Visual Stress: Information for Patients and Families

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Summary: Visual stress is a visual perceptual processing condition that affects how visual information is interpreted by the brain and interferes with reading, attention, coordination, general health and behaviour. This is different from problems involving sight or sharpness of vision and can occur despite normal vision. Classic symptoms include light sensitivity, headaches from reading, and problems reading because the white “page appears too bright” or the words appear to be "moving, flashing, or jumping on the page". As reading is such a key skill for school and life in general, problems with reading can thus lead to significant impairment. The good news is that appropriate intervention can make a significant improvement and for many individuals, one of the interventions is as simple as specific colour filters.

Vivian’s Story: “When I read, I get headaches, the light hurts, and the words move”

Vivian is a student who has been struggling for a long time. “I want to learn, but I hate school because there's too much reading. When I read, I get headaches, the light hurts, and the words move..."

When she was younger, she saw many professionals for her reading issues. Her parents were told many opinions including:

- "Your daughter is lazy -- you just need better discipline to get her to read."
- "She has attention deficit hyperactivity disorder (ADHD), and that's why she can't focus" -- yet all the usual ADHD treatments including medications have been tried without success.

Finally, one day at her yearly eye exam, her eye care professional discovers that when Vivian reads, the words “move up and down and side to side.” Vivian never thought to tell anyone because "I thought it was like that for everyone else too"...

Is it Visual Stress?

Is there any of the following?

- Do words or letters appear to jump, shake, change or move on a page?
- Do colours or lights appear to flash or flicker on the page and behind text?
- Do you struggle with headaches/migraines or eyestrain from reading, homework, computer work or fluorescent lighting?
- Have you, or a loved one, been diagnosed with ADHD, Autism, Asperger Syndrome, or Dyslexia?
- Have there been perceptual distortions that often following a stroke, concussion or other brain injury?

If there are even a few of these symptoms, then there is a possibility that there may be visual stress, a condition that occurs in as many as 15% of the population. And for many, a part of the solution is as simple as precision colour filters.

What is Visual Stress?

Visual stress is a visual perceptual processing condition that results from hyperactivity of the brain's visual cortex. As a result, the visual cortex doesn't process information properly, which can thereby cause problems with reading, attention, coordination, general health and behaviour.

Visual stress is not the same as problems involving sight or sharpness of vision; visual stress can occur even if you have normal vision.

Symptoms include:

- Light sensitivity
- Physical discomfort
- Visual and perceptual distortions.

Terms: In the past, visual stress has been called Irlen syndrome, Meares-Irlen syndrome, perceptual dyslexia, visual dyslexia and scotopic sensitivity (now realized to be a misnomer).

Visual stress is the modern term used as it is a broader term and refers to the condition that occurs in a wider range of neurological conditions.

How Common Is It?

Visual stress is experienced by 10-15% of the general population. Certain situations can increase the risk of having visual stress -- in certain individuals such as those with dyslexia, autism spectrum disorder (ASD), specific learning difficulties, migraines, and brain injuries, visual stress can occur in over 40% of individuals.

What Triggers Visual Stress?

In people with visual stress, triggers that over excite the brain may include:

- Patterns or stripes: The contrast of light to dark in some patterns or stripes can be particularly uncomfortable, as found in:
    - Text (white background to black printed text or computer screens)
    - Human-made structures and equipment such as Venetian blinds or escalator stairs (made worse by the fact they are moving)
    - Fabric patterns with contrasting colours such as swirls, stripes or zigzags.

- Flicker: Even if flicker is consciously noticed, it can still trigger visual stress. Sources of flicker include:
    - Lights: Fluorescent, LED, halogen
    - Screens: Computers, televisions, classroom Smart Boards, movie screens, tablets, cellphones
    - Movement of objects in your peripheral vision, such objects outside of what you are directly looking at; pylons or telephone poles on the side of the road; people hovering around your work or study space

- Glare from light sources: Glare from reflection can often be avoided by moving the angle of the source, however, other sources of glare are not so easily reduced, for example:
    - Vehicle lights at night
    - Reflection of lights on wet or polished surfaces
    - Reflection from desks, floors, walls, posters and windows in classrooms

- Colours
    - Every colour has a different wavelength and it appears that, for some individuals, certain wavelengths of colour trigger this overexcitement.

Although some people are more sensitive, anyone can experience visual stress under the right conditions.

What are Symptoms of Visual Stress?

Symptoms include:

- Visual symptoms
    - Reading difficulties
    - Learning difficulties
    - Light sensitivity
- Perceptual effects include:
    - Instability of text where words appear to:
        - Move, swirl, shake or vibrate
        - Double, blur, washout or disappear
    - Illusions of colour and light where:
        - Colours appear between or around words or in the white space of the page
        - Lights flicker behind the text or image
        - Colours flicker and flash in the entire viewing area
    - Depth Perception difficulties where:
        - Judgement of distance to objects may be impaired; bumping into things may be common.
        - Learning to ride a bicycle is difficult
        - Athleticism is not a problem, but ball play is difficult.
- Physical symptoms:
    - Sensitivity to light (i.e. Photosensitivity), often preferring dim or dark environments
    - Headaches
    - Sore eyes
    - Nausea
    - Dizziness
    - Fatigue
    - Pain in or around the eyes

Effects range from mild to severe, and can interfere with ability to learn to read, with reading fluency, and notably with the ability to read in a sustained manner for long periods of time.

