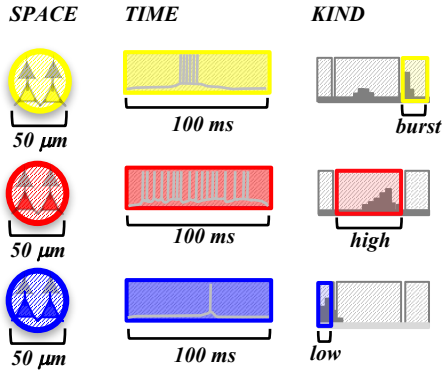
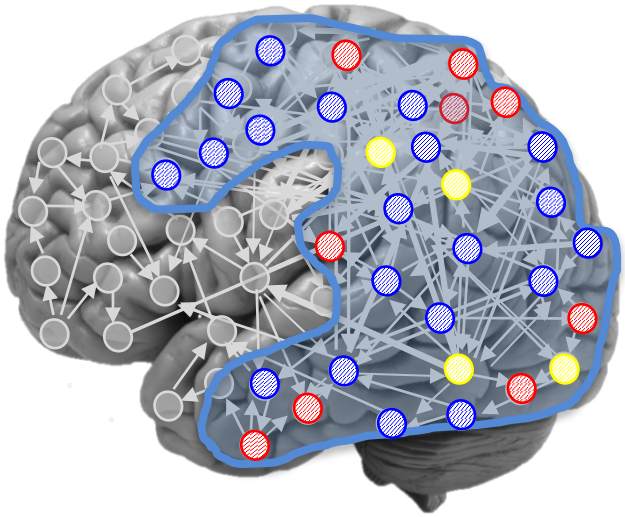
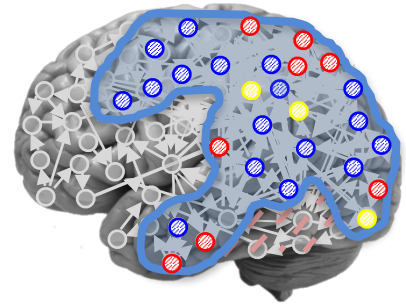
Predictive power



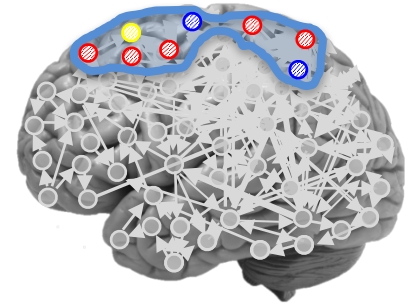
A *The major complex (watching a movie)*



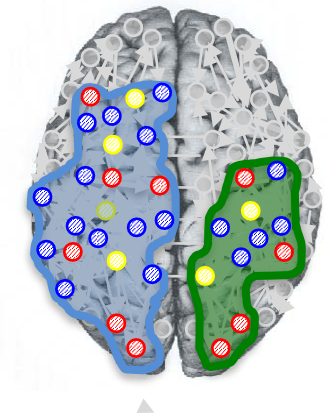
B *It shrinks (absolute achromatopsia)*



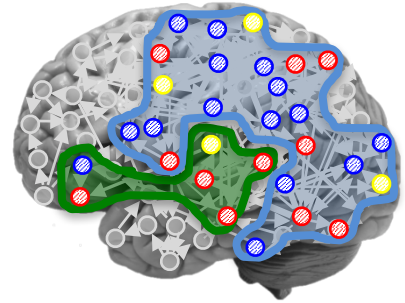
C *It moves (pure thought?)*



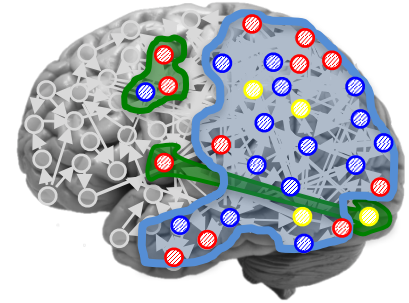
D *It splits anatomically (split brain)*



