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# Digital Glasses for Visual Rehabilitation of Glaucoma Patients suffering from Visual Fields Defects

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## Abstract

**Purpose :** Irreversible visual field defects (VFDs) in glaucoma patients negatively affect their quality of life. We performed this case series study to evaluate possible efficacy of novel Digital Glasses (DG) designed to decrease the negative impact of peripheral VFDs.

**Methods :** VFDs were first quantified with the DG testing mode. Reproducibility of the measurements was examined using a repeatability study on recruited 10 patients. Images presented to glaucoma patients with known VFDs on Standard Automated Perimetry were processed to minimize the impact of the VFD by projecting objects within their blind VF into their functional VF with the DG. Thirty-three eyes of 23 patients (Age:  $66.77 \pm 13.89$  years) were tested with DG and digital simulations of roads and cars. Patients were asked to identify safety hazards such as cars, with and without the DG correction profile.

**Results :** The DG was found to be reliably quantifying VFDs in all patients (Interclass correlation coefficient  $> 0.8$ ). The measured VFDs using the DG were similar to the Humphrey VF test based on a point by point comparison; figure 1. The average measurement error was found to 7.65 %. Using the DG rehabilitation profiles, eighteen out of 23 patients (78.3 %) were able to identify safety hazards that they could not without the DG use; figure 2 shows a case example. The ability to identify peripheral objects in the digital simulations was significantly improved with the use of the DG (23 eyes out of 33, Chi square test, P value = 0.024, 5 % significance level).

**Conclusions :** The new digital glasses may improve the ability of glaucoma patients with peripheral visual field defects to better identify safety hazards.

This abstract was presented at the 2019 ARVO Annual Meeting, held in Vancouver, Canada, April 28 - May 2, 2019.

