Prospective Memory Abilities while Driving in Adults with an Autism Spectrum Disorder

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Driving: complex & goal-oriented

Different tasks
- Parallel
- Switching
- E.g., shifting, steering, changing lanes, …

With risk of distraction
- Passenger
- Phone
- …

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Driving: complex & goal-oriented

Unknown routes and complex driving environments

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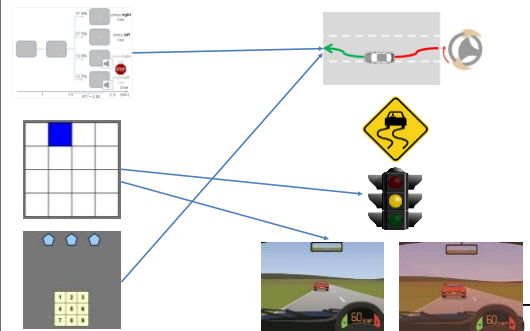TRANSPORTATION RESEARCH INSTITUTE
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Driving: complex & goal-oriented

Sudden changes in the environment
E.g., traffic density, weather conditions


Driving → dependent on executive functioning (EF)

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Example: study of young novice drivers

Source: ROSS, Veerle; JONGEN, Ellen; BRIJS, Tom; BRIJS, Kris; Ruiter, R.A. & WETS, Geert (2015) The relation between cognitive control and risky driving in young novice drivers.
In: APPLIED NEUROPSYCHOLOGY-ADULT, 22 (1), p. 61-72.

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Prospective memory and driving

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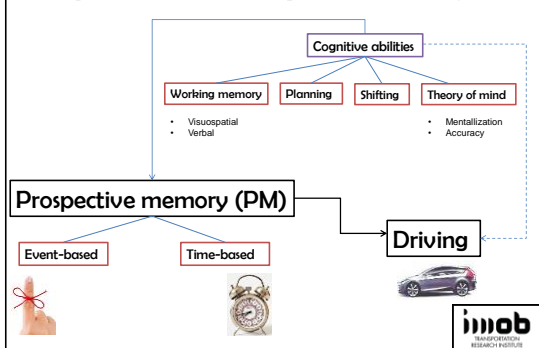
Prospective memory in ASD

Conflicting results

Agreement of time-based PM (TBPM) difficulties

Disagreement of event-based PM (EBPM) difficulties

Could be related to EF difficulties in ASD

Important to use real-life/naturalistic" studies → driving!

Driving simulation

Pilot study objectives

1. Translate typical PM task to simulated driving in ASD
   a. Age differences?
   b. Underlying EF functions?

2. Do outcome measures of the PM task predict more naturalistic PM situations?

Participants

Young adults and adults (18-62)

Matched groups
ASD
- N= 19
- 11 males, 8 females
- Mean age= 33

Control
- N= 20
- 10 males, 10 females
- Mean age= 33

Driving scenarios

Drive 1: Typical PM task
- 4 EBPM (e.g., change a tier at the ALDI)
- 2 TBPM (e.g., indicate when 5min. passed)
- Measures: EBPM distance, TBPM time

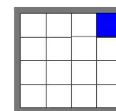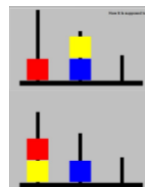Drive 2: Naturalistic PM situations
- 2 EBPM
  - Exit
  - Red light in school zone
  - Measure dependent on situation
- 2 TBPM
  - Missed call
  - Route information
  - Measure: TBPM time

Executive functioning tasks

Test battery of EF tasks

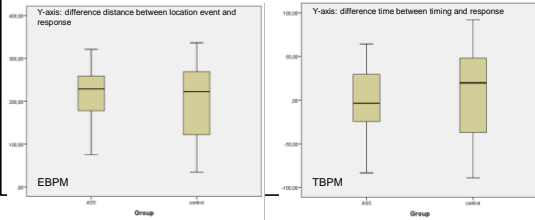Only include significant correlates (power)

Preliminary analyses and results

Drive 1: typical PM task

All intentions remembered correctly?
- EBPM: ASD & control ☑
- TBPM: ASD 79% & control 88%

Difference in timing of stated intention? ✗

Drive 1: typical PM task

Planning and working memory?

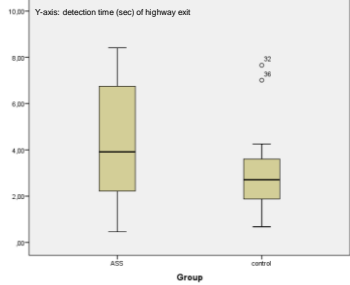| Source		F	Sig.	Partial Eta Squared
Group	Drive1_EBPM_distance	2,872	0,102	0,096
	Drive1_TBPM_time	1,359	0,254	0,048
TOL	Drive1_EBPM_distance	0,755	0,393	0,027
	Drive1_TBPM_time	2,987	0,095	0,100
WM_total_level	Drive1_EBPM_distance	0,469	0,499	0,017
	Drive1_TBPM_time	0,347	0,561	0,013
Group * TOL	Drive1_EBPM_distance	5,189	0,031	0,161
	Drive1_TBPM_time	4,722	0,039	0,149
Group * WM_total_level	Drive1_EBPM_distance	3,741	0,064	0,122
	Drive1_TBPM_time	8,135	0,008	0,232