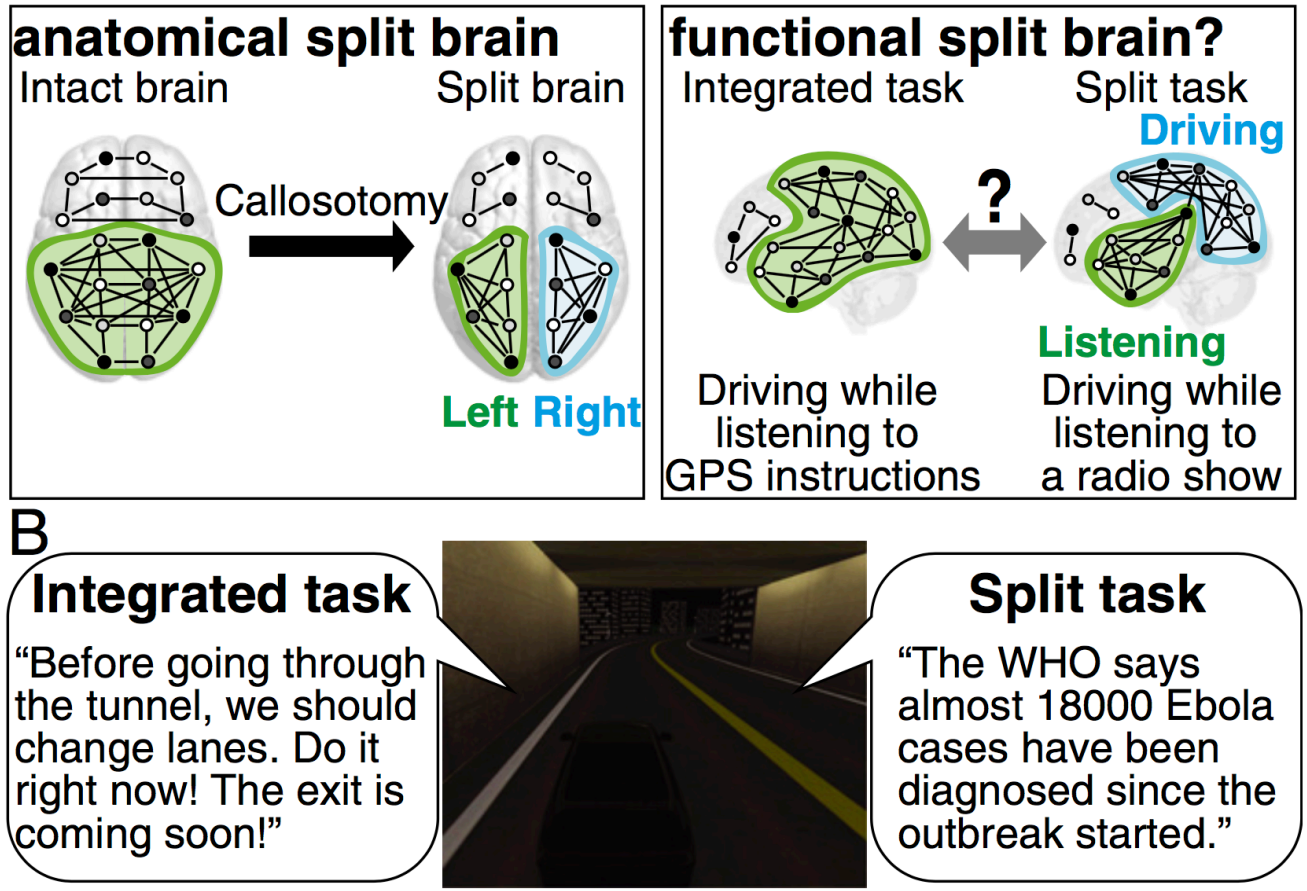
E *It splits functionally (drive and listen?)*



F *It coexists with minor complexes (high-level, "unconscious" feats?)*



Functional split-brain and information integration in a driving/listening paradigm: an fMRI study

