Evidenced Based Cognitive Rehabilitation of Attention: Case Example

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Learning Objectives

- Discuss evidence based options for treating impairment in attention.

- Describe techniques for improving attention and the steps involved in carrying out treatments.

- Provide guidelines to assist in treatment selection and monitoring of progress.

Case Study

- Rugby athlete
- 21 year old male
- College senior; physics major
- Competed in high school football and wrestling
  - "In high school, there were a lot of times where everything would go fuzzy but I would just shake it off and keep playing"
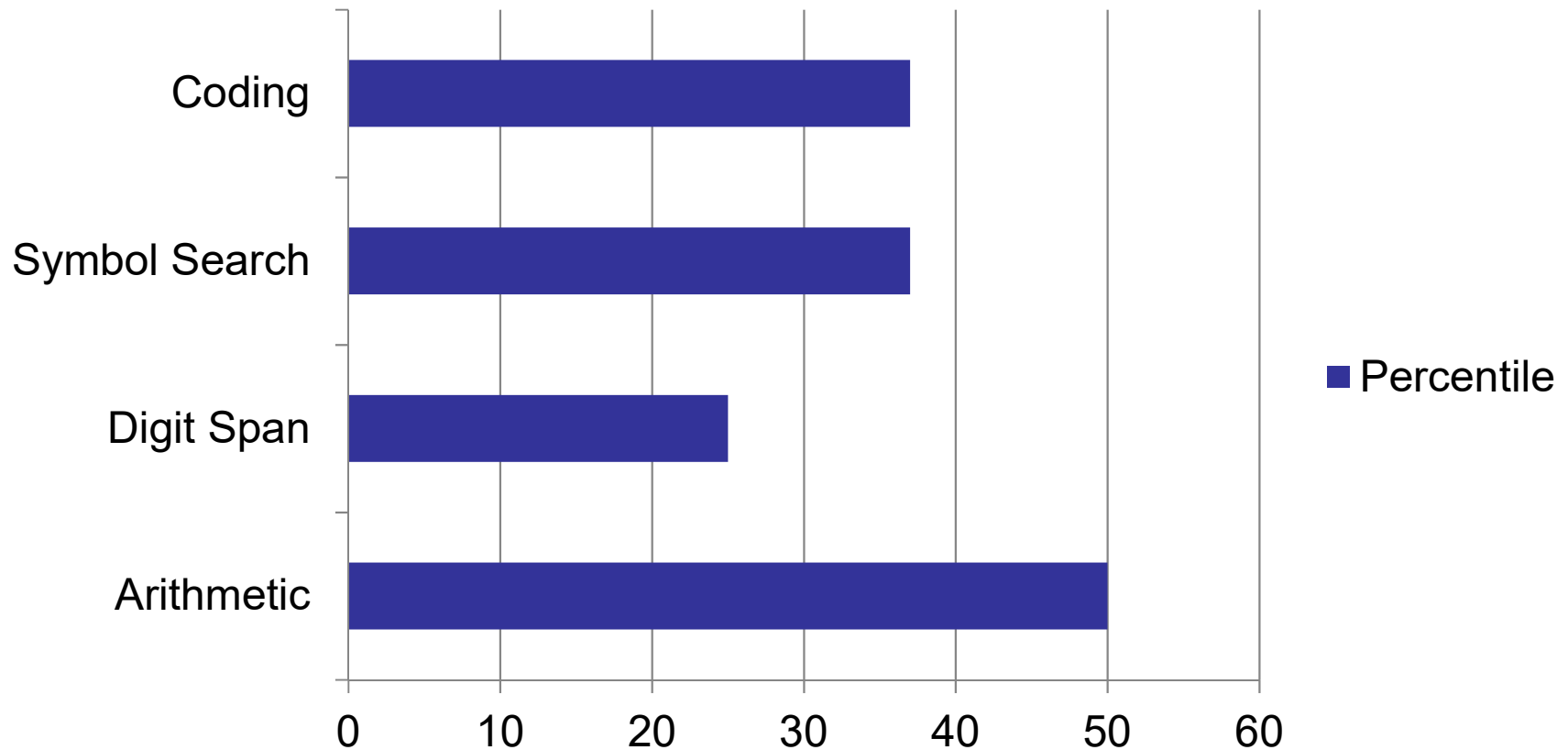
Sustained 5 concussion in 6 months

