Every Brain is Different: How to Help Children with Dysgraphia



Jenny L. Clark, OTR/L

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• Financial:

- Receive royalties from AAPC for published books
- Receive royalties from Therapro & School Specialty for products
- Receive royalties from Medbridge, Summit, Vyne Education/PESI for recorded continuing education trainings
- Nonfinancial:
 - None

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About Me







Course Objectives

- Discuss evidence-based neurological characteristics of dysgraphia and the statistical impact dysgraphia has on a child's functional performance in school.
- Select specific assessment tools to ascertain dysgraphia indicators and differentiate three types of dysgraphia; dyslexic dysgraphia, motor dysgraphia, and spatial dysgraphia.
- Develop practical compensatory strategies and interventions for children with dysgraphia to improve productive handwriting skills.

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Daniel



Dysgraphia





- Bright child with brilliant ideas
- Fast thinker, slow writing, poor spelling
- Dysgraphia symptoms:
- Writing letters backward, upside down, poor line placement, irregular letter sizes, inaccurate spacing

• **Definition:** A neurological disorder in which a person experiences writing difficulties.

Dysgraphia: Connections, Causes, and Cures (Sutherland 2012)

 "Dysgraphia is a learning disability that affects how easily children acquire written language and how well they use written language to express their thoughts"

Write Ways by Zobel-Lachuisa & Pierce, 2011. OT Practice

Video Daniel as Kid

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Know the Facts!

- Functional importance of writing:
 - Complete homework, school assignments, achievement tests for getting into college
 - Writing letters, emails, complete job application form, write checks
- Handwriting mastery is linked to compositional fluency and success. (Graham, Harris, & Fink, 2000)

Know the Facts!

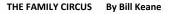


- 10%-20% of school-age children have problems with handwriting (Graham, Harris, & Larson, 2001)
- Illegible handwriting is the most common reason for OT referral in schools (Asher, 2006)
- The energy investment in orthographic motor processing contributes to a student having difficulty thinking about the writing content, causing increased fatigue & frustration (Rosenblum, 2016)

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"Could I have a different pencil to write with? This one won't stay on the lines."

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Know the Facts!



- Handwriting and Common Core State Standards: Teacher, Occupational Therapist, and Administrator Perceptions From New York State Public Schools (Collette, et.al., 2017)
- Results: After Common Core was initiated, there has been a decrease in handwriting instruction time and inconsistent use of handwriting instructional programs in the classroom
- Handwriting should be considered as a greater component in the foundational standards in Common Core with OT supporting handwriting instruction

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Signs & Symptoms of Dysgraphia

The Source for Dyslexia and Dysgraphia (Richards, 1999)

http://www.linguisystems.com/sample1/31716.pdf

- Cramped fingers on writing tool causing hand fatigue
- Odd wrist, body, paper position
- Excessive erasures
- Mixture of upper & lowercase letters
- Inconsistent letter formation & slant

Signs & Symptoms of Dysgraphia

The Source for Dyslexia and Dysgraphia (Richards, 1999)

- •Irregular letter sizes & shapes
- Misuse of line & margin
- Poor organization on the page
- Inefficient speed in copying
- Decreased/excessive speed when writing

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Signs & Symptoms of Dysgraphia The Source for Dyslexia and Dysgraphia (Richards, 1999)

- Inattentiveness about details
- Slow implementation of verbal directions that involve sequencing & planning
- Frequent need for verbal cues & use of subvocalizations
- Heavy reliance on vision to monitor what the hand is doing during writing

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Other Symptoms of Dysgraphia



- Letter reversals (reversing direction letter faces)
- Letter inversion (upside down letters)
- Transposition (sequence of letters in a word out of order)
- Handwriting does not reflect knowledge or cognitive ability (ie. Short answers, simple vocabulary)
- Verbal descriptions are complex

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Underlying Causes of Dysgraphia

