

***COORDINATION  
DIFFERENCES IN THE  
CLASSROOM***

***Seminar for Cascia Hall Preparatory  
School***

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Tucson, Arizona

# Developmental Coordination Disorder-Dysgraphia



- Dysgraphia is:
  - “...a writing pattern characterized by substantial effort which interferes with a student’s ability to convert ideas into a format...Primarily, the student experiences difficulty in automaticity remembering and mastering the sequence of muscle motor movements needed in writing letters or numbers.” (p. 72)

Richards, R.G. (1999). The Source for Dyslexia and Dysgraphia. East Moline, IL: LinguiSystems.

# Developmental Coordination Disorder-Dysgraphia



- Types:
  - Dysgraphia
  - Gertsman Syndrome-(not the type associated with Mad Cow Disease-Bovine Spongiform Encephalopathy)
- \* Symptoms of Developmental Gertsman Syndrome: Dyscalculia (Mathematics Disorder), Dysgraphia, problems with Directionality, finger agnosia

Cavey, D.W. (1987). Dysgraphia: Why Johnny Can't Write. Austin, TX: Pro-Ed.

# Developmental Coordination Disorder-Dysgraphia

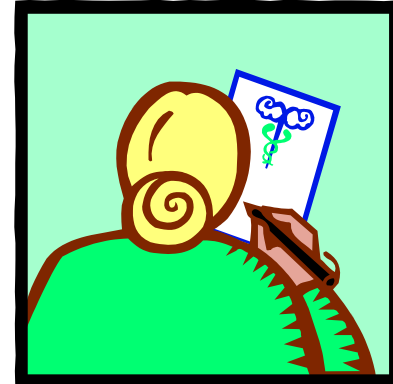


- Deuel speculated there are three types of dysgraphia:
  - “Dyslexic Dysgraphia:
    - Spontaneously written text is poorly legible, with textual complexity influencing legibility.
    - Oral spelling severely abnormal.
    - Coping of written text relatively preserved.
    - Drawing relatively preserved.
    - Finger tapping speed abnormal.” (p. S7)

Deuel, R.K. (1995). Developmental Dysgraphia and Motor Skills Disorders. Journal of Child Neurology 10 (Supplimental number 1), pp. S6-S8.



# Developmental Coordination Disorder-Dysgraphia



- “Dysgraphia due to motor clumsiness:
  - Spontaneously written text is poorly legible.
  - Oral spelling relatively preserved.
  - Copying of written text is poorly legible.
  - Drawing is usually compromised.
  - Finger tapping speed abnormal.” (p. S7)

Deuel, R.K. (1995). Developmental Dysgraphia and Motor Skills Disorders. Journal of Child Neurology 10 (Supplimental number 1), pp. S6-S8.

# Developmental Coordination Disorder-Dysgraphia



– “Dysgraphia due to defect in understanding space:

- Spontaneously written text is poorly legible.
- Oral spelling relatively preserved.
- Copying of written text is poorly legible
- Drawing severely abnormal.
- Finger tapping speed is normal.” (p. S7)

Deuel, R.K. (1995). Developmental Dysgraphia and Motor Skills Disorders. Journal of Child Neurology 10 (Supplimental number 1), pp. S6-S8.

# *Developmental Coordination Disorder-Dysgraphia*

“The neuromuscular patterns in normal writing originate in visual, auditory, tactile-kinesthetic, and linguistic images in the human cortex that stimulate the motor area where manual-motor images are aroused. These are conveyed to the writing hand in a delicate blending of visual-auditory-, tactile-, and kinesthetic-linguistic processes. Dysfunction at any point or points in this neuropsychological structure may result in impaired writing ability...”(p. 393)

Gaddes, W.H. and Edgell, D. (1994). Learning Disabilities and Brain Function: A Neuropsychological Approach (3<sup>rd</sup> Edition). New York, NY: Springer-Verlag.

# Developmental Coordination Disorder-Dysgraphia

- Dysgraphia is most commonly related to:
  - Dyslexia
  - But, may be comorbid to coordination problems and spatial awareness

Richards, R.G. (1999). The Source for Dyslexia and Dysgraphia. East Moline, IL: LinguSystems



# *Developmental Coordination Disorder-Dysgraphia*

- It is an impairment in the process of writing.
- They have problems with the ability to use automatic serial movements for letter forms.
- They exert excessive effort
- They sometimes can create accurate letters by using vision to guide their movements.
- Older dysgraphics are harder to habilitate.
- Cursive writing may be harder than manuscript.

