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ABSTRACT
                The cognitive styles of 40 children (ages 8-17) with serious
emotional disturbance (SED) were investigated via their performance on
Planning-Attention-Simultaneous-Successive (PASS) model tasks as represented
by the Das-Niggler Cognitive Assessment System (CAS). In the study, the
children with SED and 40 typical children were administered the 14 subtests
of the CAS Standardization Edition. The two groups were matched according to
age, race, and sex. Findings revealed significant differences between the two
groups, in favor of controls, across the four PASS model scales and 12 of the
14 CAS subtests, which demonstrated that the children with SED had consistent
cognitive weaknesses relative to the controls. Cluster analysis of the
performance of children with SED yielded a two-profile solution, which
suggested the presence of a subgroup that was higher functioning and had
attention disorders, and a lower functioning, more disturbed subgroup.
Overall results from the study indicate the CAS appears to provide a
promising alternative to traditional assessment measures in acquiring a
better understanding of the cognitive characteristics of children with SED,
the nature of their abilities and disabilities, and appropriate strategies
for the students' academic remediation. (Contains 74 references.) (Author/CR)

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Running Head: PASS Model

PASS Model Processes of Children with Emotional Disability

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Abstract

The purpose of this study was to investigate cognitive styles of children with serious emotional disturbance (SED) via their performance on PASS (Planning-Attention-Simultaneous-Successive) model tasks as represented by the Das-Naglieri Cognitive Assessment System (CAS; J.P. Das & J.A. Naglieri, 1994). Forty children educationally diagnosed with "emotional disability" and 40 regular education controls were administered the 14 subtests of the CAS Standardization Edition. The two groups were matched according to age, race, and sex. Findings revealed significant differences between the groups, in favor of controls, across the four PASS model scales and 12 of the 14 CAS subtests. Cluster analysis of the performance of children with SED yielded a two-profile solution, which suggested the presence in this sample of a higher-functioning, attention-disordered subgroup and a lower-functioning, more disturbed subgroup. Results are contrasted with findings from previous research. Implications and recommendations for research and practice are discussed.

PASS Model Processes of Children with Emotional Disability

The Individuals with Disabilities Education Act of 1990 (IDEA; 20 U.S.C. § 1400 et seq.) created new challenges for school psychologists in effectively identifying and serving students with serious emotional disturbance (SED). Yet students with emotional and behavioral problems remain the most underserved category of special education in this country today. Whereas federal estimates suggest that 2-3% of the school-aged population should qualify as SED (Smith, Wood, & Grimes, 1988), less than 1% of that population currently is being served nationally, with some states serving fewer than 0.2% (U.S. Department of Education, 1994).

Much of the dilemma in identifying students with SED lies in the fact that the diagnostic category of "emotional disturbance" is extremely difficult to define, with school districts nationwide relying on state adaptations of a federal definition and terminology which have been criticized as being imprecise and inadequate (Forness, 1988; Smith et al., 1988). As such, disagreement frequently surfaces regarding the nature of the students' behavior that school personnel judge to be indicative of the need for special education (Kauffman, Cullinan, & Epstein, 1987). Furthermore, the lack of clarity in definition and variability in terminology have not only impeded a clear understanding of the core characteristics of this population, but seriously confounded effective means by which they can be assessed. School psychologists attempting to make decisions regarding placement of children in programs for the seriously emotionally disturbed are faced with a dearth of objective criteria with which to support their determinations, which, consequently, are often made on the basis of subjective and inadequate information (McGinnis, Kiraly, & Smith, 1984).

Another difficulty in serving students with serious emotional disturbance lies in the focus of the identifying evaluation. A prime component of most school-based assessments for SED is the use of personality instruments to evaluate social/emotional functioning. Educators often find such assessments by school psychologists lacking in relevance for daily classroom decision-making (Bardon, 1972). Whereas teachers depend on school psychologists to help them

decide on educational objectives, techniques for accomplishing those objectives, and the most appropriate methods for evaluating their attainment, typical assessments of emotional disturbance by school psychologists often may be aimed more at providing clinical information about the nature and cause of SED rather than providing data to help make those decisions (Tombari, 1980).

Academic and intellectual characteristics of children with SED also seem to be less frequently examined in the literature than issues concerning their social or emotional adjustment. Mastropieri, Jenkins, and Scruggs (1985), in an extensive review of the literature, located only 25 articles reporting data in this area. Based on their investigation, they concluded that students with behavioral disorders consistently appear to exhibit academic and intellectual deficiencies, although none of the research to date has provided conclusive evidence of content-specific weaknesses. In addition, the authors suggest that research concerned with optimizing instructional strategies for this population has been greatly neglected. Thus, it appears that surprisingly little is known about the academic and intellectual characteristics of children who are found eligible for special education placement based on their social/emotional problems. Yet knowledge of patterns of intellectual functioning can contribute enormously, not only to an understanding of the deficits and difficulties in learning observed in these children (Walker & Birch, 1974), but to the avoidance of bias and inappropriate placement, as well as the enhancement of academic programming (Pommer, 1986).