- 1. Delayed motor skills
- 2. Faulty visual perception of letters & words
- 3. Decrease visual memory
- 4. Problem with cross-modal transfer from visual to motor

Underlying Causes of Dysgraphia

- Studies indicate students with dysgraphia often have sequencing problems (reversing letters/numbers, writing backwards, writing letters out of order)
- Delayed auditory or language processing

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Impacts in School





3 Types of Dysgraphia



- Interferes with ability to express ideas on paper
- Affects organization skills & attention
- Causes low classroom productivity & incomplete homework assignments
- Emotional factors: Because these students are bright they are often labeled "lazy", recess is withheld, asked to re-copy or finish assignments, even though the result is relatively the same

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- Dyslexic Dysgraphia
- Motor Dysgraphia
- Spatial Dysgraphia

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Identifying Dyslexic Dysgraphia

- Writes illegibly with mistakes from dictation due to spelling & punctuation errors
- Writes legibly & normal speed when copying
- Difficulties with reading & spelling that contribute to poor handwriting
- Poor oral spelling
- Normal drawing
- Normal finger-thumb touching

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Identifying Motor Dysgraphia

- Illegible handwriting due to delayed motor skills & decreased muscle tone
- Few spelling errors
- Good verbal skills
- Good readers
- Good oral spelling
- Poor drawing
- Slow finger-thumb touching

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Identifying Spatial Dysgraphia

- Poor spatial planning when writing letters; floating, off baseline, misaligned, poor spacing b/w letters/words
- Good spelling
- · Normal writing speed
- Unable to write legibly from dictation and copying
- Illegible handwriting with both composed text and copied text
- · Good oral spelling
- Poor drawing
- Normal finger-thumb touching

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Areas to Assess



- 1. Ayres Clinical Observations
- 2. Fine Motor
- 3. Visual Motor
- 4. Visual Perception
- 5. Sensory/praxis
- 6. Handwriting Tests



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Clinical Observations

- Posture muscle strengthsupine flexion/prone extension
- Muscle tone
- Hand dominance Right/Left
- •Pencil pressure Heavy/Light?
- Ocular motor control
 - Pursuits & Convergence

Clinical Observations



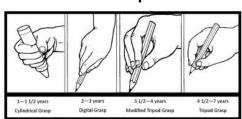
- Finger-thumb touching eyes open/closed
- Pencil grasp efficient/inefficient
- GoodEnough-Harris Draw-A-Person Test
- Primitive Reflexes ATNR & STNR

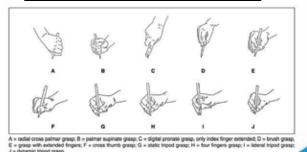
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Finger-Thumb Touching We have the second of the second of

Pencil Grasp





Goodenough-Harris Draw-A-Person Test

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- Originally developed 1926 to measure intelligence
- http://www.pearsonassessment s.com/HAIWEB/Cultures/en-us/ Productdetail.htm?Pid=015-808 3-415 (1988 version)
- The examiner asks child to draw a man. Child receives 1 point for each item present in drawing.
 For each 4 points, 1 year is added to the basal age which is 3 years.

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Possible Indications of Retained ATNR

- Difficulty with visual tracking and crossing the mid-line
- Easily losing their place when reading
- Problems with attention skills
- Poor eye teaming
- Illegible handwriting

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Possible Indications of Retained ATNR

- Difficulty with spelling
- Poor eye-hand coordination
- Difficulty with bilateral coordination
- Directional confusion with left/right

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Possible Indications of a Retained STNR



- Poor posture; tendency to slump when sitting, particularly at a desk
- ·Slow at copying from blackboard
- Poor hand-eye coordination
- Clumsy
- Problem catching balls
- Messy eating

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Standardized Assessments

- BOT-2
 - Fine, visual, & gross motor skills
- Beery VMI-6
 - Visual motor integration, VP, FM
- MVPT-4/TVPS-4
 - VD, VM, VSR, VFC, VSM, VFG, VC
- Jordan Left/Right Reversal Test 3
 - Letter/number/word visual reversals

