SR Research

EyeLink® 1000

Complete Eye Tracking Solutions

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EyeLink®

Head Supported System

1000 Hz Drift Free Video Based Eye Tracking

1000 Hz Sampling Rate
1kHz video based eye tracking with no dropped samples guaranteed

Accurate
Drift free, down to 0.15º average accuracy (0.25º - 0.5º typical)

Desktop Optics Available
Optional mirror free desktop optics provides a compact and portable mounting alternative

Focal Imaging Technology
Allows for vertical and horizontal head movements of +/- 25 mm without tracking loss.

High Resolution
0.01º in pupil-CR 1000 Hz tracking mode

Real-time
Access eye position data with 2 msec delay

Easy
Fast and simple setup, calibration, validation

Complete Software Set
Including integrated high performance experiment creation and data analysis tools

Compatible
Works with Presentation®, E-Prime®, and other 3rd party experiment creation tools.
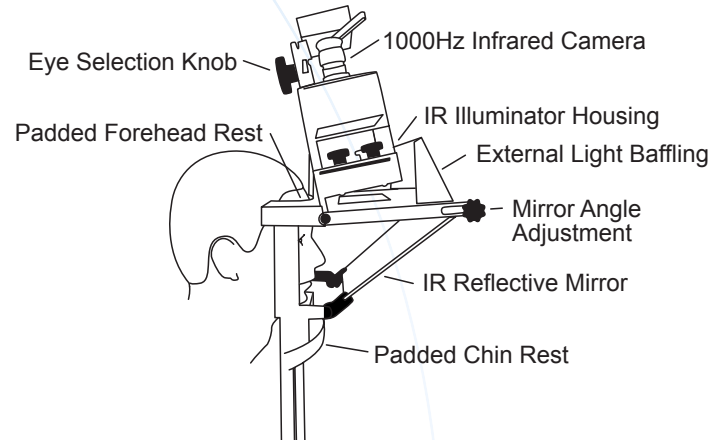
EyeLink® 1000

EyeLink® 1000 a video based eye tracking device that offers a 1 kHz sampling rate with excellent gaze accuracy and spatial resolution, surpassing any other video based eye tracker available today. EyeLink® 1000 is ideally suited for a wide range of computer based eye tracking research, including reading, visual search, and oculomotor studies.

EyeLink® 1000 is provided with a standard Mirrored Optics configuration that uses an infrared mirror to optimize eye tracking range. An optional mirror-less Desktop Optics configuration is also available which can be used with any chin rest and provides a totally unobstructed field of view. The EyeLink CL camera can be easily mounted in either optics configuration depending on which best suits the experimenter's needs.
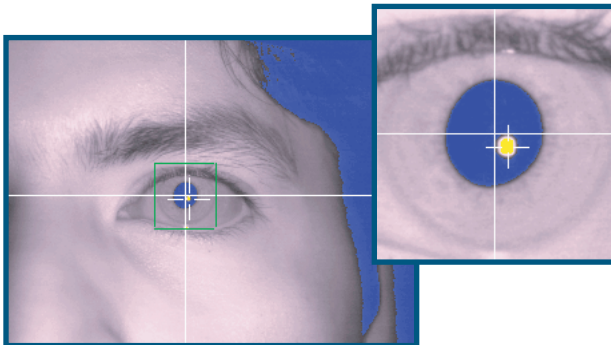
EyeLink® 1000's unique Focal Imaging technology provides extremely high resolution eye data without the result of a limited camera field of view, allowing eye position to be tracked even when the head moves +/- 25 mm horizontally or vertically. Robust eye tracking in conditions of moderate head movement allows for a less restrictive head restraint or the use of only a forehead rest, ideal for studies where verbal responses are required.

An EyeLink® Eye Tracker, coupled with the SR Research Experiment Builder and EyeLink Data Viewer software, offer researchers the most complete, powerful, and easiest to use, eye tracking package on the market.


