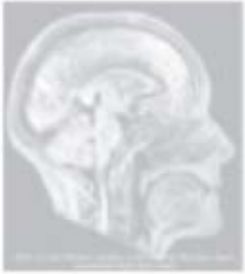


Lecture 1:

# Overview

- why cognition and emotion?
- historical background
- lecture's aims, learning and skill outcomes?
- house keeping
- preview of the lectures



## Lecture 1: Why Cognition and Emotion ?

Emotions are what we most care about

Emotions and feelings affect:

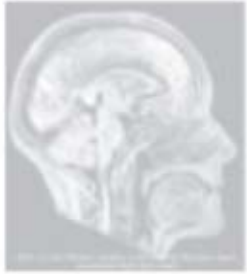
- Personal lives
- Bodily well being
- Mental states
- Ability to reason



Lecture 1:

# Arts and Emotion

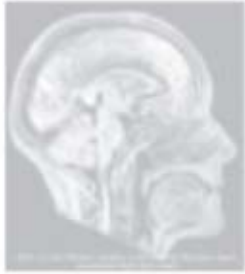




Lecture 1:

# Arts and Emotion





Lecture 1:

# Arts and Emotion



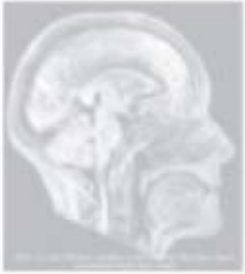


Lecture 1:

# Arts and Emotion



Judith Slaying Holofernes (Uffizi version)  
by Artemisia Gentileschi (~1620)

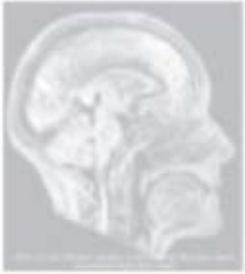


Lecture 1:

# Arts and Emotion



The Scream by Edvard Munch (1893)

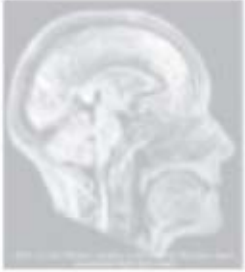


Lecture 1:

# Arts and Emotion



Meeting by Edvard Munch (1921)



Lecture 1:

# What are Emotions good for (I)?

Are they a caprice of Nature?

Certainly not, Emotions are critical for individual survival

- Affects/Emotions help to regulate bodily needs
- Emotions guide and consolidate memory
- Emotions guide social bonding
- Emotions guide reproductive behaviour

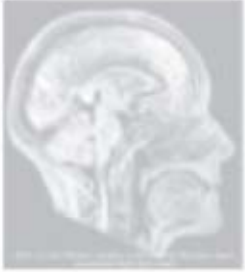


Emotions provide a flexible evaluation mechanism in an ever changing environment.

Flexible evaluation mechanisms are radically different from reflexes

But flexible in what sense?

- Evaluation of 'good' and 'bad' under given circumstances
- Ability to store that information in context with its occurrence



Lecture 1:

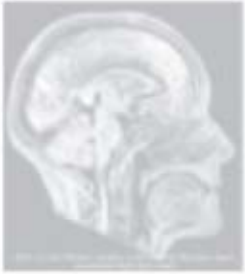
## Do animals have emotions?

**Problem:** Internal states of others cannot be measured directly.

A study of emotional states must be indirect and based on empirically guided theoretical inferences.

**Assumption:** emotions arise from distinct neuronal circuits in the brain. These circuits are shared by most/all mammals, i.e. animals have emotions.

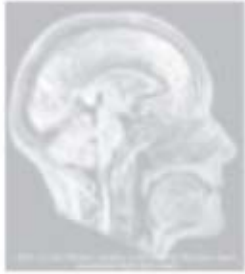
Thus emotions are of biological nature



## Lecture 1: **Emotions are of biological nature**

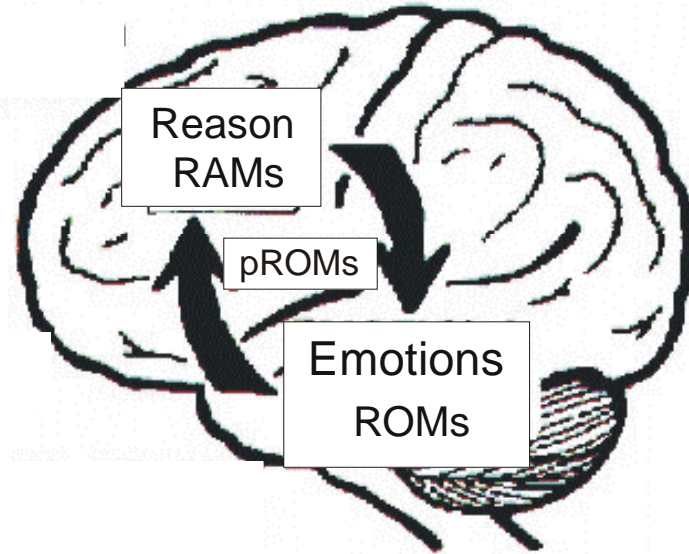
### What does that imply?