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- The Print Tool www.LWTears.com
 - Capitals, numbers, lowercase letter skills; evaluate memory, orientation, placement, size, start, sequence, control, and spacing
- Evaluation Tool of Children's Handwriting (ETCH)
 - Research: ETCH is reliable & valid (Duff & Goyen, 2010
 - Book: *Trics for Written Communication* Susan Amundson, OTR/L

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School Observations

OT observations in the classroom:

- Desk/chair height
- Desk placement in classroom
- Handwriting paper/pencil grasp
- Organization of workspace
- Attention
- Other

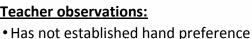
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Compensatory Strategies

- Optimal body position
 - **Research:** Body position in desk/chair effects handwriting legibility. Rosenblum, et al 2006)
- Non-sitting positions
 - Tall or half kneeling
 - Prone or side lying on floor
 - Standing (Mayo clinic studies)
- Spacers
 - Sticky note

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- Holds pencil or crayon incorrectly
- Has difficulty stabilizing paper when writing
- Does not keep letters on baseline when writing
- Maintains poor spacing between words/letters
- Makes letter reversals (typical through 1st gr)

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Compensatory Strategies

- Ball chairs
 - Research: Students with ADHD attend to task better when sitting on a ball chair vs chair. (Schilling, et al 2003)
- Air filled cushions
 - Research: Effectiveness of disc 'o' sit cushions on attention to task in second-grade students with attention difficulties. (Pfieffer, et al 2008)



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Compensatory Strategies

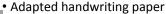






• Pencil grippers

- Slant board
- Research: Short writing tools combined with vertical surface influence grasp of young children (Yakimishyn, Magill-Evanns, 2002)



• LWT, www.Brightlines.com, raised line paper

Write Ways No-Tech, Low-Tech, High-Tech Tools for Teaching Students with Handwriting Difficulty (Zobel-Lachiusa & Pierce, 2011 OT Practice)



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No-Tech Tools

- Extra time
- Shortened written assignments
- Alternate test format
- Alternate assignments
- Peer support
- Body position (Motor dysgraphia)



Low-Tech Tools



- Electronic aids
 - Dictionary app
 - · Record assignments
- Motor Dysgraphia:
- Positioning Tools (slanted surface)
- Writing Tools (pencil grip)
- Spatial Dysgraphia:
- Adapted handwriting paper
 - Highlight writing line
 - Raised Line paper
 - Graph paper

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High-Tech Tools Apps



High-Tech Tools Apps



- https://apps.apple.com/us/app/little-writer-the-tracing-a pp-for-kids/id515890480
 - This app adds shapes and numbers to the usual letter and word practice
- https://www.letterschool.org/
 - LetterSchool is a colorful handwriting app that is going to capture your child's attention in an instant
- http://www.snaptypeapp.com/
 - complete school worksheet on ipad or tablet

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- http://www.modmath.com/
 - free ipad app that helps students with dysgraphia with math
- http://apps.essare.net/app/ready-to-print//
 - Ready to Print is a tool for parents, therapists and educators to help teach pre-writing skills to children aged 2-7. It was created by an Occupational Therapist to help build a strong foundation for beginning printers.
 Available for iPad, Android Tablet, and Kindle Tablet

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High-Tech Tools

- Word processor
- Portable keyboard (Neo 2)
- Specialized software
 - Dragon Naturally Speaking
 - Solo 6
 - http://www.inspiration.com/
- www.closingthegap.com
 - Up to date info in assistive technology

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Accommodations & Modifications for students with Dysgraphia



- http://www.resourceroom.net/readspell/dysgraphia.asp
- Accommodate reduce the impact that writing has on learning or expressing knowledge

Modify - change the assignments or expectations to meet the student's individual needs for learning

Remediate - provide instruction and opportunity for improving handwriting

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Accommodations & Modifications for students with Dysgraphia

- When considering accommodating or modifying expectations to deal with dysgraphia, consider changes in:
- 1. the rate of producing written work
- 2. the volume of the work to be produced
- 3. the complexity of the writing task
- 4. the **tools** used to produce the written product
- 5. the format of the product.

