

# Brain Injury: Overcoming Neuropsychiatric barriers to support following TBI

**Dr David Okai**  
*Consultant Neuropsychiatrist*

**Associate Medical Director, National Specialist Psychiatry Services  
(Maudsley)**  
**Senior Lecturer, Institute of Psychiatry Psychology and Neuroscience**

*[david.okai@brainmind.co.uk](mailto:david.okai@brainmind.co.uk)*

# Learning objectives

- **Understand Neuropsychiatry:** Grasp the fundamentals of neuropsychiatry- disorders of cognition, behaviour, and affect arising from brain pathology
- **Role of Psychological Medicine in the Neurosciences - as a service**
- **Explore barriers to treatment -**
  - Capacity, Functional overlay, risk issues
- **Clarity on pathways of treatment - Intensity**

# Neuropsychiatry

Disorders of cognition, behaviour and affect arising from brain pathology.

1. Psychiatric manifestations of neurological illness
  2. Management of conditions that look neurological but are not
  3. Psychiatric problems of patients with neurological disorders
  4. Psychological consequences of extracerebral diseases (toxic, metabolic, endocrine).
  5. Neuroscientific aspects of certain general psychiatric disorders.
- But...
    - Developmental, psychosocial and cultural context of the individual integrated into assessment and treatment.
    - Therefore, central role in bringing together the constellation of reports commonly seen in negligence cases (e.g. neuropsychology, neurology, orthopaedics, occupational health), as a 'physical interface' physician

# Neuropsychiatry / Neuropsychology: roles

- **Neuropsychiatry**

- Diagnosis, treatment, and prevention of mental health disorders through a *medical lens*. *'Physical interface Drs'*
- Often *the 'co-ordinating doctor'* for the complex
- Medical doctors, who can prescribe (specialised) medication and use a variety of biological approaches to treat mental illnesses.
- Training emphasises the biological and neurochemical, and psychosocial aspects of mental disorders, making them well-equipped to handle severe mental health conditions
- Diagnosis ties into formal statutes and medico-legal processes that require diagnoses.

# Care pathways

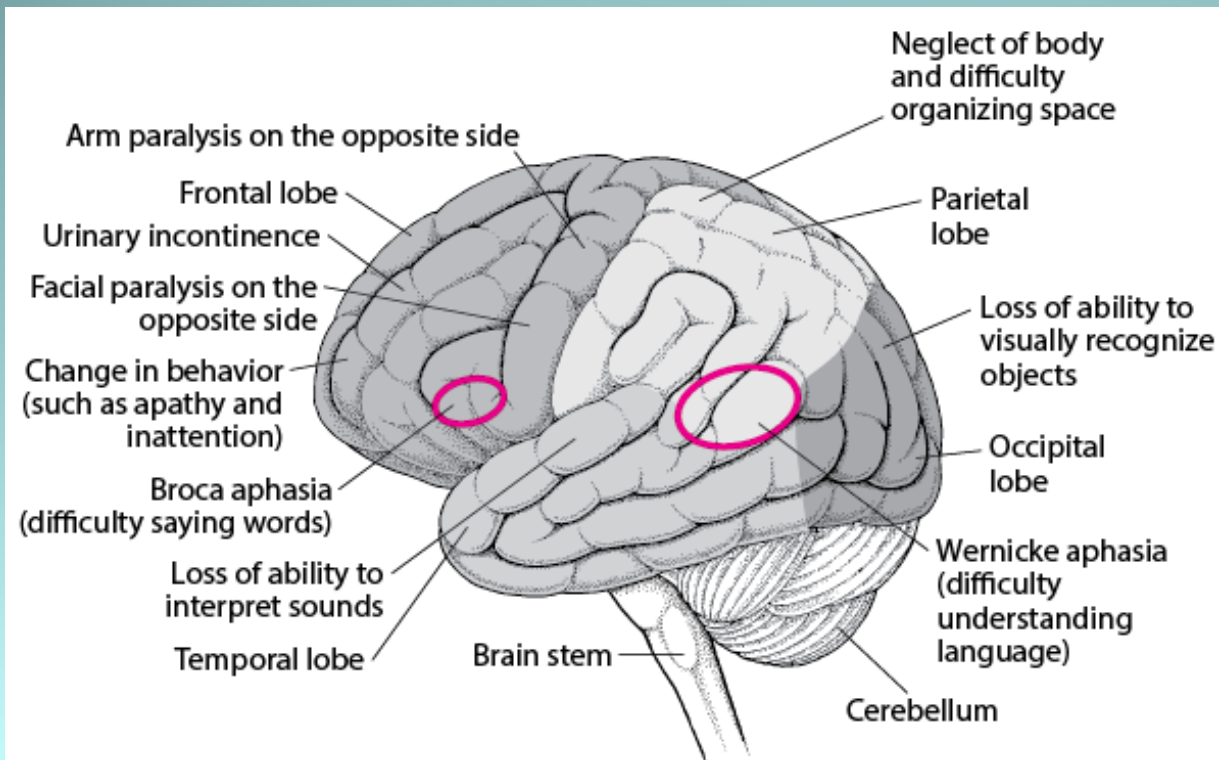
- We therefore recommend, that services adopt a radically new approach,