Technical Specifications

EyeLink® 1000 Tracking Modes			
Mode	Sampling Rate	Sample Access Delay Filter(Off/Normal/High)	Noise* (RMS) Filter(Off/Normal/High)
Pupil-CR	1000 Hz	2 ms / 3 ms / 4 ms	<0.02º / <0.01º / <0.01º
Pupil Only†	1000 Hz	2 ms / 3 ms / 4 ms	<0.01º / <0.01º / <0.01º

*Measured using an artificial eye.
†With immobilized head / use of bitebar.

EyeLink® 1000 Specifications	
Accuracy	0.25º to 0.5º (measured with real eye fixations at multiple screen positions)
Spatial Resolution	Noise Limited, see the above EyeLink 1000 Tracking Mode table
Pupil Size Resolution	0.2% of diameter
Gaze Tracking Range	+/- 30º Horizontal, +/- 20º Vertical
Allowed Head Movement	+/- 25 mm Horizontal and Vertical, +/- 10 mm Depth
Online Event Parsing	Fixation / Saccade / Blink / Fixation Update
Realtime Operator Feedback	Eye position cursor during calibration,validation, and recording. Camera images and tracking status.
Eye Illumination	910 nm, Class 1 LED Product, <1.0 mW/cm2 in standard configuration
Headrest Dimensions	Approx. 40 cm x 75 cm x 27 cm (width x height x depth)
Digital Data Access	Ethernet
Analog Output	Optional PCI card
Response Box	7 Button USB response pad included
Host Operating System	DOS
Display Operating System	Windows, Linux, Mac OSX, Mac OS9, DOS
Approvals	FCC and CISPR Class A, 60950-1 60950-1 ITE Equipment

Specifications are subject to change without notification.
Visit www.sr-research.com for more complete and up to date information.

Fixation Accuracy

Figure A

Figure B
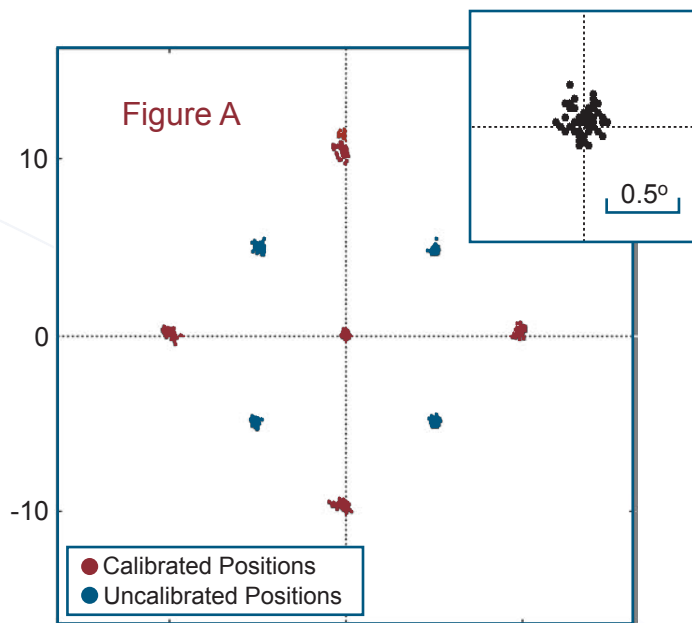
To test fixation accuracy using the EyeLink® 1000 system a paricipant performed a repeated target fixation task to nine screen locations. The session was initiated with a calibration and lasted 35 minutes, during which no drift corrections were performed. During the session, 583 fixations were collected.
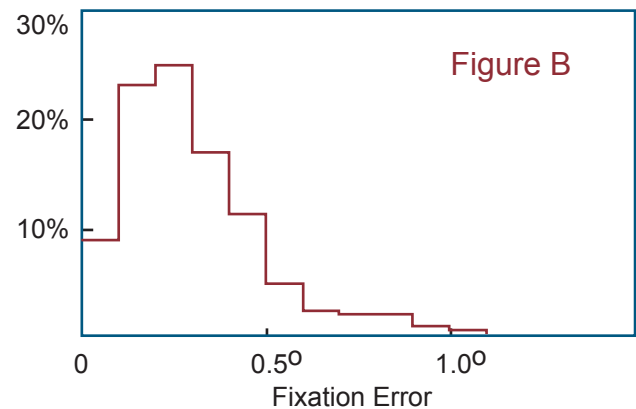
Figures A displays a scatter plot of fixation accuracy using the EyeLink® 1000 system. Each point on the figure represents one fixation event. The inset plot represents an enlarged view of the fixation ditribution around the center target position.