- April 13, 2013: kicked in the head – "Everything went black…., but I continued to play the rest of the game";

- April 27, 2013: knee to the head – "I got up slow and kept playing, until my head was hurting too much…then I came out";

- April 28, 2013: "I didn't start this game, but a teammate broke his clavicle and I was put in the game… I got my bell rung a few times, but nothing too serious that I considered a concussion";

- May 11, 2013: head-to-head – "I instantly lost the feeling in the back left part of my skull, and blacked out for a brief moment";

- September 23, 2013: head-to-head – "We hit with less force than a typical hit, the next thing I remember, I was curled up face down on the turf, I opened my eyes but couldn't see anything"

Background History

- Psychological/Emotional History:
  - Depression age 7 after father died from cancer;
  - Recent depression due to concussions and cognitive difficulties; he "broke down emotionally"
  - Moderate-severe anxiety; self-medicates
- Social History:
  - Good student; excels in science, struggles in reading;
  - Mother and friends provide strong social support
- Behavioral Observations:
  - Flat affect; calm and pleasant; mildly anxious
- Set backs:
  - January 4, 2014 – Car accident; 6th concussion

Select Neuropsychological Test Data
(12 February, 2014)

Attention Tests

Legend: ■ Percentile

Categories (top to bottom): Coding, Symbol Search, Digit Span, Arithmetic

X-axis: 0, 10, 20, 30, 40, 50, 60

Neuropsychological Testing (CVS)

Domain	T1		T2	
	Score	%	Score	%
Verbal Memory	41	1	39	1
Visual Memory	47	47	37	37
Psychomotor speed	175	34	150	3
Executive Function	49	42	28	6
Cognitive Flexibility	46	34	25	1
Reaction Time	735	5	942	1

T1 = Initial testing date
T2 = Follow-up testing

- The athlete had cognitive testing in October 2013 at the end of the season.
- Follow up testing was done after the car accident (his 6th concussion in 9 months)
- Findings indicate a decline in memory, attention, motor speed, and executive function.

Report of Symptoms

Cognitive
- Difficulty concentrating; easily distracted;
- "Fairly forgetful";
- Word-finding difficulties.

Emotional
- Easily overwhelmed and frustrated
- Bursts of anger and depression.

Physical
- "Really bad" headaches (daily);
- Light sensitivity;
- Fatigue ("I need constant naps").

Rehabilitation Plan

- Reduced class load (2 classes, 6 credits):
  - "I had to drop a math class because I couldn't keep up with lectures";
- Accommodations (e.g. testing extensions);
- Physical therapy –
  - Headaches, regain feeling in back of his head;
- Speech therapy – (Cognitive Rehabilitation)
  - Addressing attention/concentration, word finding;
  - 2x/week for 8-10 weeks; re-evaluation.

Patient's Goals

- Long-term: Get his college degree by the winter of 2015; attend graduate school and ultimately open up his own "physics shop".

- Short-term: "Not get distracted"; Improve working memory, processing speed, and sustained attention; Increase stamina, reduce fatigue, reduce frustration.

Goals of Treatment

Long-term Goals:

- Increase ability to attend to class lectures;
- Increase work (processing) speed;
- Reducing level of frustration.

Treatment Plan:

- Attention Training
- Compensatory strategies

Short-term Goals:
- Pt will attend to a reading passage for 30 minutes and answer related questions accurately:
    - With 2, 5 minute breaks; 1, 5 minute break; no break

Attention Process Training (APT): Stages of Treatment

Overview of Treatment

Week 1-2

- Assessed attention-Objective & Subjective
- Established clinical and functional goals
- Completed the Patient-Initiated Continuum (PIC) questionnaire; identifies specific skills that impact ADL
- Began APT task: 2-back executive control

