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THE ATTENTIONAL DEFICITS
OF THE LEARNING DISABLED CHILD

by

Susan E. Franta

A RESEARCH PAPER
SUBMITTED IN PARTIAL FULFILLMENT OF THE
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CHAPTER 1

When a teacher noticed a student looking out the window, the teacher said, "Johnny, pay attention!" When the child redirected his glance at the teacher or chalkboard, the teacher was satisfied that Johnny was then "paying attention" - but was he?

Ross, in Psychological Aspects of Learning Disabilities and Reading Disorders, discussed the dilemma inferred in the opening statement. Ross stated that the dilemma was the result of the fact that attention, like learning, is a covert process. Attention is a prerequisite of learning; and if both are measured by a change in performance, it seemed impossible to decide whether the lack of change in performance was due to defective attention, defective learning, or a combination of both.¹

Purposes of the Study

In light of the host of problems attributed to attentional deficits encountered in the education of the learning disabled,² this research study was developed to review the

¹ Alan O. Ross, Psychological Aspects of Learning Disabilities and Reading Disorders. (New York: McGraw-Hill 1976)

² Larry P. Harris, "Attention and Learning Disordered Children: A Review of Theory and Remediation", Journal of Learning Disabilities, 9;2 (February, 1976): 47-55

theoretical issues of attention, to examine the literature and research related to current strategies in special education which deal directly with attentional deficits and to investigate the implications for educational planning and programming.

Scope and Limitations of the Study

A vast amount of research has been published on the problem of attentional deficits. It was necessary to limit the research and literature review to American studies, and to programs and authors published within the last decade. The paper concentrated on the "child" within a chronological age range of three to thirteen years old. Research with underachievers, high achievers, mentally retarded and normal children, relevant to the topic of attention, was included.

Questions Examined in the Research Paper

The author was concerned with a research review related to the following questions:

1. What stimuli did or did not the learning disabled child attend to in terms of the visual, auditory and haptic modalities?
2. What was the relationship between attending skills and academic performance?
3. What specific techniques had been employed to increase attentional skills?
4. What were the implications for educational

programming at the primary and middle grade levels for the learning disabled child who exhibited attentional deficits?

Definition of Terms

There was a great deal of conflict evident in the literature regarding the acceptance of formal definitions for the terminology used in the research paper. Mostofsky, for instance, questioned that 'attention' was definable at all.³ However, for precision and clarity, it was necessary to establish operational definitions for the following terms:

1. Attention is....
the presence of behaviors - orientation of eyes, ears and/or hands toward task relevant stimuli, giving correct responses to questions which indicate learning or perception of pertinent stimulus dimensions - which have become associated with adaptation to classroom environments and yield correct or learned responses to pertinent, task-relevant stimuli or stimulus dimensions. 4

2. Learning disabled children are....
those children with specific learning disabilities who exhibit a disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written language. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling or arithmetic. They have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, diplexia, developmental aphasia,

³ D. J. Mostofsky, Attention: Contemporary Theory and Analysis, (New York Appleton-Century-Crofts 1970), p. 8

⁴ Ibid., p. 10

etc. They do not include learning problems that are primarily due to visual, hearing or motor handicaps, to mental retardation, emotional disturbance or to environmental disadvantage. 5

3. Distractibility is....
the inability to refrain from reaction to extraneous external or internal stimuli; the failure to be selective to stimuli in the response pattern ... and referred to as short attention span. 6

4. Selection attention is....
the scanning, focusing and selection of stimuli that are relevant to the task at hand and includes the ability to sustain attention to a task over a period of time. This involves stimulus selection. 7

5. Vigilance is....
another aspect of the individual's attention abilities and the ability to maintain concentration to the demands of a task over an extended period of time.

Summary

The research paper was developed in order to examine the attentional deficits of the learning disabled child and to examine the relationship between attention and learning. The purpose of the paper was to review the theoretical issues of attention, to examine the special educational

⁵ National Advisory Committee on Handicapped Children: The First Annual Report, (Washington, D. C.: Government Printing Office, 1968), p. 14

⁶ William M. Cruickshank and D. P. Hallahan, (Eds.) Perceptual and Learning Disabilities in Children, Vol. 1, (Syracuse University Press, Syracuse, New York 1975): 38

⁷ B. R. Bugelski, The Psychology of Learning as Applied to Teaching, 2nd Ed. (Indianapolis: Bobbs-Merrill, 1971): p. 205

techniques that deal with attentional deficits and to determine the implications for educational planning and programming.

The study was limited to research published within the last decade on children in the chronological age range of three to thirteen years old. It included some research on normal and mentally retarded children.

The author sought to examine four specific questions: the stimuli the learning disabled child did or did not attend to, the nature of the relationship between attending skills and academic performance, the specific techniques used to increase attentional skills and the implications for educational planning for the learning disabled child who exhibited attentional deficits.

The research paper defined the following terms for precision and clarification: attention, learning disabilities, vigilance, selective attention and distractibility.

Consequently, the second chapter deals with the review of the research and literature directed toward examination of the attention and learning dilemma, special educational techniques and educational programming for learning disabled children who exhibited attentional deficits.

CHAPTER 2

REVIEW OF RELATED RESEARCH

Components of Attention

In the clinical and descriptive literature, one of the most frequent disabilities attributed to the learning disabled child was not of inattention, which, according to Cruickshank, was a result of the influence of Werner and Strauss early landmark studies and writings on the "Strauss syndrome" child.⁸ It was not surprising, therefore, that the number of studies on attention abilities of learning disabled children had grown rapidly. Since the term 'attention' is a global one, and since there were many different ways of defining attention and numerous measures of the different aspects of attention, this section of the review was divided on the basis of the particular kind of attention under scrutiny. Studies of distractibility, hyperactivity, impulsivity and vigilance - as they related to attentional skills - were reviewed. It should be noted that there was much overlap due to the interdependent nature of these aspects of attention.

⁸ Op. Cit. Cruickshank and Hallahan, p. 38

Studies of Distractibility

One of the measures of power of attention was considered to be freedom from distraction, which was inseparable from the construct of attention and referred to attending to task irrelevant stimuli instead of, or in addition to, task relevant ones. Attention and distraction were often evaluated in terms of the degree the individual conformed to instructions given by another.

