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Cognitive Abilities and Gender during Air Traffic Controllers Selection and Training

D. Mouratille^{1,2}, F. Amadiou², N. Matton^{1,2}

¹Fédération ENAC ISAE-SUPAERO ONERA, Université de Toulouse, France

²CLLE, Université de Toulouse, France

CONTEXT

- Air traffic controllers (ATCO) ensure air traffic safety and efficiency. Their training is complex and costly. French ATCO are civil servants and their training lasts several years (two-year period for initial training, and duration of on-the-job training according to center complexity). The training cost for a French ATCO amounts to several hundred thousand euros.
- ATCO are commonly selected by cognitive abilities assessment (Mouratille et al, 2022). Best predictors are work sample, working memory, composite score etc. But an important part of variance is always unexplained (10% of explained variance with cognitive predictors).
- However, cognitive abilities are different according to gender (Reynolds, Hajovsky and Caemmerer, 2022). Can it be a problem in a selection context ? A source of adverse impact ?

MATERIAL AND METHOD

- **125 ATCO students** ($M = 21.01$ years), 28% women
- Experimental design (not used for selection or training purposes)
- Assessment time:
 - **Beginning** of the initial training
 - **End** of the initial training (2yo after)
- Cognitive abilities assessed (CHC taxonomy):
 - **Visuo-spatial processing**: two tests of mental rotation and one dynamic test
 - **Quantitative knowledge**: un test
 - **Multitasking with working memory, attention and speed processing**: Pilot and ATC low-fidelity simulation

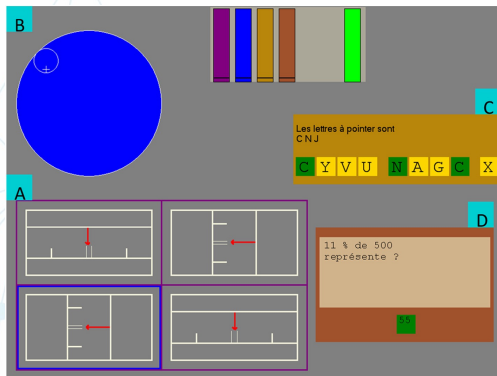
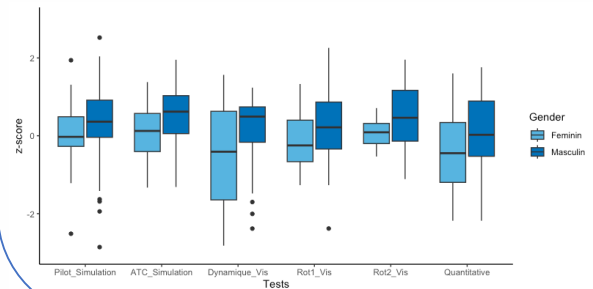
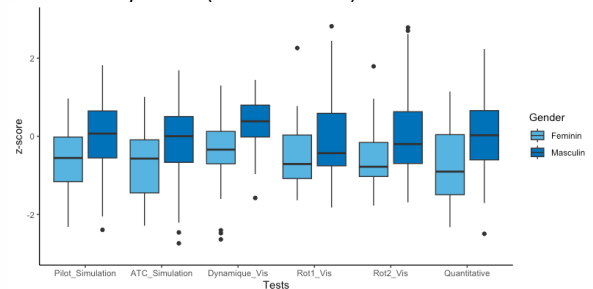


Figure 1: Pilot simulation

- Training outcome:
 - **success or failure**
- Statistics methods:
 - **Chi square**: predictive validity on training success
 - **Repeated MANOVA Time X Gender** : compare tests between assessment time and gender
 - Univariate comparisons on each metric

RESULTS

- Difference between gender for training outcome: ns
- For all cognitive tests, Time Factor and Gender Factor : $p < .05$ (no interaction)



DISCUSSION

- No difference in training success but in cognitive abilities testing
- Adverse impact possible. How to take into account this results ?
- Executive functions assessment are not different according to gender (Grissom & Reyes, 2019; Gaillard, Fehring & Rossell, 2021). Why ?

References

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