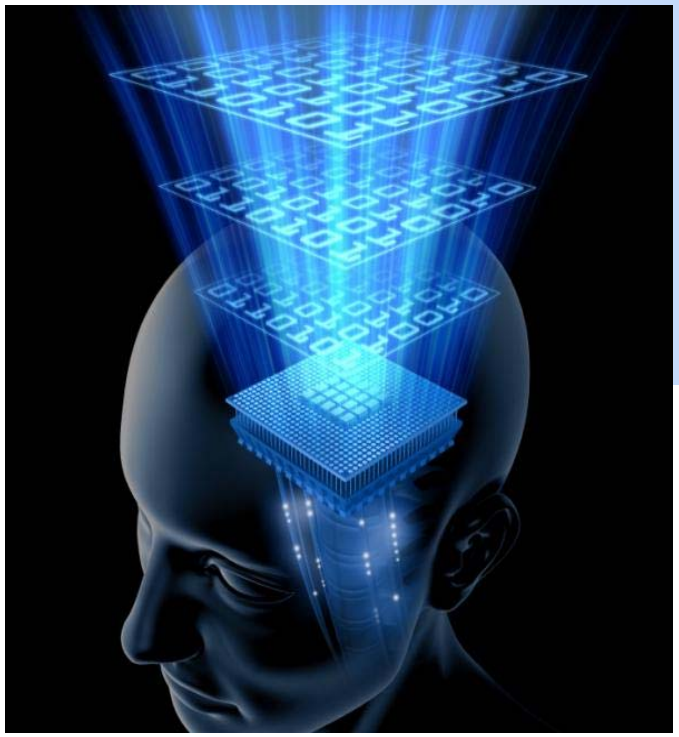
Cognitive Processing of Multimedia by Individuals with ADHD



Retrieved from Science Digest

Victoria Brown, Ed. D. Florida Atlantic University

David Lewis, Ph. D. Nova Southwest University

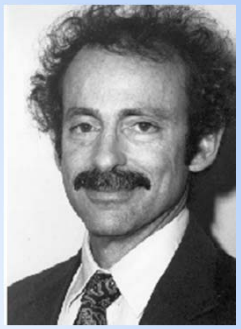
Human Cognitive Architecture

* Limitations to the Processing System (cognitive load)
* Dominate Structure in the Cognitive Architecture is Memory
  * Long term memory
  * Short term memory
  * Sensory systems

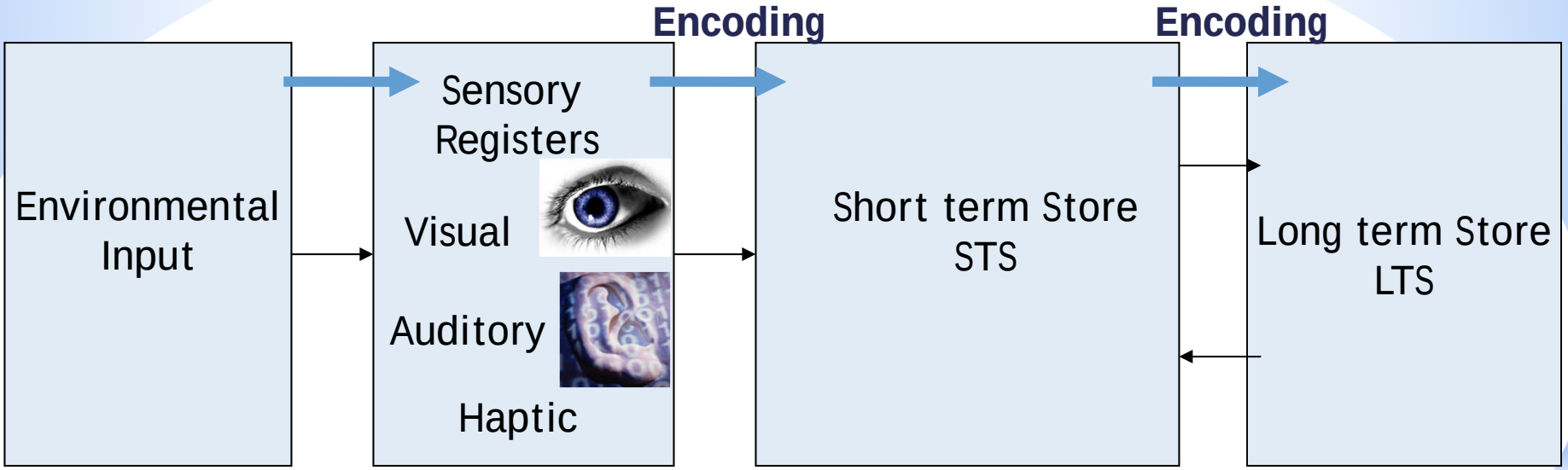
Sweller (2003)

