

# Psychology of Roadway Interactions: Implications for Road Safety

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# Traffic Crashes: The Numbers

☞ In 2014:

☞ Pedestrians:

- 4,884 killed (more than 12 per day)
- 65,000 injured\* (one injury every 8 minutes)

☞ Bicyclists:

- 726 people killed (~2 per day)
- 50,000 injured\* (one injury every 10.5 minutes)

☞ Economics:

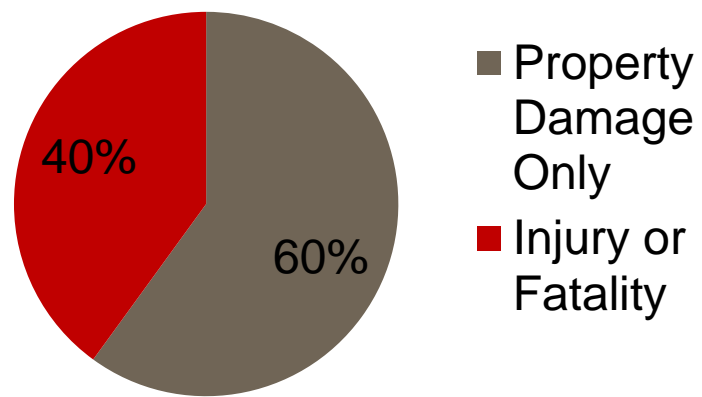
- Cost of pedestrian injury for kids 14 and under: \$5.2billion
- Cost of bicyclist injury: \$4billion

\*Known to be underreported in police data

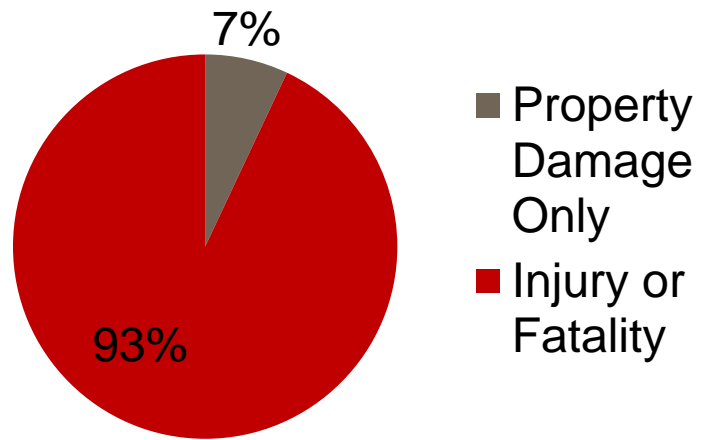
Source: National Highway Traffic  
Safety Administration Traffic Safety  
Facts 2014; PBIC

