



Title of Study¹: Flight Procedures & Episodic Memory I: Study 1

Principal Investigator: Nathan A. Sonnenfeld, M.S.

Key Information: The following is a short summary of this study to help you decide whether or not to be a part of this study. More detailed information is listed later on in this form.

Why am I being invited to take part in a research study?

We invite you to take part in this research study because you are between 18-64 years of age and representative of the local UCF student community. If you are outside of this age range or are pregnant or have a prior history of epilepsy or seizures you are ineligible for this study in the interest of your comfort and safety. Whether you choose to participate is up to you.

Why is this research being done?

The purpose of this study is to advance our understanding of how pilots acquire the knowledge and skills to perform procedures during flight operations. Modern approaches to flight crew training may vary in effectiveness due to (a) various design differences, and (b) for different types of tasks. In this research study, we are investigating the effectiveness of various modern training configurations using different instructional strategies, across a series of scenarios involving procedures associated with flight operations.

How long will the research last and what will I need to do?

This study involves two parts. The first two parts involve an online onboarding section (~30 minutes) and in-person experiment (~2 hours). A week after completing these parts, you will be asked (but not required) to participate in a follow-on study.

We expect that your combined active participation will approximately 2.5 hours. You will be asked to complete the following:

Onboarding (Online). Prior to your scheduled timeslot, you will be asked to respond to a series of online surveys about any relevant prior experience (gaming; aviation), personal characteristics, and knowledge of the aviation-related task of interest.

Experiment (In-Person). During your scheduled timeslot, you will receive training on the task, software, and equipment of interest to this study, and complete an aviation-related simulation task. The simulation will be administered either via a standard desktop computer setup or using a virtual reality (VR) head-mounted display (HMD) and hand-held controllers. You will be randomly assigned to one of these experimental conditions. You will use a few modules of this simulation and respond to a series of surveys about your perceptions, experience, and

¹ This template satisfies AAHRPP elements I.1.G, I.4.A, I-9, II.3.C-II.3.C.1, II.3.E, II.3.F, II.4.B, III.1.F, III.1.G
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knowledge following use of the simulation. You will be audio recorded during the study. If you do not want to be recorded, you will NOT be able to be in the study.

More detailed information about the study procedures can be found under ***“What happens if I say yes, I want to be in this research?”***

Is there any way being in this study could be bad for me?

The risks of participation are minimal and do not exceed the risks associated with activities found in daily life. These may include motion sickness as a result of using the VR HMD.

More detailed information about the risks of this study can be found under ***“Is there any way being in this study could be bad for me? (Detailed Risks)”***

Will being in this study help me in any way?

We cannot promise any benefits to you or others from your taking part in this research. However, your participation may help develop better training for pilots in the future.

What happens if I do not want to be in this research?

Your participation in this study is voluntary. You are free to withdraw your consent and discontinue participation in this study at any time without prejudice or penalty. Your decision to participate or not will in no way affect your continued enrollment, grades, employment or your relationship with UCF or the individuals who may have an interest in this study. Your alternative to participating in this research study is to not participate.

Detailed Information: The following is more detailed information about this study in addition to the information listed above.

What should I know about a research study?

- Someone will explain this research study to you.
- Whether or not you take part is up to you.
- You can choose not to take part.
- You can agree to take part and later change your mind.
- Your decision will not be held against you.
- You can ask all the questions you want before you decide.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team: by contacting the principal investigator (Nathan Sonnenfeld) by email Nathan.Sonnenfeld@ucf.edu. Nathan is a PhD student in the Modeling & Simulation program in the School of Modeling, Simulation, & Training.

You may also reach out to the advisor, Dr. Florian Jentsch, Professor, Department of Philosophy Chair, Team Performance Laboratory, Institute for Simulation & Training, University of Central Florida, by email Florian.Jentsch@ucf.edu

This research has been reviewed and approved by an Institutional Review Board (“IRB”). You may talk to them at 407-823-2901 or irb@ucf.edu if:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.

- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

How many people will be studied?

We expect 120 people will be in this research study.

What happens if I say yes, I want to be in this research?

Onboarding (Online). Prior to your scheduled timeslot, you will be asked to respond to a series of online surveys about any relevant prior experience (e.g., gaming; aviation, perceptions of training technologies), personal characteristics (e.g., age, sex, personality tendencies, motion sickness susceptibility), and knowledge of the aviation-related task related to this study. This part of the experiment should last no more than 30 minutes. You may complete this onboarding at a time/location of your convenience. If you are unable to complete the onboarding survey prior to arriving for your timeslot, you will be asked to reschedule. This will be checked the morning of the date of your timeslot at approximately 9:00AM.