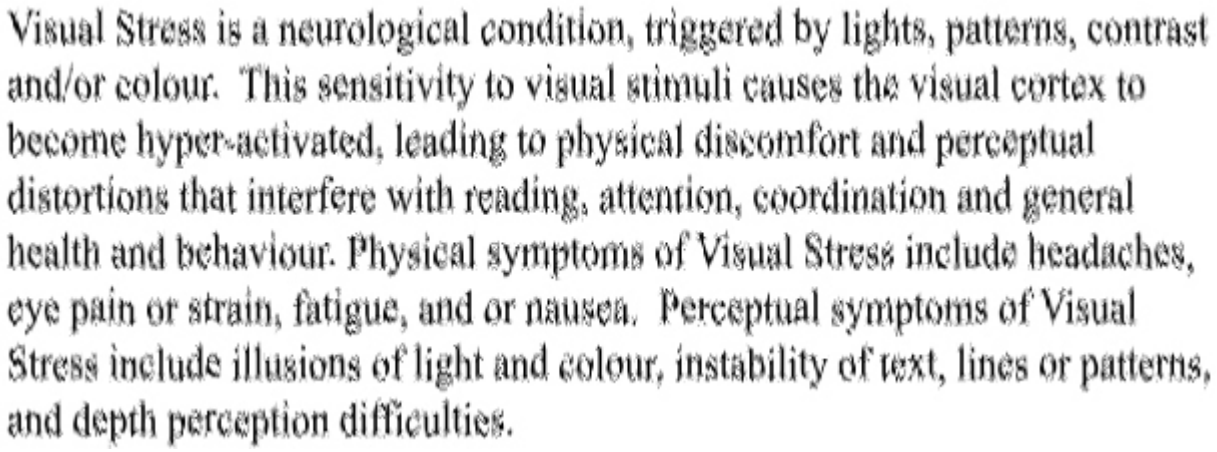
Common Visual Distortions

The images below are an example of how the distortions appear to those with visual stress:

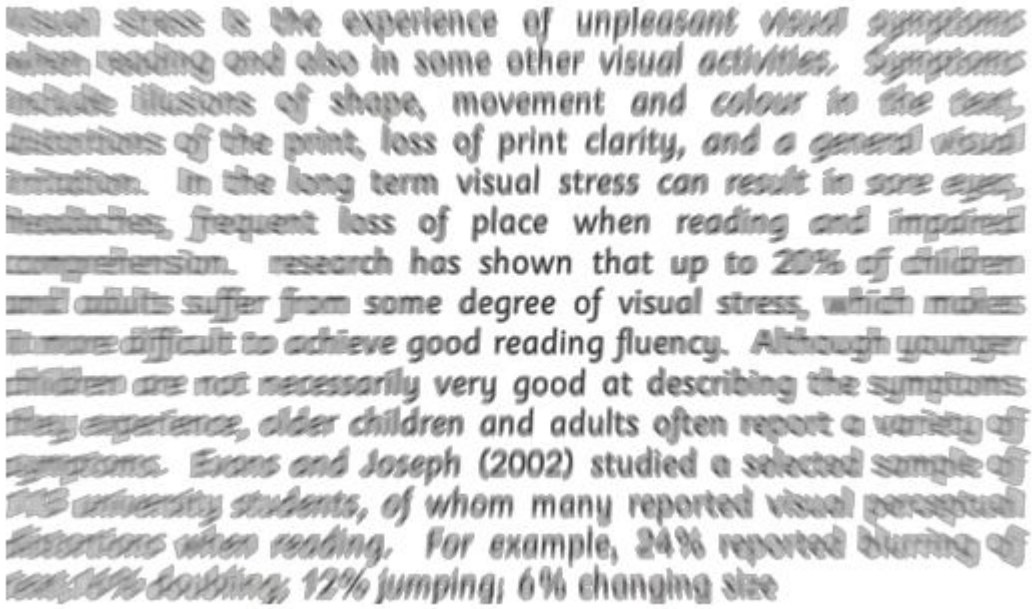
Ripples

Rivers

Heatwave



Swirl



Visual Stress Can Mimic Other Conditions

Visual stress is often not picked up in standard optometric, psychological or health exams, and is often overlooked as the cause (or part of the cause) of the person’s problems.

As well, many of the symptoms are similar to those of other conditions and may be misinterpreted as other conditions including, but not limited to:

- Attention deficit hyperactivity disorder (ADHD): Because the person has troubles looking at things due to visual stress, it may appear that the person has a lack of attention.
- Dyslexia (aka Reading Disorder): Because the person has troubles looking at text and reading in particular, it can be diagnosed as a 'reading disorder'. Interestingly enough, many teachers know from experience that some students are helped by colored overlays, but in actuality, they are actually trying to deal with visual stress.
- Coordination disorders: Because the person may be clumsy from not seeing properly, it can be mistaken for coordination problems.

