Object localization in jumbled natural road scenes

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Introduction

CONTEXT

- The context may help to localize objects in the complex scene (Giraudet & Azavant, 2006)

- Driving experience can help drivers in their visual search of road elements (Chapman et al., 2002)

- In driving context: importance of top-down processes in the perception of the traffic scene (Theeuwes, 1996)
Introduction

VISUAL SCHEMAS

- Controlled use of schemas require conscious effort and working memory resources (Kalyuga et al., 2003)

- To be operated under automatic rather than controlled processes ⇒ schemas have to be sufficiently practiced (Schneider & Shiffrin, 1977)
Objectives

- Test the effect of ageing on the localization of target (e.g., pedestrian, traffic light) in a natural driving scene

- Evaluate the impact of distraction on the use of relevant driving schemas in the visual search
Participants

- 24 older drivers
  - Aged 64 to 83 (M = 71.33; SD = 5.04)
  - MMSE > 28
  - Driving at least 3,000 km per year

- 24 young experimented drivers
  - Aged 30 to 46 (M = 28.75; SD = 3.35)
  - Driving at least 10,000 km per year
Method

- Pictures of intersections contained at least one car, one pedestrian, one traffic light and one road marking

- Participants had to decide if short sentences, listened at the same time, were true or false (Dual Task) (ex: a teaspoon is bigger than a tablespoon)

- Three conditions of presentation of all pictures (Biederman, 1981)
Scene presented in a Coherent condition

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Scene presented in a Partly Jumbled condition

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Scene presented in a Fully Jumbled condition

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Hypotheses

- The reaction times in both partly and original conditions will be shorter than in the fully one due to the use of relevant driving-related knowledge.

- Both older and younger drivers will be slower in the fully jumbled than in the original conditions.

- Older participants will be slower than younger ones in single and dual task.
Results

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Results: Single Task

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Results: Dual task

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Discussion

As expected:

- Both ageing and distraction impacted the visual search of participants.
- Older drivers were slower than the younger ones along the two tasks.
- The differences observed between partly and fully jumbled conditions suggest the use of driving schema.

But:

- In the dual task, both age groups were not able to use the top-down information to focus on the target.
Discussion

- In the dual task ➔ insufficient attentional resources to guide their visual search by top-down processes

Perspectives

- The use of eye-tracking data will help to clarify if participants made initial eye movements to the most relevant area where the target was supposed to be

- Whatever the age and conditions, participants were slower in the localization of road-signs than of road-users

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Thank you for your attention

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