auditory Comprehension (Carrow, 1973)(n = 1), and the Receptive-Expressive Emergent Language Scale (Bzoch, & League, 1970)(n = 5). An expressive and receptive language age was computed for each child according to manual instructions. For both groups, expressive and receptive language scores were strongly and significantly correlated (AUT group, n = 33, r = .83, p = .001; B/D group, n = 11, r = .94, p = .001). For this reason, expressive and receptive language scores were collapsed into one overall language score that represented the mean of the two. This overall language score was divided by chronological age to obtain a language quotient (LQ), similar to a ratio IQ, that reflected rate of language development, as seen in Table 1.

Results

Descriptive Data

First, the descriptive data of the AUT and B/D groups were compared with t tests. (All t tests reported in this article are two-tailed.) As can be seen in Table 1, the groups were not

comparable. The AUT group differed significantly from the B/D group, with lower nonverbal IQ scores and language quotients, higher CARS scores, and higher SES. The AUT group was also younger than the BD group by approximately 5 months, though this difference did not reach statistical significance.

Profile Data

Next, the initial Profile data gathered at the child's admission to the program (Time 1 data) were examined. As expected, given the younger age and lower nonverbal IQ of the AUT group, these children were significantly lower than the B/D group on all Profile scores. As can be seen in Table 2, both groups performed most poorly on Language, and there was the greatest discrepancy between the two groups on this subscale, with a mean difference of 14.5 months.

Hypothesis 1: Progress Made During Intervention

Because the following analyses focused on change scores in various developmental areas, it was important to partial out the portion of the change that could be attributed to maturation over time, rather than to the specific treatment. This was accomplished by using a method know as prediction analysis, a method frequently used in studies of early intervention programs for adjusting for changes that could be due to maturation alone (Fewell & Sandall, 1986). The amount of change expected between the initial scores (Time 1 scores) and postintervention scores gathered after a 6- to 9-month period (Time 2 scores) that was due to maturation alone was determined by calculating a ratio score (developmental level in months/CA in months at Time 1) for each Profile subscale, which represented the initial developmental rate each subject exhibited on each Profile subscale. The ratio score for each subscale was then multiplied by CA at Time 2 to determine a predicted level that each child was expected to make on each subscale, based on their initial developmental rate. These predicted scores were compared to the actual scores made by each group, in order to assess the incremental effect of the intervention approach over and above the effects of maturation; paired-sample t tests were performed to examine the significance of the differences. Since a few subjects did not receive Time 2 testing (five in each group), there were fewer subjects in these analyses.

As can be seen in Figure 1, the AUT group demonstrated higher actual scores than projected scores on all subscales, with differences reaching or approaching statistical significance on five of the six subscales: Perceptual-Fine Motor, $t(40) = -3.3$, $p = -.002$; Cognition, $t(40) = -3.0$, $p = .004$; Language, $t(39) = -2.2$, $p = .03$, Social/emotional, $t(41) = -2.1$, $p = .05$; and Gross Motor, $t(41) = -1.9$, $p = .07$. Differences on the Self-Help subscale did not reach statistical significance, $t(40) = -1.4$, $p = ns$.

As can be seen in Figure 2, the B/D group demonstrated higher actual scores than projected scores on all subscales as well, but differences reached or approached statistical significance on only two of the subscales: Cognition, $t(15) = -2.5$, $p = -.02$, and Language, $t(14) = -2.1$, $p = -.06$. Thus, our first hypothesis, that both groups would make greater cognitive and language gains than expected by maturation alone, was supported.

Hypothesis 2: Slower Progress in the AUT Group

In order to examine our second hypothesis, we selected subgroups of 16 subjects each from the AUT and B/D groups who could be matched at Time 1 on CA and Profile language levels (see Sigman, 1989, for a rationale for the need to match samples with autism to comparison groups on verbal rather than nonverbal measures). The results of this comparison of matched groups is presented in Figure 3. Between the matched groups, there were no statistically significant differences between any Profile subscale scores at Time 1. Similarly, at Time 2 there were no significant group differences. Thus, the AUT group appeared to maintain the same development

rate during intervention as the B/D group. Our hypothesis of greater learning handicaps and slower progress in the AUT group than in the more mildly impaired B/D group was not supported.

