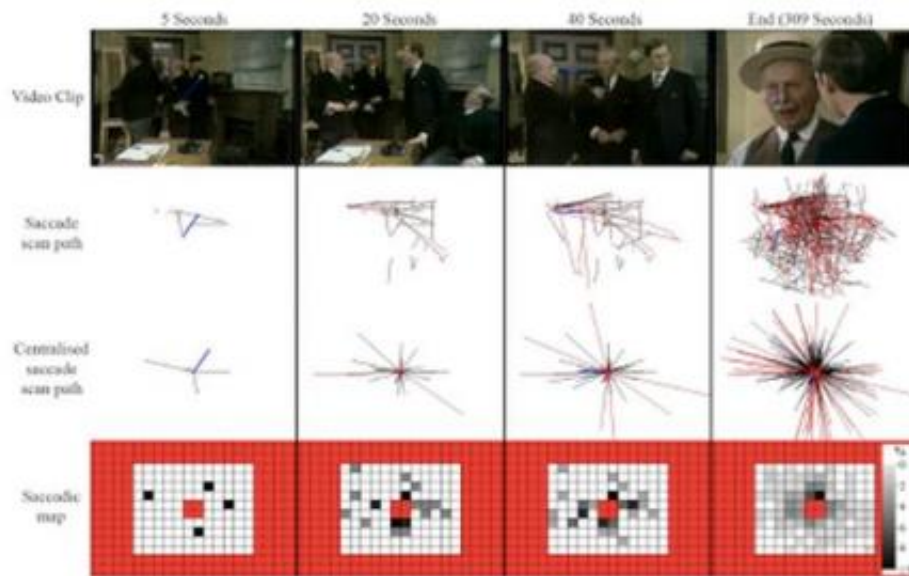


# Eye diseases identified by how we watch TV

November 11 2014



**FIGURE 1 |** A schematic illustrating how saccade maps are constructed from one control participant viewing one video clip. The top row shows frames from a video clip at a set time (green symbol shows a fixation and blue line represents the preceding saccade). The saccade scan path shows all saccades that have occurred up until that point in the video. The centralised scan path shows how the saccade is treated as vector starting at the origin (0, 0) on a Cartesian grid. The red lines highlight saccades excluded for being either too large or too small. A saccade heat map is created from the centralised saccade scan path: the darker each location in the map, the larger the percentage of saccades that ended in that region of the visual field (red regions represent excluded locations). Each square is 2°.

A schematic illustrating how saccade maps are constructed from one control participant viewing one video clip. Credit: Crabb, D. et al *Front. Aging Neuro* (2014)

One of the leading causes of blindness worldwide could be detected by how our eyes respond to watching TV according to a new study from researchers at City University London.

The researchers, who were funded by the UK charity Fight for Sight, found that they could identify diseases such as [glaucoma](#) by looking at

maps of people's [eye movements](#) while they watched a film.

With an estimated half a million people in the UK living with undiagnosed glaucoma, the research could help speed up diagnosis, enabling clinicians to identify the disease earlier and allowing treatment to begin before the onset of permanent damage.

Affecting around 65 million people worldwide, glaucoma describes a group of eye conditions that result in progressive damage to the optic nerve which connects the retina to the brain, causing people to gradually lose vision.

What makes glaucoma dangerous, however, is that this sort of vision loss can be subtle at first. People often do not know they have loss of peripheral vision. Unfortunately, as glaucoma worsens, these compensatory perceptive mechanisms unravel leading to noticeable sight loss, visual impairment and in some cases blindness. The condition is irreversible.

The team, which was led by Professor David Crabb along with Dr Nicholas Smith and Dr Haogang Zhu, compared a group of 32 elderly people with healthy vision to 44 patients with a clinical diagnosis of glaucoma. Both groups underwent standard vision examinations and disease severity was also measured for the group with clinical diagnoses.

Participants were then shown three unmodified TV and film clips on a computer while an eye-tracking device recorded all eye movement, and particularly the direction in which people were looking. These data were then used to produce detailed maps which enabled the diagnosis of glaucoma. The paper is published in the journal *Frontiers in Aging Neuroscience*.

David Crabb, Professor of Statistics and Vision Research, said:

"These are early results but we've found we can identify patients with glaucoma by monitoring how people watch TV. This could make a huge difference in detecting or monitoring a disease which currently results in one in ten of all blindness registrations in the UK and about a million NHS appointments a year for those with the disease. Once the damage is done it cannot be reversed, so early diagnosis is vital for identifying a disease which will continue to get more prevalent as our population ages."

Dr Dolores M Conroy, Director of Research at Fight for Sight said:

"One of Fight for Sight's six long-term goals is to enable conditions such as glaucoma to be detected earlier. Early diagnosis and treatment can stop people losing their sight, so we're very pleased that this proof-of-principle eye movement study opens the door to developing a new clinical test for glaucoma. Furthermore it address one of the priorities for glaucoma research identified by the Sight Loss and Vision Priority Setting Partnership-a consultation with patients, relatives, carers and eye health professionals"

**More information:** What's on TV? Detecting age-related neurodegenerative eye disease using eye movement scanpaths , *Frontiers in Aging Neuroscience* , [DOI: 10.3389/fnagi.2014.00312](https://doi.org/10.3389/fnagi.2014.00312)

Provided by Frontiers

Citation: Eye diseases identified by how we watch TV (2014, November 11) retrieved 31 January 2024 from <https://medicalxpress.com/news/2014-11-eye-diseases-tv.html>

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