

Anti-Motion Sickness Medications in Dysmetric Dyslexia and Dyspraxia

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THE MAIN PURPOSE of this study is to present the qualitatively recorded therapeutic responses of dysmetric dyslexic and dyspraxic individuals experimentally treated with a series of anti-motion sickness and related drugs and attempt to:

1. Demonstrate the efficacy of the motion sickness drugs as "cerebellar-vestibular harmonizing" and dysmetric dyslexic and dyspraxic therapeutic agents.
2. Demonstrate the efficacy of the motion sickness medications (and recorded qualitative responses) as research pharmacological tools with which to explore and dissect cerebellar-vestibular and related "higher" cerebellar neurophysiological and neuropsychological functions.

In previous studies¹ we developed the clinical and theoretical rationale for viewing the cerebellum as playing a vital role in:

1. Harmonizing, modulating, and coordinating the total sensory input (i.e., visual, acoustic, tactile, proprioceptive stimuli) in a manner analogous to its proven and known function of harmonizing and coordinating the motor output

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2. Modulating motion input, motion sickness responses, and the therapeutic responses of dysmetric dyslexic and dyspraxic individuals to the motion sickness or seasickness medications.

The recognition that dyslexia and its underlying sensory-motor dysmetria is of cerebellar origin resulted in the hypothesis that the cerebellum modulates the motion input in a manner analogous to its role in modulating the visual, acoustic, proprioceptive, and tactile input.

If we assume that: (1) the cerebellum modulates the motion input, and (2) the motion sickness medications improve the organism's ability to tolerate or modulate motion input, then we may further speculate that the motion sickness medications improve cerebellar function and as a result may be effective in correcting the cerebellar induced organismic dysmetria underlying dysmetric dyslexia and dyspraxia.

Sample and Methodology

Two hundred and fifty dysmetric dyslexic and dyspraxic and 30 mixed-dysmetric dyslexic and dyspraxic individuals of varying ages were treated with one or more of a series of motion sickness drugs (i.e., cyclizine [Marezine], meclizine [Antivert], dimenhydrinate [Dramamine], diphenhydramine [Benadryl], methylphenidate [Ritalin], etc.) for a period of three months, and the historical responses and or parental observations were recorded.*

Parents and dysmetric dyslexic and dyspraxic individuals were instructed to report any and all changes noted during the therapeutic trial and, in addition, were advised to expect nothing therapeutically inasmuch as the use of the motion sickness medications for the treatment of dyslexia was entirely new and experimental.

Definition of DDD and Diagnostic Criteria

Dysmetric dyslexia and dyspraxia has been conceptualized and defined as a cerebellar-vestibular induced dysmetria or sensory-motor and spatio-temporal sequencing and processing disturbance in dynamic equilibrium with compensatory forces—resulting in a diverse spectrum of symptoms in varying states of decompensation, compensation, and overcompensation (i.e.,

*See list of anti-motion sickness drugs in Wood and Graybiel, "A Theory of Motion Sickness Based on Pharmacological Reactions," *Clinical Pharmacology and Therapeutics* 11:5 (1970): 622. In addition, the authors have explored the usefulness of a wide range of additional antihistamines.

reading, writing, spelling grammar, arithmetic, drawing, speech, temporal, orientation, and emotional difficulties).

The diagnosis of dysmetric dyslexia and dyspraxia was made on the basis of combined neurological, psychological, educational, blurring speed, and electronystagmography (with caloric stimulation) evidence of *only* cerebellar-vestibular dysfunction. Mixed-dysmetric dyslexic and dyspraxic cases had evidence of cerebellar-vestibular dysfunction *plus* additional central nervous system impairment.

