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ABSTRACT

The study investigated and recorded changes in selected psychomotor skills of an 11-year old gifted male with severe motoric problems identified as dysgraphia. A pre-post test design using videotape evaluation recordings was employed to determine changes in psychomotor performance, and a rating scale was designed to establish baseline and determine performance changes after administration of a sensory motor intervention approach. The approach featured stimulation of vestibular, kinesthetic, tactile, and visual sensory modalities. Correlated tests were applied to factor grouped data as measured by a panel of six raters, indicating that the S improved significantly in body awareness and visual-motor control. The practical value of single-subject designs is emphasized.
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A CONTROLLED SINGLE SUBJECT RESEARCH DESIGN
UTILIZING A SENSORY MOTOR INTERVENTION SYSTEM

Key Words
Single Subject Research
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Gifted

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Abstract

A CONTROLLED SINGLE SUBJECT RESEARCH DESIGN UTILIZING A SENSORY MOTOR INTERVENTION SYSTEM

Single subject research is extremely valuable to the specialist because it offers information on how a particular individual responds to a controlled intervention system. Traditional research models and standardized test scores are often not appropriate for the specific and unique problems of exceptional students. The accountability which has always been required for therapeutic and medical interventions is now being demanded within the educational system. For this reason, a controlled single subject research design was utilized to document causal relationships between program interventions and changes in psychomotor abilities.

The purpose of this study was to investigate and record changes in selected skills involving psychomotor output of a male (age 11) gifted student who was experiencing severe motoric problems defined as dysgraphia. A pre-post test design utilizing video-tape evaluation recordings was used to determine changes in psychomotor performance. A Behavioral-Criterion Evaluation Rating Scale was designed for use by a panel of experts to establish a base-line and to determine differences in performance after administration of the sensory motor intervention system. Correlated t tests were applied to factor grouped data as measured by a panel of six raters. The subject improved significantly in body awareness and visual-motor control.

A CONTROLLED SINGLE SUBJECT RESEARCH DESIGN
UTILIZING A SENSORY MOTOR INTERVENTION SYSTEM

Joey Cowden

Traditional research models and standardized tests are often not appropriate for the specific and unique needs of exceptional individuals. Teachers and therapists must often make changes in short-term goals and individual plans based on their daily behavioral and psychomotor observation-evaluations. Due to advocacy and legislation there is a tremendous need within the educational system to document the unique contributions of such professionals who continually provide direct services to individuals. Accountability for psychomotor programs is a constant requirement in public school and residential school settings (Hacker, 1980). For this reason a controlled single-subject research design was used to document relationships between sensory motor program interventions and changes in psychomotor performance.

Single-subject research is extremely valuable to the professional because it offers information on how a particular individual responds to a controlled intervention system (Hacker, 1980). The purpose of this study was to investigate and record changes in psychomotor behavior of a male (age 11) gifted student who was experiencing severe motoric problems. The student had excellent spoken language and could read far above his grade level, but had difficulty with written work. Evaluations indicated abnormal

body tone and postural control. The asymmetrical tonic neck reflex and the tonic labyrinthine reflexes were present. The subject also experienced difficulty with body differentiation, sequence of movements, equilibrium, ocular control, and motor planning. The disorder of visual-motor integration was diagnosed as a degree of dysgraphia (3). The multidisciplinary team of evaluators determined that the subject might benefit from an individualized program for remediation of psychomotor deficits. The subject was placed in the summer school program in which he could receive daily psychomotor instruction from several specialists.

A pre-post test design using video-tape evaluation-recordings was used to determine specific changes in psychomotor performance. A Behavioral-Criterion Rating Scale was designed for use by the panel of six experts to establish a baseline and to determine significant differences in performance after administration of the sensory intervention system (Supplemental Information:13).

