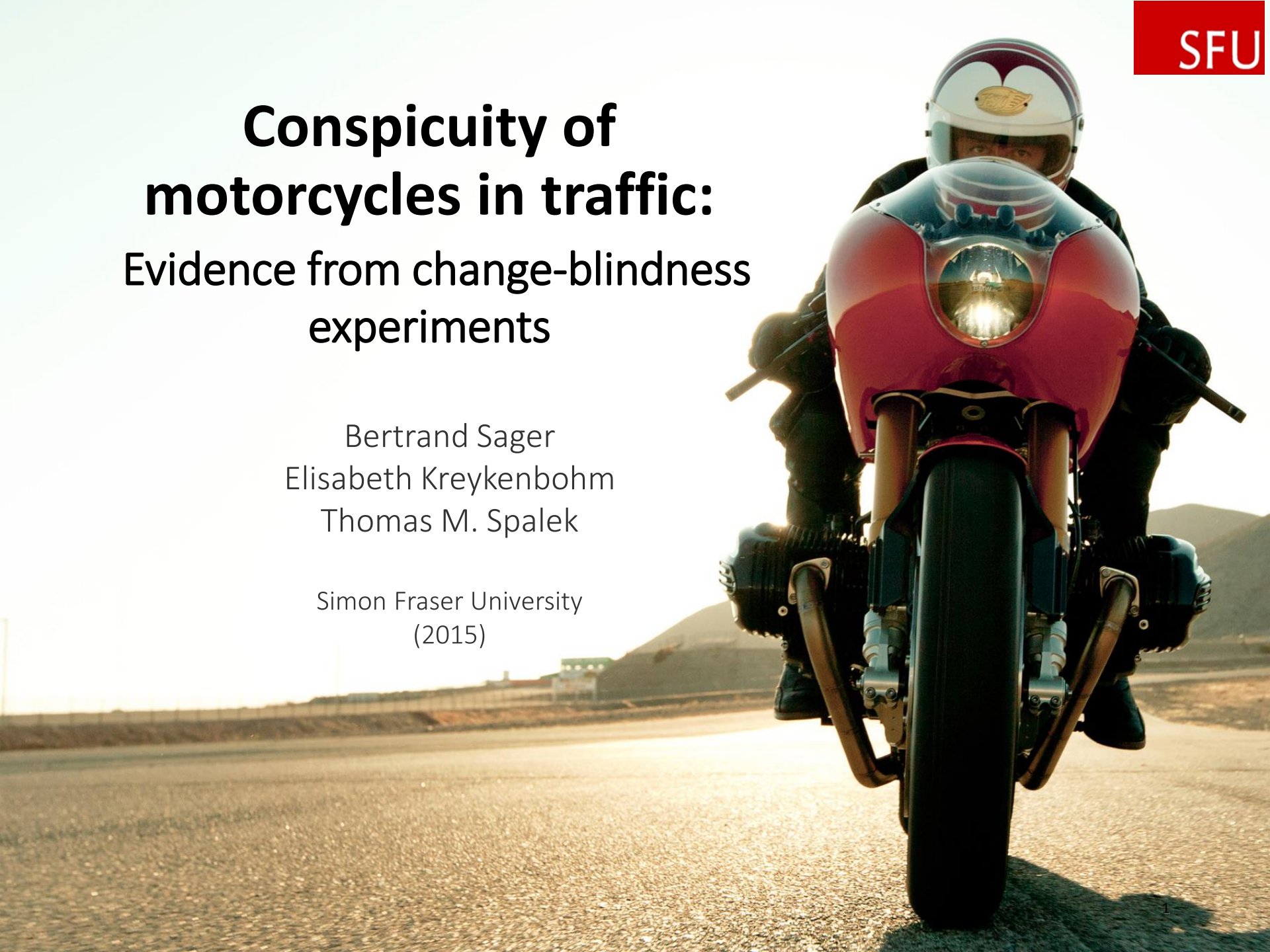
Conspicuity of motorcycles in traffic:

Evidence from change-blindness experiments

Bertrand Sager
Elisabeth Kreykenbohm
Thomas M. Spalek

Simon Fraser University
(2015)



MOTORCYCLE ACCIDENT CAUSE FACTORS AND IDENTIFICATION OF COUNTERMEASURES VOLUME I: TECHNICAL REPORT

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FINAL REPORT

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U.S. DEPARTMENT OF TRANSPORTATION
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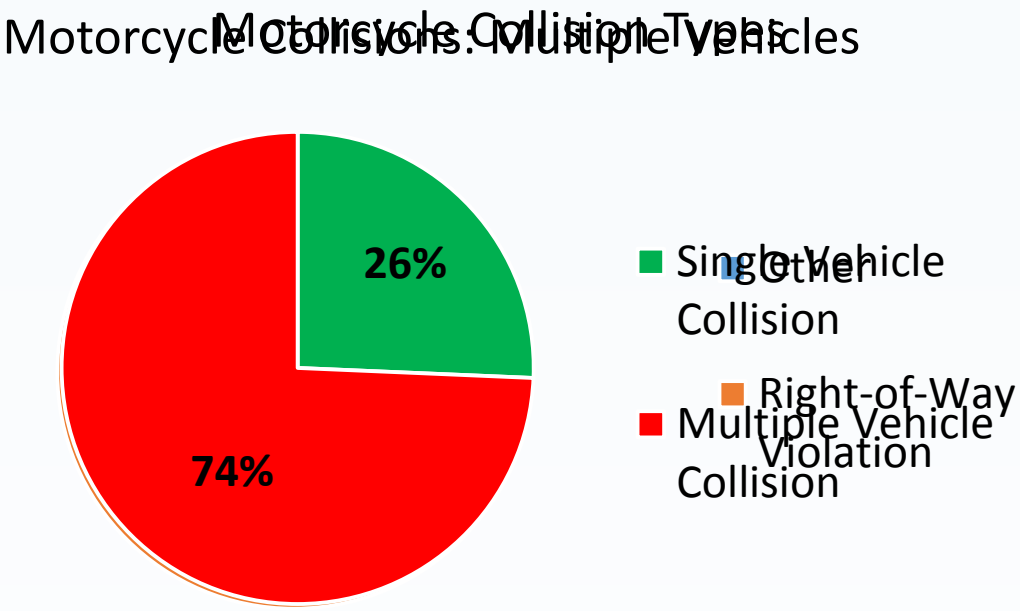
Washington, D.C. 20590