Richard Atkinson

Information Processing theory



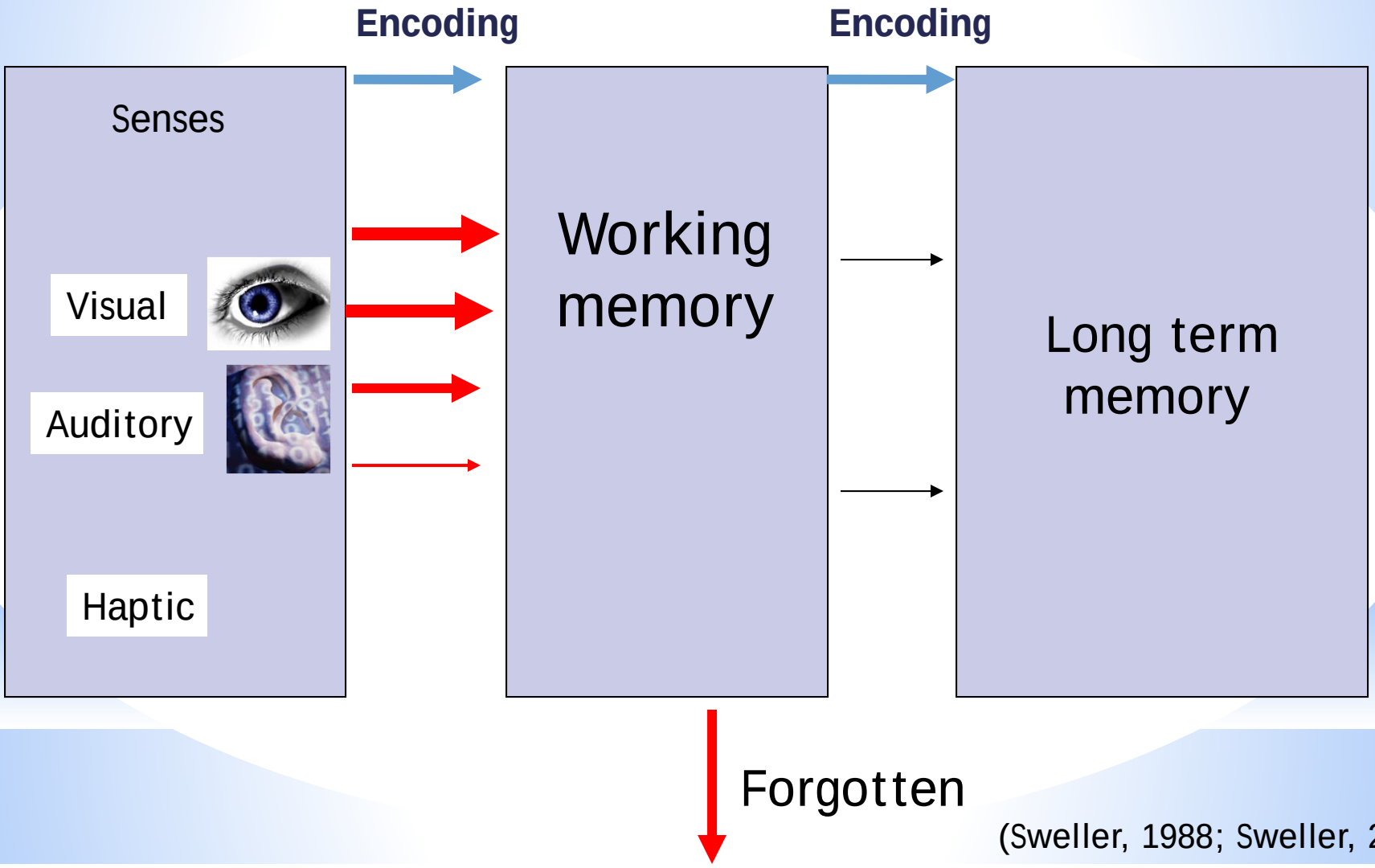
Shiffrin



Atkinson & Shiffrin (1968)

John Sweller

Cognitive Load Theory



(Sweller, 1988; Sweller, 2003)