- Some (ancient) brain circuits will be responsible for affective states/feelings, and appropriate trigger will activate them.
- Current and future behaviour will be influenced by these “archaic” circuits.
- Fully expressed emotions in humans demonstrate that powerful ancient forces have survived beneath our cultural veneer.
- This ancient heritage makes us the intense, feeling creatures that we are (which is a good thing).
- But emotions are influenced (and sometimes overridden) by higher order cognitive functions and cultural learning.



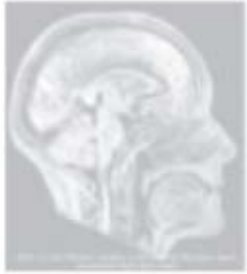
# Lecture 1: Interaction of Cognition and Emotion

Neomammalian brain



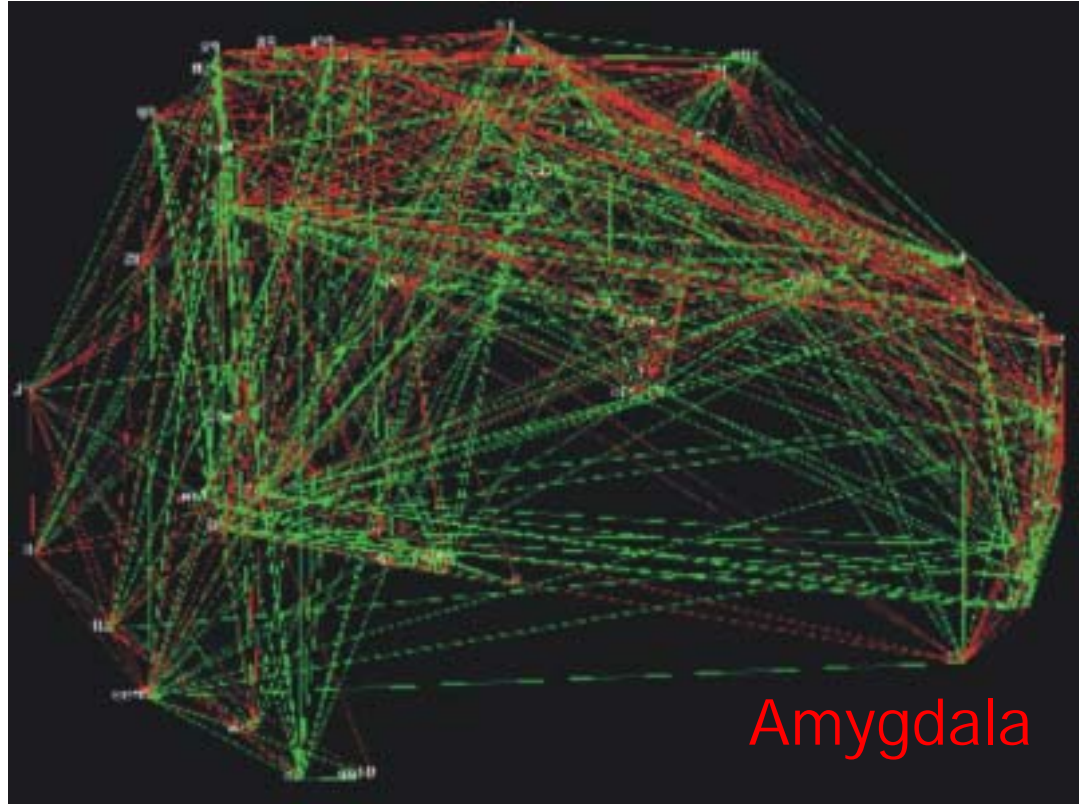
Old (mammalian) brain



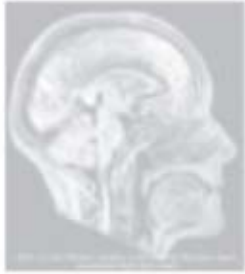


## Lecture 1: Interaction of Cognition and Emotion (III)

### Cat brain

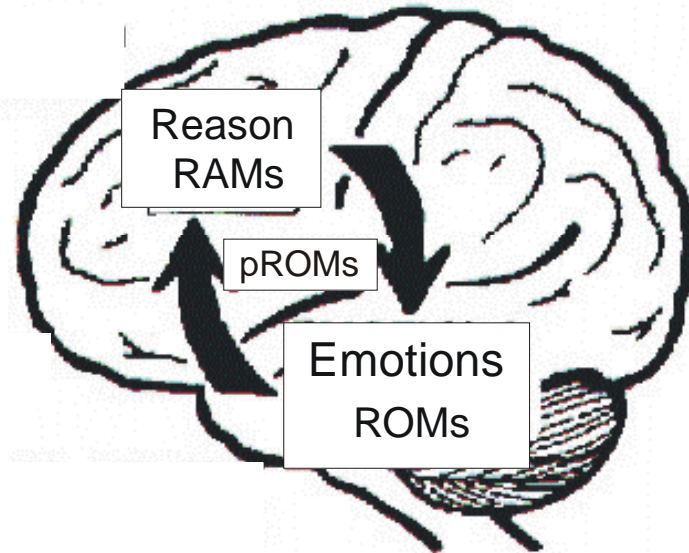


Amygdala

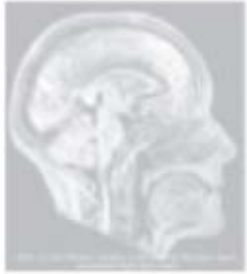


# Lecture 1: Interaction of Cognition and Emotion

Neomammalian brain



Old (mammalian) brain



Lecture 5:

## Historical concepts (I)

“Emotions have traditionally been regarded as extras in psychology, not as serious mental functions like perception, language, thinking, learning”.

Oatley & Jenkins, 1996, Understanding Emotions, Blackwell, p.122

If emotions shall be scientifically investigated, they must open to public verification.



## Lecture 5:

## Historical concepts (II)

### Classical Roots: Monism and Dualism (500 B.C.)

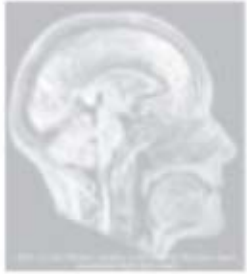
- Dualism: Body and mind (soul) are separate entities

(Plato)

Descartes: 'Body is public, tangible; Mind is private, intangible';  
Cartesian impasse: **The interaction between mind and body cannot be comprehended in either spatial or non-spatial terms**

- Monism: Matter is all there is (less influential back then).

