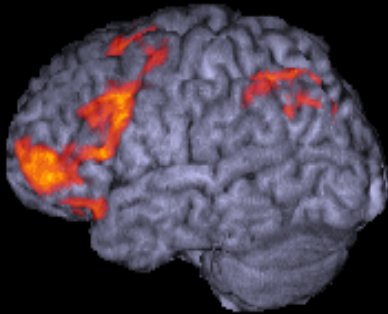


Giftedness and the brain: educating children of high intelligence



John Geake

Westminster Institute

Oxford Brookes University

<http://www.brookes.ac.uk/schools/education/staffinfo/geake.html>

Questions, questions, questions ...

- How do our brains learn and remember, and therefore how should we teach and assess for maximum effectiveness ?
- Are the brains of gifted children different from those of other children (and therefore ...) ?
- Are girls and boys brains different from each other (and therefore ...) ?
- How do our brains enable creative thinking, (and therefore ...) ?

Giftedness and the brain

Day 1

Session 1: 1000-1130

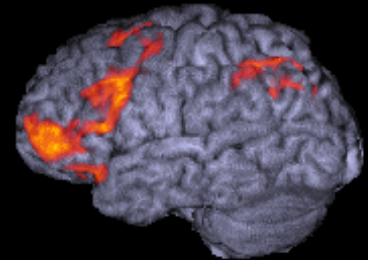
- How do our brains learn and remember?
- What are some implications for education?

Session 2: 1200-1330

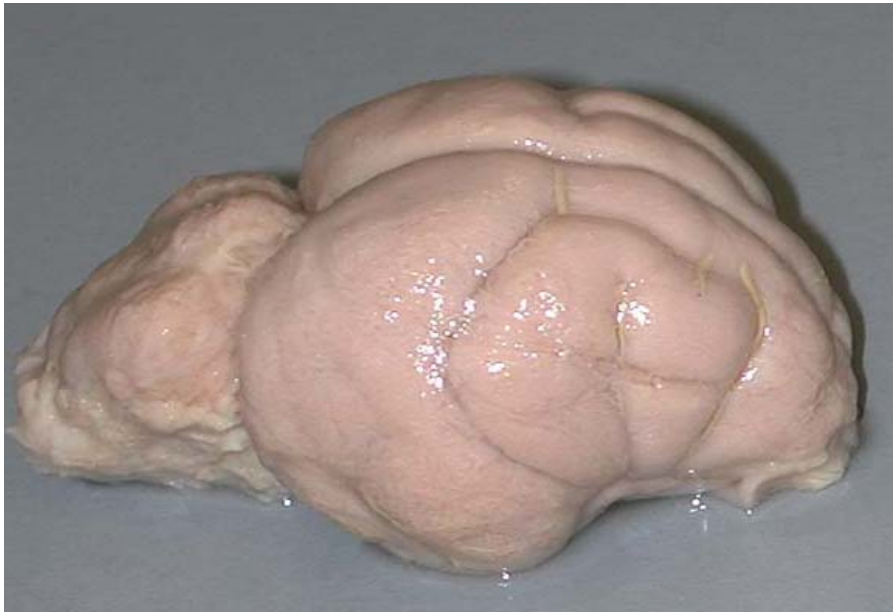
- What is educational neuroscience
- How do girls' and boys' brains diff

Session 3: 1430-1600

- Neuromyths and fads
- Neural basis of emotion



Australian research into brain functioning?