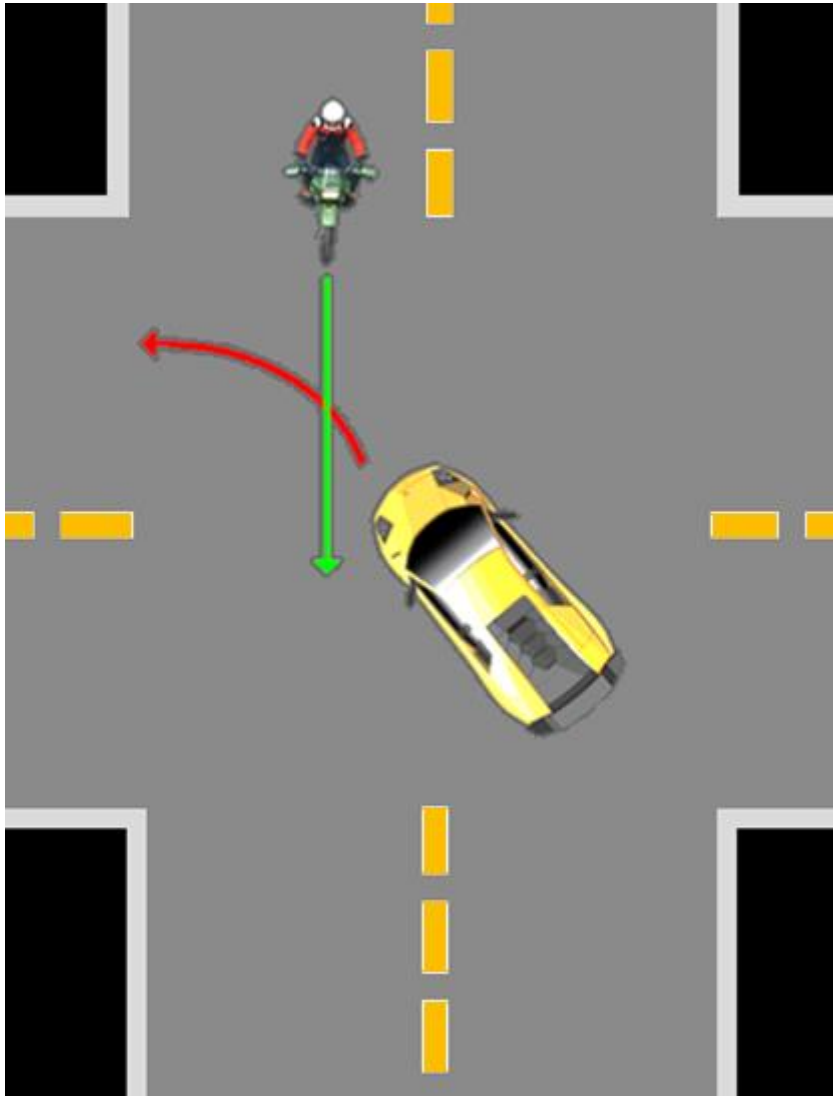
Introduction

1981*



*Hurt, Ouellet, & Thom (1981)

Typical Right-of-Way Violation



Introduction

Common belief: Collisions are due to conspicuity

Motorcycles are difficult to detect because they are small

Introduction

Countermeasures:

- Daytime running lights

Introduction

Countermeasures:

- Headlight modulators

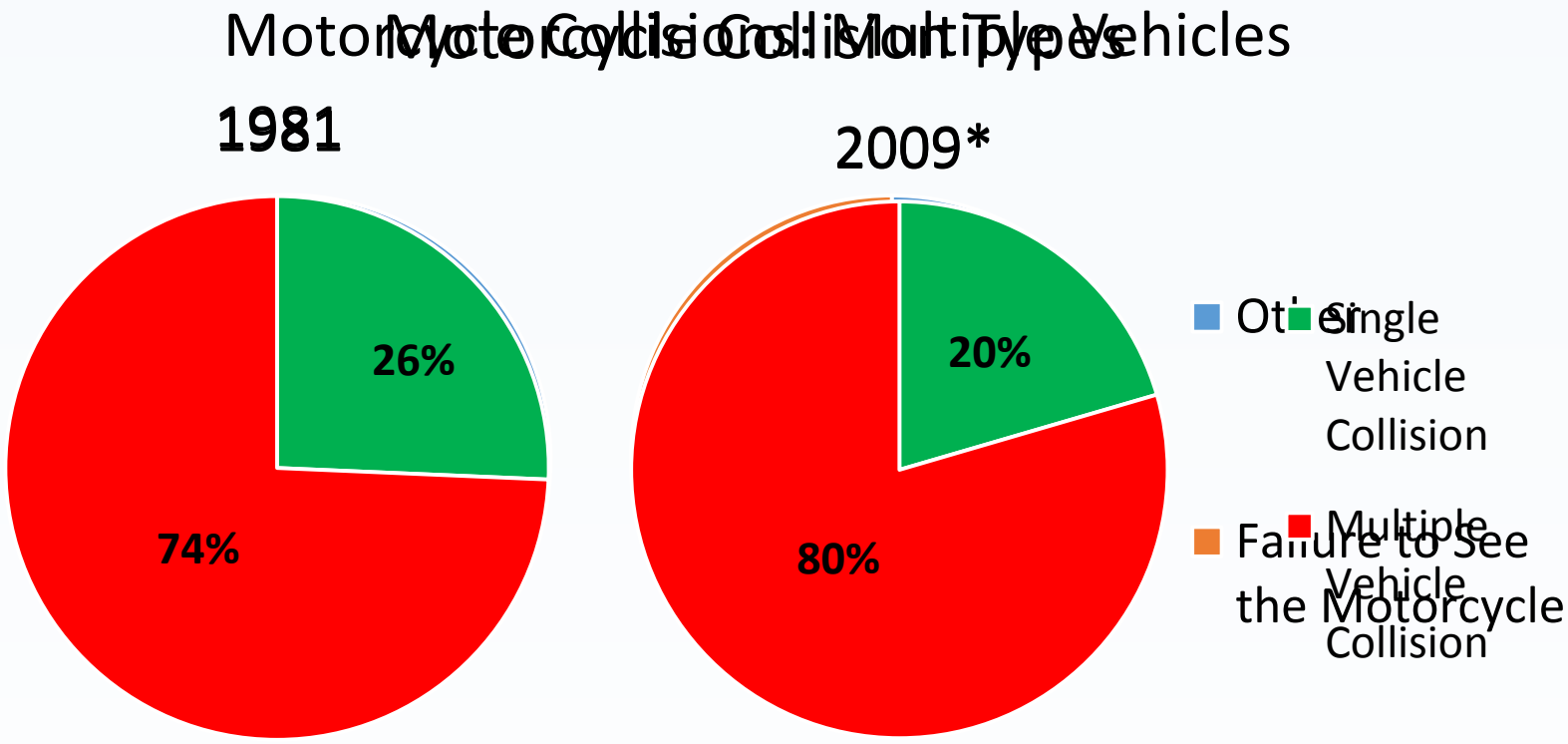
Introduction

Countermeasures:

- Fluorescent jackets

Does enhanced conspicuity reduce collisions?

Does enhanced conspicuity reduce collisions?



*ACEM (2009)

Introduction

If motorcycle collisions are due to poor conspicuity,
And if we have improved motorcycle conspicuity,

Then why have failure-to-see collisions *increased*?

Are these collisions really due to poor conspicuity?
Are motorcycles even inconspicuous?

Change-Blindness

Are motorcycles less conspicuous than cars?