“With a focus on an attempt to genuinely shape mental health care for individuals around the needs of the patient.”

“A patient really deserves to see someone who knows about anxiety and depression in neurology, not anxiety and depression as it may affect someone who does not have a brain disease.”

To this end, each of the neuroscience disciplines requires **both** neuropsychiatry and neuropsychology to ensure comprehensive service delivery within each neuroscience speciality.

# Cortex injuries



## The 4 A's Temporal Lobe

- Amnesia
- Aphasia

## Parietal Lobe

- Agnosia
- Apraxia



# Vision



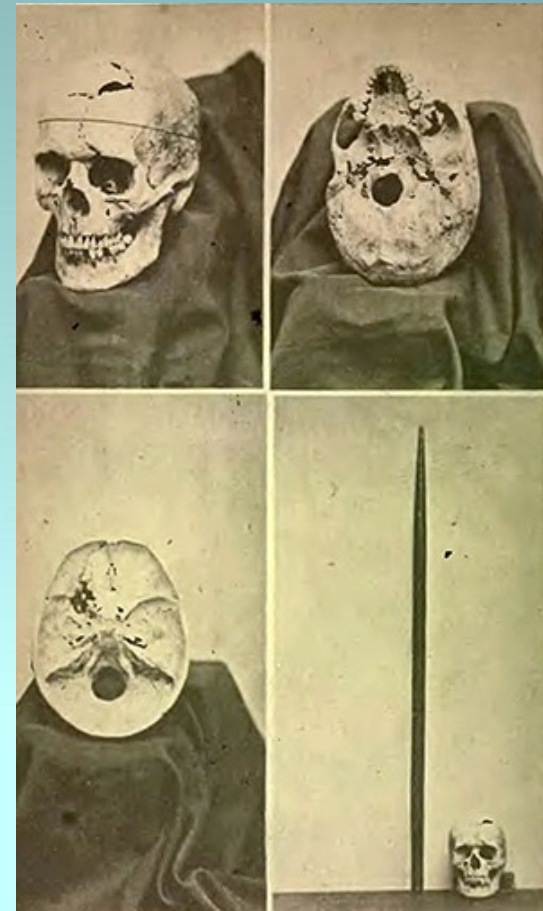


# Phineas Gage 1820-1860: Neuroscience's most famous patient

Foreman of a railway construction gang working near Cavendish, Vermont. After an accidental explosion of a charge he had set, his 3' 7" long tamping iron went in point first under his left cheek bone and completely out through the top of his head, landing about 25-30 yards away.

**“Horrible Accident...**The most singular circumstance connected with this melancholy affair is that he was alive at 2 o'clock this afternoon and in full possession of his reason, and free from pain.”