ADHD Working Memory

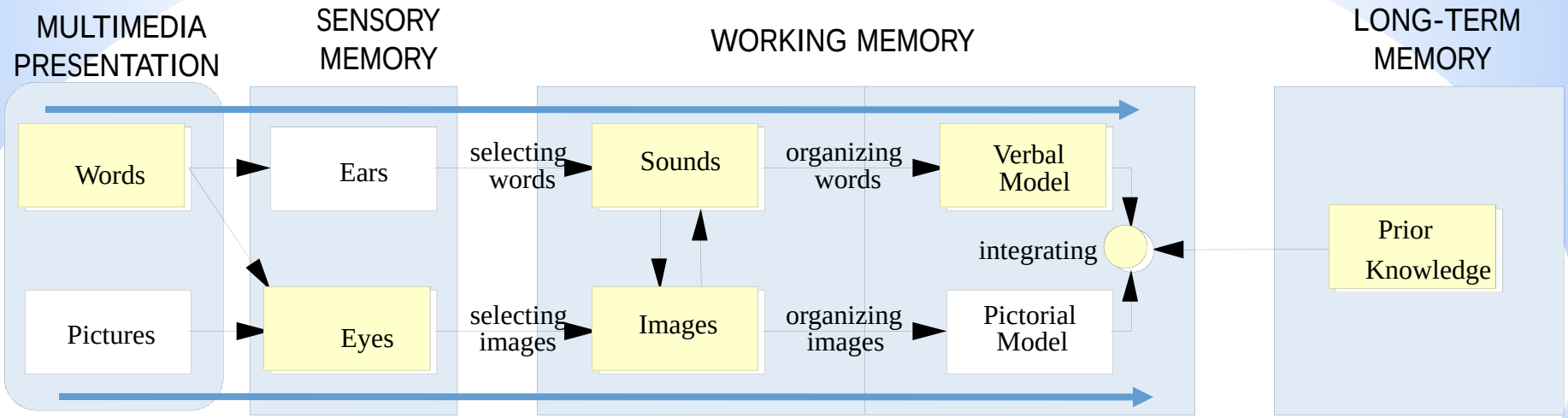
* Symptom
  * Inattention
  * Hyperactivity
  * Impulsivity
* Increased cognitive load activities
  * Effects the ability to process information through the sensory subsystems
  * Results in deficits
  * Possible effects their ability to process multimedia

* Unable to sustain attention over time (Brown, 2009; APA, 2000)
* Delay in response or change in required response pattern reduces performance (Cutting et al, 2003)
* Unable to narrow their attention to a specific spatial region or target a stimulus in a high density display (Shaley & Tsal, 2003)
* Addition distractors, multiple elements of information, or multiple operators causes slower response times and lower accuracy rates.

ADHD and Cognitive Load

Richard Mayer

Modality Effect



Cognitive Theory of Multimedia Learning

(Mayer, 2001)

* Visuaspatial subsystem less effective in processing information (Alderson, 2010)
  * Inability to limit visual searches to a specific spatial region on a screen (Shaley & Tsal, 2003)
  * Increased density of objects on the screen caused lower rates of success in searching for visually presented information (Shaley & Tsal, 2003)
* Deficits in phonological system at noted in younger children but appear to improve over time (Sowerby, Seal, & Tripp, 2011)

