

Eyesight in children with special needs - ensuring children can make the most of it

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Photos courtesy Mike O'Carroll,
our children and parents



The Hall report

- ALL children should undergo vision screening at the age of 4 to 5 years
- Children OF ANY AGE with suspected visual deficits or any neurological or disabling condition should be routinely referred for visual assessment

Hall, Elliman, Health for all Children, 2008: Oxford

Are children with special needs getting the eye care they need?

- Study in special schools in Glasgow, 228 pupils
- 12.1% were visually impaired (WHO criterion)
- 46.1% had long or short sight requiring correction
 - Only half of those with long/short sight had adequate spectacles
- Das, Spowart, Crossley and Dutton. Evidence that children with special needs all require visual assessment. *Archives of Diseases in Childhood* 2010: 95; 888-892

- Study in special schools in Wales, 152 pupils
- 38% of pupils had NEVER had an eye test
- 15% were visually impaired (WHO criterion)
 - Only 6% of children have sight problems included in their statement as primary or secondary need
- 53% had refractive error requiring correction
 - Only 26% of those with refractive error had adequate spectacles
- Woodhouse, Davies, MacAvinchey, Ryan. Ocular and visual status among children in special schools in Wales: the burden of unrecognised visual impairment. *Archives of Diseases in Childhood* 2014; 99; 500-504

- Ongoing study in special schools in London, 258 pupils
- Over half of children tested had a vision problem
- 43% of the new pupils had no history of eye care
- 85% of those discharged from hospital eye clinics had no follow-up community eye care
- 36% of the children needed glasses

Down's syndrome – Cardiff study

- cohort first established in 1992, ongoing recruitment
- current cohort = 250+, ages 2 months to 26 years
- longitudinal monitoring and lab-based studies

<http://www.cardiff.ac.uk/optom/DownsSyndromeGroup/Home.html>

Cerebral palsy vision research

Ulster University, Coleraine



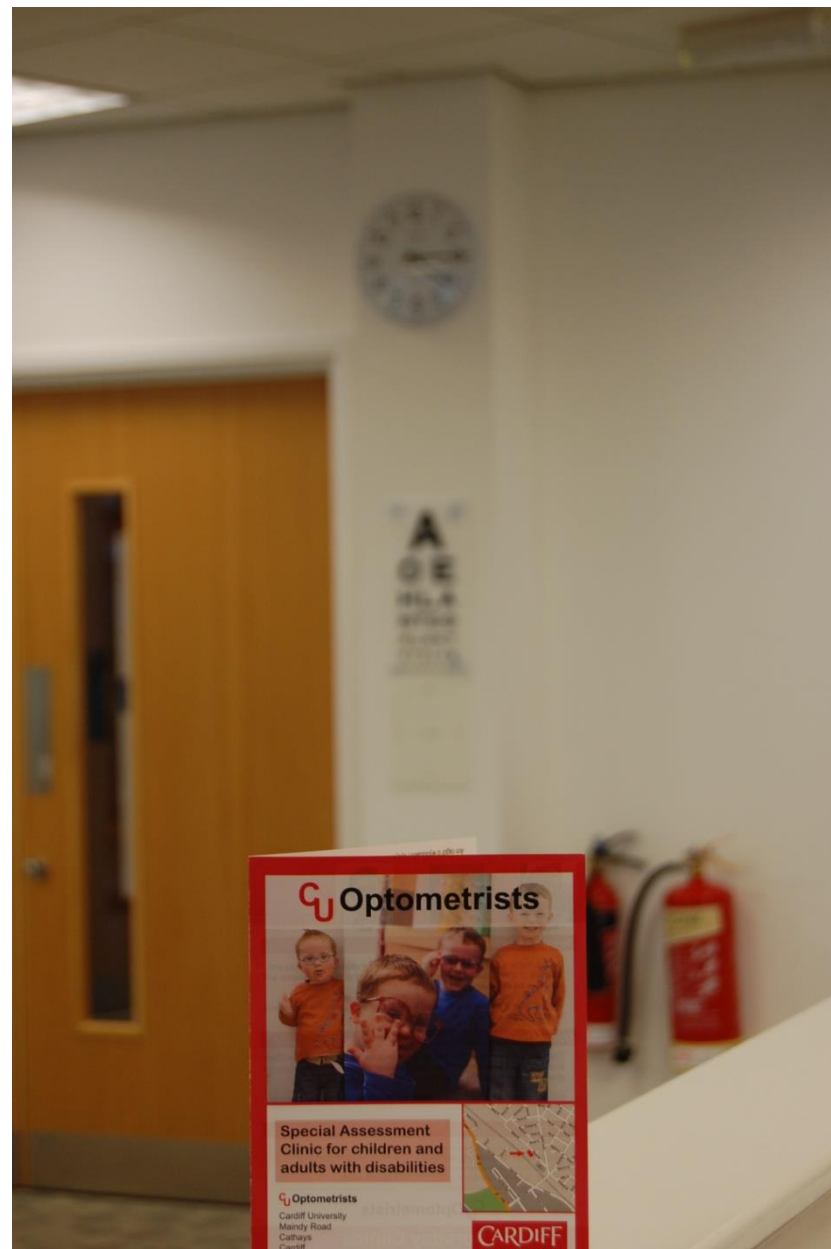
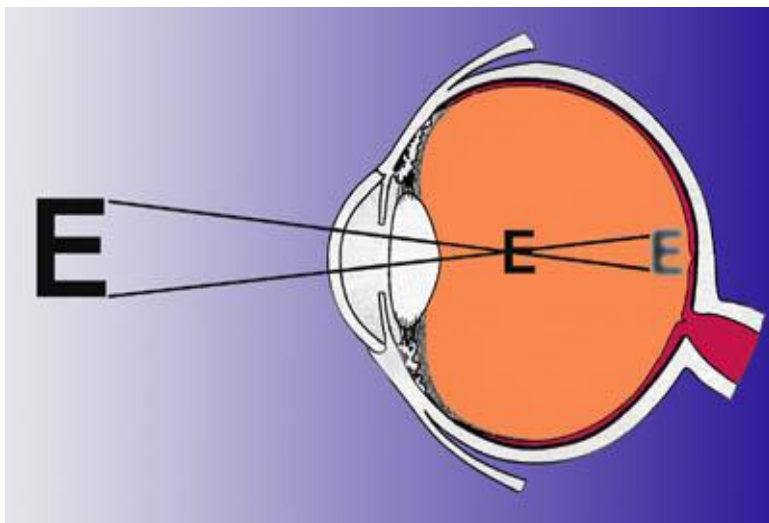
- Cross-sectional study of school-age children, 4-18 years
- 128 control children, normal development
- 98 children with cerebral palsy

- Julie McCelland and Kathryn Saunders

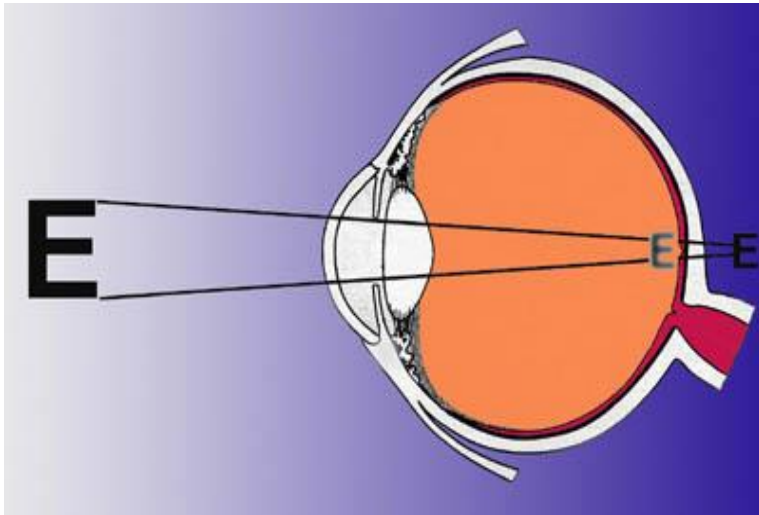
Refractive errors – long and short sight

- 60% of children with Down's syndrome will need to wear glasses
- 52% of children with cerebral palsy will need to wear glasses
- In typical children, the figure is 6%

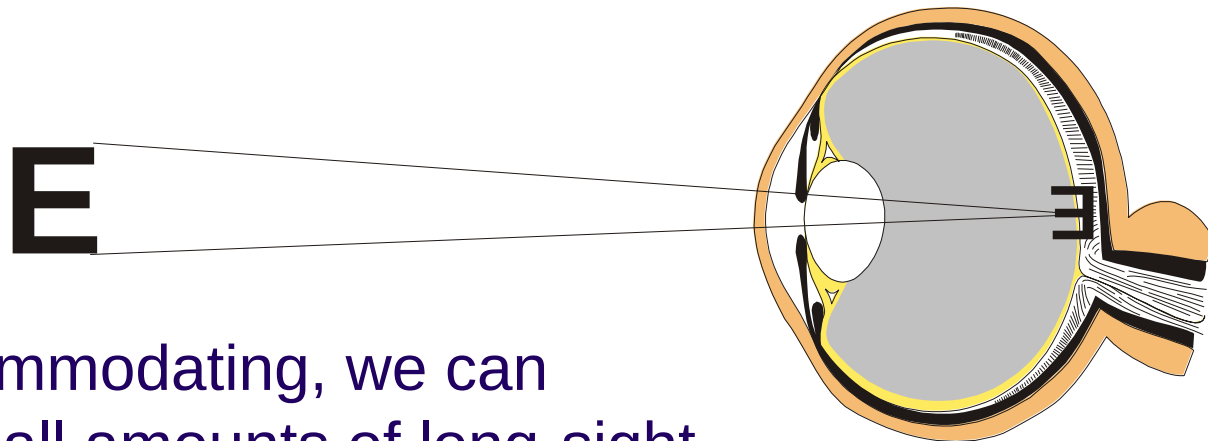
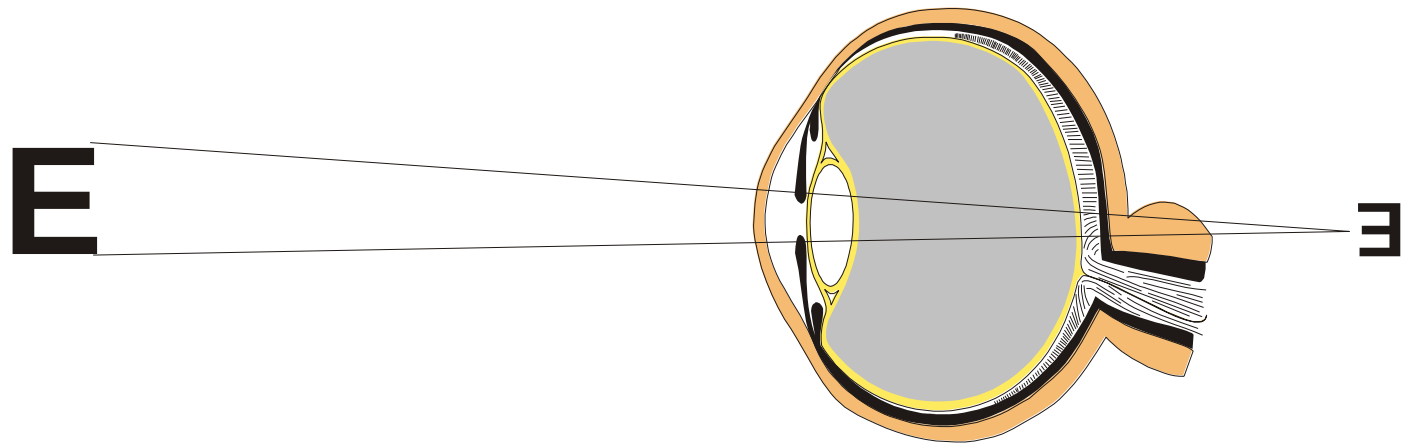
Short-sight