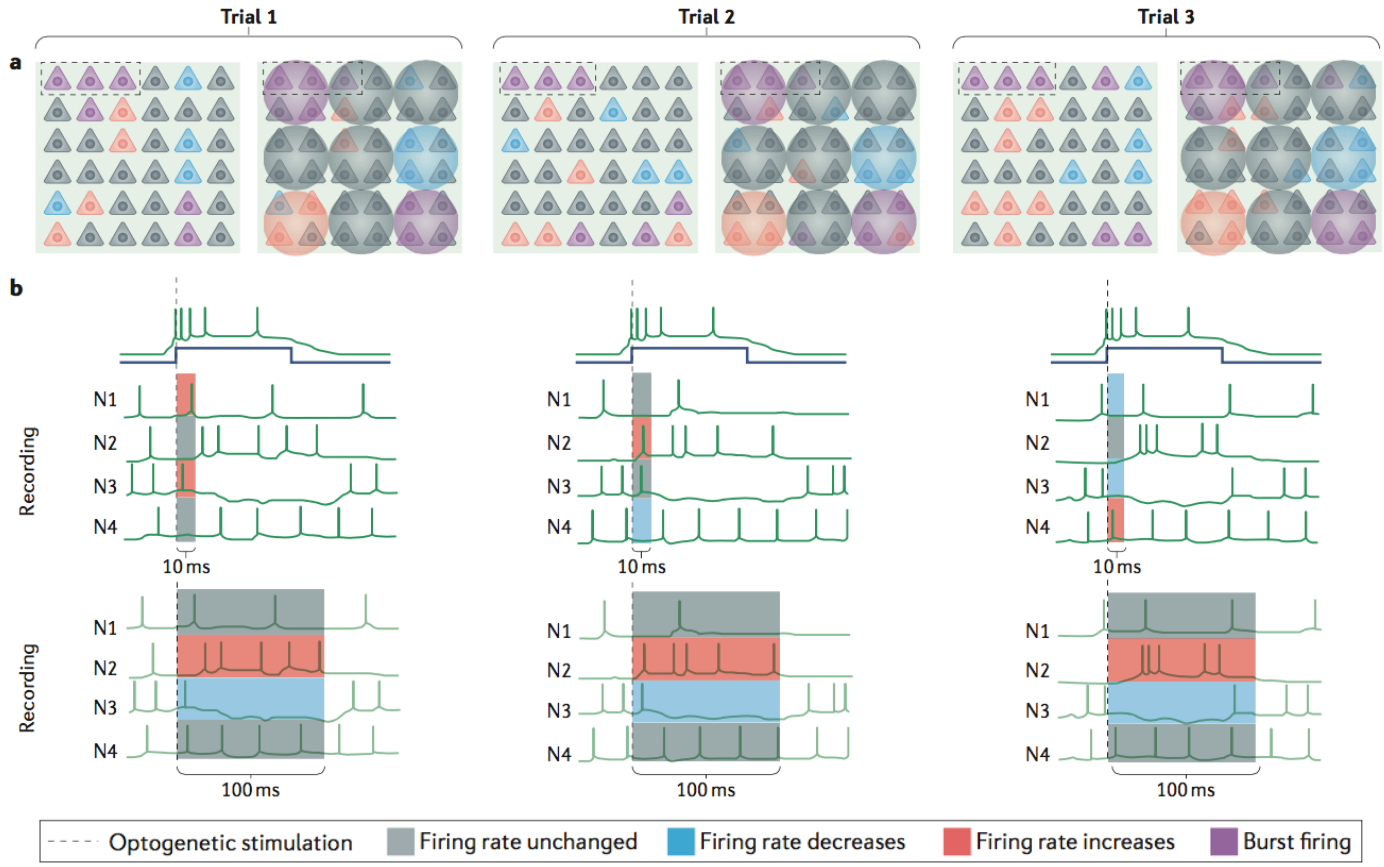


Sasai S, Boly M, Mensen A, Tononi G (2016) Functional split brain in a driving/listening paradigm. Proc Natl Acad Sci U S A 113: 14444–14449.

