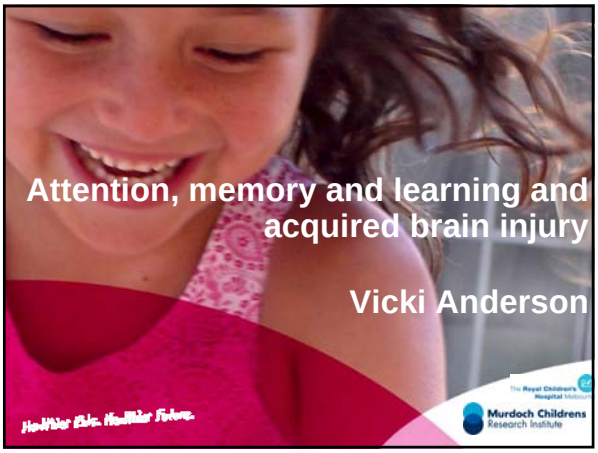
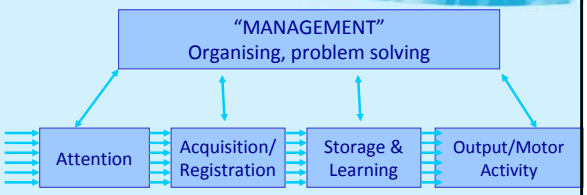


Jamie M.

Childhood acquired amnesia

Attention & learning: an information processing model

- information processing: the ability to attend to, register, encode, store and process information from the environment, and to output a response in a timely manner

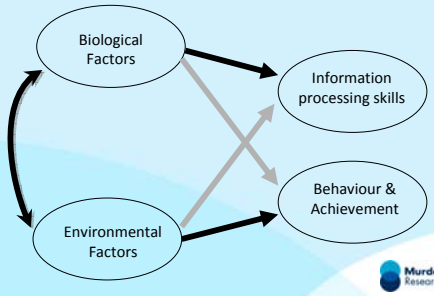


The Information Processing System

Biological factors: brain correlates

- developmental disorders
  e.g. ADHD, learning disability
- acquired brain insults
  e.g. head injury, epilepsy, tumour, prematurity
  e.g. PKU, Turner's syndrome
- psychiatric disturbance
  e.g depression, anxiety disorder, psychosis

Conceptual model for influences on information processing



Outline

- Memory and learning models
- Development of memory and learning skills
- Disrupted memory and learning
- Conclusions

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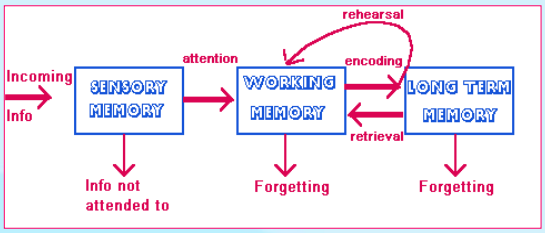
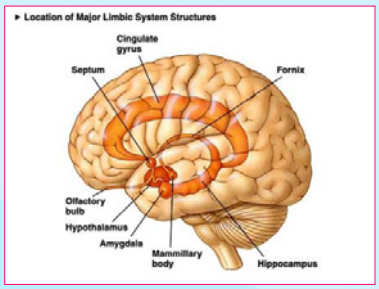
Memory and learning models



Specific language & learning difficulties, acquired brain injury

Not usually found in children

The limbic system – 'memory'



Important for encoding and retrieval – observed in children with epilepsy

Neuroanatomy of memory and learning: The information processing system

- attention: brain stem, posterior cortex, prefrontal regions, white matter
- memory and learning: temporal and frontal regions
- speed of processing: white matter, motor cortex

Outline

- Memory and learning models
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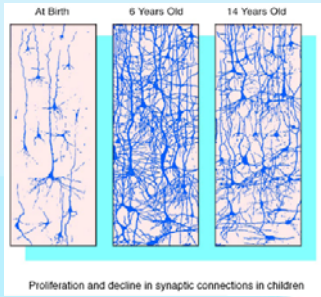
BRAIN DEVELOPMENT

3 weeks | 20 weeks | 2 years

Murdoch Childrens Research Institute

'Connectivity' –birth to puberty



Proliferation and decline in synaptic connections in children

Murdoch Childrens Research Institute

Developmental 'memory' milestones

- Event memory – early childhood
- Memory span
- Processing speed and capacity
- Memory strategies (impacted by knowledge base and motivation/effort)
  - Rehearsal
  - organisation
  - elaboration
  - chunking

