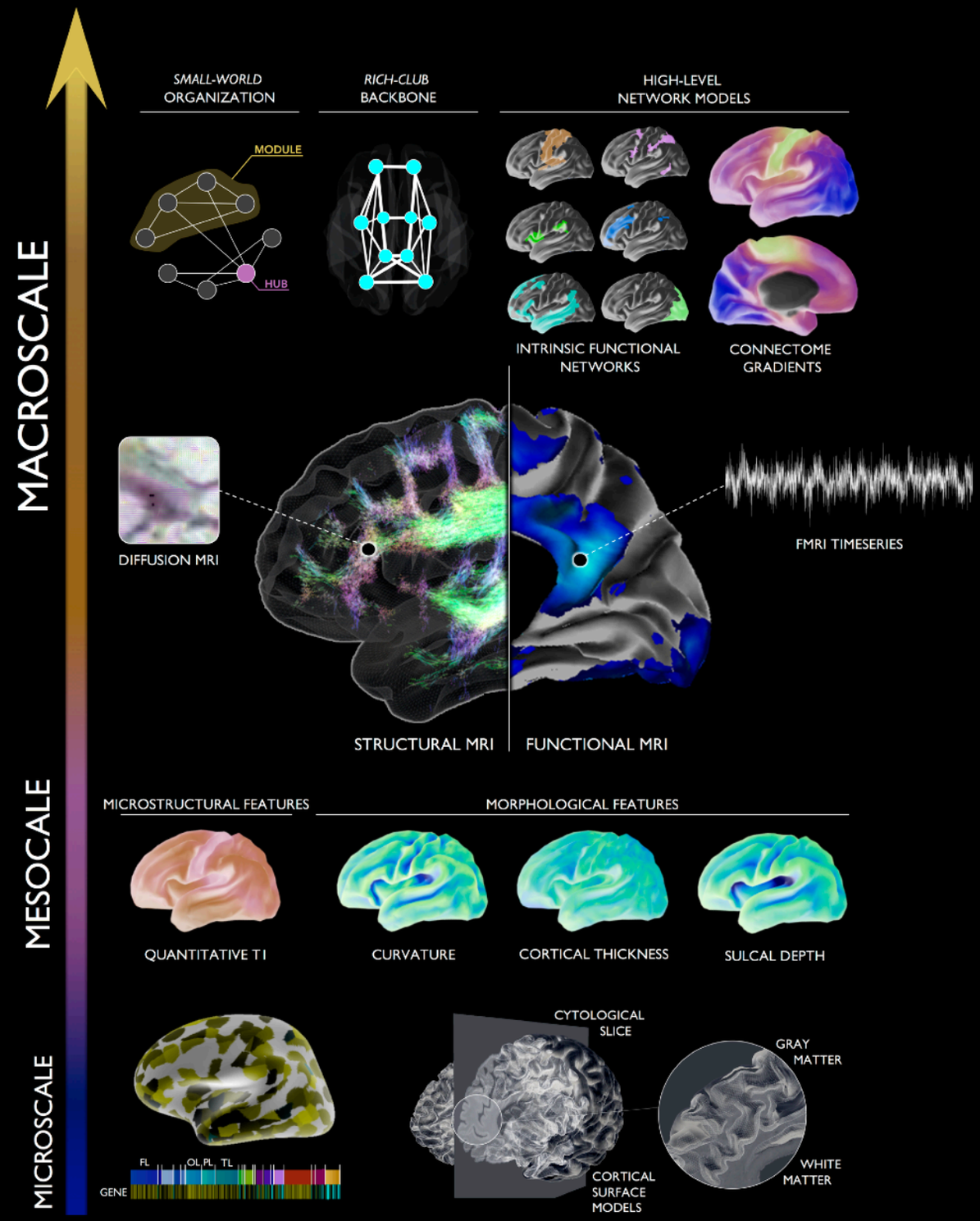
NEUR608 OVERVIEW

BRATISLAV MISIC &

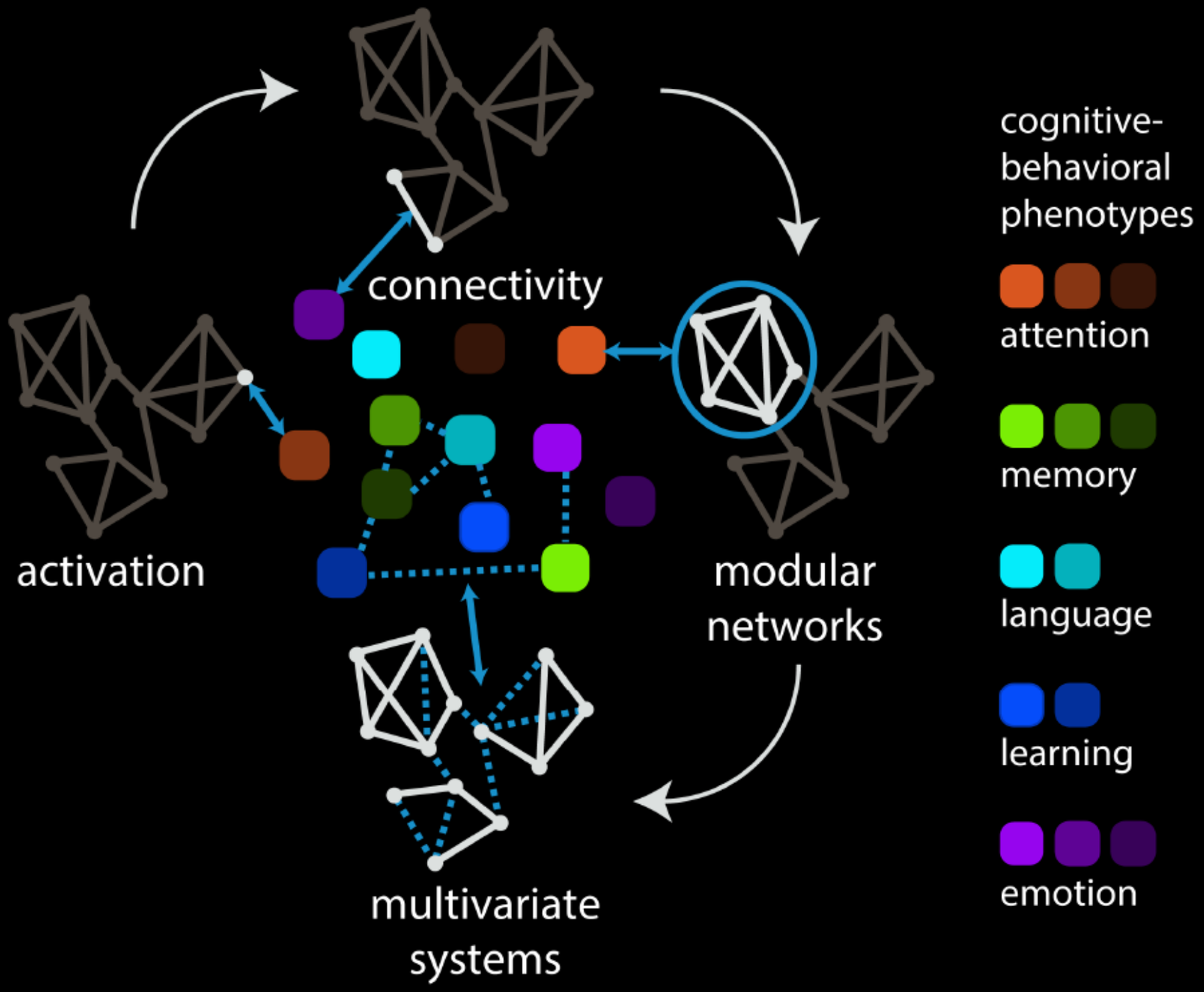
BORIS BERNHARDT

TOWARDS MULTISCALE NEUROSCIENCE



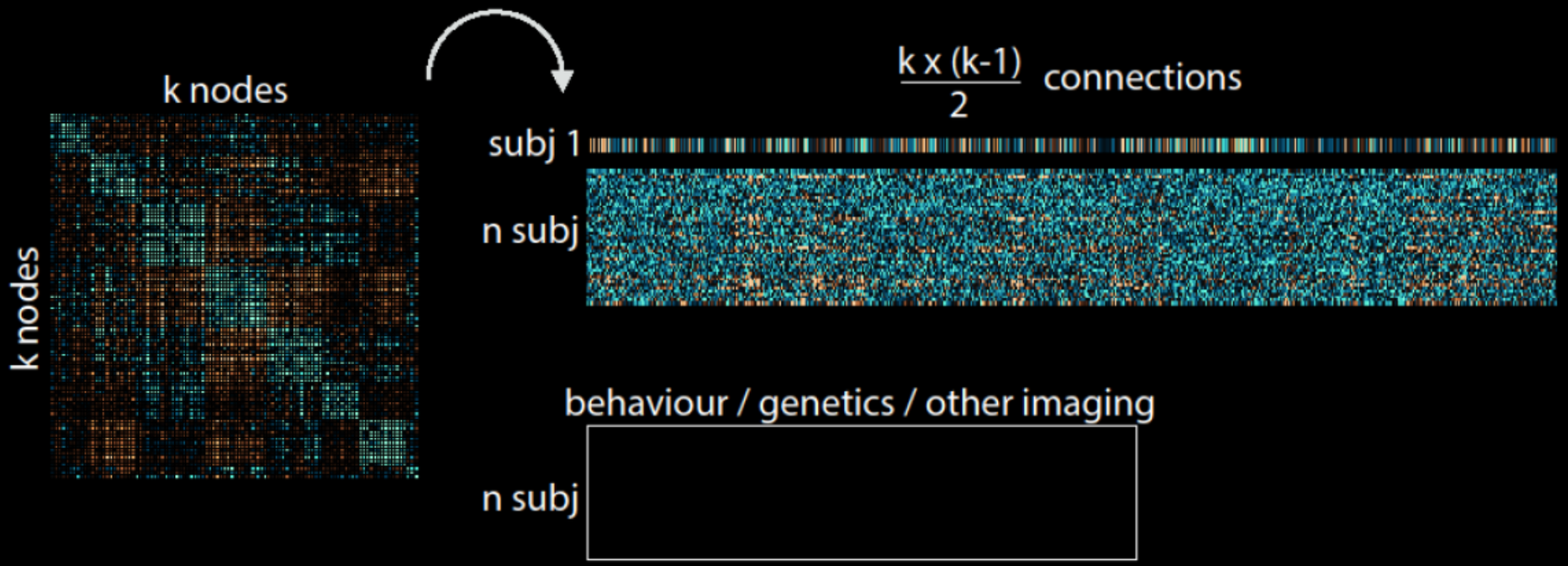
Lariviere et al (2019), Betzel & Basset (2017), Van den Heuvel & Yeo (2015) Neuron

TOWARDS MULTIVARIATE ANALYSES



Misic & Sporns (2016) Curr Opin Neurobiol

TOWARDS MULTIVARIATE ANALYSES



HOW TO DEAL WITH MORE VARIABLES THAN OBSERVATIONS?

HOW TO RELATE MULTIPLE DATA SETS / MODALITIES WITH ONE ANOTHER?

HOW TO OPERATIONALIZE THE NETWORK PROPERTY?

HOW TO INFER LARGE-SCALE MECHANISMS?

