Dysgraphia 101
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This is your Brain Reading and Writing

- **Orthographic Coding**: how the brain pays attention to, visually remembers and codes words and word parts relating them to spoken words (thru vs through)
- **Phonological Coding**: segmenting spoken words (word sounds) into units, relate them to units in written words – breaking words apart and putting back together
- **Morphological Coding**: coding of base words (“root”) with suffixes and prefixes, for example – corner vs builder
- **Verbal Working Memory**: working memory that allows you to store and process letters and written words, listening comprehension and written sentences
- **RAN**: measures ability to name familiar symbols/single letters, letter groups or words that are repeated across rows both accurately and rapidly
- **RAS**: measures executive function of switching categories (attentional switches)

Orthographic Coding
how the brain pays attention to, visually remembers and codes words and word parts relating them to spoken words (thru vs through)

different

an
exclamation
ti

Phonological Coding
segmenting spoken words (word sounds) into units, relate them to units in written words – breaking words apart and putting back together

Now your turn
• Drum roll please........

Morphological Coding
coding of base words (“root”) with suffixes and prefixes, for example – corner vs builder

Now Your Turn

<table>
<thead>
<tr>
<th>Movement</th>
<th>Move</th>
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</thead>
<tbody>
<tr>
<td>Imaginary</td>
<td>Imagine</td>
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<tr>
<td>Sentence</td>
<td>Sent</td>
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<tr>
<td>Reality</td>
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<td>Depth</td>
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<tr>
<td>Clarity</td>
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<tr>
<td>Billion</td>
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<tr>
<td>Butter</td>
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</tbody>
</table>
Verbal Working Memory
• working memory that allows you to store and process letters and written words, listening comprehension and written sentences

Now Your Turn
• Verbal Working Memory - Letters
• You get only 5 seconds to answer

Now Your Turn
• Verbal Working Memory – Words
• You get only 5 seconds to answer

RAN
• measures ability to name familiar symbols/single letters, letter groups or words that are repeated across rows both accurately and rapidly

RAN
• May I have a volunteer?!?

RAS
• measures central executive function of switching categories (attentional switches)
RAS

- May I have a volunteer?!!

Berninger’s View of Reading and Writing

Processing Disabilities


What do you know about how student’s learn to write?

Dysgraphia 101 Pre Test

Simple (or not so simple) View of Writing

Which skills are developed in the successful writer?
Research

• Juel (1988) found that 1/3 of fourth graders had difficulty with low-level writing skills (i.e. handwriting and spelling)- mechanics
• Another 1/3 had difficulty with high level skills (i.e. composition)- text generation
• Another 1/3 had difficulty with both


What is Handwriting?

“Handwriting is a complex perceptual-motor skill that is dependent upon the maturation and integration of a number of cognitive, perceptual and motor skills, and is developed through guided direct instruction”

(Hamstra-Blaet and Blote, 1993; Maeland, 1992).

Components of Handwriting

• Recall the appearance of the letters, letter groups and spelling patterns (orthographic memory)- “see it”
• Visualize the letter and coordinate the motor patterns needed to form the letters (graphomotor)- “do it”
• Judge the amount of space that is needed between the letters and words and try to position the letter on the writing lines (sensory/spatial)- “place it”

So how do kids learn to write?

OSMOSIS

Alien Implantation?

Handwriting 101
The Big Question?!?

Looking CLOSELY at HANDWRITING CONCERNS:

When is it a DYSGRAPHIA concern and
When is it an INSTRUCTIONAL need?

QUESTION 1:
Has the student received explicit handwriting instruction with fidelity?

• Students must receive explicit guided handwriting instruction on letter formation and placement with multiple guided repetitions and practice to develop legible handwriting.

• Humble ISD uses the Handwriting Without Tears Curriculum – This is not handing the students a workbook! – It involves guided imitation and practice. Contact your campus RELA lead or OT if teachers need help or training.

• Many online resources and apps to help struggling students (when caught early before bad habits form!)

• Letter School App set to HWT using a mini stylus

QUESTION 2:
Does the student know all the uppercase and lowercase letters/forms?

• To be an effective writer students’ must have knowledge of letters and letter shapes/sounds.

• Appropriately drill and practice to help fill in this educational gap.

