

Personalized stroke recovery through brain fingerprinting

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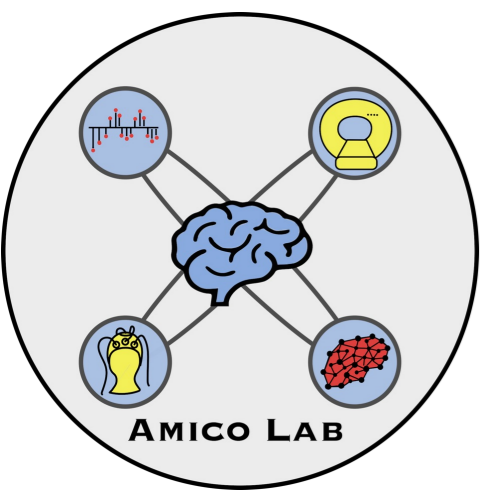
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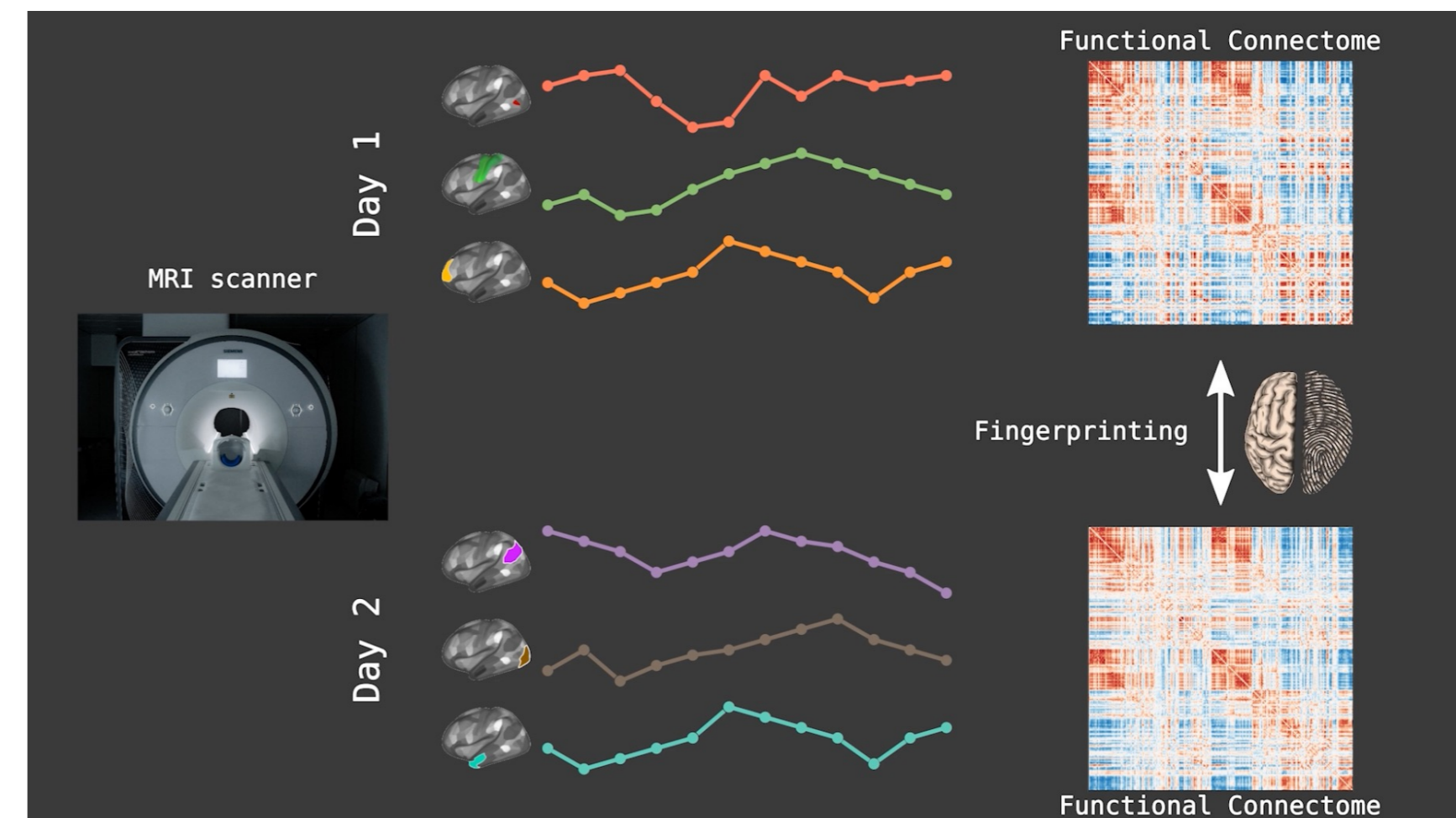
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The Challenge