Traditionally, the Wechsler Intelligence Scales for Children (WISC, WISC-R, WISC-III; Wechsler, 1949, 1974, 1991) have been the most frequently used instruments for determining the intelligence of children with SED (Clarizio & Higgins, 1989). Likewise, the majority of available research examining the intellectual functioning of these children has utilized the Wechsler scales (WISC and WISC-R). A focus of much of this research has been an attempt to establish unique patterns or profiles on the Wechsler that differentiate children with SED from other clinical populations and from normals (e.g., Dean, 1977, 1978; Lewandowski, Saccuzzo, & Lewandowski, 1977; Paget, 1982; Wechsler & Jaros, 1965).

Such attempts have met with mixed and often contradictory results (e.g., Bortner & Birch, 1969; Clarizio & Veres, 1983; Morris, Evans, & Pearson, 1978).

From the evidence, it would appear that the utility of the Wechsler scales in distinguishing among normal and clinical populations is considerably suspect. This apparent inefficacy may be due, in part, to the emphasis on test content of the Wechsler and other popular psychodiagnostic instruments. Another limitation of current standardized instruments is their failure to attend to individual differences in organizational, sequencing, and rehearsal schemes. Content-based measures such as the Wechsler are not sensitive to the unique processing strategies applied by an individual in answering a question or solving a problem.

In recent years, there has been a movement toward test development based on the cognitive processing approach. Both the Kaufman Assessment Battery for Children (K-ABC; Kaufman & Kaufman, 1983) and more currently, the Das-Naglieri Cognitive Assessment System (CAS; Das & Naglieri, 1994) are formulated upon Luria's (1966, 1973, 1980) conceptual framework of intelligence. The cognitive processing approach exemplified by these instruments attempts to connect knowledge of the neuropsychological basis of human behavior with the mental processes ascribed to specific functional areas of the brain, namely, simultaneous, successive, planning, and attention processes (Luria, 1966).

Although the K-ABC represents an admirable attempt to operationalize the conceptual framework of intelligence outlined by Luria (1966, 1973, 1980), it has been criticized for focusing solely on measures of simultaneous and sequential (successive) processing. According to Das (1984), failure to include tasks representing the attention and planning components of the Luria model ignores the complex interaction among the functional units representing these components. This interrelationship among units is a crucial aspect of Luria's theory. Nevertheless, research utilizing the K-ABC with emotionally disturbed samples has yielded findings of deficiencies in Simultaneous relative to Sequential processing (Freeman, Lucas, Forness, & Ritvo, 1985; Hickman & Stark, 1987; Pommer, 1986).

In response to the noted shortcomings of the K-ABC, Das and his colleagues

(e.g., Das, Kirby, & Jarman, 1975; Das, Naglieri, & Kirby, 1994; Naglieri & Das, 1990) have proposed a more comprehensive interpretation of the Luria model. Most recently, this has been called the PASS model (Das, Naglieri, & Kirby, 1994; Naglieri & Das, 1988, 1990), as it attempts to represent all three functional units by incorporating measures of planning, attention, simultaneous, and successive cognitive processes. The Das-Naglieri Cognitive Assessment System (CAS; Das & Naglieri, 1994), currently in the standardization phase, is the most recent operationalization of this model. The battery includes four major scales (Planning, Attention, Simultaneous, Successive) comprising 14 subtests which vary according to content (verbal vs. nonverbal), complexity, and modality (visual vs. auditory).

An impressive amount of research has been conducted on the validity of the PASS model and the tasks used to represent its constructs. Early investigations focused primarily on simultaneous and successive processing, with studies demonstrating support for the model across samples of elementary and middle school-age children (Das, 1972, 1973; Garofalo, 1986; Kirby & Robinson, 1987; Naglieri & Das, 1988); high school-age children (Biggs & Kirby, 1984; Naglieri & Das, 1988); and adults (Ashman, 1982; Merritt & McCallum, 1983; Wachs & Harris, 1986). In addition, evidence for the validity of these processes has been gleaned through research with various cultural groups (Das, 1973; Dash, Puhan, & Mahaptra, 1985; Leong, Cheng, & Das, 1985; Schofield & Ashman, 1986) and exceptional samples (Cummins & Das, 1980; Das, Leong, & Williams, 1978; Karnes & McCallum, 1983; Snart, O'Grady, & Das, 1982).

Factorial support for planning as a separate component distinct from simultaneous and successive processing also has emerged (Ashman & Das, 1980; Das & Dash, 1983; Das & Heemsbergen, 1983; Naglieri, Prewett, & Bardos, 1989). Finally, evidence for the model's attentional factor has been provided in several investigations (Naglieri, Das, Stevens, & Ledbetter, 1991; Naglieri et al., 1989; Reardon & Naglieri, 1992).