Long-sight



Long-sight



By accommodating, we can overcome small amounts of long-sight

Measuring long and short-sight - Refraction



Retinoscopy

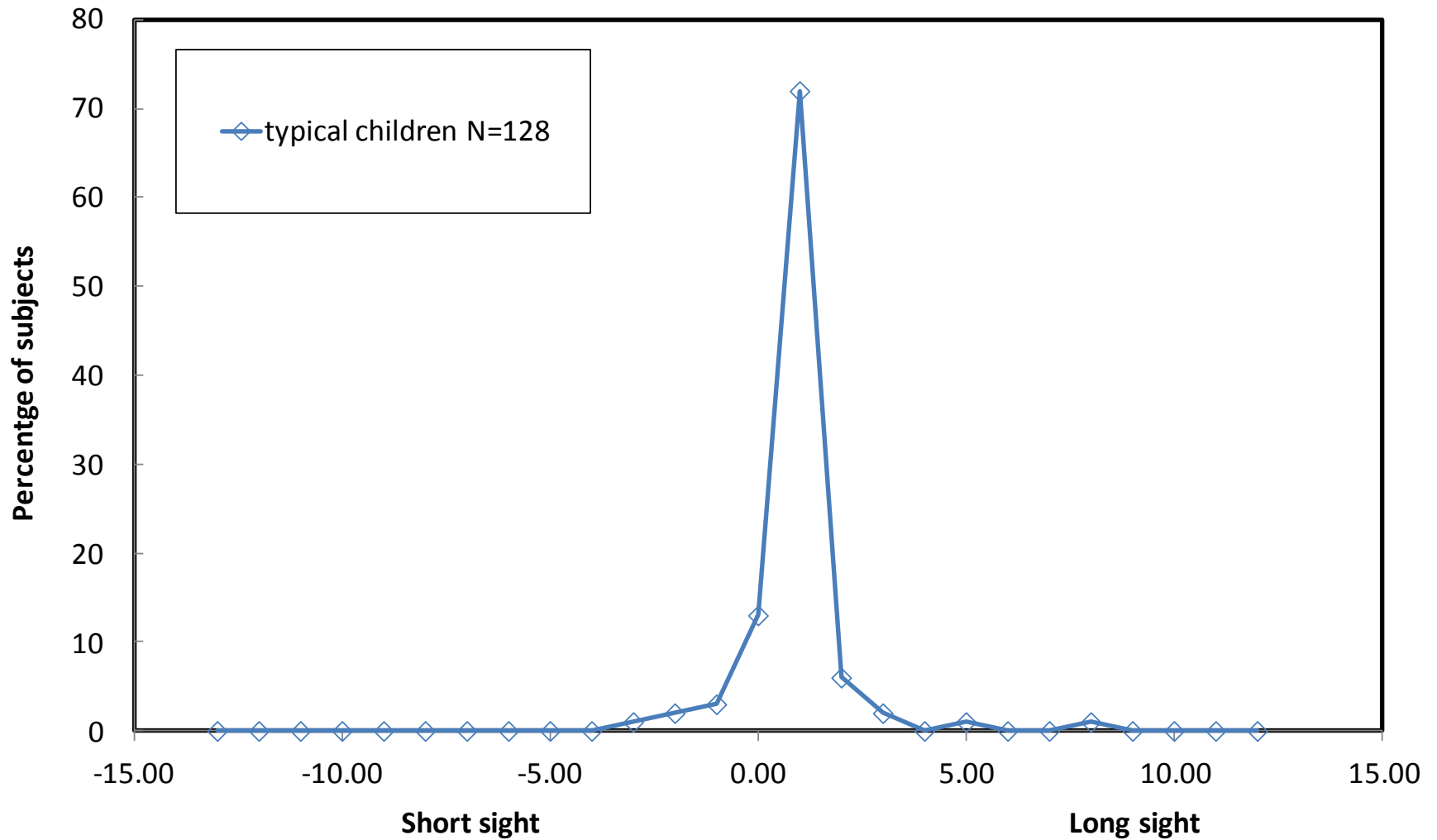


Long-sight

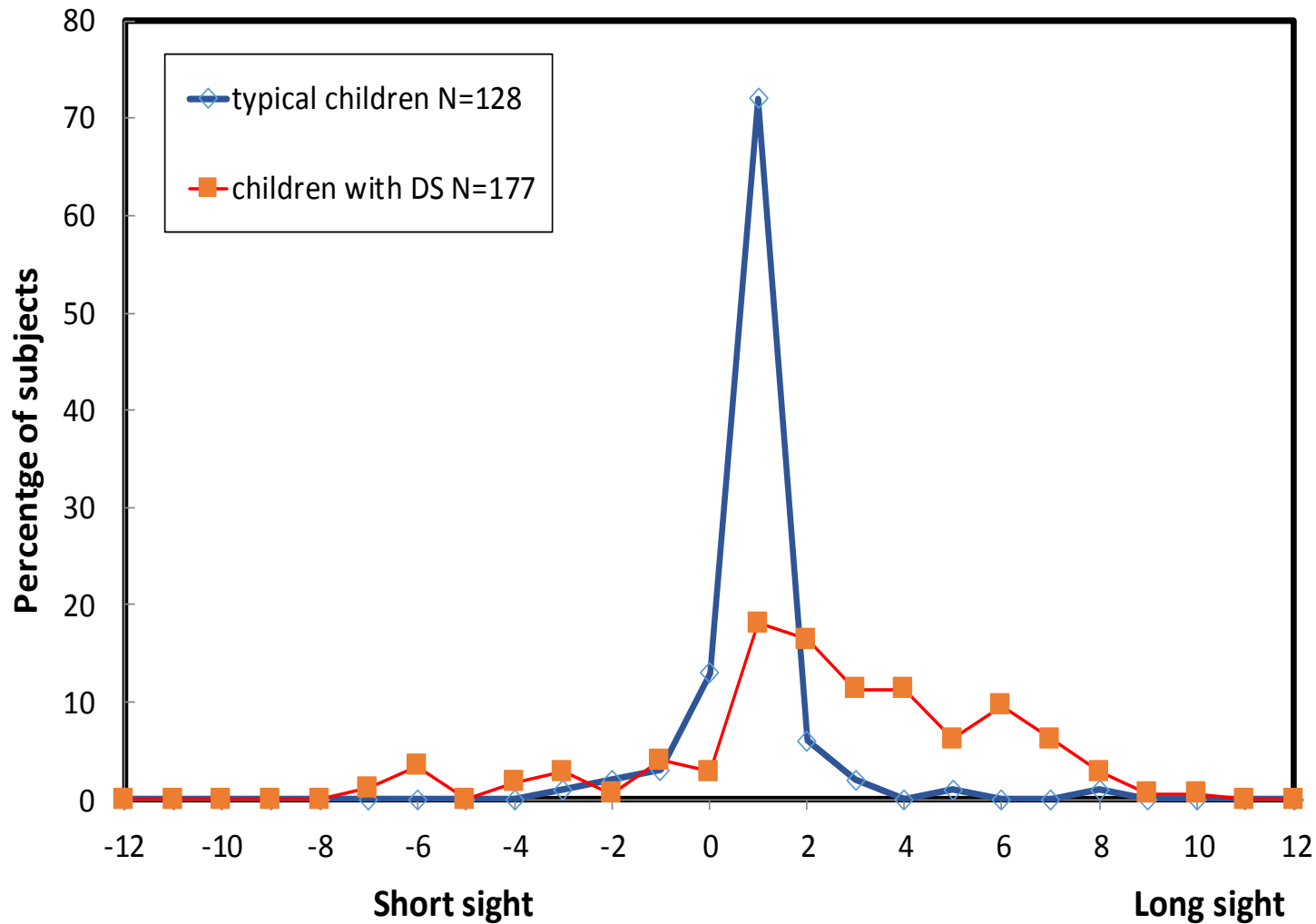


Short-sight

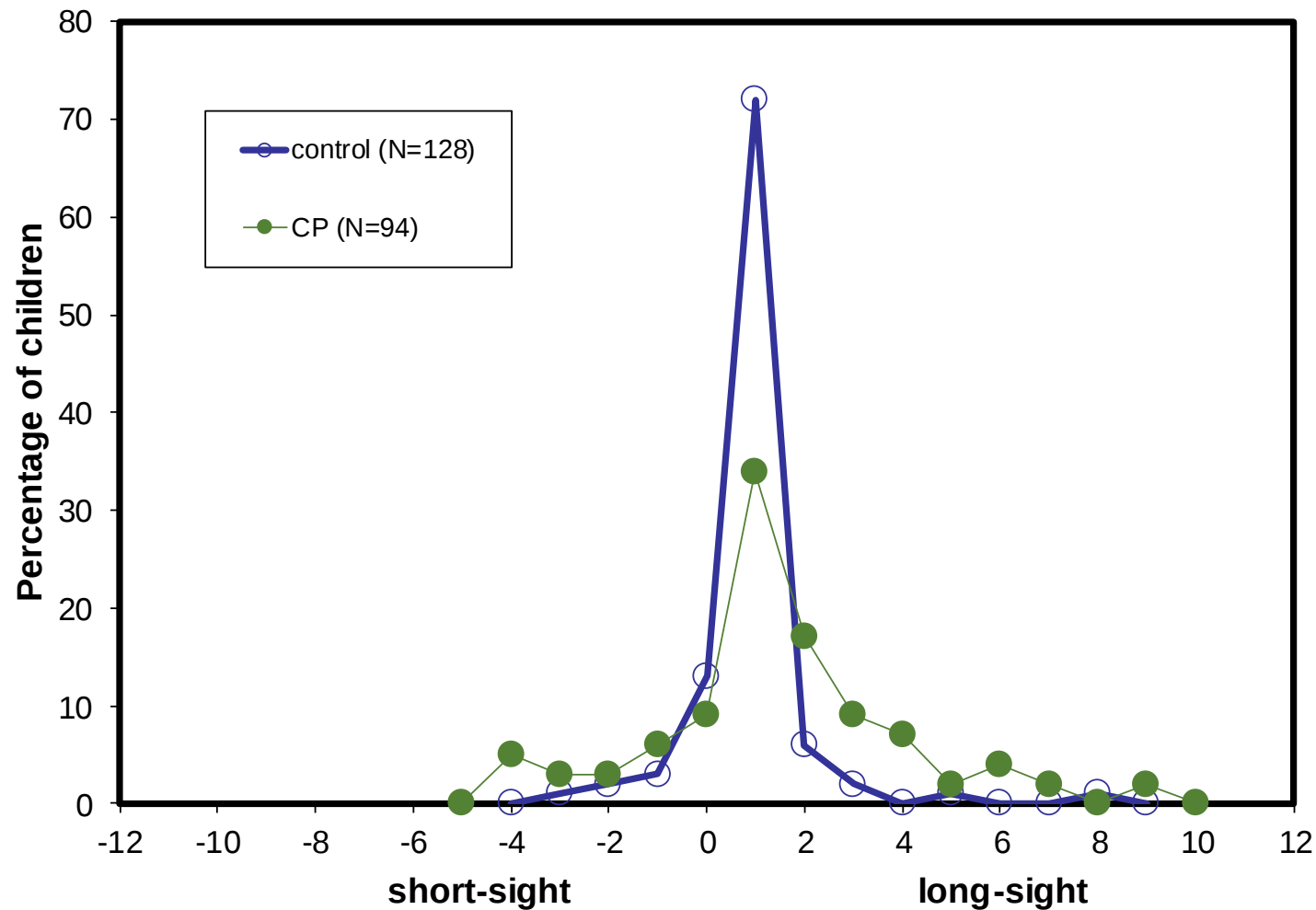
Typical children



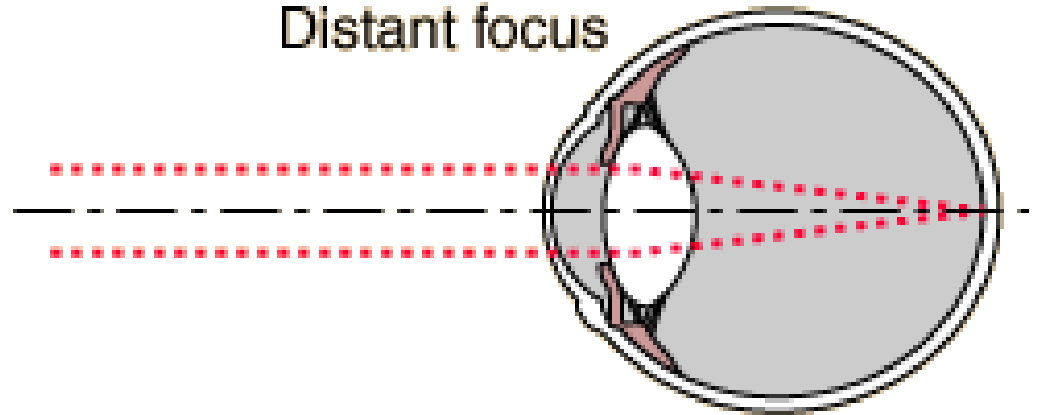
Children with Down's syndrome



Children with cerebral palsy

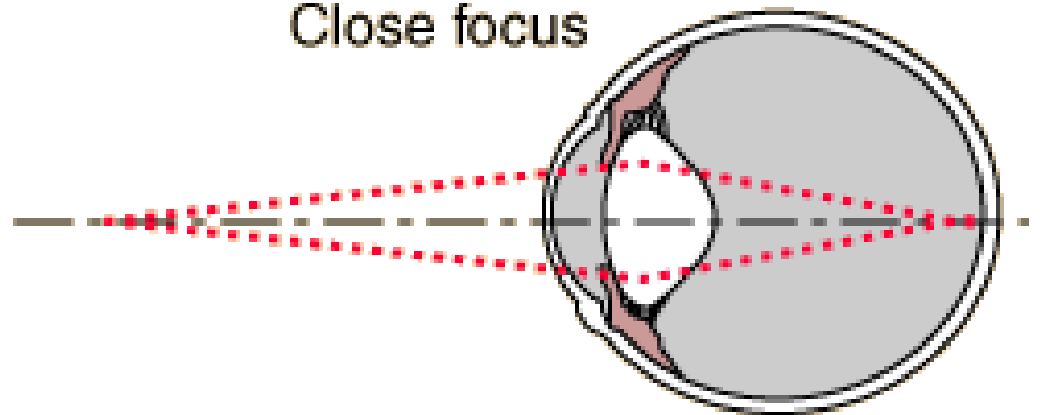


Distant focus

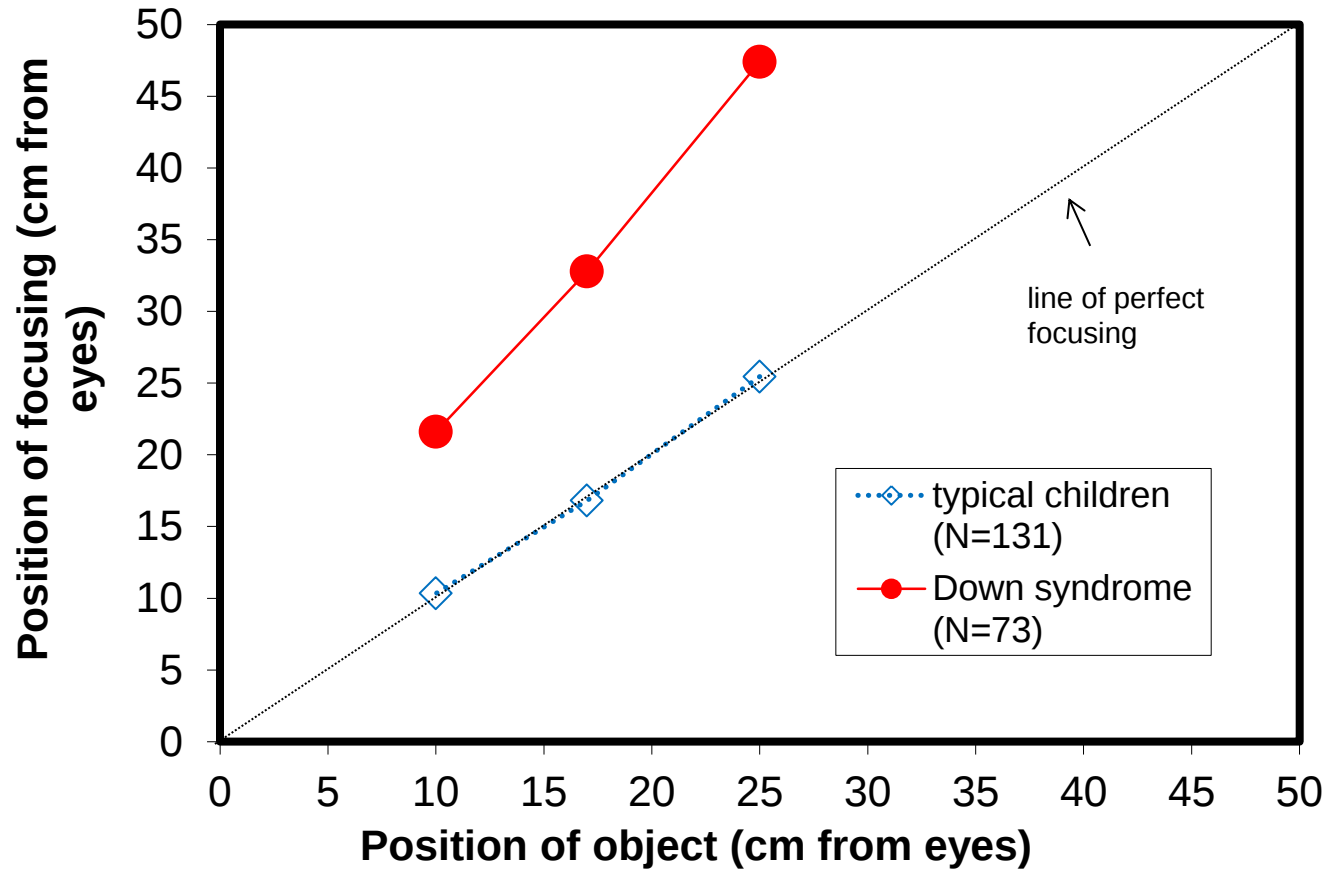


accommodation – near focusing

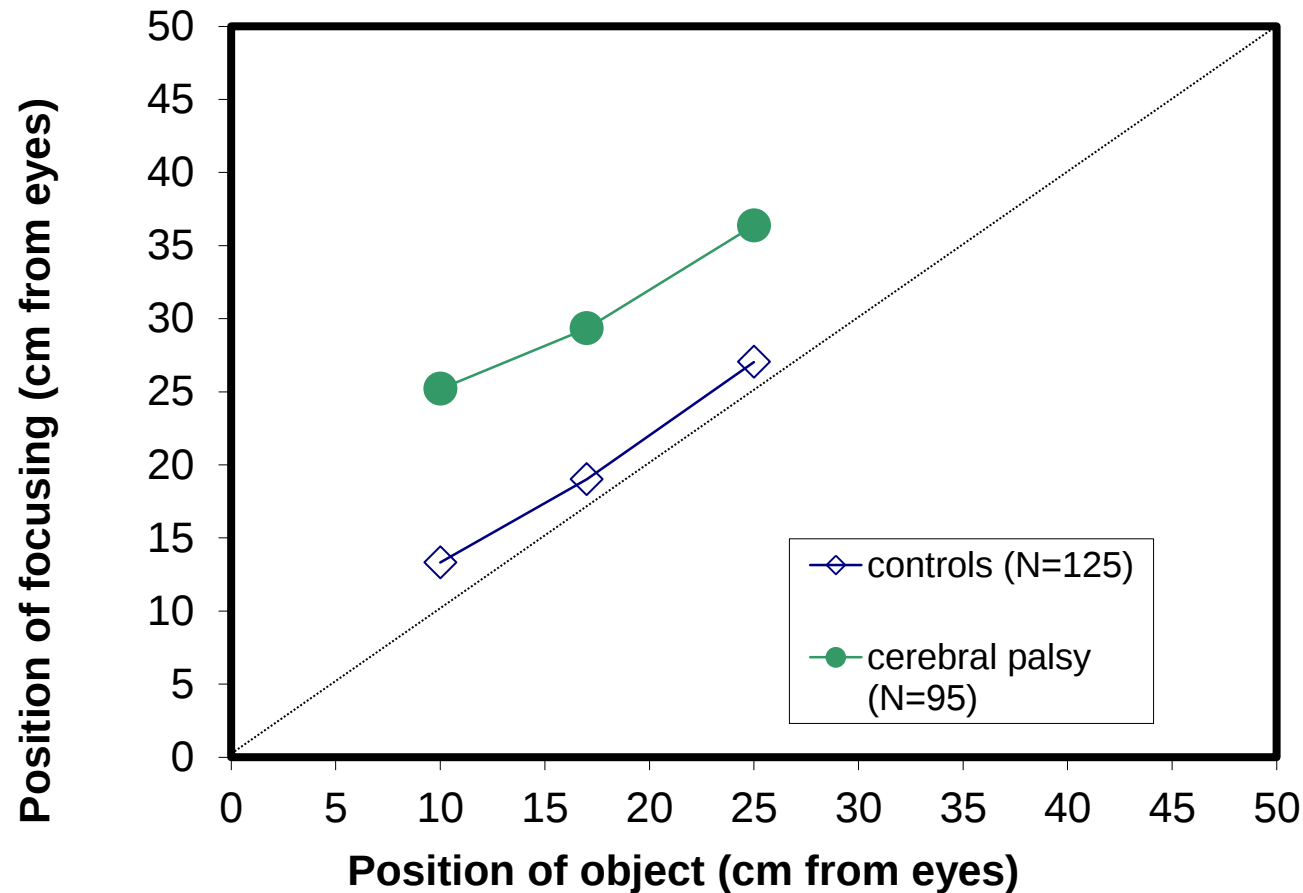
Close focus



Children with Down's syndrome (pre-school)



Children with cerebral palsy (4-18 years)



In our studies,
76% of children with Down's syndrome and
58% of children with cerebral palsy
have poor focusing for near targets

***Children have a focusing error even when they wear
glasses for long or short-sight***

Cerebral palsy – hyoscine patches

- Worn to control dribbling (drooling)
- Hyoscine is the same drug used in the eye drops children have for eye tests