Testable Prediction

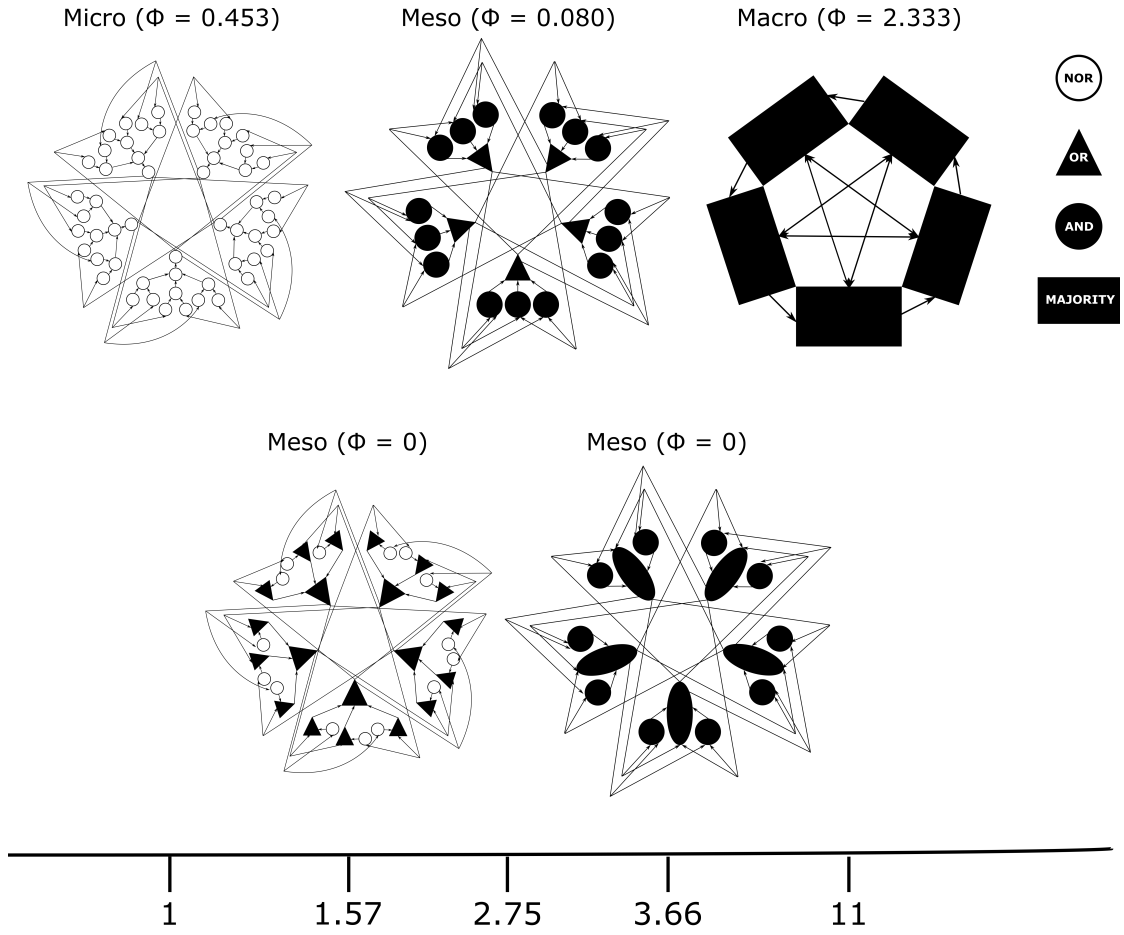
Identify the spatio-temporal scale at which the elements of the system make the greatest difference for itself

Optogenetic perturbation and unit recording



Tononi G, Boly M, Massimini M, Koch C (2016) Integrated information theory: from consciousness to its physical substrate. Nat Rev Neurosci 17:450-461.

Black boxing: How the macro can beat the micro



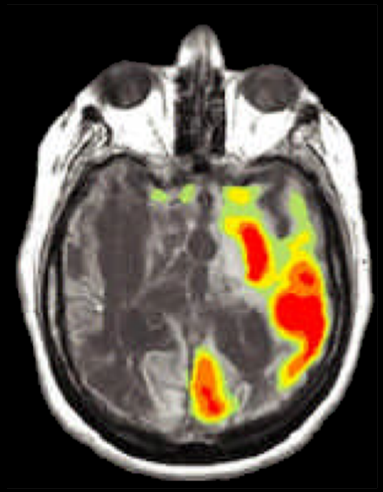
Hoel EP, Albantakis L, Tononi G (2013) Quantifying causal emergence shows that macro can beat micro. PNAS 110: 19790–19795.

Marshall W, Albantakis L, Tononi G (2016) Black boxing and cause-effect power. ArXiv:1608.03461.

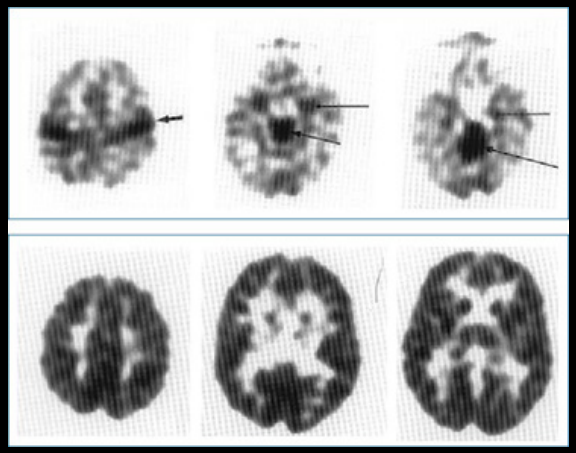
Hoel EP, Albantakis L, Marshall W, Tononi G (2016) Can the macro beat the micro? Integrated information across spatiotemporal scales. Neurosci Conscious 2016.