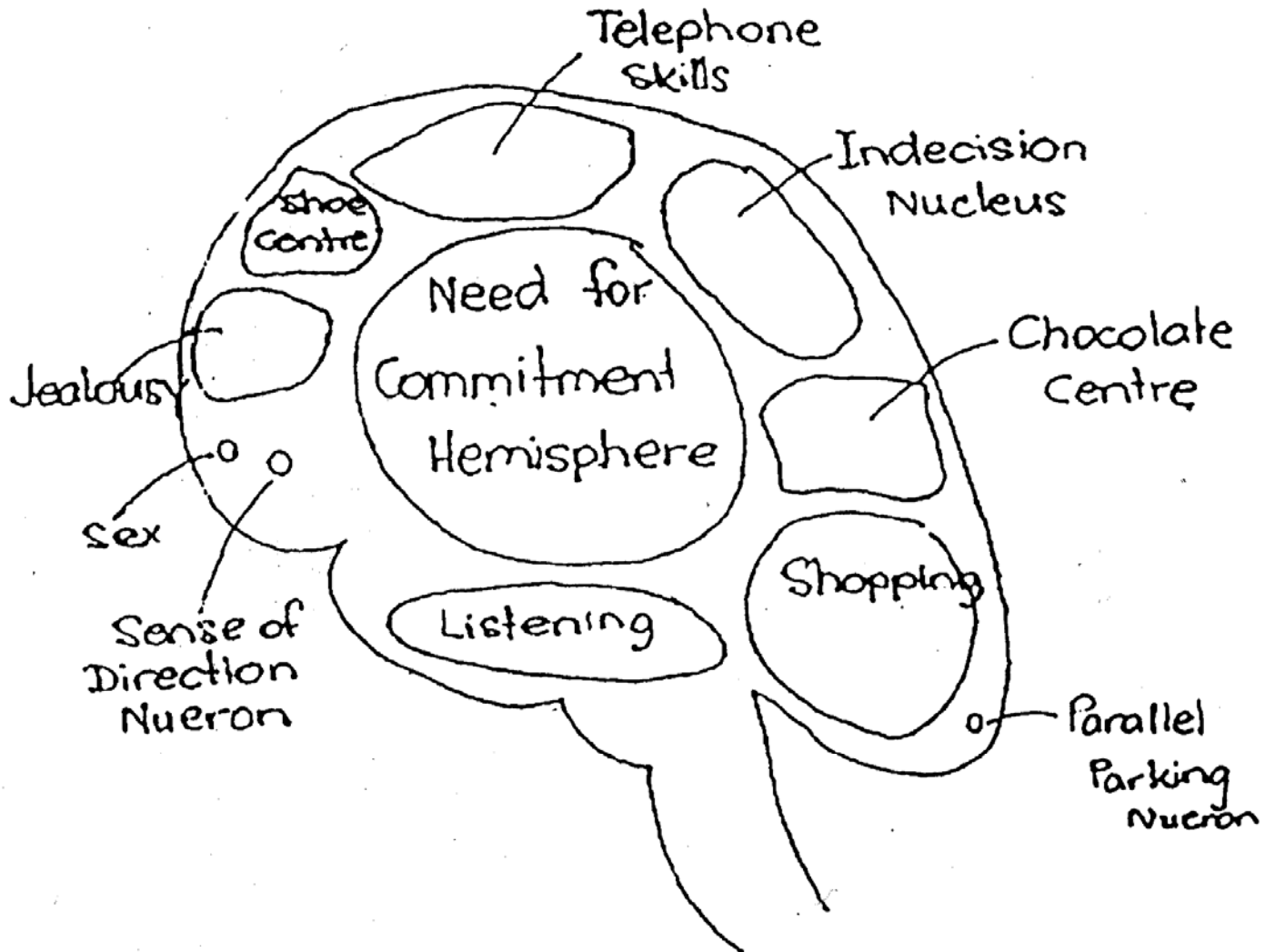
← 5 cm →

Kangaroo brain

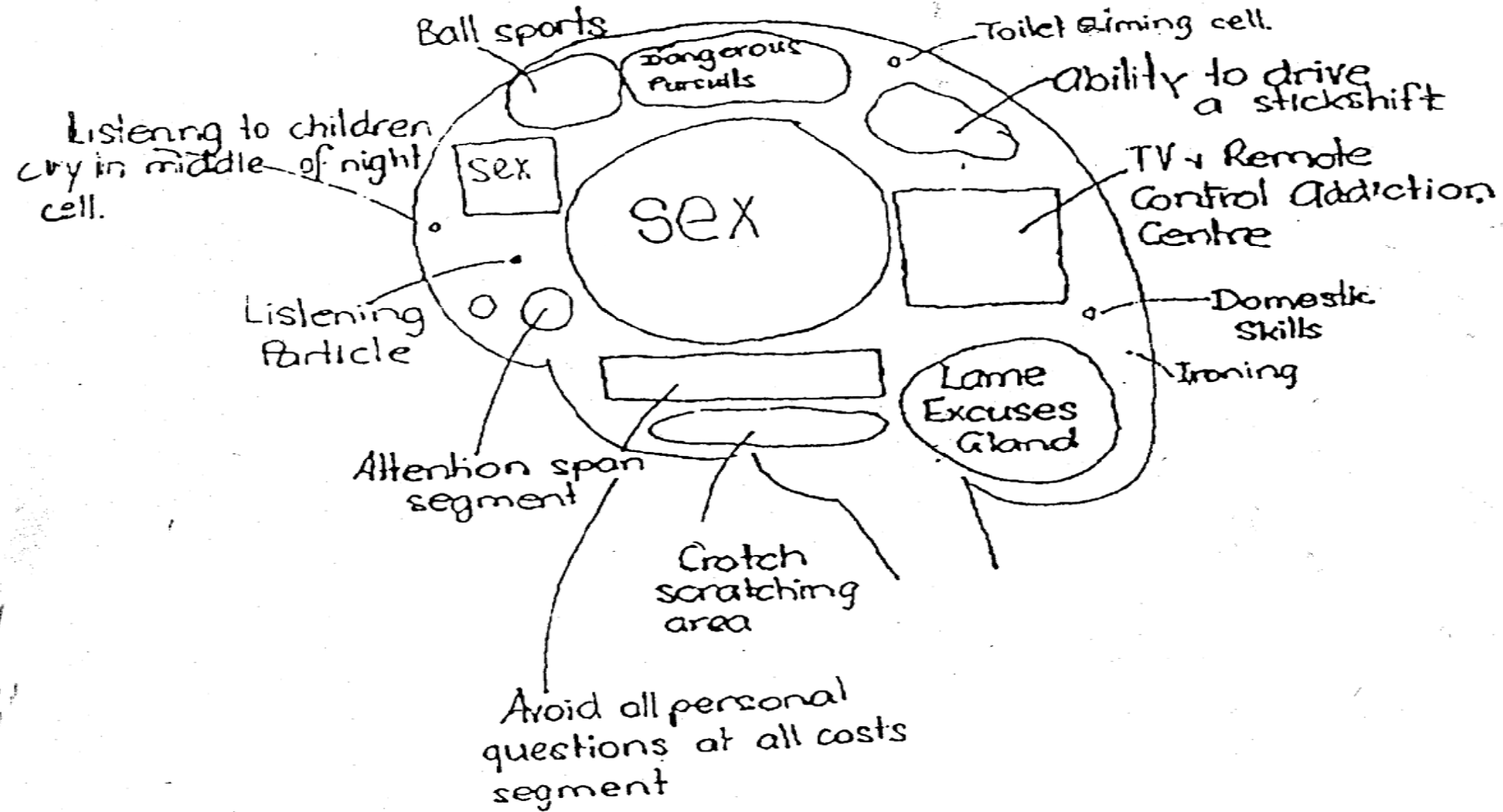
VS

human brain?

The Female Brain



The Male Brain



Abandonment of old phrenology

To suppose the roof-brain consists of point to point centres identified each with a particular item of intelligent concrete behaviour is a scheme over simplified and to be abandoned.

Rather, the contributions which the roof-brain ... makes toward integrated behaviour will ... resolve into components for which we at present have no names.