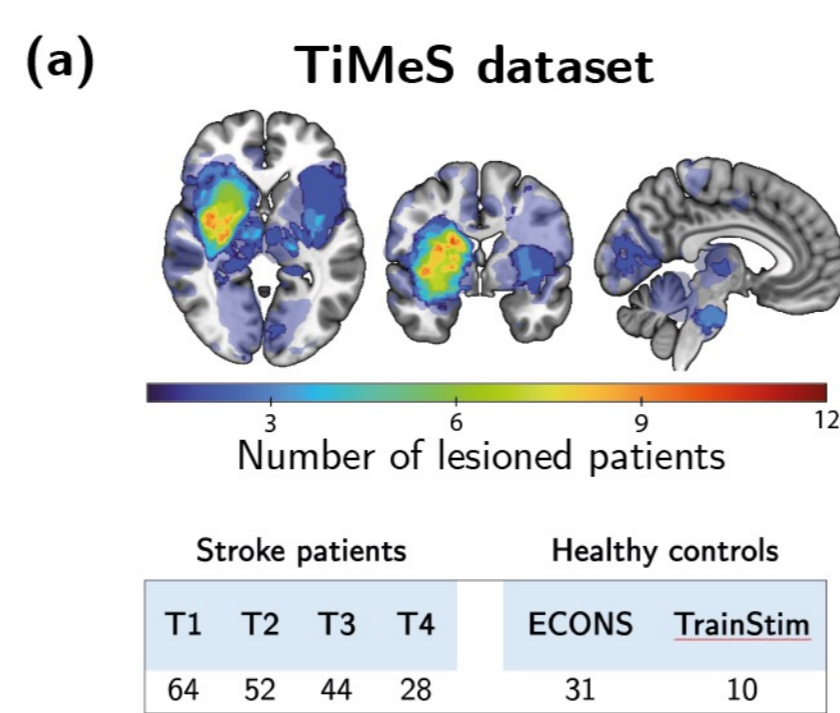
Just as fingerprints uniquely identify individuals, functional connectomes (patterns of brain activity) can uniquely identify human brains. We here apply this concept for **personalised stroke recovery**.

Current tools for stroke recovery struggle to capture **patient-specific** changes. Two patients with similar lesions can show very different recovery trajectories. We need biomarkers that are **individualised** and **interpretable** to guide **personalised rehabilitation**.

