

Attention in Context

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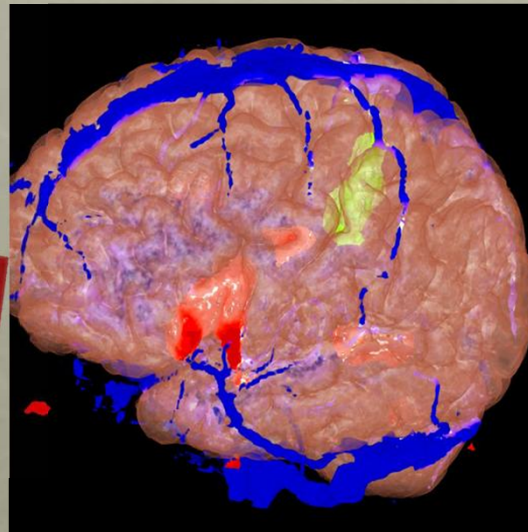
Supported by NHTSA, GM, and many graduate students



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Addressing driver distraction?

Distraction task



Crash risk

Decontextualized distraction

- “Context” in naturalistic studies often simply justifies validity; is not used to explain
- Simulator scenarios often do not consider representative sampling to support extrapolation
- Detailed theories of driver cognition, but not of driving domain
- Static cognition (workload), but not dynamic cognition (interruption and resumption), roadway interaction, social interaction

Definitions of distraction

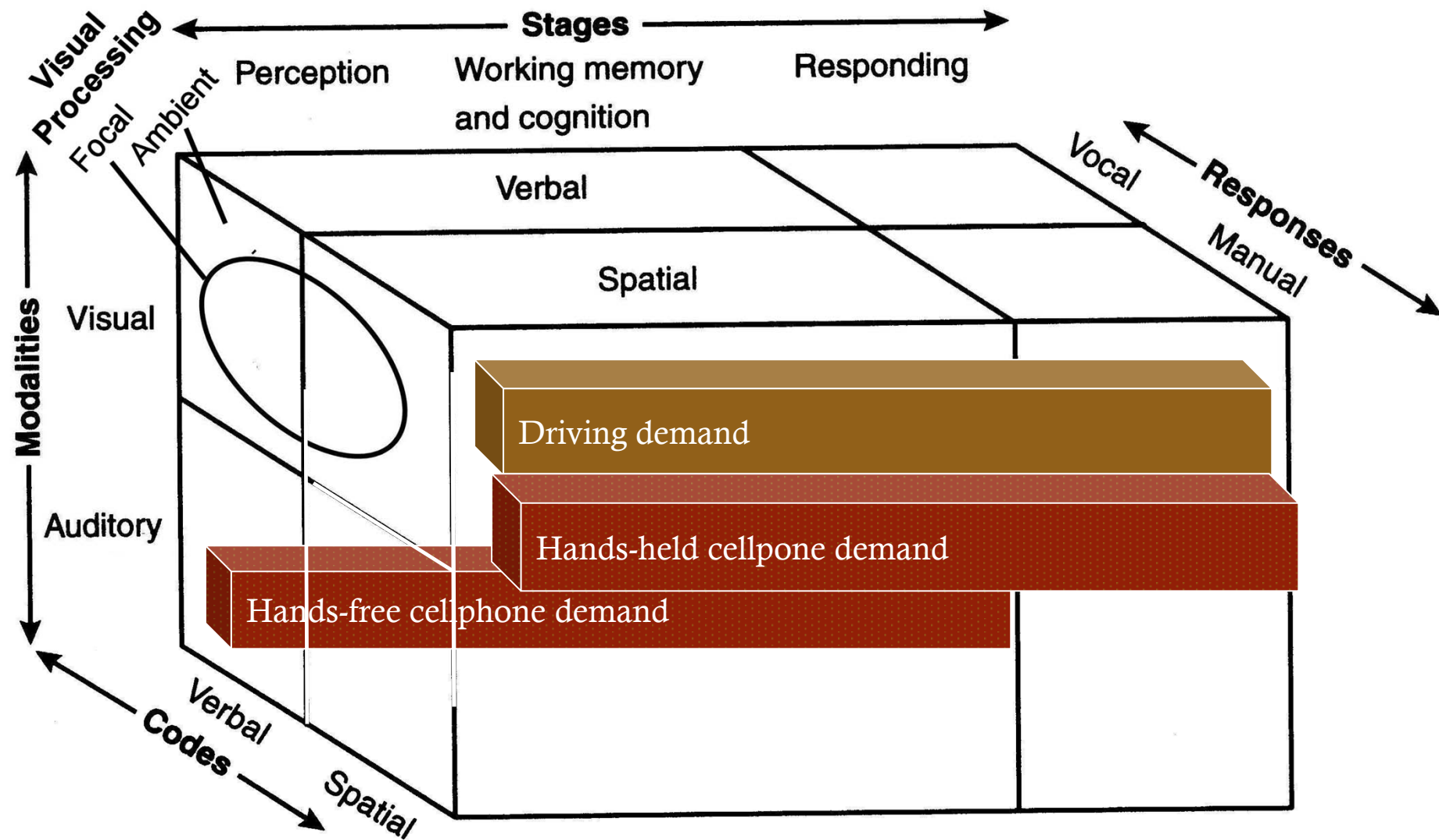
“Driver distraction is the diversion of attention away from **activities critical for safe driving** toward a **competing activity**”
(Lee, Regan, Young, 2008)

- Process of *attending*
- Equal focus on *competing* and *critical driving activities*
- Focus on single agent distracted drivers, NOT *cars, traffic, or social network*

