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CONTINUED

Pediatric Case Study: Child with Oculomotor and Perceptual Challenges

Nicole R. Quint, Dr.OT, OTR/L

1

CONTINUED

Learning Outcomes

- Participants will be able to describe Skeffington's model and OT assessment results in order to analyze a pediatric case for intervention.
- Participants will be able to list evidence-based adaptive approaches to enhance school occupations from an immediate temporal context need and competently educate teachers and parents on efficacy in case study format.
- Participants will be able to describe evidence-based remediation approaches utilizing biomechanical, sensory, and cognitive approaches to improve occupational performance in a case study format.

2

CONTINUED

Case Introduction

- Patrick: 7 y.o. male in 2nd grade that has difficulties with reading, completing homework, and following instruction during school occupations. He does not finish copying things from board and tends to have difficulty with writing, coloring and ball sports. He uses his finger to read, loses his place, and often complains he can't find things in his books. He is slow with dressing routines, buttons and fasteners are a "nightmare", and cleaning his room is tough.
- He lives with his mother and father and two siblings. He is a shy child who loves dinosaurs, football, and Avengers. He says he wants to be a firefighter when he grows up, like his father.
- Patrick was a normal delivery without complications. Mom reports he was a fuss baby with colic. She also indicates that he was slow with some developmental motor milestones, particularly balance related and object manipulation. She said he has always had difficulty following directions and struggles with ADLs. She calls him "clumsy".
- Patrick also has a history of ear infections and adenoid removal. He is on his second round of ear tubes.

Q2

3

Vision

Total process responsible for reception and cognition of visual stimuli

Reception=sensory functions

- Extract, organize info from environment
- AKA: oculomotor skills, visual motor skills

Cognition=specific mental functions

- Interpretation of what is seen
- AKA: visual perceptual skills, visual cognitive skills

Functions

- 5 functions of mature visual system:
  - Respond and adjust to retinal stimuli
    - Anatomic, physiologic
  - Move both head and eyes to collect raw data (reading, copying, taking tests)*
    - Oculomotor, vestibulo-ocular control
  - Effectively interpret visual information
    - Visual perceptual skills
  - Respond to visual cues through efficient limb movements
    - Visual motor integration
  - THEN…Integrate the above functions in occupations

*Q3

Video Link: Visual Development

- https://www.youtube.com/watch?v=SADUFc5w47Q

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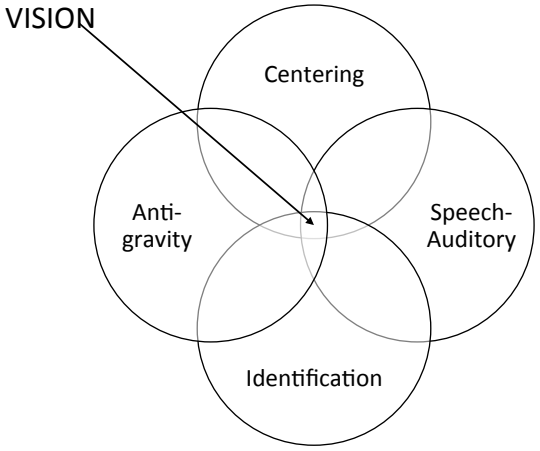
CONTINUED

Skeffington's Model



Q1

7

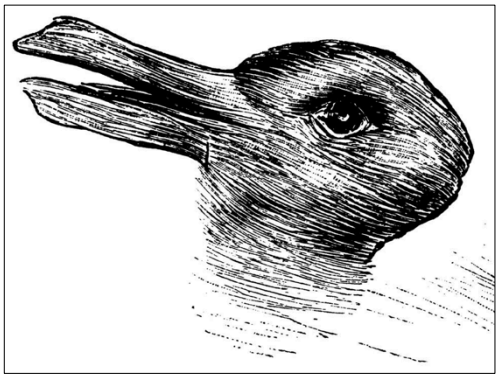
CONTINUED

Skeffington Spelled It Out…

- Antigravity system (vestibular system)
  - Internal balance
- Centering
  - Attention and orientation
  - Directing body, head, eyes toward area in space
- Identification
  - Gathering meaning from areas of selected attention in external space
  - Relationships between details (discrimination and differentiation)
- Speech-auditory
  - Analysis and communication of what is seen

CONTINUED

We see with our whole body…our eyes are simply the mechanism!