Program Rationale

"We function as a sensori-integrative-motor-sensory-feedback system, and with the omission of any component we stop functioning as humans" (Montgomery:1). In the case of dysgraphia, a type of apraxia, the defect is in association or the interaction between systems. From a neurodevelopmental approach, dysfunction in associative fibers going to the motor cortex (left cerebral hemisphere) makes effective motor planning difficult or impossible. It may be advantageous to think in terms of the significance of interneurosensory processes in brain function. For example, in writing

the individual must be able to recall, keep the idea in mind, develop a sequence and plan for the correct placement of the idea on paper. The appropriate motor system must be activated for correct expressive movement. In writing, associations must involve not only the visual system, but the auditory, tactile, kinesthetic, and vestibular modalities. "The fine discriminations, integrations, memory, coordination of hand, mind, and eyes required for the act of writing are infinitely complex" (Johnson:194).

Of particular importance are the reciprocal connections between the vestibular system, the visual modality, the auditory modality, and the cerebellum (Weeks, 1979; Keating, 1979). Erway (1975) has stated that "the vestibular system may be uniquely important among all sensory organs in the development of normal, integrative, functions of the brain, especially the cerebellum." deQuiros stressed the importance of the vestibular modality in relation to writing.

In order to point out the importance of vestibular inputs in reading and in writing, it is sufficient to state that vestibular-oculomotor pathways controlled the skilled movements of the eyes (through extra-oculomotor muscles), which are essential for establishing the correct shape cognition (and, of course, reading) and the correct relationship between motion and space (and, thus, writing) (deQuiros:40).

Ayres (1973) stated that the vestibular system has direct influence on all other sensory input. A brief review of basic neurological organization supports this belief. The receptors for the vestibular modality are located in the inner ear and are composed of the semicircular canals and the otolith

organ (utricle and saccule). The primary function of the semicircular canals is to react to experiences requiring "rate of movement, especially rotary movement or angular acceleration" and the otolith organ responds to "more static position of the head in space and linear motion" (Keating:93). Nerve fibers pass from the receptors to the vestibular nuclei located in the brainstem. The vestibular nuclei function to inhibit and facilitate extensor tone, process information to the cerebellum, and to develop balance and equilibrium reactions. Numerous major neurological tracts relay specific information regarding vestibular functioning from the brain stem to higher cortical areas. Research by Frank and Levinson (1973) indicates that cerebellar-vestibular pathways normally provide experience-feedback which reinforces the development of visual perception skills.

Evaluation of the subject revealed numerous psychomotor difficulties which were related to poor sensory integration. Based on the descriptive-rationale, therapeutic activities were designed to stimulate the sensory modalities to heighten sensitivity and improve motor proficiency.

PROCEDURES

Evaluation

Evaluation of the subject to determine specific needs included several of the Southern California Sensory Integrations Tests, the Developmental Psychomotor Evaluation, Schilder's Arm Extension Test and a Reflex Integration Test. The subject experienced significant difficulties in several sensory modalities with tasks requiring the maintenance of equilibrium, bilateral movements, visual tracking, rhythmical

sequence of movements, and kinesthetic positioning. Clinical observation revealed excessive tension and hypertonicity in most movement activities. He also experienced difficulty assuming antigravity positions. Training activities were designed for stimulation of the following sensory modalities:

- 1) Vestibular, 2) Kinesthetic, 3) Tactile, 4) Visual.

Objectives for Controlled Intervention

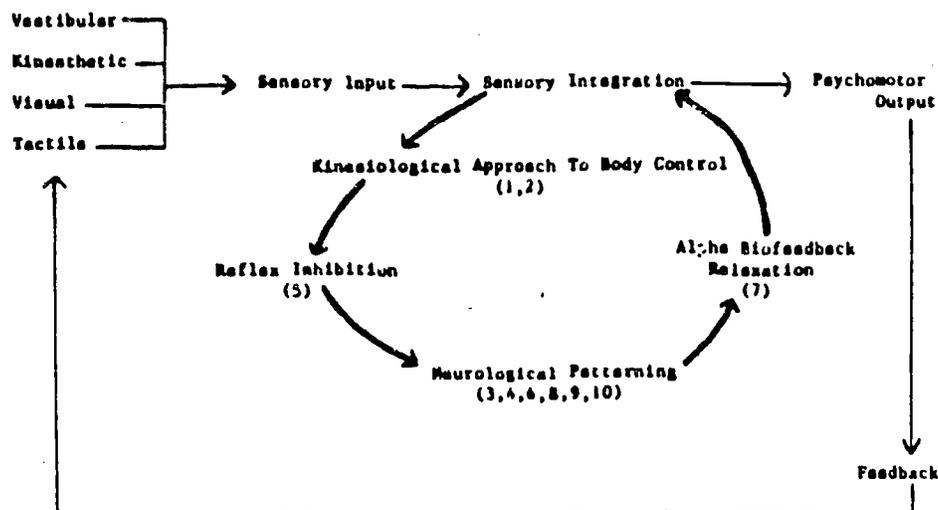
To assist with control of the research the following procedural objectives were designed. The objectives for the sensory intervention program precede the model.

