

**NATIONAL SCIENCE FOUNDATION  
BRAIN SCIENCE AT THE INTERFACE OF BIOLOGICAL, PHYSICAL AND  
MATHEMATICAL, COMPUTER SCIENCE AND ENGINEERING:  
ANALYSIS OF NEW OPPORTUNITIES**

**“Signal Processing and Its Development in the Brain”**

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# **Types of Neuroscience Data**

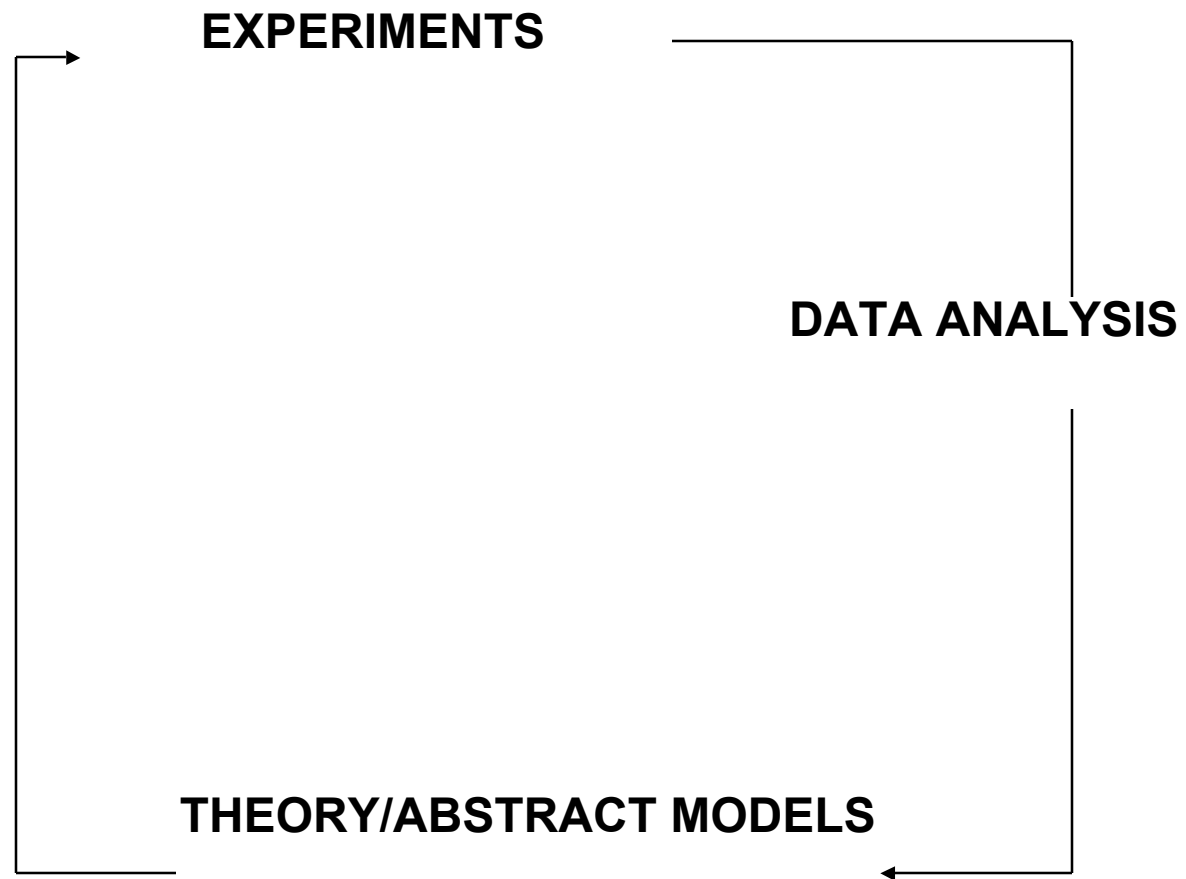
**Neurophysiological Recordings**

**Functional Imaging**

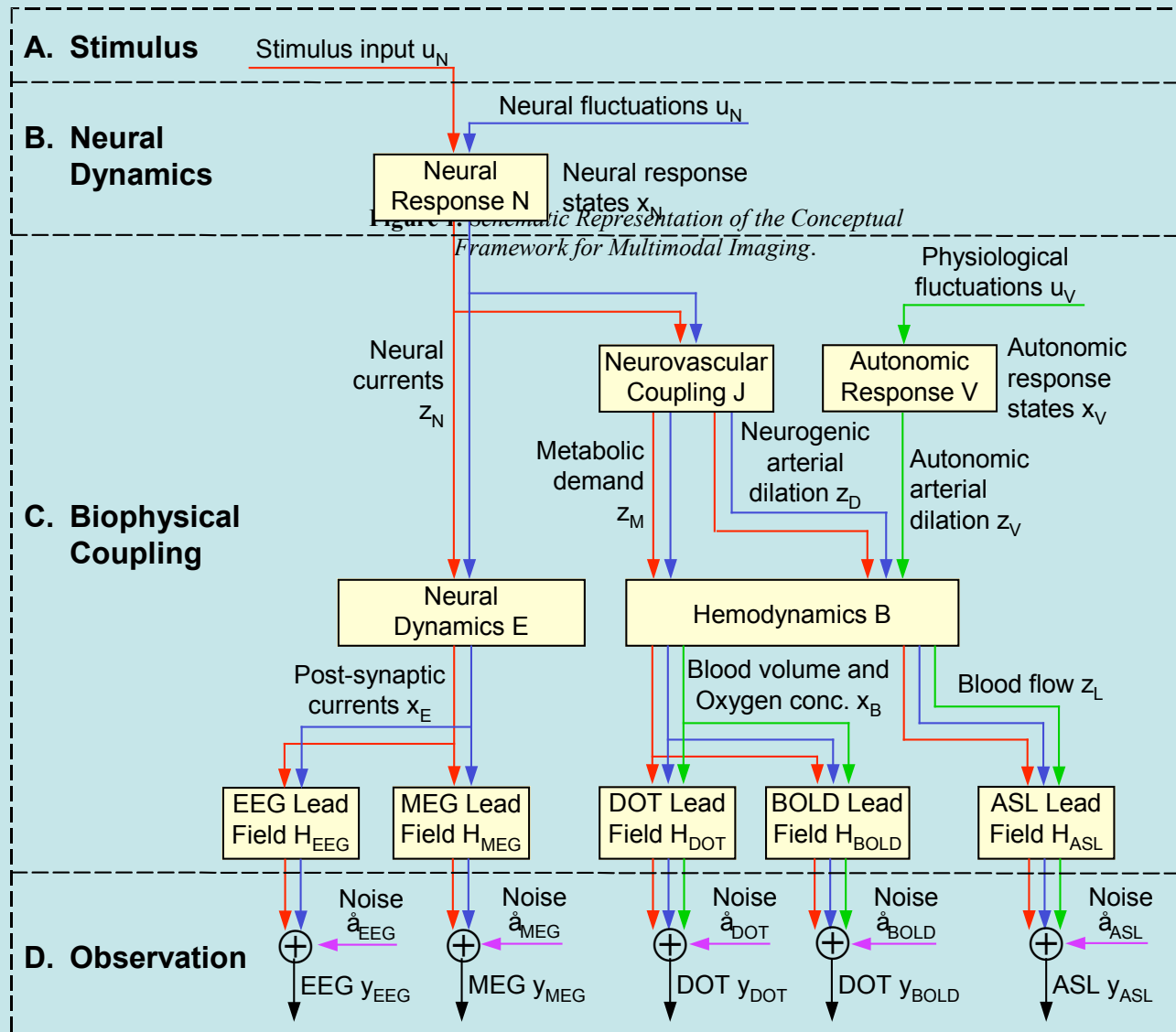