*Boston Post* 13 Sep 1848



# Phineas Gage

“The equilibrium or balance, so to speak, between his intellectual faculties and animal propensities, seems to have been destroyed. He is fitful, irreverent, indulging at times in the grossest profanity (which was not previously his custom), manifesting but little deference for his fellows, impatient of restraint or advice when it conflicts with his desires, at times pertinaciously obstinate, yet capricious and vacillating, devising many plans of future operations, which are no sooner arranged than they are abandoned in turn for others appearing more feasible. A child in his intellectual capacity and manifestations, he has the animal passions of a strong man. Previous to his injury, although untrained in the schools, he possessed a well-balanced mind, and was looked upon by those who knew him as a shrewd, smart businessman, very energetic and persistent in executing all his plans of operation. In this regard his mind was radically changed, so decidedly that his friends and acquaintances said he was 'no longer Gage'”

Harlow, 1868



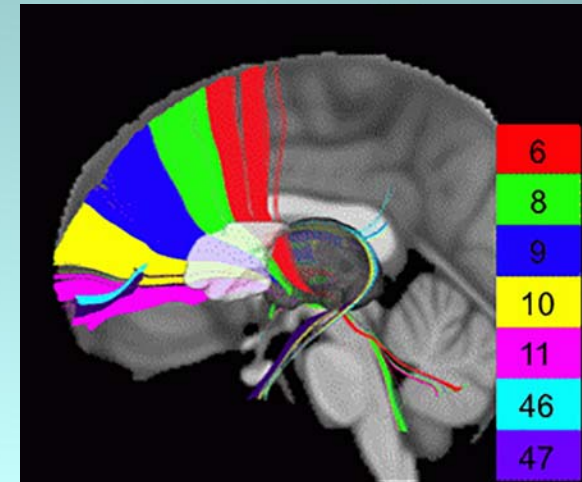
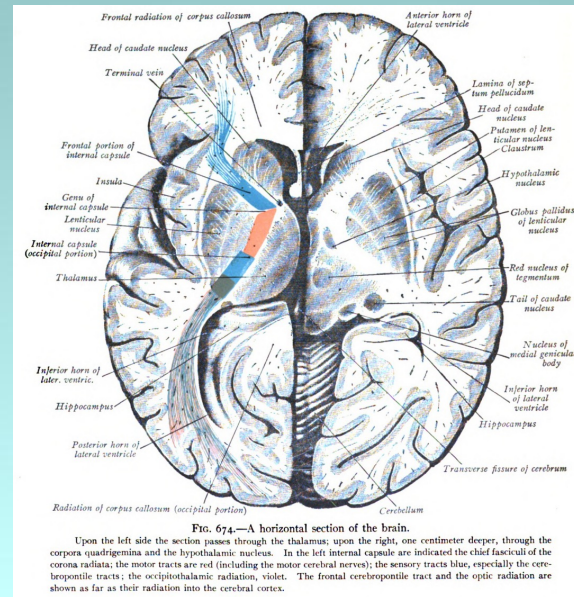
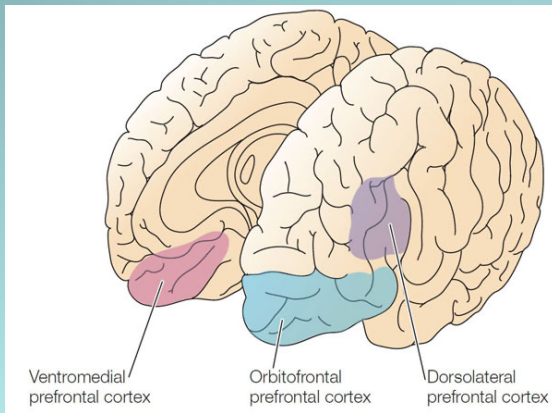
# Dysexecutive (Frontal lobe) Syndrome ICD-10 (DCR)

- **Predominantly Neurobehavioral**
- 'Pseudo-depressive' (dorsolateral pre-frontal cortex)
  - Apathy with lack of initiative
  - Slowing of thought and motor activity
- 'Pseudo-psychopathic' (Ventromedial pre-frontal cortex)
  - Disinhibition, Euphoria
  - Irritability
  - Impulsivity
  - Antisocial behaviour