Standardized Language Measures

Given this surprising finding, we decided to look more closely at the AUT group's progress in their most impaired domain--language. In order to examine language progress on the standardized measures, a predicted Time 2 score was computed as described above, by calculating a language quotient at Time 1 and multiplying this language quotient by the child's chronological age at Time 2. This predicted language level in months was compared to the actual language level achieved by the child at Time 2 using paired-sample t tests. For the group with autism, the Time 1 mean was 20.92 (SD = 9.65) and the predicted score for Time 2 was 25.37 (SD = 9.94). The actual Time 2 language level in months (M = 30.23, SD = 11.56) was significantly higher than the predicted language level, $t(25) = 4.09$, $p = .001$. Thus, while we predicted an average of 5 months' development over the 10-month period between Time 1 and Time 2 based on initial scores, in fact the AUT group doubled this expectancy and achieved almost 10 months of progress in the 10-month period--a normal rate of language development. The difference in language quotients from Time 1, LQ1 =.44, to Time 2, LQ2 =.53, was significant at the p=.001 level, $t(25)= -4.26$.

The same set of calculations was performed for the 13 subjects with autism who had Time 3 data, to see if developmental rate continued to increase in the second year of treatment. These 13 subjects were younger and had lower language scores than the larger group, so Time 1 to Time 2 changes were calculated separately, as well. The Time I level was 16.92 (SD = 7.83), the predicted language level for Time 2 was 20.87 months (SD = 9.22), and the actual Time 2 score was 27.54 months (SD = 13.49), $t(12) = -3.63$, $p = .003$. For Time 3 data, collected on the average of 9 months after Time 2, the predicted language level (based on the developmental rate at Time 2) was 32.05 (SD = 15.39) and the actual score at Time 3 was 34.38 (SD = 16.65), $t(12) = -1.31$, p = ns. Their quotients increased from .40 to .56, a significant increase, $t(12) = -3.68$, $p = .003$. Thus, this subset of the AUT group gained 17 months of language progress in a 19-month period, even though from their initial language quotient of .40 we would have expected 7 months of progress in a 19-month period. The early rapid gain in language rate seen from Time 1 to Time 2 was sustained, but not further increased, during the second year of intervention, as well.

Twelve subjects in the B/D group had both Time 1 and Time 2 data. The Time 1 language level was 31.08 (SD = 10.65), the predicted language level for Time 2 was 35.68, and the actual level at Time 2 was 39.83, $t(11) = -2.58$, $p =.03$. Thus, in a mean time period of 7.5 months, this group made over 8 months of progress, rather than the 4.5 months that their initial language quotient would have predicted, reflected in a statistically significant 8-point increase in language quotient from Time 1, LQ1 = .61, to Time 2, LQ2=.69, $t(11)= -2.77$, $p = .02$. Unfortunately, there were not enough subjects in the B/D group with Time 3 data to look at stability of these changes over the next year of treatment.

Group Comparisons

From the above findings, it appears that both groups of subjects demonstrated essentially equivalent, and normal, rates of language acquisition during the intervention period, even though the group with autism demonstrated far greater language deficits than the B/D group. In order to test this directly, we matched a subset of 12 AUT subjects to 12 B/D subjects on initial CA and standardized language scores and compared their progress at Time 2. As can be seen in Figure 4, the two groups did not differ on language level at Time 1 or Time 2. The AUT group surpassed their predicted language score by 5 months, for a total gain of 10 months in an

8.5-month period, $t(11) = -2.28$, $p = .04$. Likewise, the B/D group surpassed their predicted score by 4 months, for a total gain of almost 9 months in an 8-month period, $t(11) = -2.58$, $p = .02$. Thus, the AUT group appeared to have made as many gains in language as the B/D group, with both groups making approximately twice as much language progress during the course of intervention as one would have expected, given their initial developmental rates concerning language acquisition.