**Behavior**

**Genetics and Genomics**

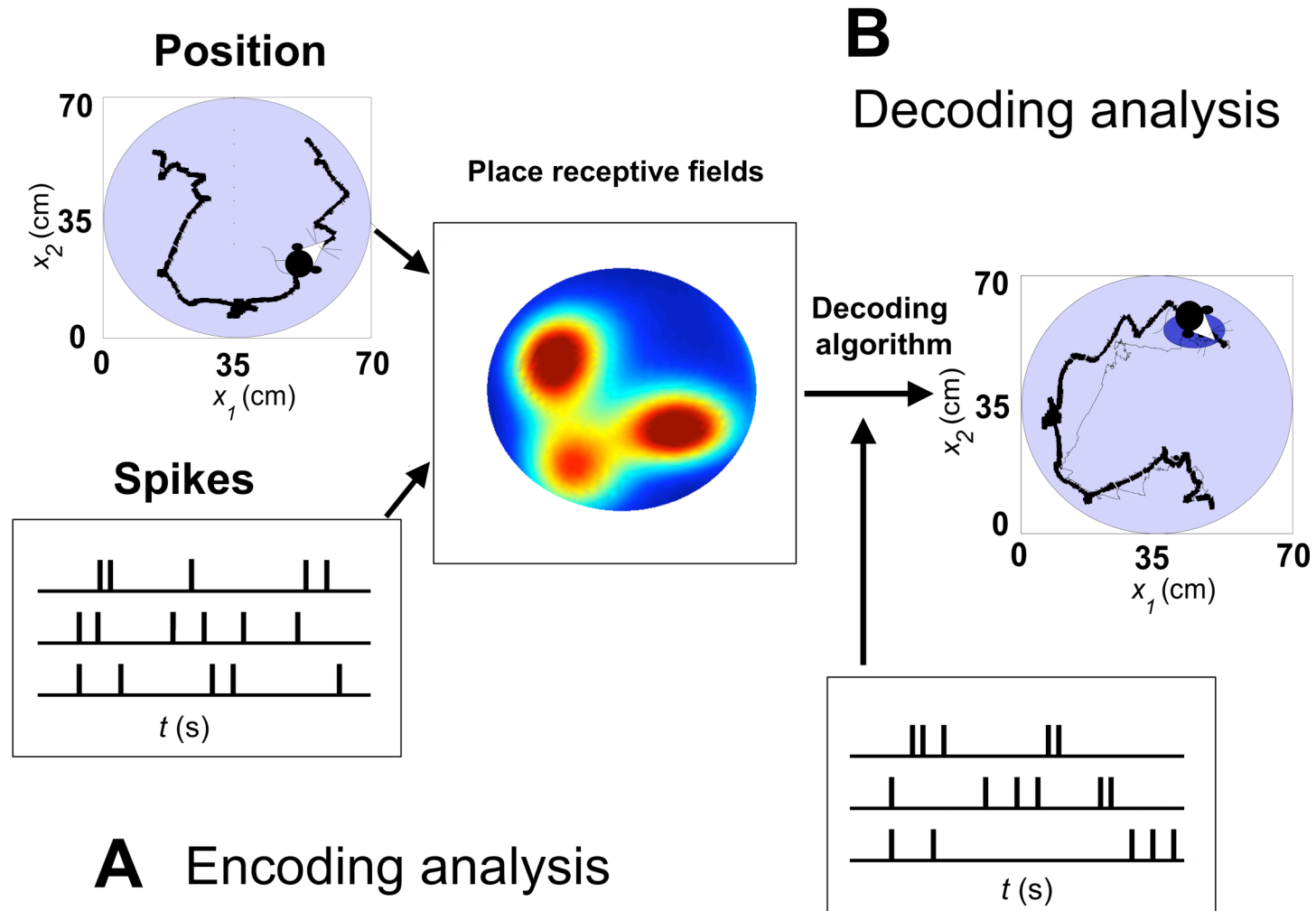
# Neuroscience Data Analysis: Dynamic and Multivariate



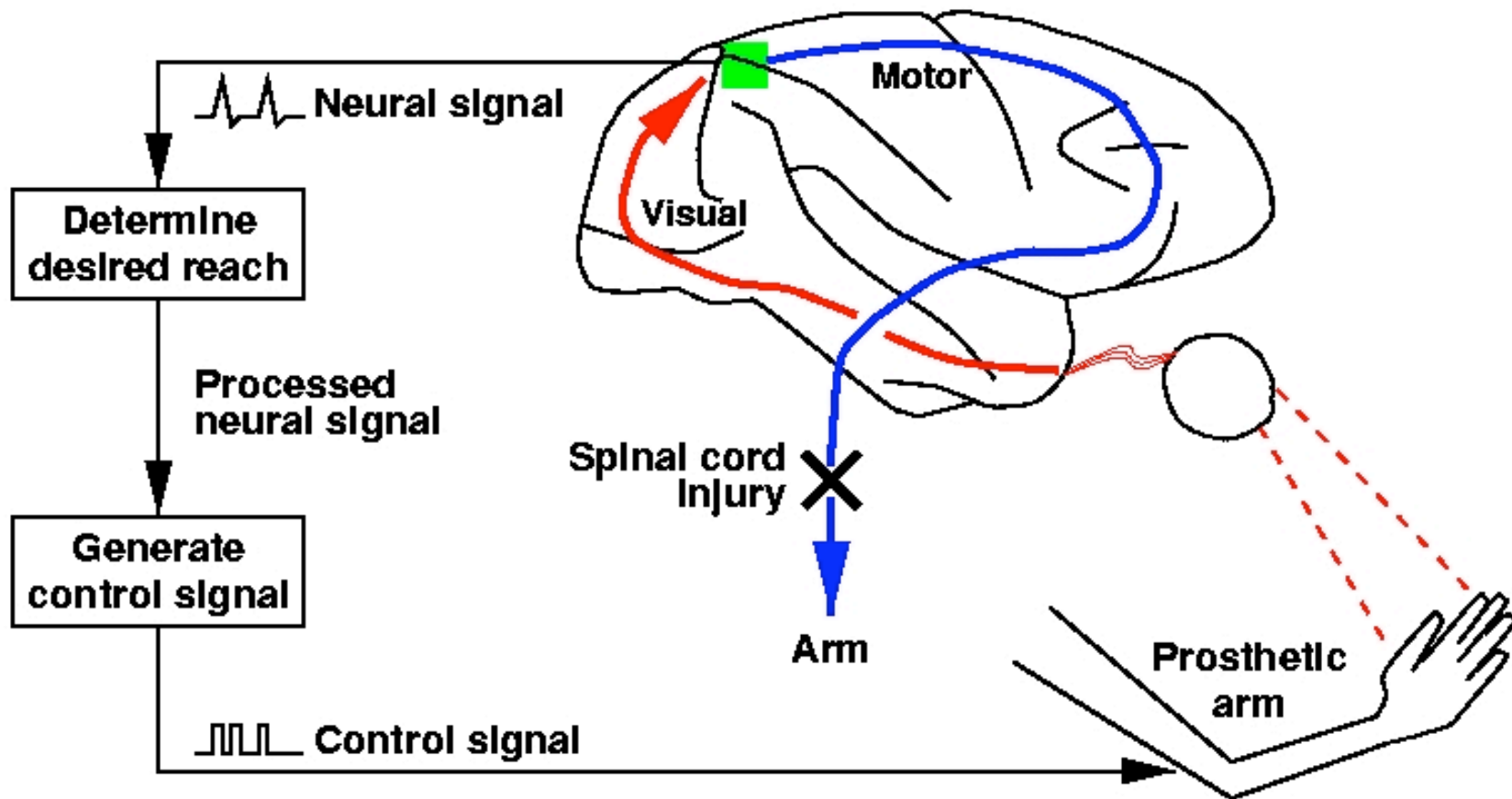
# Multimodal Imaging: Fusing Information from Multiple Sources