Demo


Rogers


Rogers


Rogers

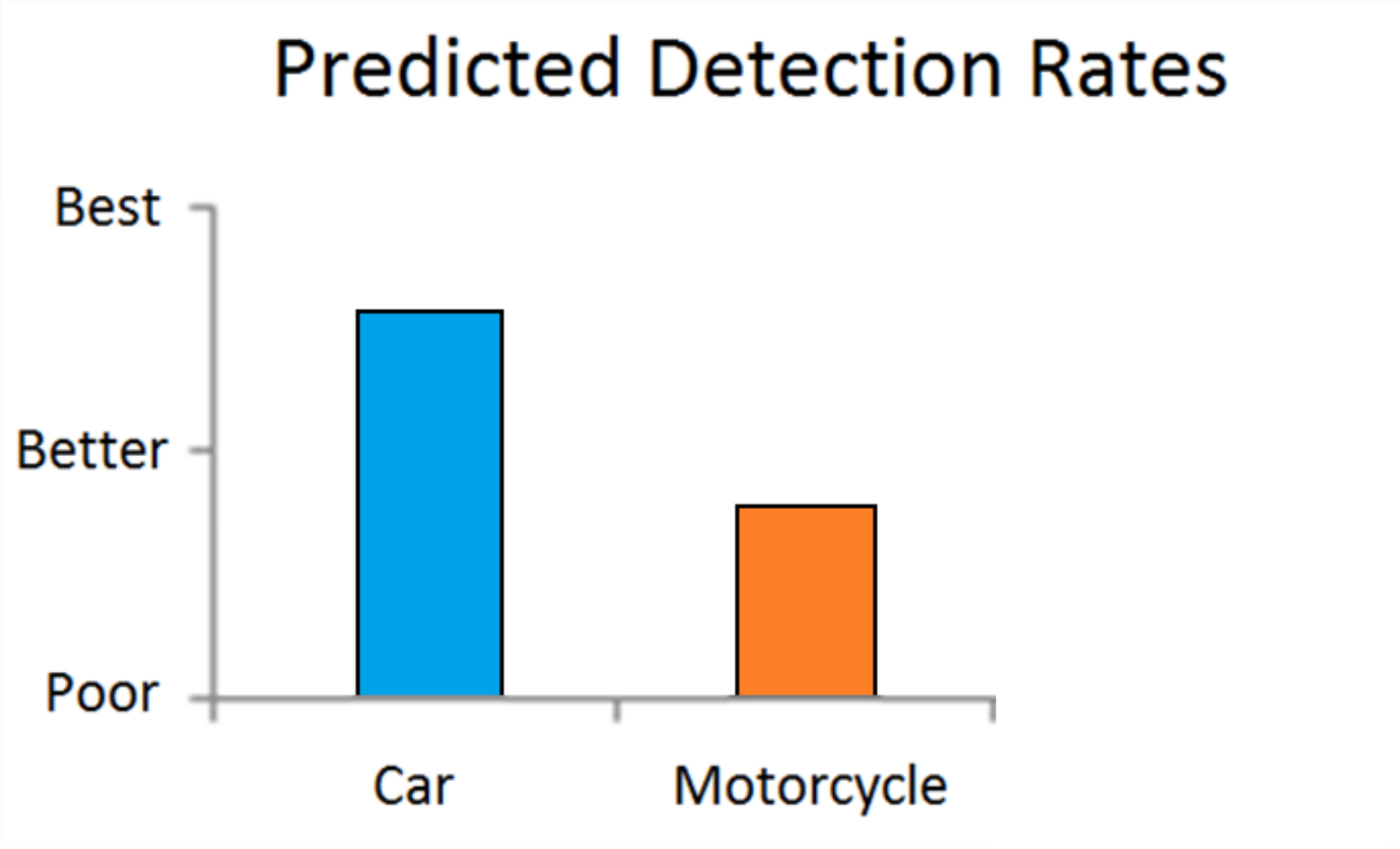
Change-Blindness

Are motorcycles less conspicuous than cars?

Change Blindness is a measure of attention

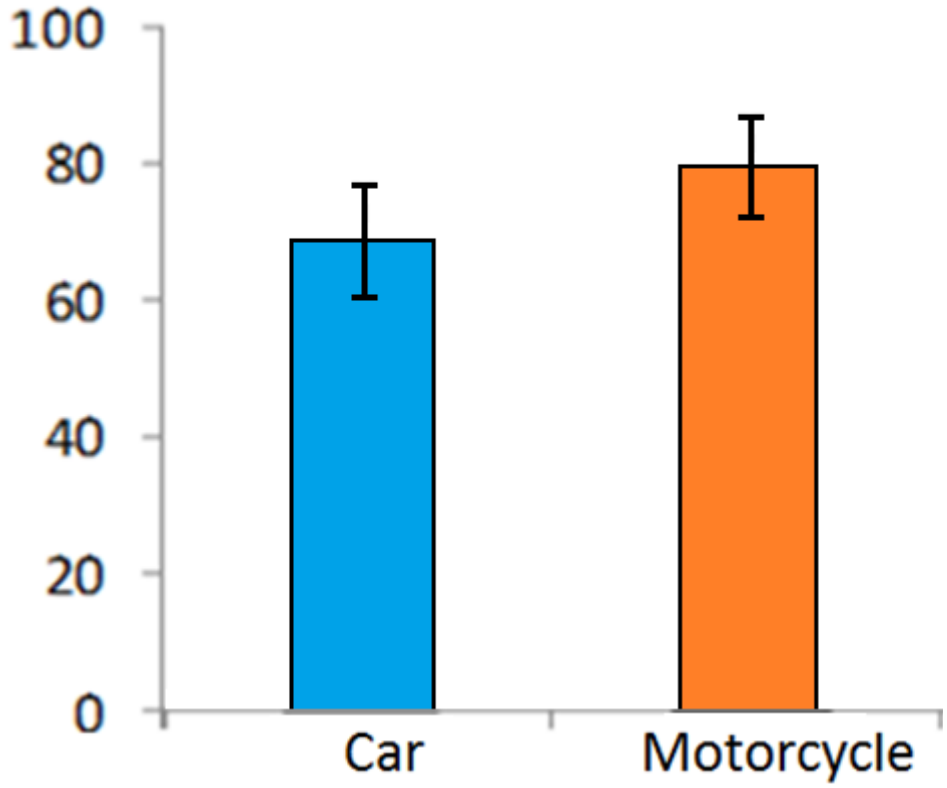
We notice changes for attended objects

Static Change-Blindness



Static Change-Blindness

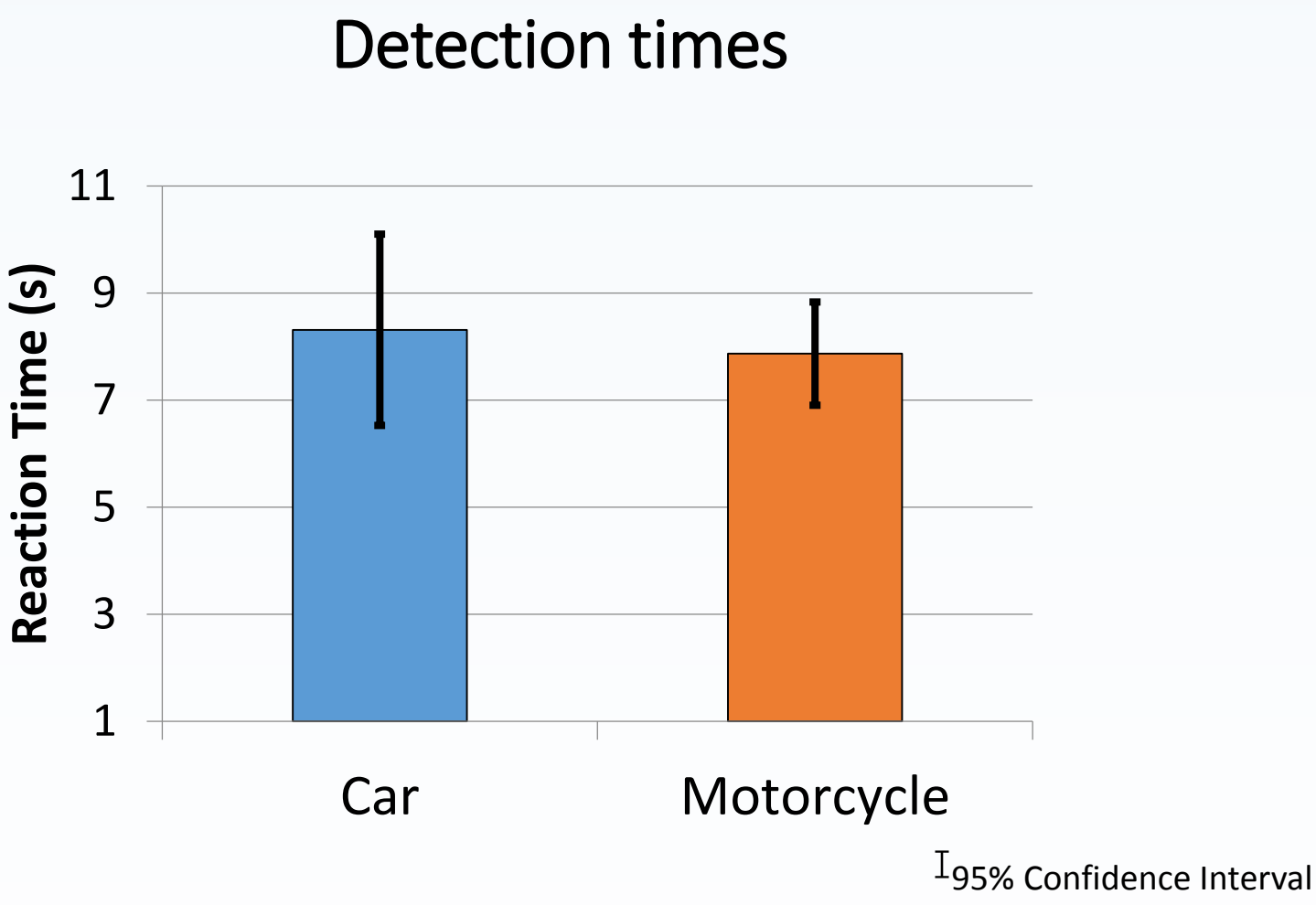
Are **motorcycles** detected less frequently than **cars**?