• Educational intervention recommendations could be: letter strip on desk, multi-sensory approach to learning letters, small group instruction in the classroom for specific letter group remediation

QUESTION 3:
Is the student’s writing equally poor in copying and free writing?

• If the student can write the alphabet fluently from memory and copy text legibly, BUT legibility decreases with composition, this is likely NOT a graphomotor-based issue.

• May be an issue with
  • Executive Function: initiation of or attention to task
  • Spelling (orthographic knowledge)
  • Grammar and Sentence Structure knowledge

QUESTION 4:
Did the student pass their vision screening?

• Contact the school nurse if the student complains of vision problems while reading or writing.

• In the interim, make sure to provide the student with preferential seating and allow accommodations to make sure the student is able to see all instruction and modeling.

• There are some vision problems that affect reading and writing that are not detected on standard school vision screens. www.covd.org
QUESTION 5:
Does the student have any of these grasp/grip concerns?

**Pushes Too Hard/Soft**
Initial interventions to try: mechanical pencil, gel or fabric or fine sandpaper on writing paper, softer lead pencils, vertical surface.

**Hand Fatigue or Pain**
Initial interventions to try: a pencil grip, encourage play with putty or Playdoh and activities that require weight bearing on the hands.

**Grasp Concerns**
Initial interventions to try: “The Pencil Grip”, use of short golf pencils or broken crayons. See the Pencil Grip Discussion Guide in your handouts.

**Moves Whole Arm**
Typically seen with younger students, but can be seen in any student who is using big arm muscles for small muscle writing movements. Encourage them to keep their forearms on table and allow opportunities to work on vertical surfaces.

**Switches Hands**
This is often seen with younger students. Continue to encourage them to utilize only one hand. If they have not developed a preference for one hand by age 6, ask your campus OT for “general strategies to promote laterality.”

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TEACH GOOD MECHANICS: Get a GRIP!

- **Tool Size** –
  - Small tools for small hands!

- **Function** –
  - Promote tiny object manipulation through fun activities while learning about the world around you

- **Imitation and Practice** of Good Grips
  - [Link](http://www.sightandsoundreading.com/how-to-teach-a-child-to-hold-their-pencil-correctly/)
  - Picking Up My Pencil (HWT Rock Rap Tap and Learn, track 9)
  - Pencil Pick Ups [link](http://www.hermans.com/files/frogjump/HWT_Pick_Ups.pdf)
  - Flip the pencil trick
  - A-OK trick
  - Pencil Driving trick

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Paper Placement
Some children exaggerate the slant on their paper placement which is acceptable if it does not cause speed or neatness trouble.

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Gamer’s Thumb

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Grip Patterns

Efficient

Inefficient

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QUESTIONS 6 and 7:
 Does poor word or letter spacing affect their legibility? Does poor orientation of letters to the line affect their legibility?

- Initial interventions to try: Teach a spacing strategy – use of an underline, finger space, popsicle stick, small pom-pom
- Try visual cues on paper – LINES!
QUESTION 8:
Do they write with tremulous strokes or have many write-overs? Are letters or words unrecognizable out of context?
This could indicate a bigger graphomotor problem and would warrant a need for a dysgraphia screening.

QUESTION 9:
Do they have good posture when writing?
• Students cannot write their best with poor posture. Make sure their feet are supported and not dangling. Make sure their desk & chair height is appropriate. Rule of 90/90/90

Alphabet Fluency Exercise

Must have FLUENCY to access content

Which writer do you want in your class?
Struggles with mechanics of writing:
• Letter formation
• Spelling
• Spacing/sizing

No Mental energy for Content
– can’t access or generate ideas!

Has FLUENCY with mechanics
• No mental energy spent – mechanics are automatic
• All Mental energy can be invested in composition

Why RtI?
“Early intervention for students at risk for handwriting and spelling difficulties can prevent more serious writing disabilities later in school.”