Richards, R.G. (1999). The Source for Dyslexia and Dysgraphia. East Moline, IL:  
LinguiSystems

# *Developmental Coordination Disorder-Dysgraphia*

- Often those with dysgraphia have weak motor memory
- Writing is not automatic, inconsistent requires a lot of cognitive processing and erasures
- There are degrees of dysgraphia
- “When the motor function is liberated from sequential memory, such children can demonstrate a strong fine motor performance, which results in artistic creative drawings.” (p. 66)



# *Developmental Coordination Disorder-Dysgraphia*

- “Drawing and most other motor skills do not demand as much recall of precise automatic, sequential motor patterns. Instead they rely on movements that involve more visual guidance and decision-making as they are performed.” (p. 67)
- “The major handwriting problem for dysgraphic students is difficulty formulating or implementing the motor plan, especially as reciprocity (the ability to change directions adequately and fluently) is required.” (p. 67)

Richards, R.G. (1999). The Source for Dyslexia and Dysgraphia. East Moline, IL:  
LinguiSystems.

# *Developmental Coordination Disorder-Dysgraphia*

- Active Working Memory allows the return to earlier steps to integrate new information into them.
- Dysgraphics have problems with Active Working Memory which leads to Processing Fatigue.
- This results in poor automatization of the motor movements and leads to Motor Fatigue.
- The more they write the less legible it gets.

Richards, R.G. (1999). The Source for Dyslexia and Dysgraphia. East Moline, IL:  
LinguiSystems

# *Developmental Coordination Disorder-Dysgraphia*

“Disruption in the neuropsychological pathways may result in: (1) motor impairment (e.g., tremor, letters clumsily drawn, letters overlapped or not linked, absence of loops, reduplication of strokes, micro-graphia, etc.); (2) spatial disorders (poor alignment of letters, crowding of words, omitting a margin, orientating lines upward or downward, etc.); (3) syntactical disorders (agrammatic written answers...” (p. 393)

Gaddes, W.H. and Edgell, D. (1994). Learning Disabilities and Brain Function: A Neuropsychological Approach (3<sup>rd</sup> Edition). New York, NY: Springer-Verlag.

# *Developmental Coordination Disorder-Dysgraphia*

- Many dyslexics have right side weakness which causes problems with handwriting.
- Such people have poor pencil grips

Duane, D.D. (1993). Developmental Disorders of Learning Attention and Affect. Videotape prepared by the Institute for Developmental Behavioral Neurology, 10210 North 92<sup>nd</sup> Street, Suite #300, Scottsdale, AZ 85258.



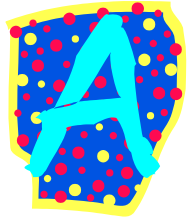
# *Developmental Coordination Disorder-Dysgraphia*

- The following are the types of pencil grips people use:
  - Non-inverted
  - Partially inverted
  - Normal
  - Tight grip
  - Loose Grip



Duane, D.D. (1993). Developmental Disorders of Learning Attention and Affect. Videotape prepared by the Institute for Developmental Behavioral Neurology, 10210 North 92<sup>nd</sup> Street, Suite #300, Scottsdale, AZ 85258.

# Developmental Coordination Disorder-Dysgraphia



“A survey of fine-motor requirements in elementary schools in Massachusetts showed that 30% to 60% of the time in school was spent in mostly fine-motor activity. This statistic reveals why the child with poor written expression (Dysgraphia) is a major disadvantage for a large portion of the school day.” (p. S6)

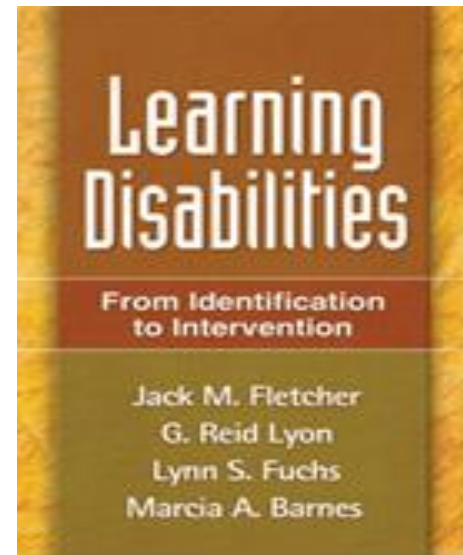
Deuel, R.K. (1995). Developmental Dysgraphia and Motor Skills Disorders. Journal of Child Neurology 10 (Supplimental number 1), pp. S6-S8.