Sager et al. (In Review)

I 95% Confidence Interval

Static Change-Blindness



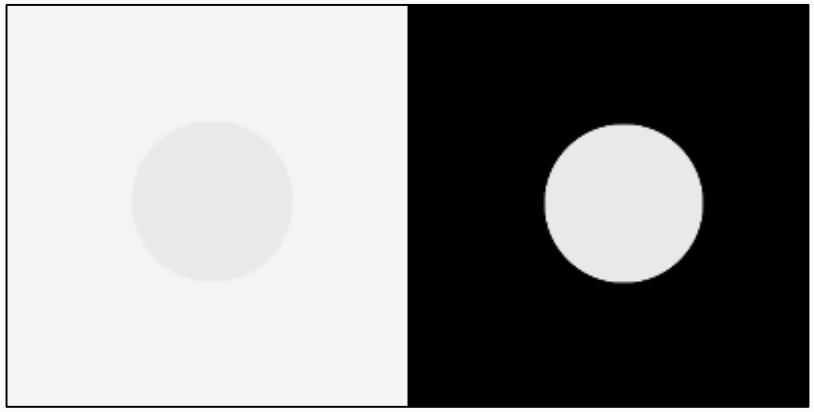
Static Change-Blindness: Discussion

Motorcycles are visible:

- Higher detection rates than cars
- Similar detection times to cars

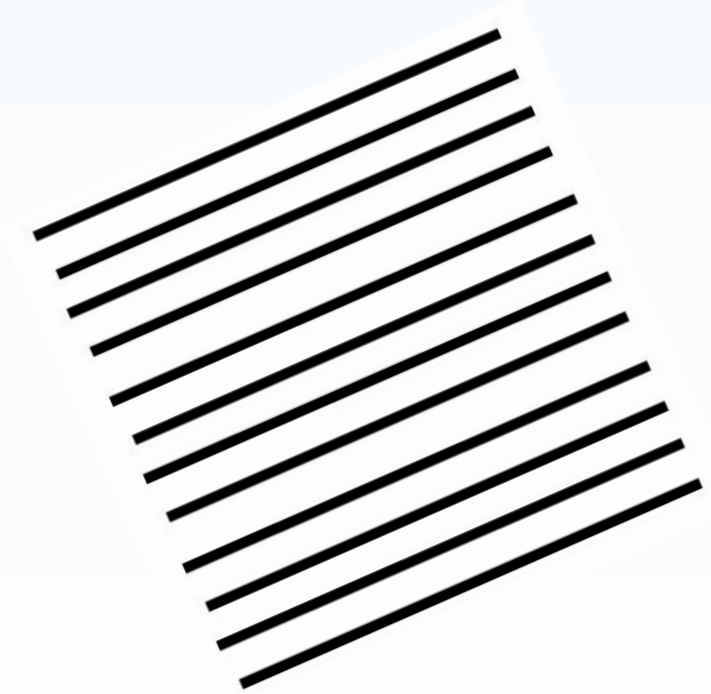
Saliency (Sensory Conspicuity)

Contrast



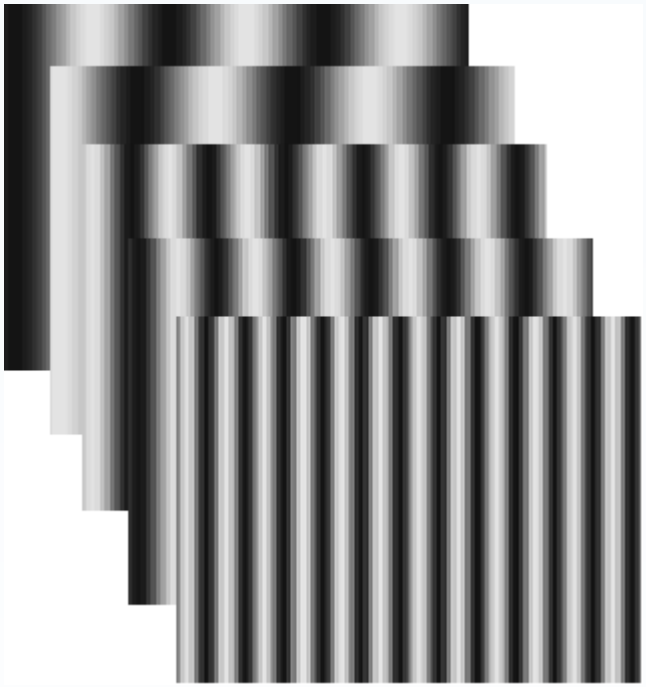
Saliency (sensory conspicuity)

Orientation



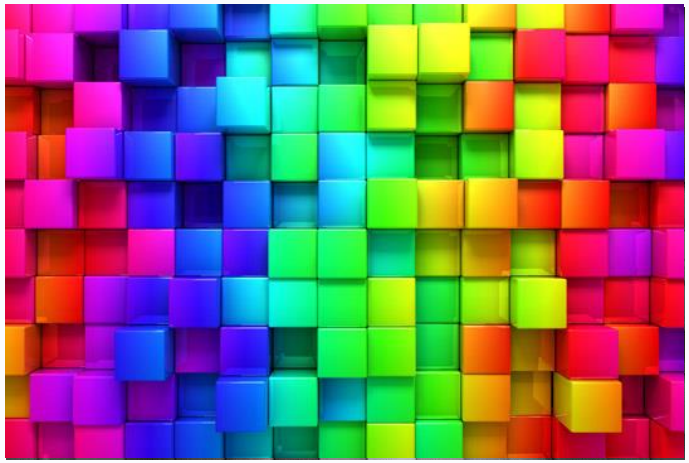
Saliency (sensory conspicuity)