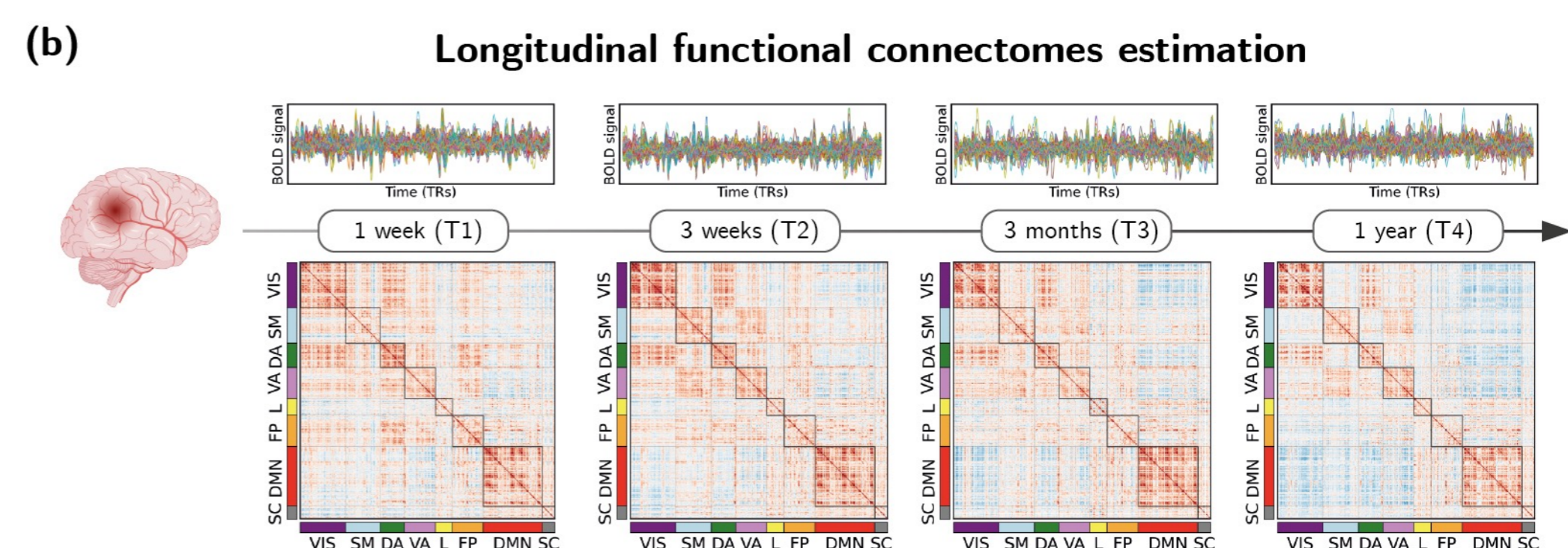


Our method: Brain fingerprinting of stroke

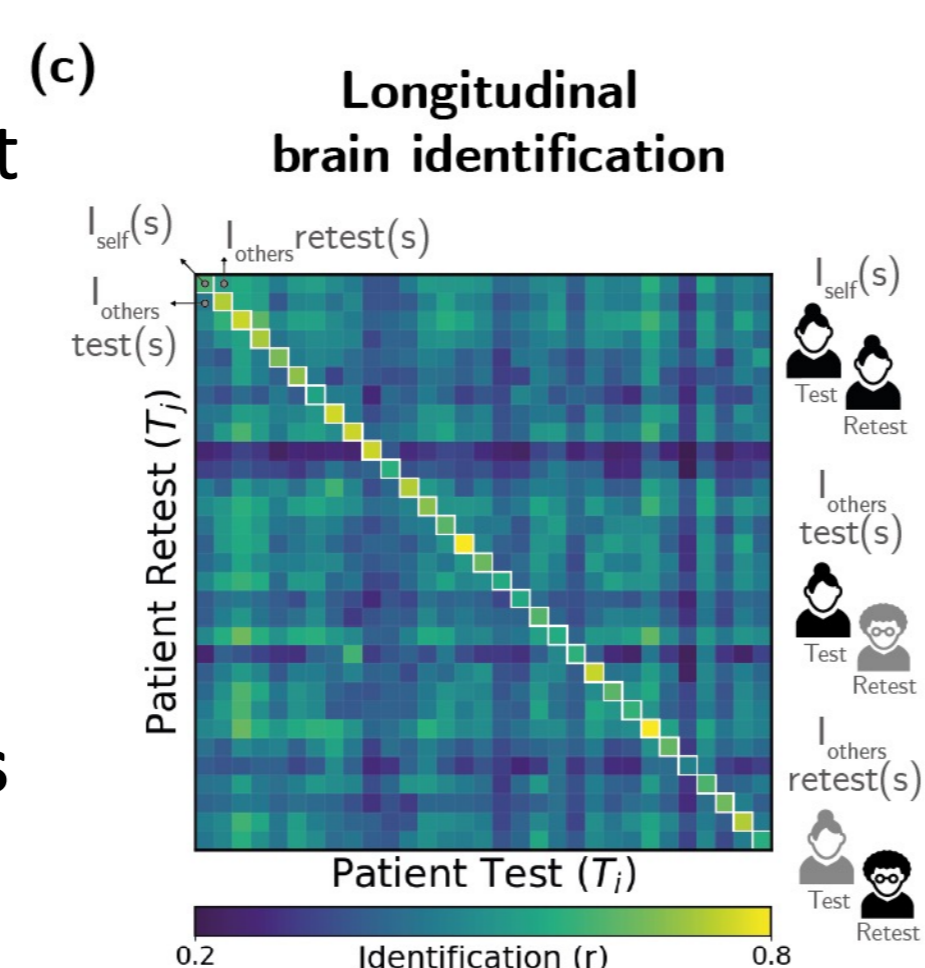
(a) We acquire resting-state fMRI 1 week to 1 year after stroke