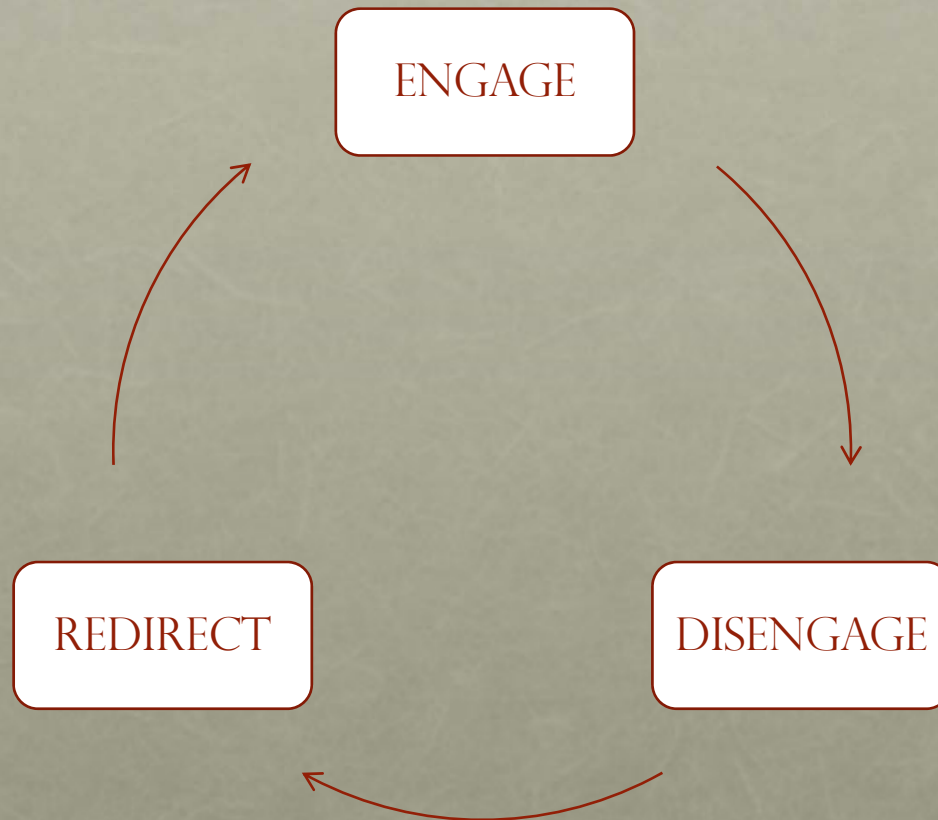
Context matters: Some initial thoughts

- Cognitive context
 - Temporal context and activation potential
 - Interactions across multiple time-scales
- Situational context
 - Theory of environment to match theory of mind
 - Distracted vehicles or cyborg distraction
- Social context
 - Distracted traffic
 - Distraction as a disease that spreads through a social network

Cognitive context: Attending vs. attentional resources



Cognitive context: Attending vs. attentional resources



Cognitive context: Interacting with an iPod

Four distracting tasks

Radio tuning

Playlist selection

Short (20 songs)

Medium (75 songs)

Long (580 songs)

