

This information sheet has been written by Pat Kennedy who is an independent Paediatric Occupational Therapist who has treated many children with hemiplegia.

The development of visual perception

Our brains are responsible for organising the information that enters them. The development of visual perception relates to how the brain organises material that enters it specifically through the eyes. The visual cortex, located at the back of the brain, must decide what to respond to and how to make sense of information very quickly. There are two stages to in this complex process:

- Stage 1 is the organisation of incoming information
- Stage 2 relates that information to things the brain has already experienced.

Most children undergo an assessment of their visual acuity (what they can directly see) and their ability to read or recognise pictures from a chart. However other aspects of vision such as the visual field (what they can see around them, particularly their peripheral vision) and some less common areas of difficulty such as contrast vision and colour awareness are not tested. Standard visual tests tell us about the acuity and recognition of images but not their interpretation.

What visual perceptual difficulties can children with hemiplegia face?

Attention difficulties: People make cognitive maps all the time to decide what visual information to keep and what to discard; otherwise we would overload the brain. Children with hemiplegia seem to have difficulty deciding what to keep and what to discard. Sometimes they attend to minute peripheral details i.e. fail to discard irrelevant information, and then miss the main points.

Visual field difficulties: A visual field defect may mean that a child cannot see what happens on one or both sides of them.

- Hemianopia, the loss of half the visual field, can affect the ability to scan letters and words across from left to right to make words and sentences.
- For example, a left hemianopia may result in the loss of the beginning of every word, or when copying, especially from the board, the loss of the beginning of each line. And a child with right hemianopia may lose the end of a word or line.
- As pupils advance in their literacy, they may learn to compensate for these problems, particularly as they will draw on context to make the script make sense.

Visual neglect: Some children with hemiplegia may experience visual neglect, which can cause them to ignore what happens on the affected side unless they use another means of drawing attention to it. They may also stumble easily and be less prepared for movement.

What other problems can arise from visual perceptual problems?

The most common and subtle of the perceptual difficulties that may affect children with hemiplegia concerns visual spatial awareness. In other words, a visual image is seen but not fully interpreted in its spatial context.

These difficulties are most likely to become apparent as the young child begins to show problems in

- practical tasks such as undressing and dressing
- placing parts of toys accurately to build or assemble puzzles
- drawing age appropriate figures and objects

Later, a visual spatial difficulty may affect the understanding of left to right sequencing in reading and writing as well as letter formation. Maths is particularly vulnerable to inadequate spatial skill, particularly the organisational aspects in the spatial context that give numbers their significance.

Organisational difficulties: Many children who have visual perceptual problems are fundamentally disorganised; e.g. they can do picture matching but are not able to do picture assembly tasks, so that puzzles, whether in a frame or not, are often virtually impossible for them to do. There are several tests that OTs and psychologists use to discover the extent and type of these spatial difficulties.

What can teachers and parents do?

Teachers and parents need to be aware how tiring problem solving is for children with hemiplegia. Indeed, some children may need to start from scratch every single time they encounter the same problem. Children with hemiplegia constantly need to think about what they are doing and how they are going to do it.

They should also be aware that perceptual problems can result in emotional and sometimes behavioural problems as the children tend to avoid tasks where they experience difficulty compared to their classmates, so gain no practical experience to build on. This can lead to a sense of failure.

Practical solutions

- The child should sit square on to the board or face to face, to avoid having to turn towards visual and verbal stimuli.
- Computer screens should be at eye level.
- For children who are visually inattentive it is helpful to work face to face so that the child can see facial expressions, and the adult can check direction of eye gaze and eye movements.
- For writing instruction and other practical organisational learning the teacher/LSA should sit alongside the child to enable them to have the same angle of vision.
- Display boards should be in the child's direct line of vision with the minimum opportunity for distraction, or adjusted for the child's restricted vision/field defects.
- In group work the child should be seated in the front or middle of the group.
- At the table, ensure that the child has enough space to work effectively and to place their affected hand
- If you sit a left hander next to a right hander, make sure their dominant arms are not going to come into contact while writing etc.
- Some children find it easier to work on paper that is at an angle to the edges of the desk. Rather than using Blu-tack to fix the paper to the desk, use a clip board which the child can adjust to the angle they require and then hold down with their affected arm.

- Pre-schoolers learn to draw and form shapes better on a well stabilised vertical surface or later on an angled surface.
- Surfaces should provide a clear background for writing, drawing etc. White boards are better than black or green.
- Plain table tops might be more effective if covered in a pale contrasting coloured paper such as blue, yellow or natural.

Problems with maths

Children with spatial difficulties often cannot plot corners to make a square and find spacing /drawing lines accurately quite hard to achieve.

Also specific to maths are problems in early arithmetic e.g. $1 + 2 + 3$ is a verbal skill, whereas

$$\begin{array}{r} 14 \\ +16 \\ \hline \end{array}$$

is a visual spatial skill requiring the ability to recognize the value of each number by its position, and the ability to carry numbers across the columns in their correct sequence and position.

To assist in using columns and other space specific aspects of maths, colour coding with highlighter pens can be used (the code should be agreed and consistent across all work relating to numbers).

More practical solutions

- With younger children use sticky labels to construct bar charts.
- When comparing (measuring) bar charts or lining up objects etc use a line drawn on acetate to divide blocks.
- Use a black fine-liner pen for stencils and maths drawings with instruments as it gives a clearer outline.
- At 16+ or earlier young people should be allowed to use photocopies for scientific and related information drawings rather than attempt them freehand.

HemiHelp has a range of information sheets for both families where there is a child with hemiplegia and adults with the condition, as well as a Useful Names and Addresses List to help you contact other organisations.

Hemiplegia is a neurological condition that weakens one side of the body and affects one child in a thousand. It is sometimes described as a form of cerebral palsy and the effects are similar to those of a stroke. **HemiHelp** is a membership organisation offering information and support to children and adults affected by hemiplegia and their families.

HemiHelp is happy for you to make photocopies of any part of this document.

Helpline: 0845 123 2372 (Mon-Fri 10am-1pm)

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