Experiment (In-Person). During your scheduled timeslot, you will receive training on the task, software, and equipment of interest to this study, and complete an aviation-related simulation task. You will be randomly assigned to an experimental condition. Different computer hardware will be used for different study conditions. The simulation will be administered either via a standard desktop computer setup or using a virtual reality (VR) head-mounted display (HMD) and hand-held controllers (see Figure 1). Everything in this study that you will see or do will be the same between conditions, except (1) the device used to experience the simulation, and (2) the format (list vs. paragraphs) of the preview of instructional material you will receive. In either condition, you will receive general training on the controls that you will need to be familiar with to successfully use our simulation software used for the study, and for verbally commenting on your interactions (think-aloud procedures). The directions for the think-aloud procedures will be supported by two videos demonstrating the think-aloud procedures for interacting with both tangible objects and virtual interfaces.

You will then receive specific training in the simulation for conducting an exterior preflight inspection of a commercial aircraft. You will walk around an aircraft and see instructional information related to the task. We will collect screen capture data during your use of the simulation, including recording the screen, audio recording, and collecting log file data such as buttons pressed, keystrokes, behavior, and interaction data, for our assessment of the effectiveness of different features of the training simulation. You will use a few modules of this simulation and respond to a series of surveys about your perceptions, experience, and knowledge following use of the simulation, including surveys of motion sickness, cognitive demand, and user experience.

The experiment will be conducted in a private room in a UCF laboratory space at the Institute for Simulation & Training (IST), where only the researchers and participants are present. Signage on the door will be placed to indicate that a study is under progress and to not disturb. This experiment will take place during your one and only visit to this lab space. Your participation in this in-person experiment should last approximately 2.5 hours, including a 10-minute scheduled break.

Study 2—Follow-Up Measures (Online). Approximately one (1) week after the in-person experiment, you will be asked (but not required) to participate in a separate follow-on study (Study 2) to complete some follow-up surveys in a period lasting approximately 30-60 minutes. You will be contacted via the SONA messaging system and access the surveys via a link to Qualtrics. These surveys will assess your knowledge of the task and memories of your experience. You will have a 24-hour period to respond to these retention tests, but you may otherwise complete these at a time/location of your convenience.

Throughout each part of this study, you will only interact with the researchers and no other participants. You will have the option to withdraw at any time rather than answer any questions or complete any experimental tasks that cause you distress or discomfort.

Your participation, feedback, and expertise are highly valued and will help us advance our understanding of how pilots acquire the knowledge and skills to perform procedures during flight operations.

Figure 1: HTC Vive Focus 3 (VR HMD)



Data Collection

The following types of data will be recorded from your participation session:

- **Screen Capture**
 - Screen capture of participants' displays within the simulation
 - Processed log file data such as buttons pressed and keystrokes
 - Simulation behavior and interaction data recorded for assessment of the training simulation.
- **Audio Recording**
 - Audio recording during your use of the simulation to identify mental processes used during use of the simulation
 - One of the questions will prompt you to provide an open-ended audio response to a question related to your memory and knowledge of the pre-flight inspection
- **Survey Data** – used to better understand individual difference factors in training:
 - Demographics (age range, biological sex, handedness, visual/auditory depreciation or impairment)
 - Aviation Experience & Self-Efficacy in Procedure
 - Personality & Need for Cognition
 - Metacognitive Ability

- Visual/Spatial Working Memory
- Video Game/Simulation Experience & Use
- Motion Sickness Susceptibility
- Simulator Sickness Questionnaire
- Perceived Workload / Cognitive Load
- System Usability Scale
- Perceptions of Training Technologies
- Training Experience and Reactions (e.g., perceived workload, cognitive load, usability, recall, familiarization, presence, embodiment, engagement, affect, motivation)
- Knowledge Assessments

Privacy

To protect your privacy during data collection, the experiment will be conducted in a private room in a UCF laboratory space where only you and the researchers are present. Signage on the door will be placed to indicate that a study is under progress and to not disturb. As a participant in this study, you will only interact with the researchers conducting their data collection session.

What happens if I say yes, but I change my mind later?

You can leave the research at any time it will not be held against you. Your data up to the point of withdrawal will be stored in a separate file from the data to be used for final analysis, and not included in the final analysis of data due to being incomplete.

Is there any way being in this study could be bad for me? (Detailed Risks)

While we do not anticipate that the use of VR and other computer-based displays in this study pose a risk of motion sickness greater than that experienced in daily life (i.e., while a passenger in a vehicle or a ride at an amusement park), we have addressed this potential concern through our study protocols and procedures. For example, including a break period. To ensure your safety, if you experience any symptoms of motion sickness, please let us know and take a break from the study session and ensure that you follow the guidance of the experimenter both during and following the conclusion of the study to allow for sufficient time in recovering from these symptoms. Should symptoms persist, researchers have been informed of available UCF services.