Universal Screening Measures
Handwriting Without Tears- Grades K-2nd print

Hot Topic: Dysgraphia

- Learning disability in the area of writing expression of neuro-biological origin (a problem with writing efficiency)

- Definition:
  “Dys”: impaired
  “Graph”: producing letter forms by hand
  Suffix- “ia” - refers to having a condition

- Exclusionary Criteria: LACK OF ADEQUATE GUIDED HANDWRITING INSTRUCTION (aka Dystaughtia)

Dysgraphia

- Can interfere with learning to spell words in writing
- Can interfere with the speed of written text.
- Children with dysgraphia may have only impaired handwriting, only impaired spelling (without reading problems) or both impaired handwriting and spelling.
- Unexpected lack of appropriate academic progress in handwriting and/or spelling even with targeted instruction/intervention.

Berninger’s Definition of Dysgraphia

- Problem in handwriting automaticity- retrieving and producing legible letters effortlessly and fast,
- Problem in spelling with or without indicators of dyslexia,
- Problem in finger motor planning, and/or
- Problem in executive functions for self-regulating the composing process (fluency and quality)

Berninger and Wolf, (2009). Teaching Students with Dyslexia and Dysgraphia

Dysgraphia: Impaired Components of Handwriting

- Recall the appearance of the letters and spelling patterns (orthographic memory)- “see it”
- Visualize the letter and coordinate the motor patterns needed to form the letters (graphomotor)- “do it”
- Judge the amount of space that is needed between the letters and words and try to position the letter on the writing line (sensory/spatial)- “place it”

Orthographic and Memory Processes

- Representation of letter forms and/or letter groups in short-term and long term memory,
- Access to and retrieval of theses representations in memory, and
- Planning for letter production.


WHAT YOU SEE:
- Crossed out letters and words
- Make letters different ways (no consistent formation strategy)
- Inconsistent spacing
- Many may have difficulty picturing whole words, which can lead to spelling delays
- May experience difficulty copying from the board (looks frequently at the board while copying)

Orthography of Language

- De snelle bruine vos sprong over de wildwaterbaan.
- Con cáo nâu nhanh chóng nhảy qua dòng sông lười.
- A gyors barna róka ugrott át a lusta folyó.
- Der schnelle braune Fuchs sprang über den faulen Fluss.
- El zorro marrón rápido saltó sobre el río perezoso.
- The quick brown fox jumped over the lazy river.

Orthographic and Memory Processes

“Students with severe motor problems are likely to have handwriting problems, but children with motor development within the normal range may also have handwriting problems, which are more directly related to orthographic than motor processing skills.”


Graphomotor Skills

Defined as...

The specialized, sensory motor component related specifically to writing

And the learned skills that require the use of your hand in writing language,

Both of which are connected to the language centers of your brain.

Types of Graphomotor Difficulties

- Motor Memory
- Motor Action
- Sensory Motor Feedback

Graphomotor: Motor Memory

What Is It?

- It’s the hand head connection
- Rapid and accurate recall and visualization of letter shapes and the specific muscle movements needed to write them

What You See:

- Slow and labored handwriting
- Inconsistent letter formations
- Frequent cross outs or erasures
- Poor legibility
- Preference for printing in adults
- Can be fantastic artists! They can draw and complete mazes, however, when a language component is added, they are unable to write legibly

Example of Graphomotor Memory Deficit
Graphomotor: Motor Action

What Is It?
• Brain assigns different muscles to specific responsibilities for letter formation
• Some muscles stabilize the pencil, others move it to form symbols (i.e. letters)

What You See:
> When young, have poor grip on pencil and/or may drop it frequently
> When older, compensate with hard pressure grip. Pencil doesn’t lie on the web space.
> Use whole arm to write
> Slow and labored writing- fatigue easily
> May not have fine tuned and controlled letter formation
> May have history of speech articulation difficulties (fine motor of the mouth)

Problem with Graphomotor Motor Action

Graphomotor: Sensory Motor Feedback

What Is It?
• The sensory system is constantly sending messages to the brain so it can make fine adjustments to the muscles and movements involved in writing.
• The primary systems involved in this feedback loop include vision, touch and body awareness (proprioception).

