

Eye Tracking Evaluation Form

Name:	Performance			Notes
				
General	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Time Spent on Instruments (Dwell Time)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Visual Search Patterns & Scan Speed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Physiological Workload & Fatigue Indicators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Phase-Specific	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Taxiing & Ground Operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Climb & Descent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Turns & Maneuvers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Approach & Landing Flare	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Checklist Execution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Emergency & Instrument Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

	Performance			Notes
				
IFR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Primary Scan Flow & The "Hub"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Recognition of Specific IFR Deviation Patterns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Dwell Time & Information Extraction Efficiency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Instrument Failure & Partial Panel Operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Workload Management in IMC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Autopilot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cognitive Load & Task Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Active Monitoring vs. Automation Complacency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Mode Awareness and FMA Verification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
External Hazard Detection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

General Gaze Evaluation	● Optimal (Pass/Expert)	● Suboptimal (Needs Improvement)
Time Spent on Instruments (Dwell Time)	Glances are short, frequent, and efficient. The pilot extracts information rapidly before moving to the next relevant source.	Prolonged dwell times or "staring" at a single instrument, indicating difficulty processing information or a breakdown in the systematic scan flow.
Visual Search Patterns & Scan Speed	The scan path is disciplined, utilizing recognizable structured patterns like the "Basic T" or General Attitude Pattern (cross-checking the speed indicator, attitude indicator, heading, and altitude). Eye movement distance between instruments is short, showing high cockpit familiarity.	Gaze transitions are slow, erratic, or random. The pilot over-fixates on specific displays and misses critical details during cross-checks.
Physiological Workload & Fatigue Indicators	Pupil size stabilizes during routine operations, and peak pupil size gradually reduces as the pilot successfully adapts to task complexity. Blinking patterns remain consistent with normal baseline rates.	Sustained pupil dilation occurs, indicating cognitive overload and mental strain. A high blink rate, long blink duration, or high long closure rate (LCR) is detected, which are strong predictors of pilot fatigue and upcoming flight maneuver errors.

Phase-Specific Gaze Evaluation	● Optimal (Pass/Expert)	● Suboptimal (Needs Improvement)
Taxiing & Ground Operations	The pilot distributes attention effectively, with a dominant focus on monitoring the external surroundings and outside environment to maintain high situational awareness.	The pilot spends excessive time looking "heads-down" at cockpit displays or electronic moving maps, neglecting external hazards.
Climb & Descent	The pilot maintains a high fixation frequency on the airspeed indicator (ASI) to ensure proper ascent or descent rates are maintained. Visual attention shifts efficiently between the attitude indicator, vertical speed indicators, and heading.	The pilot neglects the airspeed indicator during descent (where airspeed naturally tends to increase), leading to degraded control over the aircraft's rate of descent.
Turns & Maneuvers	The pilot actively cross-checks the attitude indicator (AI), spending an appropriate 42–67% of total dwell time on the AI to manage the aircraft's slope and bank angle. Gaze transitions are rapid and smooth to secondary instruments like the altimeter.	Gaze entropy (randomness) becomes too high or too restricted, indicating poor attentional distribution. The pilot fails to regularly transition back to the attitude indicator (the "hub" of the scan).
Approach & Landing Flare	During the approach, attention is actively shared between the flight path and energy state. In the landing flare, the pilot correctly shifts visual focus from the immediate runway environment and airspeed indicator to the far end of the runway to accurately judge height and descent rate.	A high percentage of dwell time is spent looking exclusively out the window on short final, to the detriment of processing critical flight parameters and aircraft energy state. Mismanagement of the visual transition during the flare leads to fixations inside the cockpit, causing "ballooning" or hard landings.
Checklist Execution	Gaze physically lands on the specific switch, gauge, or lever being verified during the checklist flow.	The pilot exhibits "hidden habits" by reciting checklist items from memory while their gaze remains disconnected from the actual systems they are supposedly confirming.
Emergency & Instrument Failure	Upon recognizing an instrument failure (e.g., the primary attitude indicator), the pilot quickly diverts their gaze to functional backup instruments (like the standby ADI). They demonstrate resilience by actively avoiding the failed display.	The pilot succumbs to "cognitive tunneling"—an involuntary, excessive focus on the malfunctioning instrument while neglecting overall flight status and situational awareness.