Week 3-6

- Continued simple & complex sustained attention task with increasing hierarchy of difficulty.
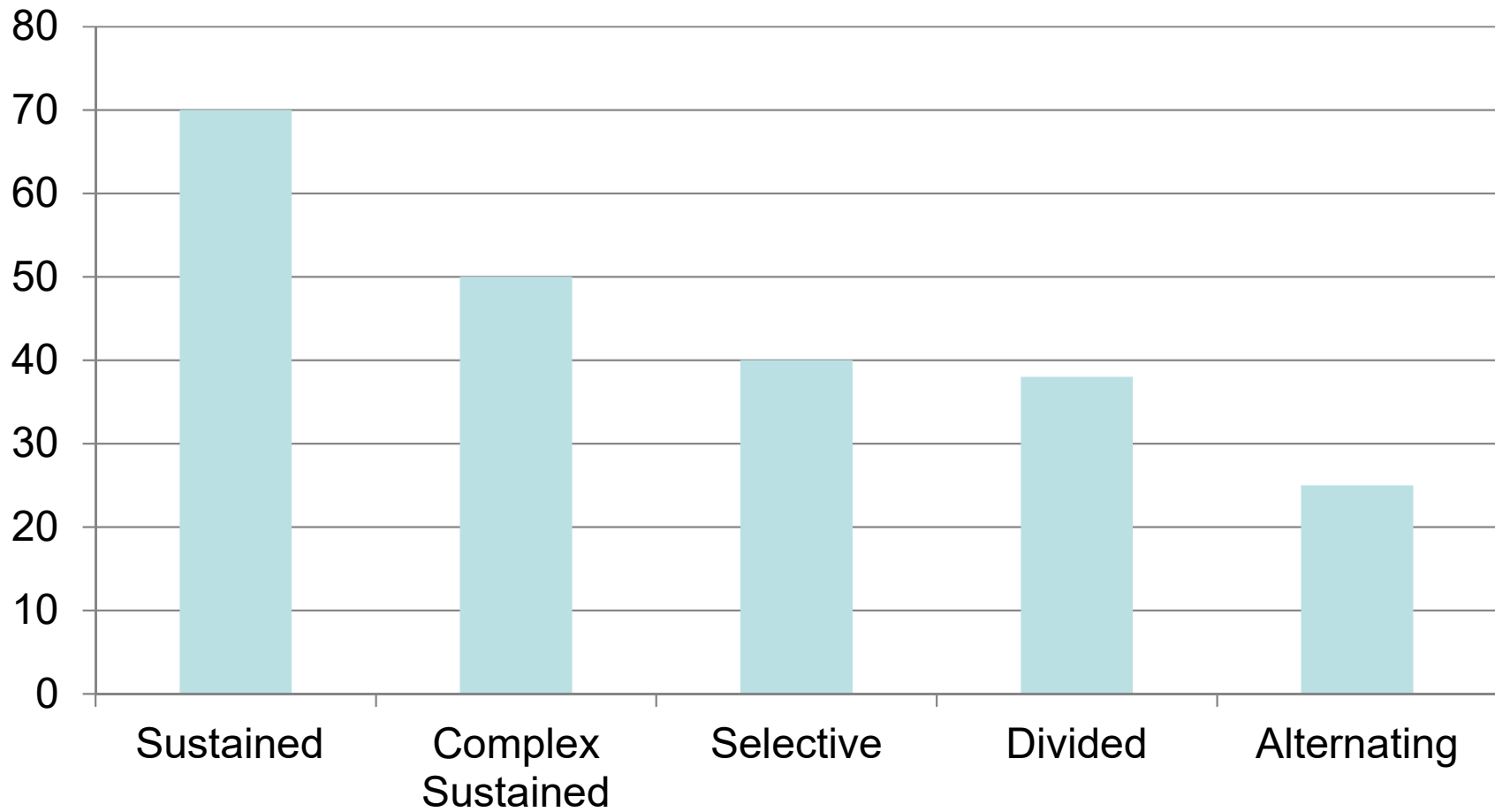- Provided feedback