1. Demonstrate the ability to perform a developmental series of flexion-extension exercises as measured by duration and frequency.
2. Demonstrate the ability to perform a developmental series of abduction-adduction exercises as measured by duration and frequency.
3. Demonstrate the ability to perform bilateral tasks without excessive tension and abortive movements as rated by a panel of experts when viewing assessment video-tapes.
4. Demonstrate the ability to visually-track objects (balls, frisbees, ball control/rebound activities--swinging ball tracking)--video-tape rating.
5. Demonstrate the ability to perform equilibrium tasks and reflex inhibition exercises as measured by duration and frequency.
6. Demonstrate the ability to perform fine-motor exercise routines with bilateral control and ease of movement (video-tape rating).

7. Demonstrate the ability to perform a series of relaxation exercises to assist with tension (clinical observation).
8. Demonstrate the ability to perform kinesthetic and temporal spatial activities as prescribed and rated by video-tape rating.
9. Demonstrate the ability to perform tactile functions requiring motor planning and gross discriminative sensations (video-tape rating).
10. Demonstrate the ability to perform selected gross motor tasks with efficient upper body differentiation, total postural control, maintenance of sequence/pattern, and maintenance of equilibrium (video-tape rating).

The procedural model was designed to show the relationship of specific objectives to stages of neurological organization. It is very important for the specialist providing program development to relate activities to sensory input. Too often psychomotor change is only based on output, with little attention directed to specialized sensory needs.

Table 1

SYSTEMATIC INTERVENTION MODEL

In general, the intervention system included the following sensory activities. Specialists listed each daily activity on a monitor chart in order to provide control of the sensory interventions and repeated measurements of behavior.

Table 2

Vestibular Training

Developmental Gymnastics
 Trampoline
 Scooter Board
 Cargo Net
 Reflex Inhibition
 Coffee grinder
 TNR leaning
 Springboard
 Incline Mat
 Rocking Boards
 Barrel rolling and balancing

Tactile Training

Texture Interpretation
 Object Interpretation
 Discriminative Tactile Func.
 (Talcum powder, shaving cream)
 Manipulative Control
 (Bead stringing, pegboards)
 Fine Motor Planning
 (Line tracing, design copy)

Instrumentation

To establish a baseline and determine differences in performance of the subject, the Behavioral-Criterion Rating Scale was developed (Supplementary Information:13). Observable criteria such as body tone, head positioning, body differentiation, equilibrium and postural control,

Kinesthetic Training

Imitation of Movements
 Bilateral & Cross Lateral Patterning
 Abduction--Flexion Positioning
 Abduction--Extension Positioning
 Body Differentiation
 Relaxation and Tension Control
 Blindfold Exercises
 Cocontraction of Muscle Groups

Visual Training

Swinging Ball Exercises
 Flashlight Tracking
 Object Manipulation
 Tracing Exercises
 Games for Fine Motor Control
 (Pick-up-sticks, jacks)

maintenance of a pattern and sequence of movements, rhythm, and kinesthetic positioning were examined to determine adequate analysis of psychomotor skills. The scale was designed to determine improved neuromuscular efficiency by utilizing observable characteristics.

METHOD

Design

A pre-post test design was used to determine the effects of the six week controlled sensory intervention system. Pre-post video-tape evaluation recordings were viewed and rated by a panel of experts (Certified Adapted and Developmental Physical Educators, Registered Occupational Therapists, Licensed Physical Therapists). Each individual rated observable behavior on the Sensory-Criterion Rating Scale. The twenty categories were then collapsed into five subgroups according to psychomotor task specialization. Correlated t tests comparing the means of the six raters on the pretest to the means of the same raters on the posttest for each subgroup were then calculated. For the purposes of this study, only two time interval video tape recordings were made.

