

Predicting Pilots' Risk-Taking Behaviour

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Objective

Big Picture

- Develop a comprehensive model of individual risk management.
 - Identify the predictors of pilots' risk-taking behaviour.

Specific

- To develop and test a newly created Implicit Association Test
- Test the predictive validity of existing risk-taking scales employed in general aviation (predominantly).

Important

- Identify pilots who may be considered at-risk of being involved in an incident/accident,
- Target these pilots in an attempt to improve their risk management skills



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Risk Management

- Defined - class of behaviour that encompasses a choice between two or more options, where one of the options has the probability of producing adverse effects that are not fully known to the person at the time (Lane & Cherek, 2000).
 - OHS commonly refer to this as 'likelihood and severity' (Sibinga, 2001)
- A bad reputation
 - Living life = risk (i.e, death itself)
 - When managed successfully, rewards are forthcoming (WOW shares, Red Bull Air Race, driving, parachuting, medical procedures...)
- Although when mismanaged...
 - Failure is almost guaranteed (ABC shares, QF1 – Bangkok, Challenger 1986,)



Predictors of Risk-Taking Behaviour

- Gender (DeJoy, 1992)
- Age (Reason et al., 1997)
- Desire for Sensation (Zuckerman, 1983)
- Intelligence (Cocolas & Sleath, 2000)
- Risk Perception (Hunter, 2006)
- Extroversion (Loo, 1978)
- Attitude (Rundmo, 2000)



Attitude

- Definition – A psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour (Eagley & Chaiken, 1993).
 - Psychological tendency = state that is internal to the person
 - Evaluating = all classes of evaluation responding (covert, cognitive, affective, or behavioural)
- Quite simply = a way of thinking or feeling displayed through behaviour.



Attitude and Behaviour: The Link

• Attitude $\xrightarrow{\text{Influence/predicts}}$ Behaviour

• Behaviour $\xrightarrow{\text{Influence/changes}}$ Attitude

• Attitude $\xrightarrow{\text{Factors ?}}$ Behaviour

• Attitude \longleftrightarrow Behaviour
Mutual Influence/reinforcement

• ~~Attitude~~



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Aviation Research: Attitude

- Attitude – Attitude towards safety related issues (self-confidence) (Aviation Safety Attitude Scale – ASAS)
 - the belief in one's ability or skill has found to be positively related to incident involvement ($r = .208$; Hunter, 2005),



Aviation Research: Risk Perception

- Definition – recognition that adverse outcome (likelihood) and consequences (severity) may result.
- Risk Perception (RP – Other)
 - pilots rate the level of risk present in *normal* flight situations (Nominal Risk) for a third person has shown to be related (negatively) to incident involvement ($r = -.168$; Hunter, 2006).
- Risk Perception (RP – Self)
 - pilots rate the level of risk that applies to self in *high-risk* flight conditions has shown to be related (negatively) to incident involvement ($r = -.123$; Hunter, 2006).



Aviation Research: Risk Tolerance

- Definition – trade-off between risk and the amount of ‘gain’ associated with an activity (Sokolowska & Pohorille, 2000; Hunter, 2002.).
- Risk Tolerance (Hunter, 2002)
 - focus on the amount of risk a pilot is willing to accept during the course of his/her operation – no prediction (Hunter, 2002)



Limitation of Existing Research

- Hunter's scales use self-reported behavioural data
- Data captured through Hazardous Event Scale (HES)
 - How many a/c acc have you been involved in?
 - How many times have you inadvertently stalled a/c?
 - How many time have you had a mechanical failure which jeopardized the safety of your flight?
 - How many times have you flown inadvertently into IMC?
- Argument for
 - very few incidents,
 - even less accidents.



Limitation of Existing Research

- Psychometric scales (attitude, risk-perception, etc) use self-report data
- Self-report data subject to self-report problems of biases
 - In other words, can be manipulated by individual completing scale.



Implicit Association Test

- An alternate to existing self-report attitudinal scales
- Implicit Association Test (IAT) measures reaction time to paired stimuli and infers that this reaction time relates to attitude
- IATs widely used within social science
 - Weight,
 - Food preference,
 - Skin tone,
 - Religion,
 - Age, etc
- Attitude vs. association.