Spatial Frequency



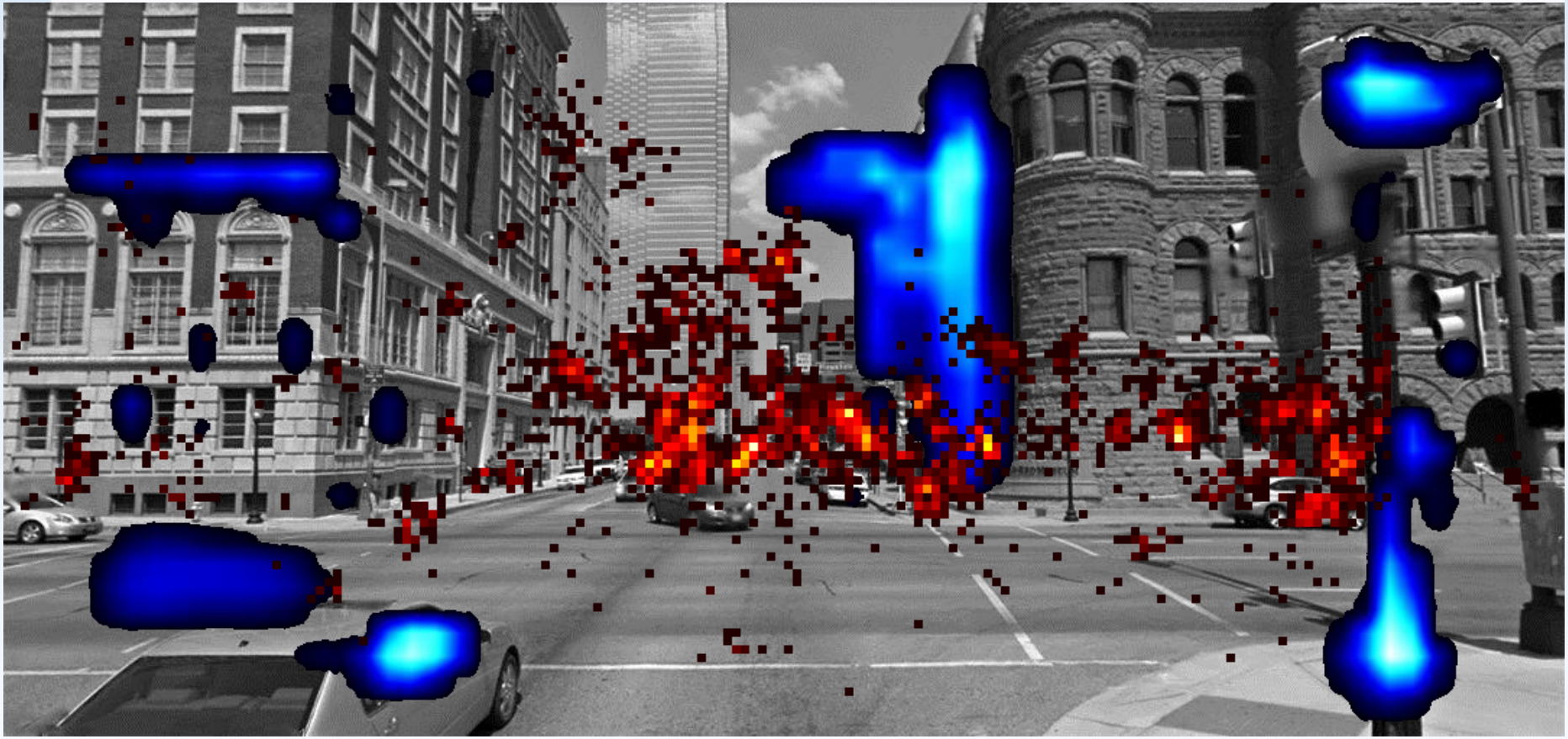
Saliency (sensory conspicuity)

Colour



Static Change-Blindness

Saliency maps and Gaze Maps



Perception is More than Sensation

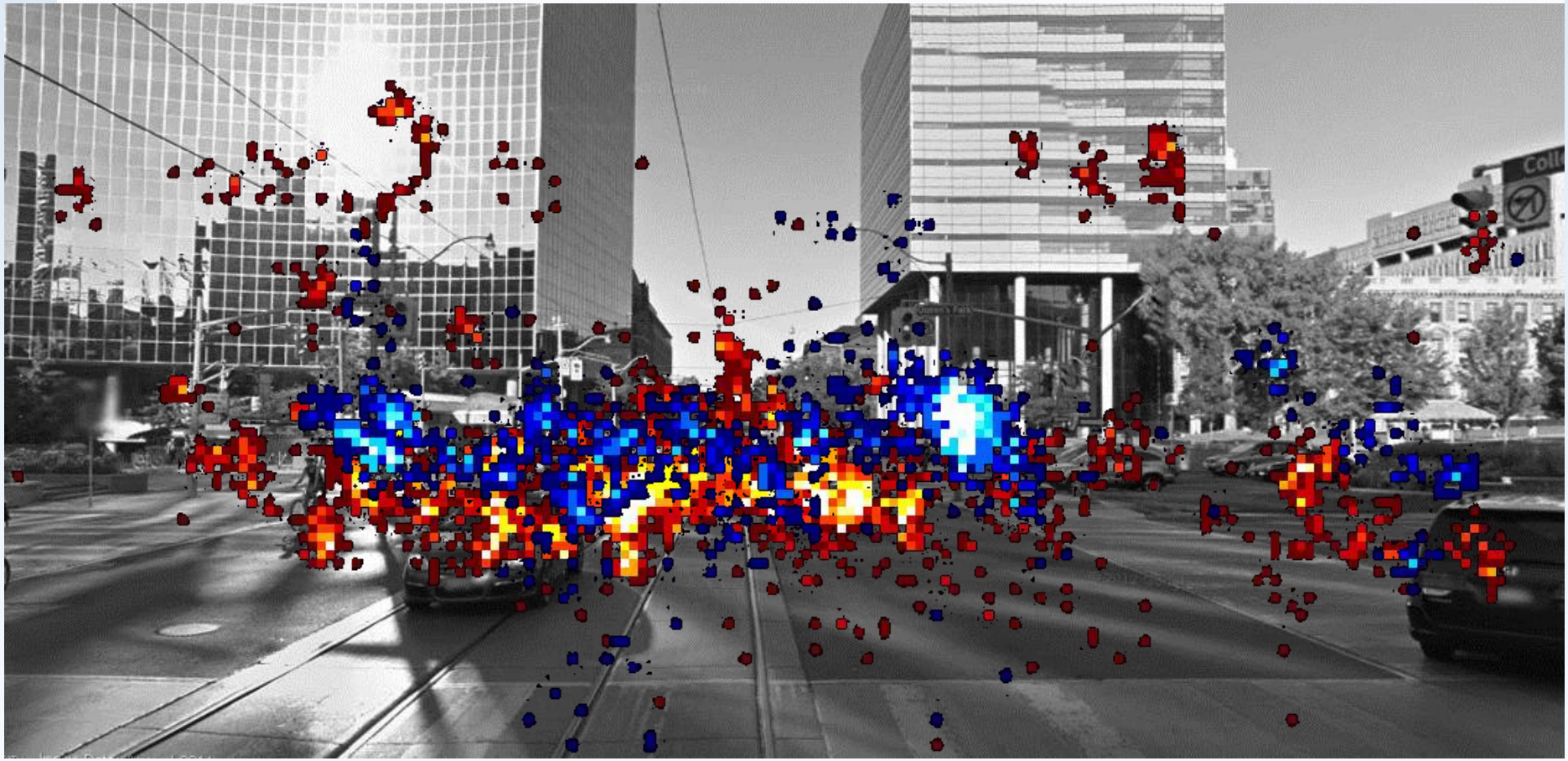
Context

Intention

Memory

Static Change-Blindness

Car and Motorcycle Gaze Maps



Static Change-Blindness: Discussion

Motorcycles are not invisible:

- Higher detection rates
- Similar detection times
- Similar gaze maps

Saliency maps do not predict gaze maps

Solving motorcycle collisions through conspicuity

- Is solving a problem that does not exist
- And it is solving it the wrong way

Dynamic Change-Blindness

But these images were static

What happens when people actually drive?