In a series of discriminant validity studies, Naglieri and his colleagues have conducted an examination of the differences between exceptional samples and

normal controls on PASS tasks. These studies, which have included reading disabled and developmentally handicapped (Bardos, 1988), Attention Deficit/Hyperactivity Disordered (Reardon & Naglieri, 1992), and delinquents (Hurt & Naglieri, 1992), highlight the utility of the PASS model/CAS tasks in examining the cognitive strengths and weaknesses of various exceptional samples. It will be important for future investigations to extend this line of research to other clinical populations and special education subcategories. Thus, the purpose of the present study was to examine the performance of a sample of children with serious emotional disturbance on the PASS tasks as represented by the 1994 Standardization Edition of the CAS (Das & Naglieri, 1994).

Previous research with this population has utilized content-based measures such as the WISC and WISC-R in order to arrive at characteristic intellectual patterns and profiles. Proposed markers, such as Verbal-Performance discrepancies in favor of the Performance IQ, and high Similarities/low Information scores (Dean, 1977, 1978; Lewandowski, Saccuzzo, & Lewandowski, 1977) have not been obtained consistently. Moreover, given findings from several studies (Bortner & Birch, 1969; Morris et al., 1978; Paget, 1982) of a disability in attention and concentration in SED samples, the importance of using more multi-dimensional measures cannot be overstated.

The current investigation seeks to provide more conclusive evidence regarding characteristic cognitive styles of children with SED by utilizing a test battery that includes measures of attention and planning, in addition to simultaneous and successive processing. In so doing, the study seeks to answer the following questions: 1) Does the performance of children with SED differ significantly from that of the normal sample across the four CAS scales? 2) Is there a distinctive profile of strengths and weaknesses across the four CAS scales for children with SED?

<div align="center">Method</div>

<u>Subjects</u>

The sample consisted of 40 children with emotional disturbance and 40 normal controls matched group-wise on age, race, and gender. The children were drawn

from metropolitan-area school districts in a large southeastern state.   All
subjects with SED had received an educational diagnosis of "emotionally
disabled."   In this state, a diagnosis of "emotional disability" is made by a
multi-disciplinary team on the basis of data gathered during a psychoeducational
evaluation.   Specifically, intellectual and academic measures are utilized to
rule out the presence of a cognitive deficit or learning disability.
Social/emotional factors are assessed via behavioral measures across settings,
and at least two supportive tests of psychological functioning (e.g., projective
techniques, personality inventories, anxiety and depression scales, etc.).   The
control children were enrolled in regular education programming.

Subjects included 56 males and 24 females.   Sixty-six were white, and 14
were black.   The students' ages ranged from 8.0 to 17.8 years, with a mean age
of 12.5 years (SD = 2.7).

Instruments

Das-Naglieri Cognitive Assessment System.   The 1994 Standardization Edition
of the Das-Naglieri Cognitive Assessment System (CAS; Das & Naglieri, 1994) was
used in the study.   The CAS is an individually-administered battery measuring
planning, attention, simultaneous, and successive cognitive processes via 14
subtests (Planned Search, Matching Numbers, Planned Codes, Planned Connections,
Matrices, Simultaneous Verbal, Figure Memory, Expressive Attention, Visual
Selective Attention, Auditory Selective Attention, Receptive Attention, Word
Series, Sentence Repetitions and Questions, and Successive Speech Rate).

Devereux Behavior Rating Scale-School Form.   The Devereux Behavior Rating
Scale - School Form (Naglieri, LeBuffe, & Pfeiffer, 1993) is a 40-item instrument
designed to evaluate behavior typical of children and adolescents with moderate
to severe emotional disturbance.   Statements which constitute the scale are
further organized into the following four subscales, each consisting of
empirically-related items corresponding to one of the diagnostic criteria
included in PL-101-476 and each yielding a separate score: Interpersonal
Problems,   Inappropriate   Behaviors/Feelings,   Depression,   and   Physical
Symptoms/Fears.   Higher scores on this instrument are indicative of greater

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severity. The Devereux is completed by a parent/guardian or teacher who has had sufficient opportunity to observe the child or adolescent during the four-week period immediately preceding the rating.

This instrument was used to assess whether the SED sample was diverse with respect to presenting behavioral problems. Subjects' scores on each of the four Devereux subscales were categorized as "Normal" (within 1 standard deviation of the mean) or "Abnormal" (1 to 4 standard deviations from the mean) and entered into a chi-square analysis. "Abnormal" scores were relatively evenly distributed (X^2 = 4.64, df = 3, p > .05) across the four subscales, suggesting that the group was heterogeneous with respect to current behavioral concerns.

Procedure

Each participant child was individually administered the 14 CAS tasks by the principal researcher, according to procedures outlined in the test manual. Administration time was approximately 90 minutes. The primary teacher for each child with emotional disability was asked to complete the Devereux Scale.

Data Analysis

In order to determine if the performance of children with SED on measures of Planning, Attention, Simultaneous, and Successive processing was significantly different from that of the normal sample, a series of independent t-tests was conducted. In addition, a discriminant analysis was performed in order to assess the extent to which the CAS differentiated the two groups and to determine which scales best predicted group membership.

