



TO FLY, OR NOT TO FLY?

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AN INVESTIGATION OF GENERAL AVIATION PILOTS'
SITUATION AWARENESS AND RISK PERCEPTION

INTRODUCTION

General Aviation (GA) is the largest aviation category, encompassing all of civil aviation, with the exception of scheduled air services and non-scheduled air transport (Department of Transport, 2013).

Due to this, it is also the broadest aviation category, without limitations in regards to size or type of aircraft flown.

Situation Awareness: Defined as the perception of elements within an environment, comprehension of the latter and projection of their effects on the future (Endsley, 1995). The 2016 UK Aviation Safety Review found that 58.4% of all GA incidents resulted from operational error; lack of situation awareness being named as one of the main causes.

Risk Perception: Ability to recognise elements, and severity of risk, in a set situation. It has been identified as a crucial aspect of pilot decision-making, and in turn been linked with a high percentage of aviation accidents (Hunter, 2002).

Our study aims to investigate the situation awareness (SA) of GA pilots, and their ability to recognise potential risk in set scenarios.



METHOD

Questionnaire

- An online questionnaire was used to gather responses from UK based GA pilots.
- Posts on GA themed forums and social networking sites were used to recruit participants.
- The questionnaire was divided into 3 sections:
 - Demographic Information
 - Work Situation Awareness scale (WSA)
 - Go/No-Go Scenarios

Example Scenarios:

'Illness': *"You have been feeling ill for the past couple of days, which has included fever and dizziness. You had planned a flight that afternoon."*

Go / No-Go Scenarios

- 12 Go/No-Go Scenarios, separated into 4 sub-categories (Irwin and Poots, 2018):
 - **Compromised Performance**
 - Fatigue, Illness, Stress
 - **Environmental Hazards**
 - Thunderstorms, Ice, Wind
 - **Faulty Equipment**
 - Engine Power, Engine Noise, Air Speed Indicator
 - **Missing Equipment**
 - Checklist, Sunglasses, Seatbelt
- 10-point Likert scale:
 - 1- I wouldn't, 10-Definitely
- Additionally participants were asked to detail their reasoning qualitatively.

'Air Speed Indicator': *"While completing pre-flight checklists you notice that the air speed indicator is displaying an abnormal reading."*

WORK SITUATION AWARENESS

Work Situation Awareness

- A 20-item self-report questionnaire measure of situation awareness.
- Adapted from Sneddon, Mearns, & Flin (2013), who developed the scale in order to measure situation awareness of offshore drilling crews.
- A 10-point Likert scale:
 - 1-Never, 10-All the time
- Example item: *“I find it difficult to concentrate for long periods of time.”*

WORK SITUATION AWARENESS FINDINGS

- A preliminary correlational analysis was conducted.
- No significant correlation was observed with any scenario category.
- No significant correlation with either age, or the length of holding a licence.

PARTICIPANT DEMOGRAPHIC

Responses of 101 UK based General Aviation pilots have been gathered.

- 96 Male, 4 Female, 1 No Answer
- Age range: 17 – 81, Mean: 51.84

The average participant:

- 51 year-old male
- Held only a Private Pilots Licence (PPL)
- Held the latter for 18 years
- Flies recreationally weekly/monthly
- Owns his own aircraft
- Most frequently flies a Piper aircraft
- No serious incidents in the past 5 years



SCENARIOS

- Likert scale responses were averaged, scores of which are presented in Table 1.
- ‘Checklist’ and ‘Sunglasses’ received ‘go’ responses
 - ‘Sunglasses’ response example: “*Sunglasses are useful but they're just a comfort thing. It's not unsafe to fly without sunglasses.*”
- ‘Illness’, ‘Air Speed Indicator’ and ‘Seatbelt’ received ‘no-go’ responses.
 - ‘Illness’ response example: “*Incapacitation risk, impaired judgement / attentiveness risk to great.*”
- ‘Checklist’ and ‘Stress’ were scenarios with the highest degree of disagreement, while ‘Illness’ received the most unified responses.

SCENARIO	MEAN	SD
Fatigue	5.37	2.17
Illness	1.35	0.89
Stress	6.12	2.69
Thunderstorms	4.01	2.54
Ice	3.17	2.21
Wind	4.99	1.87
Engine Power	3.30	1.98
Engine Noise	3.84	2.34
Air Speed Indicator (ASI)	2.06	1.87
Checklist	7.25	2.68
Sunglasses	8.04	2.46
Seatbelt	2.03	1.85

Table 1: The mean scores of the likelihood of proceeding within each scenario and their standard deviation (SD)

THEMATIC ANALYSIS

Responses to ‘Engine Noise’:

“Really depends *if I can identify the noise, and how serious it sounds.*”

“*They all do that!* Depends *if I know what it is.* Most likely to *shut down, investigate, fix the problem then go flying.*”

Factors Affecting Decision:

Familiarity/Identifiability of source,
Type of Sound

Actions: **Return and Investigate**

Others: **Common Occurrence**

QUALITATIVE ANALYSIS

Overall:

Participants referenced the recreational nature of GA flight as a common reason for avoiding risky situations.

Flight parameters (complexity of flight, flight purpose, aircraft type etc.) were quoted as factors that would affect the participants decision to continue across all scenarios.

Compromised Performance:

Presence of another pilot was seen as an important factor within all three compromised performance scenarios.

Flying in the three scenarios was also noted to not be enjoyable, and thus a 'no-go'.

Environmental Hazards:

The 'Ice' and 'Thunderstorm' scenario responses showed highly risk averse behaviour.

Faulty Equipment:

The overall consensus was that any sign of an issue should be enough to stop and investigate potential faults (*"best sorted out on the ground"*).

Missing equipment:

Very little crossover across the three scenarios due to differences in the perceived importance of the missing item.

Additional Points

'Stress' – Many described flying as a de-stressor, or at least a distraction from work stress – others however warned against using it as such.

'Ice' – A number of participants directly referenced the 1958 Munich Air Disaster; caused by a build up of ice which resulted in a lack of lift upon takeoff.

'Sunglasses' – 5 participants stated that sunglasses negatively affected their view of dials and gauges within the cockpit; 26 stated they never/rarely use sunglasses.

DISCUSSION

- Situation awareness did not affect the likelihood of proceeding within any category of the given scenarios.
- Participants were overall risk averse, commonly citing the recreational element of general aviation.
- The biggest disagreements in scores were observed in the 'Checklist' and 'Stress' scenarios; opinions differing on the importance of checklists and the possible de-stressing effects of flying.
- The scenarios were very brief and simple, and did not present either a gain or cost for proceeding / not-proceeding, which has been found to affect decision making (Pauley, O'Hare and Wiggins, 2008).
- The Work Situation Awareness scale was designed for offshore drilling crews, as such validity of using certain items on pilots may be questionable.
- Sampling bias may be present, as participants were recruited through GA themed forums and groups on Social Networking Sites (SNS's).

REFERENCES

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