- Many paediatricians do not know the ocular side-effects
 - dilated pupils
 - loss of focusing



Near tasks are blurred for most children

8 point text

Once upon a time long ago, even before the days of King Arthur, there lived a blacksmith only three feet tall.

12 point text

Once upon a time long ago, even before the days of King Arthur, there lived a blacksmith only three feet tall.

18 point text

Once upon a time long ago, even before the days of King Arthur,

30 point text

Once upon a time long ago

No Blur

8 point text

Once upon a time long ago, even before the days of King Arthur, there lived a blacksmith only three feet tall.

12 point text

Once upon a time long ago, even before the days of King Arthur, there lived a blacksmith only three feet tall.

18 point text

Once upon a time long ago, even before the days of King Arthur,

30 point text

Once upon a time long ago

Moderate Blur

8 point text

Once upon a time long ago, even before the days of King Arthur, there lived a blacksmith only three feet tall.

12 point text

Once upon a time long ago, even before the days of King Arthur, there lived a blacksmith only three feet tall.

18 point text

Once upon a time long ago, even before the days of King Arthur,

30 point text

Once upon a time long ago

Severe Blur

- It is not possible to predict which children have poor focusing
 - all children should be tested

Bifocals

- We prescribe bifocals routinely for all children with DS who
 - have a focusing problem once long or short sight is corrected
 - are old enough to sit and do near tasks

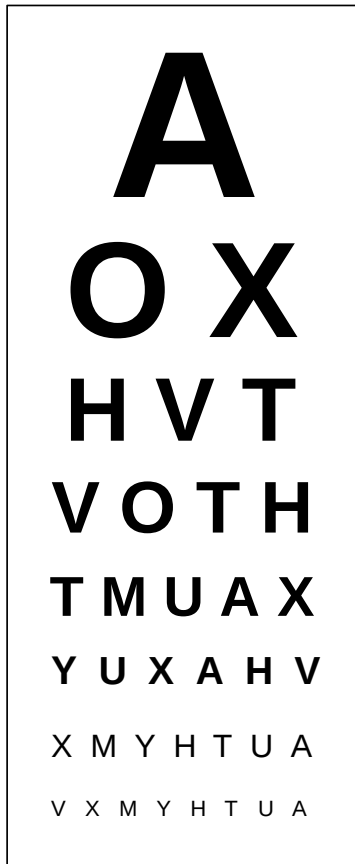
For children with cerebral palsy,

- bifocals may be suitable
- single vision spectacles for near work may be suitable

Making the most of vision in children with special needs

- Ensure regular eye examinations
- Near focusing must be measured
- Correct defects with spectacles, including bifocals if needed

Visual Acuity (detail vision)



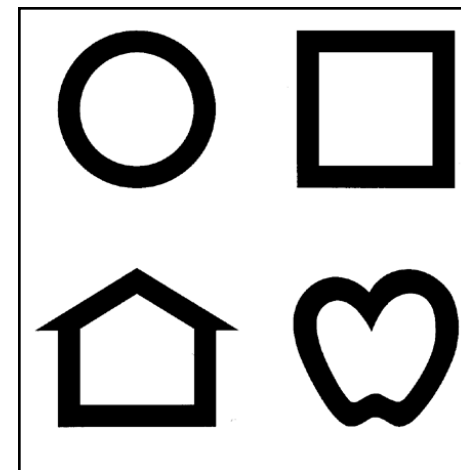
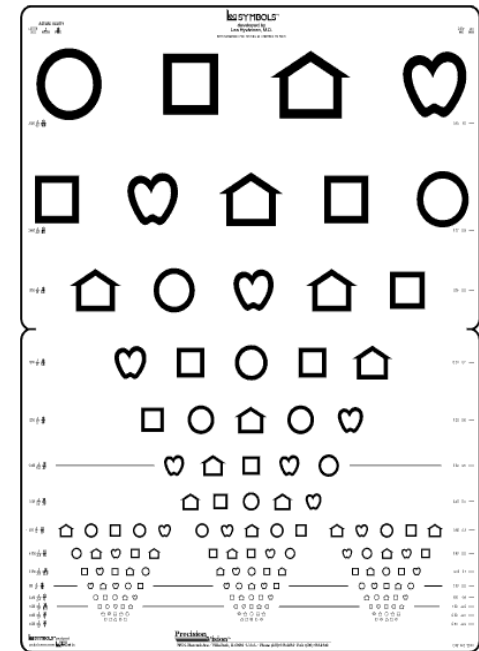
Contrast sensitivity



Measuring acuity - letters



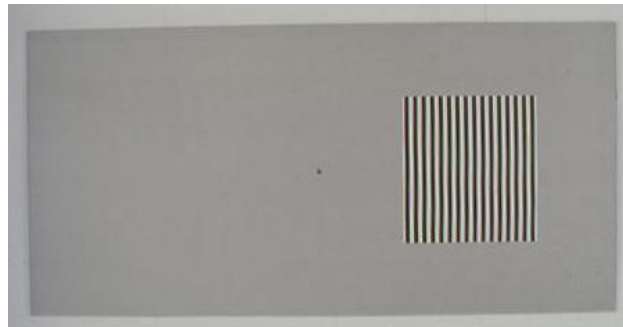
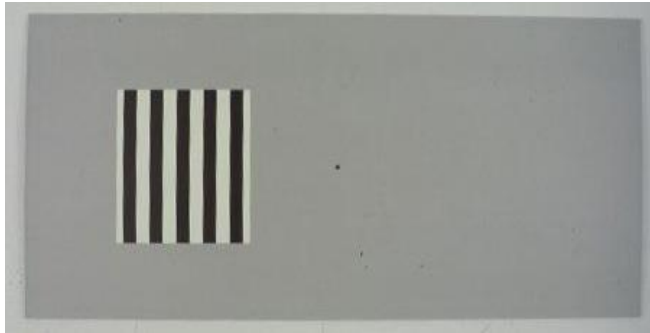
Measuring acuity - pictures