Inferential power

Brain "islands" in a vegetative subject



Newborn / 1 year old

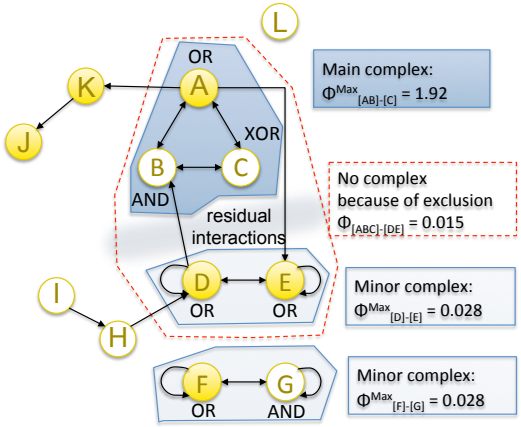


Octopus

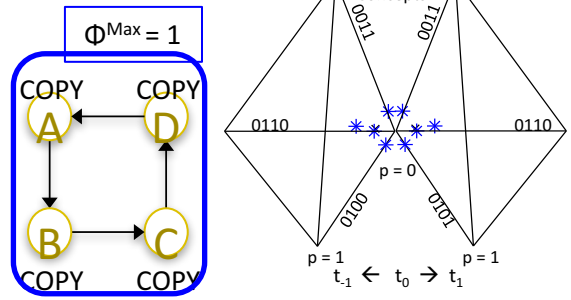
Apple Siri

Inferential power

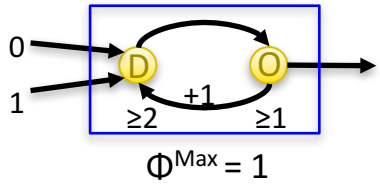
A systems can condense into major and minor complexes