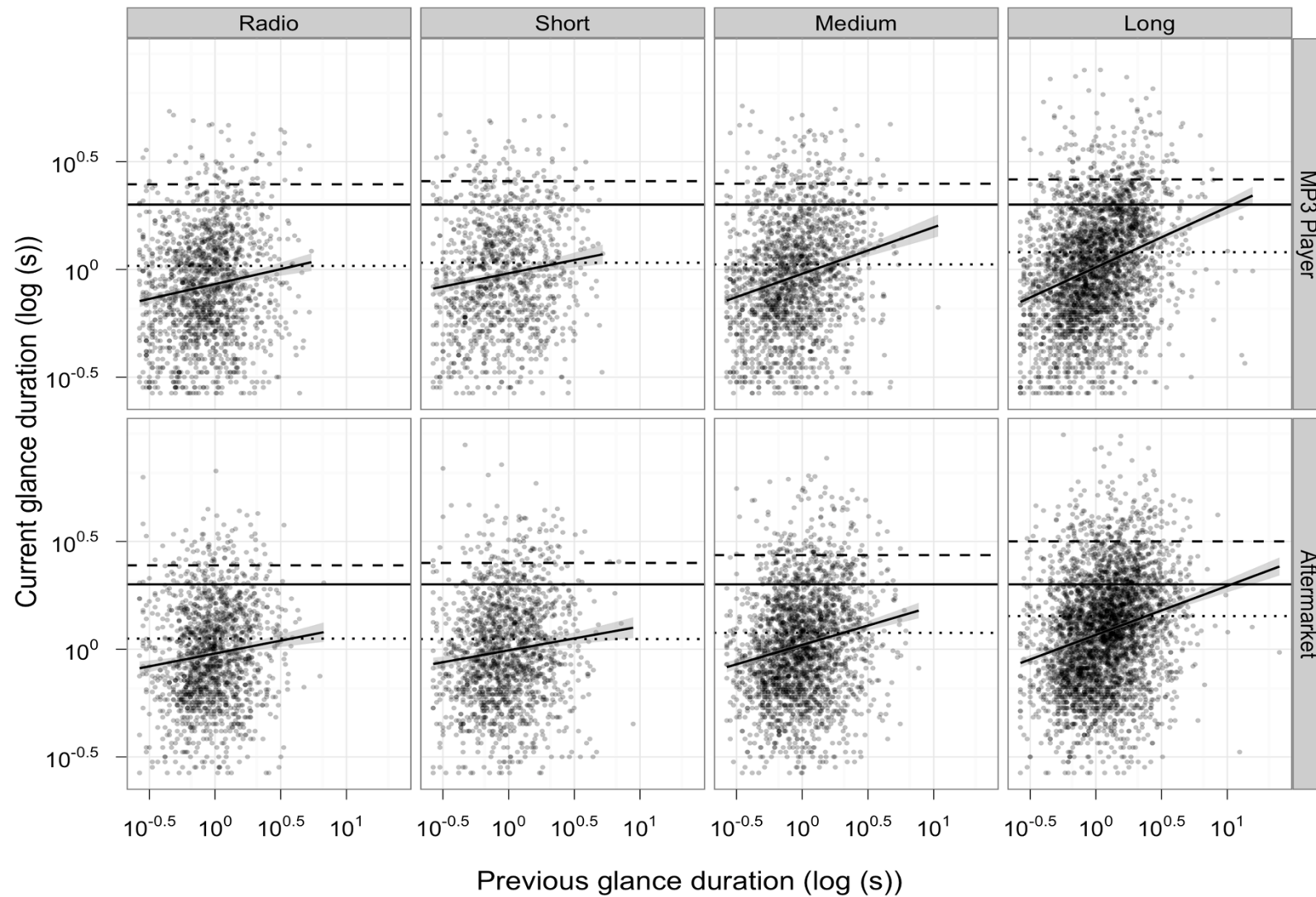
Two devices

iPod

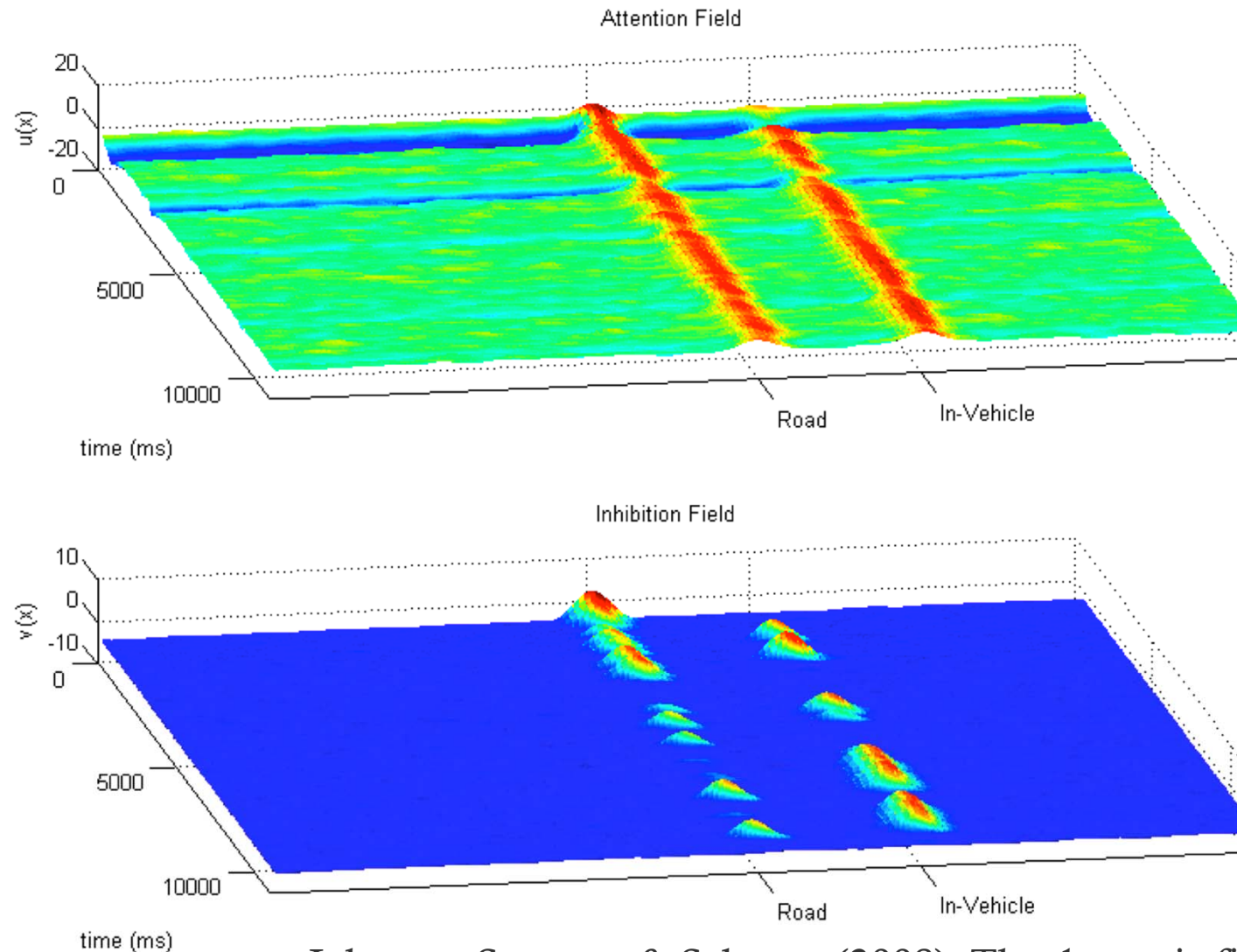
Aftermarket controller



Long glances lead to long glances

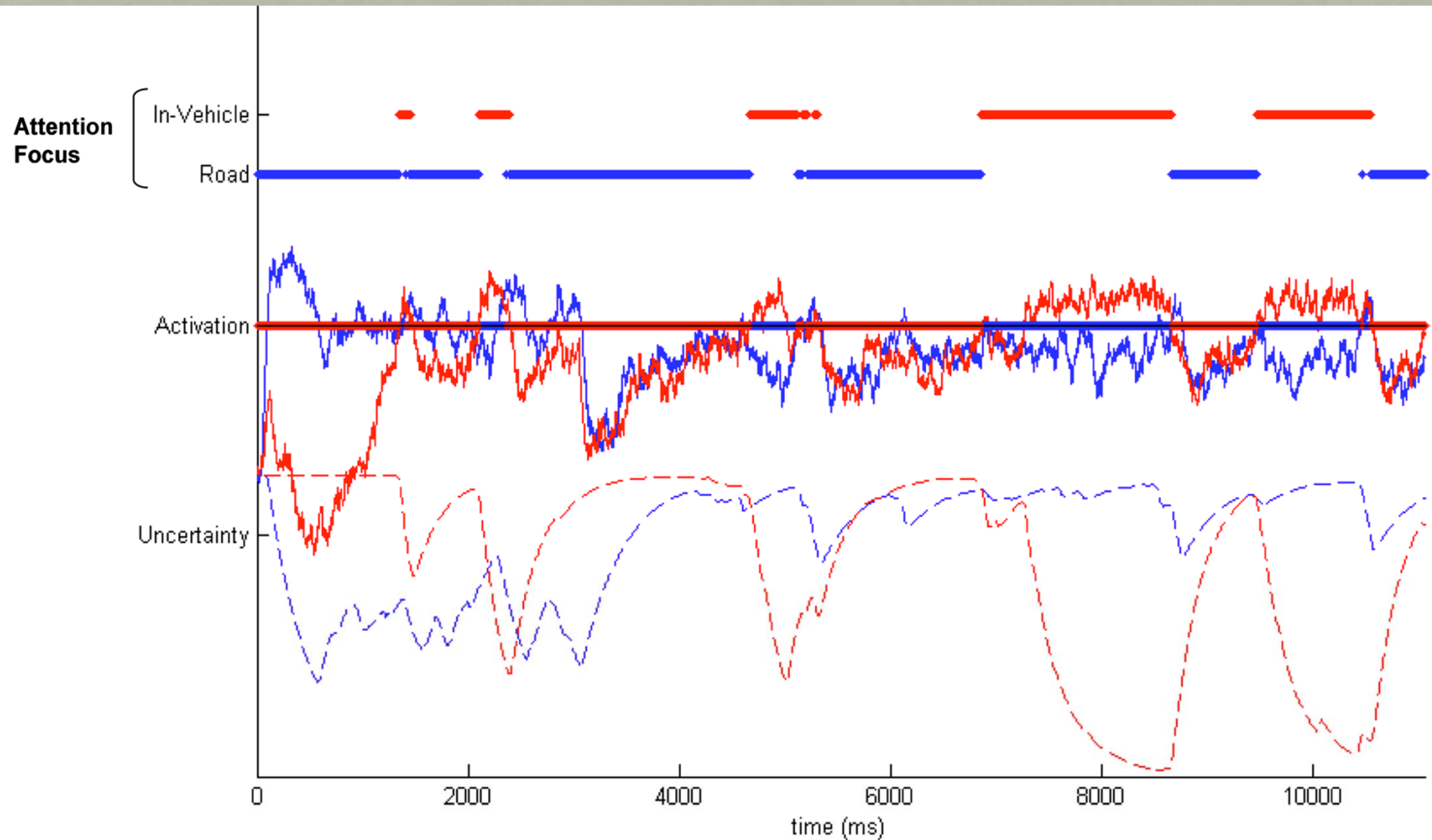


