

*Attention &
Memory
Deficits
in
TBI Patients*

An Overview

References

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- *Traumatic Brain Injury (TBI) is becoming a common occurrence, with nearly 400,000 new injuries per year*
- *TBI is known to affect cognitive functioning including attention*
- *The majority of persons with minor head injuries have difficulty with attention, concentration, memory and judgement*
- *Attention is critical to all areas of cognitive functioning including language*

- *The impact of head injuries on cognitive and neuropsychological functioning can be extensive and wide-ranging.*
- *Attention and Memory deficits are one of the most striking cognitive difficulties commonly reported by patients and their relatives following head injuries.*
- *50% of patients suffering from mild to moderate closed head injuries will develop a group of clinical symptoms known as post-concussion symptoms (PCS).*

PCS

- *Characterized by a range of subjectively experienced symptoms including:*
 - headaches*
 - dizziness*
 - fatigue*
 - irritability*
 - slowed thinking*
 - memory dysfunction*

- *Patients who report a greater number of symptoms at 1, 6 or 12 months after suffering from mild head injury may have more attentional deficits than patients reporting few or no symptoms*
- *It also appears there are large variations within these patients in terms of both presented symptoms and neuropsychological performance.*

Attention

- A vague and often used word in describing human behavior
- May be quantified by intensity and qualified by selectivity. That is how a person consciously makes an effort on one task, and how he can selectively withdraw from it, in order to deal effectively with the second task.

Theories of Attention

- *Dual process theory of attention*
- *Resources allocation theory of attention*
- *Cognitive neuropsychological and neuro-anatomical theories of attention*

Dual process theory of attention

- *Shiffrin and Schneider focused on two qualitatively different type of processes involved in attention*
 - *Automatic processing*
 - *Controlled processing*

Automatic Processing

- *A fast, parallel, and effortless process that is not limited by short term memory capacity*
- *Not dependent on conscious choice*
- *Not impaired by the concurrent execution of another task*
- *Responsible for well developed skilled behavior*

Controlled Processing

- *Slow, generally serial, and effortful process that is limited by capacity*
- *Responsible for the self-regulated processing that must be dealt with for the novel or inconsistent information*

Dual Process Theory, cont'd

- *Shiffrin and Schneider also distinguished 2 types of attentional problems...*
 - *Focused attention deficits*
 - *Divided attention*

Focused attention deficits

- *This occurs when a response produced by automatic processing interferes with a response produced by controlled processing*

Divided attention deficits

- *Results from the limited capacity of the system for controlled processing*
- *However, Hirst, et.al. showed that complex tasks requiring controlled processing can be performed simultaneously with very little or no interference*
 - *Still somewhat controversial*

Resources allocation theory of attention

- Noted as a power supply that can be flexibly allocated in many different ways to response to task demands
- Kahneman proposed that all non-structural interference between tasks were explained by a central energy or mental effort limitation
- Wickens further proposed a multiple-resource model in interpreting any interference between two tasks tapping different resources

Cognitive neuropsychological and neuro-anatomical theories of attention

- *Deals with the interrelationship between brain lesions and the manifested inattentive behavior*
- *Different theories explain attention deficits with location of lesions (Chan)*

Summary of attention theories

- Despite the various views of attention, there is commonly acknowledged agreement among them: attention is subserved by different brain regions and may be described in terms of different components, including several basic elements of attention in sustaining, dividing, and selecting attention, and a higher mental function in regulating and over-running the strategy allocation of attention onto different tasks.

More about PCS

- *The term post-concussion derives from early conception of concussion as an entirely reversible syndrome without detectable neuropathology*

Cont'd

- *The Mild Traumatic Brain Injury Committee Special Interest Group of the American Congress of Rehabilitation Medicine developed a classification system to help define the characteristics of cerebral concussion*

It includes.....

- *1) an actual or suspected loss of consciousness for less than 30 minutes*
- *2) reversible loss of consciousness*
- *3) Glasgow Coma Scale between 13 - 15, 30 minutes after the accident*
- *4) post-traumatic amnesia not longer than 24 hours*
- *5) altered mental status at time of accident, i.e. feeling dazed, disoriented, or confused*

Taking a look at memory....

- *TBI can display a variety of memory impairments such as:*
 - *forgetting new information*
 - *Impaired prospective memory*
 - *Interference*

Cont'd

- *TBI also display executive function impairments such as:*
 - *Impaired self-monitoring*
 - *Strategy decision making*
 - *Planning*

Memory complaints after TBI

- Retrieval deficits
- Acquisition of new information
- Working memory impairment, which is critical in the encoding of new information
- Impaired episodic memory

Remediation of “working attention”

- *N-back procedure*
 - *Consists of the presentation of a sequence of stimuli with the requirements for the participant to continuously report the stimulus occurring n number of stimuli previously*
 - *Example: in the 1-back condition a set of digits are presented sequentially in random order and the participant is instructed to report the digit which occurred one prior to the current digit*
 - *(can use playing cards for stimuli)*

N-back with intermittent verbal generation

- *In addition to previous n-back tasks, participants were required to make a self-generated response on each trial, prior to naming the relevant card in the n-back task.*

N-back with continuous secondary task

- *Participants were engaged in an ongoing secondary task while maintaining performance on the primary n-back task and actively allocating attentional resources between the various task demands.*