Left Behind!

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Outline

- Background on Lefties
- Common strengths
- Common challenge areas
- The handwriting challenge
- Case example
- A consistent print pattern for lefties

Background

- World not made for lefties (doors, tools, etc)
  - 10% of population
- Often do things ambidextrously:
  - Less naturally-embedded sense of laterality
- Lefties face an uphill battle in the classroom
- Review studies show that left-handedness (or mixed-handedness) is more common in people with Developmental Coordination Disorder than in the general population.*
- The handwriting challenge…

* Darvik M, Lorås H, Pedersen AV. The prevalence of left-handedness is higher among individuals with developmental coordination disorder than in the general population. Frontiers in psychology. 2018;9:1948.

Studies…

- Abstracts (for your review)
- Take Home Points follow…

Lefthandedness among Students of Architecture and Music

K. Olof Götestam

Abstract:

- Three groups of subjects (60 students of architecture and 88 of music, and 87 from a general student group) were assessed on lefthandedness, reading problems, dyslexia, and stuttering.
- There was a **higher frequency of lefthandedness** among students of **architecture**, as well as a higher frequency of **reading difficulties**, **dyslexia** and **stuttering** among students of **architecture and music**, than the comparison group. The findings were discussed in relation to Geschwind's hypotheses.
- Götestam KO. Lefthandedness among students of architecture and music. Perceptual and Motor Skills. 1990 Jun;70(3_suppl):1323-7.

Take home point:

- Architecture:
  - High demand for spatial skills
  - Visual work product
- Music:
  - Non-lexicological symbols
  - Sticks go to left or right, up or down. Only vertical location of dot is relevant!
- These fields don't dissuade lefties with laterality problems, and may even give them a benefit.

Left and right-handed dyslexic boys: An empirical test of some assumptions of the Geschwind-Behan hypothesis

Hugdahl K, Waaler PE, Hallgrim K

ABSTRACT

- Twenty-six dyslexic boys (13 left-handers and 13 right-handers) were tested for hemispheric asymmetry with dichotic listening (DL) and a visual half-field test (VHF).
- The purpose of the study was an empirical test of the Geschwind-Behan [*Proc. natn. Acad. Sci.* USA **79**, 5097-5100, 1982] hypothesis of a **difference in hemispheric asymmetry between left- and right-handed dyslexic boys**.
- Following Geschwind and Behan, left-handedness and dyslexia are caused by a common factor affecting the development of the left hemisphere *in utero* which results in a right hemisphere dominance.
- As a consequence, **handedness but not language is shifted to the right hemisphere**.

Left and right-handed dyslexic boys: An empirical test of some assumptions of the Geschwind-Behan hypothesis

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- We therefore **predicted that left-handed dyslexics should be superior to right-handed dyslexics on visuospatial tasks, but perform similar to right-handers on verbal tasks**.
- The results revealed a significant right ear advantage (REA) in both groups during a dichotic listening test to verbal stimuli.
- The **left-handed group was however superior** to the right-handed group in recognition of **visuospatial stimuli** presented in the left half-field in a visual half-field test.
- It is concluded that the results provide some, although weak, support for the Geschwind-Behan hypothesis.

Hugdahl K, Waaler PE, Hallgrim K. Left and right-handed dyslexic boys: An empirical test of some assumptions of the Geschwind-Behan hypothesis. Neuropsychologia. 1989 Jan 1;27(2):223-31.

Take home point:

- Dyslexic Lefties have visuospatial processing skill advantage over dyslexic Righties.

Handedness, Sex, Familial Sinistrality Effects on Spatial Tasks

Peter J. Snyder, Lauren Julius Harris

ABSTRACT

- Left-handed (N = 109) and right-handed (N = 115) undergraduates (99 males, 125 females) received the SIBT (a "mental rotation test"), the 3DD (3-dimensional drawing test), a family sinistrality (FS) questionnaire.
- Left-handers (LHs) were further separated into consistent and inconsistent LH subgroups, based on consistency of hand preference.
- On the spatial tests, males outperformed females, with no overall handedness effects.
- Also, for males, **Consistent LHs** (but not Inconsistent LHs) performed **significantly worse than right-handers (RHs) on the SIBT (mental rotation test)**, but this difference was *not* found on the 3D Drawing test.
- For females, no handedness subgroup differences were found on either spatial tasks.

