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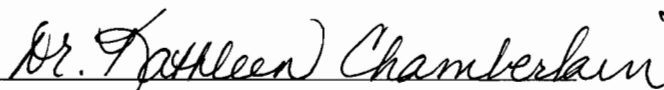
Comparison of Behavioral and Emotional Characteristics in Children with  
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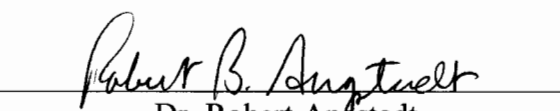
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Comparison of Behavioral and Emotional Characteristics in Children with  
Verbal and Non-Verbal Learning Disabilities

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### Abstract

Previous research has shown that children diagnosed with learning disabilities may be more likely to exhibit behavioral and emotional problems than non-learning disabled children (Greenham, 1999). However, previous studies have not successfully clarified which of the many different types of behavioral problems any given student with a learning disability is likely to display. The current study attempted to resolve this issue by taking the difference between students' verbal and performance (visual-spatial) abilities into account when examining their behavioral and emotional characteristics. It was hypothesized that children with verbal learning disabilities would exhibit more externalizing problems, such as acting out, distractibility, and peer problems, while children with non-verbal learning disabilities would exhibit more internalizing problems such as depression and anxiety. The hypothesis was not supported; the implications of the results as well as suggestions for further study are discussed.

## Comparison of Behavioral and Emotional Characteristics in Children with Verbal and Non-Verbal Learning Disabilities

The field of learning disabilities (LDs) is a relatively new one, and one that is still far from being fully understood. One thing that is clear is that a large number of children diagnosed with learning disabilities display problem behaviors. Rourke & Fuerst (1991, as cited in Greenham, 1999) found that at least 54% of LD children have some type of accompanying behavioral or emotional problems. There are many different types of behavioral and emotional problems, however, and it is not yet clear what distinguishes a learning-disabled child with one type of behavior problem or emotional problem from one with a completely different kind. As more and more children are diagnosed with LDs, it is becoming more crucial to understand exactly what types of behavioral and emotional problems are likely to be displayed by which children.

### Comparison of Behavioral and Emotional Characteristics of Learning Disabled and Non-Learning Disabled Children

Many researchers have found that children with LDs, when studied without taking subtypes into account, experience more social difficulties, emotional problems (e.g. depression and anxiety), disruptive behaviors, and attention problems than non-LD children. In a comprehensive review of previous LD research, Greenham (1999) explains that, when compared to their non-LD peers, children with LD have been found to exhibit many different types of social problems, including a lower-than-average peer status, a smaller number of social interactions, and misinterpretation of various social cues, both verbal and non-verbal. There are also a variety of emotional problems that children with LD tend to display, such as depression, anxiety, low self-concept and self-esteem, as well as externalizing behavior problems such as disruptive behavior and substance use or abuse (Greenham, 1999). Greenham (1999) explains that one can be fairly certain about the presence of such problems in the learning disabled, noting the consistency in findings even among different raters, using different measures, and across age levels.

McKinney, McClure, and Feagans (1982) found that children with LD tend to have a higher rate of “non-constructive self-directed activity” (i.e., off-task behavior) and a lower rate of

“constructive self-directed activity” than children without LD (as cited in Bender, 1987). It has also been shown that children who demonstrated problems with academic tasks in school are rated by their parents as having more attention problems and more social problems (Riva, Lyon, & Heefner, 1995).

Bender (1987) examined the difference in behavior patterns between LD and non-LD children more closely. Using the Walker Problem Behavior Identification Checklist (WPBIC, which is completed by classroom teachers) to obtain standardized behavior scores on five scales (acting out, withdrawal, distractibility, disturbed peer relations, and immaturity, as well as a measure of total problem behavior), he attempted to determine the extent to which the temperamental characteristics of children diagnosed with LD, as measured with the short form of the Teacher Temperament Questionnaire (Keogh, Pullis, & Caldwell, 1982, as cited in Bender 1987), are associated with the various behavior problems they exhibit. Bender’s data suggest that differences in problem behavior for non-LD children can be predicted by temperament, while no correlation was found to support a relationship between temperament and problem behavior in LD children. A regression analysis showed that teacher ratings of the temperamental characteristic of reactivity, defined as the threshold of response to stimuli and the intensity of that response, partially predicted variance in total problem behavior for participants in the LD group. Bender explains that the increased reactivity of LD children leads to some irregularity in their behavior patterns, and that classroom teachers may be more likely to notice problem behavior if a student’s level of reactivity is high (e.g. a low threshold of response to stimuli/overly intense response to stimuli) or if it is perceived to be high. This high level of reactivity causes the student’s responses to seem inappropriate for the stimulus, making those responses more noticeable to the teacher.