Attending across time

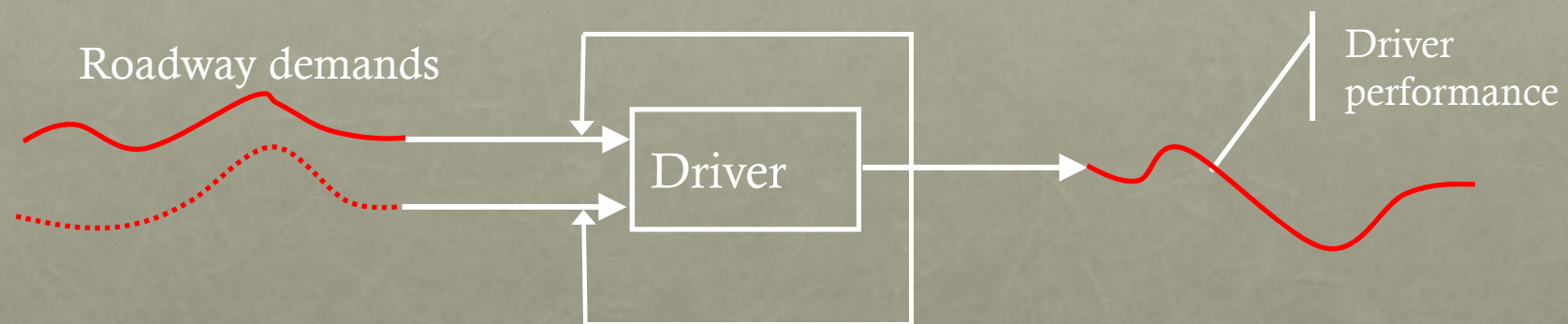


Johnson, Spencer, & Schöner (2008). The dynamic field theory and the dynamics of visual cognition. *New Ideas in Psychology* 26, 227–251.