Handedness, Sex, Familial Sinistrality Effects on Spatial Tasks

Peter J. Snyder, Lauren Julius Harris

ABSTRACT

- Familial sinistrality was twice as common in LHs as in RHs. Among males, the incidence of FS+ in the Consistent LH subgroup also was *over twice that* for Inconsistent LHs.
- Thus, where **LHs** report a greater incidence of FS +, **are inferior to RHs in mental rotation skill**, it is ***Consistent LHs*** (particularly males) who contribute mostly to these effects.
- The results suggest that previous discrepant findings reported in studies of the cognitive correlates of left-handedness may be due in part to the mixing of two distinct LH subgroups.
- Snyder PJ, Harris LJ. Handedness, sex, familial sinistrality effects on spatial tasks. Cortex. 1993 Mar 1;29(1):115-34.

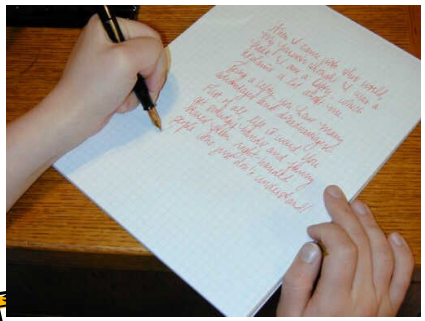
Take home point:

- Mental rotation skills (visual manipulation) require sustained orientation during visualization: Hard for lefties.
- This does not interfere with 3-D Drawing, where the test taker uses spatial visualization of a volume.

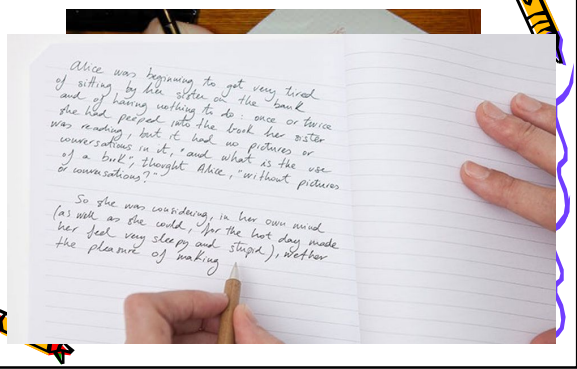
Handwriting in Lefties

- Early concerns: Spontaneous mirror-writing
- Easier to pull hand across the page, but lefties have to push to write L-R in English.
- How to tilt?!
- So much variation in lefties:
  - Tilt page up
  - Tilt page down
  - Hold page perpendicular (write everything down towards body… but read in horizontal orientation (?!).)

Page orientation?



Page orientation?



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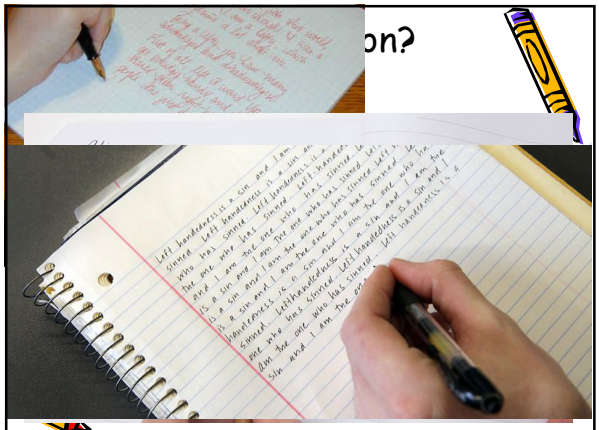

