

PRESS RELEASE

The secret behind sharp vision

Researchers from Basel, Bonn and Paris reveal the surprising benefit of tiny eye movements

Bonn, February 11 – Even when we think we are holding our gaze perfectly still, our eyes make tiny, involuntary movements. While these "fixational eye movements" might seem like they would blur our vision, new research reveals they actually help us see fine details more clearly. The results of the study have now been published in "PNAS".

Researchers from the Institute of Molecular and Clinical Ophthalmology Basel (IOB), the École Normale Supérieure in Paris, the Bonn University Hospital in Germany and the University of Bonn have uncovered how these microscopic eye movements enhance rather than impair our visual acuity. Using advanced eye-tracking technology and computational models, the team demonstrated that these movements help our retinas process visual information more effectively.

"It is a fascinating paradox," says Professor Rava Azeredo da Silveira, one of the study's lead researchers. "These constant, tiny movements of our eyes might appear to make our vision less precise, but they actually optimize the way our retinas encode visual information. We found that humans naturally maintain these movements within nearly perfect range for enhanced visual acuity."

"We were able to show that these movements help by 'refreshing' the content of our visual receptors while maintaining an optimal balance between motion and stability", explains Co-study leader Dr. Wolf Harmening, head of the AOVision Laboratory at the Department of Ophthalmology at UKB and a member of the Transdisciplinary Research Area (TRA) "Life & Health" at the University of Bonn. „We also found that in the experiment, the movements adapt to the size of the object shown." These findings could have important implications for understanding visual processing and developing new treatments for vision disorders.

The study was conducted using a sophisticated adaptive optics scanning laser ophthalmoscope, allowing researchers to track these minute eye movements with unprecedented precision while participants performed visual tasks. The researchers then combined theoretical modeling with empirical data to link eye movements to retinal neural coding and human behavior.

Publication: Nghiem T-A E, Reiniger JL, Dufour O, Harmening WM, da Silveira RA (2025): Fixational eye movements as active sensation for high visual acuity; PNAS; DOI: <https://doi.org/10.1073/pnas.2416266122>

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