Sir Charles Sherrington, *Man on His Nature*, 1938

The “roof brain”: cerebral cortex

3mm thin

six layers of neurons

1 square metre in area

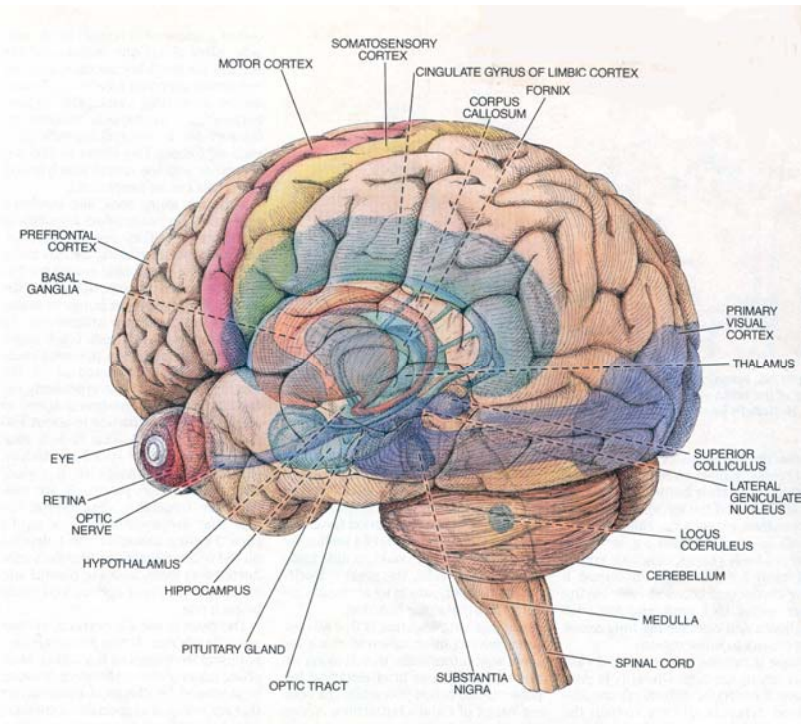
fits into the skull by

being folded as a

fractal manifold

gyrus = hill

sulcus = valley

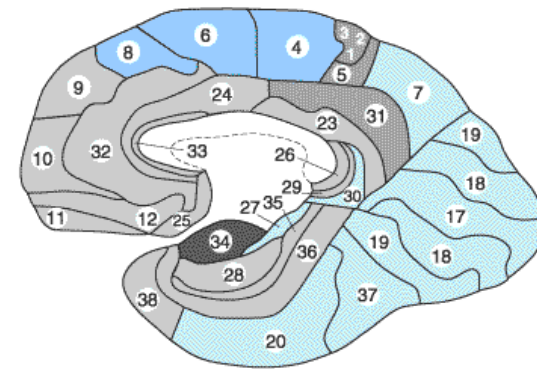
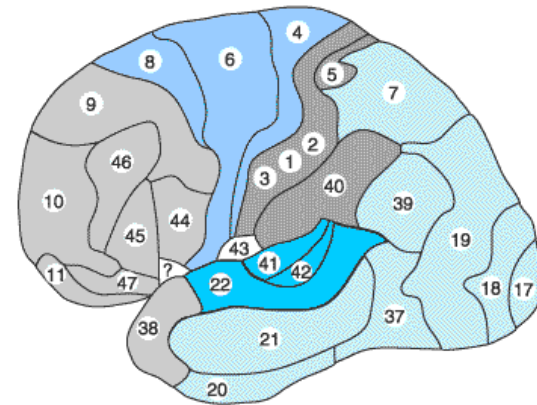


Fischbach (1992)

Brodmann (1909)

function relates to cytoarchitecture

- Brodmann classified brain regions based on their appearance of the cortex under the light microscope.
- In some instances there is a clear link between the microscopic appearance of a region and its function.
- However, visual appearance is not usually related to function.



■	cognition, language, emotion	■	olfaction
■	somato-sensory	■	motor
■	vision	■	audition
■	audition	■	???

The brain at school

Could differences in brain structure or function cause differences in academic performance?

In Brief

Learning test results from a brainwave

BRAIN scanners could one day be used to test the effectiveness of teaching methods by monitoring how children memorise information.

Experiments conducted by Dr Paul Fletcher, of the Institute of Neurology, London, have shown how it is possible to monitor the brain as it learns, revealing which parts are active as a memory is laid down.

Dr Fletcher has found associations between areas that control awareness, located in the frontal part of the brain, and the hippocampus, the activity of which is linked to memory. The technique will be used initially to detect the early signs of dementia, which affects memory.

One day, he said, there might be enough known about brain activity to show the process of learning and whether it was taking place efficiently.

Limits of 'new' psychology

You make a great mistake ... if you think that psychology, being the science of mind's laws, is something from which you can deduce definite programmes and schemes and methods of instruction for immediate school room use.

Psychology is a science, and teaching is an art.

William James, *Talks to Teachers*, 1899

Whose work directly informs our daily teaching?

- William James
- Jean Piaget
- Lev Vygotsky
- Jerome Bruner
- Carl Rogers
- R. S. Peters
- A. S. Neill
- Neil Postmann
- Bob Sternberg
- Howard Gardner

Education has largely ignored the contributions of cognitive psychology of the last century

John Bruer

A Bridge Too Far

Mapping problems

1. Relationships between brain functional modularity and psychological / behavioural categories are not one to one.
2. Relationships between psychological / behavioural categories and educational outcomes are not one to one.