An earlier study by Bender (1985) compared a group of thirty-five LD students to a group of matched non-disabled peers on measurements of temperament as evaluated with the Teacher Temperament Questionnaire (Thomas & Chess, 1977, as cited in Bender, 1985), problem behavior, measured through a teacher evaluation using the WPBIC, and observed classroom behavior. Classroom behaviors included: disruption (i.e. anything that disrupts at least two other

students), whispering (i.e. talking to another student about any non-task-related subject), passive time (i.e. time in which the student is not preparing for, learning about, or waiting for a given task), preparational waiting (i.e. how well a student used time given to prepare for a given task), and on-task behavior (i.e. the student making eye contact with the learning task). In the analysis of temperament, significant group effects were found for the temperament factor of task orientation, which consists of task persistence, distractibility, and activity level (Keogh, Pullis, & Cadwell 1982, as cited in Bender, 1985). Children with LD were seen to have lower ratings of task orientation than non-LD children, suggesting that LD students are less persistent and more distractible. In the analysis of teacher ratings of behavior, significant group effects were seen for the variables of acting-out behavior, distractibility, and disturbed peer relations, with LD kids experiencing a higher level of these problems than non-LD kids. Group effects were seen for the observed classroom behavior category of passive time; LD kids were found to spend about 18% of their time in passive off-task behavior, while non-LD kids spent about 14% of their time behaving in the same manner. Bender (1985) also showed a connection between temperamental reactivity and acting-out behavior in both groups and between total problem behavior in both groups. Reactivity also correlated with two other variables for the LD group, distractibility and disturbed peer relations. Bender (1985) concluded from the significant correlation between reactivity and problem behavior in the LD group that among LD students, there is a causal connection between the LD itself and an abnormal reaction to the environment.

In summary, children with LD have been found to exhibit a variety of behavioral and emotional difficulties when compared to non-LD kids. Previous studies have been somewhat inconclusive about the prevalence and intensity of these problems. Greenham (1999) suggests that this is due to the fact that many previous studies have not differentiated between different subtypes of LD. It is possible that research that takes into account the nature of the LD (verbal or non-verbal) will help to clear up some of these problems.

#### Comparison of Verbal/Language-Based and Non-Verbal/Visual-Spatial Learning Disabilities

A verbal/language-based LD is one in which a student has trouble with reading, writing,

and other verbal/language-based activities, while a non-verbal/visual-spatial learning disability results in impaired visual-spatial skills, but does not affect language related skills.

The cerebrum can be divided into the left hemisphere and the right hemisphere. Each hemisphere is thought to process different types of information, and therefore may control different aspects of behavior. The left hemisphere is believed to control language and language-related thought, as well as logical thought in most adults; specific functions associated with the left hemisphere include expressive speech, receptive language as well as language in general, writing, and sequential processing (Bender, 1998). The right hemisphere, on the other hand, is thought to control the processing of spatial orientation, spatial integration, visual imagery, nonverbal ideation, facial recognition, Gestalt perception, picture processing and creative expression in music (Bender, 1998).

It could be hypothesized that children with verbal/language-based LDs experience some weaknesses in left hemisphere functioning and those with non-verbal/visual-spatial LDs have underlying right hemisphere deficits (as hypothesized by Rourke below).

Subtypes of LD. Subtyping research has been identified as an area in the field of LD that needs more exploration (Bender, 1998). With the wide range of academic, behavioral, and emotional characteristics of LD students that have been observed in past research, there is insufficient evidence to allow one to predict the specific behavioral/emotional difficulties that any given child with an LD is likely to display.

Rourke (1985; Rourke & Finlayson, 1978, as cited in Greenham 1999) identified three subtypes of LD: group RSA, group RS, and group A. Group RSA is characterized by deficiency in reading, spelling, and arithmetic. Children in group RS have weak reading and spelling skills relative to their arithmetic skills. Children in group A are deficient in arithmetic and perform at least at an average level in reading and spelling. According to Rourke and Finlayson (1978, as cited in Greenham, 1999), these subtypes are likely different with regard to their varying patterns of underlying hemispheric weakness, as children in subtypes RSA and RS exhibit behavior that is consistent with that of someone with left hemisphere dysfunction, and children in subtype A



exhibit behavior that is consistent with that of someone with right hemisphere dysfunction.