# *A Good Book That Summarizes this Research*

- Fletcher, J.M., Lyon, G.R., Fuchs, L.S., and Barnes, M.A. (2007). Learning Disabilities: From Identification to Intervention. New York, NY: Guilford.

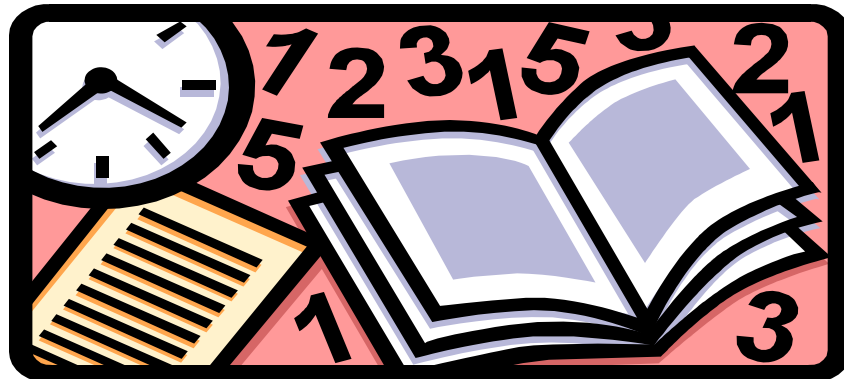
[http://www.guilford.com/cgi-bin/cartscript.cgi?page=pr/fletcher.htm&dir=pp/neuropsych&cart\\_id=169929.5486](http://www.guilford.com/cgi-bin/cartscript.cgi?page=pr/fletcher.htm&dir=pp/neuropsych&cart_id=169929.5486)



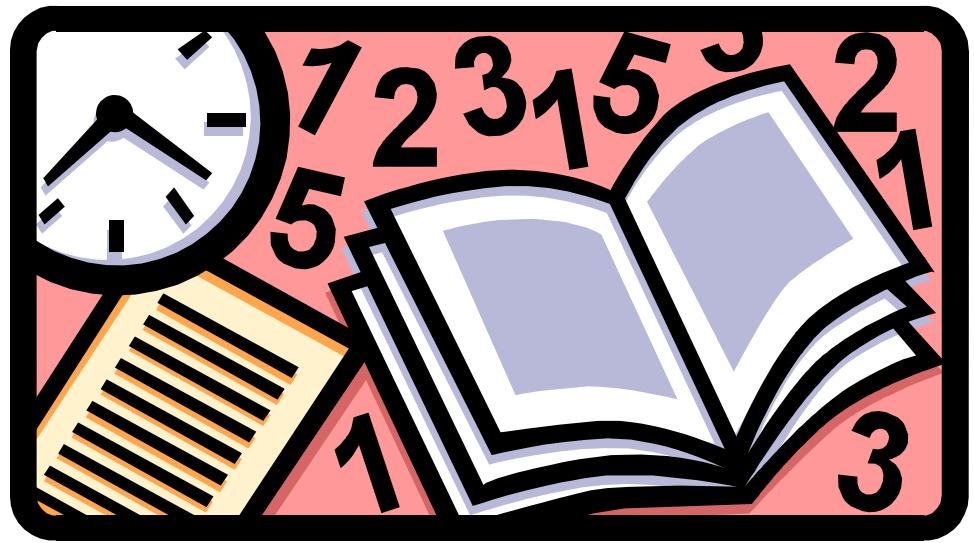
# Developmental Coordination Disorder-Dysgraphia

The importance of handwriting will probably diminish as students use computers more for written assignments.

Gregg, N. and Mather, N. (January/February, 2002). School is Fun at Recess: Informal Analyses of Written Language for Students with Learning Disabilities. Journal of Learning Disabilities, 35 (1), pp. 7-22.



# AD/HD and Learning Disorders and Dysgraphia



Barkley stated:

- 15% to 30% of AD/HD have Reading Disorder
- 26% have Spelling Problems
- 10% to 60% have Mathematics Disorder
- Developmental Coordination Disorder-Dysgraphia 60%

Barkley, R.A. (2002). ADHD and Oppositional Defiant Children. Seminar Presented February 19-20, Phoenix, AZ, The Institute for Continuing Education, Fairhope, AL, from handout, pp. 9.