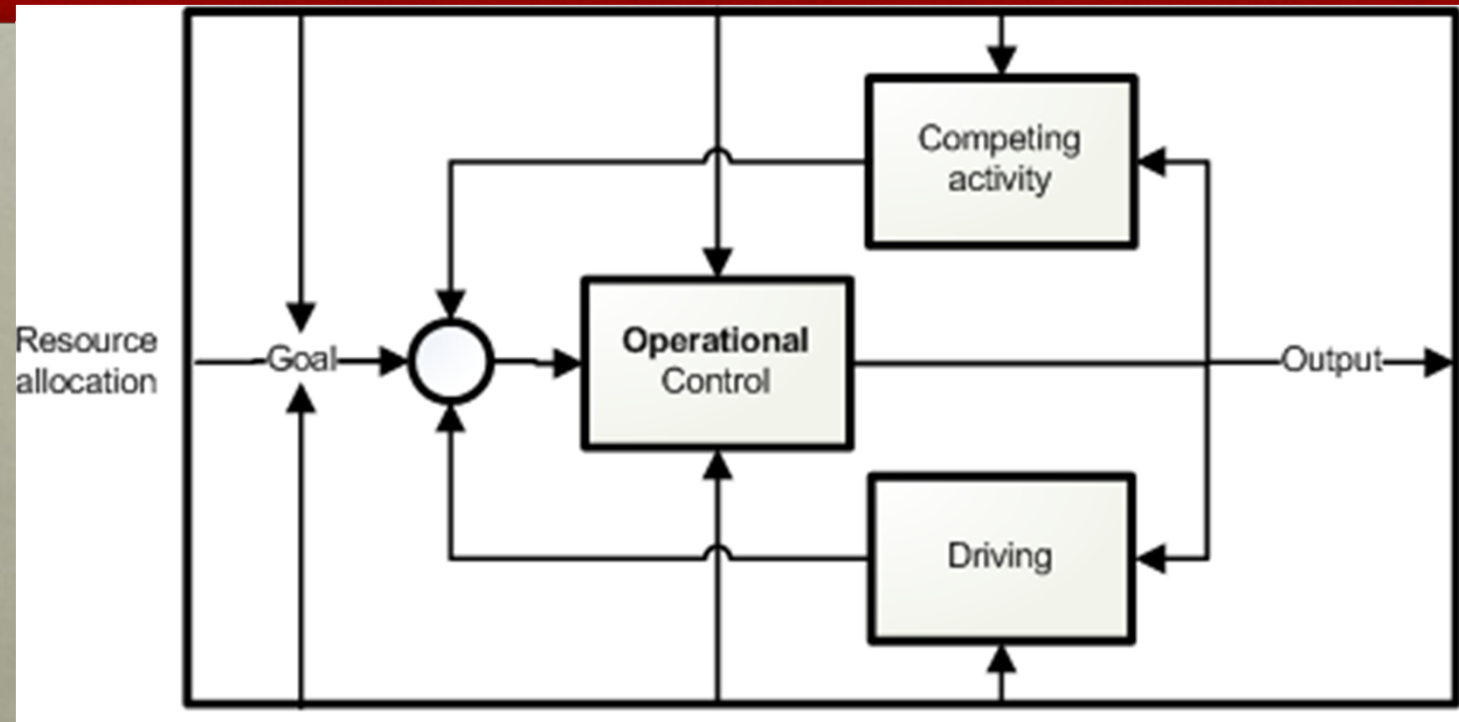
Attending across time



Theory of environment: Time matters

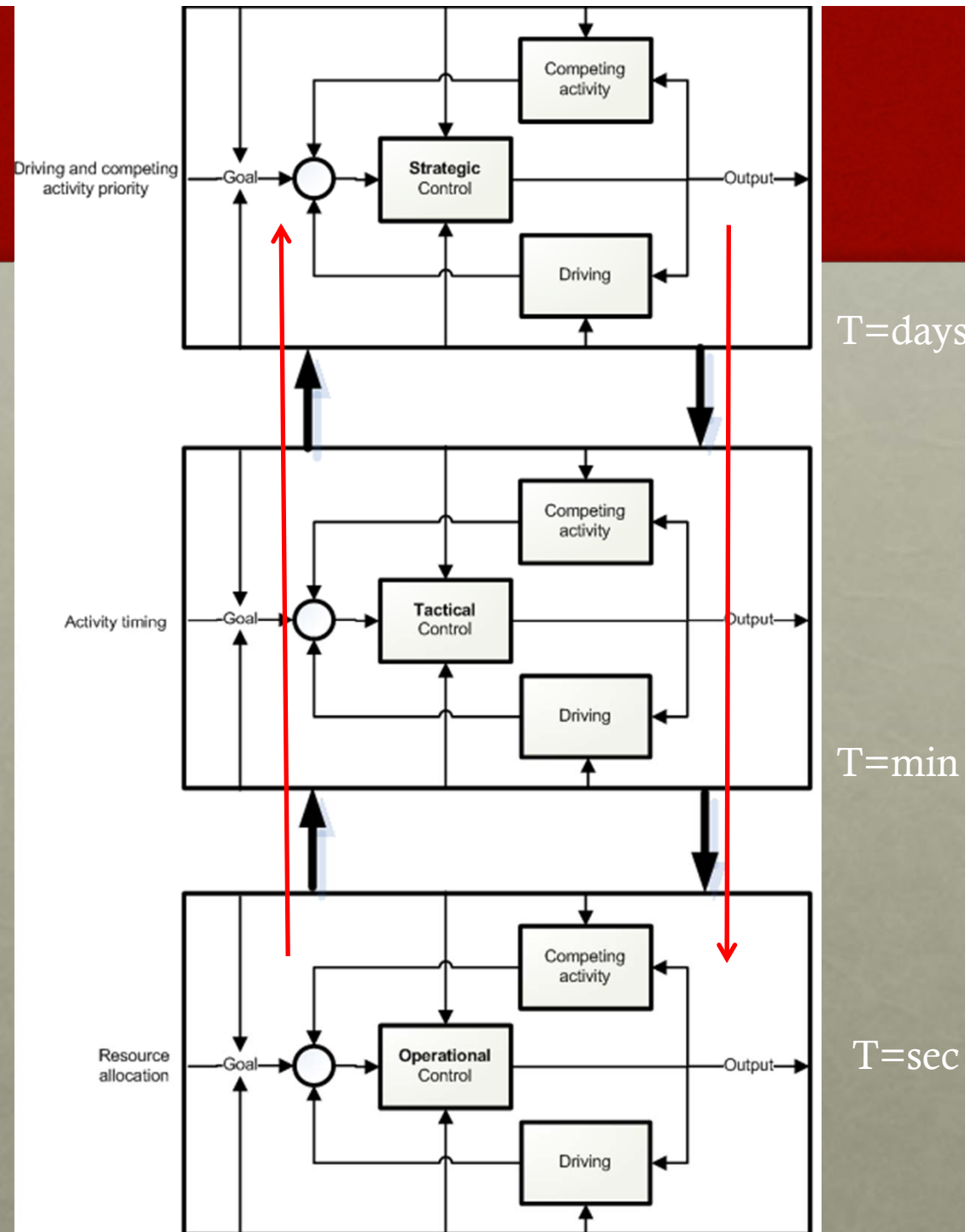


Cognitive context: Interactions across time scales



- Proactive control rather than passive response to demands

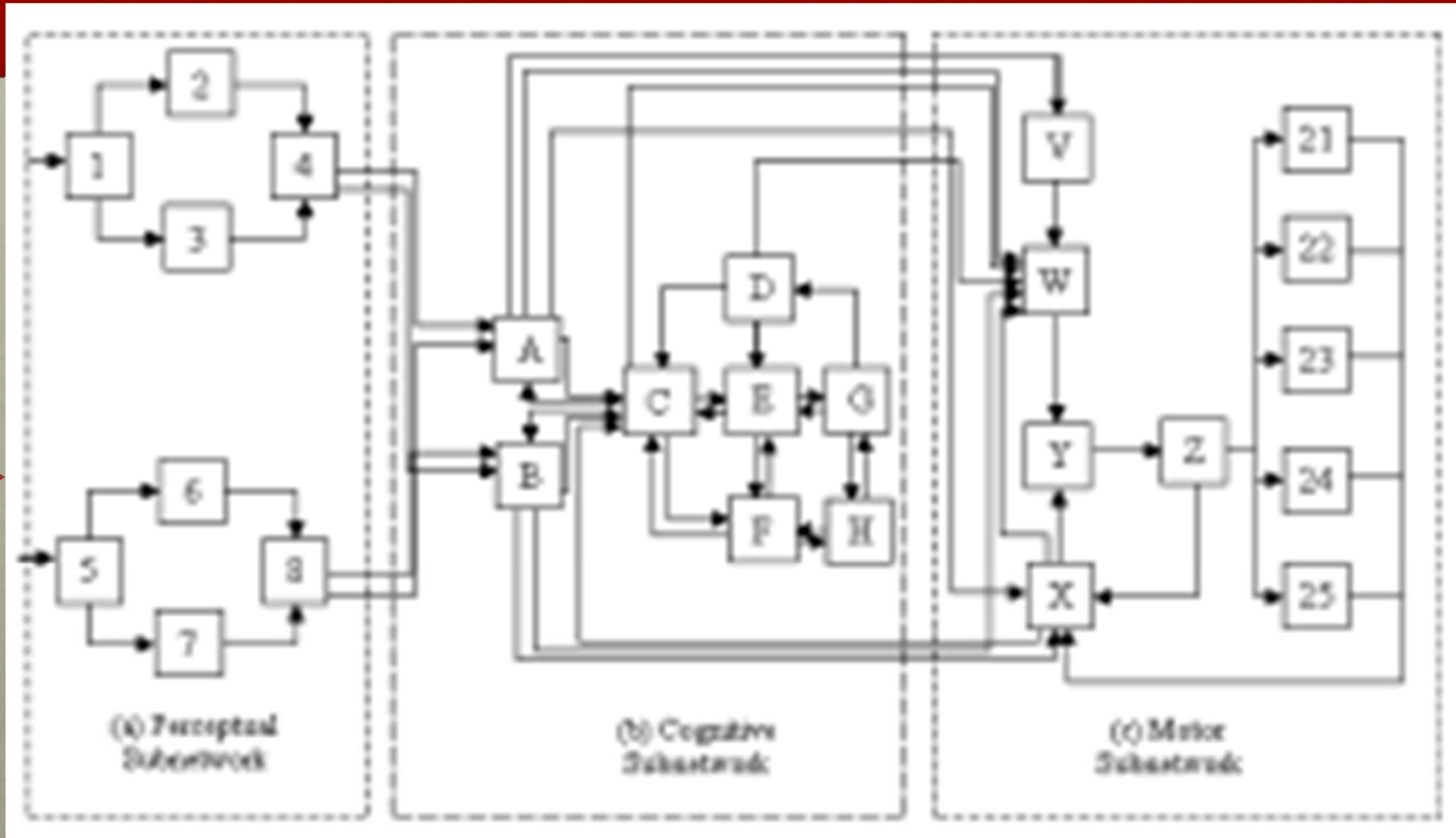
Temporal context: Multi-level control and cascade effects



Context matters

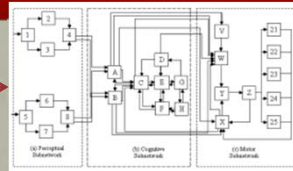
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The environment?