In later research, Rourke & Fuerst (1991, as cited in Greenham 1999) identified five subtypes of psychosocial behavior in children with learning disabilities. They report that about 30% of children with LD have a normal pattern of adjustment (i.e. no clinically significant behavior problems), 16% are in the somatic subtype, with their parents having raised some concern about the children's health, and 14% have parents who were concerned with mild anxiety or depression. These 60%, then, tend to have either normal or only mildly impaired psychosocial functioning. The two remaining groups, each accounting for 20% of LD children, include those with more significant internalizing problems and those with more significant externalizing problems. Depression, anxiety, and social isolation are considered to be examples of internalizing behavior problems, while hostility, impulsivity, acting-out, aggression, and hyperactivity are externalizing behavior problems. The results of Rourke's studies seem to suggest that there may be different types of behavior patterns present in children with different types of LD.

#### Probable Behavioral and Emotional Characteristics of Children with Verbal/Language-Based Learning Disabilities

Children with verbal/language-based LD could perhaps be expected to have a greater incidence of social and behavior problems than children with non-verbal/visual-spatial LD. These students have stronger visual skills than children with non-verbal/visual-spatial LD, and are deficient in verbal/language skills. Deficiency in verbal skills has been found to lead to such problems as a poorer ability to process conversations as well as difficulty expressing thoughts and feelings verbally, which may lead to impaired social interactions and feelings of frustration (Bender, 1998). Children with verbal/language-based LDs may also become frustrated with an educational environment that emphasizes verbal skills, such as reading and writing, as almost all educational systems do. Both of these frustrations may be manifested as behavior problems.

Consistent with this, a 1985 study by Stellern and Marlowe found that students with a preferred "right hemisphere mode" (i.e. a stronger right hemisphere, inferring poorer language-related skills), as measured by The Adapted Children's Form of Your Style of Learning and

Thinking (SOLAT), scored significantly higher on the WPBIC, a teacher rating scale of problem behavior, specifically on the measures of acting out, withdrawal, distractibility, and total problem score than students with a preferred “left hemisphere mode” (i.e. stronger left hemisphere, inferring poorer visual-spatial skills). The strength of the right hemisphere score was also correlated with the scores for the teacher rating scale, and the WPBIC measures of acting out and distractibility. In a second study by the same researchers, right hemisphere scores correlated positively with disturbed peer relations in addition to acting out and distractibility. As a result of these studies, they concluded that students with a “right hemisphere cognitive mode,” perhaps comparable to verbal/language-based LD, are at greater risk for externalizing types of behavior problems, such as acting out, distraction, and peer problems, than are students with a left or integrated hemisphere cognitive mode.

Students with a verbal/language-based LD can be thought to have a weaker left hemisphere than right hemisphere, because that region is responsible for language skills. If one assumes that verbal/language-based LD children would accordingly have a “right hemisphere cognitive mode,” (e.g. imbalance of brain functioning with the right hemisphere stronger than the left), it can be inferred that they also might have the corresponding behavior problems that Stellern and Marlowe (1985) demonstrated.

Students who have deficiencies in pragmatic language abilities in particular (as opposed to those who have problems with semantic or syntactic problems) have been repeatedly found to exhibit problems with social skills. Bender (1998) explained that a child who has difficulty using language-based skills in a social situation may easily misunderstand certain social communications, which could lead to improper behavior in interactions with peers (e.g. reacting with an inappropriate emotion). These weaknesses could potentially lead to significant difficulties with social interactions.

Researchers in the area of juvenile delinquency have approached the connection between behavior problems and brain functioning from the opposite direction. These studies have taken samples of delinquent/conduct-disordered children (children with specific, identified behavior

problems), and administered cognitive tests to identify possible underlying brain dysfunction within this group. This research has supported the theory that behavior problems may be in some way related to deficiencies in language-based skills. In one review of the literature in that field (Moffit, 1990), it is noted that in the majority of studies (in fact, every study in that particular review), the Performance IQs (PIQ) of the delinquent children exceeded their Verbal IQs (VIQ). Moffit suggests that problem behavior is not necessarily a direct result of an impaired left hemisphere, but rather it is a result of the cognitive deficiencies that are due to that impairment, specifically that delinquent behavior may be caused by impairments in executive function (functions which are thought to be controlled by the frontal lobes of the brain).

#### Probable Behavioral and Emotional Characteristics of Children with Non-Verbal/Visual-Spatial Learning Disabilities

Non-verbal/visual-spatial LDs presumably result from weaknesses in the right hemisphere of the brain, so it is likely that the behavioral and emotional characteristics that would correlate with a non-verbal/visual-spatial LD might tend to be characteristics that are associated with the right hemisphere.