Studies of distractibility tested the hypotheses that children with learning disabilities were more distractible than normal controls, and that this inability to refrain from responding to irrelevant stimuli and attend selectively to relevant stimuli, hindered their learning.

In the auditory domain, Connors, et. al. used Broodbent's dichotic listening task with achieving and non-achieving students from grades 1-6. The dichotic task presented 2 sets of digits, varying in length from 1-5 seconds over earphones. The subjects were instructed to recall all the digits they could after each trial. The low achievers recalled less than normals on the first half span, but not on the second half span. The latter finding suggested that it was not memory but poor attentional abilities which accounted for the differences between

learning disabled and normals.⁹

Also concerned with auditory distractors, Lasky and Tobin compared learning disabled and normal children on tasks requiring a variety of responses and found that auditory distractors which contained "linguistic information" were effective in disrupting the performance of the learning disabled but not the normal subjects.¹⁰

Senf and Freundl also found auditory distractors to be significant in their study which examined the premise that learning disabled children had a deficiency in modality recall of three visual items followed by three auditory items as it related to a basis for a reading disability. The results of the study suggested that retarded readers may be either "peculiarly distracted" or dominated by auditory signals. The study found that learning disabled children were:

⁹ C. K. Connors, K. Kramer and F. Guerra, "Auditory Synthesis and Dichotic Listening in Children with Learning Disabilities", Journal of Special Education 3 (1969): p. 163-170

¹⁰ E. Z. Lasky and H. Tobin, "Linguistic and Non-linguistic Competing Message Effects", Journal of Learning Disabilities 6 (1973): 243-250

auditorally preferant and...the retarded reader's attention is captured by auditory stimulation and may be unable to display sufficient attention to visual material when auditory stimulation is present... and that the degree of self-control over attentional processes may be a critical factor in learning disabilities.¹¹

In the visual domain, Atkinson and Seunath investigated the comparative ability of learning disabled and normal children to focus on relevant stimuli in the face of irrelevant stimulus materials. They presented a slide task in which the subjects identified a red square with a black dot on it. When the squares varied randomly from slide to slide, it was found that learning disabled children made more omissions and errors than normal subjects. The authors received the results as indicating that learning disabled children were deficient in focusing on relevant stimuli and were distracted by irrelevant stimuli.¹²

Another research investigation to support the hypothesis that learning disabled children were more distractible

¹¹ Gerald M. Senf and Pamela C. Freundl, "Memory and Attention Factors in Specific Learning Disabilities", Journal of Learning Disabilities 4 (1971): 105

¹² B. R. Atkinson and O. H. M. Seunath, "The Effect of Stimulus Change on Attending Behavior in Normal Children and Children with Learning Disabilities", Journal of Learning Disabilities 6 (1973): 569-73

than normal children was conducted by Hallahan, et. al. The investigators examined both poor attention and impulsivity. The subjects were 10 sixth grade boys who were academic underachievers of normal intelligence (learning disabled)¹³ and 10 sixth grade high achieving boys. The study used Hagen's Central Incidence Task for selective attention, and the results indicated that "high achievers were better selective attenders...and recalled more relevant information than low achievers, but the groups did not differ on irrelevant information recalled".¹⁴ The underachievers tended to concentrate on irrelevant incidentals in contrast to central stimuli. A study conducted by Sabatino and Ysseldyke supported the findings of the research by Hallahan, et. al.¹⁵ Their research involved a modified version of the Bender Visual Motor Gesalt, a Bender Memory test, and two Benders with stimulus designs on extraneous backgrounds, involving embeddeness which compared the performance of learning disabled normal readers and learning disabled non-readers.

¹³ D. P. Hallahan, J. M. Kauffman and D. W. Ball, "Selective Attention and Cognitive Tempo of Low Achieving and High Achieving Sixth Grade Males", Perceptual and Motor Skills 36 (1973): 579

¹⁴ Ibid. 581

¹⁵ Ibid. 579-583

Results indicated that on both the "look-and-draw" and memory procedures, the groups did not differ on the standard figures, but the disabled readers were inferior compared to the controls in the extraneous background condition.¹⁶ It should be noted that one of the strengths of the study was that the researchers used all learning disabled subjects.

The clinical investigations and research discussed thus far lend support to the distractibility evidenced in learning disabled children, but additional research questioned the validity of the previously posed hypotheses. According to Hallahan, the question of whether learning disabled children are more highly distractible than normal contrast subjects depended upon the investigator's concept of distractibility and the measures used.¹⁷

Browning conducted a series of three experiments to test the hypothesis of distractibility in "brain damaged" children which involved the use of flashing lights and a task of discrimination learning. The study compared the

¹⁶ D. A. Sabatino and J. E. Ysseldyke, "Effect of Extraneous Background on Visual Perceptual Performance of Readers and Non-Readers", Perceptual and Motor Skills 35 (1972): 323-328

¹⁷ D. P. Hallahan, "Distractibility in the Learning Disabled Child", In Cruickshank and Hallahan (Eds.), Perceptual and Learning Disabilities in Children Vol. 2 (New York: Syracuse University Press, 1975): 195

performance of older (11 years old) and younger (7 years old) minimally brain-damaged subjects and found that the distracting condition did not affect the two groups differentially and that "distractibility is more characteristic of normal than brain-injured children".¹⁸

In several studies, Douglas and her colleagues found evidence that learning disabled boys in elementary school situations were not unusually distractible. The research investigated performance on embeddedness tasks in the presence of white noise and color distraction tasks. The researchers concluded that the hyperactive and learning disabled boys did not differ from normal controls in "unusual distractibility". However, their results indicated that hyperactives detected fewer embedded figures than controls, although they were not differentially affected by several other kinds of distracting stimuli within the task.¹⁹

Tarver and Hallahan concluded their review of attentional deficits in learning disabled students that:

¹⁸ R. M. Browning, "Effect of Irrelevant Peripheral Visual Stimuli on Discrimination Learning in Minimally Brain-Damaged Children", Journal of Consulting Psychology 31 (1967): 371-376

¹⁹ V. I. Douglas, "Stop, Look and Listen: The Problem of Sustained Attention and Impulse Control in Hyperactive and Normal Children", Canadian Journal of Behavioral Science 4 (1972): 259-282

"proximal but not distal distractors lead to inferior performance by learning disabled children and...that learning disabled children may be more deficient in focusing on relevant stimuli when the irrelevant information is part of the task to be completed."²⁰

