

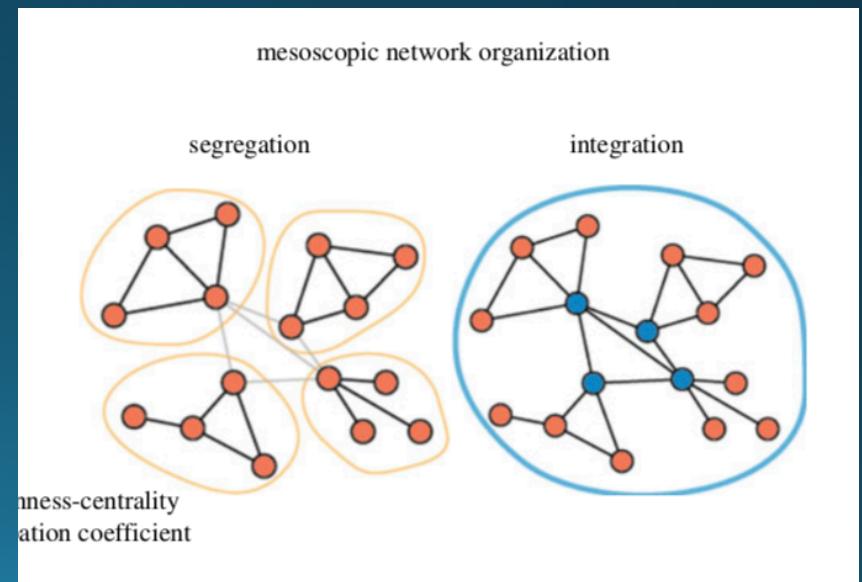
Understanding principles of integration and segregation using whole-brain computational connectomics

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Opportunity

- **Integration and Segregation** of information
 - *INTEGRATE* visual and auditory stimuli to initiate motor response
 - *SEGREGATION* of information into distinct groups for specialized action
- Imbalance in integration/segregation → neuropsychiatric diseases
- Promising clinical implications
 - Whole-brain computational connectomics?

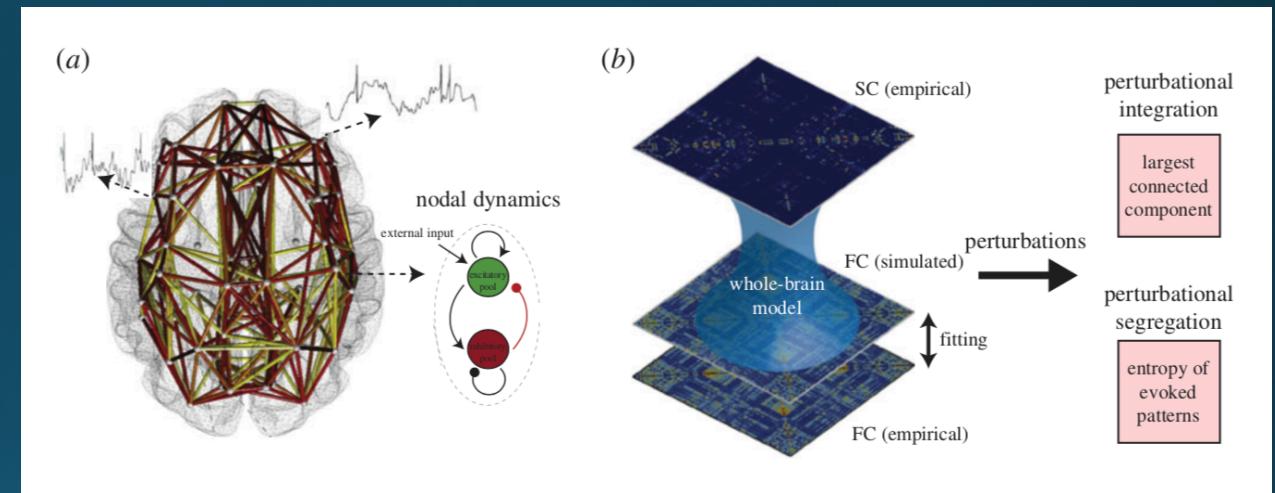


Challenge

- Static representations
 - Useful in understanding local/modular specialization
 - Significant methodological and conceptual limitation
 - Ignores the importance of time
 - Neuroimaging analysis not suited for mechanistic insights
- Difficult to identify network-based biomarkers for neuropsychiatric disorders

Action

- Integration in healthy brain requires (two factors):
 - Small-world structural connectome
 - Ratio of excitation-to-inhibition (E/I)
- Mathematical models, neural mass model, oscillatory models



Resolution

- Current whole-brain computational models
 - Provided insights into structure-to-function relationships in human brain networks
- Looking at models that incorporate time-sensitivity and the two factors will move the field forward

Feedback & Future Work

- FUTURE:
 - Brain computational models could accurately reflect molecular and cellular abnormalities on many timescales
 - Whole-brain models contribute to the emergence of neuropsychiatry and personalized therapeutics
- PROS: summary of the field, lots of references and different ideas
- CONS: dense writing (difficult to understand at times), organization of the paper