Stellern and Marlowe (1985) found that children with a “left hemisphere cognitive mode” (i.e. non-verbal/visual-spatial LD - stronger left hemisphere, weaker right hemisphere) did not have significant correlations with any of the behavior measures on the teacher-rated WPBIC (acting out, withdrawal, distractibility, disturbed peer relations, and immaturity). This outcome was repeated in a second study. Their findings support the idea that externalizing behavior problems might not be as common in children with a weakness in the right hemisphere. Other researchers have found children with non-verbal/visual-spatial LDs have been found to be more likely to be depressed or commit suicide as adolescents than were children with verbal/language-based LD (Rourke, Young, & Leenaars, 1989, as cited in Little, 1993). Because the right hemisphere is more closely related to emotions than the left hemisphere, it would be reasonable to assume that children with non-verbal/visual-spatial LD may be more likely to exhibit internalizing types of emotional problems (e.g. depression and anxiety) than children with verbal/language-

based LD.

### Definition and Diagnosis of LD

There are many different methods for defining/diagnosing LDs; schools must follow the definition set by the state to determine which students are diagnosed with LD (Bender, 1998). One criterion that has been used for the diagnosis of LDs is a discrepancy criterion; the discrepancy can be between scores on different subtests of intelligence tests, or it can be between scores representing ability and achievement (Bender, 1998). Bender (1998) explains that some type of discrepancy criterion is used in a majority of state definitions of LD, and that discrepancy criterion are often used by practitioners in identifying LD. The definition that will be of relevance to this study is based on a discrepancy between the student's Verbal IQ (VIQ) and Performance IQ (PIQ). A discrepancy of 15 points (either the VIQ at least 15 points higher than the PIQ or the PIQ at least 15 points higher than the VIQ), which is equal to one standard deviation and is therefore widely accepted in the diagnosis of LDs by schools, will define an LD student for the current study.

### Purpose of the Study/ Hypotheses

The possibility that verbal and non-verbal/visual-spatial LDs originate in different areas of the brain and may therefore have different behavioral and emotional characteristics corresponding to them is promising. Much of the existing research on the behavioral characteristics of children with LD does not differentiate participants by subtype of LD, which leads to heterogeneous samples and possibly obscures results. Perhaps separating children with LD into two groups, those with verbal/language-based LDs and those with non-verbal/visual-spatial LDs, to study their behavioral and emotional problems will help clear up some of the inconclusive results of past studies and provide a clearer picture of the specific problem behaviors that may be characteristic of each subtype. By comparing the behavioral and emotional characteristics of children with both types of LD, it may be possible to identify distinct patterns of social, emotional, and behavioral difficulties that are associated with each type of disability.

As described above, the left hemisphere of the brain is thought to control speech and other

language functions, while the right hemisphere controls performance and spatial aspects of one's behavior (Bender, 1998). An malfunctioning left hemisphere may therefore be the origin of a verbal/language-based LD, and a deficiency in the right hemisphere may be the cause of a non-verbal/visual-spatial LD; this idea has been supported in some previous research (Brumback & Staton, 1983; Kolb & Winshaw, 1996; Rourke, 1982, 1989, as cited in Greenham 1999). While in general a lower Verbal IQ often indicates verbal/language weaknesses and a lower Performance IQ is often obtained by those with visual-spatial deficits, there is some question over whether a child's Verbal IQ can be interpreted as directly reflecting left hemisphere functioning and whether a Performance IQ can be interpreted as directly reflecting right hemisphere functioning (R. Landis, personal communication, Oct. 4, 2001). Regardless of whether VIQ and PIQ scores directly reflect underlying left and right hemisphere functioning, the widespread use of the Wechsler Intelligence Scale for Children - III (WISC-III) to diagnose LDs suggests that predicting emotional, behavioral, and peer difficulties from different patterns of VIQ and PIQ scores would be useful. Therefore, this study will concentrate on the relationship between an LD student's VIQ and PIQ and his/her accompanying behavioral and emotional problems.

The identification of distinct patterns of behavioral and emotional problems in LD children may be helpful in both diagnosis and treatment of the disorder. For example, perhaps school personnel could develop more appropriate social and behavioral interventions to help LD children if they could more accurately predict early on exactly what types of behavioral and emotional difficulties a student with a given LD is likely to have.

This study will attempt to expand on the findings of previous studies by using measures of cognitive functioning (WISC-III) and behavior problems (CBCL) that are more commonly used in school evaluations of LDs. This study will attempt to replicate the findings of previous studies in terms of the relationship between verbal and non-verbal deficits and behavior, and extend those findings by identifying additional, more specific behavioral differences between children with verbal/language-based LDs and those with non-verbal/visual-spatial LDs. It is hypothesized that:

1. Children with verbal/language-based LDs (i.e. whose PIQs are greater than their VIQs)

will be more likely than children with non-verbal/visual-spatial LDs to exhibit behavior problems such as acting out, distractibility, and peer problems.

2. Children with non-verbal/visual-spatial LDs (i.e. whose VIQs are greater than their PIQs) will be more likely than children with verbal/language-based LDs to exhibit internalizing emotional problems such as depression and anxiety.