Studies of Hyperactivity

Hyperactivity was generally assumed to be a major symptom of most children with learning disabilities.²¹ Recent research seemed to indicate that hyperactivity is situation-specific and related to excessive activity. Douglas and her colleagues observed a group of hyperactives; young (mean chronological age - 7 yrs., 9 mos.) and older (mean chronological age - 12 yrs., 8 mos.). They found that the younger group showed more disorderly behavior, attracted more of the teacher's attention, moved about the room more, and vocalized more than their controls. Behavior of older hyperactives was less disrupting; but they, too, engaged in less purposeful behavior not related to classroom activity.²²

They concluded that "the most consistent differences between hyperactive children and controls were purposive behavior not related to classroom behavior".²³

²⁰ Sara G. Tarver and Daniel P. Hallahan, "Attention Deficits in Children With Learning Disabilities: A Review", Journal of Learning Disabilities 7 (1974): 569

²¹ Ibid., p. 562

²² Op. Cit., Douglas (1972) p. 259-282

²³ Ibid., p. 262

Bryan and Wheeler reported similar results in an observational study of elementary learning disabled children and normal comparison controls in the classroom and found that children with learning disabilities spent less time in behavior that could be identified as task oriented and tended to engage in more non-task orientated behavior. It was noted that the two groups did not differ in the amount of time in interacting with teachers or peers.²⁴

A research investigation by Sykes, et. al. examined the relationship between hyperactivity and selective attention.²⁵ They hypothesized that "if one perceives hyperactivity as an overresponding to task irrelevant stimuli because of inadequate capacity to maintain selective attention, then perhaps the reduction in hyperactivity reflects the eventual development of this capacity".²⁶ These investigators worked with children described as hyperactives and used a task which required the detection of "significant stimuli" and maintenance of attention. Compared with a matched normal control group, the performance of the hyperactive children was impaired; they detected fewer of the significant stimuli and made more

²⁴ T. S. Bryan and R. Wheeler, "Perception of Learning Disabled Children: The Eye of the Observer", Journal of Learning Disabilities 5 (1972): 484-488

²⁵ D. H. Sykes, V. I. Douglas and K. K. Minde, "Attention in Hyperactive Children and the Effects of Methylphenidate (Ritalin)", Journal of Child Psychology and Psychiatry 12 (1971): 129-139

²⁶ Ibid., p. 131

incorrect responses to nonsignificant stimuli. It, therefore, appeared that children described as hyperactive had problems in maintaining attention to relevant stimuli. This relationship was usually explained in terms of hyperactivity causing an inability to attend. However, Ross proposed that the causal relationship might be the reverse: the inability to attend resulted in hyperactive behavior because attention to extraneous (task-irrelevant) stimuli led to extraneous responses.²⁷

Hyperactivity was often considered to be an excess of gross motor activity. Browning used the term "hyper-responsiveness" to describe the exaggerated responsiveness to stimuli without apparent accompanying increases in motor activity.²⁸ Browning proposed that hypo-responsiveness, rather than the popularized hyper-responsiveness, was a behavioral correlate of brain damage in children. According to this hypothesis, deficiencies in discrimination learning were explained as due to fewer responses by the subject to cues unique to each of the stimuli. Decreased stimulus generalization is explained as less responsiveness to similarities in stimuli, and deficiencies in detection of hidden figures (embeddedness) was interpreted simply as a situation

²⁷ Op. Cit., Ross, p. 52

²⁸ R. M. Browning, "Hypo-responsiveness as a Behavioral Correlate of Brain Damage in Children", Psychological Reports 20 (1967): 484

in which the subject emits fewer responses.

One of Browning's predictions that stemmed from this hypothesis was that greater stimulus intensity would be required to alert children with learning disabilities, and that, once alerted, performance of the children with learning disabilities would improve and more closely approximate that of normal controls. Browning also suggested that the stimulus intensity of the flashing lights was sufficient to alert the children with learning disabilities, which would result in increased responsiveness and improved performance.²⁹

Frequent reports of the seemingly paradoxical effects of stimulant drugs on hyperactive children can also be explained within the framework of Browning's hypothesis.

Some evidence which seemed to support the hypo-responsiveness hypothesis came from research from Douglas which compared hyperactives to normal controls on physiological tests of heart rate and skin response under three conditions: a rest period, a period when the child listened to a series of tones requiring no response and a delayed reaction time task on which the child was required to respond to a warning signal.

²⁹ Ibid., p. 256-257

No group differences were found for either measure under the first two conditions when no response was required, but differences between groups emerged on the delayed reaction time task. Hyperactives remained unresponsive, while controls showed increase in both measures of ... skin response and heart rate.³⁰

It was concluded that the warning signal presented at the beginning of each trial of the task did not have the intended alerting effect on hyperactives.

The same conclusion was stated by Dykman who reported in his study that "children with learning disabilities do not differ from controls in resting physiological levels, but that they are less reactive to meaningful stimuli".³¹

Studies of Impulsivity

Examination of the attentional deficits of the learning disabled child necessarily included a literature and research review related to another component of the individual's attention abilities: impulsivity. After many years of research on the problems of hyperactive, learning-disabled children, Douglas reviewed the work that she and her colleagues had done and sought to answer the question whether there was some basic dimension on which these children differed from normal youngsters. She concluded that their

³⁰ Op. Cit., Douglas, p. 280

³¹ R. A. Dykman, et. al., "Children With Learning Disabilities: Conditioning, Differentiation and the Effect of Distraction", American Journal of Orthopsychiatry 40 (1970): 780

difficulty did not lie in intelligence level, perceptual or conceptual capacity or short term memory - not even activity level seemed to be a critical aspect. In summarizing, Douglas wrote:

It struck me that one closely related group of characteristics can pretty well account for all the deficiencies we found. These youngsters are apparently unable to keep their own impulses under control in order to cope with situations in which care, concentrated attention, or organized planning are required. They tend to react with the first idea that occurs to them or to those aspects of a situation which are the most obvious or compelling. This appears to be the case whether the task requires that they work with visual or auditory stimuli and it also seems to be true in visual-motor and kinaesthetic spheres. These same deficiencies ... inability to 'stop-look-listen' ... seem to influence the child's social behavior.³²