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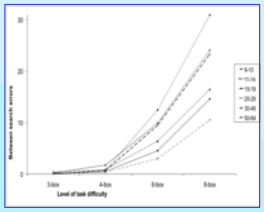
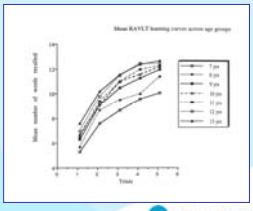
Development of memory and learning skills through childhood

Spatial Working memory: errors



Word list learning - # correct



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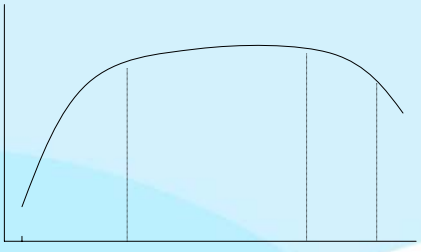
Development of memory and learning through life



Birth 15 yrs 50 yrs

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Outline

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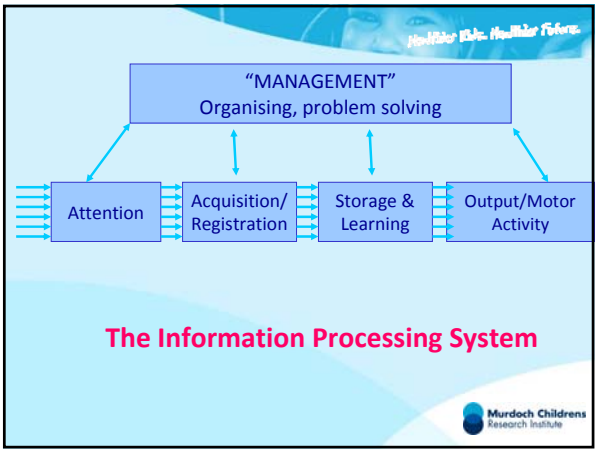
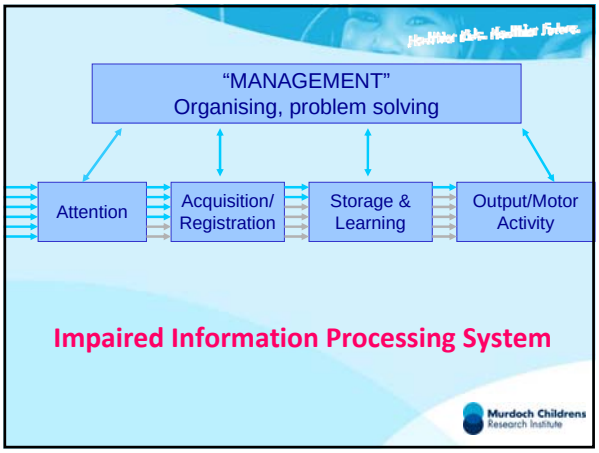


The Information Processing System



Impaired Information Processing System

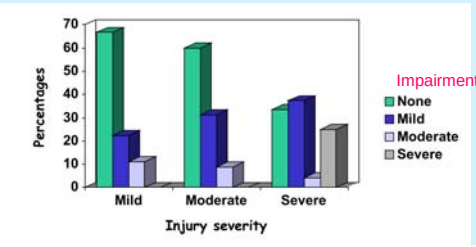
Biological and developmental underpinnings of long-term sequelae

- Deficient development and/or loss of brain tissue in the following brain areas:
  - White matter (information processing, attention)
  - Hippocampal formation (memory function)
- In infancy and childhood these brain regions are rapidly developing and thus particularly vulnerable to insult
- Short- and long-term brain changes have been identified

Testing for memory problems

- Capacity
  - digit span, block span, sentence repetition
- Processing speed
  - Coding, Symbol Search
- Working memory
  - Digits backwards, Letter sequencing
- Memory strategies
  - CVLT, Hopkins, Rey Figure

Learning and memory problems post-ABI



Attention deficits post-ABI

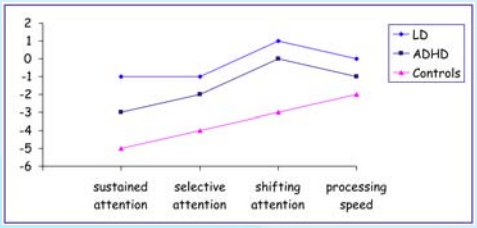
Memory deficits are not always what they seem:

