



**HAL**  
open science

## Validation of a visual attention model in a driving field test: difficulties and benefits

Sophie Lemonnier, Roland Bremond, Lara Desire, Thierry Baccino

► **To cite this version:**

Sophie Lemonnier, Roland Bremond, Lara Desire, Thierry Baccino. Validation of a visual attention model in a driving field test: difficulties and benefits. IAAP School on Applied Cognitive Research, Apr 2013, Paris, France. 1p. hal-00873671

**HAL Id: hal-00873671**

**<https://hal.science/hal-00873671v1>**

Submitted on 10 Dec 2020

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



# Validation of a visual attention model in a driving field test: difficulties and benefits.

Lemonnier, S. [1,2], Brémond, R. [2], Désiré, L. [3], and Baccino, T. [1]  
[1] Paris 8, LUTIN - [2] IFSTTAR, LEPSiS - [3] CETE-Ouest

## Background

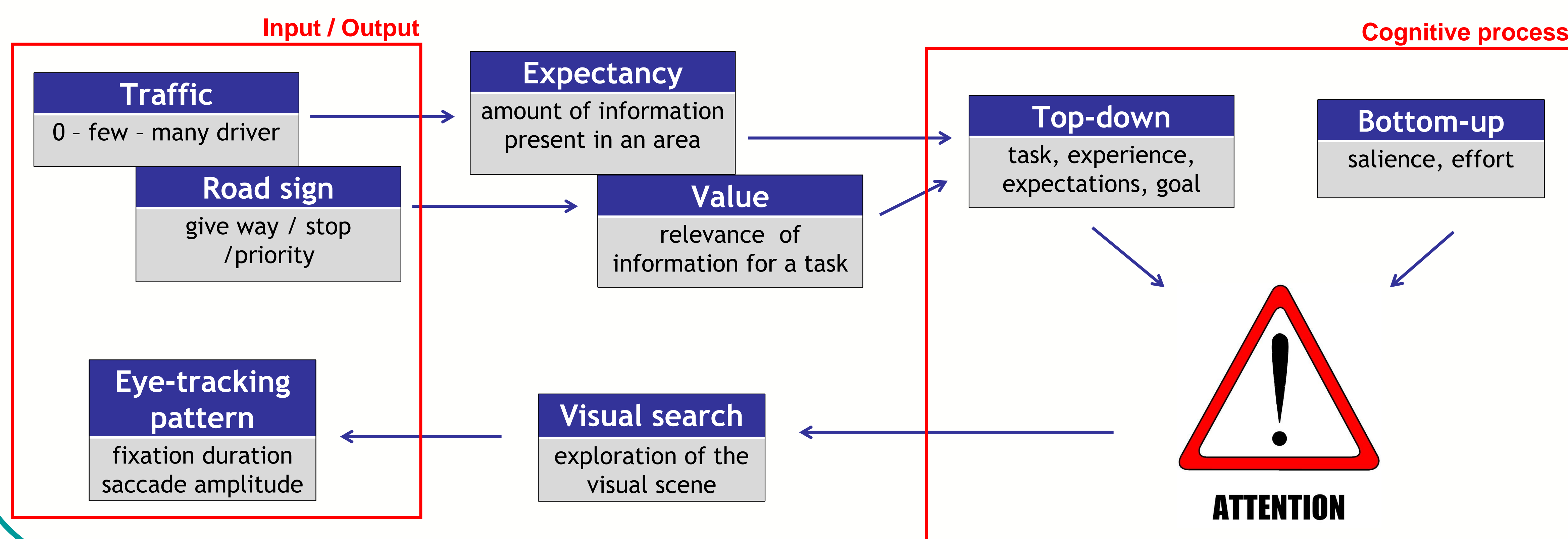
Visual attention = Bottom-up (*i.e.* saliency) and Top-down processes (*i.e.* goal, task, expectancy; +++ in the literature).

The more complex the processes under study, the more necessary it is to have an ecological experimental setting.

→ Driving is an interesting task to study top-down models of visual attention (Tatler *et al.*, 2011).

Wickens *et al.* (2003) proposed a model of visual attention predicting in which areas of interest people get information. Visual attention depends on two TD parameters: expectancy and value of information. We are currently testing this model with driving field test.

## Model



## Method

Material: a vehicle mounted eye-tracking system (SmartEye).

Driving situation: anticipation of a crossroads.

Intermediates variables = road sign [value] + traffic density [expectancy].