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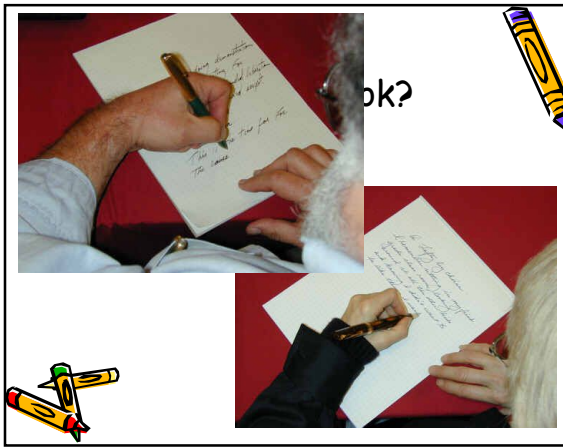
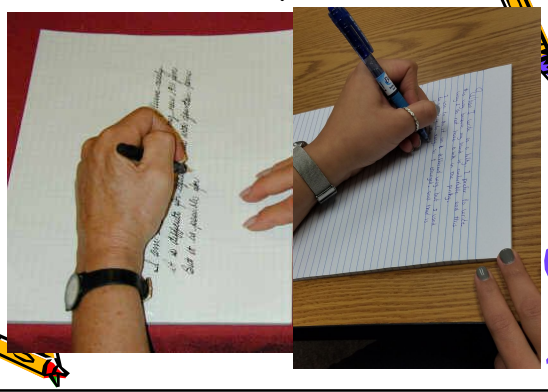
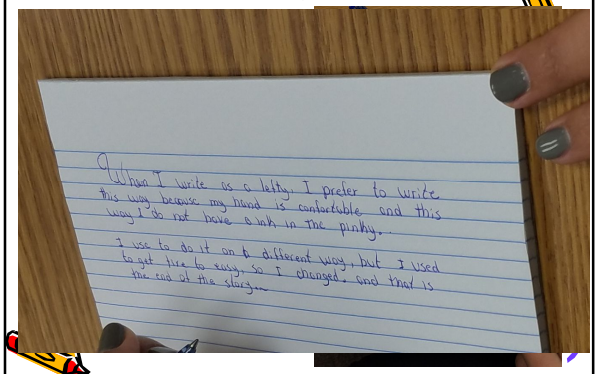


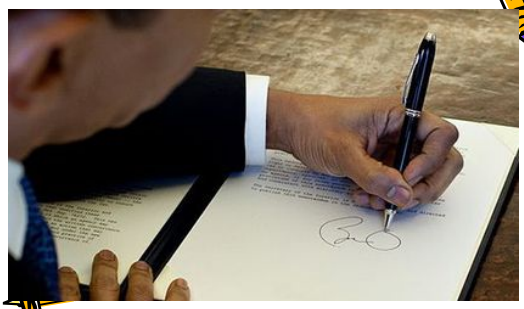
Push or pull?



Push or pull?



Inky Pinky



Case Report, Emilia

- First encounter, age 5.6… Now 7.6, 1st gr
- Younger sibling of "disorganized" kid who did well with VT
- Started VT early, body organizational work
- Early concern: Mirror writing
- "Too young" for reversal concern

Case Report, Emilia

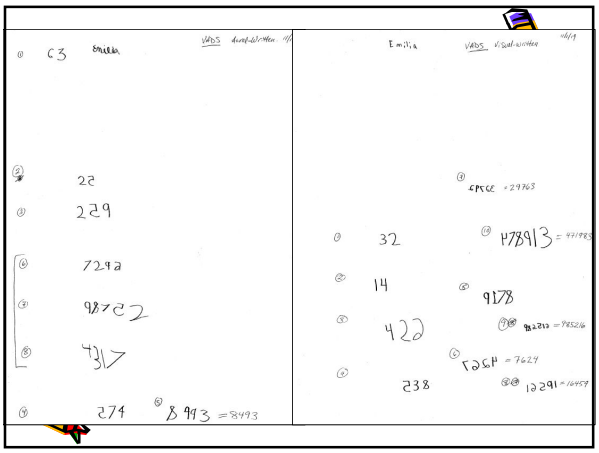
- Entering 1st gr:
- Much better at self-direction since introducing VT.
- Highly verbal, very bright, sharp sense of humor
- Mom is very concerned: Reading "flatlined"
- Reversal confusion not clearing up…

Case Report, Emilia

- Slows down for almost every 'b' 'd', but decodes sophisticated words. *(Gates Oral)*
- Sight words without b/d are better retained.
  - Even if decoding quickly, this costs her energy she could devote to reading comprehension.
  - Auditory comprehension far exceeds visual comprehension.
- Visual-motor reproduction is VERY GOOD if she can look at sample when copying it.
  - Better at writing *without* looking at her letters, but rather looking at the *sample*.