Each factor group included the following psychomotor tasks:

Group I, Locomotion

Running, Two-foot jumping, Hopping, Skipping

Group II, Balance

One foot balance--preferred foot, eyes open
 One foot balance--preferred foot, eyes closed
 Heel-to-toe walk
 Balance Beam--low--4" width
 Schilders Arm Extension Test

Group III, Body Awareness

Jumping jacks
Angels-in-the-Snow
Jump rope

Group IV, Visual Motor Control

Running catch
Toss and catch
Visual motor ball control
Batting
Visual Tracking and Ocular Control
Chalkboard Routines

Group V, Reflex Integration

Asymmetrical Tonic Neck
Tonic Labyrinthine

Results and Discussion

The results of the correlated t tests on the pretest and posttest data from the six raters on the Sensory Intervention Criterion Rating Scale are presented in Table 3. The Statistical Package for the Social Sciences (SPSS) was used to analyze the data.

Table 3

CORRELATED t TESTS FOR DIFFERENCES IN THE PRETEST AND
POSTTEST RATINGS OF VARIABLES IN THE SENSORY CRITERION RATING SCALE

Variable	d f	Mean Difference	s d	s e	t value
Locomotor	5	6.67	9.7	3.97	1.68
Balance	5	1.67	4.8	1.98	.84
Body Awareness	5	4.66	3.5	1.45	3.21 *
Visual Motor Control	5	14.5	2.3	.92	15.73 *
Reflex Integration	5	1.0	2.1	.89	1.12

$t=3.21, df=5, (p < .05)$

The t value of 3.21 for body awareness and 15.73 for visual motor control were significant at the .05 level. Comments made by the panel of raters particularly support the changes in body awareness (Jumping jacks, Angels-in-the-Snow and Jump rope). From the video tape viewings, raters agreed that the subject had greatly improved in rhythm and bilateral sequence of movements. Neuromuscular overflow and tension were decreased allowing for better overall postural control.

It was also noted by the panel that large muscle visual-motor skills greatly improved (running catch, toss and catch, and ball control). Raters noted that the subject appeared to have smoother and more efficient movement patterns. Other notations from the panel indicated that, with improved left-right orientation and body differentiation, the subject demonstrated less midline difficulty while performing ocular tasks.

From verbal and written comments by the panel, it was surprising that balance factors were not significant. Overall improvement in equilibrium and postural control were obvious in several locomotor movements such as hopping and skipping. However, one should note the higher standard error of the mean on locomotor factors indicating a greater range in the scores of the raters. This could possibly be due to the difference in scientific training of the disciplines on critical analysis of movement patterns.

Noticeable differences were observed on scooter board performance regarding the tonic labyrinthine reflex. Flexor-adduction posture was also noticeably improved. Perhaps the reflex integration factors should have been statistically computed separately.

Conclusions

The multidisciplinary team recommended that the Sensory Intervention System be continued during the full school term, allowing a longer period of time for improvement in the subject's psychomotor performance. It was also determined that, although the subject was considered a gifted student academically, his motoric problems were significant and specialists could justify time to provide services.

Much research is needed regarding controlled single-subject designs. However, with emphasis on accountability, single-subject designs may be extremely valuable for legal documentation of services provided to exceptional individuals. It offers practical information about how a subject responds to a controlled intervention. This information may be more practical for the teacher rather than statistical averages of group study.

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SENSORY INTERVENTION CRITERION RATING SCALE

Selected psychomotor developmental and evaluation tasks are listed in the left column with observational-analysis characteristics for each. In the right column a descriptive rating scale of 1-3 is provided. Each professional expert should record a score for each item. No item should be omitted. If a rater notes an observable characteristic that is significant but not included on the scale, please make record on the back of the sheet.

Criterion Rating Scale

- 1= Poor Skill appears very weak. The student would benefit from sensory motor programming.
- 2= Fair Performed the skill, but was slightly awkward. (Didn't make required length of time, distance, etc.)
- 3= Adequate Student performed skill adequate for his age. Sensory motor programming is not considered necessary.