Two approaches were used to ascertain whether a unique profile of cognitive strengths and weaknesses exists for children with emotional disability. In the first, six dependent t-tests were performed, in order to make pairwise comparisons of the CAS scale means. In the second, an ipsative approach, participants' scores on each scale were interpreted relative to their scores on the other scales (Allport, 1937, 1962, 1966; Block, 1957; Stephenson, 1953) in the following manner: 1) the scores for the 14 subtests were standardized to have a mean of 100 and a standard deviation of 15.[1]; 2) the standardized scores for the subtests comprising each of the four scales were then aggregated and

averaged, culminating in four scale scores for each person (i.e., Planning, Attention, Simultaneous, and Successive); 3) for each subject, the four scale scores were ranked such that each scale took on a value from one through four; 4) the measure of similarity used for the analysis was based on the standardized scores ranked from lowest to highest within each profile.

An intra-individual correlation matrix was then formed by correlating each pair of profiles, yielding (N)(N-1)/2 Spearman Rho values. This correlation matrix was cluster-analyzed utilizing the VARCLUS procedure of the SAS statistical package (SAS Institute, Inc., 1989), in order that individualistic patterns could be characterized for each subject. Subjects having similar profiles were expected to cluster together. The criterion of percentage variation explained by each cluster decided the most meaningful cluster solution. Multiple comparison procedures were used in an attempt to assess the differences between the resulting clusters. For each cluster, a repeated measures analysis of variance was performed in order to determine if there were significant differences between the area scores.

Results

In order to determine whether the performance of children with SED on the CAS differed significantly from that of the normal sample, a series of independent t-tests was conducted. A preliminary test of normality (Shapiro & Wilk, 1965; Shapiro, Wilk, & Chen, 1968) revealed no evidence that the data were distributed non-normally ($p > .05$), supporting the use of parametric techniques. Results of the t-tests for both scales and subtests appear in Table 1. As can be seen, scores for the two groups differed significantly across all four scales and across 12 of the 14 subtests (i.e., with the exception of Planned Search and Successive Speech Rate) at least at the five percent level.

Insert Table 1 about here

Furthermore, a discriminant analysis was used to determine: 1) the extent to which the two groups could be predicted on the basis of their CAS scores, and

2) which subscales best predicted group membership. The single discriminant function was significant, accounting for 19% of the variance between the two groups (F (4,75) = 4.40, p < .01). Using Lambert and Durand's (1975) suggested cutoff criterion of .3, the correlations between the discriminant function and the subscales (structure coefficients) indicated that all four subscales were important in distinguishing between normal and SED subjects.

In order to determine the predictive power of the discriminant function, a classification analysis was conducted. Using the sample proportions as prior probabilities, 71.25% of the subjects were classified correctly, compared with 50% which would be classified correctly by chance alone. Thus, the discriminant function improved classification by 21.25%. Subjects in the SED group were more likely to be classified correctly (75%) than were subjects in the normal group (67.5%). A follow-up chi-square test of association revealed a significant relationship between actual and predicted group membership (X^2 (1) = 14.53, p < .001), providing further support for the predictive power of the discriminant function.

In order to determine why 10 subjects with SED were incorrectly classified as normal, this group was compared with the 30 correctly identified subjects with SED using a series of independent t-tests. The misclassified children with SED scored significantly higher than their correctly classified counterparts across all four subscales (p < .01). Furthermore, these 10 subjects all scored within the expected range for normal children (i.e., 90-110).

Six dependent t-tests were performed in order to ascertain whether a distinctive profile of strengths and weaknesses across the four CAS scales exists for children with SED. Means and standard deviations are reported in Table 2. Although results indicate that, for the group, the emergent pattern was Planning > Simultaneous > Successive > Attention, only 5% of the SED sample obtained this profile. In addition, only the Planning and Attention scores were significantly different (p < .05) from one another. Further analysis, using the binomial test (Conover, 1980), however, revealed that a significant proportion (65%; p < .05) of the children scored lower on measures of Attention than on measures of

Planning.

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Insert Table 2 about here

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A more systematic approach to ascertaining the presence of cognitive profiles was undertaken utilizing an ipsative procedure and cluster analysis. Applying the criterion of terminating the splitting of clusters when each cluster has only one eigenvalue greater than one, seven clusters were identified, which accounted for 93.5% of the variation in responses (Table 3). In an attempt to obtain the minimum cluster solution which explained the maximum variation, cluster solutions which added less than 10% to the explained variation were eliminated from consideration. Thus, the two-cluster solution, which explained 70.4% of the variation, was selected as the most meaningful and parsimonious. The number of students assigned to each cluster also is presented in Table 3. The correlation between cluster components ($r = .08$, $p > .05$) suggests that each cluster represents a distinct profile.