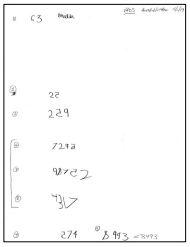
Emilia, VP eval findings

- **VADS** – see images
- **Beery VMI – 87%ile**
- **Getman Recall** (wow!)- Visual spatial recall **between 4th/5th gr level**, even w/ orientation errors.
- **Gardner Reversal-** Execution **5SD↓** Recognition **3.3SD↓**, Matching **4SD↓**
- **Gates Oral- Grade 3.3 equiv**; sophisticated decoding; only laterality errors.



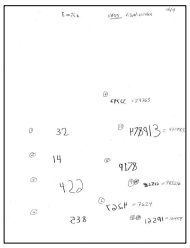
VADS Aural-Written

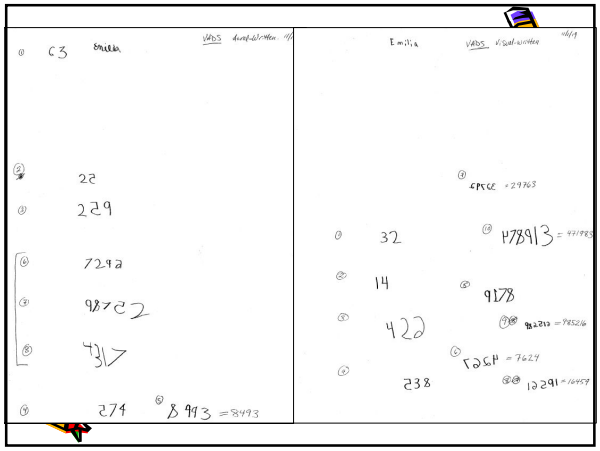
- Global organization, maintains common left border
- Numbers similar in size
- Reverses 5's, inconsistent 4's
- Jumps around page.



VADS Visual-Written

- Variability in spatial organization
- All answers, lower part of page: no stretching!
- Variability in digit size between items
- Recalls more digits
- More reversals
- Rather than *visual-visual*, she converts *visual-auditory-visual.*





Interpretation

- Although she performs better with **memory** for **visual** items…
- she organizes herself better with **auditory input**.
- **Sequential processing errors**/ transposes.
- Will benefit from **visualization** to retain more characters at a time.
- Trouble working with visualization while *creating* visual output.

Beery VMI = 87%ile

- Emilia shows advanced abilities in visual perception. She carefully assesses forms before initiating her drawings.
- On the **8 dots** arranged in a circle, Emilia places the **top/bottom/left and right dots first**, and then placed the mid-point dots on the diagonals.
- While drawing, she shows awareness of context and pattern recognition, remarking *"this is called a rhombus"* as she made the vertically-oriented diamond. Several items later, on the horizontally-oriented diamond, she remarked, *"another rhombus."*

How do we help?

- Struggling to develop laterality
- Very "flexible" in this way: sees similarities, not differences.
- Presents as if dyslexic (not officially diagnosed)
- Visual Word Form Area (VWFA)*: distinguishes between words and their mirror images.
- Often fails to specialize in children with dyslexia…
- Essentially, they have difficulty suppressing spatial facility!
- *Writing is a key factor in helping these children overcome the deficit.*

*Dehaene S, Cohen L. The unique role of the visual word form area in reading. Trends in cognitive sciences. 2011 Jun 1;15(6):254-62.

How do we help?