Results

The qualitative analysis of anecdotal and historical records of *observed DDD drug responses* clearly revealed a pattern of favorable therapeutic responses in well over one third of the 250 dysmetric dyslexic and dyspraxic and 30 mixed dysmetric dyslexic and dyspraxic cases experimentally treated. These favorable therapeutic patterns of response were functionally classified and proved immeasurably helpful in:²

1. Expanding preexisting conceptualizations of primary and related cerebellar and cerebellar-vestibular function and dysfunction.
2. Expanding preexisting conceptualizations about the function of motion sickness medications.

Inasmuch as the motion sickness and related drugs were clinically found to improve cerebellar-vestibular function and modulation, the authors coined the term "Cerebellar-Vestibular Harmonizing Agents" for any and all drugs improving cerebellar-vestibular and dysmetric functioning—regardless of their known preexisting anti-motion sickness potency. The following are representative responses from parents of children treated with these drugs.

Typical DDD Parent Responses

1. J. is an eight and a half year old dysmetric dyslexic and dyspraxic girl with positive cerebellar-vestibular signs, negative cortical signs, decreased blurring speeds and abnormal ENG. In her mother's words:

J. had significant spatial disorientation difficulty . . . If there were 2 or more sentences on the same page she'd lose her place and we had to teach her to track with a pencil.

Since starting the medication we find that she no longer uses this pencil and can read longer and longer paragraphs without losing her place and has stopped reversing on = no, what = that. She'll spontaneously pick up a book and attempt to read

it without getting discouraged whereas before she'd only choose books with one picture and two sentences on a page . . . She also spontaneously started tying her shoe laces. It seems she can coordinate different movements better . . . She even ventured up a tree and drove her bike down a hill—things she'd never do before . . . Her handwriting has improved and she no longer reverses the spelling and is writing notes to everyone . . . Even her drawings have more detail to them and she can better recall what she has seen so as to be able to draw it.

2. Mrs. B. and her daughter, S., an eleven-year-old sixth grader, were both diagnosed as dysmetric dyslexic and dyspraxic and had abnormal cerebellar-vestibular signs, blurring speeds and ENGs. Cortical signs were absent. According to Mrs. B.,

Although S. was reading on grade level, I did not feel her school work reflected what I thought her capabilities to be and I could not understand why she struggled thru her school-work. Specialists either told me it was maturation or that she was daydreaming too much, an underachiever, not trying, etc. She was down on herself and felt stupid—despite having a 140 I.Q. . . .

Since she was placed on Antivert, she's become a new child. She reads with ease and you can't stop her from reading. She no longer reverses words, her spelling, writing and punctuation have improved. Even some of her sports activities have significantly improved.

As you suggested, I took her off the medication during the Spring recess, and most of her symptoms returned. When I put her back on the medication, everything got better again.

- S. made her own observations:

Before taking the medication I'd continually lose my place when reading and I'd have to go back over the same page a million times. My writing was big, erratic, and the letters were either too close or too far apart; they'd get bigger and shorter and I'd find it hard to keep on the line. I'd even leave out commas and periods on word endings. I'd get very frustrated and felt very stupid and would get down on myself. Since taking the medication, I see and sound the words out better and everything is just easier to understand. When I read, I don't lose my place and I find most of the books I read more enjoyable—because I can easily understand it all. I don't mix up or reverse words anymore.

When I had difficulty, I'd print and now I can write cursively and don't use short cuts. For example, before I'd be lazy and write 2 instead of two . . . Now I get 90's, 95's and 100's instead of 40's, 60's and 70's.

3. P. is a fifteen-year-old dysmetric dyslexic and dyspraxic boy who was initially referred because of truancy and acting-out behavior problems. He was found to have positive cerebellar

signs, negative cortical signs, decreased blurring speeds, and an abnormal ENG.

When my son P. started to take the Marezine we had no idea what would happen as far as the effect on his learning difficulty, Dyslexia.

After P. had been on two pills a day (one in the morning and one at noon) he commented to me that his concentration in school was fantastic. He no longer heard the distracting sounds around him and he said, "It's as if I'm hypnotized and have to listen and pay attention to what the teacher is saying."