Attention deficit/hyperactivity disorder

Clinical symptoms of ADHD

- can't concentrate
- Forgets instructions
- easily distracted
- day dreams
- restless, fidgety
- can't work independently
- disorganised
- can't finish tasks
- acts before thinking
- impulsive

Standardised factor scores on components of information processing

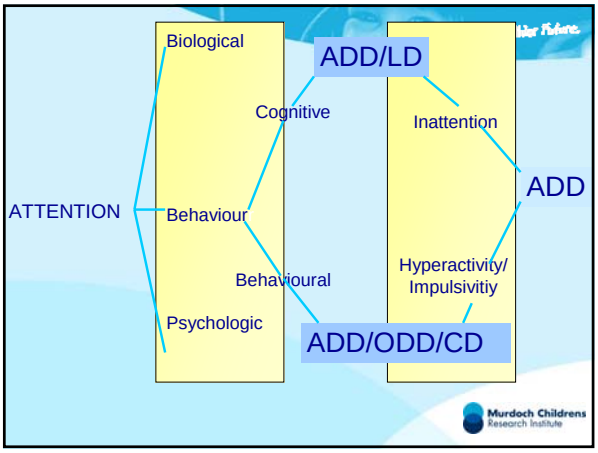


LD is associated with greater information processing problems than ADHD

Summary of deficient abilities: ADHD & LD

	ADHD	LD	ADHD +LD	ADHD + CD
Sustained att.	-	--	--	*
Selective att.	-	--	--	*
Impulsivity	-	*	-	--
Response speed	*	--	--	*
Memory/learning	*	-	--	*

** normal , - mild impairment, --severe impairment*



Jamie M.

A case of 'amnesia' following appendectomy

Presenting complaint

- Jamie is a 13 year old boy whose parents have observed severe memory problems, disturbed sleeping and eating patterns and aggressive behaviour following recent surgery for appendicitis
- Referral: paediatric neurologist

Clinical history

- 3 months prior to referral Jamie underwent appendectomy
- failed to recover from anaesthetic, with a period of hypoxia
- remained unconscious with respiratory support for 48 hours
- hospital records show family history of enzyme deficiency (pseudo-cholin estenase) associated with lack of response to antidote for reversing anaesthetic

Clinical history

- on recovery from anaesthetic Jamie was confused and disoriented, with poor coordination, and memory loss for recent events
- no further investigations were conducted and Jamie was discharged home
- no rehabilitation was considered necessary

Follow-up

- parents sought help from local and city hospital: diagnosis behavioural disorder
- recommendation: clearer structure at home
- worsening problems over next three months, including increasing aggression
- family member arranges neurological referral:
- -EEG: abnormal activity, consistent with absence seizures
- -MRI: NAD

Neuropsychological assessment

- Speed of processing: initially slow, but recovered
- Visuo-motor skills: residual moderate difficulties
- Language skills: generally intact
- Executive skills: generally intact

Memory data

	3mth	1 year	3y 6mth
Word lists (SS) (2,4,4, 10, Del = 0)	6	4	4
Picture lists (SS) (1,1,6,3, Del =2)	4	3	3
Story Recall (SS) (11, 3, Del 0,1)	5	-	-
Sentences (SS)	4	5	6

Scaled score: Average range =10 ± 3

Long-term recovery

- memory problems largely unchanged
- very poor educational progress
  - *full time integration support*
  - *regular speech & occupational therapy*
- behavioural problems reduced, family coping
- social interactions OK
  - *individual and family counselling*

Conclusions

- Memory and learning skills are part of a complex, neural network or 'information processing' system. Disruption to any aspect of the system may have significant consequences for the total system
- Skills within this information processing system develop rapidly through infancy and childhood along with the brain regions supporting them
- The information processing system is critical for intact learning within the educational context.

Conclusions

- Children with developmental or acquired conditions impacting on' brain' are at high risk of information processing problems
- The most common problems are for:
  - Processing capacity
  - Processing speed
  - Working memory
- In children, long-term memory is rarely impaired

Conclusions

- It can be difficult to separate out these problems in everyday contexts
- Accurate description and diagnosis is important for appropriate interventions
- Interventions need to take into account
  - Age/developmental stage of the child
  - The child's learning context
  - Development of realistic goals for success