TOPICS

WEEK 2: BRIEF INTRO TO MULTIMODAL & MULTISCALE IMAGING

WEEK 3: GLMS AND LMM

WEEK 4: DATA COMPRESSION AND DIMENSIONALITY REDUCTION

WEEK 5: ASSOCIATIVE TECHNIQUES (CCAS, PLS)

WEEK 6: CLUSTERING TECHNIQUES

WEEK 7: CONFIRMATORY TECHNIQUES AND CAUSAL MODELS (SEM, DCM)

WEEKS 8-9: GRAPH THEORY I-2

WEEK 10: SUPERVISED LEARNING (Oualid Benkarim)

WEEK 11: META ANALYSIS

WEEK 12: REPRODUCIBILITY

ORGA

FRIDAY 9-12 PM, ZOOM

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A TYPICAL CLASS

1 H LECTURE

1.5 H JOURNAL CLUB

30 MIN LIVE DEMO

REQUIREMENTS

WRITE ½ PAGE CRITIQUE (POSITIVE OR NEGATIVE) AND SUGGESTIONS FOR FUTURE WORK ON EACH PAPER

EMAIL THIS PAGE TO US BEFORE THE CLASS

ATTEND CLASS

BE ABLE TO VERBALLY SUMMARIZE PAPER, UNDERSTAND THE IMAGING METHODOLOGY AND THE ANALYSES USED

DISCUSS THE PAPER WITH YOUR PEERS

END OF CLASS: WRITE A MOCK PAPER USING YOUR OWN DATA

REQUIREMENTS

START THINKING ABOUT IT NOW

DISCUSS YOUR IDEAS WITH YOUR COLLEAGUES AND WITH US

PREPARE YOUR PAPER DRAFT (~10 PAGES)

SUBMIT THE FULL VERSION BY MONDAY OCTOBER 25TH

WE GIVE FEEDBACK BY FRIDAY OCTOBER 29TH

SUBMIT THE FINAL VERSION MONDAY NOVEMBER 22TH

PRESENTATION AND DISCUSSION OF THE WORK ON LAST DAY OF CLASS
(NOV. 26TH: 8 MINS TALK + 4 MINS QUESTIONS)

GRADING

CLASS ATTENDANCE (EMAIL US IF YOU CANNOT MAKE IT)

SUMMARY ASSIGNMENTS

PARTICIPATION

RESEARCH PAPER

PRESENTATION

MATERIALS

WE WILL EMAIL AROUND CHANGES AT LEAST ONE WEEK
AHEAD OF THE NEXT CLASS

PAPERS + SLIDES WILL BE ON GITHUB STARTING NEXT WEEK
https://github.com/neuroimagingdatascience/Fall2021

OPTIONAL REVIEWS
COMPLEMENT THE RESEARCH ARTICLES

NEXT WEEK

OXFORD

Cerebral Cortex, February 2017;27: 981–997

doi: 10.1093/cercor/bhx030
Advance Access Publication Date: 10 February 2017
Original Article

ORIGINAL ARTICLE

A Systematic Relationship Between Functional Connectivity and Intracortical Myelin in the Human Cerebral Cortex

Julia M. Huntenburg[1,2], Pierre-Louis Bazin[3,4], Alexandros Goulas[5], Christine L. Tardif[3,6], Arno Villringer[3] and Daniel S. Margulies[1]

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nature COMMUNICATIONS

ARTICLE

DOI: 10.1038/s41467-017-01285-x OPEN

The challenge of mapping the human connectome based on diffusion tractography

Klaus H. Maier-Hein

Tractography based on non-invasive diffusion imaging is central to the study of human brain connectivity. To date, the approach has not been systematically validated in ground truth studies. Based on a simulated human brain data set with ground truth tracts, we organized an open international tractography challenge, which resulted in 96 distinct submissions from 20 research groups. Here, we report the encouraging finding that most state-of-the-art algorithms produce tractograms containing 90% of the ground truth bundles (to at least some extent). However, the same tractograms contain many more invalid than valid bundles, and