Several studies examined the learning disabled child's impulsivity through the reflectivity-impulsivity dimension using the Matching Familiar Figures test (MFF). The child is asked to select from six variants the one stimulus that is identical with the standard. In a study by Keough and Donlon, the MFF and two measures of field dependence-independence were administered to boys with severe learning disabilities. While both groups of learning disabled boys were found to be highly field dependent, only the severe

³² Op. Cit., Douglas (1972) p. 275

learning disabled boys were also impulsive. They made more errors and responded faster than those with moderate learning disabilities. The researchers concluded:

Successful school learning probably requires both accurate field differentiation and organization, and ability to control and delay speed of response. In this study, atypical performance on one of these functions was associated with mild learning problems; disturbance on both was associated with severe learning and behavior disturbance. Quick response in situations of high stimulus ambiguity produces a large number of errors.³³

There was clinical and subjective support in a study by Hallahan, et. al. for the notion that "academic under-achievers of normal intelligence (learning disabled children) exhibit both impulsivity and poor attention".³⁴

The study investigated the hypotheses that: children of normal intelligence exhibiting academic retardation (learning disabled) will be more impulsive than high achievers; will have difficulties in selective attention compared to high achieving controls; and that there was an association between selective attention and reflectivity-impulsivity. The study compared 10 sixth grade high achieving boys and 10 sixth grade low achieving boys on two experimental tasks previously designed to measure im-

³³ Barbara Keough and Genevieve Donlon, "Field Dependence, Impulsivity and Learning Disabilities", Journal of Learning Disabilities 5 (1972): 331

³⁴ Op. Cit., Hallahan, et. al., p. 580

pulsivity (Hagen's MFF) and selective attention (Hagen's Central Incidental Task). The researchers concluded that the impulsive child responds quickly and makes many errors. Noting the frequent description of learning disabled children as impulse-ridden, Hallahan, et. al. found low achievers to be more impulsive and less reflective than high achievers. They also found a positive relationship between reflectivity and selective attention ability. The authors suggested further study to determine whether the learning disabled merely have a tendency to respond at random with regard to the first alternative they perceive or whether learning disabled use inefficient scanning strategies.

Hagen developed a two stage model of selective attention as a result of his work with learning disabled students. He suggested that the first stage was one of discrimination involving both relevant and incidental cues; and that the second stage involved focusing on the relevant features and incidental cues. Hagen noted that:

Impulsive children may have trouble attending selectivity because of problems in stage one ...related to difficulty in distinguishing relevant from irrelevant cues. This could result in their trying to remember all cues because they are not efficient in determining which cues are most important.³⁵

³⁵ J. W. Hagen, "Strategies For Remembering", In S. Farnham and J. Diggory, Eds., Information Processing in Children (New York: Academic Press, 1972): 233

Hagen concluded that:

Impulsive children are less analytic than reflective children and may do better when required to perceive wholes rather than details, and ... that impulsive children often use feedback in a nonsystematic trial-and-error fashion and efficiently utilize a feedback to evaluate and generate hypotheses.³⁶

McKinney, who studied thirty impulsive and thirty reflective second graders in a test which involved three problems with each solution scored as an instance of one of four strategies. His findings concurred with Hagen's, and McKinney reported that:

...reflective subjects generated characteristically different and more efficient hypothesis-testing strategies than impulsive subjects. The data support the conclusion that reflective children attempt to consider several alternative hypotheses and use a strategy that tests the relevance of conceptual categories rather than specific instances. Impulsive children were less likely to form abstract hypotheses and more often used information in a random, trial and error fashion.³⁷

Studies of Vigilance

The final component of attention which was reviewed in the literature was vigilance and its relationship to an individual's ability to sustain attention. Vigilance performance usually referred to detecting infrequently occurring signals over a prolonged period of time when the signals

³⁶ Ibid., p. 235

³⁷ James D. McKinney, "Problem Solving Strategies in Impulsive and Reflective Second Graders", Developmental Psychology 8 (1973): 145

were embedded in a background of regularly occurring events. Critical examination of the research regarding vigilance indicated a frequent overlapping with literature which investigated the other components of attention, particularly hyperactivity and impulsivity.

The activity level of the learning disabled child was an important variable on his performance on vigilance tasks. Anderson, et. al. conducted a study with thirty learning disabled boys, aged 8-11, and thirty normal males, aged 8-11, on a highly controlled, objective vigilance task under a computer control assuring uniformity of stimulus presentations. Subjects responded to visual signals which appeared randomly within a temporal sequence of visual events noted as a pattern of flashing colored lights. The lights flashed in a combination of red-green, green-green, and red-red at a rate of one flash each two seconds. A correct detection constituted pressing a response button to the red-green combination. Pressing the button to the red-red or green-green combination was a false alarm. The "LD children made significantly fewer correct detections and more false alarms than the normal contrast group".³⁸ The learning disabled

³⁸ R. P. Anderson, C. Holcomb and R. D. Doyle, "A Measure of Attention Deficits", Exceptional Children 39 (1973): 536

boys were then classified as hyperactive, normoactive, or hypoactive for further comparisons. The posthoc examination of the learning disabled group revealed that the hyperactive learning disabled children exhibited the most attentional deficits in terms of correct detections and false alarm rates; while the hypoactive learning disabled children showed some deficit only on correct detections; the normoactive learning disabled children exhibited no attentional deficits. Thus, the authors concluded that:

The vigilance paradigm successfully differentiated between children with learning disabilities and normal controls and ... whether a LD child exhibits an attentional deficit depends upon his activity level.³⁹

Pursuant to their previous study, Anderson, et. al. conducted another investigation to explore the vigilance procedure as a diagnostic tool, specifically in the area of medication and learning disabled children. The study included 18 boys, divided into 2 groups: 9 boys aged 6-8 and 9 boys aged 9-12 who all received medication. The purpose of the investigation was to determine if the vigilance task could provide an operational measure of the effects of medication in the behavior of hyperactive children with learning disabilities. The results indicated that:

³⁹ Ibid., p. 538

The younger boys made more false alarms but the false alarm variable was not affected by medication and that the effects of an attentional deficit, as noted through the ability to sustain attention on a monotonous, repetitious task, can be modified by medication, at least among hyperkinetic younger boys in the primary grades.⁴⁰

The authors stated that their study demonstrated, on a pilot basis, that objective measures of attention deficits could be obtained and not be influenced by observer bias.