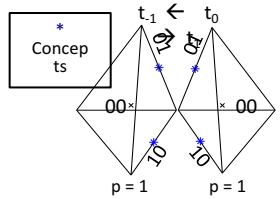


Inactive systems can be conscious

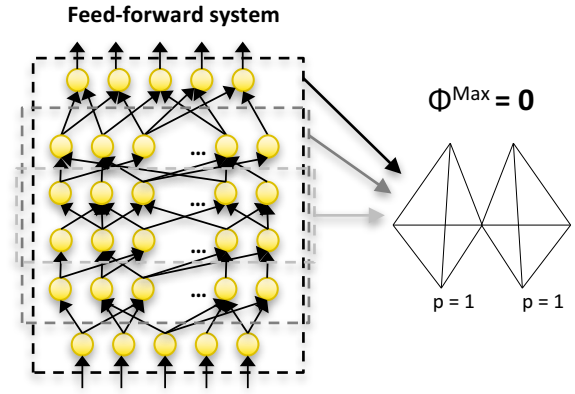


Simple systems can be (minimally) conscious

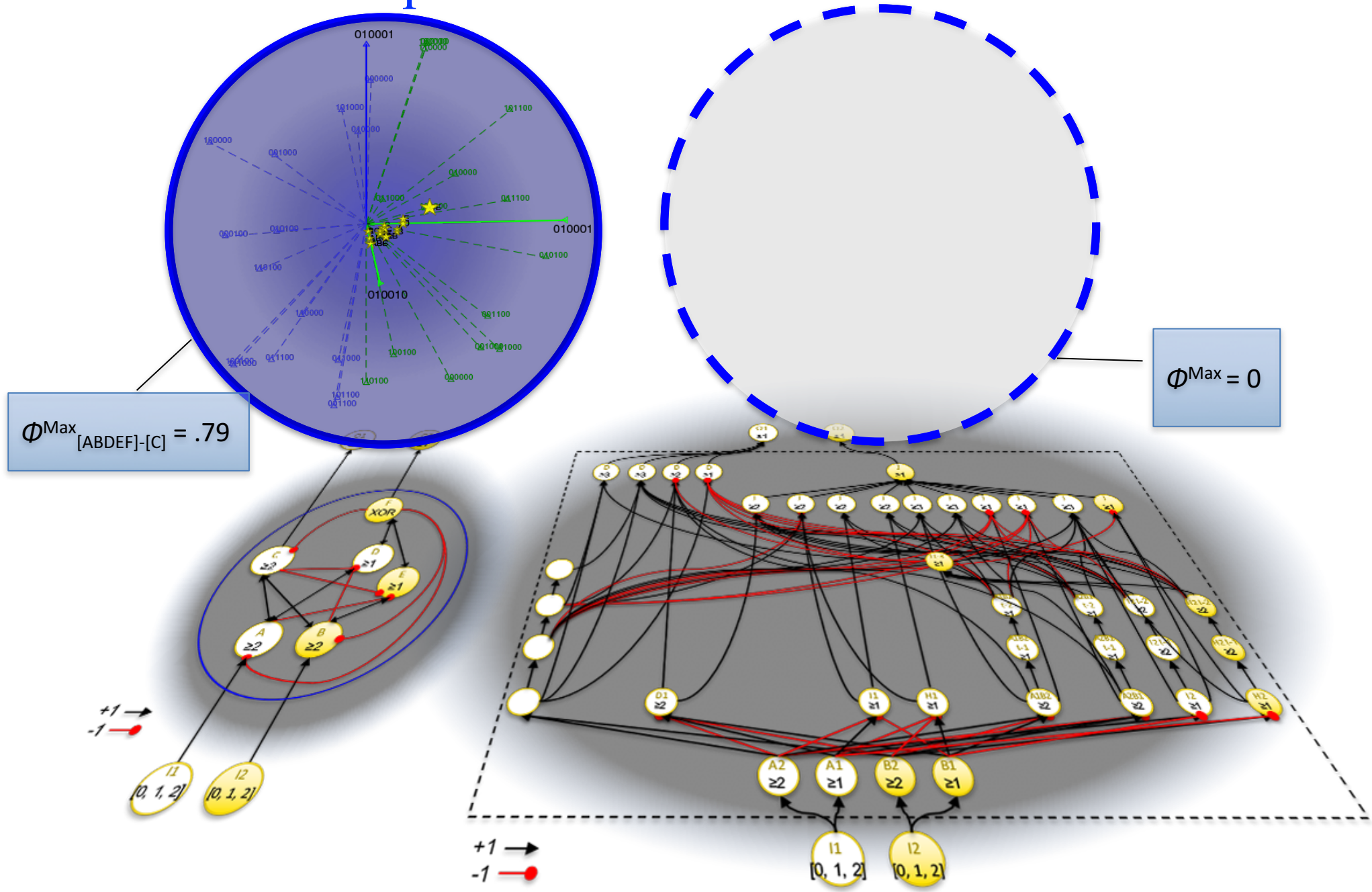




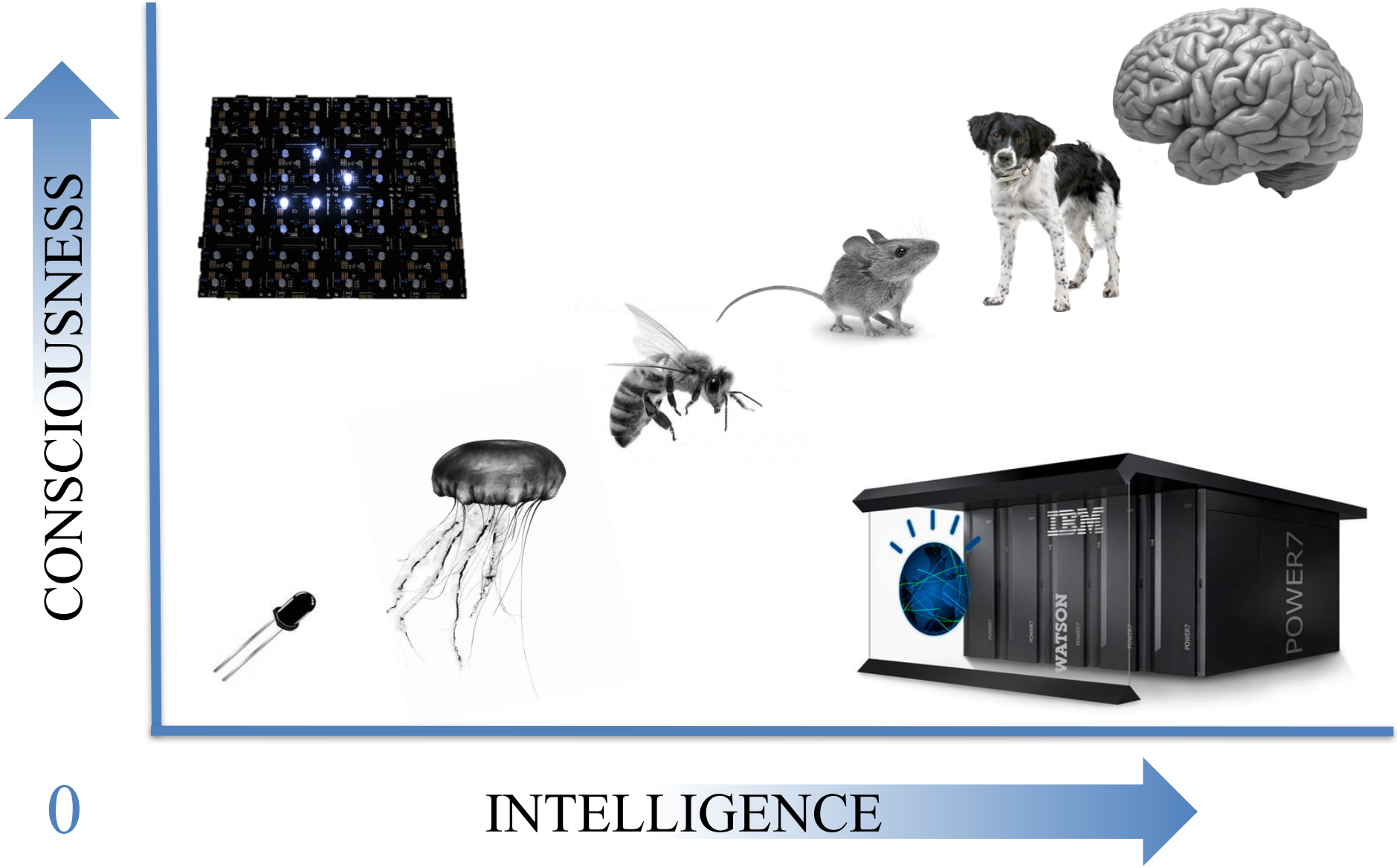