- Needs to develop kinesthetic automaticity:
  - CONSISTENCY and REPETITION are critical in embedding kinesthetic memory.
- Needs to pair sound and symbol… while WRITING it.
- Working on RAN, naming with a metronome/ time constraint.
- Provide mnemonics tied to body organization:
  - "pick hand, quick hand, boot foot, duck foot"

Slap-Tap Reading (or bdpq) modification:

"quick hand" *snap fingers of left hand*

q p

"pick hand" *grab imaginary fruit from a tree/ right hand*

"duck foot" ("quack" words), *pivot left foot out like with a duck-walk*

d b

"boot foot" (punctuate the /b/), *stomp right foot, as if wearing a heavy boot*

Handwriting in Lefties: Fine motor

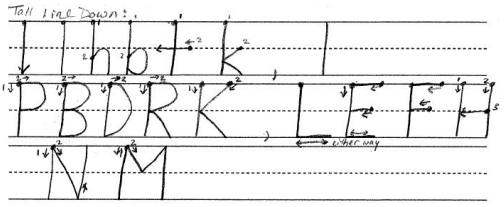
- **Horizontals:** Easier to pull fingers to make horizontal crosses: *Lefties tend to cross T's R->L.*
- **Circles/loops:** Easier to make circles by extending fingers before contracting:
  - Righties find it easier to loop CCW (2 o'clock), "c"
  - Lefties find it easier to loop CW (10 o'clock), "o"
    - *Try it with your non-preferred hand!*
- **Diagonals:** "Cross-criss" instead of criss-cross: Pull first.
  - Lefties prefer to start top-right to bottom-left.

* Ref: "JoAnn's School" videos on handwriting for lefties: https://youtu.be/qVZZic7CJqY

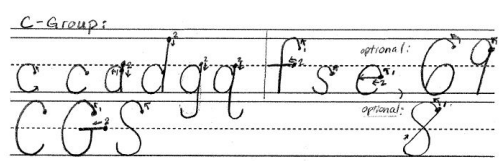
Lefty Handwriting Alternatives

- Developed a lefty-oriented handwriting pattern sample.
- Presented in letter-groups which begin with same/similar stroke.
  - Modeled off of Handwriting-without-Tears
- Modified for lefties
- Offer a couple of "options" for personal preference
  - (e.g., 'E,' 'e' and '8')

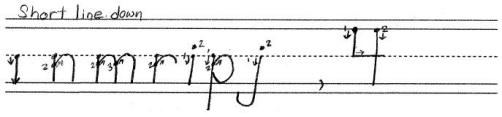
Tall line down



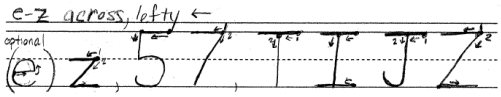
C-Group



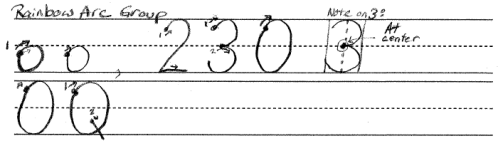
Short line down



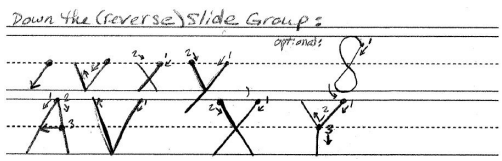
e-z across, lefty version



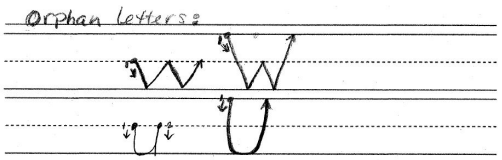
Rainbow arc



Down the (reverse) slide



Orphans, Uu and Ww



Looking ahead…

- Lost learning opportunity in the digital age:
- Insufficient instruction in handwriting denies children a consistent model for patterning and visual-spatial organization.
- Ramifications: impact math skills, spatial perception, and visual-motor planning
- Vision Therapy provides an excellent opportunity to educate parents and educators on the developmental value of handwriting instruction…
- … and its key role in ensuring the left-handed do not get *Left Behind!*