
The article starts with the background that a considerable research and operational experience has documented breakdowns in pilot-automation coordination on modern flight decks. These breakdowns are often considered symptoms of monitoring failures even though, only limited data exist concerning pilot’s monitoring strategies and performance.

The aim of this study was to examine pilot’s automation monitoring strategies and performance on highly automated commercial flight decks. Their methodology included collection of behavioral, mental model, and eye-tracking data from 20 experienced Boeing-747-400 airline pilots who flew a 1 hour scenario involving challenging automation-related events on a full-mission simulator.

The authors confirmed that pilots monitor basic flight parameters to a much greater extent than visual indications of the automation configuration. In specific, they frequently fail to verify manual mode selections or notice automatic mode changes. In other cases, they do not process mode annunciations in sufficient depth to understand their implications for aircraft behavior. Low system observability and gaps in pilot’s understanding of complex automation modes were shown to contribute to these problems.

The authors conclude by stating that monitoring failures are one major contributor to breakdowns in pilot-automation interaction. Finally, the article ends by reinforcing the need for the design of improved training programs and automation interfaces that support more effective system monitoring.

Compiled by:-
Dr. J Sasirajan
Resident, Aerospace Medicine


Spatial Disorientation continues to be a major contributor to aviation accidents. Visual illusions can occur both under full daylight conditions, when distorted or ambient visual cues are present, as well as night time or otherwise degraded visual conditions in which ambient visual cues are insufficient.

The general subdivision of the visual illusions can be made basis of whether ambient vision is available but distorted vs. merely inadequate vs. display related. The Black Hole Approach (BHA) illusion has been classified under the illusions caused by the absent ambient vision of night time landings. The misperception of height and distance is a common occurrence in BHA accidents. The Pilot experiences Glide Path Overestimation thereby initiating an inappropriately steep descent. The result is a shallow approach that lies below the correct glide path for obstacle clearance.

Although the visual cues are impoverished and perceptual capabilities limited, pilots trust out-the-window cues rather than relying on instruments because they place too much confidence in their visual perception even when cues are lacking.

This review paper has presented aircraft accident statistics, research survey results, and investigative reports that all clearly state visual SD’s role in contributing to mishaps. A number of aviation accident reports attributable to The Black Hole Illusion have been gleaned and analyzed for the benefit of the reader.

Meta-analysis of various theories and papers has led the author to put forward nine hypothesized reasons why a pilot overestimates his/her Glide Path. This demonstrates lack of a unified explanation regarding the cause of the misperception.

Despite of the technological advancements and continued training, the human pilot is perception wise limited (supported by the continued incidents and accidents related to BHA). The take home message by the author to the Pilot community is

“The best Visual Approach is not to go completely visual”

Compiled by:-
Maj Rajarath
Resident, Aerospace Medicine