Group*TOL
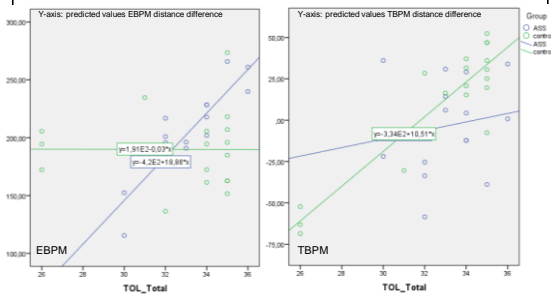
Group*WM
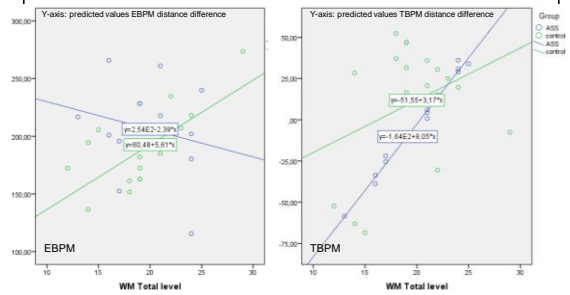
Drive 2: Naturalistic PM situations
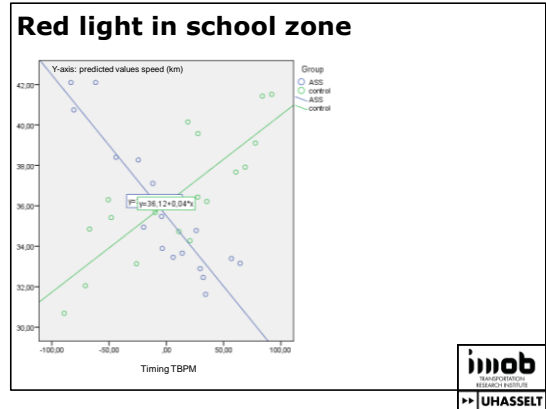
Exit highway

Exit highway

Source	F	Sig.	Partial Eta Squared
Group	3,259	0,087	0,146
Drive1_EBPM_distance	0,232	0,635	0,012
Drive1_TBPM_time	6,155	0,023	0,245
Group *Drive1_EBPM_distance	1,870	0,187	0,090
Group *Drive1_TBPM_time	2,245	0,150	0,106

Red light in school zone

Source		F	Sig.	Partial Eta Squared
Group * Drive1_EBPM_distance	2_zone10_10	1,079	0,307	0,036
	2_zone11_10	0,114	0,738	0,004
	2_zone12_10	0,005	0,942	0,000
	2_zone13_10	0,001	0,974	0,000
	2_zone14_10	0,004	0,947	0,000
	2_zone15_10	0,033	0,858	0,001
Group * Drive1_TBPM_time	2_zone10_10	0,066	0,798	0,002
	2_zone11_10	1,443	0,239	0,047
	2_zone12_10	3,597	0,068	0,110
	2_zone13_10	4,501	0,043	0,134
	2_zone14_10	3,879	0,059	0,118
	2_zone15_10	0,932	0,342	0,031

Red light in school zone

Remembering a call and asking route info

TBPM intentions remembered correctly?
ASD 84% & control 78%

Difference in timing of stated intention? ✗
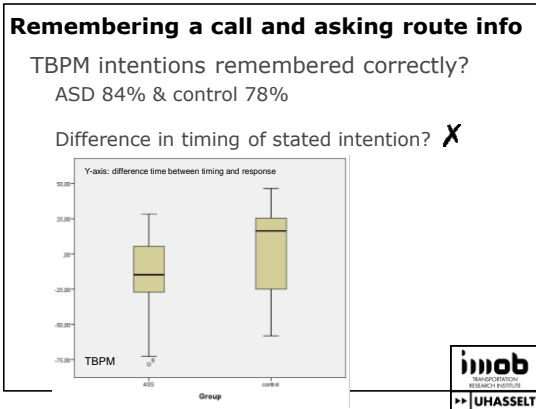
Remembering a call and asking route info

Source	F	Sig.	Partial Eta Squared
Group	2,673	0,113	0,084
Drive1_EBPM_distance	0,352	0,557	0,012
Drive1_TBPM_time	9,959	0,004	0,256
Group *Drive1_EBPM_distance	1,835	0,186	0,060
Group *Drive1_TBPM_time	0,150	0,701	0,005

Discussion and limitations

Further analyses required (e.g., more data cleaning)

Often reversed relations (e.g., planning)

Further studies focus on TBPM?
Need for investigation underlying mechanisms

Short time spans for TBPM

Cues EBPM
Difficult to control when they notice it
Very salient cues

Researcher present in the room

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Questions?
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