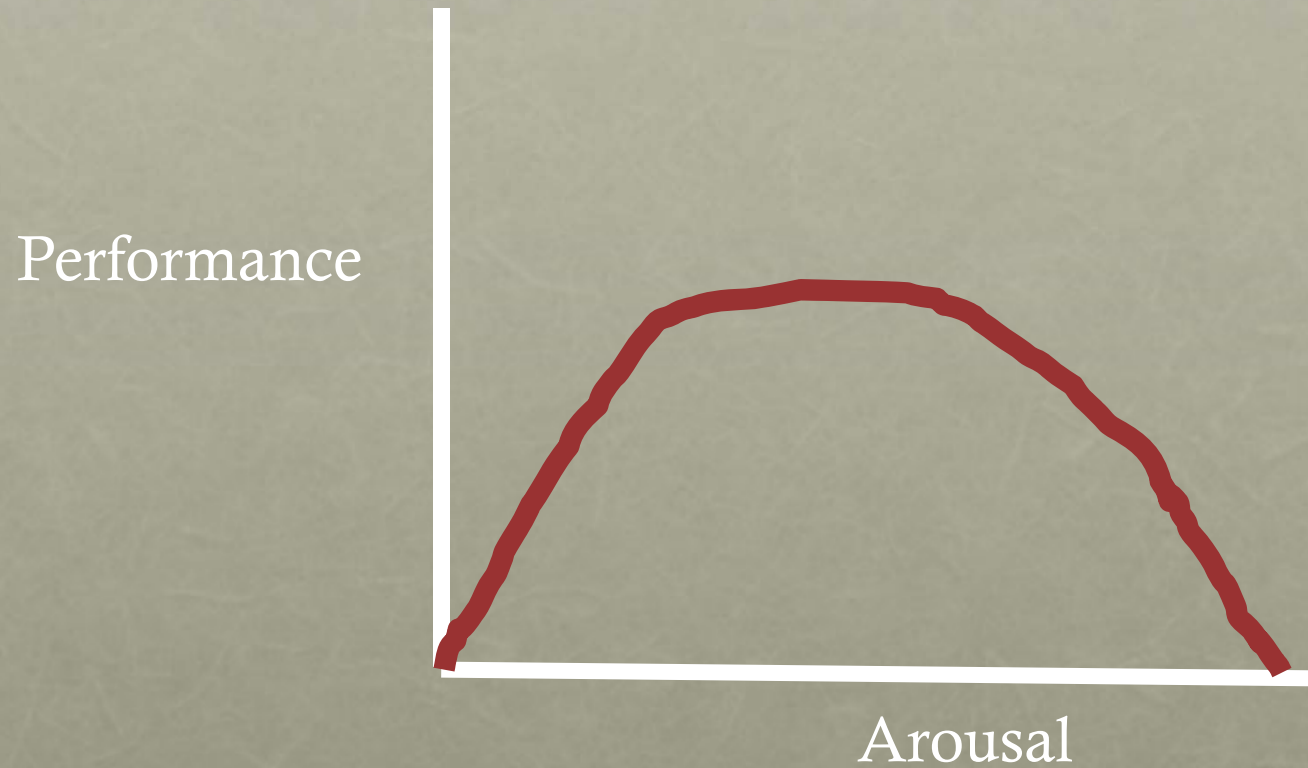


QN-MHP (Liu, 2006)

