



THE RELATION BETWEEN EXECUTIVE FUNCTIONING AND DRIVING ERRORS IN A SAMPLE OF YOUNG NOVICE DRIVERS WITH AN AUTISM SPECTRUM DISORDER

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Driving → autonomy

ASD: Difficulties with autonomy

Driving contributes to independence

Driving allows development/maintenance of social and work-related contacts

People with ASD depend highly on friends and family for their transportation



Driving: complex & goal-oriented

Different tasks

- Parallel
- Switching
- E.g., shifting, steering, changing lanes, ...

In a dynamic environment

With risk of distraction

- Passenger
- Phone
- ...



Driving: complex & goal-oriented

Unknown routes and complex driving environments



Driving: complex & goal-oriented

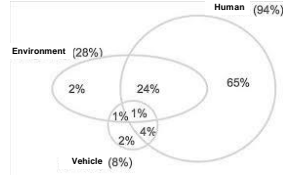
Sudden changes in the environment

E.g., traffic density, weather conditions



Driver error

Driver error → driver crashes



Errors → by-products of EF (e.g., information processing)

Young novice drivers → more driver errors



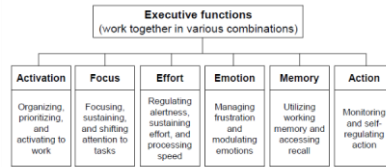
Driver error taxonomy

Underlying mechanism	Example
Action	Press the accelerator instead of brake, following too close
Cognition and decision-making	Wrongly assume a vehicle will not enter path, misjudge speed of oncoming vehicle
Observation	Fail to observe offside mirror when changing lanes, fail to observe appropriate area
Information retrieval	Misread road sign, only retrieve part of information required
Violation	Intentionally speed, overtake on the inside



Executive functioning

Executive functions (EFs) enable to flexibly perform goal-directed actions



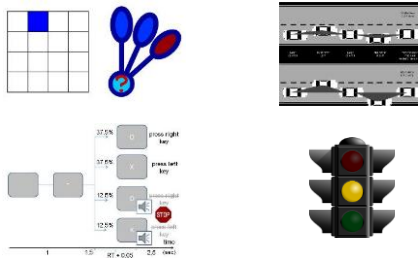
Brown, T.E. (2001). Manual for Attention Deficit Disorder Scales for Children and Adolescents.

Possible EF dysfunctions in ASD



Executive functioning

Previous research has related EFs to driving



Objectives

Increased driver errors in ASD?

EF difficulties in driving-related EF in ASD?

Relation driving-related EF and driver errors?



Participants

- 19 novices with ASD
- 21 typically developing novices
- Aged 17-25
- Maximum 2 years of driving experience



Driving simulator



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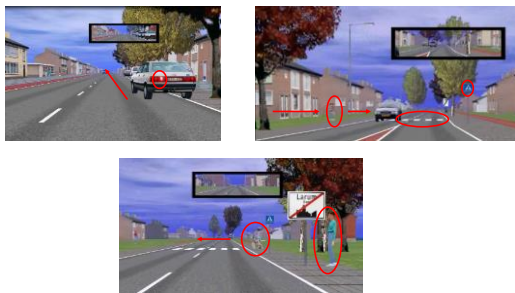


14 Driving measures

- Collisions (number)
- Brake reaction time
- Mean time to collision
- Speed exceedance (number, value, time)
- Centre line crossings (number, value, time)
- Red-light running (number)
- ...



Example: road hazards



Covariates/predictors

- Sex
- Driving experience
- Inhibition
- UFOV
- Working memory



Executive functioning tasks

Attention (Att: UFOV)

Response inhibition (RI: Stop signal task)

Working memory (WM: Span tasks)

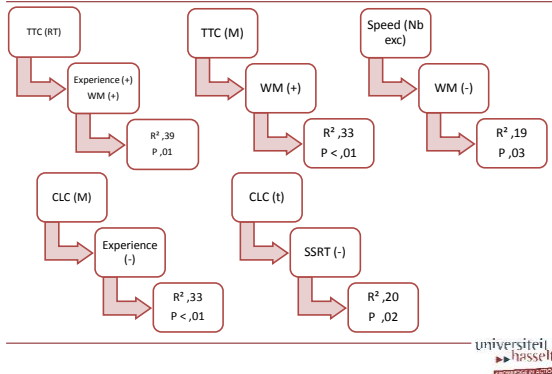


Differences in performance

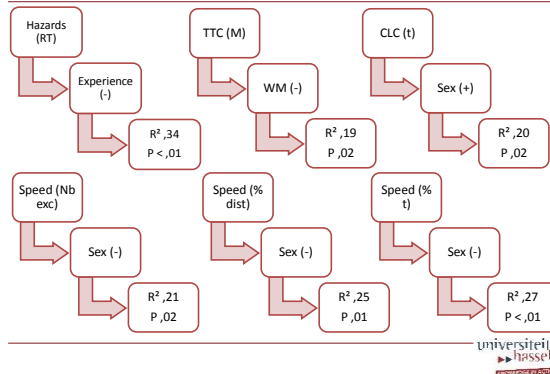
- Little for driving
 - Only sum of collision → marginal p,09; ASD worse
- EF
 - Inhibition → no difference
 - UFOV → p ,02; ASD worse
 - WM → p ,01; ASD worse



Underlying mechanisms ASD group



Underlying mechanisms control group



Limitations

- Small N → could have lowered significance levels
- Driving simulation validity and fidelity
- Not able to distinguish workload/stress



Conclusions and implications

No obvious differences in driving performance

Dual processes

Reliance on EF differs (and more in ASD)

Less risk in ASD males!?

Despite limitations, interesting preliminary results

THE RELATION BETWEEN DRIVING ERRORS AND EXECUTIVE FUNCTIONING

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Questions

