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Gender Difference in Situation Awareness When Receiving Wayfinding Direction by Landmarks and Headings

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Abstract

In aviation, situation awareness (SA) is a fundamental requirement for effective flying and air traffic control. This skill has greatly been associated with pilot and air traffic controller performance. Previous studies in aviation and other fields have shown that gender differences exist in SA performance. Four hypotheses were tested in this study: women navigate better from landmark cues; men navigate better from headings cues; women have better SA performance than men when receiving landmark directions; and men have better SA when receiving cardinal directions. Thirty-eight participants drove a driving simulator **twice**. While driving, participants were asked **SA questions** to assess their SA performances. The results showed participants navigate better from landmark cues regardless of gender. Men showed poorer SA in landmark conditions than in headings conditions, but there was no significant difference in women. However, overall, women performed worse in **response time** to answering SA questions. This study can be beneficial for pilots' selection tests and providing special training for male and female pilots.

Methods and Materials

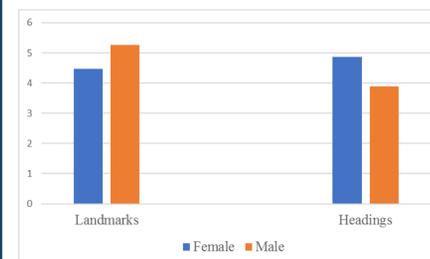
In this within-subjects design experiment, participants will be tested on performance and SA while driving a driving simulator.

1. Participants signed an informed consent form and filled out a questionnaire.
2. Participants then drove one minute as a practice.
3. Participants went through the instruction.
 - After practice, a instruction sheet were presented to participant.
 - The wayfinding instructions were presented in a random counterbalanced order.
4. Participants put on a headset and started driving.
 - Six SA questions specific to the drive were played over a headset in real time.
 - The Audacity software recorded participants' answers and their response times through speaking aloud into the microphone.
5. Repeat step 3-4. The procedures followed of the next driving task were the same.
6. Participants filled out a self-evaluation survey.



Results

SA Questions Accuracy:



- Males correctly answered fewer questions in landmarks conditions than they did during headings conditions
- Females was no different between the two driving

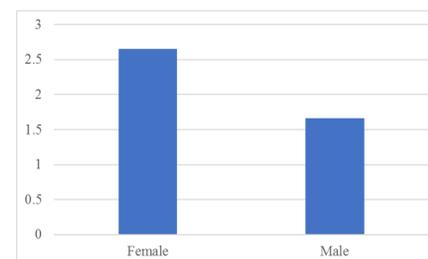
Turn Accuracy:

- Participants' turn accuracy in landmarks was higher than they were in headings.
- The post hoc analyses showed that males were likely to make the correct turns in landmarks conditions than they were during headings conditions, but female were no different between the two driving instruction conditions

Self-evaluation : Male felt more confident than female.

Over Speed Limit Time: In both conditions, the mean of the male was nearly twice as many as the female.

Response Time:



The response time of the female group (M = 2.65, SD = 1.85) was much **longer** than the male group (M = 1.67, SD = 0.94) no matter what the landmarks or headings driving tasks.

Demographic Questionnaire

	Participants	N	Mean	Std. Deviation
Driving Years	Female	19	2.9853	2.43176
	Male	19	3.5616	2.28314
Driving Miles	Female	19	8036.84	7343.796
	Male	19	12000.00	11368.817

Discussion

Confidence: Males > Females

However, males got fewer questions correct in performing under the landmarks conditions than they did in the headings conditions while female SA accuracy scores were not significantly different in both conditions.

This suggested that males did not have accurate assessment on their SA performance.

Turn Accuracy: Regardless of gender, participants performed better when they followed the landmarks instruction than when they followed the headings instruction.

- **Working memory.** Cardinal directions may have demanded greater working memory, thereby affecting performance.
- **Hard to make correction.** It was hard for participants to confirm the correct direction and make a correct turn at the next intersection if they previously had made a wrong turn.
- **Missed key words.** The unclear map in their mind could fluster the driver and result in missing some key words in the instructions.

Conclusions

Finding 1: Participants performing under landmarks condition had lower SA accuracy than those performing under headings condition.

Finding 2: Women took longer than men to answer SA questions in all conditions

Finding 3: The post hoc analyses of SA accuracy showed that, in the landmarks conditions, males answered fewer questions correctly than they did in the headings conditions, but there was no significant difference in female SA accuracy in both condition.