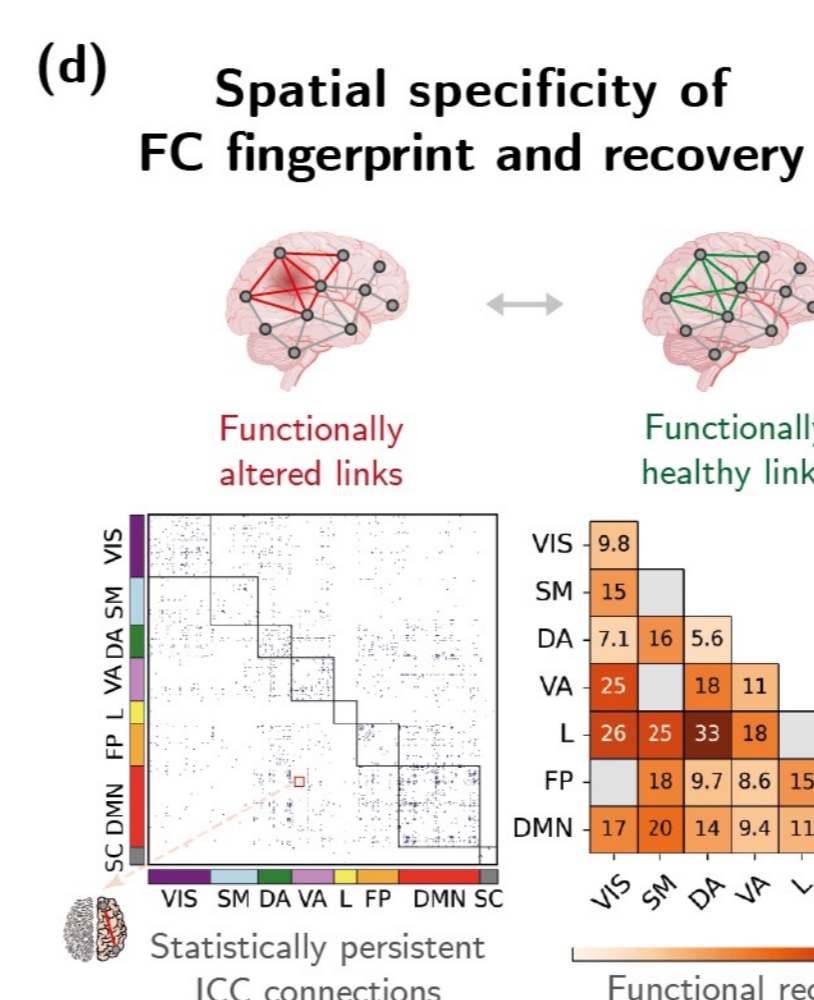
(b) We reconstruct each patient's functional connectome (FC).



