Mechanical & Industrial Engineering
UNIVERSITY OF TORONTO

Human Factors &
Applied Statistics Lab

CSRC
Collaborative Safety Research Center
TOYOTA

Designing Effective Feedback: Understanding Driver, Feedback and their Interaction

Jing Feng[1] Birsen Donmez[2], University of Toronto

Background

- Human error is the sole cause in 57% of all traffic crashes and a contributing factor in over 90% of them (Treat et al., 1979).

- Unsafe driving behaviors such as inappropriate speed choice, close car following, distraction and inattention have been identified to increase crash risks (e.g., Klauer et al., 2006).

- Providing effective feedback to drivers as countermeasures to unsafe driving behaviors may improve immediate response to road events and induce long-term positive behavioral changes (e.g., Donmez, Boyle & Lee, 2008).

- Successful design of effective feedback builds on a comprehensive understanding of the **driver**, the **feedback**, and their **interaction**.

Driver

Demographics
- age
- gender

Driving experience

Perceptual and cognitive abilities
- distractibility
- memory

Personality
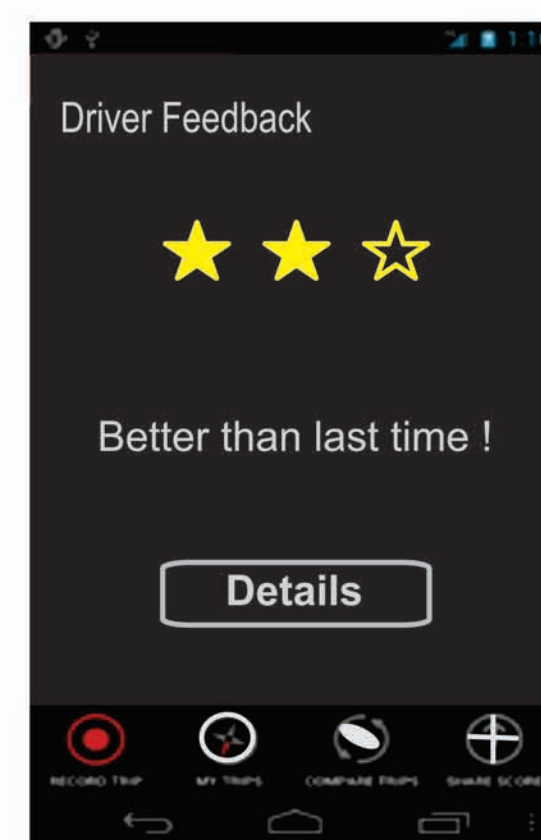- self-efficacy
- locus of control