Douglas and her colleagues found that the attention task on which hyperactive children had most difficulty was a continuous performance task. On both visual and auditory forms of the task, the hyperactive children deteriorated more seriously over time than normal controls.⁴¹

A vigilance study conducted by Dykman, et. al. reinforced the findings of Douglas. Dykman, et. al. reported that:

...There was no tendency for children with learning disabilities as a combined group to respond more slowly over trials; however, there was some evidence that hyperactive children were more subject to fatigue and less able to remain vigilant

⁴⁰ Robert P. Anderson, Charles G. Holcomb, William Gordon and Delmar A. Ozolins, "A Measurement of Attention Distractibility in L. D. Children", Academic Therapy 9 (1973-74): 266

⁴¹ Op. Cit., V. I. Douglas, p. 279

than subjects who were hypoactive, normo-active or controls.⁴²

A contrasting research study was conducted by Noland and Schuldt; the authors assessed the ability of normal and retarded readers to sustain visual attention. It was found that "performance of the retarded readers was significantly poorer during a 30-minute task, but they did not evidence a faster rate of decrement than the normal readers".⁴³

In a review of the research and literature relating to vigilance and the ability of the learning disabled child to sustain attention and maintain concentration to the demands of a task over an extended period of time, it was suggested that hyperactive children may be more deficient in ability to sustain attention than are other subgroups of children with learning disabilities. Only the vigilance study by Noland and Schuldt found no evidence of the vigilance decrement in children with learning disabilities.

⁴² R. A. Dykman, "Specific Learning Disabilities: An Attentional Syndrome", In H. R. Myklebust (Ed.), Progress in Learning Disabilities, Vol. 2 (New York: Grune and Stratton, 1971): p. 157

⁴³ E. C. Noland and W. J. Schuldt, "Sustained Attention and Reading Retardation", Journal of Experimental Education 40(2) 1971: 73-75

Developmental Trends

The studies just discussed pointed to a relationship between learning disability and problems in sustaining attention. The most recent research reviewed suggested that maintenance of attention improves in the course of a child's development, and that the child who developed the ability to sustain selective attention more slowly than others would be handicapped in learning and would be identified as a learning disabled child.

Rourke and Czudner conducted a relevant study with two age groups: the young learning disabled group had an average age of 7 years, 7 months; the older learning disabled group had an average age of 11 years, 7 months. The control group consisted of 24 unimpaired children who had been matched with the experimental group on sex, mean age and intelligence test scores. The children participated in an auditory modality task. Rourke and Czudner reported that the children in the young clinic group displayed a significantly poorer performance than those in the older group. While the young clinic group thus displayed rather gross difficulties with attention, this was not the case for the older clinic group, whose performance did not differ from that of their normal controls.

The authors offered the contention that such brain-injured children as they studied "may adapt to and/or

recover from the deficits involved in the inability to develop and maintain a state of readiness to respond".⁴⁴

Pick, et. al. conducted a similar study investigating the developmental trend hypothesis. The study used 24 second-graders and 24 sixth-graders on a time-reaction task in which the child indicated objects as same or different under two conditions: preinformed and postinformed. The relative difference in reaction times of the two age groups was of critical interest.

As expected, the younger children performed more slowly. However, the difference between reaction times in the preinformed and postinformed conditions was greater for the sixth-graders. The authors reported that the older children were better able to take advantage of the prior knowledge about what aspects were relevant and irrelevant. Pick, et. al. concluded from their study that:

...The ability to focus visual attention exclusively on the relevant information improves with age and that the acquisition of this skill may characterize developmental changes in selective attention.⁴⁵

⁴⁴ B. P. Rourke and G. Czudner, "Age Differences in Auditory Reaction Time of 'Brain Damaged' and Normal Children under Regular and Irregular Preparatory Interval Conditions", Journal of Experimental Child Psychology 14 (1973): 377

⁴⁵ Anne Pick, G. W. Frankel and M. D. Christy, "A Developmental Study of Strategies of Visual Selectivity", Child Development 45 (1974): 173

Further support for the formulation that learning disabilities are related to a delayed development in the capacity for selective attention can be found in a study conducted by Senf, cited earlier in this paper.

One of the most dramatic findings of the research was that for the normal children, the ability to order both auditory and visual material into pairs developed with age; that is, this ability is a developmental phenomenon. Senf suggested that this ability had not developed in learning disabled children and thus might be a developmental retardation.⁴⁶

Remediation

One of the purposes of the research paper was not only to investigate the various aspects of the attentional deficits of the learning disabled child, but also to examine the literature for the methodological approaches and strategies developed for remediation of attentional deficits.

The literature, theoretical approaches and research done thus far in the area of remediation of attentional deficits or the development of attentional skills seemed to have failed to produce definitive data upon which to base a program for remediation. The findings that attention has a maturational and selective component confirmed

⁴⁶ Op. Cit., Senf, p. 115

some suspicions but failed to suggest a unified attack strategy. Since attention behaviors among learning disabled students were often absent, remedial programs had been devised based on available knowledge.

Recently, programs of a more formal nature were seen as direct attempts to modify learning disabled children's attention. Those which were examined by the author were: drug therapy, reduced environmental stimulation and operant conditioning techniques.

It must be noted that many studies reviewed failed to adequately control the effects of age, sex, and/or IQ differences among experimental subjects; and that there were many different methods used to test attention; that few correlations were given between test instruments - many were experimenter-designed and that few reported reliability and validity data. Nevertheless, the reviewed studies represent the current work done in this area.

Drug Therapy

In discussion of the methodological issues, Ross noted that:

The effectiveness of a pharmacological agent is very difficult to prove, and this is particularly in the case of a disorder as poorly defined as the problem that is variously labeled "learning disability", "hyperactivity", ... "hyperactive child syndrome" or "minimal brain damage". We know that the children thus labeled are often characterized by ... impulsivity, attentional problems, distractibility,

learning difficulties in one or more academic areas.⁴⁷

He emphasized that these obstacles stand in the way of conclusive research and noted that the question of the effectiveness of drugs and learning disabilities were essentially unanswered.

Although it was not the purpose of this paper to review medications, drugs or stimulants, or their effects on hyperactivity, but rather to review the use of medication for educational purposes, it was necessary for clarity and background information to indicate that the most frequently used drugs are the stimulants, dextraamphelamine (Dexadrine) and methylphenidate (Ritalin).