Dynamic Change-Blindness

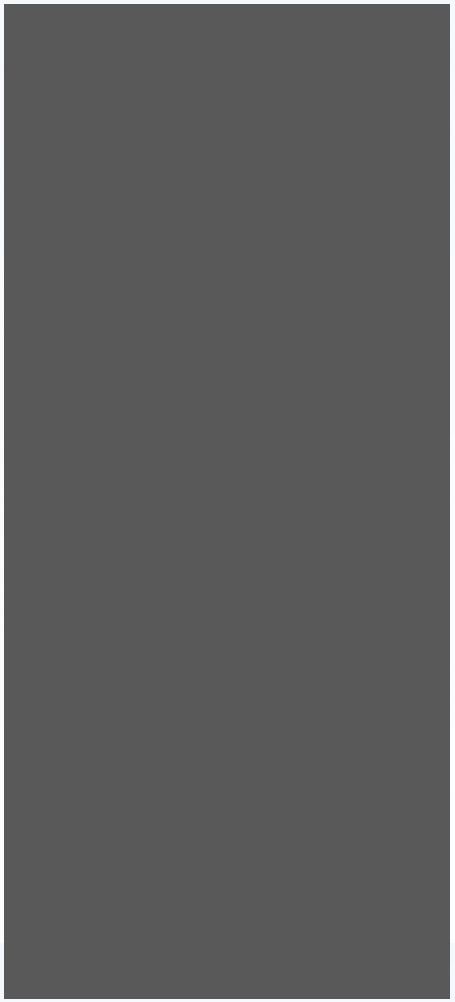
Dynamic Change-Blindness 1

Ss Drove down a straight road

Screens flickered once

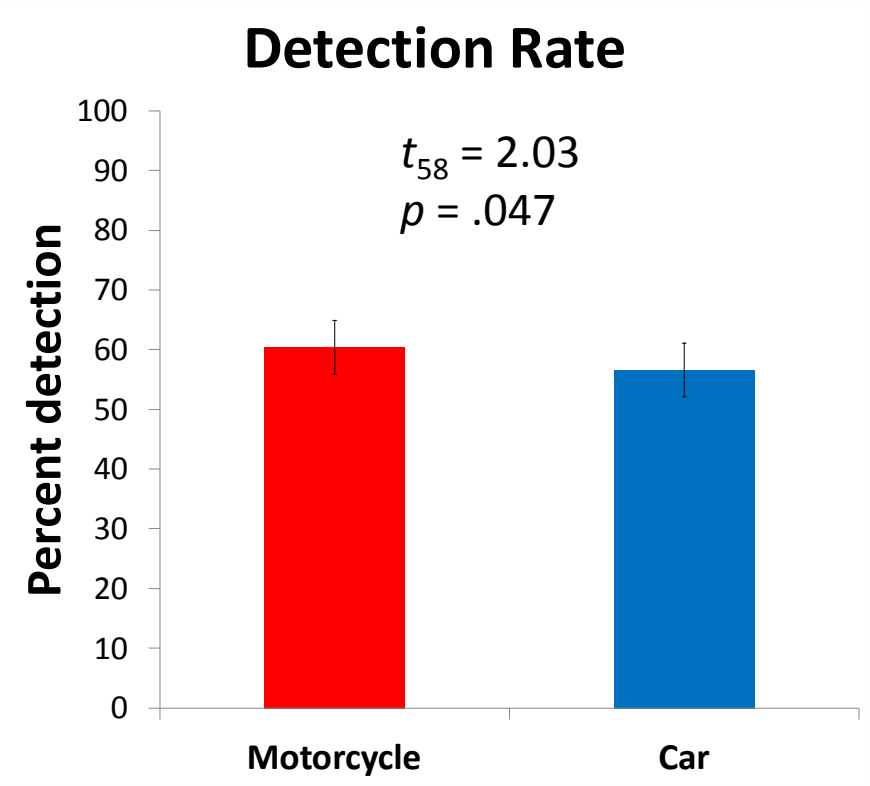
- A parked vehicle was removed

Ss indicate change detection



Dynamic Change-Blindness 1

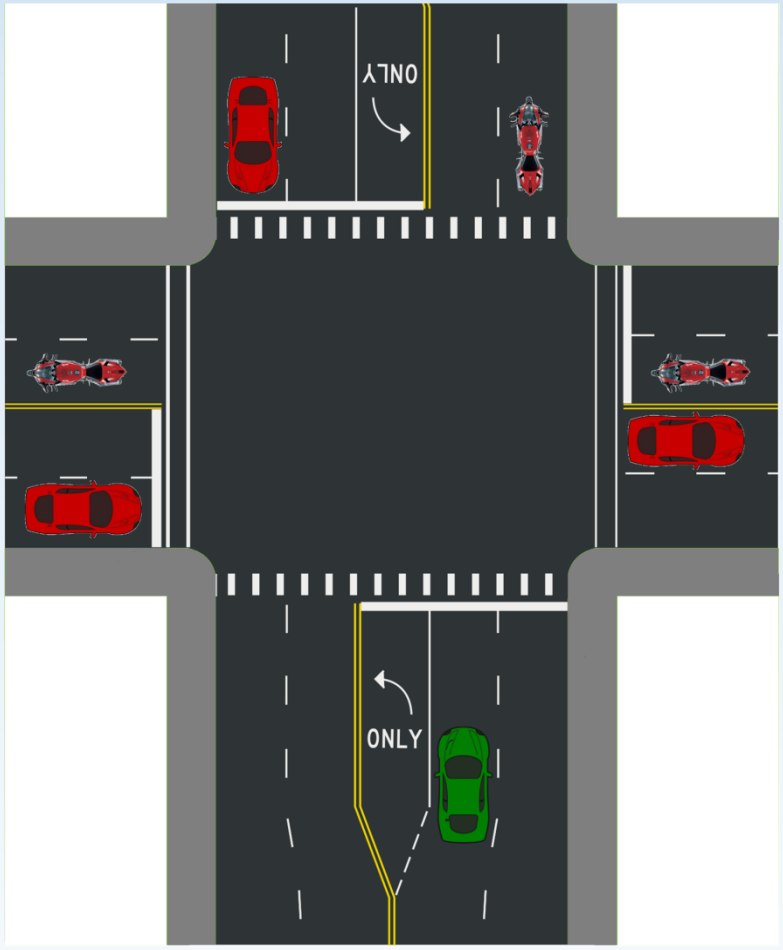
Motorcycles are detected more frequently than **cars**