Wikimedia, n.d.

9

Second Grade Occupations

Reading
- Reading complex words (2-syllable)
- Understands structure of story
- Self-corrects mistakes and re-reads when necessary

Math
- Addition/subtraction 1-20 using mental math
- Can break down 3-digit number into groups, knows various polygons
- Tells time, solves word problems with money

Science
- Works in groups to conduct experiments
- Records observations through writing and speaking to make conclusions
- Asks scientific questions and records observations through writing/speech

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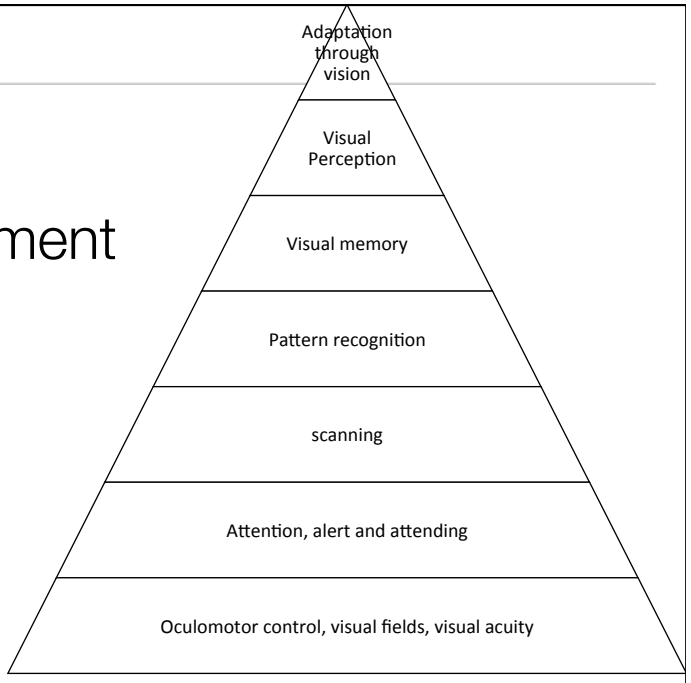
Visual Development



Q9, Q10

11

Case Assessment Results

- Assessments: M-FUN, DTVP-3, Beery VMI, oculomotor screening,
- School reports: Below age range in reading, above age range in math, handwriting difficulties, sits in front due to difficulty following directions, no significant behavior concerns but slow with work and often doesn't complete assignments
- Dislikes PE, but enjoys music and art class, enjoys science

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M-FUN	VMI	SFA	DTVP-3	SP2
Performance Scores: **Delays in Gross Motor, Visual Motor and Fine Motor** (fine motor with highest scores)	**1-2 SD below mean all 3 subtests;** MC lowest scores	**Increased need for assistance** -task behavior/ completion* -compliance with adult directives* -memory and understanding* -clothing management (activity performance limitations with *) -Limitations with using materials	1-2 SD below norms in: **-subtests:** figure-ground, visual closure, eye-hand coordination, form constancy **Composites:** Motor-reduced VP, Visual Motor Integration, and General VP all 2-SD below norm	**Proprioception and visual** much less than others; **Registration/ Bystander** (Much More than others) **Sensitivity** (More than others) **Movement and Auditory** much more than others **School Companion:** School factor 2 Much More than Others (Attention and learning)