# Crashes: Injury Severity

## Automobile only

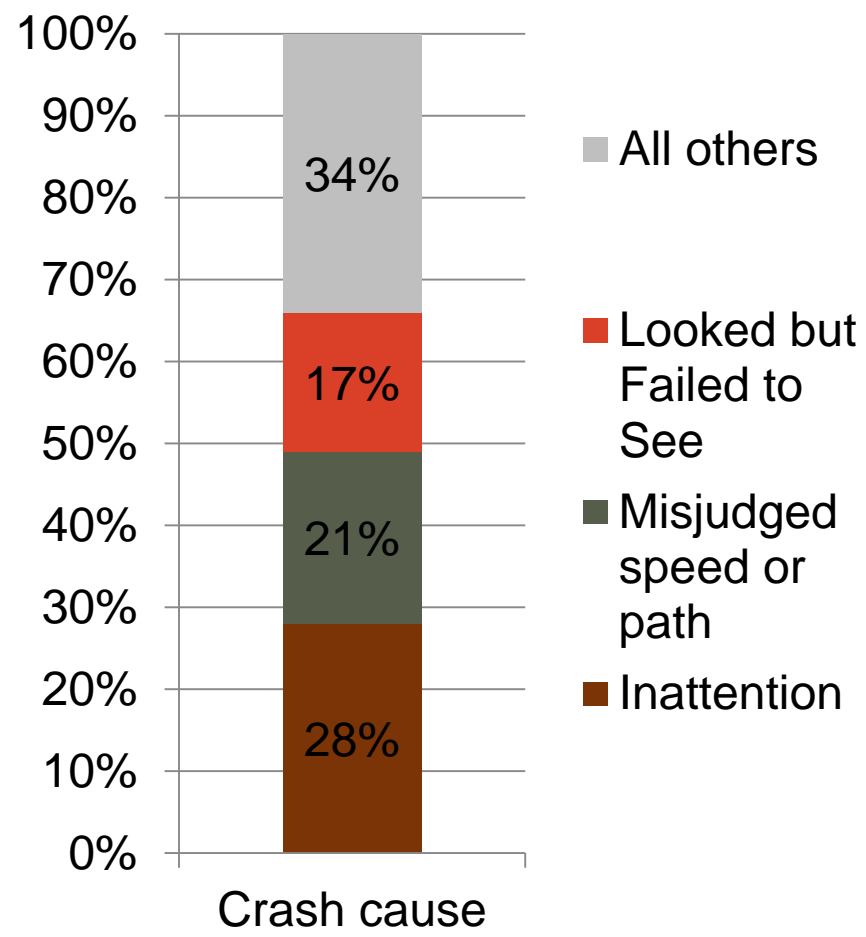


## Automobile and Bicyclist or Pedestrian

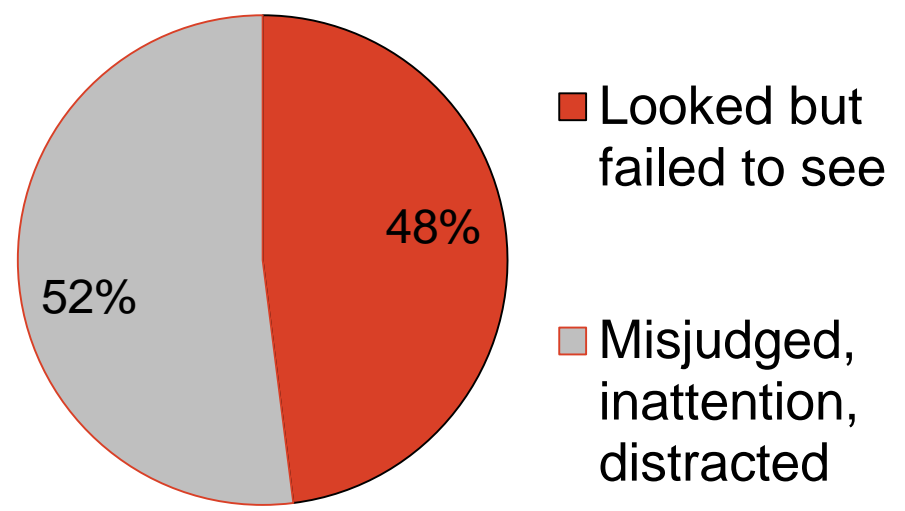


Source: Gladhill & Monsere (2012). Exploring Traffic Safety and Urban Form in Portland, Oregon. *Transportation Research Record: Journal of the Transportation Research Board*, 2318 (-1), 63-74.

# Crash Causation



## Day time, unimpaired driver



Source: Brown, I. D. (2005). Review of the "looked but failed to see" accident causation factor. UK Department for Transport



# What causes “Looked but failed to see” (LBFTS) errors?

- Multiple hazard perceptions tests in laboratories demonstrate that drivers do not recall or react to everything in their visual environment, even critical events, despite opportunity to see hazards
- “It is plausible to suggest that the looked-but-failed-to-see error does not arise due to the physical environment but **as a result of the drivers’ visual search strategy and/or mental processing.**” – Herslund & Jorgensen, 2003

