

# Physicist's vision for helping world's poor: self-adjusting eyeglasses

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Joshua Silver, a lifelong tinkerer, was fiddling around one day with a cheap, water-filled lens he'd built as an optics experiment when he noticed something interesting.

By adding or removing water he could not only change the power of the lens, he found, but he also could use it to very accurately correct his own nearsightedness when he looked through it.

"I was struck by the quality of the vision I could get with a device I could make for pennies and I could adjust myself," remembers Silver, an Oxford University atomic physicist. "My immediate thought was, 'If I can correct my own vision so easily, could other people?' "

Yes, it turns out. Eyeglasses using Silver's simple, self-adjusting technology are now poised to revolutionize the way the world's poor - and quite possibly the rest of us - see, potentially coming to the aid of billions who struggle to squint enough to farm, study, drive or hold down any job.

"With this technology, you can make your own prescription eyewear," said Silver, who has so far turned out about 30,000 pairs of the cheap glasses. He hopes to find funding to distribute a billion pairs to people around the world too poor to afford glasses or living in places like sub-Saharan Africa, where the ratio of opticians to residents is purportedly 1 to 1 million.

Rich-world eyeglass firms also are snooping around Silver's idea, tantalized by the possibility of manufacturing glasses that could give wearers the ability to change their prescription with a twist. Goodbye, bifocals.

In a world where just about everybody older than 45 needs reading glasses, and just 5 percent of the world's poor get the vision correction they need, "the market is close to 3 billion people," said the 62-year-old inventor, who took up studying optics to better view atomic structure and still considers himself a rookie at understanding vision.

Silver's glasses, now in use in 15 African and East European nations, look as if they might pair well with a fake mustache. Thick Coke-bottle lenses sit in dark tortoiseshell frames flanked with a pair of syringes on either temple. By turning dials, the wearer pushes more or less fluid into the lenses, protected between two hard polycarbonate covers, until the prescription is perfect. The syringes can then be removed or left in place to allow continuing changes.

The reaction from new wearers "is universal," said Maj. Kevin White, a U.S. Marine Corps logistics expert who persuaded the U.S. Department of Defense to buy and hand out 20,000 pairs of the glasses as humanitarian aid in Angola, Georgia and other nations.

Handed a pair, "people put them on, they look at a chart on the wall, you see them dialing, and suddenly their smirk turns to a smile. They say, 'Wow! I can see!' It's mind-boggling," White said.

Silver, who went along on the first field test of the glasses in Ghana, remembers how the first man to try a pair, a tailor forced to retire in his 40s when he could no longer see to work, grinned and immediately started up his sewing machine after being handed a pair.

"Tears came to my eyes," Silver said. "I realized how really important it was for a guy like this to be able to see." He also realized he'd made a strategic error - no one wanted to give back the prototypes after trying them.

White says he came across Silver's invention after watching a Lions Club handout of used eyeglasses in Morocco. While many people got help, few were able to find frames that gave them 20/20 vision, he said. He decided there must be an easier way. A Google search turned up the self-adjusting glasses. White flew to Oxford for a look and within days had persuaded his impressed superior to place a big order.

"I've never seen the military move that fast," he said. "No one's a believer until they see them."

The revolutionary glasses have a number of drawbacks. They don't correct astigmatism, though about 80 percent of potential users have such mild astigmatism that the glasses can still be very effective, Silver said.

Critics also have argued that the self-adjusting feature could keep people with eye diseases like glaucoma from visiting eye doctors who could catch their problem. Silver dismisses that as a major concern because in the locations most likely to benefit from the technology "there are insufficient professionals and no infrastructure" anyway to catch such diseases.

Perhaps most troubling, both the size and price of the glasses remain daunting: The current hefty model is going for \$19 a pair. Silver is working on streamlined versions, with hopes of getting the cost down to about \$2 as manufacturing volume picks up.

"I'm not in this to make money. I wouldn't mind making some money,"

he says. "But my motivation is to take this technology and get it to people who need it."

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