I then started to notice an amazing change in his handwriting—it was almost as if another person was doing the writing. The letters were well formed and he no longer left out words or misspelled simple words, which he knew well and had always misspelled in the past.

Arithmetic was always his worst subject—his marks improved dramatically, as did all his subjects. From complete failures in his subjects he started to get 75's to 100's.

His coordination is also better on the Marezine; whereas he had a tendency to trip and drop things before, with the medicine he has control of his reflexes to a great extent.

If for some reason he neglects to take the Marezine, I can notice it immediately when I look over his school work for the day—the handwriting once more is scribbled and words that are basic he misspells.

4. S. is a seventeen-and-a-half-year-old dysmetric dyslexic and dyspraxic boy with positive cerebellar-vestibular signs, compensated blurring speeds, and an abnormal ENG.*

While driving S. noticed he was reading the signs on the parkway faster and clearer . . . This could also be because of greater familiarity.

When closing his eyes, both feet together, hands and fingers outstretched and upwards, the necessity to continually readjust his balance was greatly reduced . . . almost to the point of being calm . . . When he went off the medication the swaying under these conditions became quite marked.

His writing and printing became clearer and appeared on a straighter line—when he went off Dramamine and Ritalin the regression was marked.

Typical Mixed-DDD Parent Responses

The authors have demonstrated equally beneficial results in mixed-dysmetric dyslexic and dyspraxic cases, i.e., cases with cerebellar-vestibular dysfunction *plus* evidence of more diffuse

*S. was initially tested for blurring speeds before the authors recognized the difference between sequential blurring speeds and the compensatory single targeting blurring speeds.

central nervous system impairment.

1. F. is a six-and-a-half-year-old hyperactive boy whose IQ and conceptualization were below normal and who was attending a special school. His blurring speeds were deficient; an ENG was not obtained. His father writes:

As per your request, I am writing this letter to advise you on F's progress since our last visit, April 10. His initial dosage of Antivert was 6.2 mg., morning and night. His response to the medicine was good. We notice no drowsiness or any other side effects. After taking the medicine four to five days, we began to notice a general improvement in the areas of his speech and his ability to control his hands, i.e. writing and coloring . . .

His school work in the area of writing, is now legible for the first time. He has been able to write complete sentences all on one line, and most of the letters are the same size. His coloring is better, but there is still room for improvement.

One interesting note. Since medication, we have noticed that F. no longer puts his pajama bottoms on backwards.

2. M. is an eighteen-year-old boy who had been attending special classes for the retarded throughout his school years. In addition to a deficient IQ, he had evidence of cerebellar-vestibular impairment, decreased blurring speeds, and an abnormal ENG. He was placed on Marezine, one tablet three times a day.

M. is 18 and he now writes a little more smoothly. He does not reverse his numbers. He is more at ease with us at home. Calm. He can spell a few more words: Manhattan, Bronx Park, License, etc. These are words he could not spell before. He claims he can read better now. M. can now look at a word and see it as it is. It is no longer bunched up or scrambled. Before, when he would copy words from a book he would run all the words together and leave no space between the words. Now when he writes, the letters and words are written separately as are the sentences. And his punctuation has also improved.

3. W. is a six-year-old boy who is hyperactive, has a deficient IQ and conceptualization and, in addition, shows evidence of cerebellar-vestibular dysfunction and decreased blurring speeds. He was placed on Ritalin when three years old by another physician.

W. has been on Marezine since November 28, 1974. He takes 1 Marezine and 1/2 Ritalin in the morning; 1 Marezine and 1 Ritalin at lunchtime; 1 Marezine and 1/2 Ritalin at dinner-time. His writing and overall concentration has improved slightly. I have noticed that he is not rocking as much as he did before taking Marezine and when he reads, he no longer loses his place like he did before.

These changes have all taken place since he started taking the Marezine. His reading and writing are better. He stays on

the lines better. Before he was all over the paper. The Ritalin seemed to calm him down and the Marezine seems to have improved everything else.

