

# Case study on a patients neuropsychological assessment



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TL was referred for a follow-up neuropsychological assessment to determine current symptomatology and level of functioning in light of executive dysfunction potentially manifesting itself, following traumatic brain injury incurred during a motor vehicle injury in November, 2008.

TL is a 44 year old, right-handed male. Leaving school at age 15, he pursued a career in media and publishing. Prior to injury, he had been living and working in Asia for the past 13 years, where his wife and child remain to date. TL presently finds himself unable to mentally cope with previous working environment demands, where resultant financial challenges make catering for his family unfeasible. History of alcohol abuse since age 16 has necessitated repeated AA involvement. He currently leads a very restricted lifestyle, living alone in a single room and unable to handle normal daily challenges. He has served as an inpatient in hospital, as well as having had a package of care set up at home.

TL exhibits no recollection of the accident itself, where upon regaining consciousness, required time to orient himself. Irregular retrograde amnesic episodes have been reported since, where he considers day-to-day memory to have improved markedly. TL has also experienced sporadic tonic seizures, for which he is receiving anti-epileptics. Most noticeably, he experiences challenges structuring daily life through multi-tasking and organization, where reliance on a notebook provides security, but is maintained somewhat chaotically. Magnetic-resonance-imaging revealed damage to large portions of the left frontal lobe and anterior temporal pole, as well as superficial sclerosis following intra-cerebral haemorrhages in the cerebrospinal fluid.

TL expressed frustrations about inability to work and the implications for reunifying his family, but seemed generally optimistic that with time, normality would return.

## **Formal assessment**

### **Behaviour during testing**

TL attended the session unaccompanied and punctually, appearing sober. He was attentive and oriented to time, location and the investigator. There was no evidence of speech or hearing impairments, and motor movements and dexterity appeared normal. He was co-operative and motivated to engage with presented tasks but was ardent about minimizing severity of his condition, insisting on marked improvements and anticipated return to normality. Based on these observations, test results are deemed legitimate estimates of present cognitive functioning but caution was undertaken in assessing self-reports in light of tendencies to minimize difficulties and restricted insights to own condition.

### **General intellectual abilities**

Taking into consideration educational and occupational background, his pre-morbid functioning as interpreted by the National-Adult-Reading-Test-(NART-  
FSIQ) was average. Intellectual assessment using the Wechsler-Adult-Intelligence-Scale-(WAIS-III) suggests that verbal IQ was preserved, with abilities in vocabulary skills by defining words, reasoning skills and simple arithmetic falling within normal range. In contrast, his performance IQ, reflecting attention to detail, sequencing and abstract conceptualization

abilities, was markedly reduced and estimated below average, highlighting significantly impaired problem-solving abilities since the accident.

## **Memory function**

Formal memory assessments indicated a severe global deficit in ability to consolidate and recall information in both immediate and delayed tasks, substantiating memory deficits documented in everyday life. This impairment extended to both verbal and non-verbal items, presenting marked difficulties in immediately recognizing words and faces (<5%ile and 5th%ile, respectively) and later reproducing a complex figure he initially registered adequately and a short story, scoring in the <5th%ile and 5-10th %ile, respectively.

## **Language and Literacy skills**

Whilst vocabulary in natural conversation appeared to be largely preserved, formal assessment of basic language functioning revealed poor performances on graded naming tests and very poor semantic fluency task performance, scoring below the 1st%ile. Throughout the session, TL was communicative and exhibited fluency in speech and quantity but presented considerable repetition, being heavily reliant on formulaic phrases and routine exclamations. He expressed inabilities to be specific in response to questions directed at him, resorting to confabulation by producing long-winded but essentially empty answers.

## **Visual-Perceptual and Visuo-spatial skills**

TL exhibited adequate level of visual processing skills as examined by the Visual-Object-and-Space-Perception-(VOSP) object decision task and direct

replication of a complex figure. It is of note that whilst a spatially coherent copy was created, the manner by which this was achieved was highly disorganized, TL adopting a chaotic approach.

## **Executive functions**

Formal assessment exposed profound executive functioning deficits, TL scoring below the 1st%ile in a phonemic fluency task. Whilst performing better on letter ' A' than ' F', he exhibited considerable repetition that he himself was unaware of, as well as an inability to constrain behaviour to outlined rules. On measures of the Modified Wisconsin-Card-Sorting-Test-(M-WCST), he similarly scored below average, obtaining only 3 out of 6 solutions and was unable to identify a 3rd sorting category, highlighting novel concept generation deficits.

## **Speed-of-Information-Processing**

Severe deficits in speed-of-information-processing became evident when required to learn abstract relations between numbers and symbols, as assessed by the Symbol-Digit-Modalities-Test-(SDMT). Scoring the same as less than 1% of individuals taking the test (<1st %ile) is consistent with low WAIS-III performance scores, which may similarly indicate impaired information processing, and deficits in carrying out cognitive processes automatically and under time constraints.