Research: Assessments

Kulp (1999a, b)	Kulp (2003)	Klein et al. (2011)	Ego et al. (2015)
• VMI related to teacher ratings of reading, writing, spelling (7-9yo)	• Assess all 3 subtests of VMI • WNL on VMI may show deficit in other subtests	• DTVP-2 differed between students classified as "skilled" and "unskilled" hand- writers • DTVP-3 based off same purpose with improved psychometrics	• Poor visual memory predicts reading comprehension, related to below-average reading decoding, math, and overall academic achievement (SAT) 2nd-4th graders

EBP Remediation: Skeffington's Model

Vestibular	Motor: Exercise/ strength	Language and Identification (cognitive)
• Hypofunction affects reading acuity • Can promote gaze stabilization • Balance training	• Exercise program can improve hand eye coordination • Visual attention therapy improves reading skills	• Proprioceptive awareness • Visual imagery • Perceptual activities • Improving VM, WM and automaticity in motor learning improves reading and learning

Christy, 2019; Shelly-Tremblay et al., 2012; Gibson et al., 2015; Garje Mona et al. 2015; Jamal et al. 2019; Grisham et al., 2007; Sweeney et al., 2014; Mast et al., 2014, Gaymard et al., 2017; Van Hecke et al., 2019.

Q5

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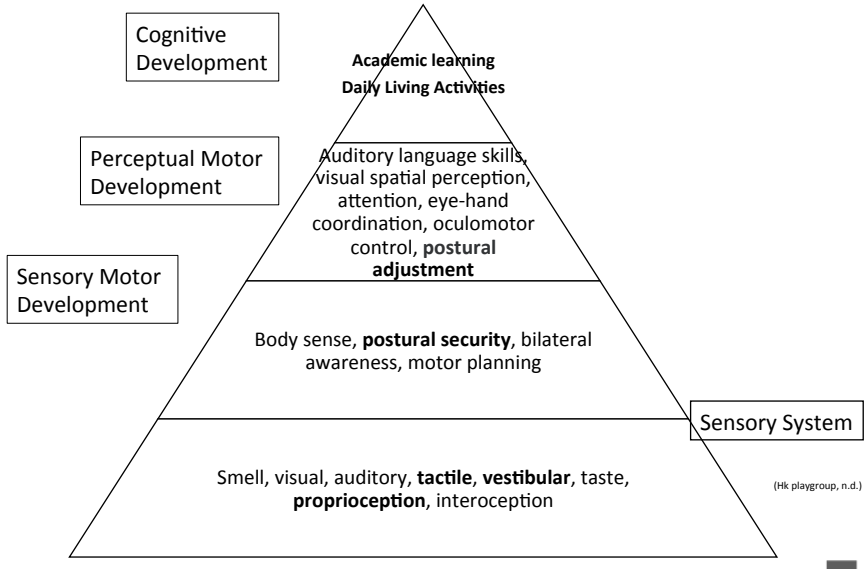

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CONTINUED

Remediation Approaches: Motor

- Prone extension strength
- Supine flexion strength
- Postural control
- Head/eye dissociation

- Sustained stationary posture
- Sustained seated postural control
- Prone extension for lateral tracking
- Supine flexion for vertical tracking
- If the child cannot sit still, the child will not have adequate vision for learning!

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CONTINUED

Remediation Approaches: Vestibular

- Balance reactions
  - Righting reactions
  - Equilibrium reactions
  - Protective extension
- Stationary balance
- Dynamic balance
- Vestibular processing
- Rolling with gaze stabilization

- History of ear infections?
- History of ear tubes?
- History of car sickness or other motion over-responsiveness
- Can he/she do a somersault?
- Can he/she do a log roll?

Q4

18

Let's Apply!