Assessment

Objective data

- Neuropsychological Data: Decreased auditory attention, processing speed, verbal production/fluency/naming, problem solving & concept formation.
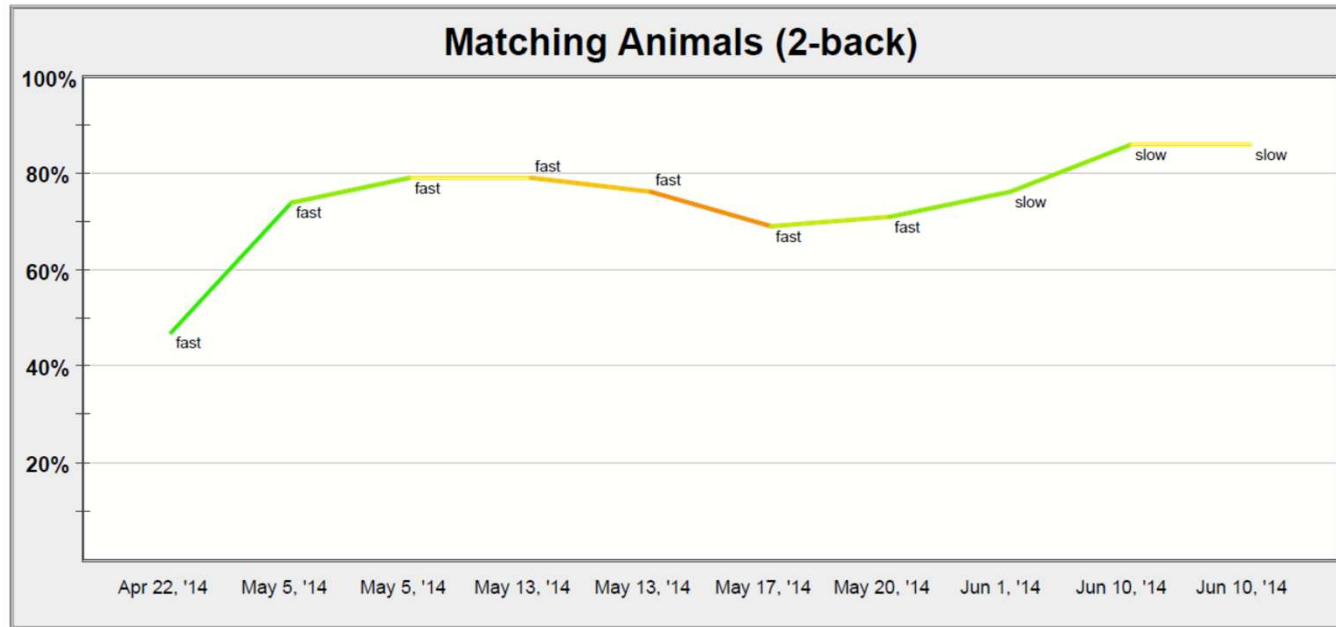
- APT-Test