IFR Gaze Evaluation	● Optimal (Pass/Expert)	● Suboptimal (Needs Improvement)
Primary Scan Flow & The "Hub"	The pilot utilizes a disciplined, structured approach to assembling flight information, treating the Attitude Indicator (AI) as the "hub" of the scan. The pilot spends an appropriate 42–67% of their total dwell time on the AI. Their gaze frequently and consistently returns to the AI after quickly verifying other instruments like the Altimeter or Heading Indicator.	The scan path is random, erratic, or rushed. The pilot exhibits high gaze entropy (randomness) and fails to regularly transition back to the AI to maintain a complete mental picture of the flight's attitude
Recognition of Specific IFR Deviation Patterns	The pilot dynamically adapts their scan to correct specific deviations using recognizable patterns. <ul style="list-style-type: none"> ● Correcting airspeed: Quick shifts between the airspeed and attitude indicators. ● Correcting altitude: Alternating between the altitude, VSI, and the attitude indicator. ● Correcting course: Transitions between heading/lateral deviation indicators and the attitude indicator. 	The pilot fails to execute targeted scan sequences during specific maneuvers. For example, during a turn, they fail to follow a required sequence (e.g., Attitude → Speed → Altitude → Heading → Attitude), leading to missed critical details during cross-checks
Dwell Time & Information Extraction Efficiency	Glances at specific Areas of Interest are short, frequent, and highly efficient. Top-performing pilots average about 167 milliseconds per AOI, rapidly extracting data before moving to the next source.	The pilot exhibits prolonged dwell times on individual instruments. This "staring" indicates difficulty processing the instrument's information or a complete breakdown in the systematic scan flow
Instrument Failure & Partial Panel Operations	Upon the failure of a primary instrument, the pilot quickly identifies the failure and shifts their visual attention to the standby instruments. They adopt an effective visual search strategy that ignores the broken display.	The pilot succumbs to "cognitive tunneling" and wastes critical cognitive resources by repeatedly checking the inoperative display. They fail to actively bring functional backup instruments into their primary scan
Workload Management in IMC (Instrument Meteorological Conditions)	During demanding phases of IFR flight, the pilot manages their mental workload effectively. Pupil diameter changes indicate successful adaptation, with peak pupil size gradually reducing as the pilot processes the complex environment.	Sustained pupil dilation is detected throughout the approach, serving as an early biometric warning of severe cognitive overload and mental strain

Autopilot Gaze Evaluation	● Optimal (Pass/Expert)	● Suboptimal (Needs Improvement)
Cognitive Load & Task Management	The pilot effectively engages the autopilot to shift their visual attention to other critical tasks when they are experiencing high mental workload. Their scan pattern demonstrates an efficient transition from concentrated, heavy instrument tracking to broader situational awareness gathering.	The pilot exhibits prolonged dwell times on individual instruments—a primary indicator of mental overload—but fails to engage the autopilot to manage their workload.
Active Monitoring vs. Automation Complacency	Even with the autopilot engaged, the pilot maintains an active, disciplined monitoring scan, as increased cockpit automation makes the active visual monitoring of flight parameters a critical skill.	The pilot succumbs to "automation surprise" or complacency, incorrectly assuming the autopilot is handling a task while their gaze drifts or they suffer from attention lapses. A critical failure occurs if the pilot fixates on a secondary, non-critical task (such as staring at flap retractions for 10 seconds) to the complete detriment of monitoring the aircraft's attitude and energy state.
Mode Awareness and FMA Verification	Whenever the automation is engaged or altered, the pilot's gaze actively targets the Flight Mode Annunciator (FMA) and other specific objective indicators (like the speed tape or glide slope) to verify the system state.	The pilot makes inputs or receives system alarms without visually verifying the automation mode, which can lead to contradictory manual inputs that fight the autopilot's intended trajectory.
External Hazard Detection (Out-the-Window Scanning)	During partially or fully automated flight, the pilot utilizes their freed-up cognitive resources to actively scan the outside environment. This broadened visual focus results in higher detection rates for external hazards, such as runway incursions or conflicting traffic.	The pilot remains excessively "heads-down" inside the cockpit, failing to use the automated flight phase to scan the external environment for hazards.