Complicated systems can be unconscious



Functional equivalence with and without consciousness

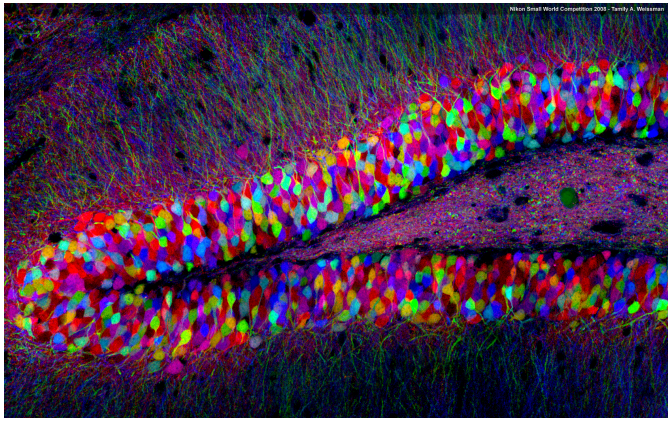


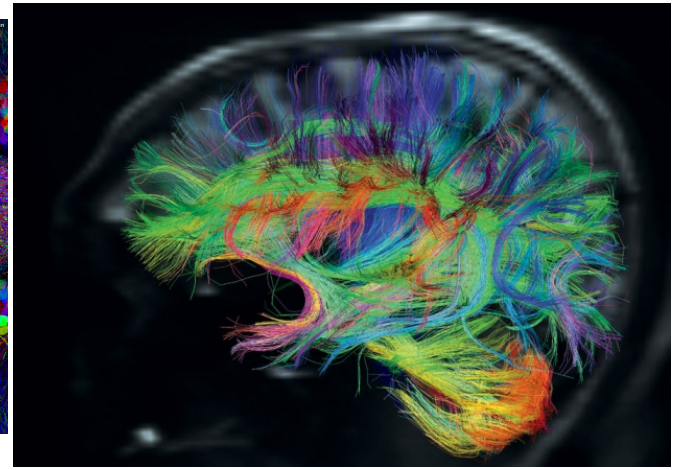
There can be a double dissociation between consciousness and intelligence

