Aligning patients for fundus image capture – effects of a gamified interface on speed and ease of capture

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Poster #3522435

PURPOSE

This study investigated a new alignment feedback mechanism that uses gamified graphics without live images of the eye to provide feedback that requires fewer mental computations, to assess the impact on alignment times and ease-of-use ratings for imaging technicians.

METHODS

Ten participants who are not imaging technicians and have little to no experience with fundus cameras were asked to capture images on the CLARUS™ 500 (ZEISS, Dublin, CA) using both the commercial user interface (UI) and a modified alignment interface.

Participants were asked to capture two widefield (WF) color images of "acceptable" quality. They were given 5 minutes of practice before acquiring images with each system, and the order of conditions was reversed for half the participants.

Ease-of-Use ratings (5=Very Easy; 1=Very Difficult) were used to quantify perceived ease of use.

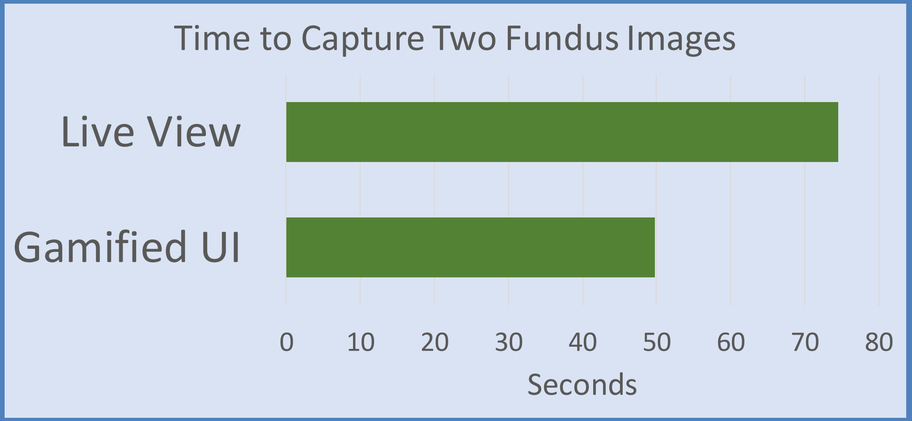
RESULTS

Average alignment time to capture two images of acceptable quality was 74.5 seconds (SD=33.8) using the commercial UI, and 49.8 seconds (SD=20.6) using the gamified UI.

The gamified UI condition demonstrated significantly faster acquisition times ($T=2.83$, $p<0.05$). Average Ease-of-Use ratings were 3.1 (SD=1.1) using the commercial UI, and 3.9 (SD=1.0) using the gamified UI.

Ease-of-Use ratings between the two UI's were not significantly different ($T = -1.86$, $p= 0.096$).

Inexperienced technicians can align patients more quickly with a gamified user interface.



Correct alignment of patients' eyes is essential for capturing fundus images but can be a challenge for inexperienced imaging technicians.

An alignment UI design that applies video game elements and neuroergonomic principles to reduce cognitive load during acquisition is shown to speed up acquisition time for new and less-experienced imaging technicians. The practical impact is improved efficiency of fundus imaging workflows.

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Disclosures: GA (E); AB (E): Carl Zeiss Meditec, Inc.

Most devices overlay guides on a live view of the eye to show target positions along the x-, y-, and z-axes (figure 1). These guides rely on mental computations on the part of users to convert colors and arrows to manual adjustments of the device.

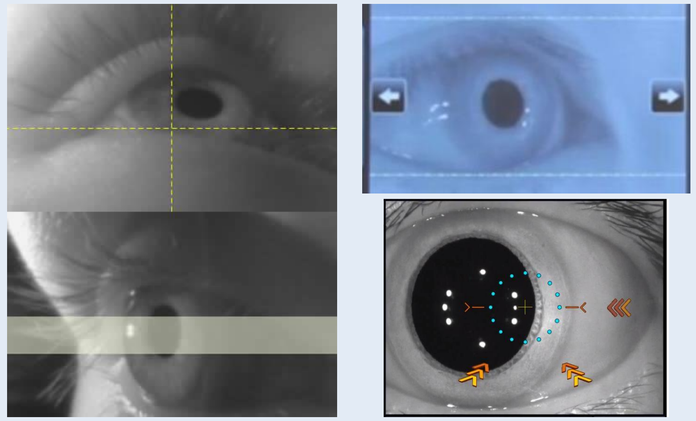

Figure 1. Live view alignment guides on commercially-available imaging devices from three different manufacturers.

Gamified UI employs pupil tracking algorithm to display a stable representation of the pupil along all three axes (figure 2). Depth (z-axis) is represented by the size of the circle, which can be scaled to provide greater perceptual discrimination than the live image for the user.

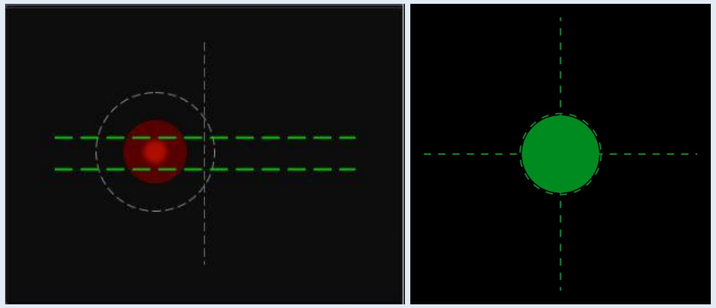

Figure 2. Gamified alignment UI showing unaligned (left) and aligned (right) states.