4. E. is a seven-year-old hyperactive second grader who also had evidence of cerebellar-vestibular dysfunction and manifested deficient blurring speeds. His IQ was above average.

E. was very agitated and excitable on Marezine and even became confused. According to his reading teacher, E. seemed to have an easier time reading when he had taken Dramamine than when he had not.

When taking Antivert he showed the most dramatic improvement. His concentration, hyperactivity and reading ability improved greatly and he recently developed a great talent for sports. E. plays football as a wide receiver and really can catch the long ones. It seems everything comes together as far as coordination goes and E. is enjoyed in sports and socially.

Adult DDD Cases and Phobias

The evaluation of numerous adult dysmetric dyslexic and dyspraxic cases clearly revealed that they frequently:

1. Deny all dysmetric dyslexic and dyspraxic signs and symptoms unless specifically and skillfully questioned and often strive to compensate and overcompensate for their underlying deficiencies.

2. Develop various cerebellar-vestibular related inhibitions and phobic and counterphobic responses, i.e.

- a. Phobias for travel, motion, tunnel, bridge, heights, and so on.

- b. Inhibitions in reading, writing, spelling, math, sports, and so on.

- c. Counterphobic and overcompensated functioning in the foregoing.

3. Develop their first manifest vertigo episode during adulthood—and a history of previous cerebellar-vestibular dysfunction and dysmetric dyslexia and dyspraxia escapes clinical view.

Mrs. B. is an exceptionally bright 35-year-old dysmetric dyslexic and dyspraxic woman with abnormal cerebellar-vestibular signs, ENG, and blurring speeds. Cortical signs were absent.

Her case is of special interest for several reasons:

1. She was a "typical" underachiever in a family of well-educated individuals and was never diagnosed "dyslexic"

because her reading score deficiency was partially compensated, and she had never verbalized (nor was she asked about) her many cerebellar-vestibular sensory-motor dysmetric symptoms and fears of height, motion, elevators, tunnels, and so on. Mrs. B. was diagnosed dysmetric dyslexic and dyspraxic by chance, i.e., she brought her daughter for a learning disability neuropsychiatric evaluation and became aware that their symptoms and signs were remarkably alike.

2. Her first episode of vertigo occurred during adulthood—and her chronic cerebellar-vestibular and dysmetric dyslexic and dyspraxic dysfunction dated back to childhood and remained unrecognized until recently diagnosed. (Our clinical data clearly indicates that many dysmetric dyslexic and dyspraxic children will be predisposed to vertigo and dysmetric dyslexic and dyspraxic related mental symptoms as adults, and that many adults with vertigo had unrecognized and undiagnosed cerebellar-vestibular dysfunction and dysmetric dyslexia and dyspraxia as children.)

3. She was able to describe her disorder succinctly as well as her response to Marezine. Her daughter, S., responded well to meclizine (Antivert) and poorly to cyclizine (Marezine); Mrs. B. responded in opposite fashion, i.e., she responded poorly to Meclizine and favorably to Marezine. (The specificity of response to the various motion sickness medications was found "typical" for all dysmetric dyslexic and dyspraxic individuals and suggested that even slight pharmacological structural differences result in significant and diverse symptomatic responses. And, in addition, favorable response for any given medication is significantly dose-dependent—much more so than previously recognized.)

4. Dysmetric dyslexic and dyspraxic related phobias and inhibitions improved with a corresponding improvement in cerebellar-vestibular sensory-motor functioning. (The improvement in previously unrecognized cerebellar-vestibular related inhibitions, phobias, and so forth resulted in a new psychodynamic and neurodynamic conceptualization and treatment for these "psychic" disorders.)

All too often, dyslexia is viewed as just a reading or learning disability—and the subclinical but devastating emotional fallout resulting from the underlying dysmetric functioning is overlooked. Hopefully, the following portions of a letter from Mrs. B. will convey to the reader the fact that the emotional scarring and dislocations resulting from dyslexia are far worse than the

more obvious reading and learning difficulties and are thus worthy of early intervention, treatment, and prevention.