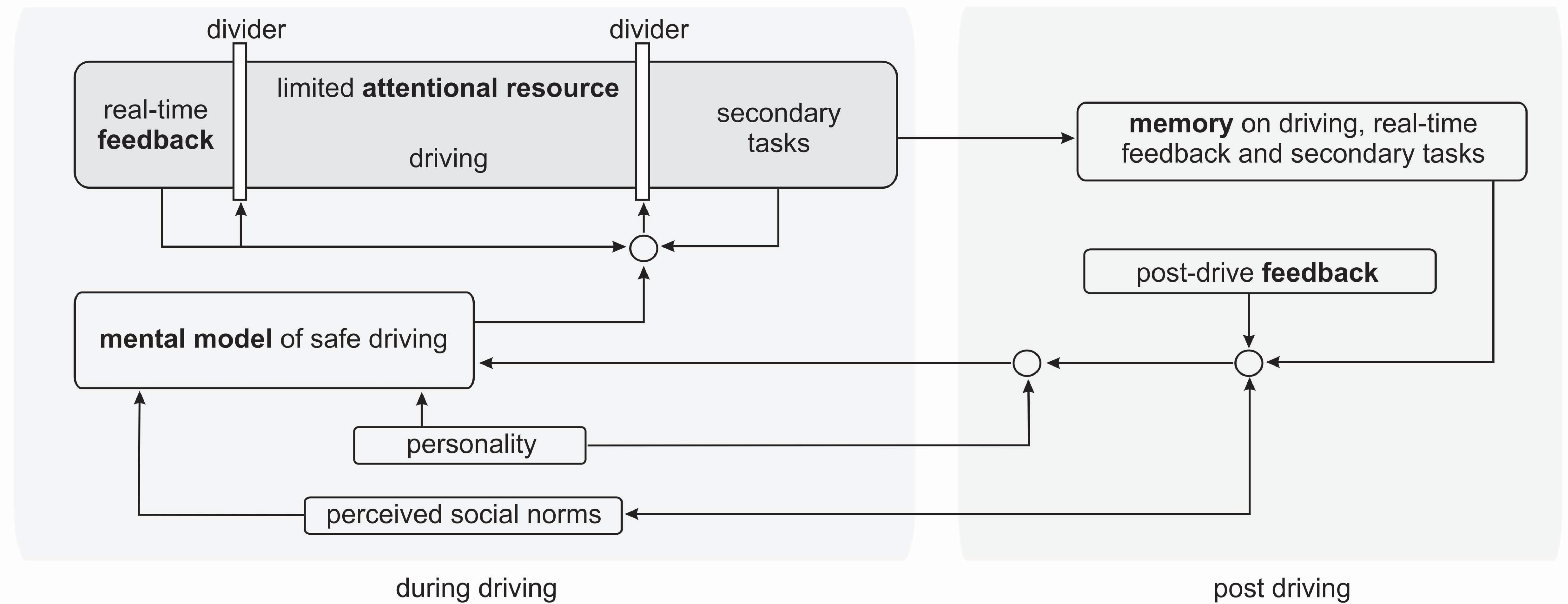## Feedback

"When"
- timing
- trigger
- duration

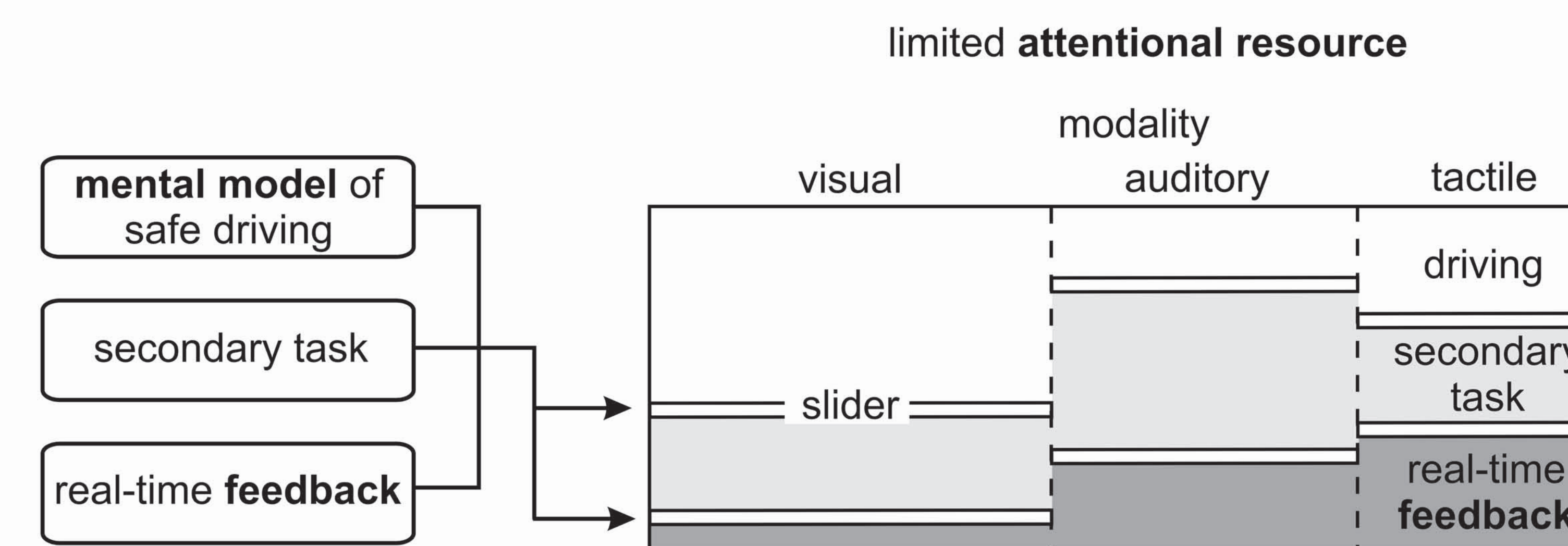### "What"
- modality
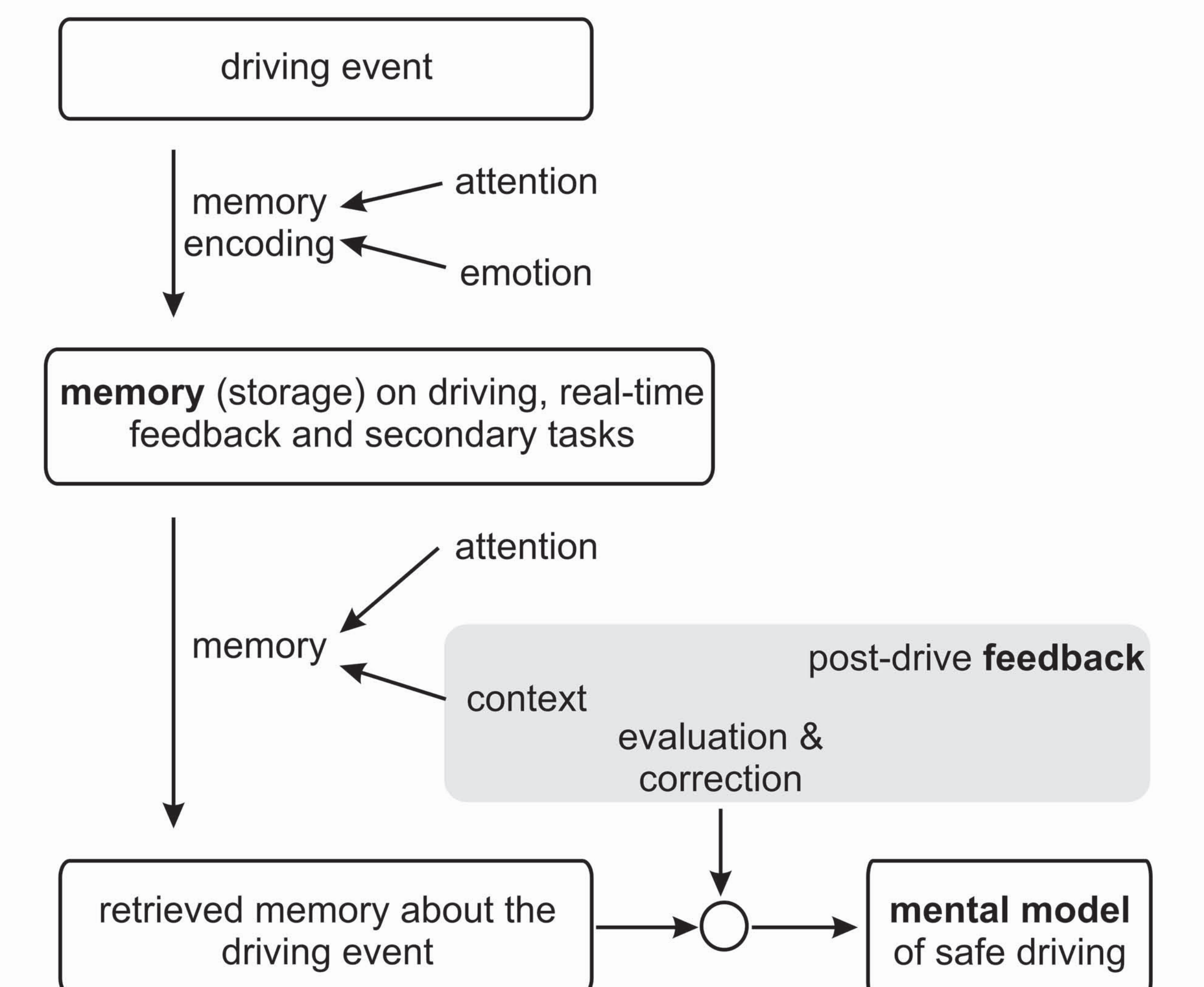- reinforcement type
- content

"Where"
- location

Literature Review → Model → Experiments

A General Model of Driver-Feedback Interaction

during driving   post driving

Attentional Process

Memory Process

Mechanisms of Feedback

References:
- Donmez, B., Boyle, L., & Lee, J. D. (2008). Designing feedback to mitigate distraction. In M. A. Regan, J. D. Lee, & K. L. Young (Eds.) Driver Distraction: Theory, Effects and Mitigation. CRC Press: Boca Raton, FL.
- Klauer, S. G., Sudweeks, J., Hickman, J. S., & Neale, V. L. (2006). How risky is it? An assessment of the relative risk of engaging in potentially unsafe driving behaviors. AAA Foundation for Traffic Safety.
- Treat, J. R., Tumbas, N. S., McDonald, S. T., Shinar, D., Hume, R. D., Mayer, R. E., Stansifer, R. L., & Castellan, N. J. (1979). Tri-level study of the causes of traffic accidents: final report. (DOT HS 805 009). Indiana University Institute for Research in Public Safety: Bloomington, IN.

[1] **jfeng@mie.utoronto.ca**   [2] **donmez@mie.utoronto.ca**