

Investigating attentional problems in special populations

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Overview

- Model of attention
- Common measures of attention
- Studies of children with ADHD, LD and genetic conditions



Mirsky's model of attention

1. Focus/execute – capacity to concentrate attentional resources on a specific task
2. Sustained attention – ability to stay in task in a vigilant manner
3. Stability – capacity to maintain a regular, predictive response rhythm to task stimuli over time
4. Shifting attention – ability to shift attentional focus from one aspect of a stimulus to another
5. Encode - capacity to hold information briefly in mind while performing some action or cognitive action on it



Common Measures of Attention

- Behavioural ratings - parent and teacher
- Neuropsychological tests
- Continuous performance tests
 - modality (visual or auditory)
 - targets (spatial, language, visual)
 - time interval between each stimuli
 - similar outcome variables e.g omission and commission errors
- Measures – not a ‘pure’ measure of attention
- Performance influenced by factors – age, gender and intelligence



Attention – ADHD & LD

- Children with ADHD have sustained attention problems with omission and commission errors being the most likely variables to differentiate children with ADHD and controls
- Children with LD have selective attention problems
- Clinical groups as comparison groups are important in determining the diagnostic efficiency of tools. For an instrument or a test to have clinical utility, it must discriminate between different clinical groups
- Most studies, the CPT performance of children with ADHD is compared to normal healthy children, whereas few study designs compare CPT performance of children with ADHD to other clinical groups



CHERI's Research – ADHD & LD

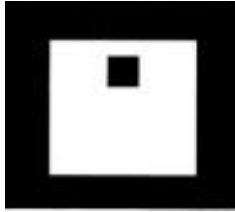
- Aim: to compare the attentional functioning of children with ADHD and/or LD
- Participants: 5 groups of children aged 6 -12 years
 - ADHD/C with LD (n=14)
 - ADHD/C without LD (n=15)
 - ADHD/I (n=17)
 - LD only (n=15)
 - Controls (n=24)

Soo, C.A. & Bailey, J.G. Componential attentional functioning in children with ADHD combined subtype, ADHD inattentive subtype and LD.

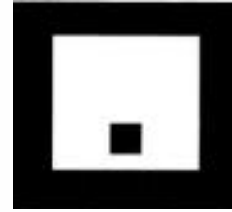


Assessment

- Test of Variables of Attention (TOVA)



Target - **respond**

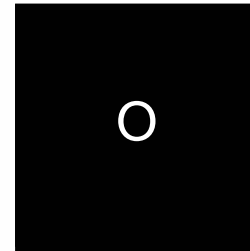
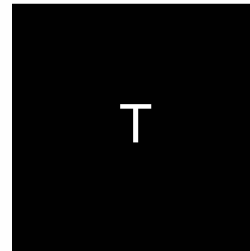


Non-Target
do not respond

- Conners' Continuous Performance Test



Target – do
not respond



Non-Targets
respond



Assessment

- Test of Everyday Attention for Children
 - Sky Search: visual selective attention
 - Score: auditory sustained attention
 - Sky Search Dual Task: sustained-divided attention
 - Creature Counting: attention control/switching



Results

	ADHD/C (LD+ & LD-) vs Controls	ADHD/C vs LD	ADHD/C vs ADHD/I	ADHD/C LD+ vs ADHD/C LD-	ADHD/I vs LD
CPTs					
Inattention	*	<i>ns</i>	<i>ns</i>	*	<i>ns</i>
Impulsivity	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>
TeaCH					
Visual selective attention	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>
Auditory sustained attention	*	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>
Sustained-divided attention	*	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>
Attention control/switching	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>

ns = non-significant



Neurofibromatosis type 1 (NF1)

- Most common genetic disorder affecting the human nervous system
- Gene for NF1 located on chromosome 17 (tumour suppressor gene)
- Prevalence 1 in 3000 people
- Below average intelligence/academic achievement
- Learning disabilities (~ 30%)
- Executive functioning, visuo-spatial, attentional and organisational problems



Attention in NF1

- Poor sustained attention – inability to stay on task for a period of time
- Poor shifting attention – inability to switch attention from one task to another task
- Intact selective attention – ability to attend or focus to a particular stimuli or task, and to ignore irrelevant stimuli
- Intact divided attention – ability to attend to two stimuli presented simultaneously
- High frequency of ADHD – 38%
- Stimulant medication – significant improvements
- ADHD associated with significantly poorer social skills



Velocardiofacial syndrome (VCFS)