... As a person with Dyslexia I too have also sold myself short in many areas, that's putting it mildly. My feelings of ineptness have carried over to all phases of my life, and in order to compensate for them I have either over reacted or just reacted instead of acted towards different situations in my life. ... I had always felt like I was on the outside looking in, never really a participant. Constantly searching for love and approval, I felt safest if I were to be married and have someone else protect me from the world. I didn't feel that I could make it on my own and therefore never really strived for a college education, using money as the excuse. After listening to others with the same problem and worse I am ashamed that I didn't even try. I still might some day. How is that for a positive thought about ones self. I have watched my movements and thoughts so closely I can tell you as I'm sure you know that this Dyslexia touches all parts of your life. My husband is quite a sports enthusiast and always wanted me to participate with him in either tennis, bicycling, target shooting and I always shyed away not knowing why, well now I do and between the new knowledge that I have and the aid of medication I hope to be by his side alot more. In our arguments I would frustrate so easily for I couldn't find the words to make my self understood. In fact we went to Marriage Encounter which you might know deals with writing down your feelings in a letter; well his were always so clear that you could almost taste them, but mine would be so disorientated that I was better off not bothering. So I did as I always do, I withdraw from the situation.

... I could go on for hours spilling my guts and still have more to say. I could never read a recipe and follow through on the directions. I could never read the instructions on one of my children's games to explain it to them, yet if I played the game once I would be able to pick it up right away. My feelings towards my daughter are that of understanding mixed with frustration, for her and for myself. She understands me (before medication because I would give such a detailed explanation of things, she couldn't miss. After all one Dyslexic to another, I talk our language. It must be comforting to her to see me function as a person with no problems inspite of the Dyslexia. After all mommy has it and look at her. (Well she is young yet and maybe she doesn't see or know the scars, and yet maybe she does.) I am just so happy that she can label her problems as I couldn't and put them in the proper perspective.

Discussion

Our initial pharmacological research was not conducted in a formal double-blind manner. However, inasmuch as neither patient nor investigator could anticipate the range and depth of the reported positive cerebellar neurophysiological and neuro-

psychological responses, the studies did have "double-blind" aspects. In addition, so theoretically consistent and uniform were the patterns of positive cerebellar responses in each patient that the authors were forced to suspect that each and every patient responding favorably to the motion sickness medications isomorphically validated our hypotheses as to the cerebellar role in dysmetric dyslexia and dyspraxia, the motion sickness mechanisms and the motion sickness medications.

Chance alone could not explain the cerebellar pattern of positive therapeutic responses in each fortunate dysmetric dyslexic and dyspraxic patient; and a "placebo effect" would probably have resulted in only "reading score improvement" and could not have explained the uniquely specific positive response to only one of several medications used and the dramatic regression in function when the medication was stopped, switched, or changed in dosage. Needless to say, double-blind studies are contemplated.

In retrospect, a careful patient-by-patient, in-depth neuropsychological study utilizing an analytic psychodynamic and neurodynamic methodological approach proved exceedingly helpful in mapping out what might be considered a new, dynamic and holistic cerebellar-vestibular neuropsychological topography.

An initial formal double-blind pharmacological approach attempting to measure only reading score changes would have resulted in a "scomatized" bird's eye view of the dynamic, complex, and overdetermined cerebellar-vestibular topography, and surely we would have lost the forest for the trees.

The analysis and classification of positive dysmetric dyslexic and dyspraxic responses to the anti-motion sickness medications revealed:

1. A consistent, broad range of improved cerebellar functions
2. The presence of silently active, vital and heretofore unrecognized "higher" cerebellar and related functions
3. The somatopsychic unity of cerebellar-vestibular function and dysfunction.

