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Abstract

The safety of the National Airspace System is reliant upon the partnership between pilots and air traffic controllers facilitated through verbal communications. When the partnership based on trust is strong, the pilot is able to better manage the complexities associated with flying in congested airspace; errors may be reduced and system efficiency increased. Understanding the components of a pilot's trust in controllers is an important first step towards developing trust-building and trust-enhancing strategies to ensuring strong partnerships. Further this knowledge may reduce errors and improve system efficiency.

Problem Statement

A review of the literature revealed a scarcity of research on a pilot's trust in air traffic controllers. Previous studies were conducted to research trust in air traffic automation (Langan-Fox, Sankey, & Canty, 2009) and trust based on confidence in the controller's speech (Kang, Han, & Lee, 2017). However, there appears to be a gap in the literature regarding variables that correlate with and predict trust in the human controllers. Additionally, there are no domain specific instruments to measure a pilot's trust in air traffic controllers.

Purpose

The purpose of this research is two-fold. The first purpose is to develop an instrument to measure a pilot's trust in controllers. The second purpose is to conduct a pilot study to determine the usefulness of the scale and test the study design prior to full-scale studies.

Research Questions

- RQ 1 – Given trust is a latent variable, what observed variables can be used as a surrogate measure of a pilot's trust?
- RQ 2 – What variables are valuable in predicting a pilot's trust in air traffic controllers?

Methodology

Part I – Developing the Scale. The five-stage procedure used in Rice, Mehta, Steelman, & Winter (2014) and Rice, Mehta, Winter & Oyman (2015) form the methodology basis.

Stage 1: Word Generation

- Using the Delphi method (Bolger & Wright, 2011) comprised of a team of aviation experts, a series of words or phrases representing trust in controllers will be compiled.

Stage 2: Nominal Paring

- The list produced in Stage 1 will be narrowed by the Delphi experts; words not judged by a majority of the team to represent trust are pared out.

Stage 3: Likert-scale Paring

- Using the results of Stage 2, the Delphi experts will further narrow the word list through Likert-scale scoring. Those items scoring the highest will be retained.

Stage 4: Scenario-based Testing

- In stage 4, participant will be presented with a scenario and asked to use the proposed words to rate the scenario. Results will be subjected to a Principle Component Analysis. Words that strongly load together will form the scale.

Stage 5: Scenario-based Experiment

- A simple experiment will be used to determine if the scale can discriminate between perceptions of a trustworthy or untrustworthy air traffic controller.

Part II – Conduct a Pilot Study. This study is quantitative and non-experimental. Using a correlational approach and predictive design, the objective is to determine variables that appear to predict trust in air traffic controllers using the newly developed Trust in Air Traffic Controllers Scale as the measurement instrument.

The initial independent variables are pilot age, gender, race, experience, and personality type.

The study is designed and conducted using E*Prime, a software platform for psychological studies. E*Prime presents stimuli and records responses in a controlled manner. The data captured includes how fast in milliseconds participants respond to questions.

Participants will be presented with two different audio clips of controllers saying air traffic control phrases. The voices will be actual air traffic controllers or upper-class ATC students. The two voices will have different accents. After listening to the audio clips, participants will record their level of trust in each controller using the Trust in Air Traffic Controllers Scale.

Data gathered will be used to improve the study design in preparation for a full-scale study in the future.

Status

Stages 1 – 3 of the scale development are complete. The experts came to 100% agreement on six words for the Stage 4, Scenario-based Testing. Having received IRB approval, Stage 4 data collection is currently in progress.

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References

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Do you trust your air traffic controller?