

# Human gaze is precisely aligned with the foveolar cone topography of both eyes

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## What is the Manuscript Microscope Sentence Audit?

The Manuscript Microscope Sentence Audit is a research paper introspection system that parses the text of your manuscript into minimal sentence components for faster, more accurate, enhanced proofreading.

## Why use a Sentence Audit to proofread your manuscript?

- **Accelerated Proofreading:** Examine long technical texts in a fraction of the usual time.
- **Superior Proofreading:** Detect subtle errors that are invisible to traditional methods.
- **Focused Proofreading:** Inspect each individual sentence component in isolation.
- **Reliable Proofreading:** Ensure every single word of your manuscript is correct.
- **Easier Proofreading:** Take the hardship out of crafting academic papers.

Bonus 1: **Improved Productivity:** Rapidly refine rough drafts to polished papers.

Bonus 2: **Improved Authorship:** Cultivate a clear, concise, consistent, writing style.

Bonus 3: **Improved Reputation:** Become known for rigorously precise publications.

**Manuscript Source:** <https://www.biorxiv.org/content/10.1101/2021.03.19.436115v1>

**Manuscript Authors:** Jenny L. Reiniger, Niklas Domdei, Frank G. Holz & Wolf M. Harmening

### Features of the Sentence Audit:

The Sentence Audit combines two complementary proofreading approaches:

1. Each sentence of your text is parsed and displayed in isolation for focused inspection.
2. Each individual sentence is further parsed into Minimal Sentence Components for a deeper review of the clarity, composition and consistency of the language you used.

The Minimal Sentence Components shown are the smallest coherent elements of each sentence of your text as derived from it's conjunctions, prepositions and selected punctuation symbols (i.e. commas, semicolons, round and square brackets).

The combined approaches ensure easier, faster, more effective proofreading.

### Comments and Caveats:

- The sentence parsing is achieved using a prototype natural language processing pipeline written in Python and may include occasional errors in sentence segmentation.
- Depending on the source of the input text, the Sentence Audit may contain occasional html artefacts that are parsed as sentences (E.g. "Download figure. Open in new tab").
- Always consult the original research paper as the true reference source for the text.

### Contact Information:

To get a Manuscript Microscope Sentence Audit of any other research paper, simply forward any copy of the text to [John.James@OxfordResearchServices.com](mailto:John.James@OxfordResearchServices.com).

All queries, feedback or suggestions are also very welcome.

### Research Paper Sections:

The sections of the research paper input text parsed in this audit.

[illegible]

Title      **Human gaze is precisely aligned with the foveolar cone topography of both eyes**

### **S1 [001]      Abstract**

**S1 [002]**      The small physical depression of the human retina, termed fovea, is the functional center of human vision, providing an acute sense of visual space and color, but it is yet unclear if the exact arrangement of the few thousand photoreceptors at the foveal center is relevant for visual behavior.

The small physical depression ...  
... of the human retina, ...  
... termed fovea, ...  
... is the functional center ...  
... of human vision, ...  
... providing an acute sense ...  
... of visual space ...  
... and color, ...  
... but it is ...  
... yet unclear ...  
... if the exact arrangement ...  
... of the few thousand photoreceptors ...  
... at the foveal center is relevant ...  
... for visual behavior.

**S1 [003]**      By employing adaptive optics in vivo imaging and micro-stimulation, we created complete topographical maps of the foveolar cone mosaics in both eyes of 20 healthy participants while simultaneously recording the exact retinal location of a fixated visual object in a psychophysical experiment.

By employing adaptive optics in vivo imaging ...  
... and micro-stimulation, ...  
... we created complete topographical maps ...  
... of the foveolar cone mosaics ...  
... in both eyes ...  
... of 20 healthy participants ...  
... while simultaneously recording the exact retinal location ...  
... of a fixated visual object ...  
... in a psychophysical experiment.

**S1 [004]**      We found that the locus of fixation was systematically shifted away from the topographical centers towards a naso-superior quadrant of the foveolea in both eyes, thereby creating an enlarged binocular area of visual space sampled by high density cones.

We found ...  
... that the locus ...  
... of fixation was systematically shifted away ...  
... from the topographical centers towards a naso-superior quadrant ...  
... of the foveolea ...

... in both eyes, ...  
... thereby creating an enlarged binocular area ...  
... of visual space sampled ...  
... by high density cones.

**S1 [005]** This demonstrates a finely tuned link between the development of the cellular arrangement of the photoreceptors of the foveola and visual behavior.

This demonstrates a finely tuned link ...  
... between the development ...  
... of the cellular arrangement ...  
... of the photoreceptors ...  
... of the foveola ...  
... and visual behavior.

## **S2 [006] Introduction**

**S2 [007]** As a sensory organ, the human eye is a highly dynamic optical probe that projects sharp images of the environment onto the retina, the light sensitive tissue of the brain.