## Method

### Participants

Participants were chosen from a group of 49 children, 35 boys and 14 girls, ages 7 to 12, who had previously been evaluated at an outpatient psychological clinic in the northeast. Data on ethnicity and classroom placement was available for a subset of the participants, 90% of whom were Caucasian and 100% of whom were in a regular classroom in school as opposed to a learning support or emotional support classroom. Information on handedness was available for another subset of the participants, 95% of whom were right-handed. It is reasonable to assume that these percentages can be generalized to the group of participants as a whole. All participants were determined to have either a verbal/language-based LD (N=26) or a non-verbal/visual-spatial LD (N=23), as well as a WISC-III Full Scale IQ of at least 80. The only co-diagnoses that were excluded were Autism, Mental Retardation, and significant vision and hearing impairment. All other co-diagnoses were included because the purpose of the study was to explore different types of behaviors displayed by children with differing patterns of IQ test scores. After consideration the children who were taking medications at the time of the CBCL evaluation (N=9), as well as the one participant for whom no data on medication status was available, were excluded from the analysis due to the probability that medication would decrease behavior problems (and therefore scores on the CBCL) and confound the findings. This left a final group of 39 participants.

Participants with verbal/language-based LDs (group one, N=18) had a PIQ at least 15 points greater than their VIQ. The group was composed of 12 males and 6 females, with an average age of 8.94 years. Of the subset of these participants for whom information on handedness was available, 100% were right-handed. The average full scale IQ for the group was

100.94 and the average VIQ/PIQ split was 22.67.

Participants with non-verbal/visual-spatial LDs (group two, N=21) had a VIQ at least 15 points greater than their PIQ. The group was composed of 15 males and 6 females, with an average age of 9.10 years. Of the subset of these participants for whom information on handedness was available, 100% were right-handed. The average full scale IQ for the group was 100.71 and the average VIQ/PIQ split was 22.14.

### Measures

Scores from the WISC-III were used to assess the cognitive functioning of each child. This test, one of the most commonly used instruments for assessing intelligence in children ages 6-16, has well-established validity and reliability (Sattler, 1982, as cited in O'Brien, Margolin, and John, 1995). The test gives separate scores for Verbal IQ and Performance IQ, as well as a score for Full Scale (overall) IQ.

The Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983, as cited in Klein & Forehand, 2000) was used as a measure of each participant's behavioral and emotional characteristics. The CBCL is a widely used, well-standardized rating scale which is completed by the parent/guardian and/or teacher of each participant. Behaviors are scored 0 (not true), 1 (somewhat or sometimes true), or 2 (very true or often true). According to Klein & Forehand (2000), Achenbach and Defrock (1983) reported both high test-retest reliability and content and criterion validity. This scale produces *t*-scores (55=average, 70 or above is considered a significant problem) on a variety of different behavior domains which are slightly different depending on whether the child is male or female and whether the child is being rated by a parent or a teacher (see Table 1). For the current study, ratings from both parents and teachers were used. McConaughy and Ritter (1986, as cited in Spreen, 1989) grouped the categories of the CBCL into externalizing behaviors (hyperactive, aggressive, and delinquent) and internalizing behaviors (schizoid/anxious, depressed, and obsessive/compulsive), and they identified social withdrawal as a "mixed syndrome." For the current study, the behavioral domains of inattentive, nervous/overactive, angry/aggressive, delinquent/disobedient, and hyperactive were considered to

be externalizing behavioral problems. The behavioral domains of obsessive/compulsive, schizoid/anxious, and depressed were considered to be internalizing behavioral problems. The scores for each group were also analyzed in terms of an overall  $t$ -score for internalizing behavioral problems and an overall  $t$ -score for externalizing behavioral problems.

### Procedure

Clinicians retrospectively selected those patients who met the criteria for this study from their files. In order to be selected, a discrepancy of at least 15 points between a student's VIQ and PIQ was required, along with a minimum full scale IQ of 80. Excluding those participants who were taking medication, scores from both the WISC-III and CBCL for each participant were obtained from patient files. These scores were then analyzed using multiple univariate analyses of variance (ANOVAs) to determine if a relationship exists between a child's neuropsychological and behavioral profiles. In the case of finding results that supported the hypotheses (i.e. many categories of externalizing behavioral problems in which children with verbal/language-based LDs were rated significantly higher than children with non-verbal/visual-spatial LDs and/or many categories of internalizing behavioral problems in which children with non-verbal/visual-spatial LDs were rated significantly higher than children with verbal/language-based LDs), the significance level would have been adjusted from  $p < .05$  by dividing by the number of tests to account for the likelihood of finding significant results due to running the multiple univariate ANOVAs.