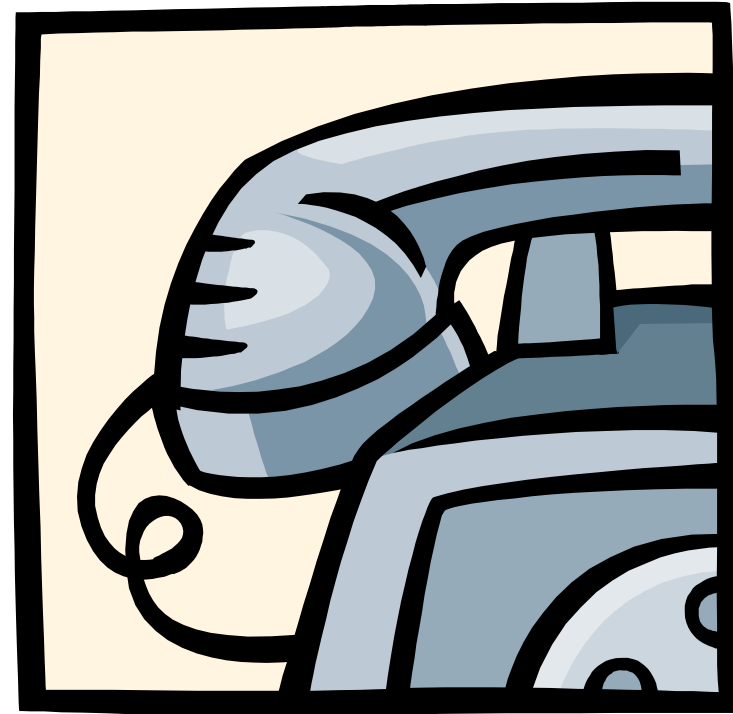
Barkley, R.A. (2002) Mental and Medical Outcomes of AD/HD. Pre-Conference Institute, # TPA1, Thursday October 17, 2002, 14<sup>th</sup> Annual CHADD International Conference, Miami Beach, FL.

# AD/HD and Learning Disorders and Dysgraphia

Hynd indicated those with Inattentive AD/HD:

- 21% have Reading Disorder
- 33% have Mathematics Disorder
- 4% have Spelling/Disorder of Written Expression

Hynd, G. (2002). ADHD and Its Association with Dyslexia: Diagnostic and Treatment Challenges. Paper presented at the 53<sup>rd</sup> Annual International Dyslexia Association Conference, Atlanta, GE, November 16.



# *AD/HD and Developmental Coordination Disorder*

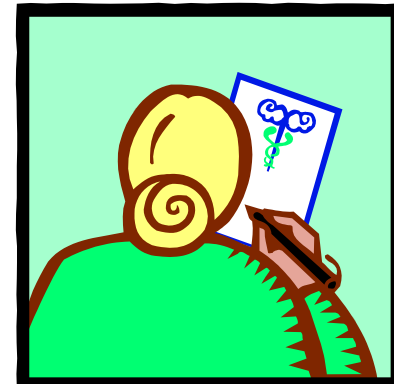
- Barkley stated 50+% of those with ADHD meet criteria for DCD.
- They have Poor Physical Fitness
- They are Accident Prone (Especially those with ODD)

Barkley, R.A. (2002). ADHD and Oppositional Defiant Children. Seminar Presented February 19-20, Phoenix, AZ, The Institute for Continuing Education, Fairhope, AL, from handout, pp. 9.

# Developmental Coordination Disorder- Dysgraphia: Accommodations

*“So long as the student’s writing is legible, and so long as it is the best he or she can do, I will accept it without making the writer feel threatened or inferior.” (p. 231)*

*Jordan, D.R. (2002). Overcoming Dyslexia in Children, Adolescents, and Adults (Third Edition). Austin, TX: Pro-Ed.*





# *Developmental Coordination Disorder- Dysgraphia: Accommodations*

“If you will write a story as I have suggested, I will read it carefully. I know that it’s hard for you to spell and punctuate accurately. But don’t worry about that. The main thing is for you to express yourself. Be creative! You can trust me to appreciate the part of yourself you put on paper, I won’t betray your trust!”

*Jordan, D.R. (2002). Overcoming Dyslexia in Children, Adolescents, and Adults (Third Edition). Austin, TX: Pro-Ed.*

# ***Developmental Coordination Disorder- Dysgraphia: Accommodations***

- Warm-up you writing hand before writing
  - Mildly shake your hands.
  - Rub them together.
  - Wiggle fingers for about 10 seconds.
  - Do the above periodically as you write.

Richards, R.G. (1999). The Source for Dyslexia and Dysgraphia. East Moline, IL: LinguSystems.