# Dynamic Analyses of Information Encoding by Neural Ensembles.



# Prosthetic Arm System

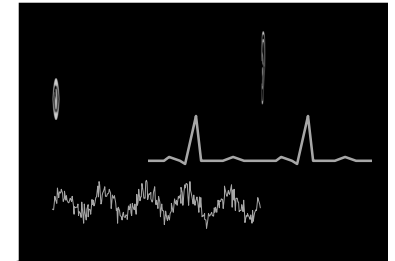


Wessberg et al. (2000), Taylor et al. (2002), Serruya et al. (2002),  
Mussallam (2004)

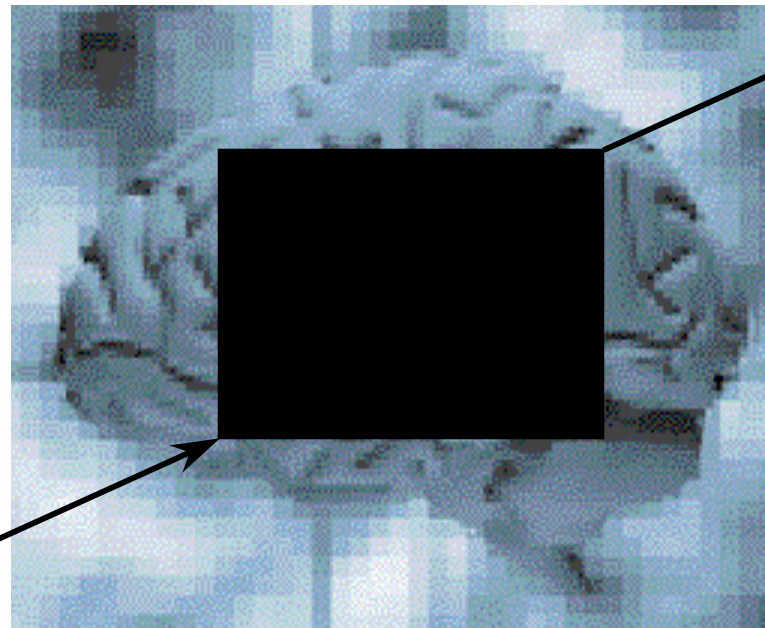
# General Anesthesia: A Systems Neuroscience Question

## Amnesia

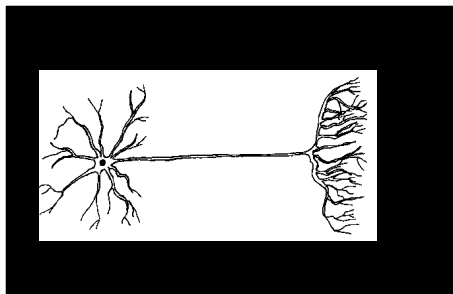
- Analgesia
- Hypnosis
- Immobility
- Hemodynamic Stability



**Clinical Observations**



## Molecular and Cellular Biology



- “.... a drug-induced, reversible depression
- of the central nervous system resulting in
- the loss of response to and perception of
- all external stimuli.” (Oliver Wendell Holmes)

# **Neuroinformatics**

**Cataloguing Neuroscience Data**

**Sharing of Neuroscience Data**

**Algorithms and Paradigms for  
Neuroscience Data Analysis and Data  
Mining**