

ANTI-PULFRICH CORRECTIONS

Investment opportunity in
 Ophthalmology
 July, 2019

Premium Monovision Ophthalmic Corrections



Summary

Technology:
 Anti-Pulfrich monovision premium ophthalmic corrections.

Market:
 Ophthalmic industry
 Optometry/Ophthalmology
 Contactology

Patent Pending
 To be published in Current Biology 2019.
 Validated with scientists in visual perception and visual optics, presented at VSS 2019 and CIP 2019.

Collaboration:
 CSIC (Spain) + Upenn (USA)
 Co-funded by NIH grant (USA), and ISCIII-DTS Grant (Spain).



@VioBio_Lab
 @johannesburge

MONOVISION CORRECTIONS FOR PRESBYOPIA

Presbyopia –the age-related loss of ability to change focus distance– affects 100% of the population after the age of 45. In the year 2020, nearly two billion people will have presbyopia worldwide. Monovision is a common prescription lens

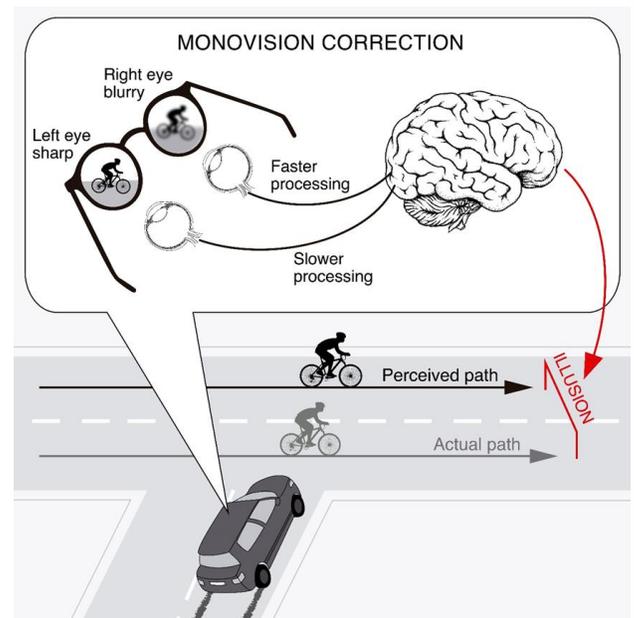
correction for presbyopia. With a monovision correction, one eye is corrected for far vision and the fellow eye for near vision. This causes the image of a target in one eye to be blurrier than the image of the same target in the other eye. We have recently discovered a new version of a 100-year-old illusion

caused by this interocular blur difference. The illusion is characterized by misperceptions of the distance and 3D direction of moving objects. We call it the reverse Pulfrich effect. Depth misperceptions have serious implications in public safety.

TECHNOLOGY

Progress. VIOBIO Lab, in the Institute of Optics of CSIC in Madrid, is a worldwide leader in the study of the optical properties of the normal and treated eyes (i.e. refractive surgery, contact lenses, and interocular lenses) and is internationally recognized in the fields of visual optics and ocular imaging. VIOBIO Lab has developed tools for real visual simulation of ocular corrections. The Natural Vision Lab at the University of Pennsylvania, headed by Johannes Burge, is a world leader for research on vision and works with real-world images with focus on blur, motion, and stereo-depth perception.

1 Patent. US Provisional Patent 62/799,468, (2019) protects the concepts.





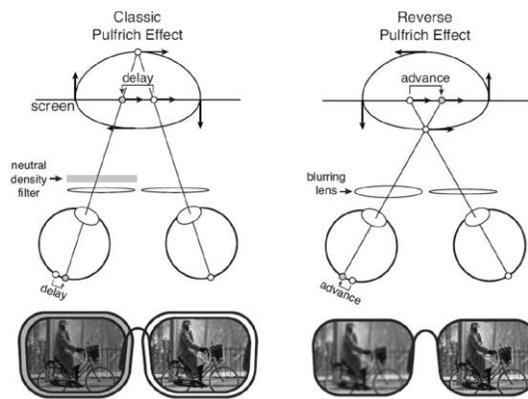
Anti-Pulfrich ophthalmic corrections will eliminate depth misperceptions of moving objects caused by monovision corrections. This has direct implications in public safety.

PREMIUM MONOVISION: THE IDEA

Millions of people have monovision corrections, but little is known about how differential blur affects motion perception. CSIC and UPenn have discovered the reverse Pulfrich effect: differential blur causes a previously unknown motion

illusion that makes people dramatically misperceive the distance and three-dimensional direction of moving objects. The effect occurs because the blurry and sharp images are processed at different speeds. The mismatch in processing speed

causes a neural disparity, which results in the illusory precepts. The depth misperceptions associated with monovision have implications in public safety: the effect may reach 3 meters for a driver estimating the distance to a cyclist. CSIC and UPenn have also demonstrated that the misperceptions can be eliminated with novel combinations of existing ophthalmic interventions. The classic Pulfrich effect associated with interocular luminance difference causes depth misperceptions in the opposite direction as those caused by interocular blur differences. Consequently, one effect can be easily nulled with the other. By tinting the lens that causes the blurry image, the depth misperceptions will be eliminated.



INVESTMENT PROPOSAL

Business Idea.

Commercialization of a premium monovision ophthalmic correction compensating 3D-motion misperceptions. Additionally, a screening device to assess the reverse Pulfrich effect caused by interocular blur differences. This device may be a 3D display or an augmented reality system, that will make the task easy and fast.

Currently, 10 million people in the US uses monovision correction. The market for presbyopes using contact lenses increases every day.

Target Market. Optometry and Ophthalmology practisers; manufacturers of ophthalmic corrections; active presbyopes; professional athletes and drivers.

Investment needs. External capital investments required for R&D, engineering, optimization and industrialization; Regulatory approvals; Market analysis; Business development.

Revenues. Through patent licensing or spin-off company. Revenues from sales expected in an early phase after product launch.

Added value. The biggest issue with monovision corrections comes from the decrease in stereovision and depth misperceptions. The discovery of this new optical illusion in moving objects might be one of the reasons for people dropping on this ophthalmic solution for presbyopia. The ability to eliminate depth misperceptions creates a new branch of premium monovision corrections that will have a positive impact in the prescription of this type of corrections, reported to be an excellent solution for potential customers.

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