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Accommodate

- Change demands of writing rate
 - Allow more time for written tasks
- Change volume
 - Reduce copying by providing math worksheet with problems written
- Change complexity
 - Provide a binder with alphabet strip for student to reference
- · Change tools
 - Graph paper for math problems, pencil grippers, adapted paper
- Change format
 - Do not grade spelling on some assignments

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Modifications

- Adjust volume
 - Reduce length of written assignments
- Change complexity
 - Cooperative writing projects each student has a role
- Change the format
 - Offer oral report in place of written report

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Remedial Activities

- Theraputty Exercises
- Kinesthetic activities for handwriting (ie shaving cream, paint with water on sidewalk, write on aluminum foil, etc.)
- https://www.jennylclark.com/free-ebook/

Research: Kinesthetic handwriting intervention effective in improving skills of students with handwriting challenges (Roberts, et al. 2010, AJOT)

- Fine & visual motor, visual perceptual games
- 'bed' trick
- Adapted Handwriting Curriculum



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Adapted Handwriting Programs



- Handwriting Without Tears'
- Research: Significant improvement in prewriting & fine motor skills (Lust, et al. 2011, AJOT)
- Write Start Program http://write-start-handwriting.org/
 - Research: Gains in handwriting legibility, speed, fluency. (Case-Smith et al. 2011, AJOT)
 - Research: Students who completed the Write Start program improved more in handwriting legibility, writing fluency, legibility, and speed than the group receiving standard instruction. (Case-Smith, et al 2014)

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Adapted Handwriting Programs



- Big Strokes for Little Folks (Rubell)
- Loops & Other Groups (Benbow)
- www.callirobics.com

Research: Co-teaching handwriting program effective for improving legibility (Case-Smith, et. Al 2012, AJOT)

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Remedial Activities

- Letter Treasure Hunt by Jenny L. Clark, OTR/L
- Reversals and Rotations Carol M. Burton
- A Sense of Direction by Laura Sena
- Action-Based Learning www.abllab.com

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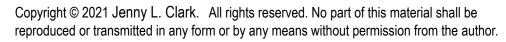
Letter Treasure Hunt game



- Developed by Jenny L. Clark, OTR/L, BCP
- Published by www.therapro.com April 2014
- Letter Treasure Hunt is a handwriting adventure game!
 Pirates practice legible handwriting skills while engaging in physical activity for motor & sensory preparation.
 Arrgh!
- Letter Treasure Hunt also helps with learning skills, such as letter recognition, reading, & spelling
- Facebook page

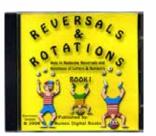


Letter Treasure Hunt Video – Let's Play!





Reversals and Rotations by Carol M. Burton

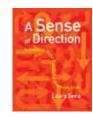


 Published by Burton Digital Books (2006)



A Sense of Direction
Activities to Build Functional Directional
Skills





- Pro-ed (1999) By Laura Sena
- 40 lessons developmentally sequenced for ages 5-12
- Learn body awareness & directional concepts
 - Left/Right
 - Forward/Backward
 - Up/Down

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Action-Based Learning™ www.abllab.com

- Action Based Learning™ Lab is a kinesthetic teaching strategy
- Links movement/physical activity to academic performance
- Series of stations designed to prepare the brain for processing
- Helps develop balance, coordination, spatial awareness, directionality, & visual tracking