As a sensory organ, ...  
... the human eye is a highly dynamic optical probe ...  
... that projects sharp images ...  
... of the environment ...  
... onto the retina, ...  
... the light sensitive tissue ...  
... of the brain.

**S2 [008]** As the entry point of neural activity initiating our rich and acute sense of vision, the retina contains about 100 million photoreceptors (1) which sample the retinal image over space and time.

As the entry point ...  
... of neural activity initiating our rich ...  
... and acute sense ...  
... of vision, ...  
... the retina contains ...  
... about 100 million photoreceptors ...  
... (1) ...  
... which sample the retinal image ...  
... over space ...  
... and time.

**S2 [009]** The spatial distribution and arrangement of these cells across the retina is strikingly non-uniform, with a concentration of tightly packed cone photoreceptors at a small, centrally located circular area, termed fovea, because of its anatomical feature as a shallow physical depression within the surrounding retinal tissue.

The spatial distribution ...  
... and arrangement ...

... of these cells ...  
 ... across the retina is strikingly non-uniform, ...  
 ... with a concentration ...  
 ... of tightly packed cone photoreceptors ...  
 ... at a small, ...  
 ... centrally located circular area, ...  
 ... termed fovea, ...  
 ... because of its anatomical feature ...  
 ... as a shallow physical depression ...  
 ... within the surrounding retinal tissue.

**S2 [010]** At the center of the fovea, the foveola, downstream neurons are displaced centrifugally to allow an un-obstructed illumination of the cones, maximizing optical fidelity by reduced light scatter.

At the center ...  
 ... of the fovea, ...  
 ... the foveola, ...  
 ... downstream neurons are displaced centrifugally ...  
 ... to allow an un-obstructed illumination ...  
 ... of the cones, ...  
 ... maximizing optical fidelity ...  
 ... by reduced light scatter.

**S2 [011]** The natural variation in foveal size and cone axon length in primates are optimized to the cells' biophysical capabilities and limitations, providing an essentially loss-free transmission of electrical signals through elongated axons (2).

The natural variation ...  
 ... in foveal size ...  
 ... and cone axon length ...  
 ... in primates are optimized ...  
 ... to the cells' biophysical capabilities ...  
 ... and limitations, ...  
 ... providing an essentially loss-free transmission ...  
 ... of electrical signals ...  
 ... through elongated axons ...  
 ... (2).

**S2 [012]** While the foveal pit already forms during fetal development, the main elongation and migration of cones, accompanied by a thickening of the outer nuclear layer in the very center of the fovea, takes place after birth and in the early years of child development (3, 4).

While the foveal pit already forms ...  
 ... during fetal development, ...  
 ... the main elongation ...  
 ... and migration ...  
 ... of cones, ...  
 ... accompanied ...  
 ... by a thickening ...  
 ... of the outer nuclear layer ...  
 ... in the very center ...  
 ... of the fovea, ...  
 ... takes place ...

... after birth ...  
... and in the early years ...  
... of child development ...  
... (3, 4) ...  
... .

**S2 [013]** Those morphological changes are accompanied by enhancements in visual capacity during development, such as cortical processes, orientation and directional selectivity, eye movements and fixation, as well as spatial frequency tuning (5).

Those morphological changes are accompanied ...  
... by enhancements ...  
... in visual capacity ...  
... during development, ...  
... such as cortical processes, ...  
... orientation ...  
... and directional selectivity, ...  
... eye movements ...  
... and fixation, ...  
... as well ...  
... as spatial frequency tuning ...  
... (5).

**S2 [014]** For high acuity vision, for instance during reading small print, only the smallest and most densely packed cells are employed at the foveola.

For high acuity vision, ...  
... for instance ...  
... during reading small print, ...  
... only the smallest ...  
... and most densely packed cells are employed ...  
... at the foveola.

**S2 [015]** Here, in an area free of rods or vascular structure, cone density peaks at about 160,000 cones/mm<sup>2</sup> (6).

Here, ...  
... in an area free ...  
... of rods ...  
... or vascular structure, ...  
... cone density peaks ...  
... at about 160,000 cones/mm<sup>2</sup> ...  
... (6).

**S2 [016]** What is unknown yet is to what extend the cellular mosaic of foveolar cones in an individual bear on visual function and behavior.

What is unknown ...  
... yet is ...  
... to what extend the cellular mosaic ...  
... of foveolar cones ...  
... in an individual bear ...  
... on visual function ...  
... and behavior.

## **End of Sample Audit**

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This is a truncated Manuscript Microscope Sample Audit.

To get the full audit of this text (or any other research paper),  
forward a copy of the research paper to John James at  
[John.James@OxfordResearchServices.com](mailto:John.James@OxfordResearchServices.com)

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