Measuring acuity (Cardiff test)



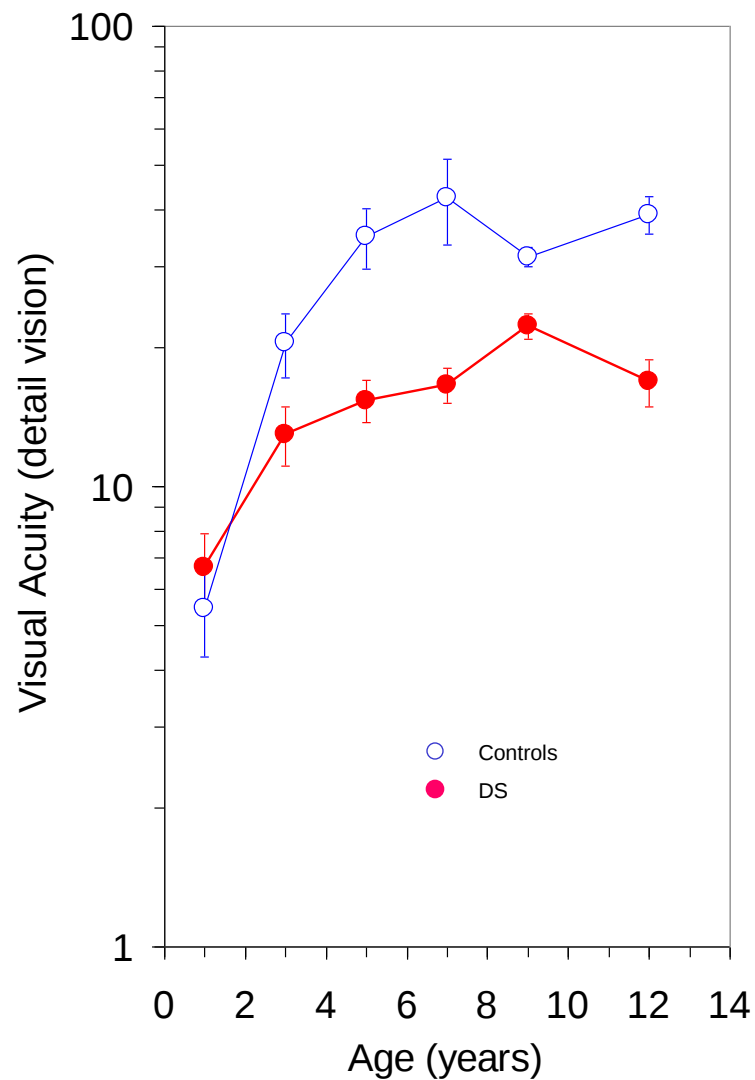
Measuring acuity (Teller cards)



Measuring contrast sensitivity

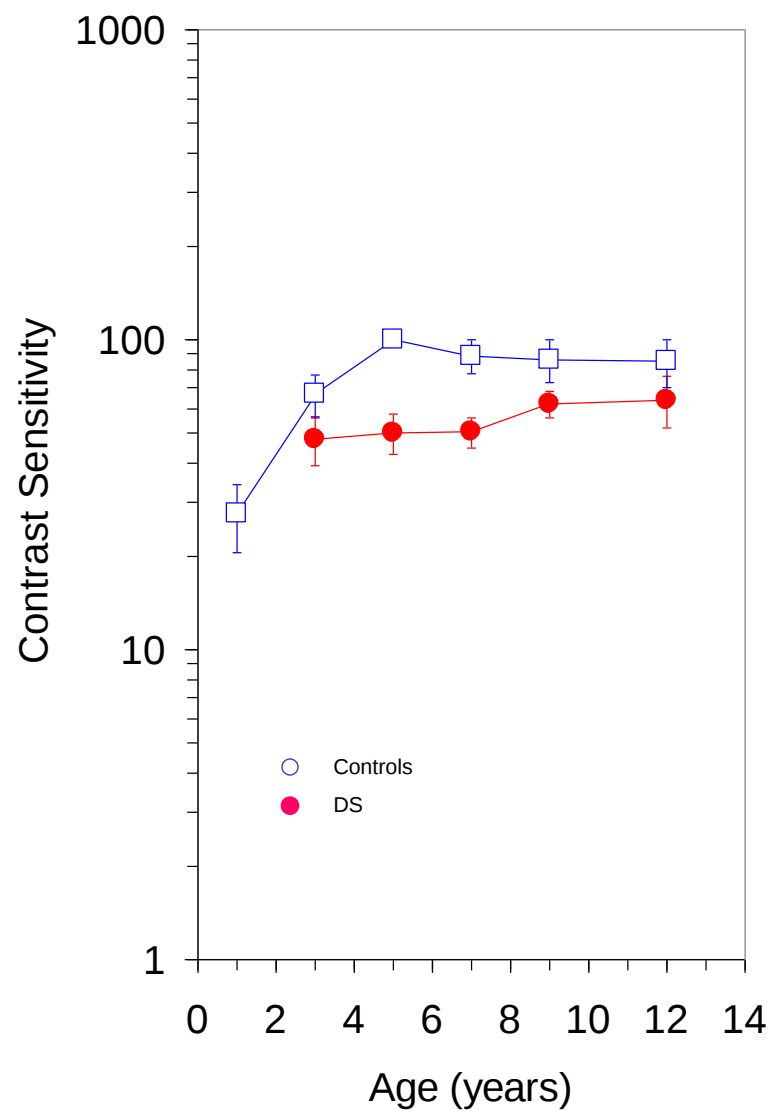


Behavioural acuity

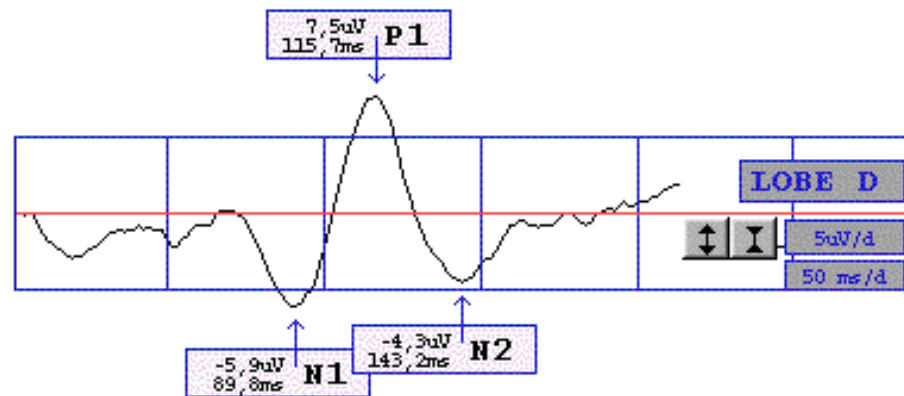


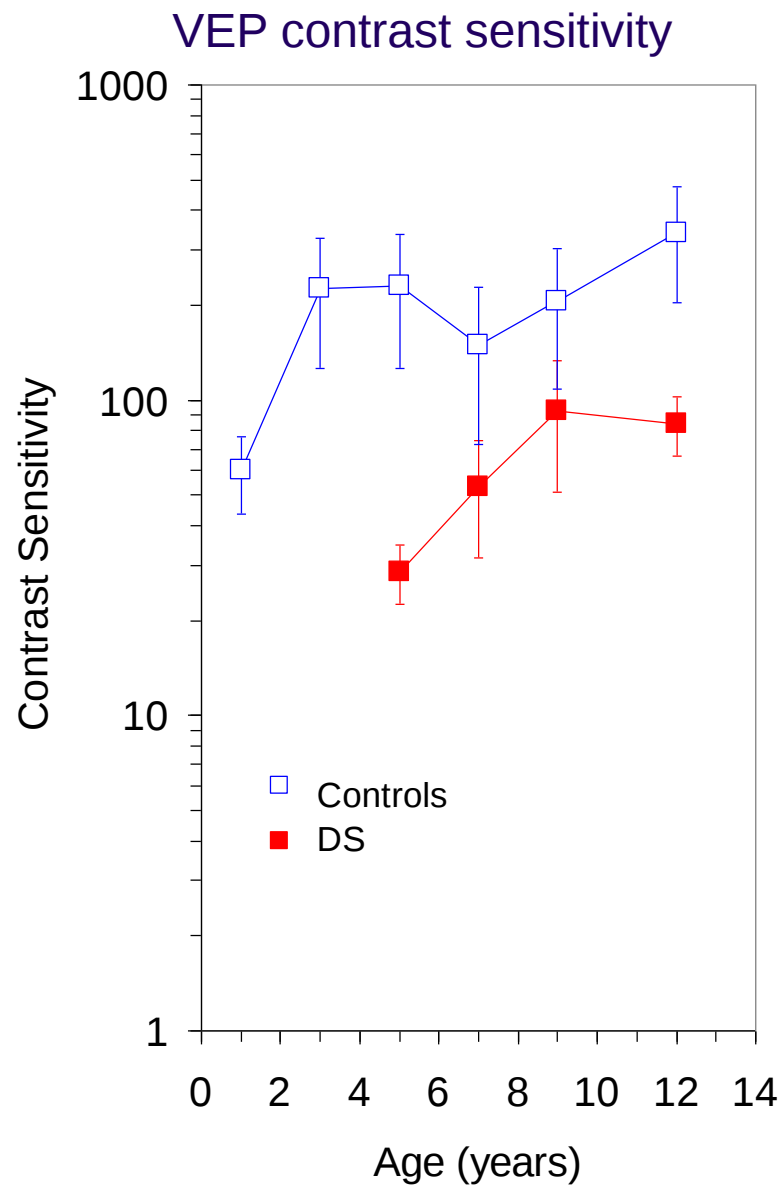
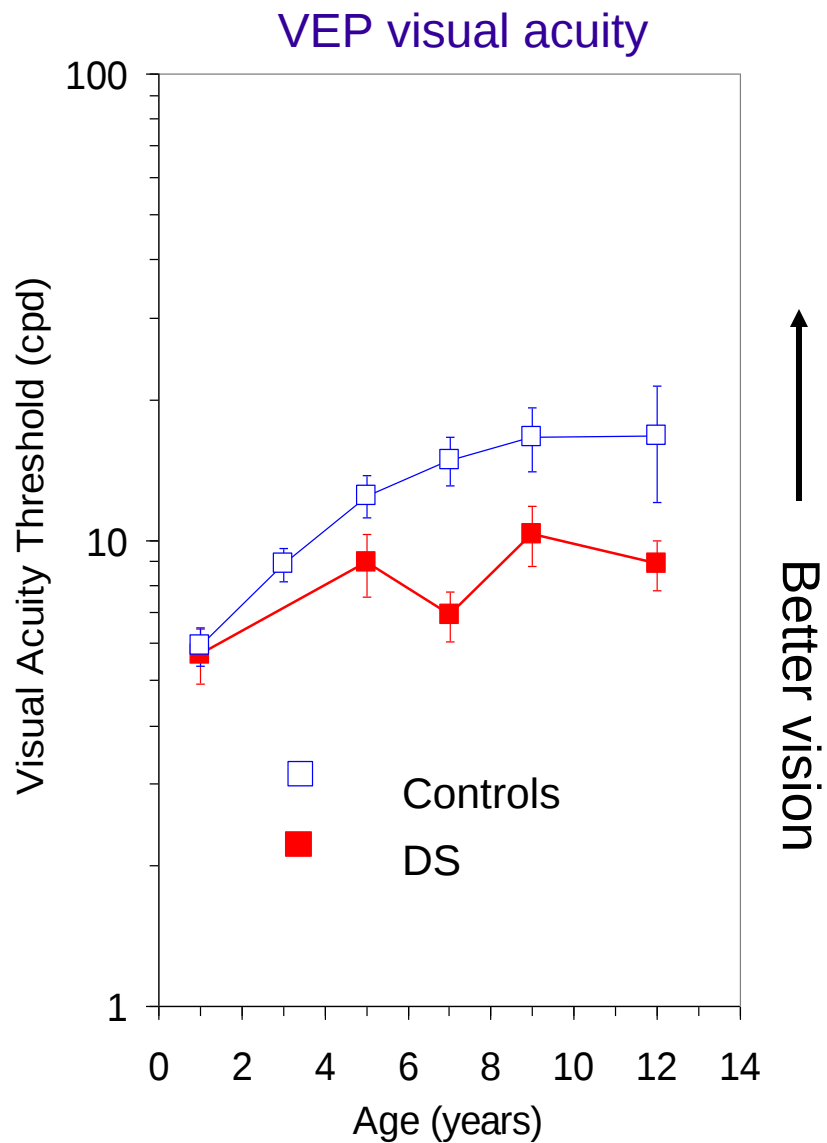
↑
Better vision