What happens to the information collected for the research?

Efforts will be made to limit the use and disclosure of your personal information, including research study records to people who have a need to review this information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the funding sponsor (FAA), the IRB, and other representatives of this organization.

If identifiers are removed from your identifiable private information that is collected during this research, that information could be used for future research studies or distributed to another investigator for future research studies without your additional informed consent.

Any raw data which includes potentially identifiable information (e.g., informed consent, audio recordings as a part of screen capture) will be stored on a password-secured and encrypted external hard drive with a reference sheet, within a secure, manually locked laboratory space.

The incidental collection of informed consent forms is unavoidable given the experimental protocol, but University of Central Florida (UCF) Institutional Review Board (IRB) protocol will be strictly followed to ensure the ethical management of this information.

Identifiable data will be stored for the minimum of 5 years after study closure (per UCF policy), on a password-secured and encrypted external hard drive in a secure, manually locked laboratory space at the Institute for Simulation and Training (IST). We will limit personal data collected in this study to people who have a need to review this information; access to the raw data will be limited to the PI and study members directly involved in the coding and transfer of raw data. Identifiable information will be scraped from your data, and de-identified such that your responses cannot be traced back to you. Participant IDs (PIDs) will be randomly assigned based on the ordering of study timeslots, each participant's PID will determine which study conditions they experience, and for the de-identification of study data. Only de-identified data will be included in data files used for analysis, and only de-identified data may be disseminated among other study members. Potentially identifiable information (i.e., informed consent, SONA IDs, audio recordings as a part of screen capture) will be disposed of after 5 years following the completion of the UCF IRB protocol, which includes shredding of all physical documents and proper deletion of electronic information. Only de-identified data will be stored indefinitely, for longer than the minimum of 5 years after study closure (per UCF policy), on a password-secured and encrypted external hard drive in a secure, manually locked laboratory space at the Institute for Simulation and Training (IST).. A copy of the de-identified data will be uploaded to a UCF-approved and protected cloud storage drive (UCF OneDrive) only accessible through two-step verification of study personnel identity.

As indicated under "Screen Capture", you will be audio recorded during this study (only when using the simulation). If you do not want to be recorded, you will NOT be able to be in the study. Discuss this with the researcher or a research team member. If you are recorded, the recording will be kept in a locked, safe place. The recording device used will be the Open Broadcaster Software (OBS) Studio, which will initiate the recording when you start the simulation and end when you exit the simulation. Audio recordings collected as a part of the screen capture will be transcribed by study members directly involved in the coding and transfer of raw data using a combination of automated transcription using Microsoft Word and manual transcription. The transcripts will be manually de-identified by these lab assistants and disposed of following the UCF IRB protocol—the recording will be erased or destroyed after a minimum of 5 years after study closure per UCF policy. Only de-identified summary results of this study will appear in research reports which may include, but are not limited to, technical reports and scholarly peer-reviewed journal articles and conference proceedings

Can I be removed from the research without my OK?

You may be withdrawn from the research without your consent with or without cause at any time. We will consider withdrawing participants without their consent in the following circumstances:

- For malingering or "Christmas Treeing" (e.g., after being asked to stop this behavior by the researcher in charge), or if the researcher in charge determines that continuing participation is not in your best interest (e.g., in the event of tornado warning in the building, participant is falling asleep, etc.).

- If you are disrupting the participation of other participants, being disrespectful to other participants, research staff, or research equipment, or if you engage in conduct that is not compliant with the University's Golden Rule policy.
- If you are pregnant or indicate a prior history of epilepsy or seizures, in the interest of your health and safety.
- If you feel any of the following at a moderate or severe level: General Discomfort, Fatigue, Headache, Eye Strain, Difficulty Focusing, Increased Salivation, Sweating, Nausea, Difficulty Concentrating, Fullness of Head, Blurred Vision, Dizzy (Eyes Open), Dizzy (Eyes Closed) Vertigo, Stomach Awareness, Burping.

What else do I need to know?

You will be compensated at a rate of 0.5 SONA credits per half hour of participation. You may expect to receive ~2 SONA credits for fully completing this study (Study 1), up to a maximum of 2.5 credits.

Your information (both identifiable and de-identified) may be used to create products or to deliver services, including some that may be sold and/or make money for others. If this happens, there are no plans to tell you, or to pay you, or to give any compensation to you or your family.