Subjective data

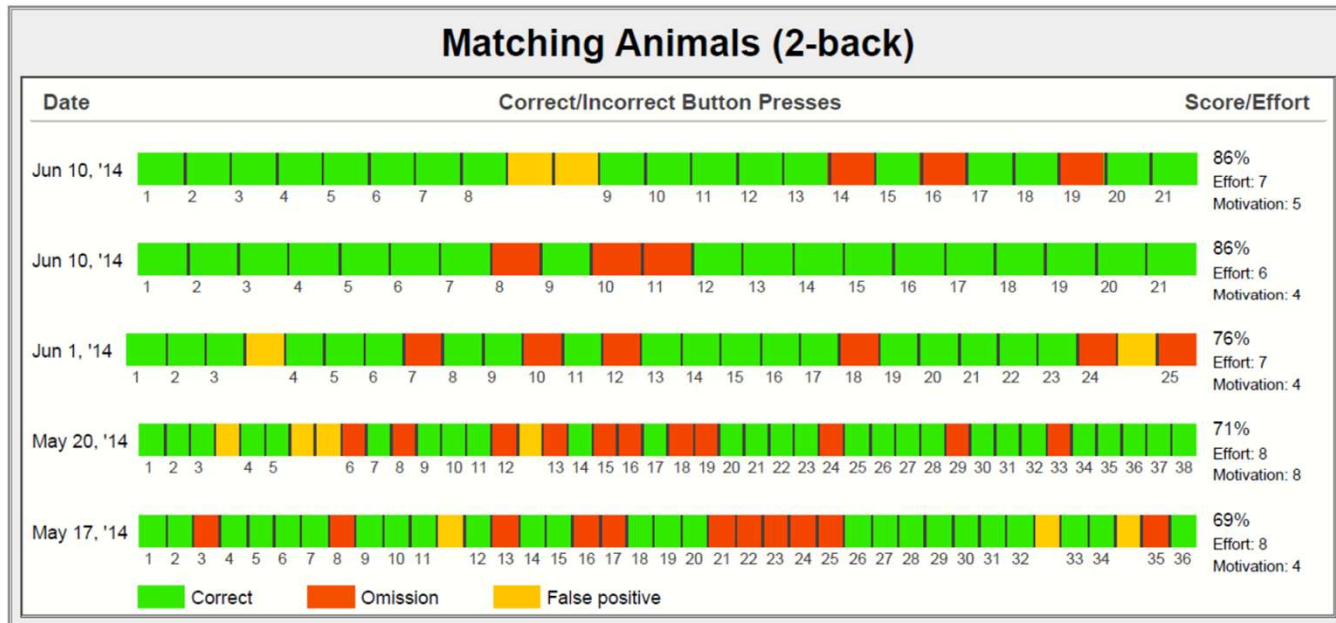- APT Questionnaire; Patient-Initiated Continuum (PIC)
- APT Log

APT-Test Results

Task Data over Time:

Matching Animals (2-back) — line chart showing scores from Apr 22, '14 through Jun 10, '14.

Detailed Task Data:

Matching Animals (2-back)

Date	Correct/Incorrect Button Presses	Score/Effort
Jun 10, '14		86% Effort: 7 Motivation: 5
Jun 10, '14		86% Effort: 6 Motivation: 4
Jun 1, '14		76% Effort: 7 Motivation: 4
May 20, '14		71% Effort: 8 Motivation: 8
May 17, '14		69% Effort: 8 Motivation: 4

Legend: Correct (green), Omission (red), False positive (yellow)

Generalization Activities

<u>Goal</u>: Patient will read passage from physics textbook and answer 5 questions at the end while taking a 2 minute break every 15 minutes for a total of 30 minutes. Homework will be completed on Tuesday and Thursday evenings.

| Date/Time	Activity	Performance	Comments
5/13 7:00pm	Began reading chapter, read first 2 pages	Read for 10 minutes, roommates were making noise, he got distracted and never got back to task	Find alternative location to complete homework assignments.
5/15 7:30pm	Finished reading chapter, did not answer questions	Started feeling tired after reading for 15 minutes.	Take breaks every 10 min instead of 15. Breaks should not entail looking at phone.
5/20 7:15 pm	Read next chapter, completed questions and put in notebook to take to class next day.	Remembered to set alarm to take breaks. Did not feel too tired. Read in a quite room away from roommates.	Continue taking breaks every 10 minutes. Increase reading time to 15 min.

Overview of Treatment

Week 6-8

- Therapy begins to include a divided attention task-reading article for content and crossing out targets.
- Initiated generalization activities outside of clinic

Week 8-10

- Increased levels of complexity and level of independence in completing tasks.
- Continued to collect data regarding generalization activities