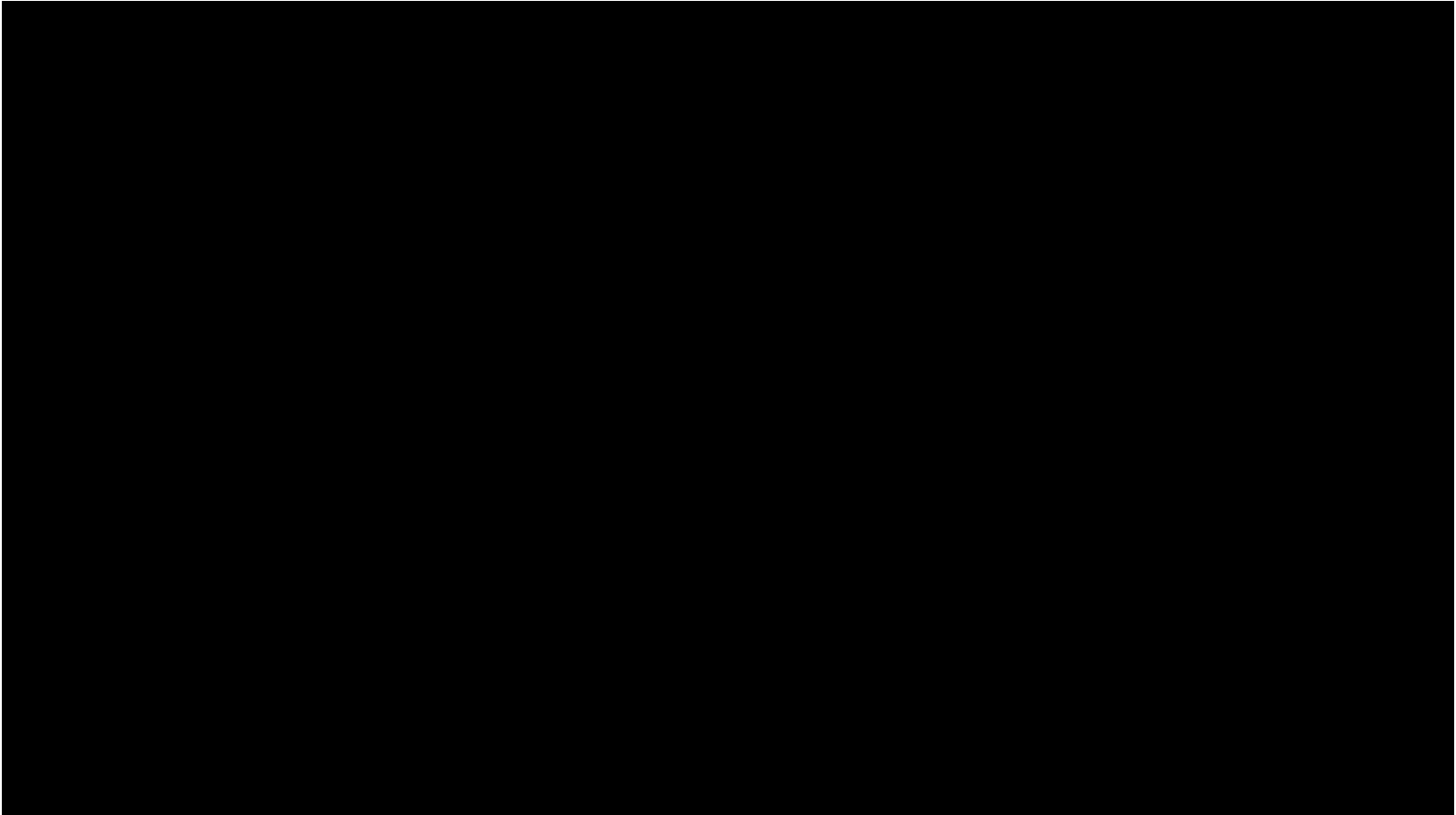
# Controlled Processes

- *Are intentional*
- *Involve awareness*
- *Require effort*
  - Typically slow
- Executed serially
- *Tend to be linguistic*
  - Reportable in words





# A test of attention (count the passes by the team in white shirts)





# A test of attention (count the passes by the team in white shirts)



Image credit: Daniel Simons, personal website

# Inattentional Blindness (IB)

Cause:

A *psychological* lack of attention

Outcome:

Failing to perceive an unexpected stimulus in plain sight

Source: Mack, A., &  
Rock, I. (1998).  
Inattentional blindness.  
Cambridge, Mass: MIT  
Press.