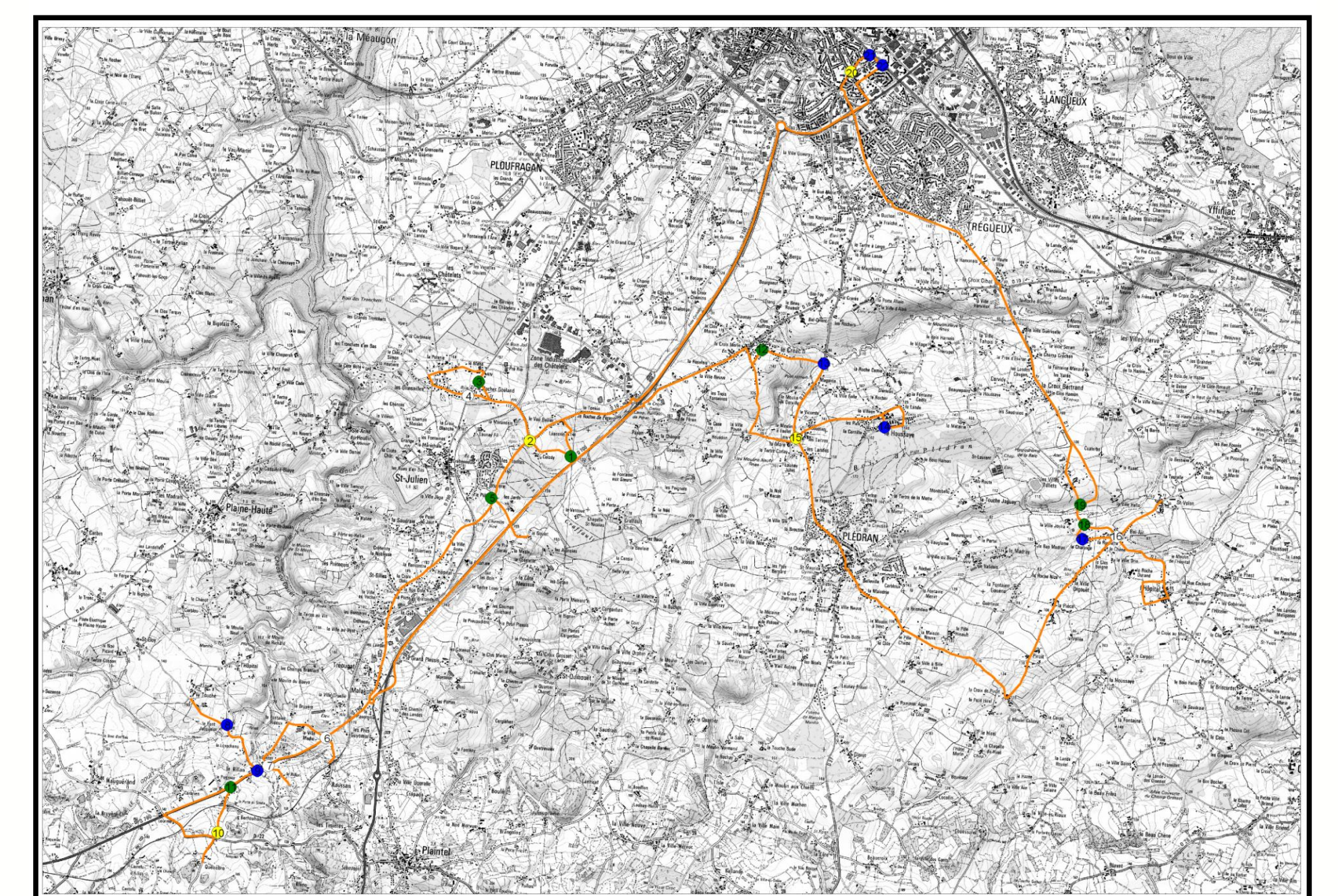
Results: data analysis in progress.

## Variability intra- and inter- of participants and situations

Each step of the experiment protocol leads to some difficulties, but each difficulty introduces variability in the data, and thus enlarges the field of potential applications.

### Itinerary

includes 5 crossroads per road sign (*i.e.* give way, stop, priority). Some detours were necessary because of the constraints of the road network, which resulted in a 2 hours trip per participant. A benefit of this long trip is the fact that the participants cannot guess the hypothesis under study.