If mind (emotions, cognition, consciousness) is private, invisible and intangible, it is excluded from scientific research and concepts of truth.



## Lecture 1:

# Historical concepts (III)

- Pragmatism

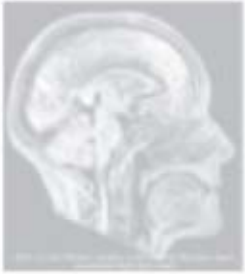
is based on 'hard fact' science, but assumes that truth is not absolute. Knowledge about reality is derived from sensory perception. 'True is what promotes successful adaptation' (biological implementations). Truth is modified as discoveries are made. It is relative to time and place and purpose of inquiry.

- Positivism

All knowledge has to be based on logic and the description of sensory phenomena. Scientific discourse is cognitive discourse. Emotive discourse is necessarily non scientific.

- Behaviourism

only measurable facts are subject of scientific inquiry. Introspection or analysis of internal (cognitive or emotive) states are regarded to be non scientifically.

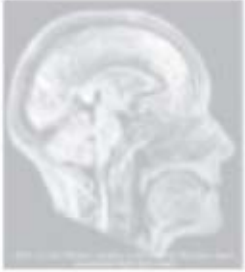


Lecture 1:

## Historical concepts (IV)

### Affective and Cognitive Neuroscience

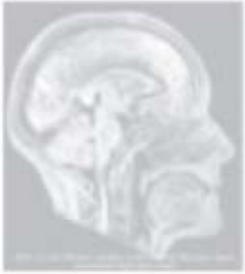
- has opened the black box
- has established that cognitive **and** emotive knowledge exist



## Lecture 1:

# Knowledge

- Knowledge based on raw awareness (knowledge by acquaintance, direct knowledge). Knowledge by acquaintance is always true, e.g. the knowledge of a certain taste, the knowledge of the perception of 'red'.
- Representational knowledge, knowledge by description ('higher' form of knowledge). Direct knowledge can sometimes be restructured into knowledge by description, which is not self-evident, i.e. it can be false.
- We have direct knowledge about events in the terrestrial, social and bodily environment, but representational knowledge about these events based on processing and interference.