What You See:
> Very hard pencil pressure
> Excessive pressure on pencil with dark writing
> Trouble keeping up with writing demands- slower rate of writing
> Hovers close to paper
> Cannot copy from the board without watching themselves write
> Struggle to write a single letter or word with their eyes closed- they do not know where they are in space
> Poor spatial awareness

Handwriting Activity

• Fold a piece of paper into four squares and number the squares 1-8 (four on one side, four on the other side)
• Square 1- trace three times with finger or pencil
• Square 2- plan first then copy
• Square 3- plan, copy
• Square 4- plan, copy

Handwriting Activity

• Draw in the arrow to mark where to begin the letter in squares 2-8
• Squares 5 & 6 draw two closed eyelids at the top
• Square 5- copy with eyes closed
• Square 6- copy with eyes closed
• Square 7- make very best copy
• Square 8- make very best copy

Sensory Perception & Spatial Skills

What Is It?
• Ability to perceive visual input correctly so that you can reproduce the letters you see accurately
• Understanding of the self and of the relationships between objects within a given space

What You See:
> Confuses left and right on-self, off-self or with directions
> Reverses letters/words past the 3rd grade
> Difficulty discriminating between letters of similar shapes (p, b, q, d)
> Difficulty with sizing, spacing, or copying written words
> When reading or writing the student may cover an eye, turn head to side complain of blurry/double vision, eyes itching, burning or hurting, or headaches
> Writes on a slant uphill or downhill
Social Emotional Considerations

Students who struggle with handwriting often:

- Labeled as “lazy”, “unmotivated” and/or “oppositional” because they are reluctant to produce written work
- Accused of writing neatly “when they want to”. This statement has moral implications and is untrue; neat handwriting at a reasonable pace is often not a choice
- Engage in numerous avoidance behaviors: have to go to the bathroom; need to sharpen their pencils; just sit and stare or may even disrupt the class because getting in trouble may be less painful for them than writing
- Take up to 3 times as long to complete written work than do typical students
- Develop poor self-esteem


Composition: Oral vs Writing

Dyslexia and Dysgraphia

Dyslexia is not just a reading disorder...... it can also be a writing disorder because of the spelling problems that interfere with development of written composition.

A Dyslexia/Dysgraphia Challenge

Using the code on the next slide, we would like you to write for three minutes about the best thing that has happened to you so far this summer. You have to use the code without any use of actual letters. You may begin as soon as the code appears... Good luck!
### A Dyslexia/Dysgraphia Challenge

What made this most challenging for you?

How does this relate to our dyslexic and dysgraphic students?

- Searching for the correct “symbol” – orthographic memory
- Copying from the board - graphomotor
- Text generation
- Processing the language – phonemic awareness and verbal working memory
- Executive functioning – attention to a task
- Fluency - automaticity

### Applicable Classroom Take-Aways:

Instructional activities to improve handwriting with all children (especially dysgraphics)

- **K-2**
  - Playing with clay to strengthen hand muscles
  - Keeping lines within mazes to develop motor control
  - Tracing letters with index finger and eraser end of pencils
  - Initiation of the teacher modeling HWT
  - Whole class air writing based on projected model while saying the stroke sequence out loud together
  - Covering the letter with an index card and imagining the letter in mind’s eye

- **Grades 3-12**
  - Accommodations are most appropriate to improve written expression with students at these grade levels.
  - Accommodations can include assistive technology such as access to a word processor or Universal Co-Writer

### Screening for Dysgraphia

- **K-2**
  - Use the HWT universal screener to identify any struggling students to receive *early intervention*

- **3-5**
  - Look at 3-5 writing samples and ask someone unfamiliar with the student’s writing to read it out loud. Take note of difficulty in reading it fluently and accurately.

### What if I think I have a student who is Dysgraphic?

Make sure you can answer **YES** to all of the following questions:

- The student has unexpected lack of appropriate academic progress in handwriting and/or spelling.
- The student has received appropriate instruction and appropriate intervention in HWT.
- Student continues to exhibit poor performance in the areas of handwriting and/or spelling despite intervention.
- Student has passed vision and/or hearing screenings.
- Student has consistent school attendance
- Student has average or higher cognitive ability.

And **YES** to one or more of the following:

- Student has difficulty with handwriting legibility
- Student has difficulty with handwriting speed in both copying and composition
- Student has difficulty spelling words in both isolation and in context

### Then.....

Submit 3 writing samples to Stefanie Perry along with your above mentioned checklist.

- 1 informal (ex. Journal entry)- not graded
- 1 formal writing piece done independently
- 1 spelling test
Still have questions????

Call or email

Stefanie Perry at 281-641-8338

and/or

Laura Dowdy at 281-641-8390