Learning Style

- Implicit vs Explicit learning
- Note response to task
- Since we can learn implicitly, it is thought that we can be measured/assessed in the same way.



Implicit Association Test

5 classification tasks in the IAT

1. a target classification task (high flight vs. low flight),
2. an attribute classification task (pleasant vs. unpleasant),
3. a target and attribute combined classification task,
4. a target classification task with reversed response assignment, and
5. a target and attribute combined classification task with reversed pairings.



IAT Stimuli

High Flying



Pleasant

Cheerful
Ethical
Generous
Lovely
Loyal
Wise
Witty

Unpleasant

Bad
Cold
Crude
Mean
Nasty
Rude
Angry

Low Flying



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IAT Stimuli

- Safe (risk adverse) Condition (quick reaction time)
 - High Flying with Pleasant word, or
 - Low flying with Unpleasant word
- Risky (Risk-taking) condition (quick reaction time)
 - High flying with unpleasant word, or
 - Low flying with pleasant word
- Mean reaction time in risky condition subtracted from mean reaction time in safe condition



Present Research

- Aim - Examine the accuracy in which existing scales and the newly created IAT predicts pilots risk-taking behaviour
- Participants - 35 (27 males) pilots
- Procedure -
 - Simulated flight involving spotting task
 - IAT
 - Battery of tests (IAT and tests reversed for half of participants)

Risk Management (DV) - Min alt, fuel exhaustion, dist from threshold, speed at touchdown (Nall, 2006).



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Results - Data Reduction & Analysis

- Flight performance measure (32 pilots) - z score for all 4 measures
 - Higher score = Riskier behaviour
 - Cronbach's alpha .68 (acceptable for exploratory research – Nunnally & Bernstein, 1994)
- Larger IAT effect = stronger preference for low flying (riskier flight behaviour)
- Correlation Analysis (19 variables) - 2 statistically significant results
 - Everyday Risk (RP - self) $r = .353, p = .047^*$
 - IAT Effect $r = .422, p = .018^*$



Results - Data Analysis

Multiple regression

- 2 predictors accounted for 30.3% of the variance in flight behaviour ($R^2 = .30$), which was a significant fit, $F(2,28) = 6.39$, $p = .005$.
- Everyday Risk was a significant predictor of flight behaviour ($B = .053$, $t(28) = 2.35$, $p = .026$), and accounted for 12.5% of the variance in flight behaviour.
- The IAT effect was also a significant predictor of flight behaviour ($B = 1.15$, $t(28) = 2.69$, $p = .012$), accounting for 17.8% of the variance in flight behaviour.



Results - Summary

The result from the multiple regression indicate

- Pilots whose flight behaviour was more risky, accurately judged the risk in everyday scenarios (Risk Perception – Self).
- The more participants preferred high flying to low flying (IAT Effect), the safer their behaviour was in the flight simulator.



Limitations

Task involved:

- Examining pilots risk-taking behaviour in the safety of a flight simulator, and
- Relatively small number of participants (35 pilots) for a multiple regression



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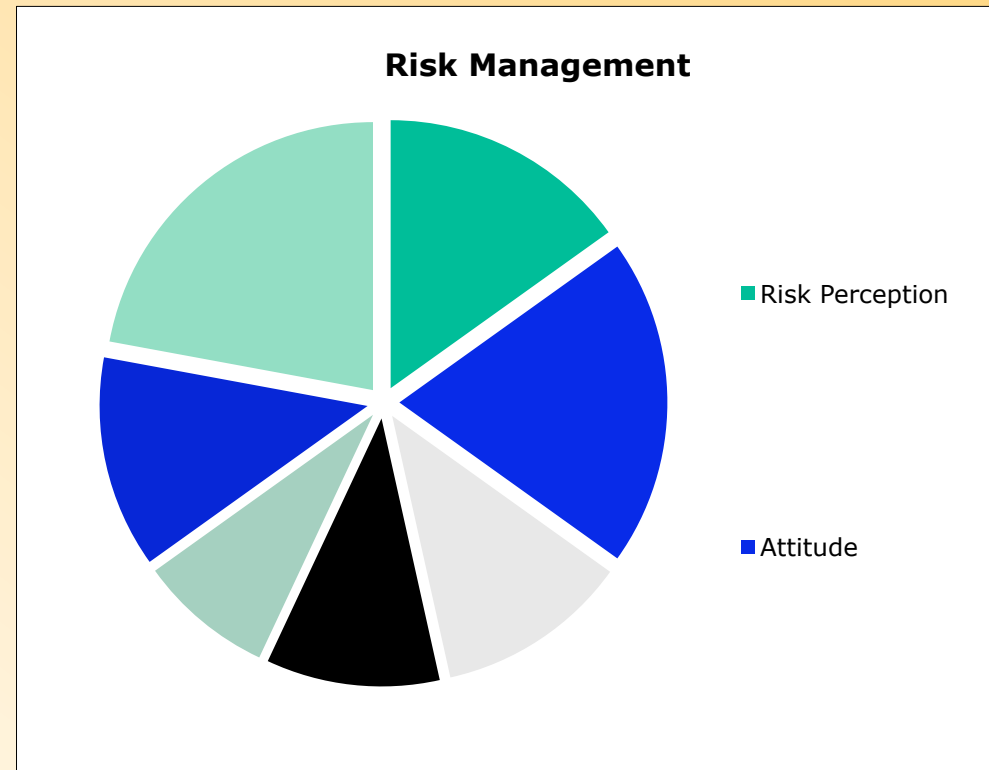