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Insert Table 3 about here

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The profiles for the resulting two clusters are displayed pictorially in Figure 1. As can be seen, the emergent profile for Cluster 1 was Planning > Simultaneous > Successive > Attention. The Cluster 2 profile was Planning > Attention > Simultaneous > Successive. A series of dependent t-tests was conducted in order to determine whether the within-clusters scale scores differed significantly from one another. For Cluster 1, Attention was significantly lower than both Planning and Simultaneous ($p < .05$). None of the other four comparisons yielded significant findings. For Cluster 2, there were no significant differences between the scale scores.

In order to ascertain significant differences between the two clusters, a series of independent t-tests was performed. Although the two clusters were not significantly different from one another, two features were apparent: 1) the

direction of the differences between Cluster 1 and Cluster 2 across the four scales was consistent, and 2) using Cohen's (1988) criteria, the effect sizes for the mean differences between the clusters on the Planning and Simultaneous Scales were moderate.

In order better to define the clusters, scores on the Devereux subscales were considered in conjunction with CAS scale scores. With respect to the Devereux, no significant differences were found between the two clusters (Table 4). Again, however, a comparison of the four subscale means revealed consistency in the direction of the differences between the clusters and moderate effect sizes (i.e., Interpersonal Problems, Inappropriate Behaviors/Feelings, and Depression). Using the binomial test, the probability of obtaining such consistency in direction across all four CAS scales and all four Devereux subscales is .004, which suggests that at least some of the observed differences between the two clusters reflect findings other than chance.

Insert Table 4 about here

Discussion

One of the major findings of this study was a significant difference between the performance of children with SED and that of a normal comparison group. Specifically, subjects with SED scored significantly lower across all four CAS scales and across 12 of the 14 subtests (i.e., with the exception of Planned Search and Successive Speech Rate). This finding supports the general conclusion based on the literature (Mastropieri et al., 1985) that children with SED demonstrate consistent cognitive weaknesses relative to normals. It is also similar to Reardon and Naglieri's (1992) finding of deficits in Planning, Attention, and Successive processing, relative to normals, for an Attention Deficit/Hyperactivity Disordered (ADHD) sample. Possible explanations with regard to the non-significant differences on the Planned Search and Successive Speech Rate tasks involve ordering of the subtests and nature of the tasks. Planned Search is the first task administered in the battery. As such, it is

high in both novelty and sustained interest.   Thus, it is conceivable that children with SED, not yet bored or weary of the testing session, might score as well as their regular education peers.   Successive Speech Rate is a task involving the accurate repetition 10 times of a series of three words. The test is scored for total completion time of all eight items. This is also the last subtest in the battery. Perhaps children with SED, cognizant of this, may be highly motivated to terminate the lengthy administration session. Additionally, because the task focuses primarily on speed, children with SED may regard it as a "last chance" to redeem themselves for perceived inadequate performance on the higher-demand tasks which immediately precede it; thus their comparable performance with normal peers.

With regard to the discriminant analysis, the fact that all four CAS scales contributed significantly to predicting group membership suggests that each is an important component of the PASS model, as asserted by Naglieri and his colleagues (e.g., Naglieri, Braden, & Gottling, 1993; Naglieri, Braden, & Warrick, 1993; Naglieri, Das, Stevens, & Ledbetter, 1991). Assuming that students with SED were identified correctly prior to the study, results indicate that the CAS is somewhat successful in predicting group membership. Most importantly, the majority (75%) of identified children with SED were classified appropriately. The 10 children with SED who were classified incorrectly as normals scored significantly higher (i.e., within the "normal range") than did the 30 correctly classified subjects. These findings could be interpreted in one of two ways: 1) the CAS was unsuccessful in correctly predicting group membership for the higher functioning children with SED, or 2) these children were incorrectly identified as having SED in the first place. Similarly, the 13 normal subjects who were misclassified as SED may possess characteristics which distinguish them from the 27 correctly classified normals, and may even share traits in common with children with SED. The most appropriate explanation for these findings, however, is beyond the scope of this investigation.

A second important result of this study was the finding of two profile clusters which appeared to characterize the SED sample. Cluster 1, into which

21 of the subjects fell, was typified by Planning > Simultaneous > Successive > Attention. Cluster 2, which comprised 19 subjects, was denoted by Planning > Attention > Simultaneous > Successive. Although no statistically significant differences were found between the two clusters, scores across the four scales were consistently lower for Cluster 2. In addition, moderate effect sizes were noted for the differences between the two clusters on the Planning and Simultaneous scales (favoring Cluster 1). What this suggests is the presence in this SED sample of a somewhat more cognitively deficient subgroup, and that this deficit may hold a reasonable degree of practical significance in at least two processing areas (i.e., Planning and Simultaneous).

When the two clusters were examined individually, the Cluster 2 profile emerged relatively flat; that is, there were no significant differences across the four scales for this group. Cluster 1, however, demonstrated a significantly lower group performance on measures of Attention than on measures of Planning and Simultaneous processing. Thus, it would appear that Cluster 1 may represent an attention-disordered subgroup.