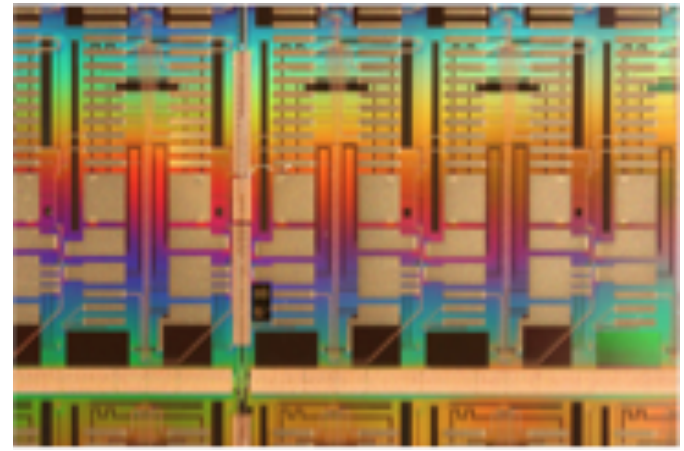


Computers simulating our behavior (BCC) are not conscious

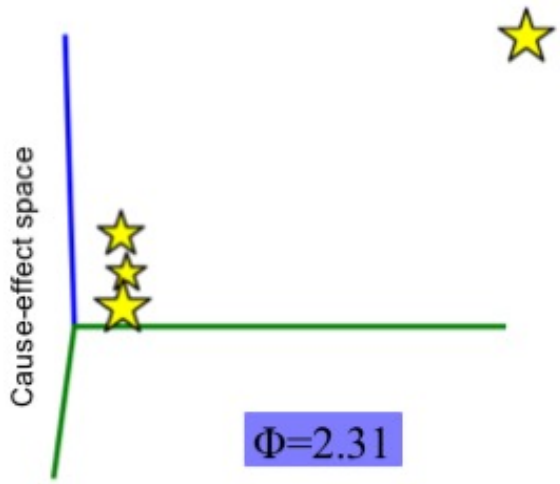
Computers simulating our neural organization (NCC) are not conscious



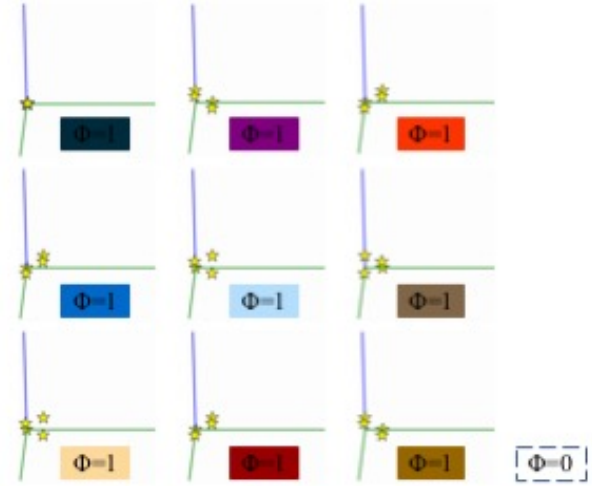




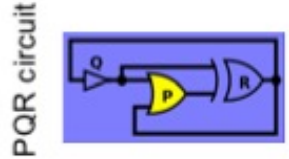
Functional equivalence does not imply phenomenal equivalence

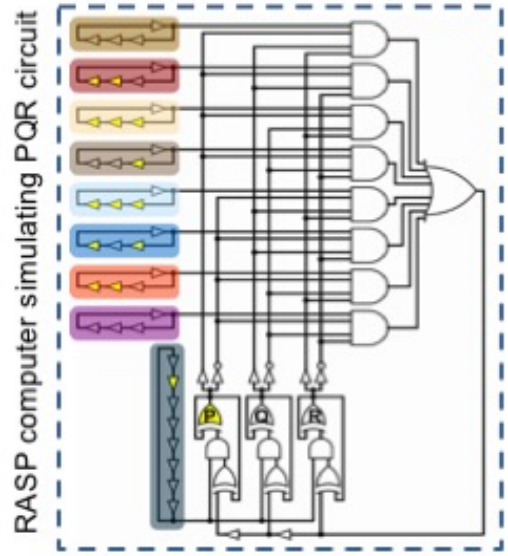


Conceptual structures



Physical substrates





Findlay et al., in preparation

3 main ideas of IIT

1. **Start from Phenomenology**
   Identify the complete set of axioms
   (necessary and sufficient requisites of experience)
   Q: Is the current set complete, self-consistent, uncompressible?

2. **Translate the axioms into postulates about the physical world**
   The physical substrate must have the same properties
   Existence is cause-effect power
   Q: *Is this premise justified?*
   Q*: Is the translation correct?*

3. **Translate the postulates into a quantitative, mathematical framework**
   Counterfactual approach to cause-effect power
   Q: *Is this translation correct? Self-consistent? Unique?*

Then:
Q: How can we measure Phi?
Q: How can we test IIT? Etc. etc.

http://integratedinformationtheory.org

Open post-doc position on IIT:

Email with CV and letter of intent to:

albantakis@wisc.edu

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