The use of medication for educational purposes was reviewed by Freeman who reviewed the effects of medication. He stated that:

...until better longitudinal studies of children with and without different handicaps are available and more meaningful diagnostic schemes are developed, it remains to draw firm conclusions about the influence of drugs on learning and behavior.⁴⁸

⁴⁷ Op. Cit., Ross, p. 97

⁴⁸ Robert D. Freeman, "Drug Effects on Learning in Children: A Selective Review Over the Past Thirty Years", Journal of Special Education 1 (1966): 36-37

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It should be obvious that this improvement in test scores does not mean that drugs improve intelligence; they merely permit a child's intellectual capacity to be expressed in a scorable fashion.⁵¹

A study by Sykes, et. al. was designed to assess the effect of the drug Ritalin, and it revealed that the performance of hyperactive children who were given this drug showed significant improvement in the child's ability to maintain selective attention.⁵²

Generally, it seemed from the related literature that the drugs, amphetamines and Ritalin, had increased attentive behaviors among certain students. However, the evidence that such regimens had a direct effect on academic progress was inconclusive. In Ross' discussion on drugs and learning, he commented that:

...drugs do not produce learning; they only make learning more possible. That they do this is, of course, no mean achievement... since the drug induced changes in the child's behavior elicit changes in the attitudes others hold about the child...It is these changes which are reflected in the ratings of "improvement" that are so often used to assess the effectiveness of drugs.⁵³

⁵¹ L. A. Sroufe and M. A. Stewart, "Treating Problem Children with Stimulant Drugs", New England Journal of Medicine 289 (1973) 413

⁵² D. H. Sykes, V. I. Douglas, G. Weiss and K. K. Minde, "Attention in Hyperactive Children and the Effects of Methylphimdate (Ritalin)", Journal of Child Psychology and Psychiatry 12 (1971) 129-139

⁵³ Op. Cit., Ross, p. 101

Reduced Environmental Stimulation

Whereas, drugs might be viewed as biochemically reducing the potential for reacting to irrelevant or non-task-related stimulation, there appeared to be another method which sought to remove all extraneous stimulation. Developed by Cruickshank and his associates, this was referred to in the literature as the "stimulus-free classroom" strategy. It required classrooms with bare walls, painted a bland color, student carrells or cubicles enclosed on three sides and devoid of books and papers. Along with reduced extraneous stimulation, relevant stimuli (that is, teaching materials) were emphasized through novel uses of color, shape and type size. This program was well known to most special educators and still used in many districts.⁵⁴

It was difficult for the author to find pertinent and relevant research related to reduced environmental stimulation, done within the last decade. Most of the literature was published in the early 1960's.

However, an exceedingly limited study was conducted by Rost and Charles in 1967. The study was undertaken to evaluate the cubicle method of reducing stimulation for hyperactive and brain-injured children divided into four groups. The students spent two to five hours daily in the

⁵⁴ Op. Cit., Cruickshank and Hallahan, p. 227

cubicles working on basic academics. The researchers found that:

...There were no significant differences between the experimental and control groups for any subtest (and)...the inescapable influence from the present study, however, is that isolation in a booth, in a classroom, is not beneficial, contrary to numerous suggestions in the literature; there was no evidence to suggest that having a brain-injured or hyperactive child spend his study time in a separate booth has any effect whatsoever on his achievement.⁵⁵

It must be noted that this study seemed to lack control of population, little quantitative data was provided and duration of the experiment was only 170 days.

The 1972 study of Shores and Haubrick seemed to be more controlled but was limited in the number of children studied. The researchers were concerned with the effect of cubicles in controlling attention and whether the use of cubicles had an influence on academic achievement. They worked with only four children, between 9 and 12 years of age, described as emotionally disturbed and academically retarded. The data was collected during the first two hours of the school day, and each child was his own control. Although the researchers worked with an extremely small population sample, they concluded that "the cubicle experience

⁵⁵ K. J. Rost and D. C. Charles, "Academic Achievement of Brain-Injured and Hyperactive Children in Isolation", Exceptional Child 34 (1967) 126

appeared to increase the attending behavior of the subjects but did not affect achievement in reading or arithmetic".⁵⁶

A study conducted by Groton in 1972 brought a more carefully developed study to light than those just cited. He selected 42 children divided into 3 equal groups, and all classified as mentally retarded. The subjects were studied under four "environmental conditions" in a cubicle setting. He concluded from his research investigation that:

...Each of the group benefited significantly by the control of extraneous stimuli and... these subjects performed better in the secluded condition than when no extraneous visual, auditory, and social stimuli impinged.⁵⁷

He also noted that the poor performance of brain-injured children may be due to poor attention, outside stimuli and unstructured situations which distract them from the primary task.

Given the limitations of studies which attempted to evaluate stimulus-free classrooms, it seemed unadvisable to dismiss this approach. However, Tizard raised a poignant question as to whether limiting the environmental possibilities taught specific behaviors or merely denied certain

⁵⁶ R. E. Shores and P. A. Haubrick, "Effect of Cubicles in Educating Emotionally Disturbed Children", Exceptional Child 34 (1967): 126

⁵⁷ G. E. Groton, "The Effects of Various Classroom Environments on Performance of a Mental Task by Mentally Retarded and Normal Children", Education and Training of the Mentally Retarded 7 (1972): 37

avenues, and whether this approach allowed for generalization to the regular classroom.⁵⁸ The research and literature did not validate the assumption that academic improvement was due to reduced environmental stimulation.

Operant Conditioning

Other than medical or environmental limitations on the student's stimulus selection, the operant conditioning approach affected attention by arranging contingencies so that desired behaviors were reinforced.

