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**Elise Ackerman**, Contributor  
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# Could Google Glass Hurt Your Eyes? A Harvard Vision Scientist And Project Glass Advisor Responds

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*Updated to correct paragraph about phoria and to add a comment about EyeTap*

With all the hype around Google Glass, there's been surprisingly little attention paid to one of the most obvious questions: Could Google Glass hurt your eyes?

Computer eyestrain is a common problem affecting between 64 percent to 90 percent of office workers. It's caused by spending too much time staring at a computer monitor and is aggravated by factors like poor lighting, poor posture and incorrect



Sergey Brin, co-founder of Google, shows off Google Glass. Image credit: AFP/Getty Images via @daylife)

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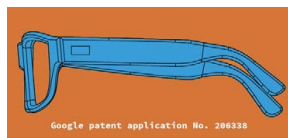
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 Haydn Shaughnessy  
Contributor

see this [excellent article](#) in the March issue of IEEE Spectrum.

When I spoke to Mann and Fateh, neither had had the opportunity to try out Google Glass. I relayed their concerns to Google. Babak Parviz, the head of the project, told me that the team has taken the possibility of side effects seriously since the beginning of the project in order to design a product that's safe, "visually and otherwise."

After some prodding, Google put me in touch with Eli Peli, a professor of

[computer vision syndrome, or CVS](#), symptoms include redness, burning, irritation and blurred vision.

If merely looking in front of you at a regular-sized computer monitor can cause discomfort, what about repeatedly glancing up at a tiny display?

Sina Fateh, an ophthalmologist and entrepreneur who has filed at least thirty patents related to heads-up displays, says there is reason to be concerned. "In the same way that we can get fatigue in our hands, we can get fatigue in our eyes," Fateh said.

In addition to fatigue, Fateh said products like Google Glass also carry a risk of visual confusion. "The problem is that you have two eyes and the brain hates seeing one image in front of one eye and nothing in front of the other," he explained. Fateh notes that over the years researchers have [documented problems](#) associated with heads-up displays, including those used by military pilots. The problems include binocular rivalry, visual interference and phoria, a latent deviation or misalignment of the eyes that appears when both eyes are no longer looking at the same object.

Steve Mann, a professor at the University of Toronto and one of the pioneers of heads-up display technology, has been wearing his own version of Google Glass for more than three decades. He [echoes](#) Fateh's concern about the risk of visual confusion. Mann said he personally experienced side effects like dizziness, confusion and flashbacks from wearing early versions of smart glasses that he designed himself. Mann eliminated the discomfort by revamping the product, which he calls [Digital EyeTap](#), so that it sits directly in front of the eye. For more about Mann's experience wearing computerized eyewear and a more detailed explanation of his concerns,

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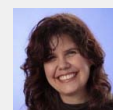
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I'm a long-time technology journalist now working in the telecom industry. Previous employers included U.S. News & World Report 1997-2000, the San Jose Mercury News 2000-2009 and Salesforce.com 2009-2011. I currently contribute to IEEE Spectrum and work at [Twilio](#). Qubits is a personal blog. Feel free to get in touch at

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ophthalmology at the Harvard Medical School and a senior scientist at the Schepens Eye Research Institute. Peli has been conducting research on the use and impact of head-mounted displays for two decades, and he has been consulting with the Glass team for nearly two years.

“They approached me before they really got started because they knew that safety and comfort were going to be important parts of their project,” Peli said in an email. “All told, the results we see so far are encouraging. The head-mounted displays I have worked with prior to this one have been just that—displays where you could play videos or computer games. Glass is designed for interaction and communication, which is what people want.”

Peli said that Glass “has a more advanced design for safety and comfort than any of the previous head-mounted displays I’ve evaluated.” He noted that the glasses have a very minimal impact on the wearer’s field of vision, so that there was little chance of Glass putting a wearer at physical risk of bumping into objects.

“Theories about potentially serious consequences like confusion or disorientation were raised in the media and had echoes in the literature in the 1990s, but they were associated with virtual reality type displays that completely enclosed the viewer,” Peli wrote. “Most importantly, the devices that academics wore years ago were very different in fundamental ways from systems like Glass, despite what a casual observer might perceive as superficial similarities. For example, the position of the camera has no impact on the natural vision of the wearer with Glass, but in systems like those mentioned by Mann where the camera is providing the only view of the environment (video see-through systems), camera position may have some disorienting effect. I don’t think it’s reasonable to assume that experiences with older and different display systems with completely different design and utility would be consistent with the kinds of technologies that are being developed today.”

Peli said Mann’s Digital EyeTap product, as described on the [EyeTap](#) web site is a video see-through device, as compared to Glass which is an optical see-through device. “Thus, his conclusion on the camera position effect is irrelevant to Glass,” he said.

In an interview, I asked Peli whether binocular rivalry could be an issue with Glass. Binocular rivalry occurs when each eye sees a different image and perception alternates between the two images. “The likelihood of having rivalry [with Glass] is not zero, but it’s small,” Peli said. He explained that to get rivalry the two competing images have to be similar in contrast, brightness and movement.

Peli said there was a chance for discomfort caused by the unaccustomed act of looking up. “Anyone that tries to use Google Glass notices it,” he said. “But the likelihood is that this will go away.” While most people spend their lives looking down, there are a number of tradespeople—among them, electricians, painters and carpenters—who spend a good portion of their day looking up. Their eye muscles adapt, and so should the muscles of people who wear Glass, Peli said.

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In terms of a change in phoria, which ~~can~~ may happen ~~any time a person uses their eyes for near work~~ when binocular vision is interrupted for an extended period, that shouldn't be an issue, Peli said. "Google Glass is supposed to be used for micro-use. You look up for a second or two," he explained. "The interruption of binocular vision is so brief and so ~~small~~ limited that I don't expect to see any changes in the phoria when it is used as it is intended."

The bottom line is that risk of wearing Glass appears to be low, based on Peli's assessment. But some of the applications that people are particularly excited about—such as using Glass for gaming—should probably be discouraged. Ultimately, Glass will be no different from any other consumer product—from baseballs to video games to buckyball puzzles—it will be up to people who purchase it to use it safely.

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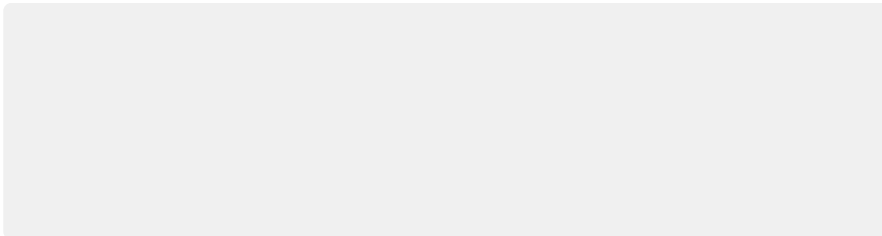

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