Modality Effect and ADHD

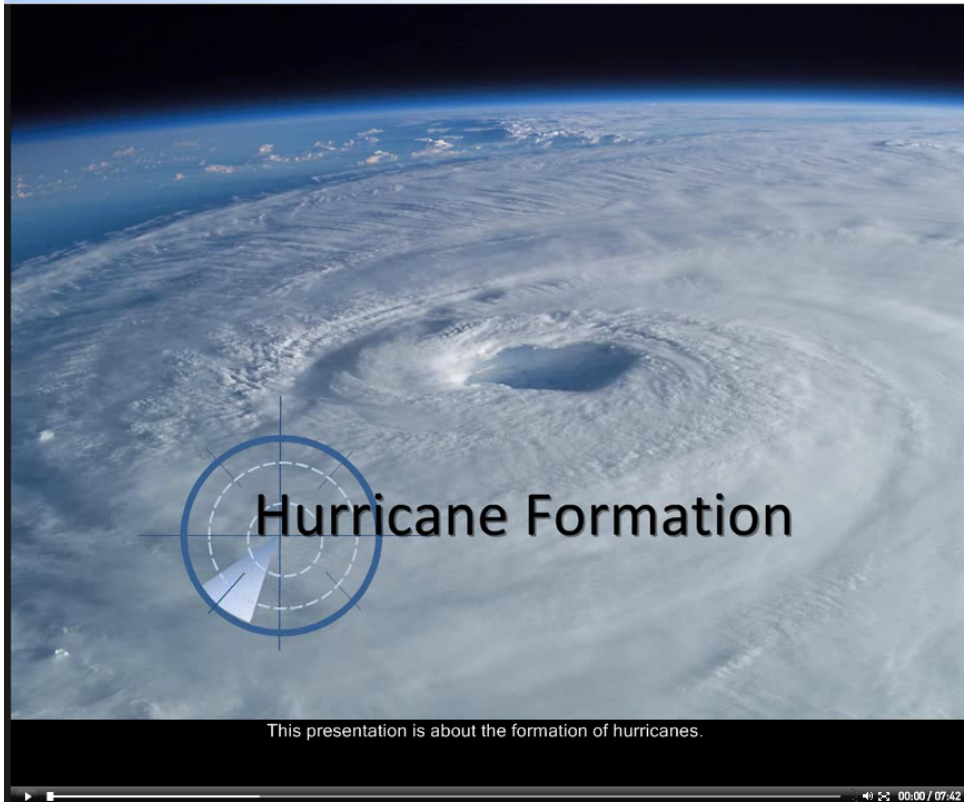
Redundancy Effect

* Redundant information in instruction
* Increases cognitive load
  (Chandler & Sweller, 1991;
  Sweller & Chandler, 1991)
* **Question what is considered redundant?**

Redundancy Effect

Redundancy Effect and ADHD

* Simultaneous narration and redundant text (no visuals) improved reading comprehension in less skilled readers (Montali & Lewandowski, 1996)
* In individuals with ADHD the dual processing of visual and audio is complicated by slower response to visual information (Weiler et al, 2002)
* Increased complexity leads to inaccurate responses and slowing down of the processing