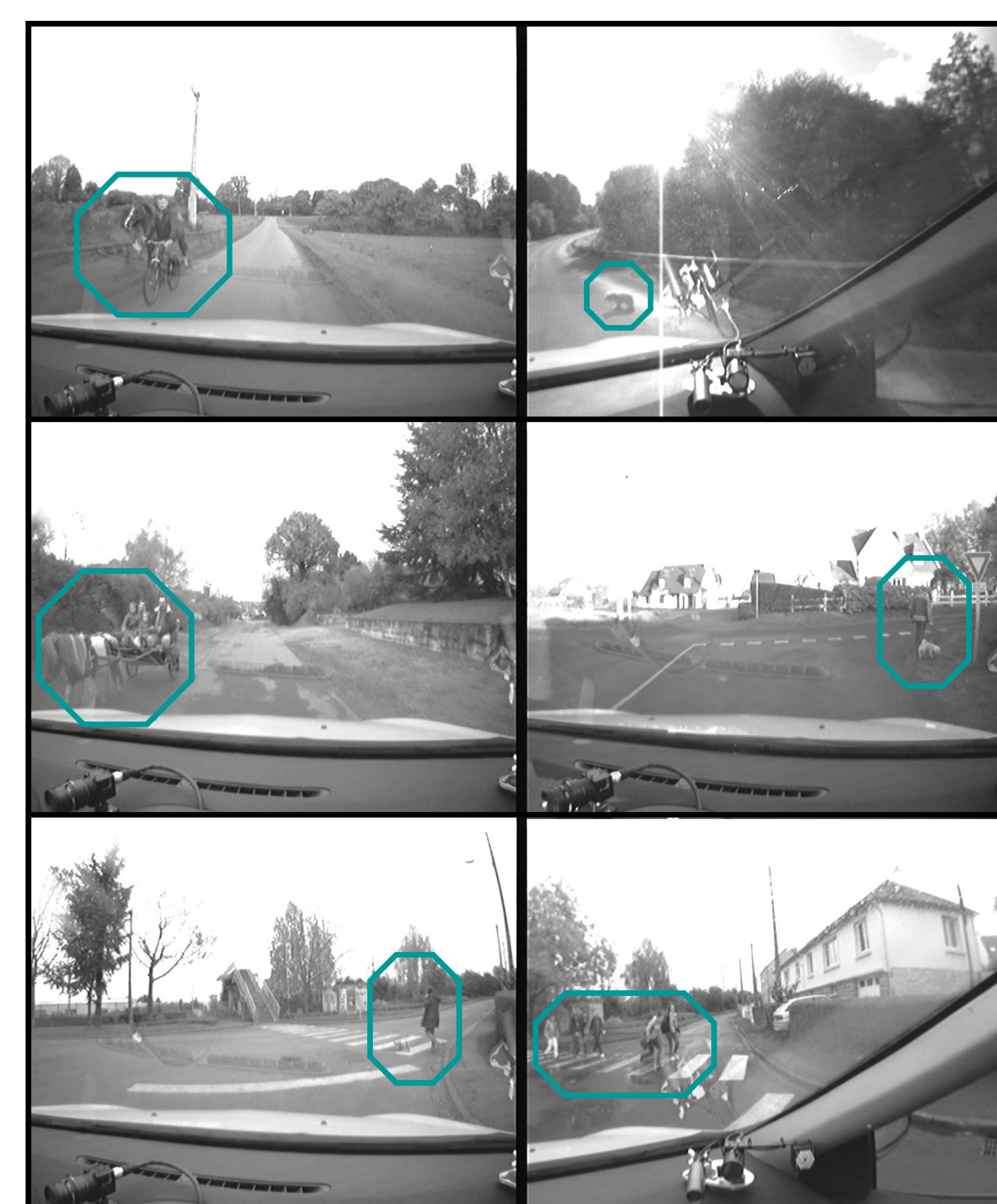
### Traffic density

can only be controlled *a posteriori*, with some intra-modality variability (*i.e.* no, low, dense traffic).



### Surprising events

But also: the weather, the familiarity of the trip, interactions with other drivers, and more



### Eye-tracking calibration

is complicated, including variable duration, with expected consequences in terms of the participants' state of mind.



... all these factors contribute to the variability of the encountered situations.

These differences in terms of participants and crossroads environments help to generalize our results to many driving situations. (Smilek *et al.*, 2006)

## Discussion

Although test field experiments are costly, some advantages emerge. Among the benefits of generalizing a visual attention model to true driving situations, its applications to road safety, road design, driving assistance systems and traffic simulation become easier. In addition, such an experiment on the road produces a large database of behavioral data, ready for future analysis.

## References

- Smilek, D., Birmingham, E., Cameron, D., Bischof, W.F., & Kingstone, A., 2006. Cognitive ethology and exploring attention in real world scenes. *Brain Research*, 1080, 101-119.
- Tatler, B., Hayhoe, M., Land, M. F., Ballard, D., 2011. Eye guidance in natural vision : Reinterpreting saliency. *Journal of Vision* 11 (5), 1-23.
- Wickens, C. D., Goh, J., Helleberg, J., Horrey, W. J., Talleur, D. A., 2003. Attentional models of multitask pilot performance using advanced display technology. *Human factors*, 45 (3), 360-380.