Behavioural contrast sensitivity



Visual Evoked Potentials – VEP (EEG)





- Children with Down's syndrome have poorer vision than their peers

- This applies to children with no other eye defects, and to children wearing their glasses



WE USE ENERGY WHEN WE MOVE THINGS.

In each of these sets of pictures write the name of the person who is using the most energy.

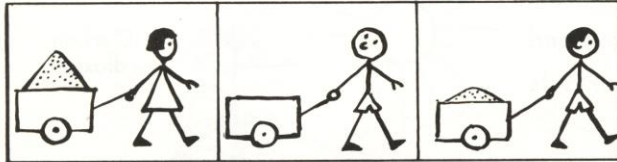


Mary

John

Peter

..... is using
most energy.



Mary

John

Peter

..... is using
most energy



Mary

John

Peter

..... is using
most energy

WE USE ENERGY WHEN WE MOVE THINGS.

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Mary

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Peter

..... is using
most energy.



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Peter

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Mary

John

Peter

..... is using
most energy.

Mary had a little lamb

Mary had a little lamb

Mary had a little lamb

Mary had a little lamb

Email from Ben's Mum – Ben is 6 years old

Please send me some information that I can show to school.

I know what a difference this will make to Ben as one of his targets is to write on the lines which he couldn't do. It turned out the line was in pencil. I suggested that perhaps he couldn't see it, so his teacher then drew the lines in pen and instantly he could write on the lines!

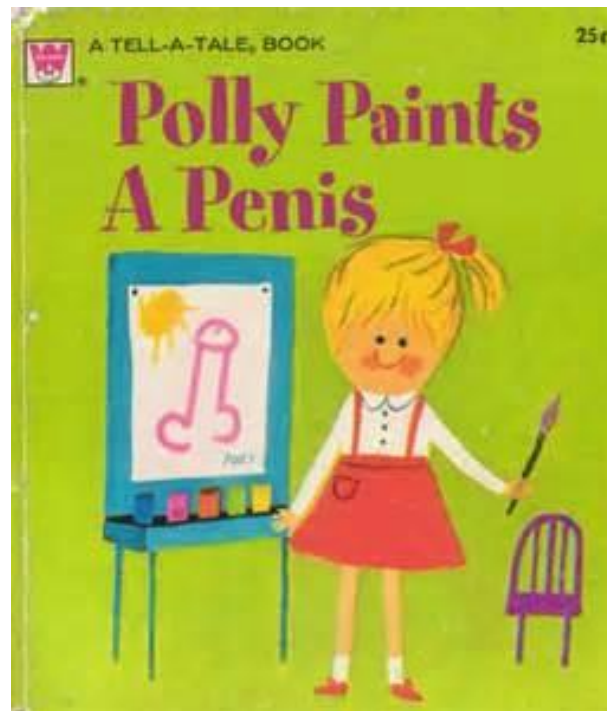
Making the most of vision in children with special needs

- Ensure regular eye examinations
- Near focusing must be measured
- Correct defects with spectacles, including bifocals if needed
- Make classroom modifications – for any reduced vision

Guidelines for enlarging and embolding

Research studies show that

- For fluent reading we need
 - Text THREE to FOUR times larger than our limit
- For any learning we need
 - Images TEN times bolder than our limit (seven steps on chart)