- Perform top down occupational analysis and find discrepancy
- Identify and incorporate occupation-based practice to address discrepancies
- Final occupation-based activity mimics real activity in context
- Incorporate adaptations as needed (including education and consulting)
- Embed vestibular, motor, and cognitive perceptual based upon visual hierarchy and discrepancies

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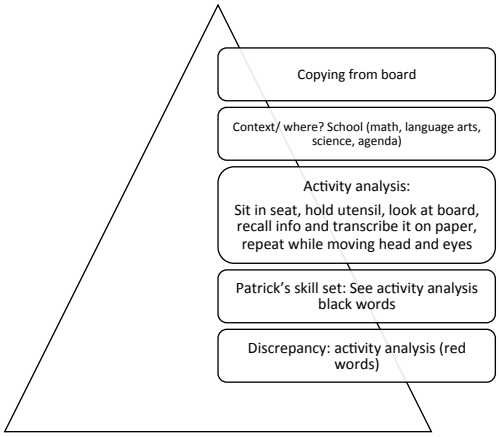
Case Application: Remediation

Patrick:

Top down analysis



Focus for intervention (sustained posture, head and eye dissociation with gaze stabilization, visual memory)

Occupations: Mad Libs, Secret Decoding, scavenger hunt, obstacle course, Patrick Olympics

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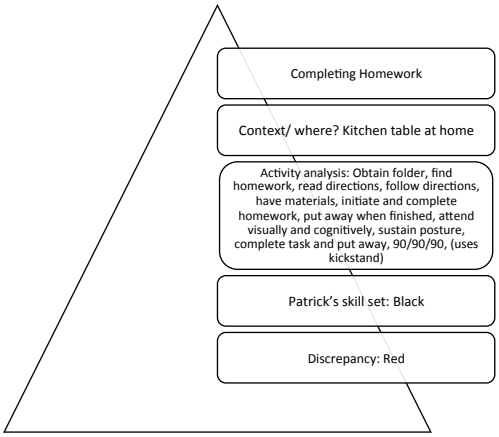
Case Application: Remediation

- Patrick:



Focus: completing (sustained attention, postural and bilateral integration, environmental supports)
Occupations: Mad Libs, fantasy football, football charts and plays, stop drop and roll obstacle course)

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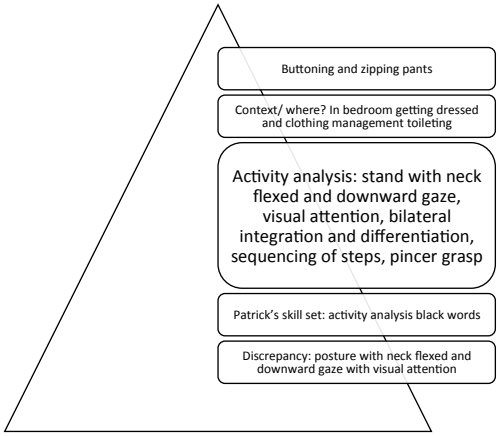
Case Application: Remediation

- Patrick:



Focus: Posture with neck flexed and downward gaze; visual attention
Occupations: mini golf, egg game, crab soccer, fire rescue

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Evidence Based Approaches: Adaptive Approaches

Functional Learning Position	Reduce Eye Strain	Reading Options
Harmon Distance Postural supported seating	20/20/20 Lighting Seat position Computer screen	•Finger Tracking •Graphic Novel/ Comics •Closed Captioning •Window/ruler

Q6, Q7, Q8

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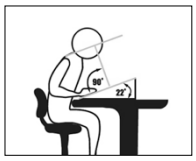
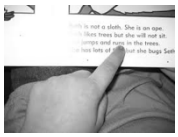
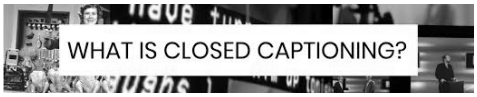
Case Application: Adaptive Approaches

- What would you choose for Patrick?
- Rationale? Education?







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Helpful Resources

- https://www.trianglevisions.com/blog/your-childs-vision-development/
- https://www.aao.org/eye-health/tips-prevention/children-vision-development
- http://www.healthofchildren.com/E-F/Eye-and-Vision-Development.html
- VERA vision screening program https://visualscreening.com/
- https://www.covd.org
- AMAZING blog with lots of sections: https://visionhelp.wordpress.com/

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Questions?

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