Complimentary Sensory-Based Intervention Programs



- Speed Stacks <u>www.speedstacks.com</u>
- Therapeutic Listening www.vitallinks.net
- Brain Gym www.braingym.org
- S'cool Moves www.schoolmoves.com

www.JennyLClark.com

Therapro

www.JennyLClark.com

www.Speedstacks.com

1-877-GOT-CUPS Sport Stacking with Speed Stacks





- Developed by Bob Fox
- Upstack & downstack specially designed cups
- Develops eye-hand coordination, bilateral coordination, reaction time, laterality, focusing skills, self-esteem



- Dr Hart Texas Tech University examined electrical activity of 2 hemispheres of brain (EEG) results indicate sport stacking uses both sides of the brain
- Dr. Udermann & Dr. Murray examined sport stacking on hand-eye coordination & reaction time of 24 boys & 18 girls in 2nd grade. Significant improvements were notes for both. (results published in Perceptual and Motor Skills and Research







Therapeutic Listening

www.vitallinks.net

- Evidence-based auditory intervention tool
 - Research: The Effect of Sound-Based Intervention on Children With Sensory Processing Disorders and Visual-Motor Delays (Hal & Case-Smith 2007)
 - Results: Participants demonstrated significant improvement on Sensory Profile w/ parents reporting improved behavior and VMI scores and ETCH legibility improved during therapeutic listening phase.
- Electronically modulated music that highlights parts of sound spectrum that naturally triggers attention & activates body movement. Listen 30 minutes 2x per day at least 3 hours apart
- Improves focusing, attention, noise tolerance, sleep, handwriting, and decreases anxiety

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Therapeutic Listening Case Example

Case study: Boy 3yrs 9 mo. After 6 months of OT with TL

Music with most positive effect: 1. Rhythm & Rhyme- better play, hugging more, less upset when would drop something or hear loud sound, FIRST time commented on SMELL of something 2. Mozart Modulation- very good- little humming, less toe walking, waving at people, pointing out and then talking about things when driving in car and at home.



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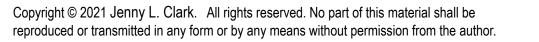
Brain Gym® www.braingym.org



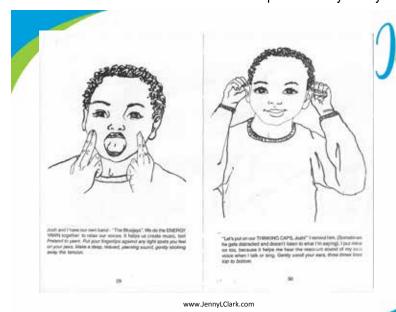
- change to Brain Gym International 2000
- 26 Brain Gym activities that mimic natural movements during the first years of life
 - · Lazy 8's, Thinking caps, neck rolls, rocker, belly breathing, energizer, owl, arm activation, footflex, calf pump, gravity glider, grounder, Bluejays



- Brain Gym program is evidence-based and refers to:
 - Educational model of honoring the individual
 - Value of goal setting & noticing
 - Importance of movement as it relates to optimal learning & living







www.schoolmoves.com

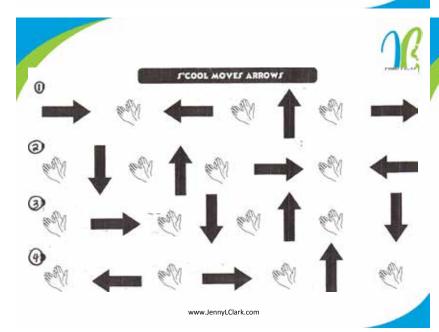


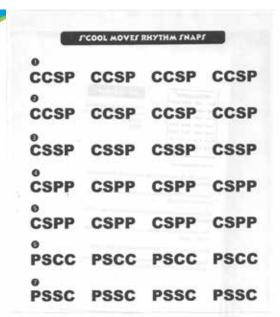
- Developed by Debra Wilson, teacher
- S'cool Moves for Learning
- Integrates Movement, Music and learning
 - Includes sensory, posture, balance, body image, laterality, eye-hand coordination, ocular motor
- Aligns with Common Core State Standards, supports RtI, Evidence-Based
- Minute Moves for the Classroom (Tier 1 lg grp & Tier 2 sm grp)