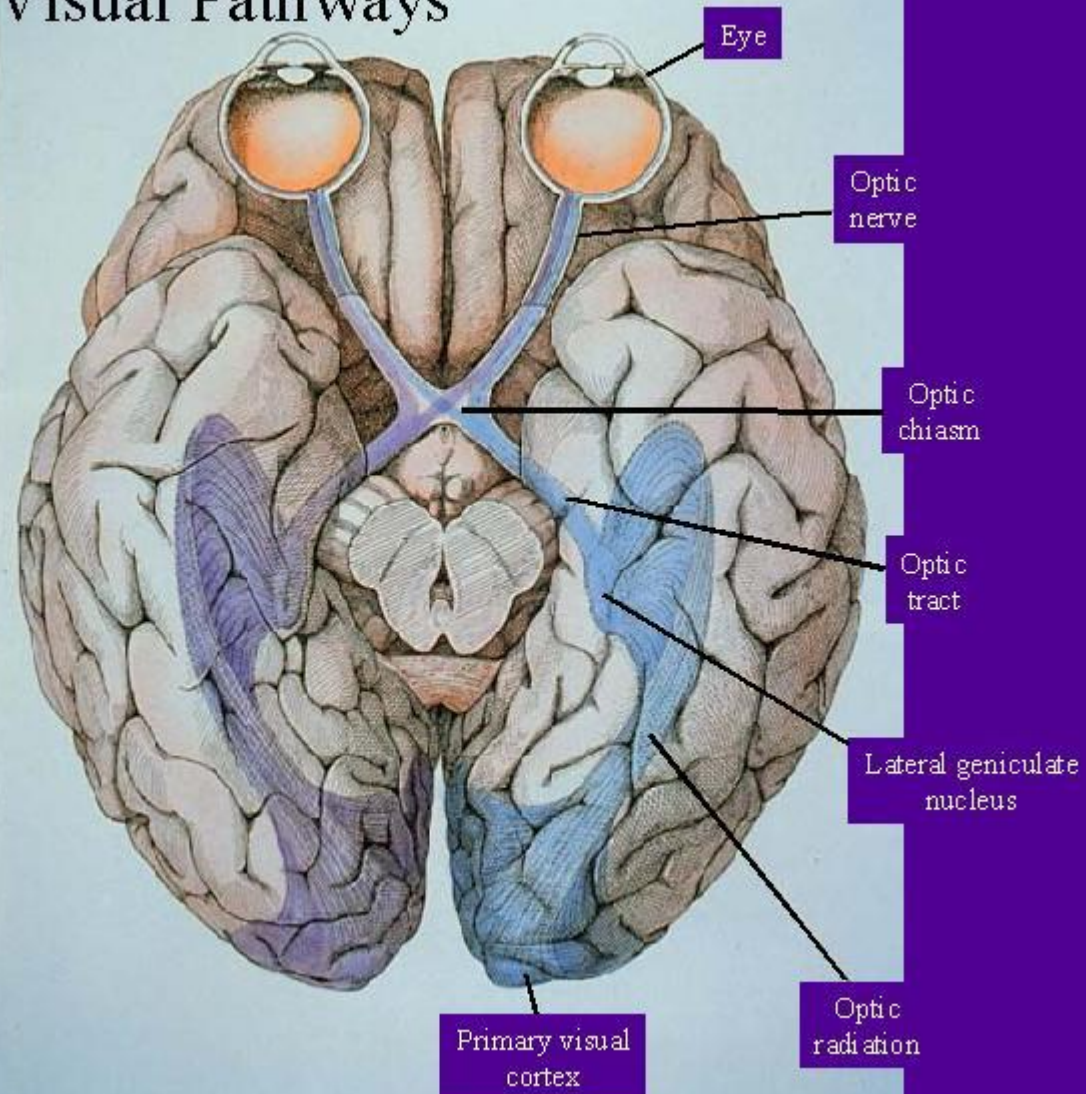


Cerebral / Cortical Visual Impairment

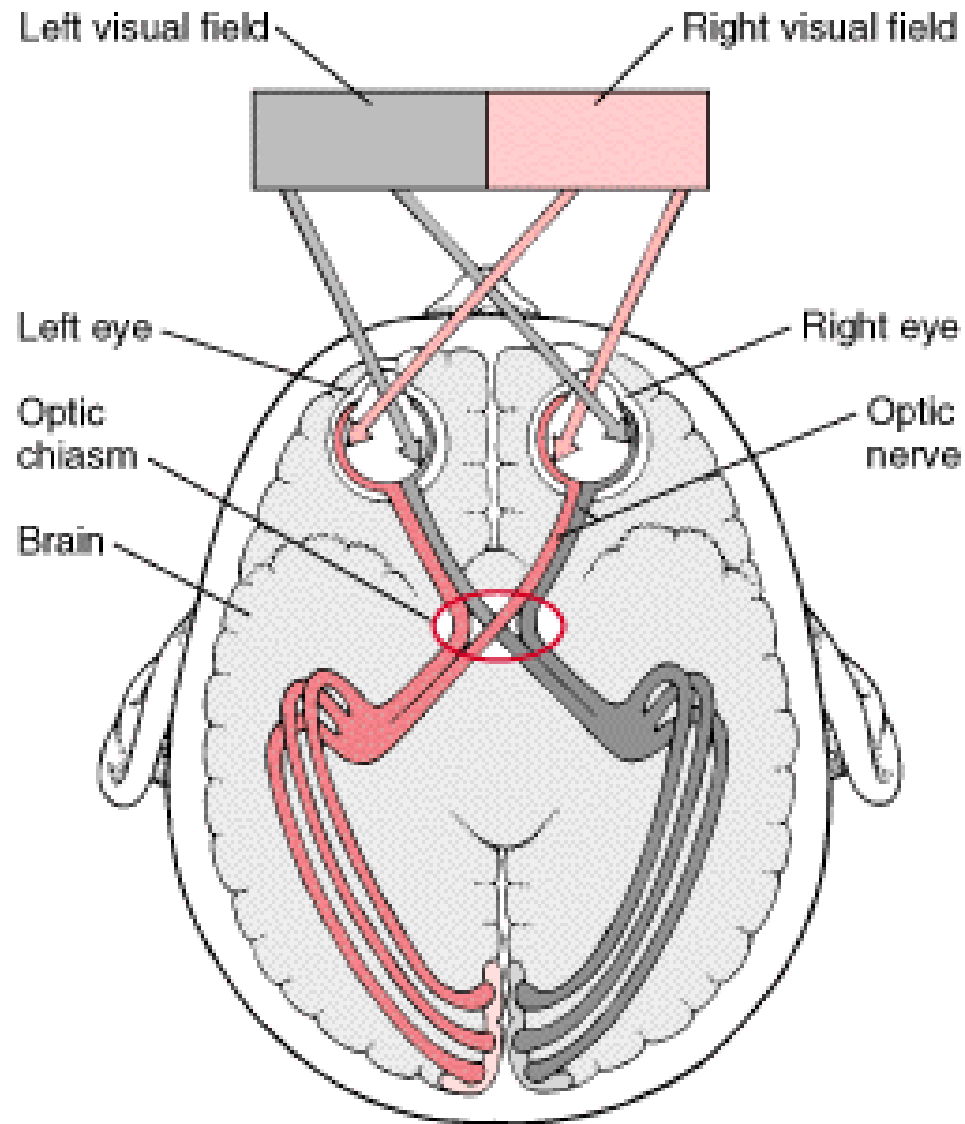
- Visual problems due to brain injury or malformation
- CVI is an umbrella term covering:
 - Reduced visual acuity or blindness
 - Visual field defects (very common in CP – 75% of children with hemiplegia)



Visual Pathways



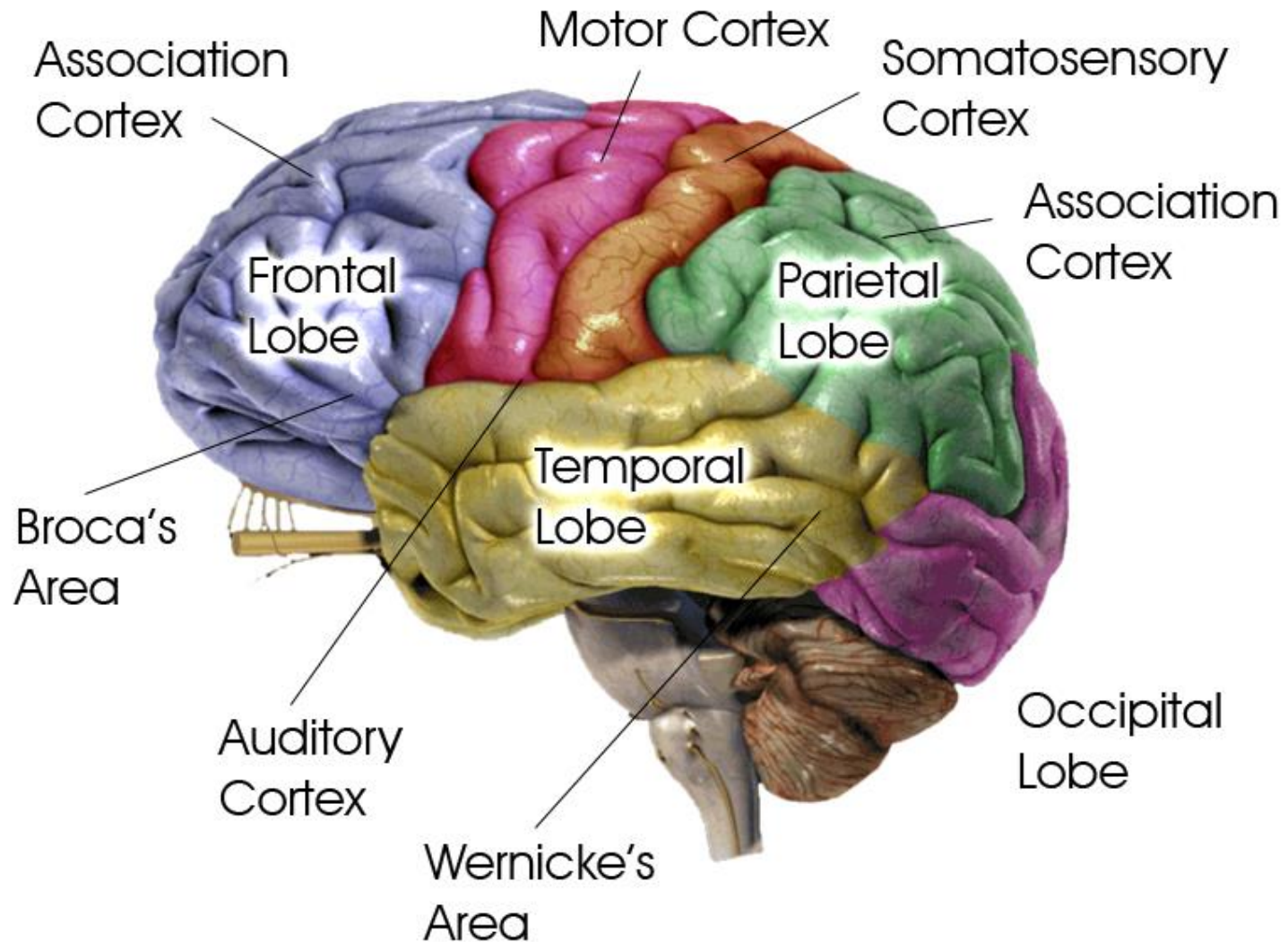
Visual Pathways

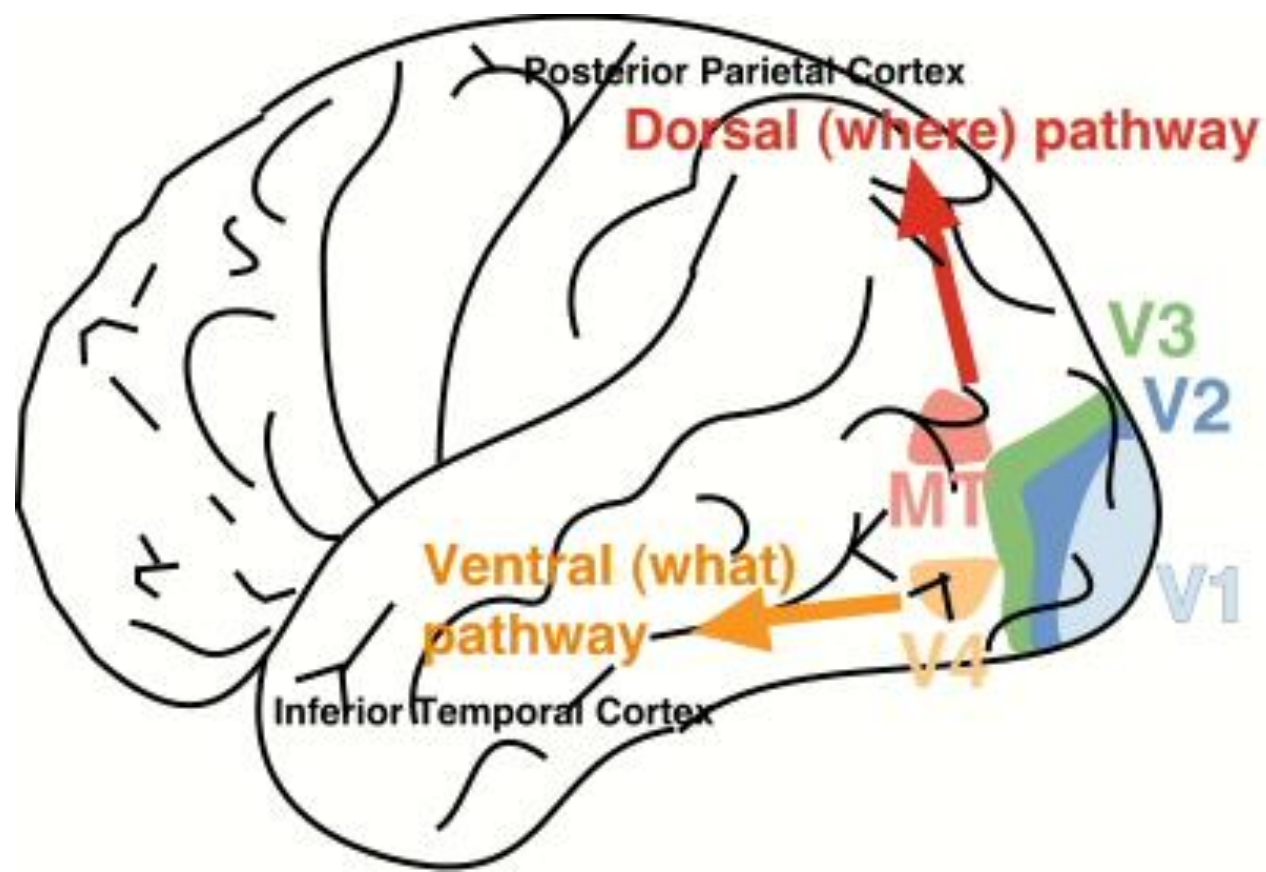


Cerebral / Cortical Visual Impairment

- Visual problems due to brain injury or malformation
- CVI is an umbrella term covering:
 - Reduced visual acuity or blindness
 - Visual field defects (very common in CP – 75% of children with hemiplegia)
 - Poor eye movement control
 - Visual perceptual problems (difficulty in interpreting visual images)