# The psychology of (in)attention

- ∞ “Attention creates no idea” – William James, 1890
- ∞ “It is possible to conceive of [attention] as **an effect and not a cause, a product and not an agent** . . . Attention *creates* no idea; an idea must already be there before we can attend to it”  
-(William James, *The Principles of Psychology* (1890) p. 450)
- ∞ Are certain types of ideas more important than others?

# An important type of idea: Attitude

- ∞ Evaluation of a person, object, group, concept, etc.
- ∞ “Psychological tendency to evaluate an entity with favor or disfavor” (Eagly & Chaiken, 1998)
  - Has multiple components
  - Has conscious and unconscious aspects
  - Can affect mental models and processing
  - Can direct attention

# The ABCs of attitudes

**Affective**

- Moods, emotions

**Behavioral**

- Intended and enacted behaviors

**Cognitive**

- Thoughts, beliefs

# Attitude toward bicyclists: Negative attitude example

## Affective

- Moods, emotions
- Ex: “Bicyclists annoy me”

## Behavioral

- Intended and enacted behaviors
- Ex: “I do not want to bicycle”

## Cognitive

- Thoughts, beliefs
- Ex: “Bicyclists should not block cars”

# Explicit vs implicit attitudes

## Explicit Attitudes

- Deliberate, conscious
- Voluntarily accessible, can be acknowledged

## Implicit Attitudes

- Automatic, below conscious awareness
- Involuntarily activated

# Inconsistent explicit and implicit attitudes

## Explicit Attitudes

- Deliberate, conscious
- Ex: “Bicyclists are doing good things for the environment”

## Implicit Attitudes

- Automatic, below conscious awareness
- Ex: “Bicyclists are annoying”





# Implicit vs. Explicit Attitudes

- Implicit and explicit attitudes are *distinct*, but *related*
- Meta-analysis:  $r = .27$  for implicit attitudes for prediction of behavioral, judgment, and physiological measures (Greenwald, et al. 2009)
- Better predictor than explicit attitudes when:
  - automatic processing conditions (e.g., time pressure, cognitive load)
  - Sensitive topics like prejudice
  - Nonverbal or subtle behaviors

# Implicit Bias

## ☞ Implicit bias affects:

- Policy preferences
- Doctors' behaviors with minority patients
- Hiring and job interview selection
- Police behavior with minorities

## ☞ Might implicit bias affect issues in the transportation domain?

# Bias in the Transportation Context

- Previous studies have shown that drivers do not respond equally to all pedestrians
  - Drivers yielded more frequently to visibly disabled pedestrians (Harrell 1992)
  - Drivers more likely to yield to pedestrians in same age group (Rosenbloom et al 2006)
  - Drivers in highest status cars less likely to yield to a pedestrian (aka “The BMW Study” ) (Piff et al 2012)
  - Drivers displayed racially-biased yielding behaviors to pedestrians at crosswalks (Goddard et al (2015), Coughenour et al (2017))

# Bias in the Transportation Context

- ✎ Similarly, drivers do not respond equally to all bicyclists
  - Walker (2007) and Florida DOT (2011) determined that drivers passed more closely to male, Lycra-wearing “cyclists”
  - Walker and Garrard (2014) found that drivers only gave more passing distance to “Police: Video Recording in Progress” vest