In 1971, Wagner and Guyer conducted a study in the Richmond, Virginia Public Schools, and the entire population of a school that serves children with specific learning disabilities was involved. A token reinforcement system was used to strengthen the "span of attending". The researchers' results indicated that reinforcement of attentive behaviors tended to improve levels of attention among learning disabled children. Wagner and Guyer reported that:

Conditioning a student's attending behavior to a given task seems to affect general adjustment behavior positively and thus decrease disciplinary problems. However it does not seem to have a positive effect on academic performance.⁵⁹

⁵⁸ B. Tizard, "Observations of Over-Active Imbecile Children in Controlled and Uncontrolled Environments", American Journal of Mental Deficiency 72 (1968): 552

⁵⁹ R. F. Wagner and B. P. Guyer, "Maintenance of Discipline Through Increasing Children's Span of Attending by Means of a Token Economy", Psychology in the Schools 8 (1971): 289

Graubard, et. al. reported similar results and reached the same conclusions as Wagner and Guyer. Graubard and his associates noted that the "quality of social behavior was independent of academic indices".⁶⁰

An illuminating study was conducted by Ferritor, et. al. who worked with 14 borderline children (mean IQ = 75). Ferritor and his colleagues obtained improved academic performances and behavior using alternating contingencies (reinforcement for attention, reinforcement for correct work, reinforcement for attention, etc.). The researchers reported:

...contingencies that increase attending behavior and reduce disruptions do not necessarily increase student performance. Contingencies on attending alone increased attending behavior, but had little effect on the measures for correct work accomplished. Reinforcement contingencies for "correct work" alone increased the accuracy of the work but had little effect on attending behavior and appeared to correlate with increased disruptive behavior.⁶¹

Generally, the reviewed data supported the premise that operant conditioning techniques aimed at increasing attention have been successful in increasing attention, and that if academic improvement is the goal, it was necessary to reinforce correct work.

⁶⁰ P. Graubard, P. Lanier, H. Weisert and B. Miller, "The Introduction and Use of Token Reinforcement in Classes for Disruptive Children", American Journal of Orthopsychiatry 40 (1970): 317

⁶¹ D. E. Ferritor, et. al., "The Noneffects of Contingent Reinforcement for Attending Behavior on Work Accomplished", Journal of Applied Behavioral Analysis 5 (1972): 16

Implications for Educational Programming

Since attentional behavior appears to be a critical factor in classroom performance, the nature and extent of the attentional deficit of learning disabled children could have a major impact on the implementation of educational programs. Lack of attention is an impediment to learning.⁶² According to Hewett, et. al., "attention is the most basic of all learning competencies and...getting the child to pay attention to relevant stimuli is the most basic precondition within the area of readiness for learning."⁶³

A survey of over 600 "educationally handicapped children" in California indicated that "difficulty in attending" was the problem which regular classroom teachers gave most often as a reason for referral of these children to special class programs.⁶⁴

As a review of the related literature indicated, the major assumption behind systematic efforts to design a comprehensive educational program was the attentional problems of learning disabled children. Cruickshank's highly structured classroom environment was designed to teach to the

⁶² Op. Cit., Hallahan, p. 579

⁶³ Frank Hewett and Steven R. Forness, Education of Exceptional Learners (Allyn and Bacon Inc., Boston, Massachusetts, 1974): 243

⁶⁴ B. K. Deogh, L. D. Becker, M. Kukic and S. Kukic, "Programs for EH and EMR Pupils: Review and Recommendations", Academic Therapy 3 (1974): 198

disability of the child. He considered two aspects of the classroom structure that were important to incorporate into the educational program; they were that:

First the classroom must be a non-stimulating environment - removed of as many auditory and visually stimulating materials as possible. Secondly the environmental structure must involve spatial considerations. As space increases - so stimuli increase, as space decreases, the stimulus value of space also decreases. A room smaller than a regular size classroom has been found to be more satisfactory.⁶⁵

In terms of program structure, Cruickshank and Johnson believed that it was necessary to provide structure to all activities within the classroom. They noted that "it is essential that the daily program be structured with sufficient similarity from day to day to provide a pattern for adjustment and a setting wherein satisfying prediction can be practiced by the child."⁶⁶ The authors also emphasized that structured teaching materials be kept within the realm of the child's known needs and developmental levels.

Hewett and Forness also discussed curriculum in program structure and stated that it was imperative that discrete smaller units of instruction be provided for children

⁶⁵ William Cruickshank and G. O. Johnson, Education of Exceptional Children and Youth, 2nd Ed. (Prentice-Hall, Englewood Cliffs, New Jersey, 1967): 272

⁶⁶ Ibid., p. 274

with learning problems. They referred to the problem of overloading the communication system and demanding too much at once.⁶⁷ They emphasized that "the crucial determinant in learning is the 'education of attention' which will occur when the child increasingly focuses on critically differentiating details and progressively eliminates concern for the irrelevant".⁶⁸

In Magdol's critical and illuminating review of the problems of attention, a distinction was made between internal and external stimulating factors in the environment because, as the researchers noted:

...to be effective in working with children who demonstrate disorders of attention, it is essential that the adult (teacher) differentiate between these two aspects of behavior. When it becomes clear that attention is influenced by both factors, teaching procedures become more clearly defined and far more effective.⁶⁹

The investigation stated that for educational planning, it would be necessary to isolate and distinguish the behavioral characteristics of short attention span and distractibility, even though there were relationships among

⁶⁷ Op. Cit., Hewett and Forness, p. 250

⁶⁸ Ibid., p. 251

⁶⁹ Miriam S. Magdol, "Problems in Attention: Clearing Up The Terminology", Academic Therapy 8 (197201973): 151

them. Magdol recommended that the distractible child work in a small space such as a carrel in a calm atmosphere devoid of pictures, mobiles and open shelves. The teacher should be close to him, possibly touch him lightly on the shoulder when verbally communicating with each other. The tasks should be presented with a single purpose - not a multiple one; and when the task is completed, all materials should be removed. Magdol emphasized that "most important of all, the tasks and activities provided for the child must meet his needs, arouse his interest and, hence, be pleasurable".⁷⁰

In programming for the child with a short attention span, Magdol offered different modifications in teaching strategies and curriculum modifications. The author suggested that the instructions to the child be clear and direct; expressed in as few words as possible. The teacher must plan a task that can be completed within the realm of the child's attention span, and each task must be a unit in itself because when habits of completion are established, the tasks mentioned can be lengthened slowly. Magdol mentioned that other methods of extending the child's ability to attend might include a rhythmic component included in

⁷⁰ Ibid., p. 150

activities, and that the preferred learning mode for the child with short attention span was often the kinesthetic.

Summary

The second chapter of the research paper critically reviewed the literature related to the attentional deficits of the learning disabled child. It examined the components of attention: distractibility, hyperactivity, impulsivity and vigilance. The bulk of the research in this area concentrated on what the learning disabled child did or did not attend to and the variable conditions.