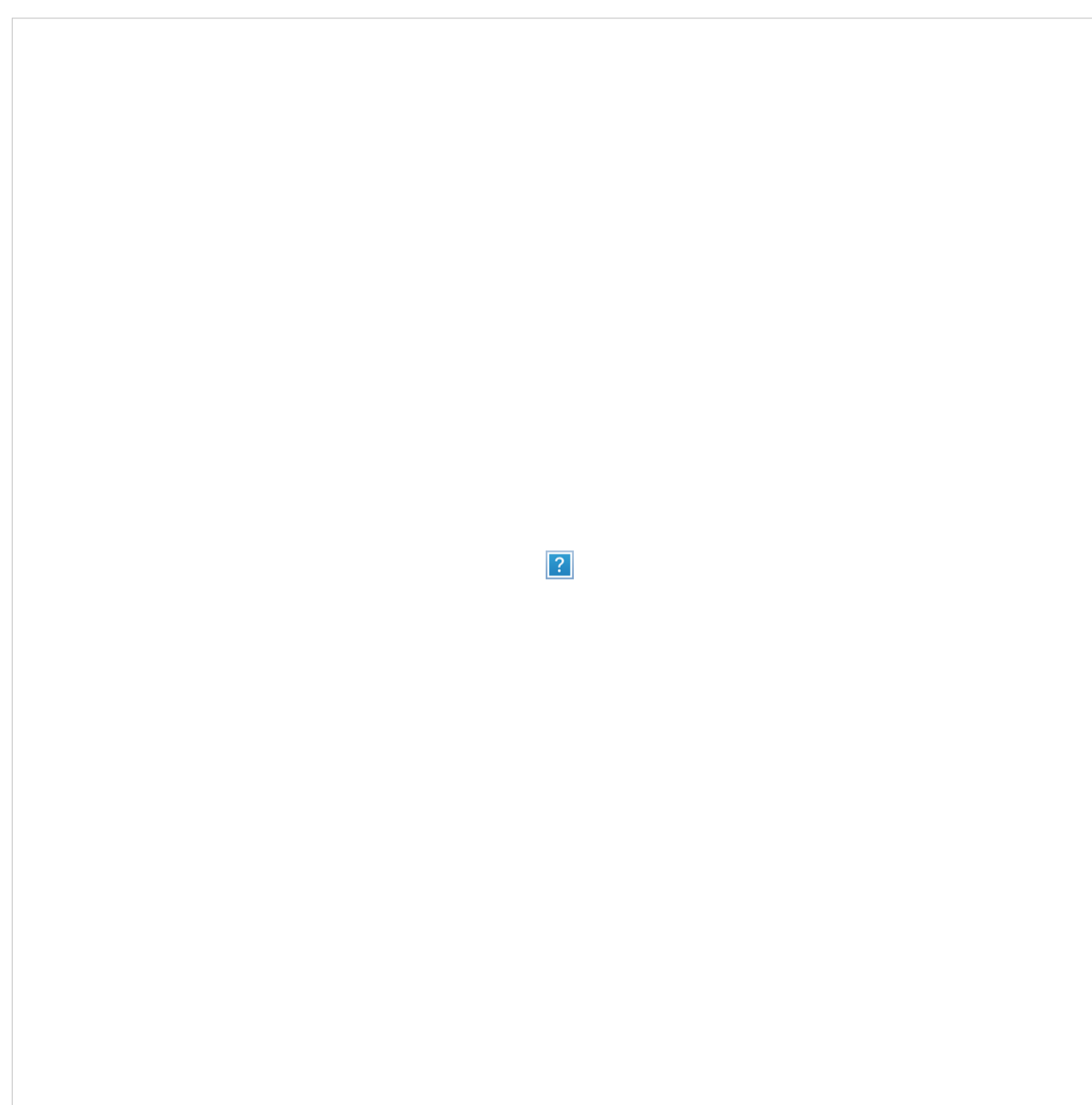

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Figure 1: Testing visual field defect for two Glaucoma cases (a) and (b): Right: 24-2 Humphrey visual field test. Left: Visual field test using our DG, central 40 degrees. The yellow circle represents the 24 degrees for comparison purposes.

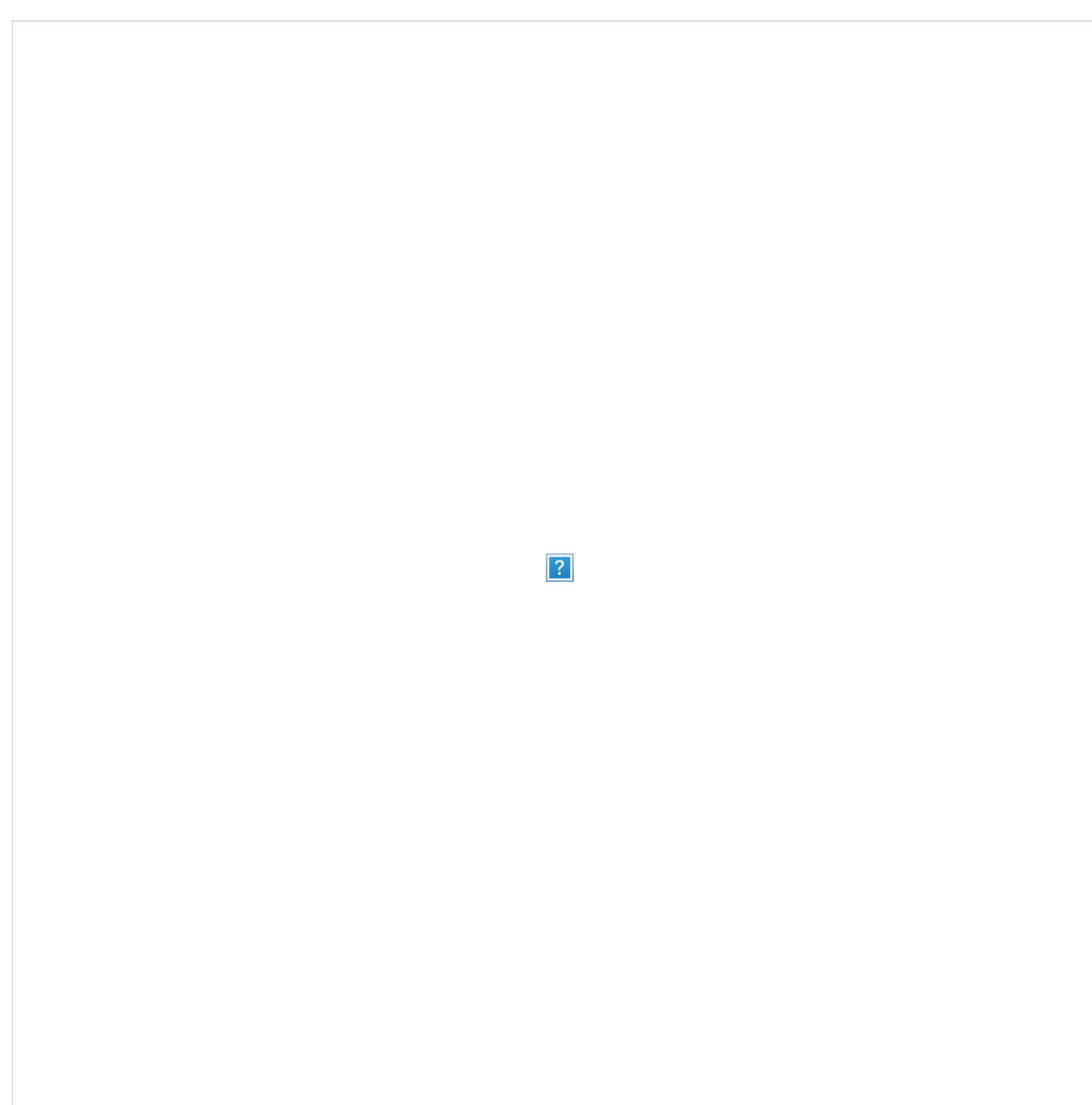

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Figure 2: a) Measured visual field (VF), b) Test image shown to the patient, c) VF is overlaid for demonstration purposes, d) remapped test image where the patient was able to identify the car.

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