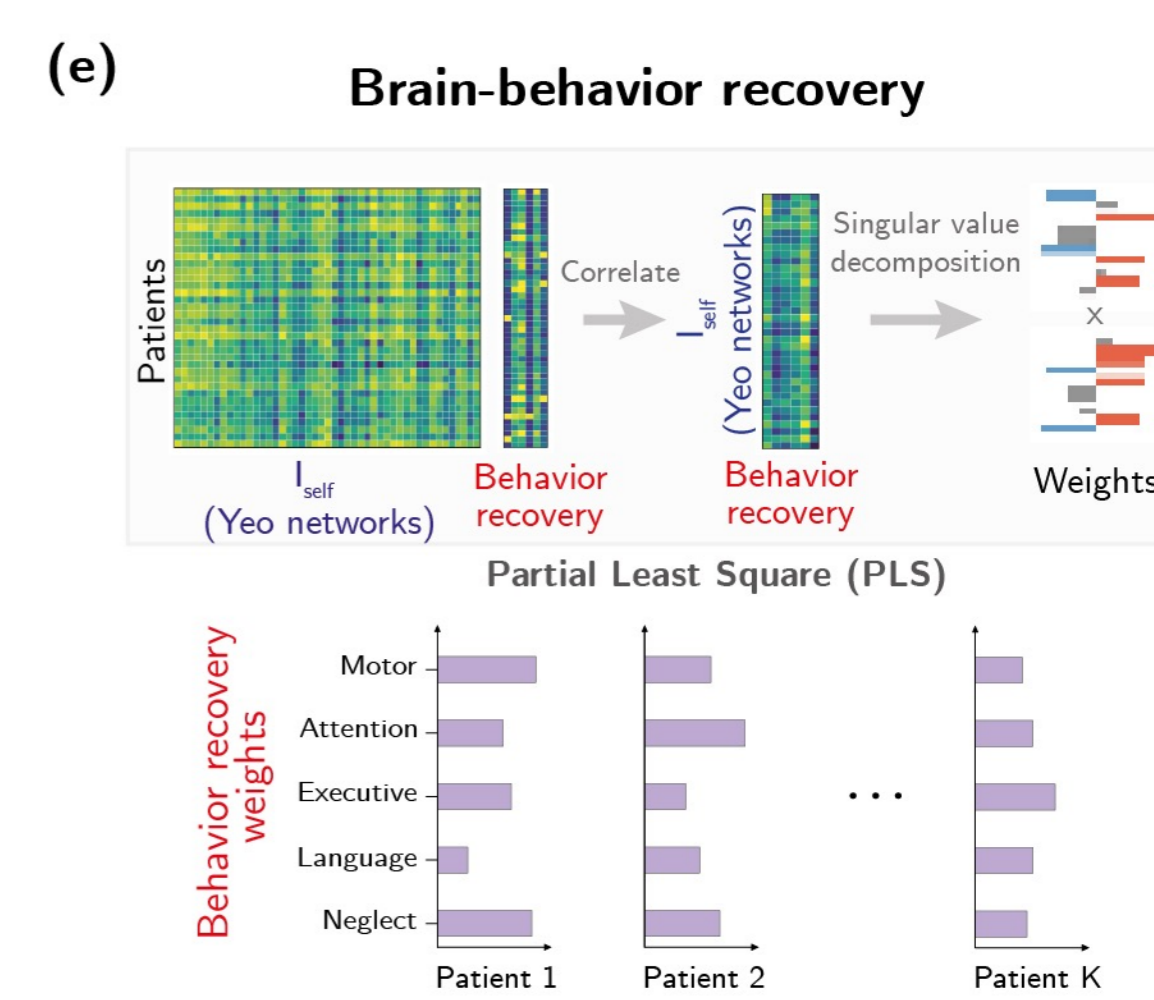
(c) We quantify the unique neural signature (fingerprint) of each patient



(d) We track stroke trajectories longitudinally.