# Evolutionary perspective – frontal lobe



# Dysexecutive (Frontal lobe) Syndrome



Nanda et al., HBM, 2017; Coenen et al., J Neuropsych Clin Neurosci, 2012; Zhang CC, Kim SG et al., 2019; Ningfei et al., Nat Comm, 2020; Balderman et al., Biol Psychiatry 2019, 2021

## Insensitivity to future consequences following damage to human prefrontal cortex

Antoine Bechara, Antonio R. Damasio\*, Hanna Damasio, Steven W. Anderson

Department of Neurology, Division of Behavioral Neurology and Cognitive Neuroscience, University of Iowa College of Medicine, Iowa City, IA 52242, USA

### Abstract

Following damage to the ventromedial prefrontal cortex, humans develop a defect in real-life decision-making, which contrasts with otherwise normal intellectual functions. Currently, there is no neuropsychological probe to detect in the laboratory, and the cognitive and neural mechanisms responsible for this defect have resisted explanation. Here, using a novel task which simulates real-life decision-making in the way it factors uncertainty of premises and outcomes, as well as reward and punishment, we find that prefrontal patients, unlike controls, are oblivious to the future consequences of their actions, and seem to be guided by immediate prospects only. This finding offers, for the first time, the possibility of detecting these patients' elusive impairment in the laboratory, measuring it, and investigating its possible causes.

### Introduction

Patients with damage to the ventromedial sector of prefrontal cortices develop a severe impairment in real-life decision-making, in spite of otherwise preserved intellect. The impairments are especially marked in the personal and social realms (Damasio, Tranel, & Damasio, 1991). Patient E.V.R. is a prototypical example of this condition. He often decides against his best interest, and is unable to learn



# Evidence of Head Injury vs. Brain Injury

## • Head injury

- Bruising, haematoma
- Scalp lacerations
- Skull fracture
- Maxillofacial fractures
- Eye injuries
- (Neck injury)

## • Brain injury

- Loss of consciousness\*
- Post-traumatic amnesia
- Focal neurological deficits
- Imaging evidence of structural brain injury
- Epileptic seizures

\*LOC, or altered mental state

# Head Injury Severity – Mayo criteria

Classification	Criteria
Moderate-severe (definite):	Death
	Loss of consciousness > 30 minutes
	Antegrade amnesia > 24 hours
	GCS score < 13 in the initial 24 hours
	Intracerebral, subdural, epidural, or sub-arachnoid hemorrhages; cerebral or hemorrhagic contusion, penetrating TBI (dura penetrated), or brainstem injury
Mild (probable):	Loss of consciousness—momentarily to < 30 minutes,
	Post-traumatic anterograde amnesia—momentarily to < 2 - 4 hours
	Depressed basilar or linear skull fracture (dura intact).
Symptomatic (possible):	None of the “moderate-severe” or “mild” criteria apply
	One or more of the following are present: blurred vision, confusion (mental status changes), dizziness, headache, nausea or focal neurological symptoms