Another interesting finding related to the cluster analysis involved outcomes on the Devereux Scale. The two clusters were compared with respect to their scores across the four behavioral subscales of the Devereux. Although no statistically significant differences were found between the two clusters on these measures, Cluster 2 scores emerged consistently higher across all four areas, with moderate effect sizes noted on the first three. Thus, it seems that Cluster 2 may represent a more severely disturbed subgroup. Such a finding might help to explain the relative deficits in performance on the CAS observed for this cluster.

The cluster analysis approach utilized in this investigation was unique with respect to prior research of a similar nature with the CAS.   Thus, a more traditional method also was employed to assess the performance of the SED sample as a whole. Following Bardos (1988), Reardon and Naglieri (1992), and Hurt and Naglieri (1992), mean scores were calculated for the entire SED group for each of the four processing areas. The resulting pattern was Planning > Simultaneous

> Successive > Attention. Further investigation, however, revealed that only 5% of the sample obtained this profile. Two explanations might account for this. First, it is highly possible that the observed differences between the means might reflect nothing more than chance. Second, because two distinct pattern clusters were identified in the sample, one relatively flat and one more variable, the combined effect may have yielded regression toward the mean, with a resulting flatter profile. Regardless, it is evident that caution must be exercised when postulating cognitive profiles on the basis of group means.

Of greater interest in this "traditional" approach was the result of subsequent repeated measures analysis of the four area scores. Among the six comparisons, only Planning > Attention emerged as a significant finding; however, a significant proportion (65%) of the sample demonstrated this ordering. With respect to the Successive > Simultaneous marker proposed by Pommer (1986), Freeman et al. (1985), and Hickman and Stark (1987), on the basis of their research with the K-ABC, results of this study were not consistent. Not only was there a non-significant difference between these two area scores, a nearly even split occurred, with 22 subjects demonstrating higher Simultaneous and 18 demonstrating higher Successive performance.

Taken together, the results of these analyses--specifically, the similarity with Naglieri and Reardon's (1992) ADHD sample and the findings of significance regarding the attention factor both for Cluster 1 and the total SED group-- suggest a possible confounding effect of attention deficit in the present SED sample. This finding might be interpreted in one of three ways. First, children with SED could very well be deficient in attentional processes. This conclusion would be supported by results of previous research with the Wechsler scales (i.e., Bortner & Birch, 1969; Morris et al., 1978; Paget, 1982). Second, it is conceivable that many of these children could be dually diagnosed as ADHD and SED, as Mattison, Morales, and Bauer (1991) found in a sample of elementary-aged girls. Finally, these children may simply be misdiagnosed as having SED, when, in fact, the true source of their disability is ADHD. Given the present lack of a special education service category and specific alternative programming for

children with ADHD, many may be placed inappropriately in classrooms serving students with SED.

The findings from this investigation suggest a number of implications and recommendations for research and practice. First and foremost, subtest scoring criteria and normative data have not yet been compiled and finalized for the CAS. Thus, a major concern in this study was the use of an unproven scoring system and sample-based means for purposes of inter- and intra-group comparisons. More meaningful interpretations may have been derived had standardized scoring criteria and an established reference group been available. In addition, the battery's lengthy administration time presumably will be reduced during the course of test development by the elimination of redundant items and the institution of more appropriate basal and ceiling levels. This would result in less fatigue and ennui on the part of test-takers, and consequently, more valid administrations. Thus, firm conclusions regarding CAS findings should await the outcome of the test standardization.

Although SED and control groups in the study were matched carefully to allow for meaningful interpretations of mean score comparisons, the sample sizes were relatively small; thus, these interpretations must be made with caution, and any attempts to replicate this research should utilize larger numbers of subjects.

Findings from the discriminant analysis also suggest that the CAS was moderately accurate in predicting group membership. Yet a question remains as to why certain subjects were misclassified. Given the possible presence, based on cluster analysis, of an attention-disordered subgroup in this SED sample, one conclusion might be that some children were inaccurately diagnosed as having emotional disability in the first place. Thus, attempts to replicate this study should take steps to ensure the "purity" of the SED group, perhaps by utilizing subjects' scores on an attention scale as a covariate. In addition, future investigations utilizing cluster analysis might go further in investigating specific subject characteristics which could account for the distinction between identified subgroups. Another interesting line of research might involve the comparison of profiles obtained for various clinical groups, such as SED,

reading disabled (Bardos, 1988), developmentally handicapped (Bardos, 1988) Attention Deficit/Hyperactivity Disordered (Reardon & Naglieri, 1992), and juvenile delinquents (Hurt & Naglieri, 1992).

Because the CAS is still in the process of development and standardization, specific practical implications must be drawn tentatively. On a global level, the CAS is a complex instrument requiring skilled administration. Thus, seminars and workshops would be beneficial in order to provide practitioner training in valid test administration and scoring. In addition, teachers should be made cognizant of the basic concepts underlying the PASS theory of intelligence and the model's potential applications via assessment with the CAS.