Areas of the brain





Damage to the VENTRAL stream can result in

- difficulties with recognising objects
- difficulties learning to associate abstract drawings with objects
- difficulties discriminating faces or facial expressions

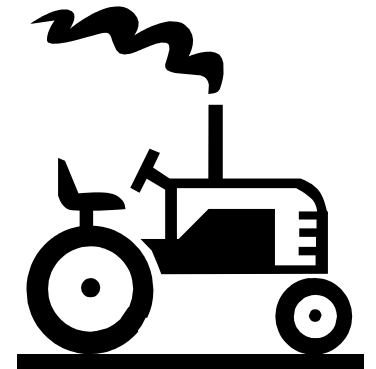


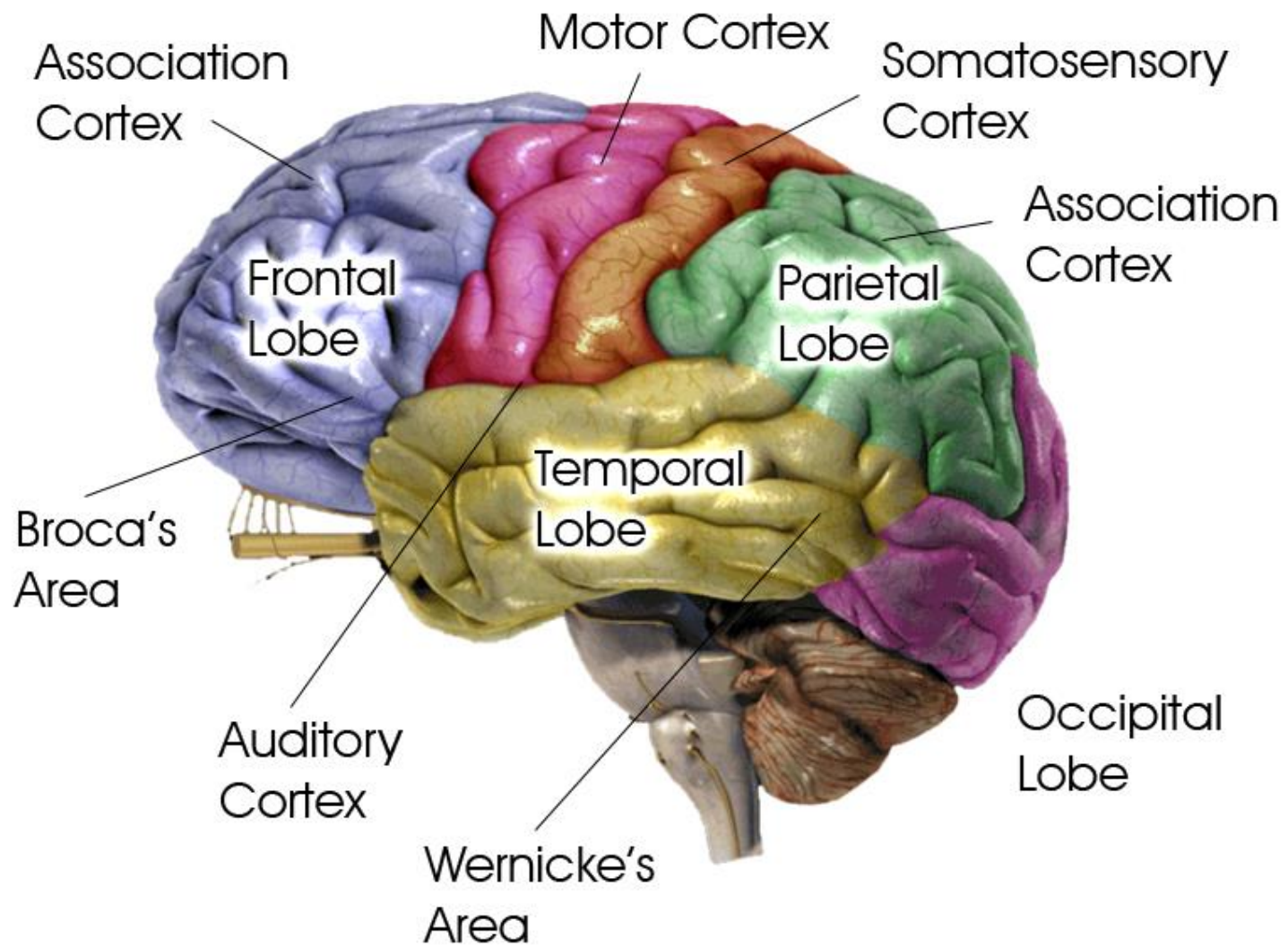
Duck



Damage to the DORSAL stream can result in

- difficulties with spatial awareness and localisation
- difficulties judging position of objects in order to make eye movements
- difficulties perceiving motion





- Parietal cortex:

- Receives input from vision, auditory, touch, and motor output signals.
- Links with frontal cortex, (where decision making is carried out) and the motor system
- Allows processing of a lot of sensory information at once
- Shifts attention from one item to another

- An intact parietal lobe is able to cope with several things at once
- A person with parietal lobe damage:
 - Can only attend to one sense at a time?
 - Can only 'see' one thing at a time (simultanagnosia)
 - Has difficulty distinguishing figure-ground
 - Finds visually busy environments distressing
 - Can't find an item in an array, or a person in a crowd
 - May have difficulty integrating information from vision and movement (inability to judge steps etc)

Managing CVI

- There is no treatment
- Diagnosis gives credence to parental concerns
- The difficulties can be fully understood
- Find strategies to enable the person to achieve by different methods

Thank you for your attention

woodhouse@cf.ac.uk

Down's Syndrome Medical Interest Group

[http://www.dsmig.org.uk/library/articles/
guideline-vision-5.pdf](http://www.dsmig.org.uk/library/articles/guideline-vision-5.pdf)

1. There is a high prevalence of ocular disorder among people with Down's syndrome. Refractive errors and/or squint may be present from an early age and persist into childhood (1,2,3). *The majority of children with Down's syndrome have reduced accommodation at near (2,4,5).*

Down's Syndrome Medical Interest Group

[http://www.dsmig.org.uk/library/articles/
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7. Children and adults with Down's syndrome should be expected to respond to standard vision testing procedures at appropriate developmental age *but a distraction free environment and extra time may be necessary to optimise performance. Distance and near functioning vision should be checked at every review and a prescription for near correction or bifocals considered at all ages * (13, 16, 17)*. Detail vision is likely to remain poorer than expected throughout life even when appropriate spectacles are worn (18,19)

Wearing glasses

Children with Down's syndrome have differently shaped faces to 'ordinary' children



How to wear your glasses!



How NOT to wear your glasses!



- Ensure specs fit well





hypermetropia (long-sight)



myopia (short-sight)

Ethan – went into bifocals aged 3 yrs 9 months: email from Mum

- Just thought I'd let you know that he took to the bifocals straight away and hasn't put his old glasses back on since wearing them.
- Just this morning his key worker at pre school asked me if I'd noticed a difference in Ethan since he's been wearing his bifocals - steadier on his feet, better communication and attention when looking at flash cards and so on. It's nice that someone else has noticed too.
- Also, I know I mentioned to you that I was worried about his peripheral vision when we visited because he only seemed to look at 1 out of 4 words on a matching board when we were practising reading. I think it's because he had to try so hard to focus that he could only look at 1 at a time. Now he looks at the whole board and understands better what I'm asking him to do!

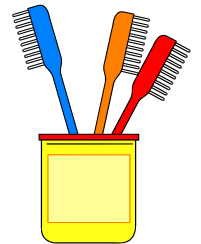
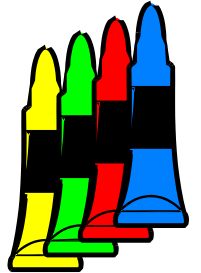
Minnie – went into bifocals aged 13 years: email from Dad

- *Although able to read effectively, in secondary school Minnie found reading really tedious and started developing all kinds of difficult behaviour to avoid reading altogether; at times the teachers and support staff would have to exclude her, which suited her fine.*
- *It was in year 8 that we got the bifocals and within two weeks the change was remarkable, not only did she take part willingly in reading at school but started to undertake independent reading for pleasure, reading the Radio Times and magazines. She started to actively seek out reading material on topics that interested her. This was also the point in time when she started taking a real interest in independent writing .*
- *Her behaviour and attitude improved immensely. Minnie was so much more engaged by everything that involved reading including her transition planning and college work when she finished school.*



What can we do to help children with CVI?

- Poor object recognition:
 - use colour cues
 - move from real objects to photographs to representations gradually
 - Develop other cues to recognising people and educate others always to speak
 - wear consistent colours or perfume
 - practice?



- **Poor spatial awareness:**
 - reduce clutter in the environment
 - keep the environment constant
 - teach the person verbally (use rhymes to describe the journey home for example)
- **Simultanagnosia:**
 - present objects singly
 - mask other items
 - highlight important features
 - use colour coding