### Results

Mean scores, along with their corresponding  $F$  values, for parent and teacher ratings for each category of the CBCL are found in Tables 2-5. None of the parent ratings of the individual categories of behavioral problems differed significantly between the two groups. The only teacher rating to differ significantly between groups was the rating for anxiety in males ( $\bar{x}_1 = 60.13$ ,  $\bar{x}_2 = 55.82$ ;  $F = 5.062$ ,  $p < .05$ ), meaning that males who have verbal/language-based LDs were rated by their teachers as having more symptoms of anxiety than males with non-verbal/visual-spatial LDs. The parent ratings for females for the categories of delinquent/disobedient ( $\bar{x}_1 = 60.00$ ,



$\bar{x}_2=65.17$ ;  $F=3.562$ ,  $p>.05$ ) and angry/aggressive ( $\bar{x}_1=61.50$ ,  $\bar{x}_2=71.67$ ;  $F=4.350$ ,  $p>.05$ ) as well as the teacher ratings for females for the categories of unpopular ( $\bar{x}_1=58.40$ ,  $\bar{x}_2=65.00$ ;  $F=4.542$ ,  $p>.05$ ) and angry/aggressive ( $\bar{x}_1=56.60$ ,  $\bar{x}_2=66.75$ ;  $F=3.082$ ,  $p>.05$ ) approached significance. Females with non-verbal/visual-spatial LDs were rated by their parents as having more symptoms of delinquency/disobedience and anger/aggression and were rated by their teachers as having more symptoms of unpopularity and anger/aggression than females with verbal/language-based LDs, although these differences did not reach clinical significance.

### Discussion

The results of the current study do not support the hypotheses that children with verbal/language-based LDs would be more likely to exhibit externalizing behavioral problems than children with non-verbal/visual-spatial LDs and that children with non-verbal/visual-spatial LDs would be more likely to exhibit internalizing behavior problems than children with verbal/language-based LDs. The only significant difference that was found suggests that males with verbal/language-based LDs may have higher instances of anxiety, which is generally considered an internalizing behavioral problem. This is contradictory to the hypotheses, and may be due to the fact that a classroom teacher would be observing the student in a language-based school atmosphere where long-term failure could lead to a lack of confidence, resulting in heightened levels of anxiety. No other CBCL scores indicated a significant difference between the two groups on internalizing or externalizing behavior problems. There was some indication that females with non-verbal/visual-spatial LDs tend to have higher levels of anger/aggression, delinquency/disobedience, and unpopularity than females with verbal/language-based LDs, although these differences were not clinically significant.

These results do not support the findings of Stellern & Marlowe (1985), whose study seemed to suggest that students with a preferred “right hemisphere mode” have higher rates of externalizing behavior problems than students with a preferred “left hemisphere mode.” In the current study, the group with verbal/language-based LDs (group one) would have been expected to show patterns of behavior similar to Stellern & Marlow’s (1985) preferred “right hemisphere

mode” group as both of these groups would presumably have inferior language-related skills. The fact that the current group of students with verbal/language-based LDs did not show a pattern of behavior problems similar to Stellern & Marlow’s (1985) “right hemisphere mode” group may be due to the fact that the behavior problems in their study were evaluated using the WPBIC, while the current study used the CBCL. Another factor that may contribute to this discrepancy is the fact that Stellern & Marlowe (1985) used the SOLAT to define “right hemisphere mode” and “left hemisphere mode.” In the current study, the groups were defined using a VIQ/PIQ discrepancy. There is some controversy over whether VIQ and PIQ directly reflect left and right hemisphere functioning, respectively. It is possible that the SOLAT takes some other factors into account in addition to a student’s VIQ and PIQ, and that these other factors may have an influence on the student’s pattern of behavioral problems.

It is important to note that the behavioral problems of an LD child are not necessarily a function of the LD itself. Any number of other variables could influence an LD student’s behavior. Examples of factors that could have such an effect are socioeconomic status and other social factors, such as the relationship between the parents and school. It is possible that some such variable could account for the behavioral problems of the participants in the current study.

Another possible explanation for the fact that the hypotheses were not supported is that it is possible that the CBCL is not an accurate measure of all possible behavioral problems exhibited by LD children. Of the 9 participants who were excluded due to the fact that they were taking medication at the time of the evaluation, 7 of these children (78%) had verbal/language-based LDs, while only 2 of these children (22%) had non-verbal/visual-spatial LDs. This indicates that children with verbal/language-based LDs may tend to have more behavioral problems that are severe enough to require medication than children with non-verbal/visual-spatial LDs. The CBCL scores obtained for the current study do not seem to corroborate this, so it is possible that parents and teachers are picking up on some behavior problems that are not reflected by the measures used in the current study.