Outcomes: APT Re-Test Results
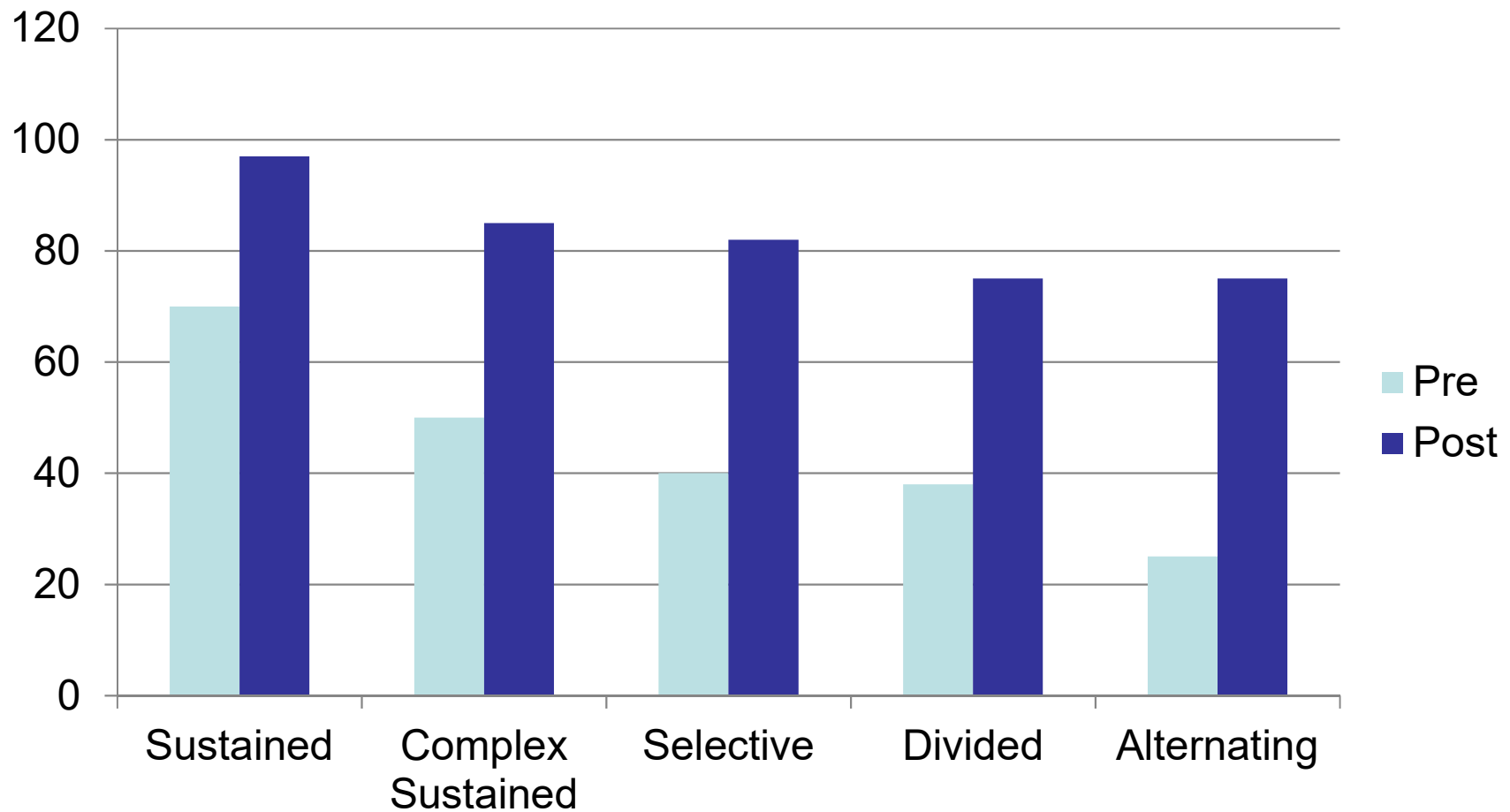
Follow-up Neuropsychological Testing

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	Score	%	Score	%	Score	%
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Visual Memory	47	47	37	37	47	47
Psychomotor speed	175	34	150	3	158	12
Executive Function	49	42	28	6	44	25
Cognitive Flexibility	46	34	25	1	41	18
Reaction Time	735	5	942	1	645	27

Outcomes: 6 month follow-up

- Increased alertness
- Decreased fatigue
  - Requires fewer naps
  - However, becomes increasingly drowsy as day progresses
- Decreased irritability
- Infrequent headaches
- Increased course load

- Continues to report:
  - Light sensitivity
  - Forgetful
  - Word finding challenges

- One year follow-up:
  - Graduated from WWU
  - Lives with mother

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