I 95% Confidence Interval

Dynamic Change-Blindness 2

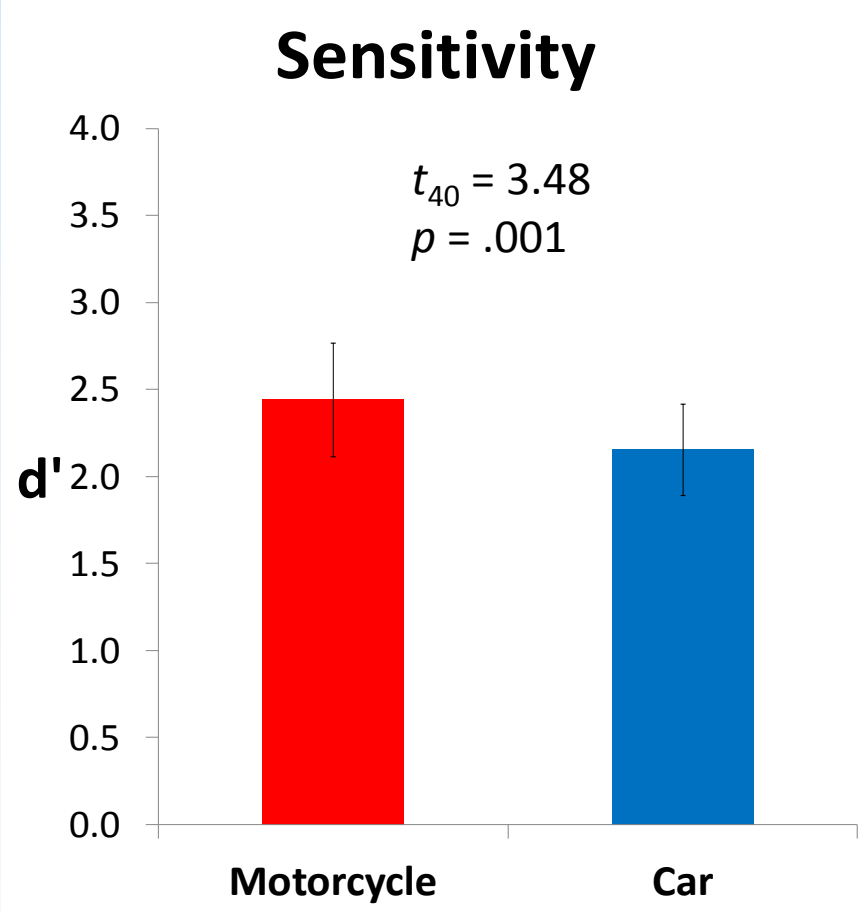
- Ss Drove toward intersection
- Screens flickered once
  - A vehicle was removed on half the trials
  - (entering or exiting)
  - (car or motorcycle)
- Ss indicate change detection

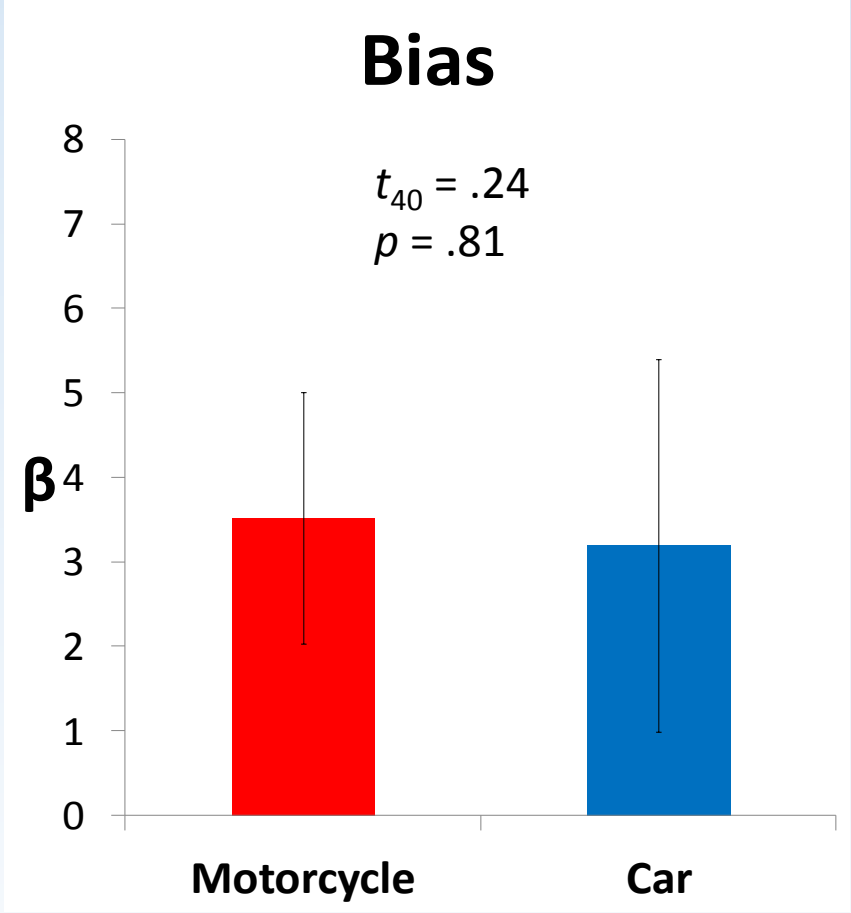


SDT: Was ist das?

	Target present
Target reported	Hit
Target not reported	Miss

Dynamic Change-Blindness 2





I 95% Confidence Interval

Dynamic Change-Blindness: Discussion

Results replicate findings from static change blindness experiments

Motorcycles are not invisible:

- Higher sensitivity for motorcycles than for cars

Conclusion

Motorcycles are (very) visible.

- Why?

Sensory conspicuity is not the issue.

- Efforts should be directed at education
- Because the problem is likely a judgement issue

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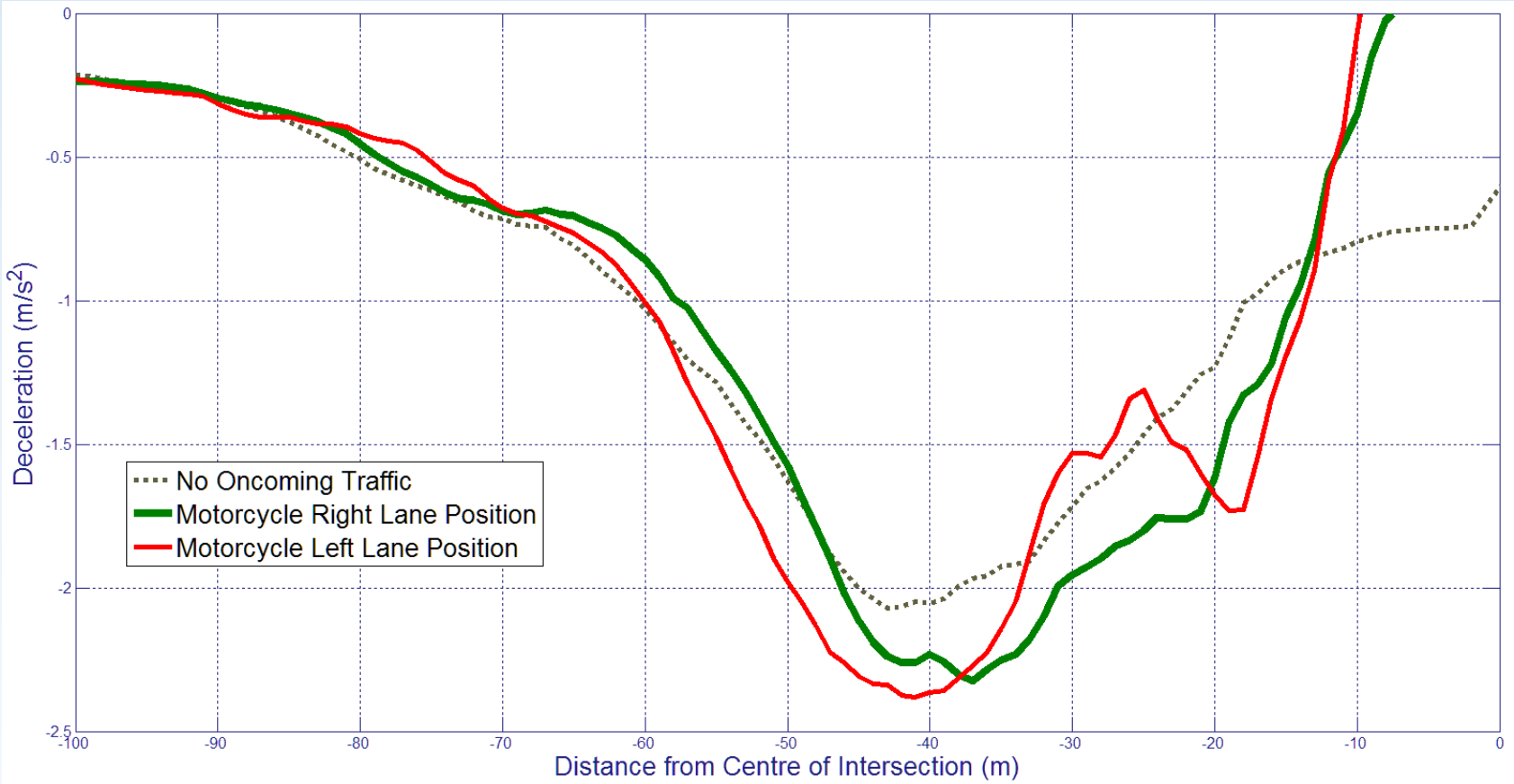
- Andrew Lowery
- Amaris Tok
- Jackie King
- Aaron Richardson