On a more specific level, the CAS appears to hold a promising degree of discriminatory power in identifying children with SED. To this end, practitioners should be encouraged to incorporate the CAS into currently utilized assessment batteries in order to improve convergent validity in the identification of this population.

Perhaps most importantly, however, the CAS can provide valuable clinical information regarding the general approach of students with SED to cognitive tasks. Behavioral observations recorded during the course of test administration may yield crucial insight into the strategies and processes these children utilize in solving problems. Since school achievement is complexly determined-- being a function of both general processes and specific content learning (Das, Naglieri, & Kirby, 1994), practitioners can make use of the information gleaned from such observations to assess a child's strategy strengths and weaknesses. A potential outcome, in fact, would be the construction of remedial training in areas of strategy deficiency, including transfer training to appropriate academic situations.

In sum, although still in its infancy, the CAS appears to provide a promising alternative to traditional assessment measures in acquiring a better understanding of the cognitive characteristics of children with SED, the nature of their abilities and disabilities, and appropriate strategies for their academic remediation.

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Footnotes

[1]In order to facilitate interpretation of the normal and SED group scores on the CAS tasks, raw scores were converted into a common metric of standard scores (mean of 100, standard deviation of 15). For purposes of between-group comparisons, the means and standard deviations of all 80 subjects were used as the normative data entered into the formulas. For within-group analyses of the SED sample, the means and standard deviations of only the 40 normal control subjects were used (i.e., the control subjects served as the normative group). This follows a convention utilized in previous research with the CAS (e.g., Reardon, 1988). Scale scores for the four CAS dimensions (i.e., Planning, Simultaneous, Attention, and Successive) were derived by computing the mean of the standard scores for the subtests which comprise them. The four Devereux subscale scores (i.e., Interpersonal Problems, Inappropriate Behaviors/Feelings, Depression, and Physical Symptoms/Fears) were derived from a normative distribution with a mean of 10 and a standard deviation of 3. Thus, in order to establish uniformity, the scores were converted to the common metric (mean of 100, standard deviation of 15).

Table 1

Means, Standard Deviations (Normal vs. SED), and t-Values of CAS Scales and Subtests

CAS Scale	Normal (n=40) Mean (SD)	SED (n=40) Mean (SD)	t
PLANNING	104.05 (13.73)	95.95 (10.79)	2.93**
Planned Search	101.96 (16.07)	98.03 (13.77)	1.17
Matching Numbers	105.64 (17.20)	94.36 (9.74)	3.61***
Planned Codes	105.17 (16.12)	94.83 (11.88)	3.26**
Planned Connections	103.43 (14.05)	96.57 (15.30)	2.09*
SIMULTANEOUS	104.42 (12.57)	95.58 (11.21)	3.32**
Matrices	103.28 (14.51)	96.72 (14.94)	1.99*
Simultaneous Verbal	105.65 (15.53)	94.35 (12.21)	3.62***
Figure Memory	104.33 (15.34)	95.67 (13.49)	2.68**
ATTENTION	104.87 (12.66)	95.13 (11.09)	3.66***
Expressive Attention	103.98 (14.72)	96.02 (14.37)	2.45*
Visual Selective Attention	104.46 (14.88)	95.54 (13.91)	2.77**
Auditory Selective Attention	105.79 (10.75)	94.21 (16.47)	3.73***
Visual Receptive Attention	105.23 (15.89)	94.77 (12.13)	3.31**
SUCCESSIVE	104.08 (10.65)	95.91 (12.22)	3.19**
Word Series	103.88 (14.72)	96.12 (14.43)	2.38*
Sentence Repetitions/Questions	105.95 (12.63)	94.05 (14.95)	3.84***
Successive Speech Rate	102.44 (10.90)	97.56 (18.02)	1.47

* p < .05   ** p < .01   *** p < .001

Table 2

Mean CAS Scale Differences (Dependent t-values) for SED Group (n=40)

Scale	Mean (Std. Dev.)	2	3	4
1. Planning	92.39 (10.38)	1.11 (0.84)	3.18* (2.53)	1.97 (0.99)
2. Simultaneous	91.28 (11.16)	—	2.07 (1.27)	0.86 (0.41)
3. Attention	89.21 (12.41)		—	−1.21 (−0.57)
4. Successive	90.42 (14.76)			—

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3

Cluster Solutions Based on Responses to CAS (n=40)

Cluster Solution	Variance Explained (%)	Variance Increase (%)	Number of Subjects per Cluster						
			1	2	3	4	5	6	7
1	42.96	—	40						
2	70.43	27.47*	21	19					
3	79.44	9.01	14	16	10				
4	84.88	5.44	7	16	9	8			
5	88.58	3.70	7	6	9	8	10		
6	91.02	2.44	7	6	9	8	7	3	
7	93.49	2.47	7	6	6	8	7	3	3

