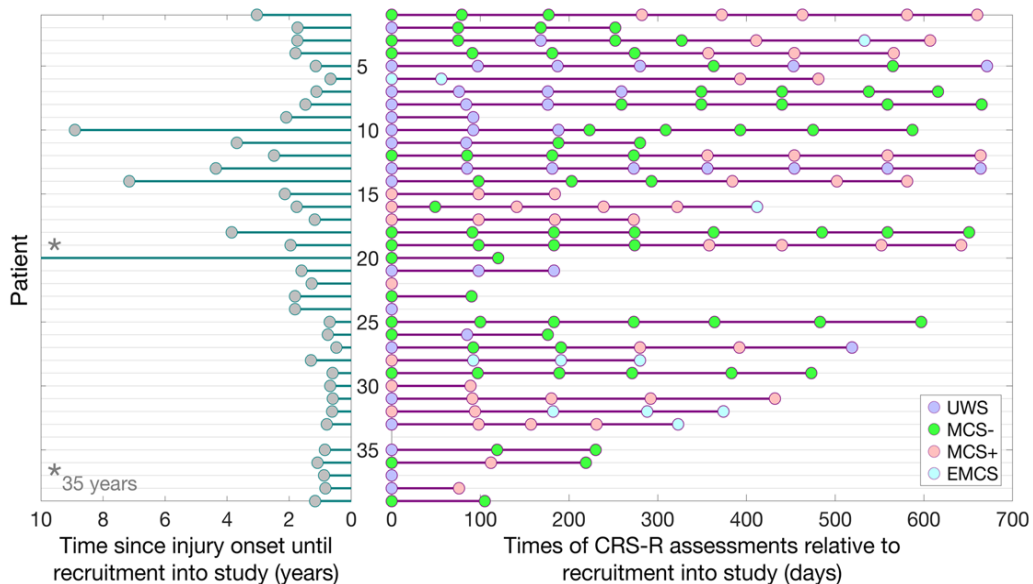


Complexity and Criticality as a Diagnostic Approach for Patients with Disorders of Consciousness

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Background

- Patients with **Disorders of Consciousness (DoC)** reside in a prolonged state of impaired awareness, commonly brought about by anoxic or traumatic brain injury.
- Standardised behavioural measures for DoC diagnosis depend strictly on; (1) **subjective interpretations** & the dubious presumption that patients are capable of (2) **showing awareness behaviourally**.
- The current research aims to examine promising computational models for DoC diagnosis within the frameworks of **algorithmic complexity** and **criticality**.



(Bareham et al., 2019)

Methods

Subjects	39 DoC patients
Diagnosis	22 Minimally Conscious, 17 Vegetative State
Mean Age	42.9 years (s.d. = 15.7) min = 19, max = 75
Cause	18 TBI, 21 non-TBI
Gender	22 male, 17 female

Algorithmic Complexity

Lempel-Ziv Complexity
Block Decomposition Method

Criticality

Neuronal Avalanche Detection
Detrended Fluctuation Analysis
Phase Lock Interval Analysis

Research Question

“What empirical measures of algorithmic **complexity** and **criticality** can most effectively distinguish between different diagnoses of consciousness in DoC patients using spontaneous EEG recordings?”

Key Takeaway

Computational models proposed within the theoretical frameworks of **complexity** and **criticality** suggest to be promising objective diagnostic markers for the detection of residual consciousness in DoC patients.