Canada Research Chairs

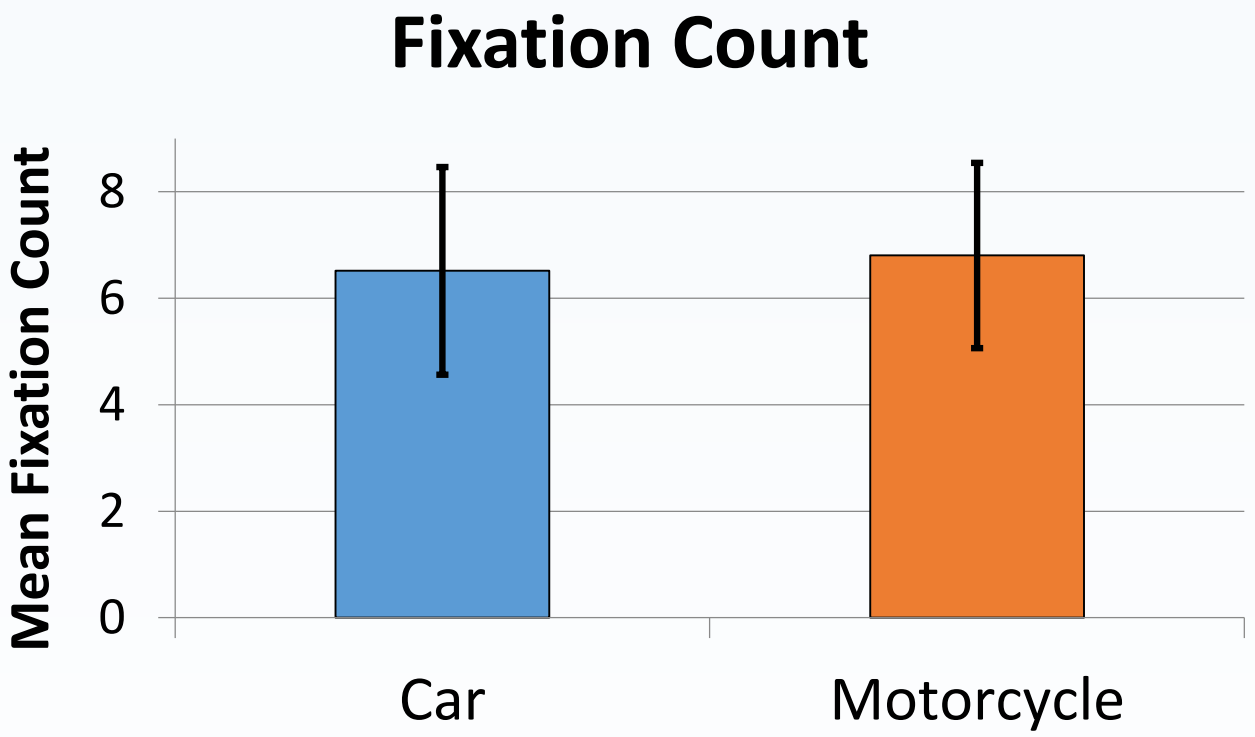
Questions?

Additional Slides

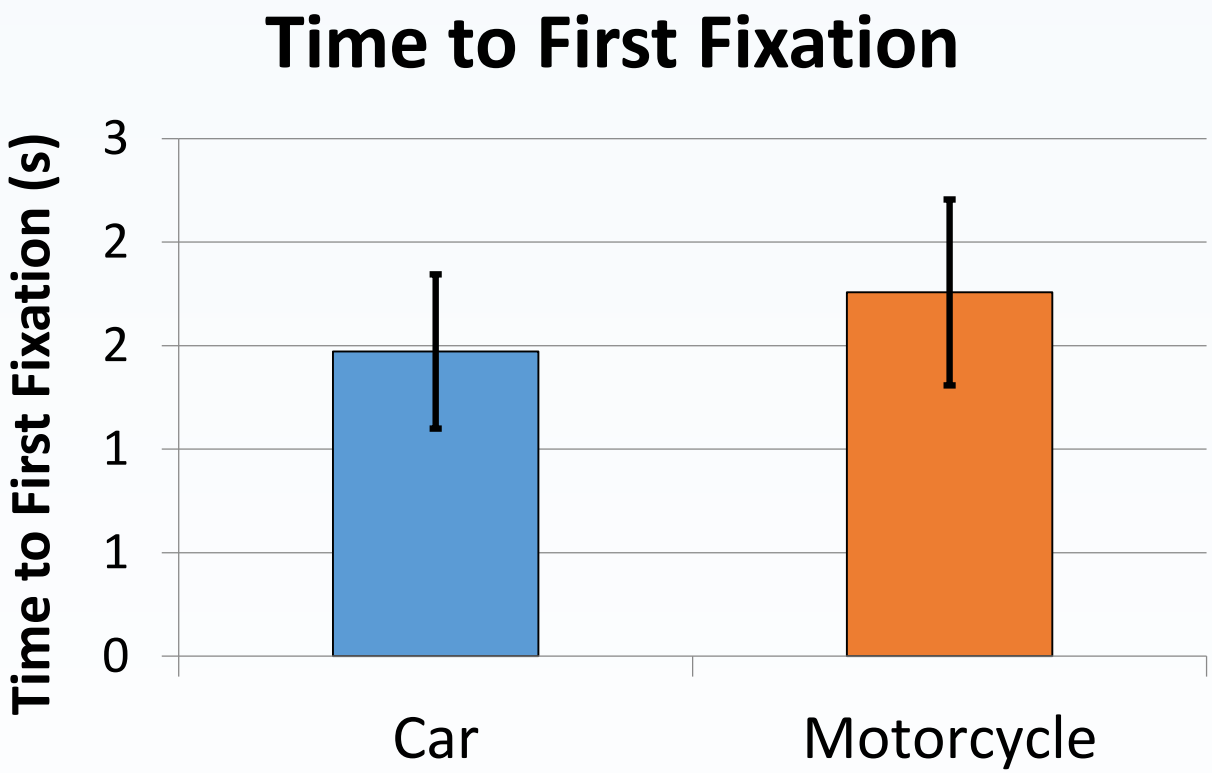
Braking Behaviour



Additional Results



Additional Results



Additional Results