Figure B displays the fixation error histogram for the fixation set illustrated in figure A, demonstrating the tight fixation accuracy distribution under 0.5^O.

Average fixation accuracy was 0.315^O. Median accuracy equalled 0.260^O. The standard deviation of the accuracy was 0.223^O.

Saccade Contingent Display/Saccade Resolution

As an example of EyeLink® 1000's superior real-time data access and recording resolution characteristics, a simple saccade-contingent paradigm was created using the SR Research Experiment Builder software. Participants fixated centrally and were instructed to saccade to a peripheral target as quickly and accurately as possible. Using an invisible boundary trigger, the target's position was changed by 0.9^O during the participants' saccade to the target. Although the participants might not detect the positional change, a corrective saccade of less than 0.5^O was invoked following the initial target saccade.

Figure C shows the horizontal eye position starting from the appearance of the initial target in the periphery. The saccadic RT of the participant was 190 ms. The targets position was moved approximately 20 ms into the saccade.

Figure D illustrates the corrective saccade made as a result of the target position change during the initial saccade. The amplitude of the corrective saccade was approximately 0.35^O in the direction of the target position change, with a duration of 12 ms.

Figure C

Target Position Shifted by 0.9^O

Figure D
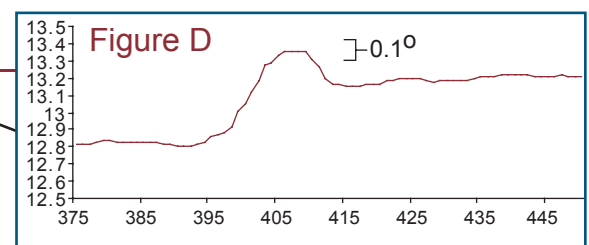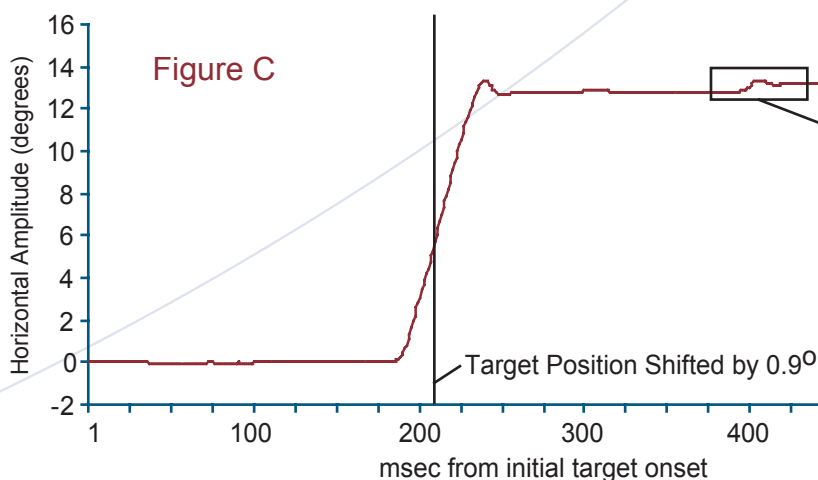
Gaze Contingent Display Delay	
Display Retrace (Hz)	Average GC Delay (EL1000 1000 Hz, Filter Off)
60	10.5 msec
120	6.2 msec
180	4.8 msec

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