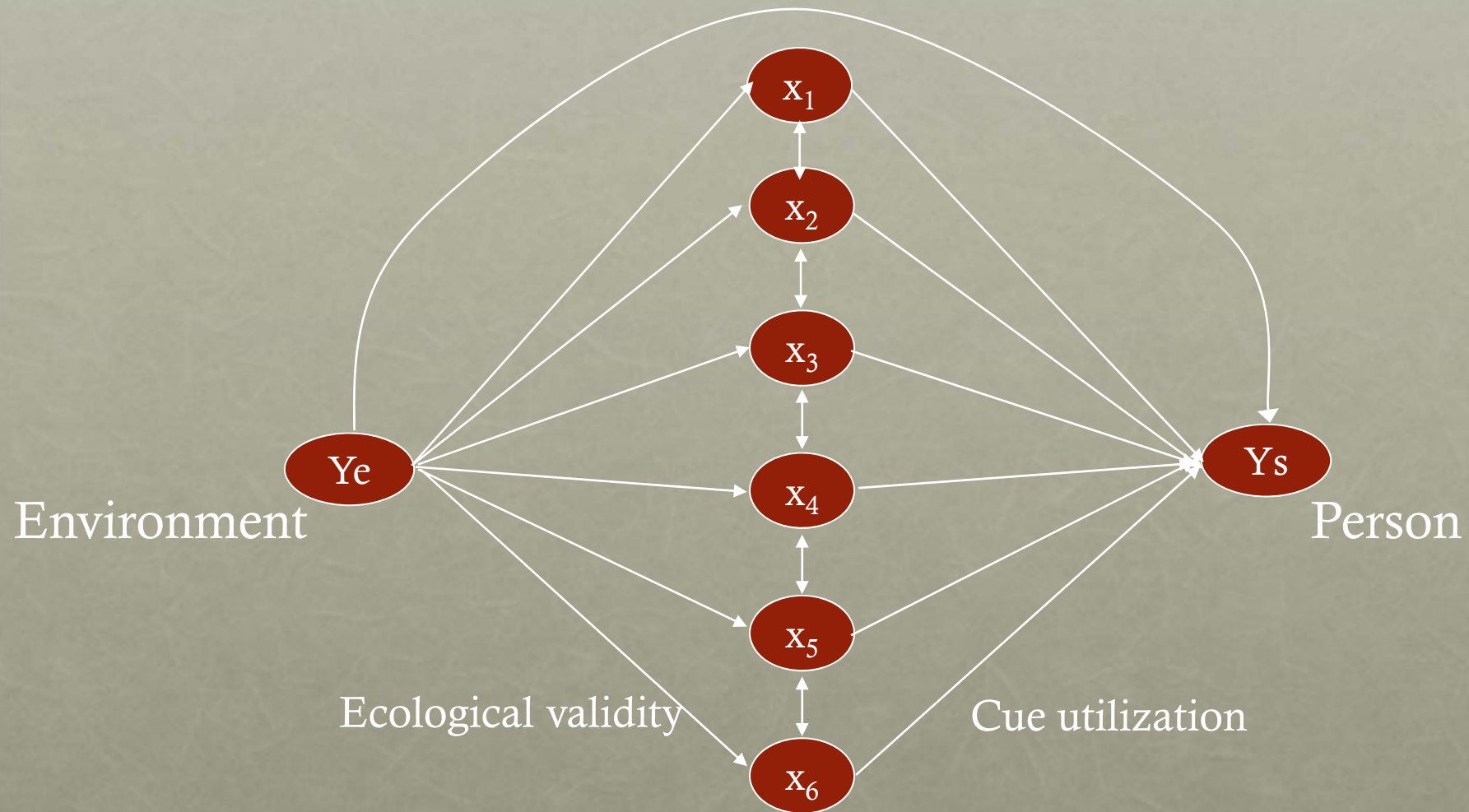
Theory of driver and environment



Mind/environment models vs models of mind



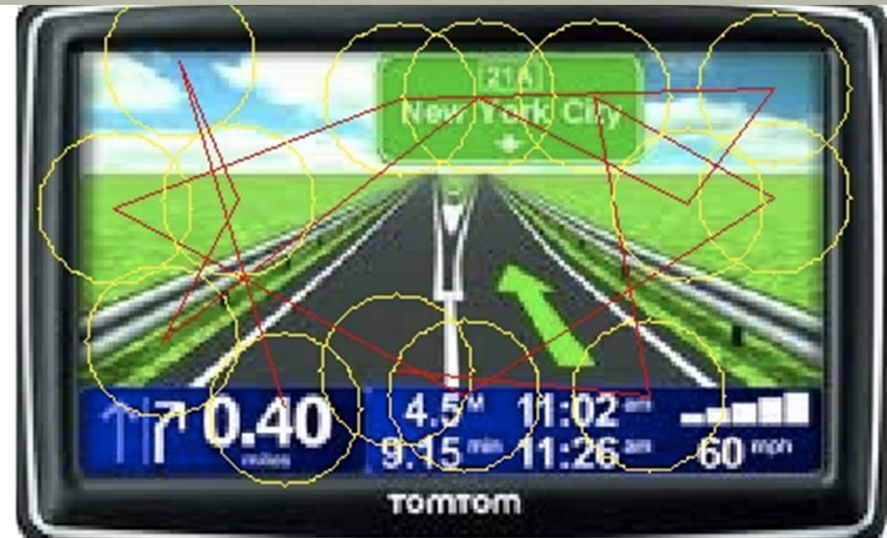
Mind/environment model vs model of mind



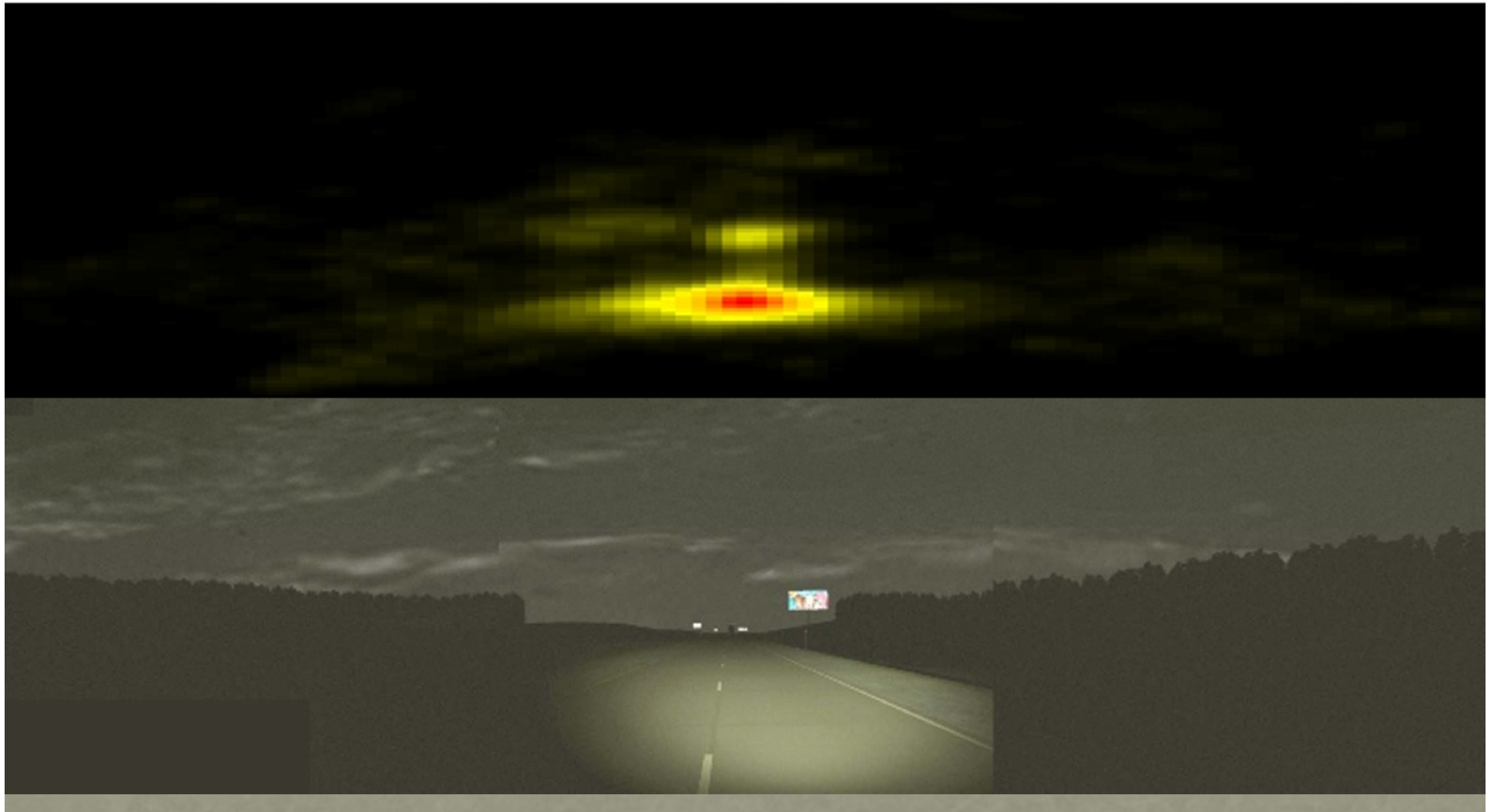
Saliency maps of roadway and distractors

High visual complexity

Misplaced saliency



Saliency maps of roadway and distractors



Theory of environment: Observability and Controlability

- Salience (exogenous)
- Predictability (endogenous)
- Familiarity (endogenous)
- Time constant of onset and response

Distracted vehicles and cyborg distraction



Where people and technology are becoming intermeshed, a useful unit of analysis for cognition might not be the person, but the tech-person combination