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3

1. Running

Description: Periods of nonsupport with arms in opposition to legs.

Observational Characteristics:

Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity

Head positioning

Arms/upper body differentiation

Total body postural control

Maintenance of pattern/sequence

Maintained equilibrium

2. Two Foot Jumping

Description: 15 consecutive jumps landing on both feet simultaneously.

Observational Characteristics:

Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity

Head positioning

Arms/upper body differentiation

Total body postural control

Maintenance of pattern/sequence

Maintained equilibrium

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3
3. <u>One Foot Balance-Preferred Foot</u>			
Description: Position should be maintained for 15 seconds with eyes open.			
Observational Characteristics:			
Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity	_____	_____	_____
Head positioning	_____	_____	_____
Arms/upper body differentiation	_____	_____	_____
Total body postural control	_____	_____	_____
Maintenance of pattern/sequence	_____	_____	_____
Maintained equilibrium	_____	_____	_____
4. <u>One Foot Balance-Preferred Foot</u>			
Description: Position should be maintained for 10 seconds with eyes closed.			
Observational Characteristics:			
Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity	_____	_____	_____
Head positioning	_____	_____	_____
Arms/upper body differentiation	_____	_____	_____
Total body postural control	_____	_____	_____
Maintenance of pattern/sequence	_____	_____	_____
Maintained equilibrium	_____	_____	_____

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3
5. <u>Hopping-Preferred Foot</u>			
Description: Executes sequence of 3R, 4L, 3R, 4L, 3R, 4L, 3R, 4L and maintains balance.			
Observational Characteristics:			
Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity	_____	_____	_____
Head positioning	_____	_____	_____
Arms/upper body differentiation	_____	_____	_____
Total body postural control	_____	_____	_____
Maintenance of pattern/sequence	_____	_____	_____
Maintained equilibrium	_____	_____	_____
6. <u>Skipping</u>			
Description: Alternate foot pattern			
Observational Characteristics:			
Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity	_____	_____	_____
Head positioning	_____	_____	_____
Arms/upper body differentiation	_____	_____	_____
Total body postural control	_____	_____	_____
Maintenance of pattern/sequence	_____	_____	_____
Maintained equilibrium	_____	_____	_____

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3

7. Heel-To-Toe-Walk

Description: Completion of 10 steps with heel to toe pattern on 1" line

Observational Characteristics:

Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity

Head positioning

Arms/upper body differentiation

Total body postural control

Maintenance of pattern/sequence

Maintained equilibrium

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

8. Balance Beam-low 4" beam

Description: Overall rating based on three performance skills on the beam- Alternate foot pattern forward without stepping from beam, alternate foot pattern backwards, alternate foot pattern forward kneeling in center and continue to end of beam

Observational Characteristics:

Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity

Head positioning
(Maintaining focus on visual target)

Arms/upper body differentiation

Total body postural control

Maintenance of pattern/sequence

Maintained equilibrium

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3
9. <u>Jumping Jack Pattern</u>			
Description: Performs 20 jumping jacks coordinating bilateral action of arms and legs- eyes open			
Observational Characteristics:			
Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity	_____	_____	_____
Head positioning	_____	_____	_____
Maintained bilateral action of arms and legs	_____	_____	_____
Maintained pattern/sequence	_____	_____	_____
Maintained body control and equilibrium	_____	_____	_____
10. <u>Jump Rope</u>			
Description: Overall rating based on three performance skills with rope- jump rope forward in place with alternate foot pattern 10 times, jump rope forward in place with two foot pattern 10 times, jump rope backwards 10 times.			
Observational Characteristics:			
Body tone-Smooth muscle tone with no presence of excessive rigidity or hypertonicity	_____	_____	_____
Bilateral action of arms	_____	_____	_____
Appropriate leg action for task	_____	_____	_____
Total body postural control	_____	_____	_____
Maintenance of pattern/sequence	_____	_____	_____

