Section 3: Eyegaze Edge Subject Setup

Quick Reference Sheet

This discussion applies only to Eyegaze Edge systems with fixed camera(s). Eyefollower versions of the Edge, which include the gimbal, accommodate user head motions automatically.

For Fixed-Camera Eyegaze Edge Systems:

1) **Sit the subject comfortably**.

Ask the subject to lean back comfortably in his chair in front of the computer screen. This will make it easiest for him to maintain good head position during the data collection session.

Instruct the subject to hold his head still so that his eye remains both within the camera field of view and in focus.

2) **Point the camera at the eye(s).**

With monocular Edge systems (that have one camera) decide whether to track the right or left eye. Remember which eye so you can verify that tracking does not switch eyes during the session.

Set the focus and f-stop rings; both should be fully clock wise (clockwise as you face the camera).

Aim the camera so that the eye appears near the center of the camera field of view.

Focus the eye – Monocular System:

Move the monitor, or the subject's chair, forward or backward to bring the eye into good focus. Use the focus range indicator to verify good focus. Adjust the focus ring a small amount if desired.

Focus the eye – Binocular System:

To start with, both rings on both cameras should be turned fully clockwise (from the user point of view). This opens the f-stop to their maximum values of f 1.3, and causes the lenses to focus as far out as they can. (The focus range on the lens says infinity, but because the lenses are mounted on 5mm lens extensions, the maximum focus range is actually about 26 inches).

To get maximum tolerance to head motion, it is desirable that both cameras be focused at the same range. Thus, after you have turned both focus rings fully clockwise, it may be desirable to cock one of the focus rings slightly counter-clockwise to get the two cameras to focus equally.

To do this fine focus-ring adjustment:

a) Turn the Eyegaze system on and put it into an eyetracking mode - such as calibration – where both sets of on-screen eye images are visible.

b) Turn the focus rings on both cameras fully clockwise. (The focus ring is the front ring on each lens. At the same time, reconfirm that the f-stop rings, i.e. the rear rings, are also set fully clockwise.)

c) Sit in front of the system with your face square toward the camera.

d) Move your head back and forth very slowly until you are in optimum focus on both cameras. Check the focus condition on each eye by observing the "focus-indicator" bar that moves up and down between the expanded and full-field eye images. The eye is in perfect focus if the bar is centered on the reference mark.

e) If both eyes do not come into focus at the same range, move one of the focus rings off its infinity mark. Play around, moving one or the other focus ring off infinity, until you get both cameras in focus simultaneously - with one ring at infinity and the other just off infinity.

Note: Any focus ring adjustment off of infinity should be quite small – only a few degrees, not an eighth of a turn or more.

Once adjusted, it may be desirable to lock the focus-ring with a piece of tape.

3) **Check for good eye image**.

Check the image of the eye for conditions that may degrade eyetracking:

glasses reflection interfering with eye image – reorient subject's head or tilt glasses slightly.
eyelids occluding pupil – turn on "droopy-eyelid" compensation in the Config program. (Remember to turn droopy eyelid compensation off before the next subject.)
dirty contact lenses – clean the lenses and eliminate any gas trapped between the cornea and the lens.
small contact lenses or hardline bifocals– short of removing the contacts or glasses, not much can be done.
ambient light sources reflecting off the cornea – eliminate the ambient light sources.
very large, bright pupil – add background fluorescent light to close the pupils down.
very dark pupil – reduce background light to open the pupils up.
eye physiology problems: dry or goopy eyes – try saline eye drops; corneal or pupil abnormalities, nystagmus, strabismus – typically little can be done.

If tracking is poor on one eye, try the other eye.

5) **Run the calibration procedure** .

After calibration, do not adjust the focus ring or the camera orientation with respect to the monitor. To restore a good eye image during a test run, move the user's head or move the camera/screen combination.

6) **Run the test session**.

During the test session, monitor the subject and the Eye Displays to verify proper eye tracking:

Observe the tracking indicators to verify that the system is tracking.
Check that the eye remains within the camera field of view. Adjust the head or monitor/camera position if necessary.
Make sure the camera is tracking the same eye as was calibrated.

Note: More detailed discussions of the above topics are presented in Chapter 2, Eyegaze System **User's Guide** , particularly Section 3, Preparing a Subject for Eyetracker Operation.