In conducting our initial neuropsychological and pharmacological investigations with the anti-motion sickness medications, the authors assumed:

1. That underlying each and every positive dysmetric dyslexic and dyspraxic response there preexisted manifest or latent cerebellar and cerebellar-vestibular dys-

function.

2. That in highlighting cerebellar and cerebellar-vestibular functional changes in dysmetric dyslexia and dyspraxia, the anti-motion sickness medications served as an invaluable research tool with which to dissect and analyze cerebellar and cerebellar-vestibular latent and related dysfunctions.

3. That inasmuch as dysmetric dyslexic and dyspraxic individuals were proven to have only cerebellar or cerebellar-vestibular dysfunction, all positive (and some negative) neurophysiological and neuropsychological changes resulting from the use of the motion sickness medications may be theoretically considered to be cerebellar or cerebellar-vestibular-related within a dynamic, holistic central nervous system functional context.

The neuropsychological evaluation of the foregoing positive dysmetric dyslexic and dyspraxic responses clearly indicated:

1. The existence of an "organismic dysmetria" in dysmetric dyslexia and dyspraxia.

2. The significant therapeutic response of this sensory-motor sequential scanning and processing "organismic dysmetria" to the anti-motion sickness medications.

3. That this cerebellar-vestibular neurophysiological and functional response pattern was in theoretical harmony with the conceptualizations of cerebellar function previously derived from our clinical dysmetric dyslexia and dyspraxia and blurring speed data.

In a summary paper of this type, we can hope to present but a mere glimpse of the ramifications of our dysmetric dyslexia and dyspraxia pharmacological-neuropsychological cerebellar-vestibular research data.

The repetitive clinical findings of improvement in sequential thinking, state of consciousness, memory, mathematics, grammar, word recall and use, expressive and other communication speech and "pregnostic" sensory functions led to the development of new conceptualizations of "higher" cerebellar functions—neurophysiological functions previously attributed entirely to the cerebral cortex.

In addition, we recognized the neuropsychological cerebellar-vestibular basis of a group of travel and motion phobias and have developed a holistic psychoanalytic and pharmacological approach to the treatment of cerebellar-vestibular related phobias and counterphobias.

Summary

On the basis of a new blurring speed methodology and use of our 3-D Optical Scanner, the authors have developed a clinically based hypothesis of cerebellar function which postulates:

For normal perception, gnosis and conception to occur in the cerebral cortex, the cerebellum via processes of selective inhibition-facilitation regulates the sensory input transmission speed and thus separates foreground from background, and maintains and coordinates the spatio-temporal order of the sensory input in a manner analogous to its recognized and established role in regulating and coordinating the motor output.

Utilizing these dysmetric dyslexic and dyspraxic clinically based insights as to cerebellar function and dysfunction, the authors speculated:

1. That the diverse pharmacological group of motion sickness medications act to improve "cerebellar-vestibular harmonizing capacity" for the motion input, i.e., the cerebellum is capable of regulating increased motion input via its inhibitory function and thus avoids or minimizes the "motion sickness responses."
2. The "motion sickness response" is an inbuilt release mechanism (IRM) regulated by the cerebellum in the service of adaptation and homeostasis.
3. That in increasing "cerebellar-vestibular harmonizing capacity," the motion sickness medications will result in improved cerebellar harmonization of the total sensory-motor input and output, and not only the motion input.
4. That if the motion sickness medications improve overall sensory-motor cerebellar function, they may be useful in treating dysmetric dyslexia and dyspraxia.

On the basis of our clinical dysmetric dyslexia and dyspraxia observations, blurring speed data and corresponding ENGs, the authors developed new conceptualizations of cerebellar function and dysfunction, the anti-motion sickness medications and mechanisms and the use of the anti-motion sickness medications in dysmetric dyslexia and dyspraxia. The positive dysmetric dyslexic and dyspraxic response pattern to the anti-motion sickness medications is presented—and provides the basis for a new treatment of dysmetric dyslexic and dyspraxic in-

dividuals as well as a new tool with which to investigate cerebellar function and dysfunction pharmacologically.