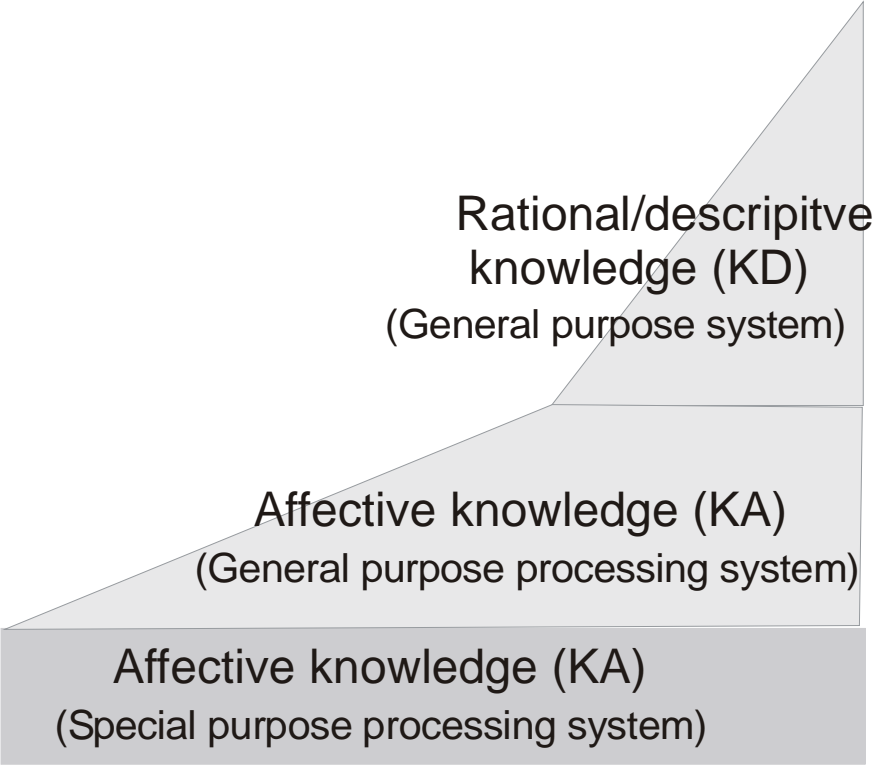


## Lecture 1: Affect/Emotion

- Direct knowledge of feelings and desires.
- This knowledge is based on readouts of specifiable neurochemical systems.
- These system have evolved by natural selection as phylogenetic adaptations functioning to inform the organism of bodily events important for self-regulation.
- Emotions/Affects are always present (self-evident)
- Relatively strong affects associated with specific elicitors are typically termed **emotions** as compared with **moods**, which last longer and are not associated with specific elicitors.