* More than 10% increase of explained variation

Table 4

Means, Standard Deviations (Cluster 1 vs. Cluster 2), and t-Values of
Devereux Scales

|	Cluster 1 (n=21)	Cluster 2 (n=19)		
CAS Scale	Mean (SD)	Mean (SD)	t	Effect Size
Interpersonal Problems	111.76 (12.86)	118.82 (14.09)	-1.53	0.52†
Inappropriate Behavior/ Feelings	108.53 (12.72)	115.88 (17.61)	-1.40	0.48†
Depression	114.12 (15.93)	124.41 (16.94)	-1.82	0.63†
Physical Symptoms/Fears	114.41 (16.38)	120.29 (18.50)	-0.98	0.34

*   p < .05   **   p < .01   *** p < .001

Effect Size = $(x_1 - x_2) / \sigma$

where $\bar{x}_1$ = Mean for Cluster 1, x_2 = Mean for Cluster 2,

σ = root mean square error

$\dagger$ moderate effect size

Figure Caption

Figure 1. SED Cluster Profiles.

Figure 1. SED Cluster Profiles

Standard Score

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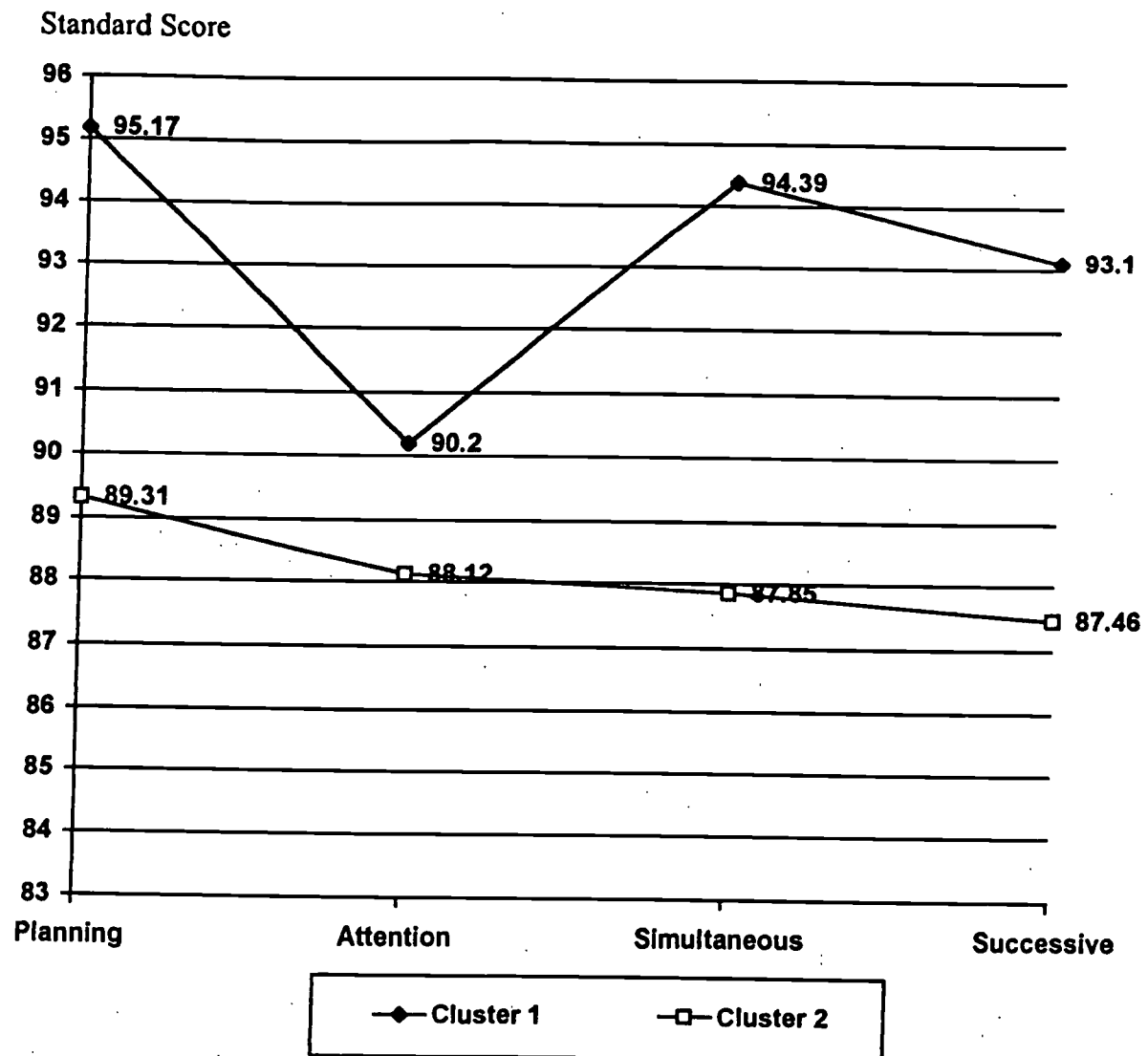
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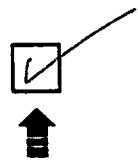(Specific Document)

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