With Subtitles

Without Subtitles

*Methodology

Informed Consent

All learners

Redundant

Non-redundant

Survey

Survey

Identical Survey:
Includes 18 questions
Demographics
Quiz, etc

Thank you! page

Thank you! page

During data analysis

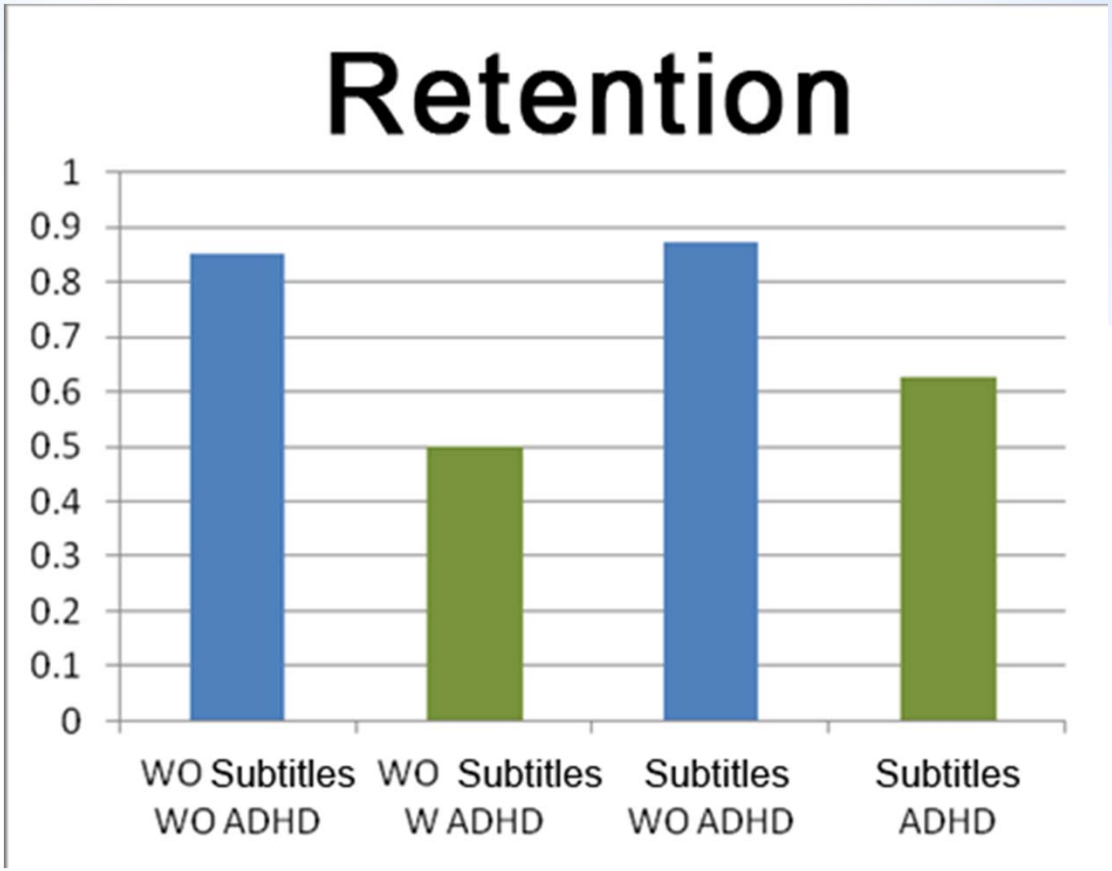
Scores

ADHD

Non ADHD

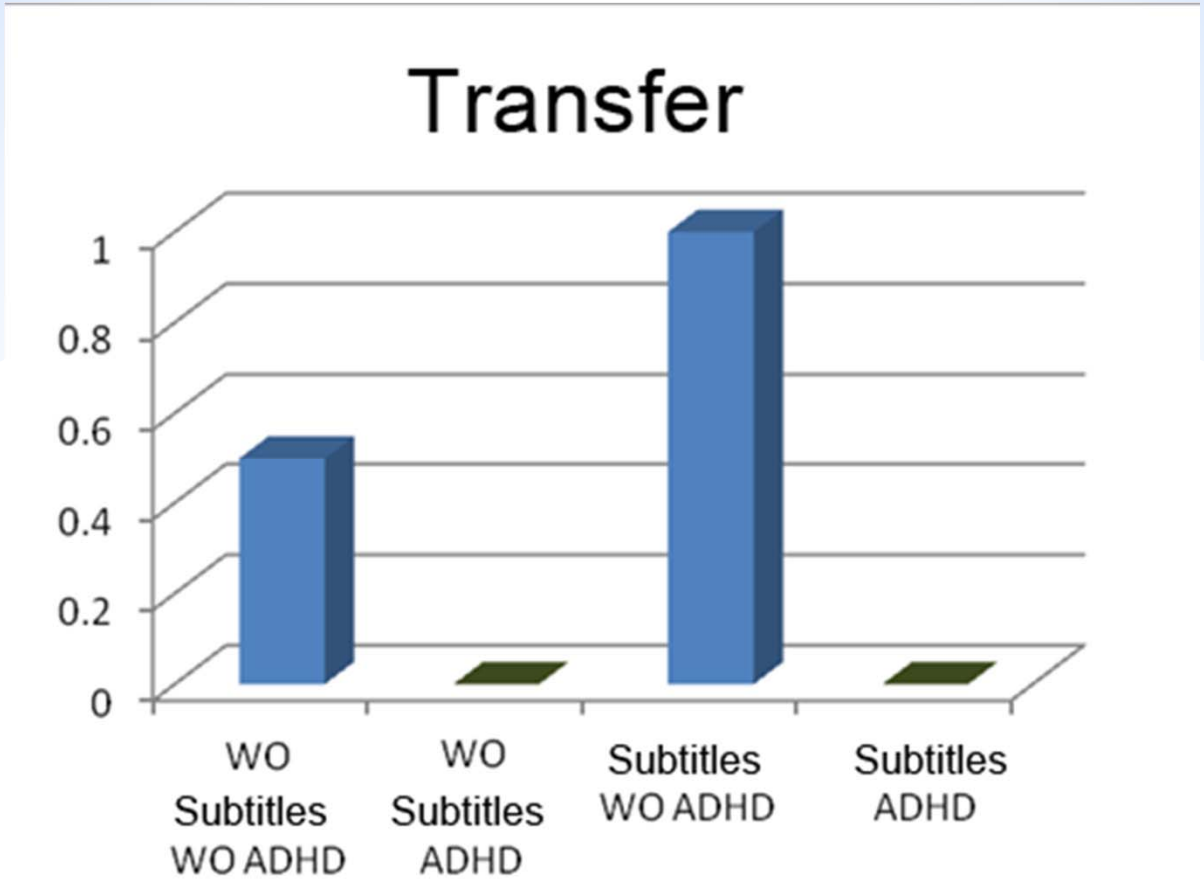
ADHD

Non ADHD



Pilot Study Findings

n=7



Pilot Study Findings

n=7

Discussion

- Contrary to Mayer and Johnson 2008, these students did not experience redundancy effects.
- The one ADHD person was able to recall better with redundancy.
- Either individual with ADHD was able to transfer possibility due to the complexity of the task.