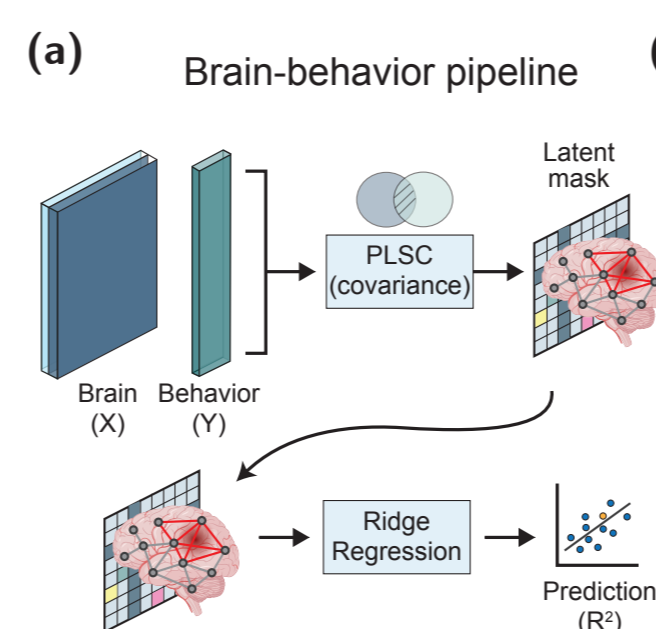


(e) We use fingerprint features to predict individual recovery outcomes



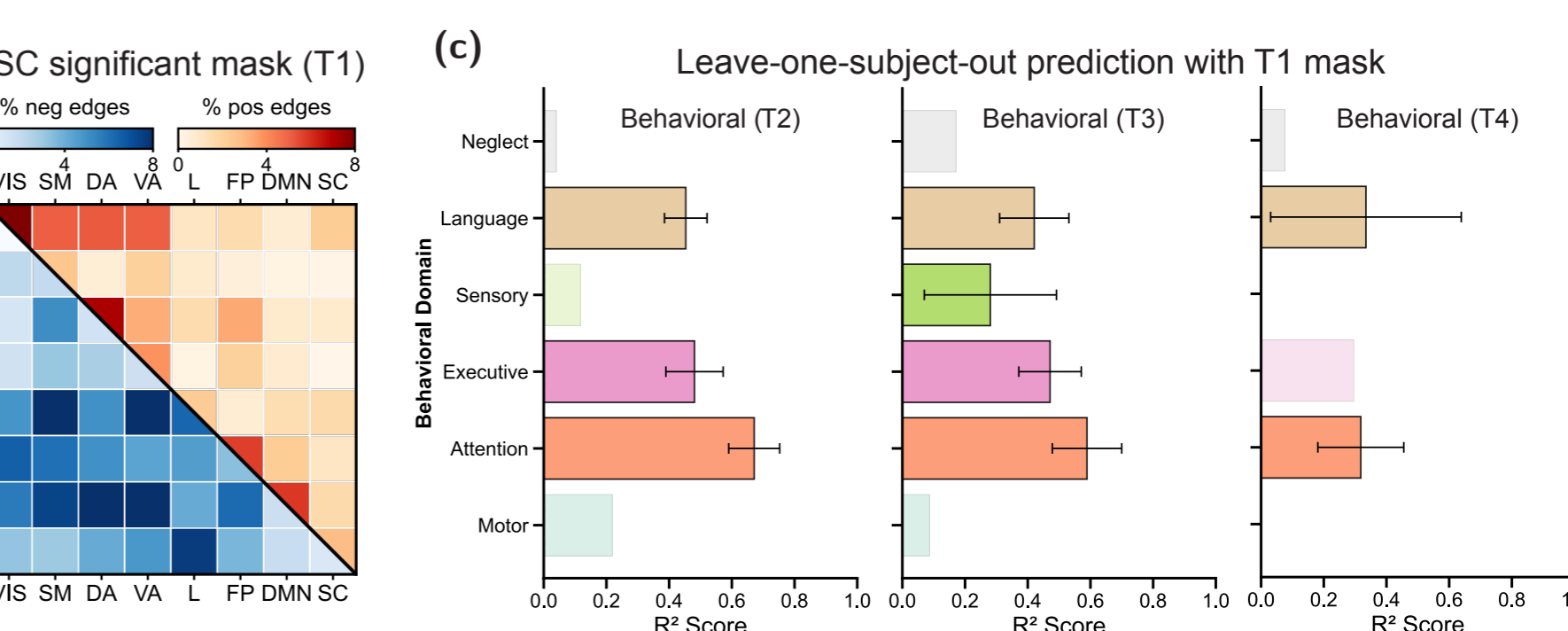
Our results: Personalised recovery prediction

(a) We combine brain scans and clinical scores to learn the **network signature of recovery**.

