Situation awareness during mode transition in highly automated driving

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**PROBLEM STATEMENT**

- Highly automated vehicles will allow driver to disengage from the driving task and to be immersed in a non-driving related task (Michon², 1985).
- Nevertheless, the vehicle may issue a manual takeover request in a potentially dangerous situation, necessitating the driver to rebuild situation awareness (SA) and react in an appropriate manner.
- This study investigated drivers’ takeover of manual control and situation awareness at two different levels of the driving task, namely strategic and tactical (Michon², 1985).

**EXPERIMENTAL DESIGN**

- 64 participants performed 4 drives in a driving simulator
- IV 1 : driving mode
  - 2 drives in manual mode
  - 2 drives in automated mode
- IV 2 : Critical Event :
  - Direction Following (DF) : Strategic Decision Making
  - Obstacle Avoidance (OA) : Tactical Decision Making

Total time budget: 10 seconds
Cars blocking the central lane during the first 5 seconds

- IV 3 : SA assessment (results not presented here) : simulation is frozen 5 seconds after the beginning of the critical event and questions are asked to participants split into 2 groups
  - Group 1 : SA assessed on DF and behavior observed on AO
  - Group 2 : SA assessed on OA and behavior observed on DF
- Mixed design : randomized partial counterbalancing on IV2 and IV3 to avoid a carryover effect

**RESULTS**

Variables studied :

- Takeover time :
- Number of collision and lane violation
- Acceleration potential (Mean)
- Lane change time

- Takeover time : no significant effect of critical event
- OA: increased number of collisions and lane violations in automated mode
- OA > DF
- OA : automated > manual
- DF : no significant effect of driving mode

- Lane change was delayed in automated mode
- No significant effect of critical event

**REFERENCES**