



PLAIN LANGUAGE SUMMARY

Visual processing changes in people with Visual Snow Syndrome

SOURCE

Emma J Solly, Meaghan Clough, Allison M McKendrick, Paige Foletta, Owen B White, Joanne Fielding. Ocular motor measures of visual processing changes in visual snow syndrome. *Neurology*. First published July 16, 2020, <https://doi.org/10.1212/WNL.00000000000010372>

WHAT IS THE RESEARCH ABOUT?

- Visual snow syndrome is a complex and mysterious neurological condition. The hallmark symptom is a veil of static, much like that of a badly tuned analogue TV, across the entire visual field. And, other visual events co-occur, e.g. floating black specks across the eyes or shadowy outlines of previously seen images.
- People with this syndrome experience these symptoms *all the time, every day* irrespective of whether their eyes are open or closed.
- At present, the cause, areas of the brain affected or how to treat visual snow syndrome is unknown.
- The diverse range of visual symptoms suggests that the syndrome may be caused by a deficit to the processing of visual information within the brain.
- Therefore, studying the precise point in which visual processing is affected in the brain can be helpful in understanding the condition. It also informs further investigations to find out what causes visual snow syndrome. We can do this by activating the ocular motor network using key tasks.

Key definitions or terms

1. **Visual processing** - the acquiring and transmission of visual information from the eyes, with the integration and interpretation of this information into a meaningful image to move the eyes or head
2. **Ocular motor network** - the system responsible for moving the eyes on to or to maintain a stable visual image
3. **Stimulus** - a visual event that brings about or increases the likelihood of an eye movement

4. **Central cognitive executive control** - the integration of sensory visual information with an individual person's intentions (derived from memory, attention and psycho-emotional processes), resulting in the perception of a unified visual image within the brain's consciousness

5. **Saccade** - a quick movement of the eyes from one location to another

WHAT DID THE RESEARCHERS DO?

- We observed visual processing in a group of people diagnosed with visual snow syndrome (in total 64 people) and compared them with a group of healthy people (in total 23) by studying the ocular motor network.
- We used three validated and distinct ocular motor tasks (e.g. a prosaccade, an antisaccade and an interleaved antisaccade-prosaccade), each of which placed different demands on the ocular motor network, allowing us to illustrate the types of visual processing changes occurring in people with the condition.

WHAT DID THE RESEARCHERS FIND?

- We found that the basic execution of an eye movement towards a suddenly appearing stimulus in the visual field occurred **faster** in people with visual snow syndrome than in healthy people.
- And when people with visual snow syndrome were asked to perform the opposite action, i.e. prevent an eye movement towards a suddenly appearing stimulus, they were **more likely to erroneously move their eyes towards the stimulus**.
- Interestingly, when the level of difficulty of a task was increased (i.e. requiring increased demands on central-cognitive executive visual processing), neither the faster eye movement response nor the proportion of erroneous eye movements changed.
- This indicates that these visual processing changes are not a consequence of a disruption to the decision making centres of the brain.

- Rather, people with visual snow syndrome appear to be processing visual stimuli more quickly than healthy people, **leading to hyper-accelerated eye movements to visual stimuli**.

WHAT DO THESE FINDINGS MEAN?

- A behavioural signature of visual snow syndrome is evident.
- This can be measured objectively using simple ocular motor tasks.
- The changes seen in people with visual snow indicates that their attention when filtering visual information may be affected and be a contributing factor.

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This summary can be found here - monash.edu/medicine/ccs/neuroscience/research/fieldingwhite-group

References

1. White OB, Clough M, McKendrick AM, Fielding J. Visual Snow: Visual Misperception. *Journal of neuro-ophthalmology: the official journal of the North American Neuro-Ophthalmology Society* 2018; 38:514-521. A useful overview of visual snow syndrome.

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