- Genetic disorder caused by deletion in chromosome 22q11.2
- VCFS occurs as often as 1 in every 2000 to 4500 births, affecting almost every human system and organ
- Clinical features - congenital heart abnormalities, cleft palate, serious feeding and breathing problems, and language impairment
- Mild intellectual disabilities (~ 45%) and learning disability for maths
- 25-30% of individuals with VCFS will develop a mental illness
- ADHD is common – 36% to 46%



Attention

- Poor sustained and divided attention
- No significant difference between adults with VCFS and an IQ matched control group for sustained attention
- Studies of attention have been few and no IQ-matched controls have been used in the studies of children
- Switching and selective attention have not been examined



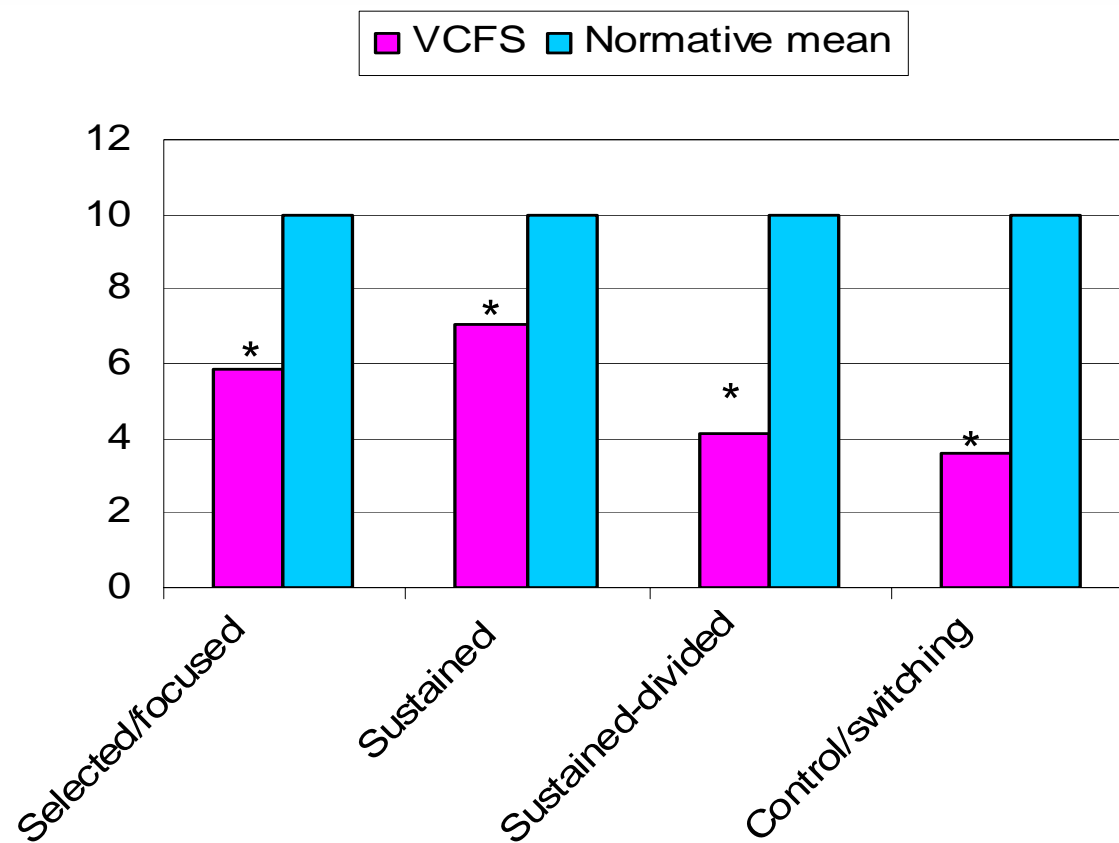
Our current VCFS study

Aim: To identify specific cognitive and psychosocial features that are associated with VCFS when compared to an IQ matched control group

Method: Comprehensive assessment of 50 children with VCFS and 50 control children matched by gender and IQ



Attention



Considerations

- Identify child's specific attentional deficits
- Consider factors such as age, gender and intelligence
- Discriminant validity of the test
- Specificity and sensitivity of the measure
- Include multiple sources and measures
- Diagnosis of ADHD – best practice and evidence based guidelines eg. AAP
- For comparisons between groups and over time – use the same measure of attention



Summary

- Models of attention can assist in identifying and understanding attentional processes
- Clinical childhood groups demonstrate differential patterns of attentional processing
- Limited resources for processing information, but there are ways of coping
- Identification of specific attentional deficits can assist in planning treatments