## **Conclusion**

TL is presently functioning well below the norm in most cognitive domains assessed, with visuo-perceptual and verbal reasoning skills preserved. The nature of his neuropsychological profile appears consistent with impairments

seen following frontal lobe damage. Frontal area functions have a variety of behavioural outputs, damage therefore leading to diverse syndrome presentations. These mirror difficulties manifested in TL's everyday life, such as reported inability to organize and coordinate daily tasks, as well as deficits in working memory and lack of drive, regarding returning life to normality. Overall, this alludes to a severe, general executive dysfunction underlying the recorded impairments in distinct, albeit related domains.

Formal assessments verified profound deficits in executive processing and control, specifically novel concept generation and modifying rule regulated behaviour. These were augmented by poor detail analysis during response coordination and weak cause and effect associations, as assessed by sub-tests of the WAIS-III. Deficits in cognitive reasoning and control mirror reported daily planning difficulties and are characteristic of implicated damage to the dorsolateral-prefrontal-cortex, a region responsible for strategy development.

WAIS-III results revealed that whilst verbal comprehension and manipulation were preserved, performance tasks requiring recruitment of problem-solving, response planning and reasoning skills proved to be a challenge since the accident. These results may be attributed to reduced abstract conceptualization and sequencing abilities as opposed to visual processing deficits which remained unimpaired in designated visuo-perceptual tasks. Strengthening this view is the observation that whilst an adequate figure copy was created, a disorganized manner was used to achieve this, reflecting chaotic approaches to life.

Whilst bulk of damage was incurred on the left side, thought to mediate verbal processing, caution must be exercised in assuming selective language impairment, particularly in light of average verbal IQ scores. Whilst formal language and literacy assessments revealed profound impairment, these tasks weren't necessarily immune from relying on executive control. His language impairments, specifically on semantic fluency tests, may be attributable to difficulties in novel concept generation, adopting new strategies and inhibiting pre-potent responses. This is substantiated by preservation of everyday vocabulary and natural conversation, where there existed marked inability to answer questions specifically, with heavy reliance on repetitive and formulaic phrases.

Manifestation of memory problems extended to both verbal and non-verbal domains, where verbalisation often accompanies non-verbal tasks, explaining poor performance on both. However, face recognition scores were similarly impaired, which as a pure non-verbal recognition test, was not diluted by verbalisation. This provides further evidence for general memory impairment, as opposed to selective language impairment. This view is strengthened by various WAIS-II procedures relying on working memory strategies, potentially accounting for poor performance.

Numerous procedures rely on active processing and re-evaluation of information before memory consolidation. Working memory is therefore inextricably linked to attention, where TL's ability to rapidly attend to and utilize new information was below average. This could reflect a general memory deficit with roots in decreased attention to relevant sensory stimuli and inefficient consolidation of these in coordinating and executing

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responses. This is echoed by TL's detachment and general out of sync-ness with his environment, not responding to daily demands.

In conclusion, TL presents a complex clinical profile where a diversity of problems may interact, notably excessive alcohol consumption, episodic seizures and traumatic brain injury. Many factors contribute to the pathology of frontal lobe syndrome, and the pattern and severity of symptoms since injury in distinct, albeit related cognitive domains directs attention to a chronic, declining executive dysfunction.

Keen to deflect from his disordered lifestyle, this very mechanism ironically leads to lack of insight into his own case. Along with highly limited cognitive resources, this obstructs error monitoring and adopting novel strategies to update behaviour accordingly, which would allow him to benefit from rehabilitative efforts and lead a structured lifestyle.

Word Count: 1, 500

## **APPENDIX: Test Results**

### **Tests Administered**

**Scores attained on Assessment Date: 10/03/2010**

### **Estimated Pre-Morbid Functioning**

NART FSIQ

Average

### **Current Intellectual Functioning**

WAIS-III



Verbal IQ

Digit Span

Vocabulary

Arithmetic

Similarities

Performance IQ

Picture Arrangement

Picture Completion

Block Design

95

77\*

## **Memory Functions:**

Recognition (RMT)

Words

Faces

Delayed Recall (AMIPB)

Story

Figure

<5th %ile\*

5th %ile\*

5-10th %ile\*

<5th %ile\*

### **Language Functions:**

Graded Difficulty Naming Test

Semantic Fluency (Animals)

<5th %ile\*

<1st %ile\*

### **Visuospatial/Visuoperceptual Skills:**

VOSP Object Decision

AMIPB Figure Copy

> 5% cut-off

normal

### **Executive Functions:**

Phonemic Fluency (FAS)

Modified WCST

<1st %ile\*

3/6 categories\*

## **Speed of Information Processing:**

http://portal.wpspublish.com/images/pobtrans.gif Symbol Digit Modalities

Test (SDMT)

<1st %ile\*

\*Performance below average