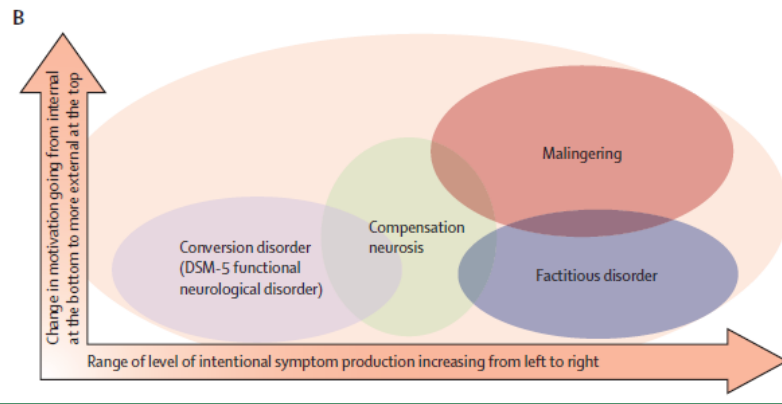
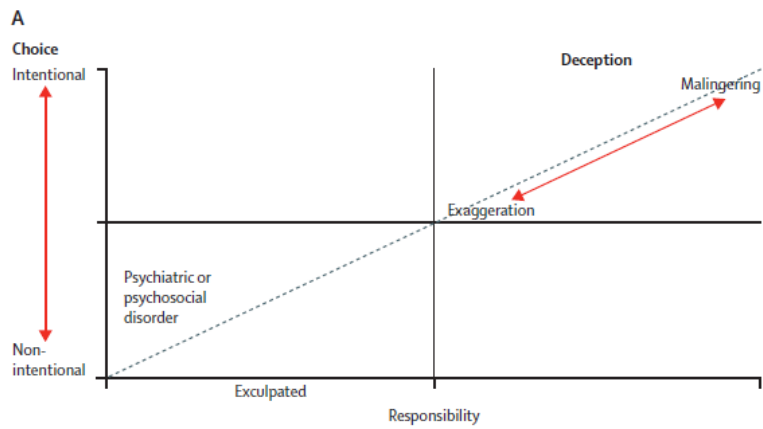


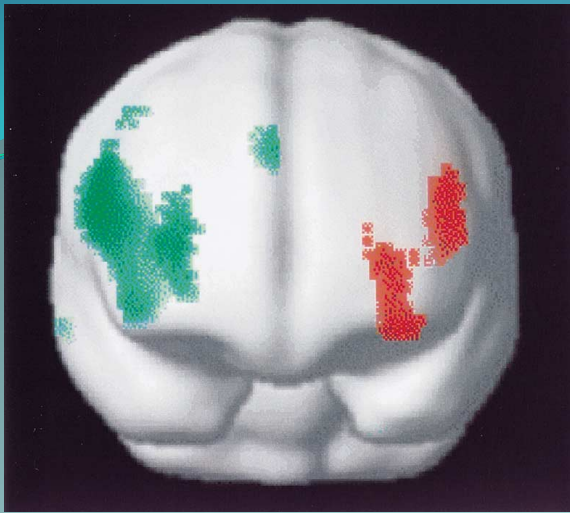
# FUNCTIONAL NEUROLOGICAL DISORDER (FND)

- Patients with FNDs have neurological symptoms but with no organic/structural correlate, i.e. the nervous system itself is intact, or the symptoms do not correlate.
- Thought to arise from increased attention to the body (or, an abnormal representation of the body), abnormal predictions about the body (informed by certain expectations that are often driven by society/media/prior beliefs etc.)
- Altered agency (i.e. the brain misperceives internal sensations as external symptoms).
- FNDs are often triggered by physical injury- because the body 'feels different'- especially in circumstances of heightened vigilance and salience (stress/anxiety surrounding an accident).
- Frequency increases in those with a structural problem (estimated at around 30%)

# Underlying psychological processes

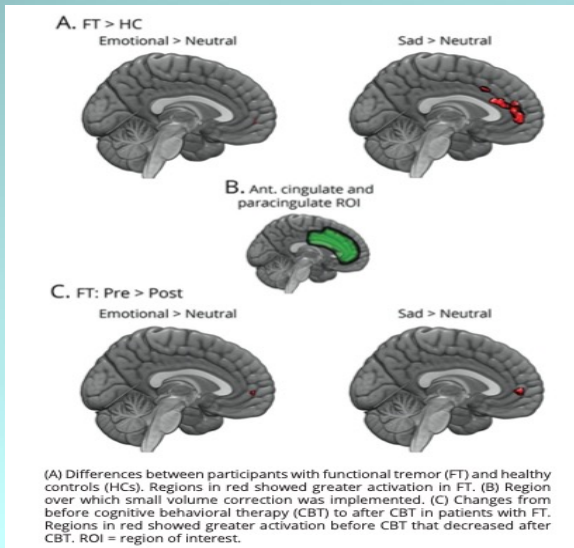
	Illness <b>behaviour</b>	Motive
Somatisation Disorder(s)	unconscious	unconscious
FND	unconscious	unconscious
Pain disorder	unconscious	unconscious
Factitious	<b><i>conscious</i></b>	unconscious
Malingering	<b><i>conscious</i></b>	<b><i>conscious</i></b>