# Lecture 1: Interaction of Affective and Rational Cognition

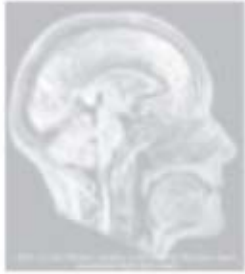


Level of prime: Reflex -----Instinct-----Drive-----Affect

Phylogen. Scale: Simple creatures-----Complex creatures

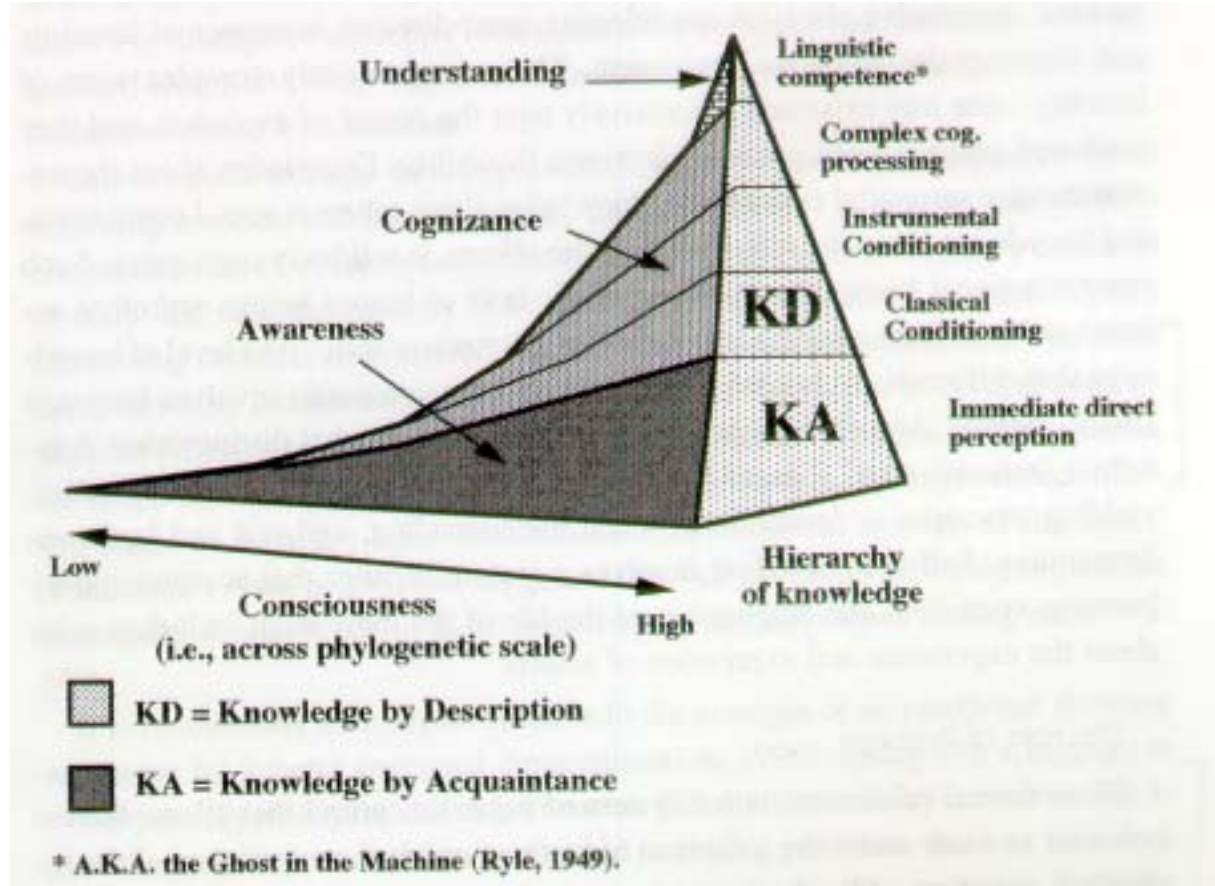
Development: Infant ----- Adult

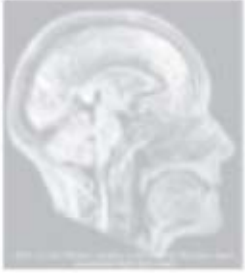
Brain System: spinal cord - brainstem - midbrain - paleocortex - neocortex



Lecture 1:

Levels of knowledge

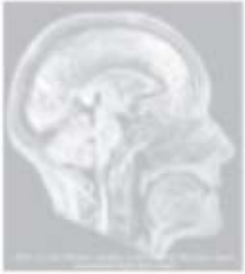




Lecture 1:

# How do emotions arise?

Do they precede or follow cognition?



## Lecture 1:

# How do Emotions arise ?

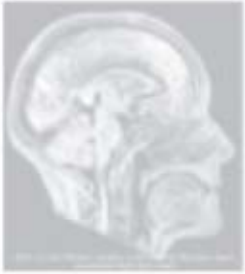
## Zajonc –Lazarus debate:

Does affect occur before cognition or is it dependent on cognitive appraisal?

- LeDoux : fear involves interaction between fast processing (bypassing the cortex) of information to the amygdala, and slower but more elaborate information from the neocortex to the amygdala.

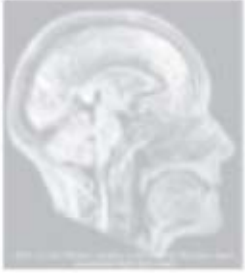
Thus, Zajonc and Lazarus are both right, only they used different definitions of cognition: initial fast response vs. slow representational response.

Use of particular language may become trivial, once we understand the neural organization underlying what we call cognition and emotion.