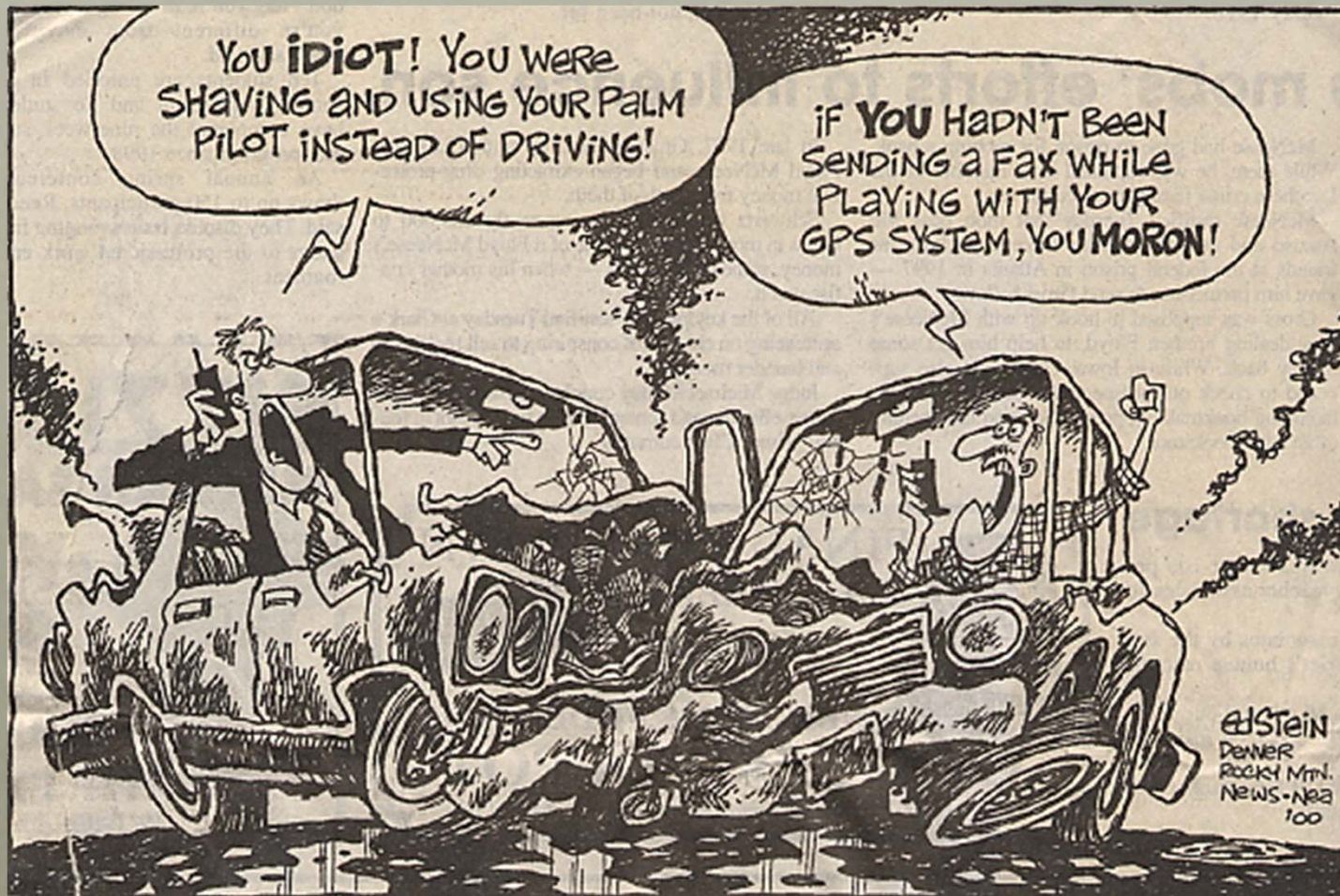
Distracted vehicles and cyborg distraction



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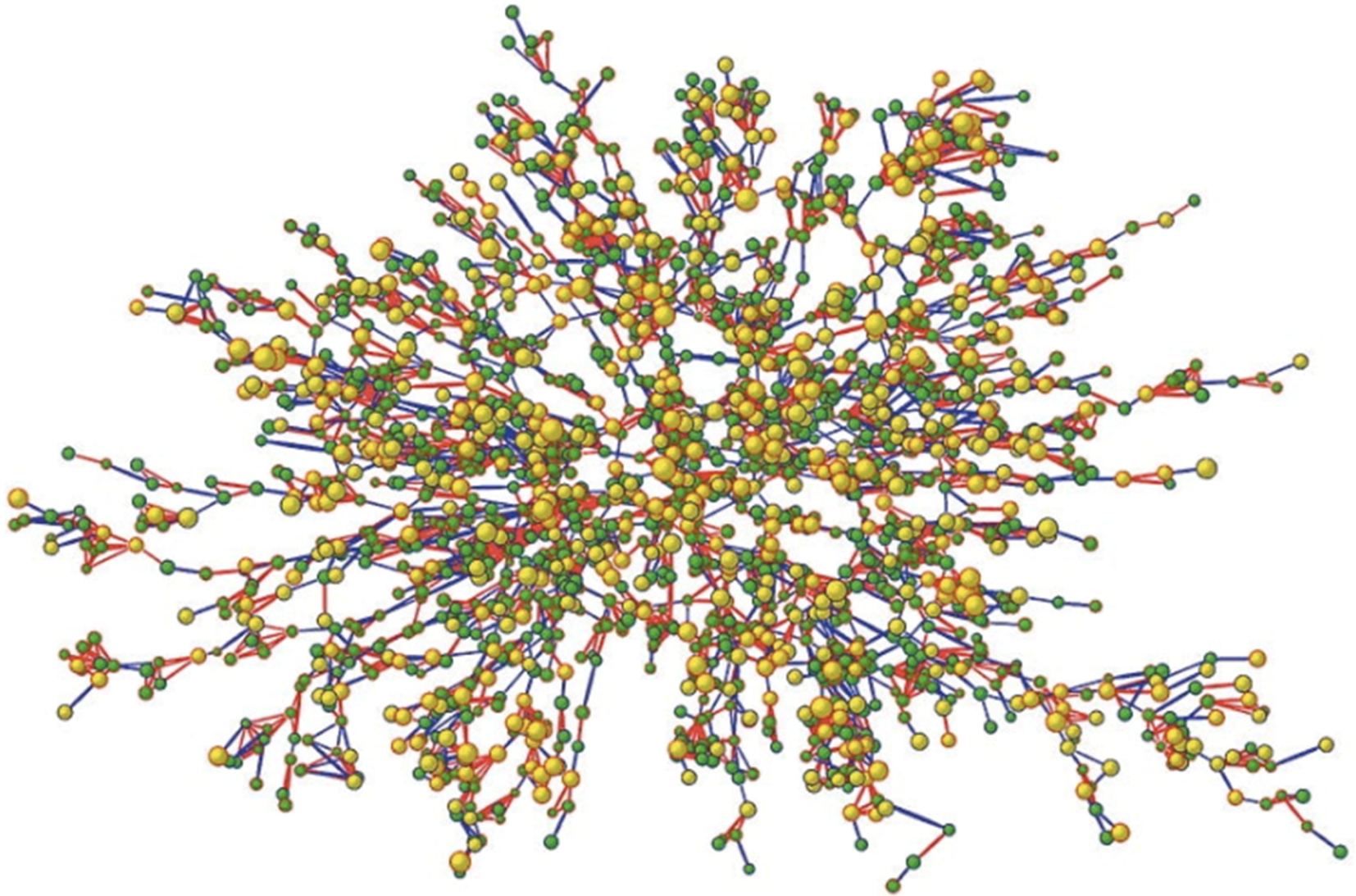
Social context: Distracted traffic



Social context: Distraction as a communicable disease

- Framingham heart study tracked 12,067 people over 32 years
- Smoking and obesity spread through social network over time
- More likely to be a smoker or be obese if friends are
- Same for distraction?

Obese people are yellow nodes



Context and attention