Discussion

Two main findings emerged from the results. First, the of a particular intervention approach was examined on two different groups of children: a group of children with autism or autistic-like disorders, and a second group of children with developmental delays and emotional/behavioral disorders unrelated to autism. An examination of the children's functioning after 8 to 12 months of intervention reveals that both groups of children made greater developmental gains than was predicted based on their developmental levels at entry to the program. Their gains surpassed what was expected based on maturation alone and reached statistically significant levels in both cognitive and language functioning for both groups of children. When improvement in language was examined more closely, it was seen that both groups achieved twice as many months' gain as was predicted from initial developmental rates. Because the subjects were used as their own controls and no separate, matched control groups were used, these results must be interpreted accordingly. However, these initial data appear to support the power of the instructional model described to enhance cognitive and language development in children with autism or other disorders of development and behavior.

The second major finding concerned the progress of the group with autism during intervention. Although they were more severely handicapped than the B/D group, as demonstrated by their lower developmental rates in all areas, they made as much progress as the B/D group on all measures. This finding was even more apparent when we matched a group of children with autism to a group of children with behavior disorders on language levels at the start of intervention and compared their outcomes after 8 to 12 months of intervention. The groups continued to be matched on all skills, demonstrating equivalent developmental growth across the groups. This ran counter to our hypothesis, but it replicates other findings (Prior, 1979; Tager-Flusberg et al., 1990) that demonstrate equivalence of children with autism when compared to nonautistic subjects of equivalent mental ages in some developmental areas.

How might we account for these findings? There are two explanations, one more speculative than the other. First, it is increasingly accepted that autism is a disorder of specific, rather than global, deficits and that, except for the few, specific deficits--in pragmatics of language, theory of mind, imitation, symbolic play, and emotion perception--children with autism perform as well as comparison subjects matched on IQ or mental age (Baron-Cohen, 1988; Goodman, 1989). This is in fact what we are demonstrating here, as well, as the outcome measures do not specifically test any of those five areas that are specifically deficient in autism. This finding may serve the important function of raising expectations regarding the progress of young children with autism in high-quality intervention programs.

The second explanation is not an alternative to the first but, rather, an additional speculation that comes from clinical observation. As we have worked with young children with autism over the years, we have been repeatedly struck by the fact that the 2- or 3-year-old child with autism has very few of the positive symptoms--the behavioral excesses--of the older child with autism: few or no stereotypes, little gaze avoidance, few rituals, and so forth. It is the negative symptoms--the behavioral absences--that stand out in the very young child with autism. It is as if the disorder has not fully formed yet, and the behavioral excesses will develop later to fill the void left by the psychological deficits specific to autism (Baron-Cohen, 1988; Goodman, 1989). Perhaps intervening in these specific areas of deficit during early childhood (before the full disorder has canalized, so to speak) could help fill in the missing information at a developmentally appropriate time and help the child proceed on a course that is closer to normal development. (There is some evidence from animal studies that intervention at particular

periods of development can remarkably affect recovery of functions, because of corresponding greater brain plasticity; see Kolb, 1989). Some evidence for this speculation comes from our observations of less pronounced stereotypic behavior and social isolation in our very young (ages 2 and 3) students with autism. Other evidence comes from our past and present findings concerning their response to intervention: their decreasing autistic symptomatology and high rate of language acquisition (Rogers &: Lewis, 1989), and their rate of language, cognitive, social, and general developmental progress as described in this article.

In summary, a particular, developmentally based instructional model was shown to promote developmental gains in cognitive, social, and communicative functioning in two groups of children, those with disorders in the autistic spectrum, and those with other kinds of emotional, behavioral, and developmental disorders. This approach resulted in particularly impressive gains in language acquisition, which were sustained during intervention periods for as long as 2 years. A second important and unexpected finding was the equivalence of progress made by the two groups. It was anticipated that the group with autism would demonstrate greater developmental delays and slower developmental gains than the B/D group. While they did demonstrate greater delays, the subjects with autism made as many months of progress as the more mildly impaired B/D group during the intervention period. These two findings support the usefulness of this particular instructional model for two groups of young children with handicaps: those with autism-related disorders and those with other kinds of social/behavioral disorders. Further studies are needed to compare the effects of various instructional models on these particular groups of children.