On a positive note, mean  $t$ -scores for the behavioral problems of all participants were not

exceedingly high (see Tables 2-5). Even the category for which a significant difference was found (teacher-rated anxiety in males) did not have mean levels for either group that reached clinical significance. While individual participants may have been rated as displaying certain behavioral problems, it is encouraging to see that overall this group of LD children was not rated as having severe levels of behavioral problems. As a score of 70 is considered a significant behavioral problem, the male category of angry/aggressive as rated by parents, and the female categories of angry/aggressive and total externalizing  $t$ -score as rated by parents would be considered severe behavior problems. This means that the remaining 96% of the behavior categories had means that were in the “normal” range.

It is important to note that while the current study used both parent and teacher ratings on the CBCL, there is a relatively poor correlation between parent and teacher ratings of a child’s behavior (see Tables 6 and 7). This is probably due to a few factors, most notably being that the parent is untrained in scoring his/her child’s behavior and that, unlike the teacher, the parent does not have a whole classroom of students to compare the child’s behavior to. It is also possible that the child is displaying two totally different patterns of behavior at home and at school; this could be especially true if a student with an LD (particularly with a verbal/language-based LD) is especially frustrated with his/her educational situation.

It is possible that no significant differences were found between the behavioral profiles of the two groups in the current study due to the small sample size. While there were 39 participants overall, not every participant had both parent and teacher ratings available. This resulted in a few categories of behavioral problems being analyzed with as few as 5 participants (e.g.  $t$ -scores for overall internalizing and externalizing behavioral problems based on teacher ratings for females); with such a small sample size it would be difficult to find a significant difference.

Another problem with the current study is the fact that the participants were self-selected, due to the fact that the students in the sample were all taken voluntarily by their parents to the clinic for neuropsychological testing. There is a good chance that these parents all have something in common that led them to take their children to this clinic. Unfortunately, not every child with

an LD has parents willing to do this, and many may never undergo such testing. For this reason, the participants in the current study may not accurately represent all children with LDs.

Another possibility is that there is not a significant difference in any of the types of behavioral problems exhibited by students with LDs; it may be that children with different subtypes of LD are experiencing the same behavioral problems although they may be experiencing them for different reasons (i.e. children with both types of LDs may have poor social interactions, due to poor language/communication skills in children with verbal/language-based LDs, but due to irritability in children with non-verbal/visual-spatial LDs). More sensitive behavior scales may need to be developed to identify different underlying factors contributing to specific behavior problems.

In 1989, Spren proposed that both LD and emotional disorders might have common origins in neurological dysfunction. As he later acknowledged (2001), research investigating the neuropsychological basis of LDs and research investigating the different subtypes of LD have remained isolated from each other; he suggests that combining the two would be a significant contribution to the field. Spren (2001) explains that while many researchers have suggested that LD children may show signs of “soft” or “non-focal” neurological damage (signs with uncertain significance), these signs do not point to specific problem areas within the cortex; he proposes that such “soft” signs of neurological damage may be the result of a central nervous system abnormality, and that it cannot be concluded that they necessarily contribute to LD. Spren & Haaf (1986, as cited in Spren, 2001) identified five common clusters of LD subtypes from previous research: minimally impaired, primarily arithmetic disabled, specific reading disabled, visuo-perceptually disabled, and linguistically impaired. They did not find any relationship between any of these five subtypes and either soft or hard neurological signs.

The discovery of a neurological basis for LD would likely help to clear up some of the uncertainty in the areas of LD subtypes and behavioral problems in LD. Further research will be necessary to investigate the relationship between a child’s neuropsychological and behavioral profiles more fully. In any case, it is important to gain a better understanding of the relationship

between learning disability subtype and behavioral and emotional problems, as such information will aid in both diagnosis and treatment of learning disabilities.

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Table 1

CBCL CategoriesMales: Teacher CBCL Subscales

Angry/Aggressive

Anxious

Inattentive

Nervous/Overactive

Obsessive/Compulsive

Social Withdrawal

Unpopular

Males: Parent CBCL Subscales

Angry/Aggressive

Depressed

Disobedient

Inattentive/Hyperactive

Obsessive/Compulsive

Schizoid/Anxious

Withdrawal

Females: Teacher Subscales

Angry/Aggressive

Anxious

Depressed

Inattentive

Nervous/Overactive

Social Withdrawal

Unpopular

Females: Parent CBCL Subscales

Angry/Aggressive

Delinquent/Disobedient

Depressed

Hyperactive

Obsessional/Anxious

Social Withdrawal



Table 2

Mean Scores and Results of ANOVAs for Parent CBCL Ratings of Males


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<u>CBCL Categories</u>	<u><math>\bar{x}</math> Verbal LD</u>	<u><math>\bar{x}</math> Non-Verbal LD</u>	<u>F</u>
Schizoid/Anxious	65.00	62.53	.654
Depressed	63.58	66.20	.652
Obsessive/Compulsive	67.83	65.20	.588
Withdrawal	68.42	65.67	.596
Inattentive/Hyperactive	69.08	68.47	.029
Angry/Aggressive	71.08	67.80	.430
Disobedient/Delinquent	67.83	63.87	1.069
Total Internalizing <u>t</u> -score	60.67	61.75	.047
Total Externalizing <u>t</u> -score	66.78	64.50	.163