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3
11. <u>Angel in the Snow Pattern</u>			
Description: Performs sequence of bilateral and cross lateral movements with arms and legs			
Observational Characteristics:			
Smooth movement of arms and legs with no jerky or abortive movements	_____	_____	_____
Kinesthetic positioning of arms to shoulder level	_____	_____	_____
Performed bilateral and cross-lateral pattern according to directions	_____	_____	_____
Left-right orientation	_____	_____	_____
12. <u>Running Catch</u>			
Description: Runs forward for a distance of 15 yards, turns and catches a thrown ball-3/5 times			
Observational Characteristics:			
Visually tracks ball	_____	_____	_____
Appropriate temporal-spatial timing to attempt catch	_____	_____	_____
Runs described pass pattern	_____	_____	_____
Catches ball 3/5 times	_____	_____	_____
Maintains body postural control while running pattern and catching projected ball	_____	_____	_____

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3
13. <u>Toss and Catch</u>			
Description: Tosses tennis ball to height of 24" above his head and catches with same hand-10 times and tosses as described and catches with other hand-10 times			
Observational Characteristics:			
Body tone-No presence of hypertonicity or rigidity	_____	_____	_____
Head positioning (Maintained focus on visual target)	_____	_____	_____
Maintained pattern as described	_____	_____	_____
Total body postural control	_____	_____	_____
Arms/upper body differentiation	_____	_____	_____
Rhythmical timing of sequence	_____	_____	_____
14. <u>Batting</u>			
Description: Strikes a softball projected within striking distance 7/10 times			
Observational Characteristics:			
Completion of task as described	_____	_____	_____
Ball hit firmly and in the direction of a regulation softball diamond	_____	_____	_____
Swings bat appropriate to speed of the ball-temporal spatial relationships	_____	_____	_____
Total body postural control	_____	_____	_____
Maintained equilibrium	_____	_____	_____

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3
15. <u>Visual-Motor Ball Control</u>			
Description: Overall rating of running dribble and standing and kneeling ball control while maintaining visual focus on wall target			
Observational Characteristics:			
Head positioning- maintained visual focus on wall target	_____	_____	_____
Maintained control of ball in various positions	_____	_____	_____
Body tone- Smooth muscle tone with no presence of excessive rigidity or hypertonicity	_____	_____	_____
Arms/upper body differentiation and midline task	_____	_____	_____
16. <u>Visual Tracking and Ocular Control</u>			
Description: Vertical and horizontal tracking of mars ball			
Observational Characteristics:			
Head positioning	_____	_____	_____
Smooth eye movements	_____	_____	_____
Focusing (Blinking, Squinting)	_____	_____	_____
Crosses midline smoothly	_____	_____	_____
Maintains tracking	_____	_____	_____

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3

17. Chalkboard Routines

Description: Overall rating of bilateral and midline tasks during chalkboard routines as demonstrated-bilateral line reproduction, bilateral circle reproduction, midline test.

Observational Characteristics:

Maintenance of patterns	_____	_____	_____
Smooth bilateral usage of hands	_____	_____	_____
Crosses midline smoothly	_____	_____	_____
Body tone-No presence of excessive rigidity	_____	_____	_____
Head positioning (maintain focus without excessive rotation of head)	_____	_____	_____

18. Tonic Neck Reflex

Description: Quadruped position- Examiner turns head from side to side. Note flexion of arm contralateral to face side.

Observational Characteristics:

Integrated tonic neck reflex	_____	_____	_____
No passive resistance noted during turning of head	_____	_____	_____

SENSORY INTERVENTION CRITERION RATING SCALE

Psychomotor Task Description of Task Observational Characteristics	Criterion Rating Scale		
	Poor 1	Fair 2	Adequate 3

19. Tonic Labyrinthine Reflex

Description: Maintenance of extensor-abduction posture in supine position and flexor-adduction posture in prone position

Observational Characteristics:

Maintained extensor-abduction posture for 30 seconds

Maintained flexor-adduction posture for 30 seconds

Scoter board posture and extensor tone indicates integrated TLR

Head positioning

Body Strength

20. Schilder's Arm Extension Test

Description: Student stands with feet together and eyes closed. His arms are outstretched parallel to the ground and not touching the other. Fingers abducted. Examiner turns head from side to side.

Observational Characteristics:

Head positioning-freedom of movement

Noticeable change in parallel arm position

Maintenance of equilibrium

Body tone-No presence of excessive rigidity