Discussion

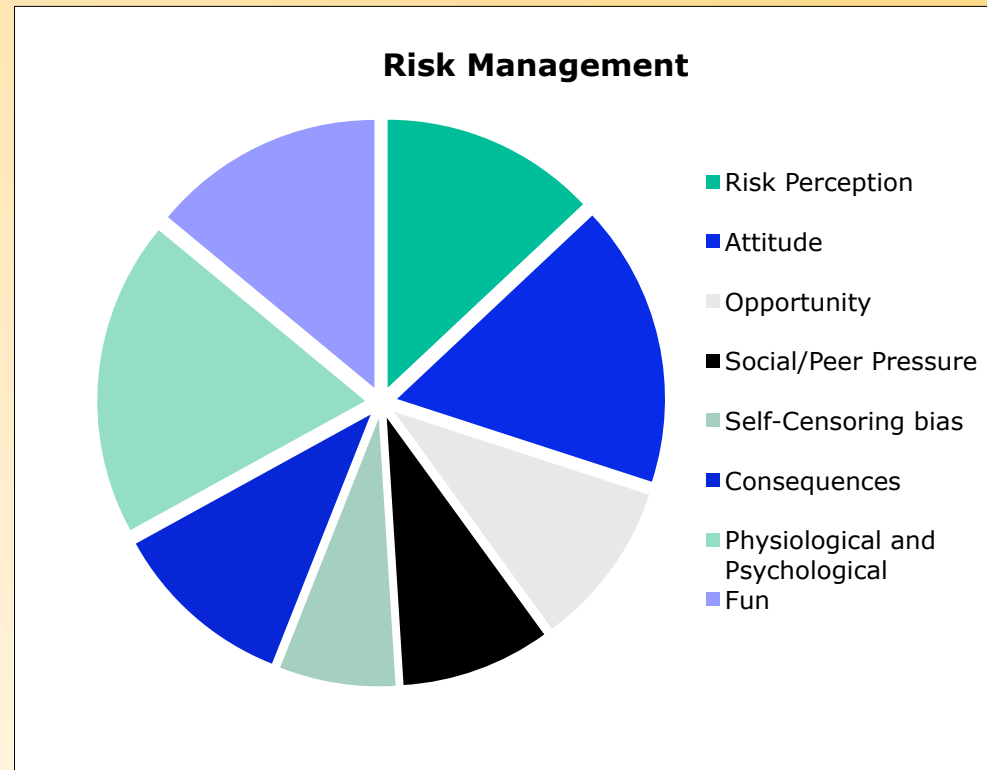
- Hunter's 'Everyday' risk scale (RP - Self) is a better predictor of pilots risk-taking behaviour than other risk perception scales.
- The IAT is a better predictor of risk-taking behaviour than existing attitudinal scales (ASAS, New HAS).
- Employing IAT to aid in training
 - If risk-taking is viewed as decision-making under uncertainty, being able to identify those individuals who are likely to be riskier will permit more targeted training.



Future Research



Future Research



Thank You

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