If you Suspect Visual Stress, see a Health Professional

If you suspect problems with visual stress then:

1. Start by seeing a primary care provider (such as a family physician). Your primary care provider can make sure that any contributory medical issues are addressed, as visual stress can occur along with, or be triggered by conditions such as head injuries or concussions.

2. See an eye care professional (such as an optometrist or ophthalmologist familiar with visual stress), and/or a professional who has training in the area of visual stress. You might specifically search on the internet for “visual stress” professionals in your area.

Note that because awareness of visual stress is still in its early stages, it is possible that even if you see an eye care professional (such as an ophthalmologist or optometrist), that they may still not be aware of visual stress.

What Can Be Done About Visual Stress?

The good news is that there are many strategies and interventions that can be done for visual stress, depending on the specific circumstance:

- Corrective lenses. The person may require corrective/prescription lenses for binocular vision abnormalities. In order to discover if this is the cause it is always recommended that an eye care professional be consulted to rule out these conditions.
- Precision coloured filters. If corrective lenses have been tried, and there are still visual stress issues, consider precision coloured filters. The right colour filters can slow down the wavelength of light, which can then bring an immediate calming sensation and the trigger that was previously causing the stress now has little effect. This can be done simultaneously and prescriptions and tinting can be combined on one set of glasses.
- Glasses or Contacts. When you see a specialist, they can help customize a pair of glasses/contacts in order to filter out the stressful visual input.

Self-Help for Visual Stress

- **Natural lighting.** Human eyes are designed for natural light. Whenever possible, use natural lighting, e.g. sit by a window with natural light.

Improve lighting conditions. Some individuals have problems if there is too little or too much light. Changes to the environment may be necessary to correct for lighting issues. There are new LED lighting products that allow the user to change the colour of the light using a remote or app on their smart phone.

- **Avoid artifical light.** If possible, avoid fluorescent lights, which includes compact fluorescent (CFS) bulbs, by turning them off, or putting in burnt out bulbs.

- **Overlays.** Placement of a coloured overlay on the troublesome white page, smart phone, computer screen, or the wearing of coloured lenses, has been found to neutralize the unpleasant visual symptoms (e.g. Robinson and Conway, 2000; Kriss and Evans, 2005). The effective colour varies from person to person.

- **Reduce exposure to electronic screens whenever possible.** Considering that the average North American spends several hours a day on recreational screen time, considering limiting the recreational screen time and replacing it with outdoor or non-electronic activities that are less visually stressful.

- **If electronic screens must be used, you can:**
    - Adjust the screen settings to change the appearance and brightness of background or text.
    - Install screen tinting software and tint the screen a custom colour
    - Place an anti-glare overlay in front of the screen

- **Limit exposure to SmartBoards and LCD projectors**: SmartBoards and LCD projectors are a type of electronic screen and can cause discomfort and migraines. Ask for printed copies of materials if possible.

- **Coloured paper.** Try using different colors of paper to see which one is least stressful for the brain.

- **Using a book holder or ‘slant board’.** Try a paper holder to hold up reading materials to reduce glare and make it easier to see.

- **eBook Readers instead of bright tablets.** Reading a physical book is usually easier on the eyes than an electronic screen. But if reading a physical book is not possible, consider an eBook reader. Many people report that lower contrast eBook readers, with their ‘electronic ink’ are easier on the eyes.

- **Avoid patterns**. Are there any strong patterns or distractions in the environment, such as horizontal or vertical blinds? If so, then try to completely open or completely close them. Or find a way to avoid them altogether. Solid, un-patterned roller blinds are recommended in a neutral shade.

- **Use sans serif fonts.** When printing or reading materials, try to use sans serif fonts such as Arial, Tahoma, Calibri or Helvetica.

- **Wear hats or visors**: Consider a hat with a dark brim, baseball cap, visor, or a 'hoodie' in order to block glare and light from above.

Vivian’s Story, Part 2

During Vivian’s visual stress assessment, it is confirmed that she does indeed struggle with visual stress. Her reading has always been slow, interrupted and cumbersome. The testing identified a custom colour combination for tinted lenses that, when worn, leads to a remarkable improvement in her reading.

Several months later, she is now regularly wearing her specially tinted glasses, and as a result:

- Her brain now works, processes and concentrates better, with significantly less stress and fatigue -- “When I wear my glasses, the words don’t move anymore!”
- Her visual perception is improved, so that she is seeing better and she no longer stumbles on steps or escalators.

She now looks forward to going to school, does better in school, and has picked up a new favorite pastime… reading!

Further Reading

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About this Document

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Conflict of interest declaration: Karen Monet and Susan Atack-Brousseau work at Opticalm, which is a private clinic that specializes in the treatment of visual stress.

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