Relationship between situation awareness and experience during conditions of equipment failure and poor visibility

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Abstract
Situation awareness (SA) is not required to make good decisions, but when pilots are fully aware of a situation, SA tends to have a positive impact on their decisions. Furthermore, research has also shown that hours of experience flying (HEF) play an important role in aviation safety. Records show that certified private pilots who have more HEF have fewer accidents than those having less. This research aims to identify whether there is a relationship between HEF and SA under unexpected flight conditions of equipment failure and poor visibility. The results showed that less HEF was associated with higher SA only during the no failure conditions. There were no statistically significant relationships showing that SA and HEF correlated under any combination of failure and visibility conditions. Better understanding of SA and flying experience could potentially improve decision making under unexpected conditions.

Introduction
- Poor visibility and equipment failure are abnormal conditions for VFR pilots. However, they are still vulnerable to these conditions
- SA plays an important role in the decision-making process
- There is still a need to understand pilot SA when faced with unexpected conditions
- Pilots with more HEF have fewer flight incidents
- More experienced pilots develop better memory storage, facilitating the categorization of events by gathering cues from the environment
- Novice pilots tend to either overlook or over sample information because they need to think through the information provided
- Pilots with less experience can build SA by maneuvering the aircraft
- Too much information can diminish SA, especially in pilots with little experience
- More experience with a system can lead to a better understanding of changes within the system, stating that more experienced people tend to recognize unusual situations fast

Purpose
Investigated the relationship between SA and HEF during abnormal conditions of visibility and equipment failure

Variables
Situation awareness (SA):
- SA is defined as “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future”
- SA was measured using the SAGAT technique

Hours of experience flying (HEF):
- Participants reported their HEF on a pre-questionnaire

Results

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Correlation</th>
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</thead>
<tbody>
<tr>
<td>All (n=30)</td>
<td>-0.100</td>
</tr>
<tr>
<td>Clear visibility (n=15)</td>
<td>-0.069</td>
</tr>
<tr>
<td>Poor visibility (n=15)</td>
<td>-0.062</td>
</tr>
<tr>
<td>No failure (n=10)</td>
<td>-0.751*</td>
</tr>
<tr>
<td>Altimeter failure (n=10)</td>
<td>-0.028</td>
</tr>
<tr>
<td>DG failure (n=10)</td>
<td>0.409</td>
</tr>
<tr>
<td>Combined clear visibility and no failure (n=5)</td>
<td>-0.418</td>
</tr>
<tr>
<td>Combined clear visibility and altimeter failure (n=5)</td>
<td>-0.539</td>
</tr>
<tr>
<td>Combined clear visibility and DG failure (n=5)</td>
<td>0.728</td>
</tr>
<tr>
<td>Combined poor visibility and no failure (n=5)</td>
<td>0.382</td>
</tr>
<tr>
<td>Combined poor visibility and altimeter failure (n=5)</td>
<td>0.231</td>
</tr>
<tr>
<td>Combined poor visibility and DG failure (n=5)</td>
<td>0.330</td>
</tr>
</tbody>
</table>

Discussion and Conclusions
- This research provides a better understanding of the relationship between SA and HEF in private pilot decision making when facing unexpected conditions in a glass cockpit situation
- Even though more experienced pilots have less accidents during abnormal conditions, this does not mean that more experienced pilots are more aware of the status of the aircraft
- HEF and SA were not related under conditions of poor visibility and equipment failure
- HEF and SA were only related when there were no failures, regardless of the visibility condition

References

Full list of references upon request