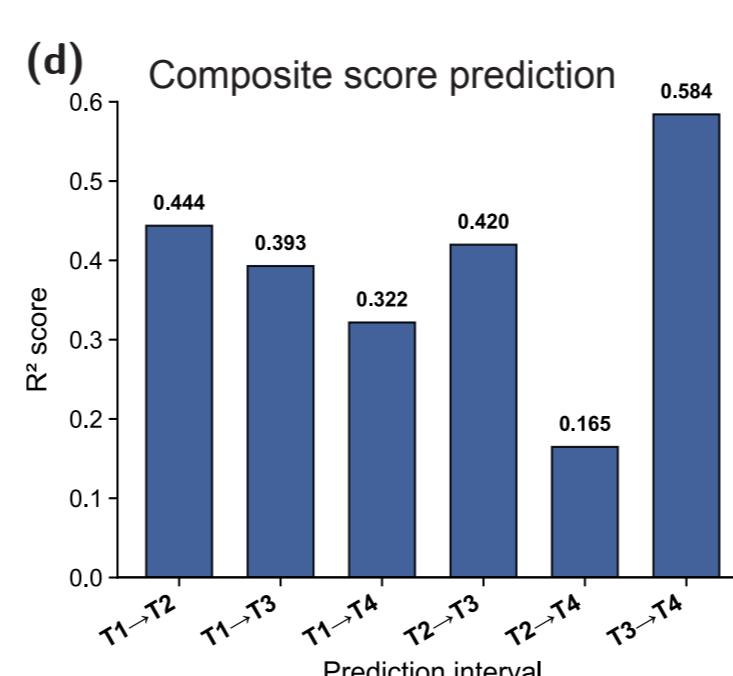


(b) The **“recovery fingerprint”** follows a reproducible pattern of stronger and weaker connections

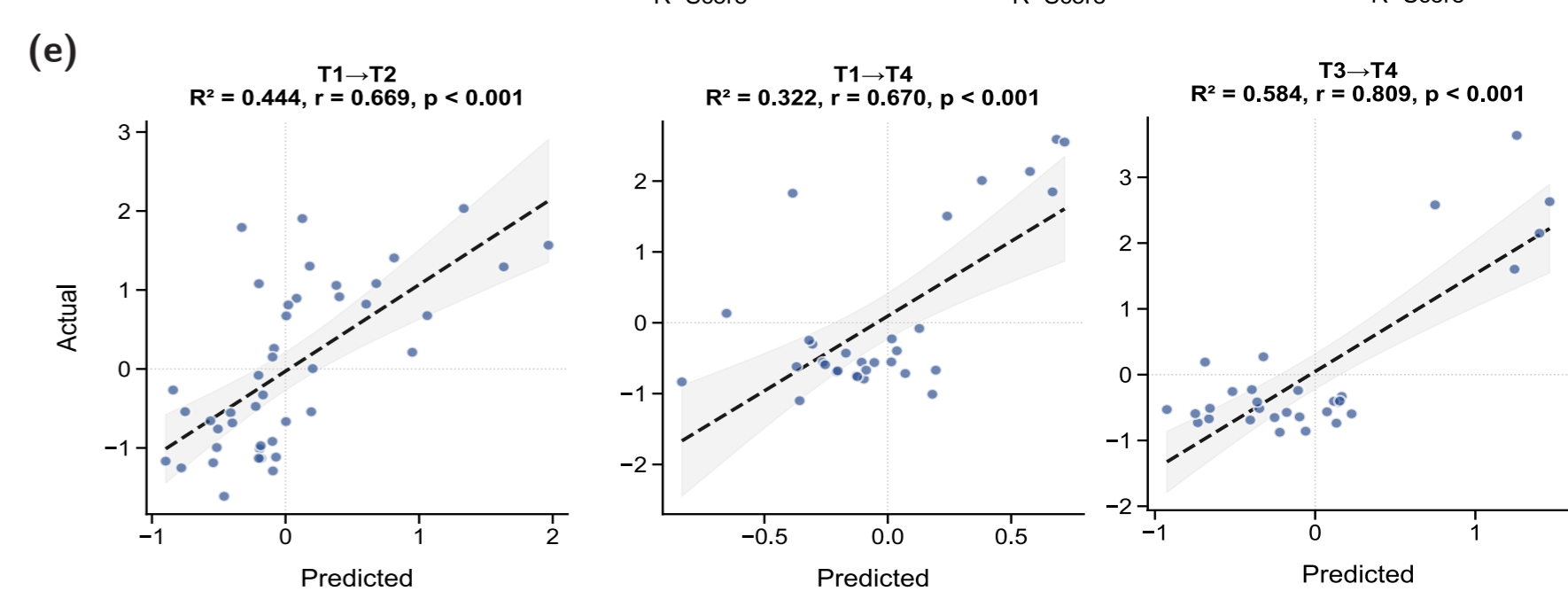
(c) Early brain scans **predict recovery** across key domains (attention, language, executive function).



(d) Predictions hold across **short- and long-term recovery**.



(e) Predicted outcomes match real patient outcomes, supporting **personalised recovery forecasting**.



Conclusions

Stroke recovery is not a one-size-fits-all. Our brain fingerprinting method provides an individual-level, trackable biomarker that predicts recovery trajectories and supports targeted and personalised rehabilitation.