Authors' Note

1. The program described here was supported by Grant No. G0081100247 from the Office of Special Education and Rehabilitation, U.S. Department of Education.
2. This research was also supported in part by an award from the Developmental Psychobiology Research Group Endowment Fund provided by the Grant Foundation.

Table 1. Demographic Descriptions for the AUT Group and the B/D Group

PART I

Measure	AUT Group	n
CA	45.77 (10.02)	48
LQ	.44 (.16)	34
Nonverbal IQ	70.30 (22.91)	46
CARS	35.91 (6.91)	48
SES	3.17 (1.29)	49
Male/Female	36/13	49
Majority/minority	29/20	49

PART II

Measure	B/D Group	n	t
CA	50.20 (12.09)	25	-1.67 [*]
LQ	.64 (.16)	14	-3.91 [***]
Nonverbal IQ	85.79 (22.36)	24	-2.71 [***]
CARS	22.21 (8.05)	21	7.20 [***]
SES	2.43 (1.54)	27	2.06 [**]
Male/Female	22/5	27	
Majority/minority	18/9	27	

Note. CA = Chronological age; LQ = language quotient;

CARS--Childhood Autism Rating Scale score; SES = socioeconomic status; AUT = autism; B/D = behavioral and developmental disorders. [*]p =.10. [**]p < .05. [***]p < .001.

Table 2. Descriptions of the AUT Group and the B/D Group at Time 1 on the Six Subscales of the Developmental Profiles

PART I

Subscale	AUT Group	n
Cognition	27.3 (9.9)	45
Language	24.2 (14.5)	45
Fine Motor	31.1 (12.1)	46
Gross Motor	34.8 (11.6)	46
Self-Help	29.0 (13.5)	46
Social/Emotional	29.6 (13.9)	46

PART II

Subscale	BID Group	n	t
Cognition	40.0 (13.2)	21	-4.4 [***]
Language	38.6 (18.3)	20	-3.4 [***]
Fine Motor	50.4 (10.3)	26	-3.6 [***]
Gross Motor	45.8 (16.6)	21	-3.1 [**]
Self-Help	38.9 (18.3)	18	-2.4 [*]
Social/Emotional	43.2 (14.0)	22	-3.6 [***]

Note. AUT = autism; B/D = behavioral and developmental disorders. [*]p = .05. [**]p < .01. [***]p < .001.

GRAPH: Figure 1. Mean, pre, post, and predicted Profile scores after a mean of 6.4 months of intervention for AUT group (n = 41, CA = 45.9 months), for perceptual-fine motor, cognition, language, social/emotional, self-help, and gross motor domains.

GRAPH: Figure 2. Mean pre, post, and predicted Profile scores after a mean of 5.8 months of intervention for BID group (n = 16, CA = 47.4 months) for perceptual-fine motor, cognition, language, social/emotional, self-help, and gross motor domains.

GRAPH: Figure 3. Profile scores of matched subgroups of AUT subjects (n = 16, CA = 50.5 months) and BID subjects (n = 16, CA = 47.4 months) before and after 5.9 months of intervention.

GRAPH: Figure 4. Standardized language scores of matched subgroups of 12 AUT and 12 BID subjects before and after a mean of 8.1 months of intervention.

References

American Psychiatric Association. (1980). Diagnostic and statistical manual of mental disorders (3rd ed.). Washington, DC: Author.

American Psychiatric Association. (1987). Diagnostic and statistical manual of mental disorders (rev. ed.). Washington, DC: Author.

Barnett, W.S., &: Escobar, C.M. (1988). The economics of early intervention for handicapped children: What do we really know? Journal of the Division for Early Childhood, 12, 169-181.

Baron-Cohen, S. (1988). Social and pragmatic deficits in autism: Cognitive or affective? Journal of Autism and Developmental Disorders, 18, 379-402.

Bayley, N. (1969). Bayley scales of infant development. San Antonio, TX: Psychological Corp.

Bzoch, K.R., & League, R. (1970). Receptive-expressive emergent language scale. Austin, TX: PRO-ED.

Carrow, E. (1973). Test of auditory comprehension of language. Austin, TX: Learning Concepts.

Cole, K.N., Mills, P.E., & Dale, P.S. (1989). A comparison of the effects of academic and cognitive curricula for young handicapped children one and two years postprogram. Topics in Early Childhood Special Education, 9(3), 110-127.