NOTES

1. Jan Frank and Harold N. Levinson, "Compensatory Mechanisms in Cerebellar-Vestibular Dysfunction, Dysmetric Dyslexia, and Dyspraxia," *Academic Therapy* 12:1 (Fall 1976): 5-27; Jan Frank and Harold N. Levinson, "Seasickness Mechanisms and Medications in Dysmetric Dyslexia and Dyspraxia," *Academic Therapy* 12:2 (Winter 1976-77): 133-153.
2. See Table 1, Positive Dysmetric Dyslexic and Dyspraxic Response Patterns to Seasickness Medication, in Frank and Levinson, "Seasickness Mechanisms," *op. cit.*: 150-151.

Table 1

Positive Dysmetric Dyslexic and Dyspraxic Response Patterns to Seasickness Medications

Reading Activity

Increased spontaneous reading activity
 Diminished dysmetric tracking and finger pointing
 Improved fixation ability
 Improved foreground-background differentiation (i.e., decreased blurring and increase in degree of letter blackness)
 Decreased or eliminated reading reversals
 Increased reading speed and accuracy
 Increased interest in reading

Writing Activity

Increased spontaneous writing activity
 Smoother rhythm and increased legibility
 Improved spacing between letters and words
 Increased horizontality in writing
 Increased use of cursive writing (printing usually easier)
 Decreased writing reversals
 Increased use of grammatical details (i.e., periods, commas, etc.)
 Increased writing speed
 Increased word content
 Decreased number of spelling errors

Spelling

Increased spelling-recall and decreased letter reversals (i.e., insertion and omissions)

Arithmetic

Increased mechanical alignment
 Increased memory for calculations

Directionality, Spatial Organization and Planning

- Increased right-left differentiation
- Decreased rotations
- Increased detail in drawing
- Improvement in *Goodenough* figure drawings
- Improved spacing in writing
- Improved relationships to spatial coordination tasks (i.e., ball playing, catching, throwing, batting, etc.)
- Increased ability to tie shoelaces, etc.

Balance and Coordination

- Increased ability to ride a bike, dribble basketball, etc.
- Decreased clumsiness (i.e., tripping, falling, and various past-pointing and pre-pointing activities)
- Increased feeling of internal steadiness

Foreground-Background Activity (Sensory)

- Increased foreground clarity
- Improved background suppression of irrelevant and distracting events (i.e., visual, acoustic, etc.)
- Decreased acoustical blurring and scrambling

Speech

- Increased spontaneity of speech
- Decreased slurring, where present
- Increased rate and improved rhythm of speech
- Increased verbal content
- Decreased stuttering, stammering and hesitations

Sequence Activity and Memory

- Increase in sequence memory (i.e., days of the week, months of the year, spelling, multiplication, etc.)

Time Sense

- Increased sense of time and time sequences

Concentration and State of Consciousness

- Improved and increased clarity of consciousness—and associated improvement in memory

Mood

- Improved and increased stability of mood

Self-Image

- Decreased feelings of inferiority and stupidity
- Decreased defensive attitude
- Increased self-assertiveness
- Increased positive attitude

Body Image

- Improved—as reflected in *Goodenough* figure drawings and generalized sensory-motor activity
- Improved visual, acoustic, tactile, temperature, olfactory and proprioceptive modulation

Frustration Tolerance

- Increased frustration tolerance
- Increased concentration and attention span

Anxiety Tolerance

- Increased anxiety tolerance

Socialization

- Increased and improved socialization—especially with peers

Acceptance of Symptoms

- Decreased denial
- Increased ability to tackle, understand, and accept symptoms
- Increased ability to ask questions spontaneously

Dysmetric Dyslexic and Dyspraxic Phobias, Inhibitions, Counterphobias, Characterological Development

- Improved

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