• Poster P.E. (motor groups, APE, SPED)

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Remedial Activities

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Remedial Activities



- Motivation: Make handwriting fun and purposeful!
- Address self-esteem: praise, reward charts
- Improve activity level & attention with meaning
 - Write @ pics cut from kid magazines
 - Free things for kids to write away for

http://www.books4you.addr.com/350FreeThingsForKids.html

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- Ocular Tracking
- Muscle strength & FM warmups to handwriting
- Handwriting check-up form
- "Writer's License"

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Ocular Tracking

- http://eyecanlearn.com/
- https://eyesontrack.com/

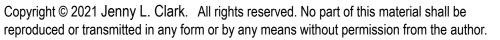


Muscle Strength & FM Warmups to Handwriting



- Spider Push-Ups
- Penny In-Hand Manipulation
- Making Pancakes
- Disappearing Desk
- Chair Push-Ups
- Finger Squeezes
- Finger Pulls
- Milking Cow

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Handwriting Check-Up for student self feedback



Writer's License Driven to Success



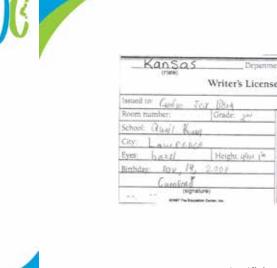
- 1. My spacing is correct. Yes/No
- 2. My letters are correct size. Yes/No
- 3. My letters are on the line. Yes/No
- 4. My letters forms are correct. Yes/No
- 5. My handwriting is readable. Yes/No

- Teach students that writing is like driving a car. You have to learn to:
 - Steer a pencil
 - Stay in the lines
 - Make correct turns
 - Maintain a safe distance between words
 - Come to a stop at end of sentence.

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Case Examples

- "Children are aware of their handwriting deficits and are able to report them. Children's reports may contribute to the identification of dysgraphia and facilitate their participation in OT intervention and in class." (Engel-Yeger, et al. 2009, AJOT)
- Programs with the best outcomes are structured, concentrated, repetitive, and designed or implemented by an OT. (Hasenauer & Greiner, 2018)
- Low-intensity, high-frequency, short-duration handwriting intervention may be effective for children with below-average handwriting. (Brevoort, 2018)

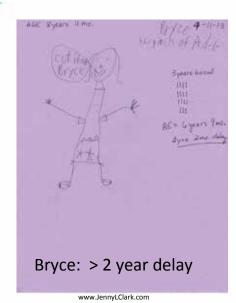
Bryce 3rd grade Boy Motor Dysgraphia



- BOT-2 Sept. 2012 Fine motor precision Scaled Score=8 (below average)
- Dysgraphia checklist
- ETCH
- Draw a person (Delayed 2 yrs 2 mo.)
- Slow & uncoordinated fm movements, verbally adept, skillful reader, good oral spelling, messy drawing, slow finger tapping



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mariocart and 5+115+ water day Biggames

Handwriting sample before OT July 11, 2012

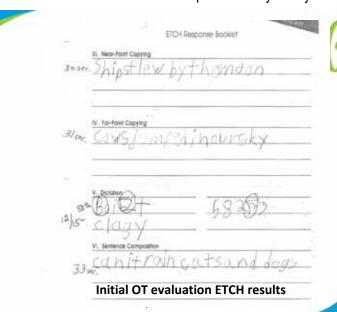
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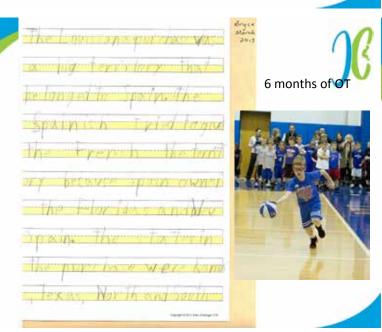
Therapeutic Intervention