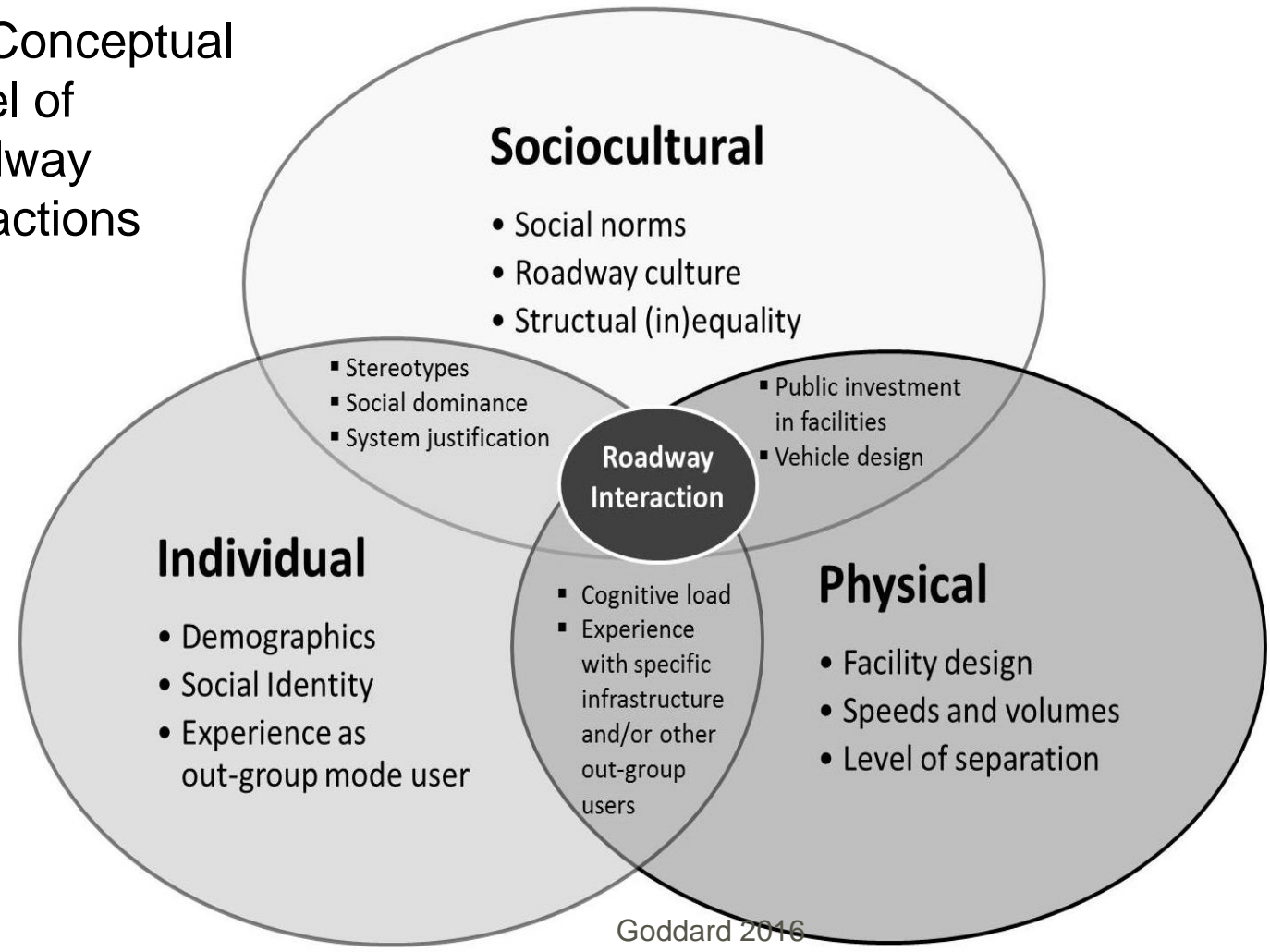


# Bias in the Transportation Context

- ∞ Point-of-view via mode may affect evaluation of other people's intent or motivation, and future mode choice
  - Gatersleben et al (2013) found that when viewed from a car, people rated a simulated playground interaction as “threatening”, while viewed as a passerby on foot, rated the interaction as playful
  - Moody et al (2016) found that implicit bias toward “car pride” and against bus use improved prediction of mode choice

# Attitudes just one piece of a complex puzzle, but understudied in context of bike/ped safety

## The Conceptual Model of Roadway Interactions



Goddard, T. (2016) "Theorizing bicycle justice using social psychology: Examining the intersection of mode and race with the Conceptual Model of Roadway Interactions." In Golub, A., Hoffman, M., Lugo, A., & Sandoval, G. (Eds.), *Bicycle Justice and Urban Transformation: Biking for All?*.

# Implications

- ⌘ Can design “overrule” these implicit biases?
- ⌘ Can education or enforcement be better informed by theory?
- ⌘ How do we normalize or legitimize all roadway users?

# THANK YOU



Questions on these slides or research cited:  
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