Dunn, L., & Dunn, L. (1981). Peabody picture vocabulary test. Circle Pines, MN: American Guidance Service.

Esposito, B.G. (1987). The effects of preschool integration on the development of nonhandicapped children. Journal of the Division for Early Childhood, 12, 31-46.

Fewell, R.R., & Sandall, S.R. (1986). Developmental testing of handicapped infants. Topics in Early Childhood Special Education, 6(3), 86-100.

Flavell, J. (1963). The developmental psychology of Jean Piaget. Princeton, NJ: Van Nostrand.

Goodman, R. (1989). Infantile autism: A syndrome of multiple primary deficits? Journal of Autism and Developmental Disorders, 19, 409-424.

Hedrick, D.L., Prather, E.M., & Tobin, A.R. (1975). Sequenced inventory of communication development. Seattle: University of Washington Press.

Hollingshead, A. (1975). Four factor index of social status. Unpublished manuscript.

Kolb, B. (1989). Brain development, plasticity, and behavior. American Psychologist, 44, 1203-1212.

Mahler, M.S., Pine, F., & Bergman, A. (1975). The psychological birth of the human infant. New York: Basic Books.

Piaget, J. (1954). Construction of reality in the child. New York: Ballantine Books.

Piaget, J. (1962). Play, dreams, and imitation in childhood. New York: W.W. Norton.

Piaget, J. (1966). Psychology of intelligence. Totowa, NJ: Littlefield, Adams. Prior, M. (1979). Cognitive abilities and disabilities in infantile autism. Journal of Abnormal Child Psychology, 7, 357-380.

Rogers, S.J., Herbison, J., Lewis, H., Pantone, J., & Reis, K. (1986). An approach for enhancing the symbolic, communicative, and interpersonal functioning of young children with autism and severe emotional handicaps. Journal of the Division for Early Childhood, 10, 13.5-148.

Rogers, S.J., Lewis, H.C., & Reis, K. (1987). An effective procedure for training early special education teams to implement a model program. Journal of the Division for Early Childhood, 11, 180-188.

Rogers, S.J., & Lewis, H. (1989). An effective day treatment model for young children with

pervasive developmental disorders. Journal of the American Academy of Child and Adolescent Psychiatry, 28, 207-214.

Schafer, D.S., & Moersch, M.S. (Eds.). (1981). Developmental programming for infants and young children. Ann Arbor: University of Michigan Press.

Schopler, E., Reichler, R., DeVillis, R., & Daly, K. (1980). Toward objective classification of childhood autism: Childhood autism rating scale (CARS). Journal of Autism and Developmental Disorders, 10, 91-103.

Sigman, M. (1989). The application of developmental knowledge to a clinical problem: The study of childhood autism. In D. Cicchetti (Ed.), The emergence of a discipline: Rochester symposium on developmental psychopathology (pp. 165-187). Hillsdale, NJ: Erlbaum.

Strain, P.S. (1988). The evaluation of early childhood research: Separating the winners from the losers. Journal of the Division for Early Childhood, 12, 182-190.

Stutsman, R. (1948). The Merrill-Palmer scale of mental tests. New York: Harcourt Brace Jovanovich.

Tager-Flusberg, H., Calkins, S., Nolin, T., Baumberger, T., Anderson, M., & Chadwick-Dias, A. (1990). A longitudinal study of language acquisition in autistic and Down syndrome children. Journal of Autism and Developmental Disorders, 20, 1-22.

Weiss, R. (1981). INREAL intervention for language handicapped and bilingual children. Journal of the Division for Early Childhood, 4, 40-51.

White, K.R., & Mott, S.E. (1987). Conducting longitudinal research on the efficacy of early intervention with handicapped children. Journal of the Division for Early Childhood, 12, 13-22.

Zimmerman, I.E., Steiner, V.G., & Pond, R.E. (1979). Preschool language scale. Columbus, OH: Merrill.

~~~~~~~~

Sally J. Rogers, University of Colorado Health Sciences Center, Denver, and David L. DiLalla, University of Colorado, Boulder

---
~~~~~~~~