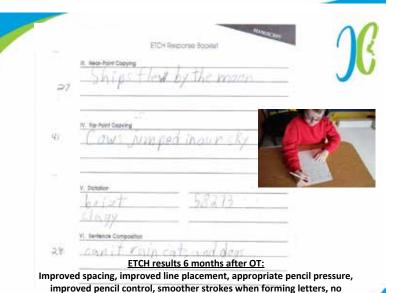
- Therapy: Sensory, motor planning, Therapeutic Listening, bilateral coordination, Speedstacks_{tm}, School Moves, fine motor, handwriting game/kinesthetic
- School accommodations: Movin' sit cushion, slant board, yellow highlight paper











evidence of reversal errors, faster speed, smaller letter sizes.



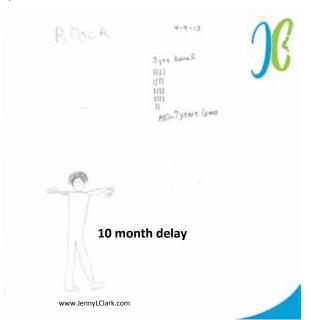


Brock 2nd grade Boy Spatial Dysgraphia



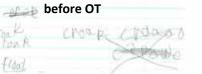
- Illegible handwriting with composition & copied text
- Good oral spelling
- Poor drawing (Draw-A-Man test 10 month delay)
- Normal finger-thumb tapping
- Normal writing speed (30 LPM)
- Poor spatial planning when writing; misaligned, floating, off baseline
- Has an IEP at school

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Classroom handwriting sample

fidal



Rhall





Therapeutic Intervention



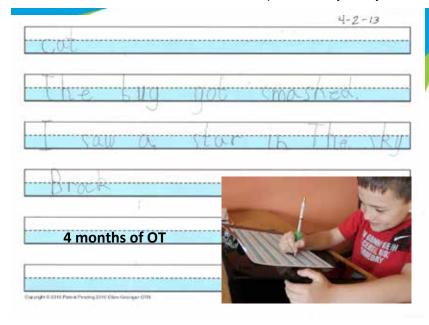
- Vestibular/proprioception
- School moves
- Therapeutic Listening
- Home ocular motor
- Visual perception activities
- Fun Handwriting activities



- School Accommodations:
- · Movin' sit cushion, blue raised-line paper, tactile pencil grip

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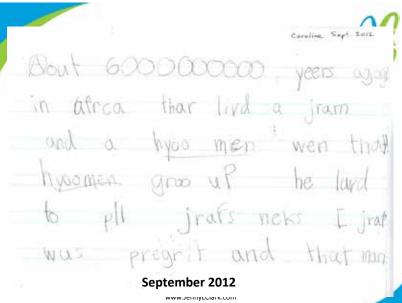


Caroline 2nd grade Girl Dyslexic Dysgraphia



- Poor reading & spelling
- Good motor control BOT-2 results average range
- Poor letter formation, spacing, line placement
- Copy text ok, composing text poor
- Above average drawing skills
- Finger tapping normal
- Dysgraphia checklist

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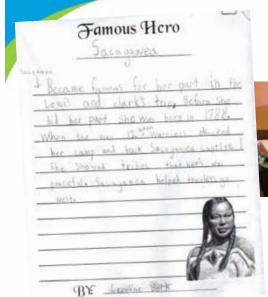
Therapeutic Intervention



- Swings for vestibular over responsivity
- Proprioception; Trampoline, ball pit, yoga, thera-putty; (helped decrease tight grip and heavy pencil pressure)
- Ocular motor (vision therapy)
- Jump & spell
- Reversals & Rotations
- <u>School accommodations</u>: Slant board, pencil grip, extra time on written assignments

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Therapro













OG



"You must be the change you want to see in the world"

Mahatma Gandhi

Questions?

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