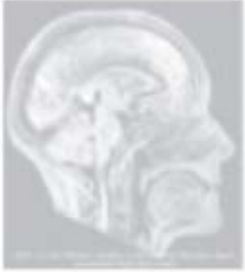
## Lecture 1 Defining Motivation, Emotion, Cognition

- Emotion always involves cognition and cognition always involves emotion
- Emotion and cognition always involve 'motivation' and vice versa

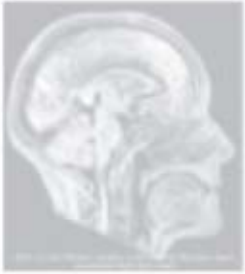


## Lecture 1: Motivation

- the potential of the system to elicit certain behaviour, analogous to energy in physics (never seen per se).



1. Emotions provide a flexible evaluation mechanism and thereby promote survival
2. Emotions arise from dedicated brain structures
3. Humans and animals alike have emotions
4. Emotions are no longer 'private' events
5. Cognition and Emotion constantly interact
6. Various scales of affective and descriptive knowledge exist



## Lecture 1:

# Readings

### Essential Reading References

Panksepp, J. (1998) *Affective Neuroscience* Oxford University Press, ISBN: 0195096738

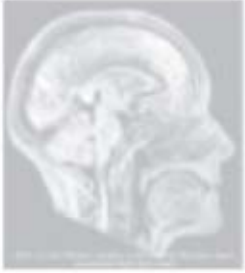
Borod, J.C. (Ed.), (2000) *The Neuropsychology of Emotion*, Oxford University Press, ISBN: 0195114647

Kandel, E.R., Schwartz, J.H., Jessell, T.M. (2000) *Principles of Neural Science*, 4<sup>th</sup> Edition, McGraw-Hill, ISBN: 0838577016

### Supplementary Reading References

Mesulam M. M. (2000) *Principles of Behavioral and Cognitive Neurology*, Oxford Univ Press; ISBN: 0195134753

Gazzaniga, M.S. et al. (1999) *The New Cognitive Neurosciences* MIT Press, ISBN: 0262071959



## Lecture 1:

# Intended learning outcomes

At the end of this module you will:

- be familiar with the basics of neuronal information processing
- be familiar with basics of brain anatomy
- be familiar with concepts of cognition and emotion and how they can be applied to humans and other mammals
- know the basic neuroanatomical and neuropharmacology circuits that mediate cognition and emotion
- know something about the interdependence of cognition and emotion
- be familiar with some tests to determine emotional and cognitive dysfunctions



## Lecture 1:

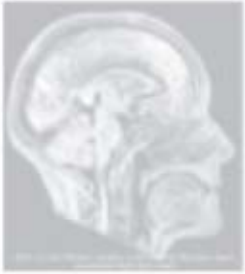
# Housekeeping/Assessments

- This module counts a total of 2.77% to your final degree marks.
- Written essay, due on 28<sup>th</sup> of April
- Assessment at the end of 3<sup>rd</sup> term

## Essay titles:

- Care circuits: what is the neurobiology and neuropharmacology of nurturance and social bonding?
- What is the neuroanatomical and neuropharmacological basis of aggression?

Tutorials: 18-03-02 from 9-10 am, 11-12 am, and 1-5 pm



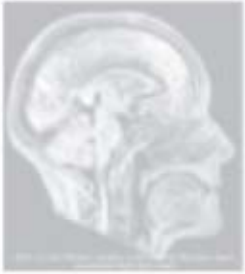
Lecture1:

## Lectures preview

Lecture 1: General Introduction, preview of all the lectures, and 'housekeeping', historical background

Lecture 2: Background I – Neurodynamics: The Neuron and its electrical language .

Lecture 3: Background II – Neurostatics: The Anatomy of the Brain/Mind.



Lecture 1:

## Lectures preview

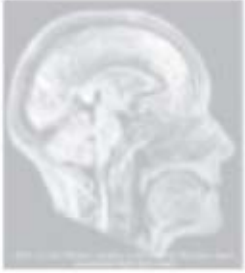
Lecture 4: Psychological models of emotions

Lecture 5: Neuropharmacology

Lecture 6: Basic Emotional and motivational processes: the Seeking system, Rage and Anger

Lecture 7: Fear and Anxiety.

The sexual Brain



Lecture1:

## Lectures preview

Lecture 8: Social Emotions: Varieties of Love and Lust, Love and Social Bond, Loneliness and Social Bond, Rough and tumble play: The sources of social joy

Lecture 9: Emotions and Memory

Lecture 10: Emotional and Cognitive Disorders of the Brain

Lecture 11: Repetition