After identification and investigation into the components of attention, the author reviewed three remediation strategies, or programs, commonly used by special educators dealing with attentional deficits in learning disabled children: drug therapy, reduced environmental stimulation and operant conditioning methods.

The final section of the second chapter discussed the implications for the educational programming of the learning disabled child with attentional deficits. The related literature analyzed teaching procedures, curriculum modification and physical environment.

The third chapter will summarize and evaluate the literature related to the attentional deficits of the learning disabled child.

CHAPTER III

Summary

The purpose of the research paper was to critically review the related literature on the attentional deficits of the learning disabled child. It examined the theoretical issues of attention in the learning disabled child in the primary and middle grades within a chronological age range of three to thirteen years old. The research was limited to periodicals, texts and studies published within the last decade and related to four specific questions: the stimuli the learning disabled child did or did not attend to, the nature of the relationship between attending skills and academic performance, the specific techniques used to increase the attentional skills and the implications for educational planning for the learning disabled child who exhibited attentional deficits.

In examination of the literature related to what stimuli the learning disabled child did or did not attend to, it was necessary to discuss and analyze the components of attention identified as: distractibility, hyperactivity, impulsivity and vigilance. The number of studies related to the components of attention had grown rapidly but there was much overlap in the available literature due to the interdependent nature of these aspects of attention.

The studies of distractibility generally indicated that children with learning disabilities were consistently found to be more distractible than normal controls and unable to filter out extraneous stimuli and focus selectively on the task. However, they were not differentially distracted by other types of distractors such as flashing lights and extraneous color cues, but did seem deficit in ability to focus their attention on other types of tasks involving embeddedness. These conclusions necessarily depended upon the acceptance of the definition of distractibility cited in the first chapter of this research paper. Some research suggested that learning disabled children are most distracted by auditory stimuli than visual.

The hyperactivity studies provided strong evidence that hyperactivity was situation-specific with higher levels of activity being exhibited in the structured situation. This supported the increasing speculation that hyperactivity was a socially defined phenomenon. The hypo-responsiveness hypothesis suggested that learning disabled children were less reactive to meaningful stimuli and made fewer responses.

Children with learning disabilities are more impulsive, when impulsivity was defined as the opposite of reflectivity. This possibly indicated weaknesses in the scanning aspect of attention. However, when impulsivity was viewed as rapidity

of responsiveness, the evidence was less consistent. The children with learning disabilities often exhibited faster reaction times than normal controls, made more efforts, and tended to work in a random trial and error fashion.

In the research review on studies of vigilance, vigilance usually referred to detecting infrequently occurring signals over a prolonged period of time when the signals were embedded in a background of regularly occurring events. The research generally reported that learning disabled children, particularly hyperactives, had difficulty sustaining attention to a continuous progress task over an extended period of time. Activity level of the child and amount of time required for a task were crucial variables.

The most current research focused on the developmental trends of attention. The researchers hypothesized that the learning disabled child was retarded in the development of selective and sustained attentional skills. Their studies indicated that the learning disabled child's attending skills improved with age.

As a result of an examination and analysis of the components of attention, most of the research was developed not only to study a particular component of attention, but also to suggest its positive relationship to learning. The research seemed to indicate that attention is a necessary condition for learning and that without the necessary

attentional skills, the child will experience difficulty in the acquisition of academic skills and may be an "under-achiever", "educationally handicapped" or learning disabled student.

Consequently, the second part of the research and literature review focused on remedial techniques or programs developed for the purpose of increasing the child's ability to attend in order for learning to take place in the individual. Three methods of attention control commonly used by special educators were examined to determine their efficacy. From an examination of experimental studies, reviews and pilot programs, it appeared that each - drug therapy, reduced environmental stimulation and operant conditioning - had proven effective in producing behaviors which experimenters called 'attention'. There was limited evidence, however, that these approaches produce stable changes in the individuals involved. For example, once medication had been given, it had to be continued to maintain levels of attention; once a stimulus-free environment was established, it had to be maintained; once token or primary reinforcers were used, they had to be continued. Firm evidence that these strategies led to concomitant improvement in scholastic performance was not found.

The last section of this chapter examined the literature and research related to the implications for educational programming. The researchers generally concurred

that attentional behavior was a basic learning competency and a critical factor for learning. Educational programming was discussed in two areas: physical structure of the classroom and curriculum modifications.

The classroom was to be devoid of extraneous auditory and visual stimuli such as mobiles and open shelves; it was to be a calm, quiet nondistracting atmosphere. The classroom could include use of carrels or cubicles to limit distractors for the learning disabled child.

In terms of curriculum planning, the researchers generally agreed that tasks or assignments should be broken down into small units, involving a short time period for completion and utilizing simple directions. However, the tasks should not only meet the individual's needs, but also be pleasurable and interesting.

Conclusions

The examination of the literature related to the attentional deficits of the learning disabled child was enlightening, yet disillusioning. The purpose of the paper was to examine four specific questions, and most of the literature related to those questions reported valid and reliable research studies using controlled populations and proper experimental methods. The author was able to gain a deeper insight and much broader perspective on the components of attention, their interdependence and their strong

positive relationship to learning.

Yet the review of the related literature contained an element of disillusionment in terms of terminology and limitations of the research.

The terminology used to refer to the learning disabled child was inconsistent and confusing. Various labels were used interchangeably: "minimally brain damaged", "brain-damaged", "hyperactives" or "learning disordered". It seemed that the label "learning disabled" had been used as a "waste-basket" for a heterogeneous group of children having learning and/or behavioral problems with at least assumed average intelligence. Occasionally, the lack of concern for specification of sample characteristics by the investigators of the studies reviewed was lamentable. Until the large within-group variance is recognized, numerous questions and problems pertaining to the attentional deficits of learning disabled children will remain unanswered.

Given the much talked about problems of attention among the learning disabled, it seemed unfortunate that only three strategies for remediation had arisen, and that research was extremely limited in examining attention and its relation to other factors such as memory motivation and set.

At the onset of this research paper, the author hypothesized that attentional deficits were the most significant determinant of learning disabilities. As a result of the

review of studies, programs, techniques and theoretical writings, the author held that the hypothesis tended to be a true hypothesis.

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