**Statistical parametric maps on a smoothed magnetic resonance image of the anterior surface of the brain (the right prefrontal cortex is on the left of the image)**

Red: regions where patients with hysterical motor symptoms exhibit hypofunction relative to controls; green: feigners exhibit hypofunction relative to controls.



Three observations provide some objective evidence that dissociative seizures are, at some level, unconscious:

- (i) Most patients are compliant with antiepileptic drugs before the correct diagnosis is made;
- (ii) When patients are admitted for telemetry, the majority have a seizure in a setting which they must surely recognise involves sophisticated monitoring and
- (iii) The seizures are usually a poor imitation of epilepsy.

None of these points is by any means conclusive, but if deception is involved it is of a kind that eludes simple understanding.

Espay et al., Neurology 2019

# Capacity Assessments: Inter-rater reliability (dichotomous outcome)

Cohen's Kappa ( $\kappa$ )	Categorisation
$\kappa < 0$	Poor
$0 < \kappa \leq 0.2$	Slight
$0 < \kappa \leq 0.4$	Fair
$0.4 < \kappa \leq 0.6$	Moderate
$0.6 < \kappa \leq 0.8$	Substantial
$0.8 < \kappa \leq 1$	Almost perfect

# TBI: Capacity Assessments: Inter-rater reliability of

	K
Understanding	0.90
Use and Weigh	0.58
Reason	0.86
Express a choice	0.82

Okai et al., BJPsych 2007

# Caseness for disorder (TBI)

- Where caseness is defined as sufficient severity and range of symptoms to qualify for disorder; and disorder is defined as a sufficient impact on social and or occupation function to warrant therapeutic intervention (e.g. significant periods of time off work, the main determinant of a relationship breakdown).

# Management

- Biological:
  - Psychotropics (disinhibition, apathy)
  - Comorbidities – Anxiety (most common)
  - Physical co-morbidities (e.g. pain, epilepsy, mobility)
- Psychological
  - Psychometric assessment – work on areas of strength /weakness
- Social
  - Manage carer strain
  - Physio-/occupational- therapy



# Prognosis

Regarding prognosis, the appellant, after the attack (head injury), suffered a trajectory of a reduction in social contact. Additionally, there has been a reduction in their occupational ability.

There are four possible outcomes:

1. The appellant's symptoms remit spontaneously and not present again, and they return to occupation in a similar fashion as prior to her head injury. In my view, this is unlikely, given the duration of symptoms.
2. The appellant's symptoms have plateaued, with ongoing symptoms of sufficient severity and frequency to impact on social and occupational function, precluding sustained, long-term employment.
3. Their symptoms worsen in terms of disability over time.
4. With appropriate psychosocial support, the appellant sees some improvement in symptoms. Such an option is usually associated with access to an evidence-based treatment for ABI related-rehabilitation/neurorehabilitation that involves both biological (appropriate medication), and psychosocial (neuropsychological input) and social support (occupational therapy input and physiotherapy).

In the case of options 1 and 4 above, we tend to view the definition of recovery as a progressive reduction in severity and frequency of episodes of disinhibition, rather than the dichotomous outcome of ill or 'cured'.

# Learning objectives

- **Understand Neuropsychiatry:** Grasp the fundamentals of neuropsychiatry- disorders of cognition, behaviour, and affect arising from brain pathology
- **Role of Psychological Medicine in the Neurosciences - as a service**
- **Explore barriers to treatment -**
  - Capacity, Functional overlay, risk issues
- **Clarity on pathways of treatment - Intensity**