# *Developmental Coordination Disorder- Dysgraphia: Accommodations*

- Deuel offered the following regarding habituation:
  - Allow the Dysgraphic to answer orally or to audio tape essays.
  - Allow extended time testing.
  - Allow word processors.

Deuel, R.K. (1995). Developmental Dysgraphia and Motor Skills Disorders. Journal of Child Neurology 10 (Supplimental number 1), pp. S6-S8.

## *Developmental Coordination Disorder- Dysgraphia: Accommodations*

- Adaptive pencils and pens may help those with fine motor control problems, but no spatial or linguistic problems.
- Anti-seizure medications may help those with dystonia or tremor.

Deuel, R.K. (1995). Developmental Dysgraphia and Motor Skills Disorders. Journal of Child Neurology 10 (Supplimental number 1), pp. S6-S8).

# Orthopedic Pens for Dysgraphia

- [www.penagain.com](http://www.penagain.com)



<http://www.penagain.com/productselection.html>.

## *Developmental Coordination Disorder- Dysgraphia: Accommodations*

“Because the deficit in handwritten expression results from an adverse interplay between output systems and linguistic and non-linguistic mental operations, the lower the motoric requirement, the better and faster the written expression.

Computerized word processing requires only a single ballistic movement (a keystroke, or sometimes two for capitalization) to perfectly form a legible letter or carefully measured space...”



# *Developmental Coordination Disorder- Dysgraphia: Accommodations*



“This is simply motor motion, once overlearned, demands a much smaller extent of cerebral activation than control of a pen or pencil.” (pp. S7-S8)

Deuel, R.K. (1995). Developmental Dysgraphia and Motor Skills Disorders. Journal of Child Neurology 10 (Supplimental number 1), pp. S6-S8.

# *Developmental Coordination Disorder- Dysgraphia: Accommodations*

- **Accommodations:**
  - Oral essay tests
  - A scribe/note taker-dictate to a typist
  - Word processor (Note: this will often not help those with Gertsman's Syndrome because of finger agnosia.)
  - Voice Activated Word Processors
  - Extended time testing and for written assignments
  - Tape recorded notes
  - **Good academic advisement with disability in mind**



# *Developmental Coordination Disorder- Dysgraphia: Accommodations*

- Jordan suggested the following regarding compensating for writing problems:
  - Encourage students to talk while they write
  - Extended time
  - Frequent breaks for muscle tension
  - Double spacing
  - Reduce expected writing
  - Allow the use of manuscript and/or cursive
  - Encourage drafts and editing

# *Developmental Coordination Disorder- Dysgraphia: Accommodations*

- Dictation to a scribe
- Use sentences first as semantic maps
- Use a word processor

Jordan, D.R. (1996). Teaching Adults with Learning Disabilities. Malabar, FL: Krieger.



# Development Coordination Disorder- Dyslexia

- Helpful Resource:
  - American Occupational Therapy Association
  - 4720 Montgomery Lane
  - P.O. Box 31220
  - Bethesda, MD 20824-1220
  - Phone: 301-652-2682
  - TDD: 800-337-8555
  - Fax: 301-652-7711
  - Web: [www.aota.org](http://www.aota.org)



# Developmental Coordination Disorder-Dysgraphia and/or DWE

- Helpful Technology:
- AlphaSmart Direct, Inc.
- Renaissance Learning, Inc.  
P.O Box 8036  
Wisconsin Rapids, WI, USA  
54495-8036  
800-656-6740  
715-424-4242 (fax)
- Website: <http://alphasmart.com/index.html>
- <http://www.renlearn.com/neo/neo/>



# *Developmental Coordination Disorder- Dysgraphia*

- **Helpful Resource:**

- American Occupational Therapy Association, Inc. (AOTA)

4720 Montgomery Lane

PO Box 31220

Bethesda, MD 20824-1220

- **Phone:** 301-652-2682

- **Website:** <http://www.aota.org>



# *Developmental Coordination Disorder-Dysgraphia*

- Helpful Resource:
  - American Physical Therapy Association
  - 1111 North Fairfax Street
  - Alexandria, VA 22314-1488
  - Phone: 800-999-2782
  - TDD: 703-684-6748
  - Fax: 703-684-7343
  - Service Center: 800-399-2728, ext. 3395
  - Web: [www.apta.org](http://www.apta.org)





# *Developmental Coordination Disorder-Dysgraphia*

- A good resource on Dysgraphia:



Richards, R.G. (1999). The Source for Dyslexia and Dysgraphia. East Moline, IL: LinguiSystems.