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Note.  $\bar{x}$ =55 is considered a normal level of behavior.

$\bar{x}$ =70 is considered a clinically significant level of behavior.

Table 3

Mean Scores and Results of ANOVAs for Teacher CBCL Ratings of Males

<u>CBCL Categories</u>	<u><math>\bar{x}</math> Verbal LD</u>	<u><math>\bar{x}</math> Non-Verbal LD</u>	<u>F</u>
Anxious	60.13	55.82	5.062*
Social Withdrawal	66.75	62.09	.913
Unpopular	63.00	59.91	.888
Obsessive/Compulsive	67.38	61.91	2.230
Inattentive	66.50	64.55	.296
Nervous/Overactive	63.38	60.36	2.073
Angry/Aggressive	61.63	58.82	1.806
Total Internalizing $t$ -score	61.60	56.50	.617
Total Externalizing $t$ -score	62.40	60.00	.355

Note.  $\bar{x}$ =55 is considered a normal level of behavior.

$\bar{x}$ =70 is considered a clinically significant level of behavior.

\*significant at the .05 level

Table 4

Mean Scores and Results of ANOVAs for Parent CBCL Ratings of Females

<u>CBCL Categories</u>	<u><math>\bar{x}</math> Verbal LD</u>	<u><math>\bar{x}</math> Non-Verbal LD</u>	<u>F</u>
Depressed	63.33	66.67	.150
Social Withdrawal	64.50	68.83	.479
Obsessional/Anxious	62.50	60.67	.143
Hyperactive	67.50	69.67	.187
Disobedient/Delinquent	60.00	65.17	3.562
Angry/Aggressive	61.50	71.67	4.350
Total Internalizing $t$ -score	63.33	67.25	.142
Total Externalizing $t$ -score	64.33	74.00	2.545

Note.  $\bar{x}$ =55 is considered a normal level of behavior.

$\bar{x}$ =70 is considered a clinically significant level of behavior.

Table 5

Mean Scores and Results of ANOVAs for Teacher CBCL Ratings of Females

<u>CBCL Categories</u>	<u><math>\bar{x}</math> Verbal LD</u>	<u><math>\bar{x}</math> Non-Verbal LD</u>	<u>F</u>
Anxious	57.60	57.25	.014
Social Withdrawal	62.20	61.00	.043
Depressed	57.60	61.75	1.614
Unpopular	58.40	65.00	4.542
Inattentive	63.60	66.75	.394
Nervous/Overactive	60.40	67.25	1.116
Angry/Aggressive	56.60	66.75	3.082
Total Internalizing t-score	59.33	62.00	.122
Total Externalizing t-score	55.00	70.00	3.092

Note.  $\bar{x}$ =55 is considered a normal level of behavior.

$\bar{x}$ =70 is considered a clinically significant level of behavior.

Table 6

Correlations between Parent and Teacher Ratings of CBCL Categories for Males


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<u>Parent Rating</u>	<u>Teacher Rating</u>	<u>Correlation</u>
Schizoid/Anxious	Anxious	.248
Obsessive/Compulsive	Obsessive/Compulsive	.480*
Withdrawal	Social Withdrawal	.549*
Inattentive/Hyperactive	Inattentive	.078
Inattentive/Hyperactive	Nervous/Overactive	-.123
Angry/Aggressive	Angry/Aggressive	.523*
Total Internalizing t-score	Total Internalizing t-score	.304
Total Externalizing t-score	Total Externalizing t-score	.327

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\*significant at the .05 level

Table 7

Correlations between Parent and Teacher Ratings of CBCL Categories for Females


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<u>Parent Rating</u>	<u>Teacher Rating</u>	<u>Correlation</u>
Depressed	Depressed	.169
Social Withdrawal	Social Withdrawal	.302
Obsessional/Anxious	Anxious	.338
Hyperactive	Nervous/Overactive	-.509
Angry/Aggressive	Angry/Aggressive	.378
Total Internalizing t-score	Total Internalizing t-score	.194
Total Externalizing t-score	Total Externalizing t-score	.658

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