Chapter 1: Introduction

Introduction: What is Behavioral Neuroscience?

Biological Explanations of Behavior

Applications of Behavioral Neuroscience

Understanding Human Consciousness

Natural Selection and Evolution

Ethical Issues in Research with Animals

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Introduction: What is Behavioral

Normal	Pathology
sensation	addiction
motor activity	neurodegenerative disorders
arousal	brain/spinal cord injury
motivation	mood disorders
language	developmental disorders
socialization	cognitive aging
anxiety/fear	psychiatric disorders
pain	
reproductive	

- study of physiological, evolutionary, & developmental mechanisms of behavior & experience
- focuses on functioning of nervous system & reciprocal interactions with body to control behavior
- emphasis on both normal behaviors & pathology

Introduction: What is Behavioral

Where do Behavioral Neuroscientists work?

- **University**: research and teaching
- **Research Institute**: research
- **Pharmaceutical/Biotechnology Industries**: research

What other disciplines contribute?

- **Basic Research**: Neuroanatomy, Neurochemistry, Electrophysiology, Developmental Biology, Molecular Biology
- **Preclinical/Clinical Research**: Neurology, Endocrinology, Psychiatry
- integrative function of Behavioral Neuroscience

NIH National Institutes of Health
Turning Discovery Into Health

NSF National Science Foundation
WHERE DISCOVERIES BEGIN

Introduction: What is Behavioral

Methodological Approaches.

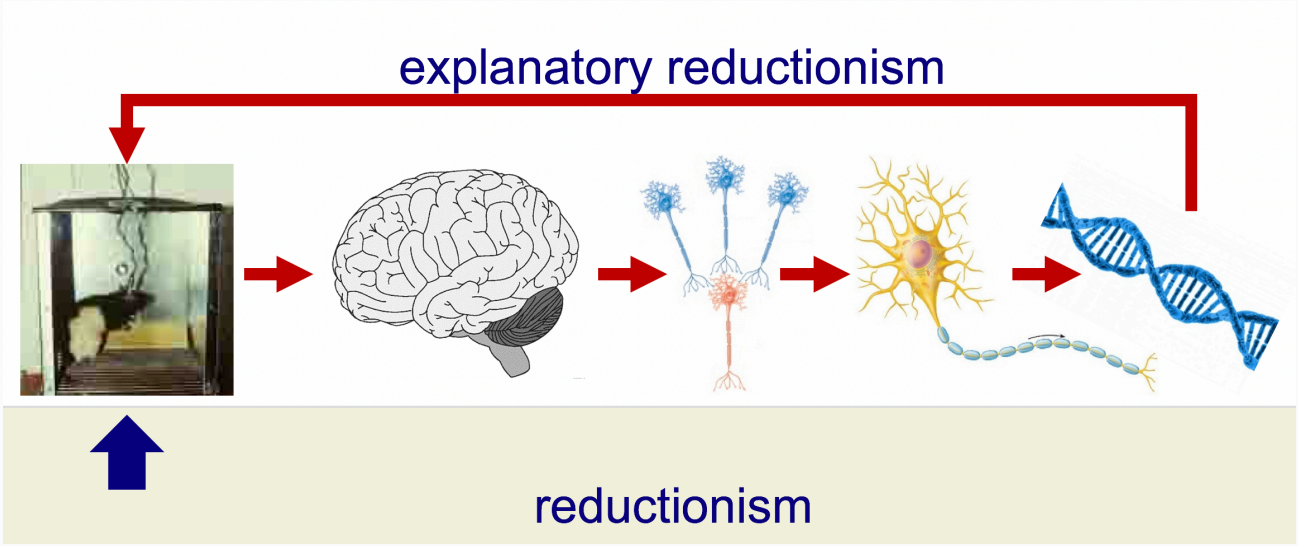
- **Simplification**: procedures to reduce complexity of experiments without altering level of analysis
- **Generalization**: general conclusions based on many observations

Biological Explanations of Behavior

Methodological Approaches.

Reductionism: shift in level of analysis from behaving organism to neuronal systems, circuits, cells & molecules

Explanatory Reductionism: understanding components of a system that will ultimately explain behavioral characteristics



Biological Explanations of Behavior

Proximal Explanations

- **PHYSIOLOGICAL**: relationship between behavior and activity of brain/other organs
- **ONTOGENETIC**: development within individual (genes, nutrition, experience, etc.)

Ultimate Explanations

- **FUNCTIONAL**: purpose served by particular behavior (adaptation for survival)
- **PHYLOGENETIC**: evolutionary organization of the capacity for particular behavior

Applications of Behavioral Neuroscience

The Human Genome Project.

- structure of DNA published April 25, 1953
- human genome completely sequenced April 14, 2003
- more than 99.99% accuracy
- highly contiguous
- only 1.1 – 1.4% of 3.2 billion base pairs encode proteins
- approximately 24,000 genes
- single nucleotide polymorphism (SNP)

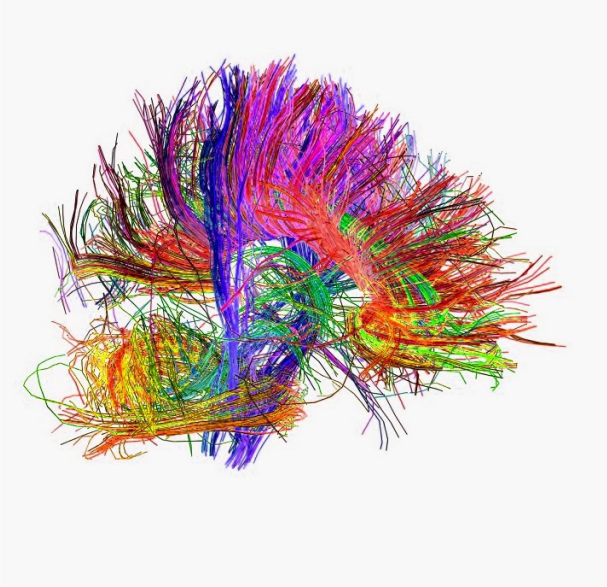
A A G G C T A A $\longrightarrow$ A T G G C T A A

- Behavioral Neuroscientists study functions of mapped genes and their products, interactions of resulting biochemistry with environmental events... as they relate to behavior.

Applications of Behavioral Neuroscience

The Proteome and Connectome Projects.

- genome project is just the blueprint
- new focus on functional impacts



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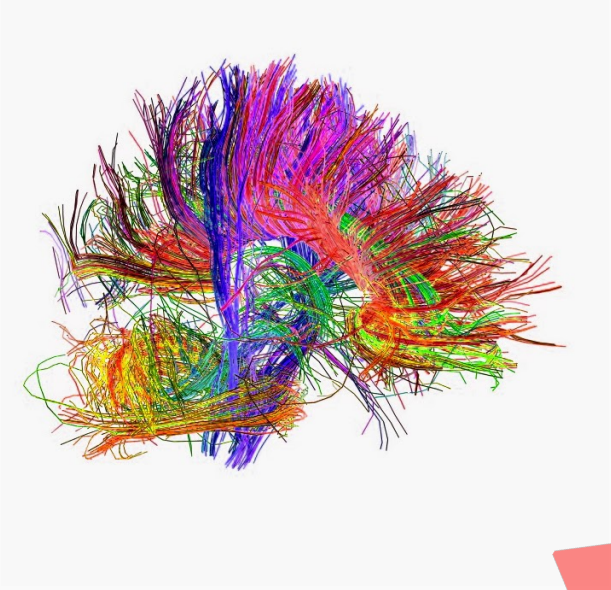

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