

Changes in Intersection Scanning Behavior Due to Intersection Collision Warning Systems

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Background

- Rural intersection crashes are problematic
 - ✓ Intersections = 30% of severe crashes
 - ✓ Frequently angle crashes
- Factors
 - ✓ Inappropriate gap selection (minor approach)
 - ✓ Failure to yield (minor approach)
 - ✓ Minor street driver initiates actions leading to crash



Image source: Shutterstock

Intersection Collision Warning Systems

- Minnesota (US State) installed ICWS at various locations to address rural intersection crashes
- Sensors on mainline warn minor stop controlled approaches
- 5 locations selected for evaluation

Location of Evaluation Sites

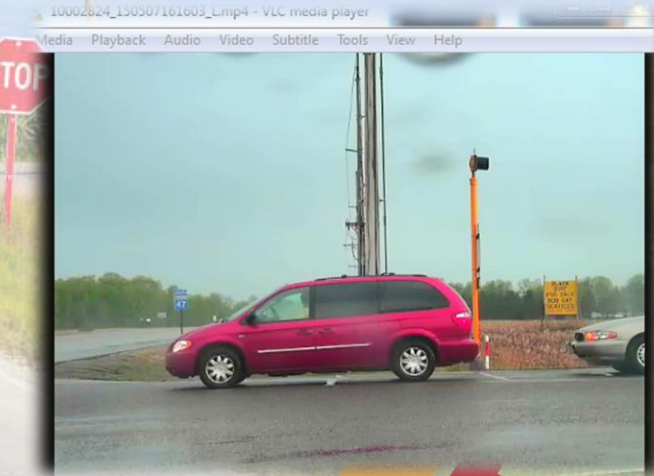
County	Intersection	Roadway
McLeod	MN7 and County Rd 1	2-lane/2-lane
Pipestone	MN 23 and County Rd 16	2-lane/2-lane
Cottonwood	MN 60 and County Hwy 1	4-lane divided/2-lane
Isanti	MN 47 and County Rd 8	2-lane/2-lane
Chippewa	MN 7 and MN 15	2-lane/2-lane



Image source: MnDOT

Data Collection

- Collected data 1-3 mon before install
- Collect baseline data ~ 1 week
- Nighttime depends on lighting conditions
- Collect after data
 - ✓ 1 to 3 months
 - ✓ Similar weather/traffic conditions as before
- Overhead camera and camera focused to side of vehicle



Data Reduction

- Randomly selected sample of vehicles
- Manually reduced data for drivers on minor street
- Started when vehicle approached stop bar
- Reduced
 - ✓ Number of glances left
 - ✓ Number of glances right
 - ✓ Presence of distraction (if obvious)

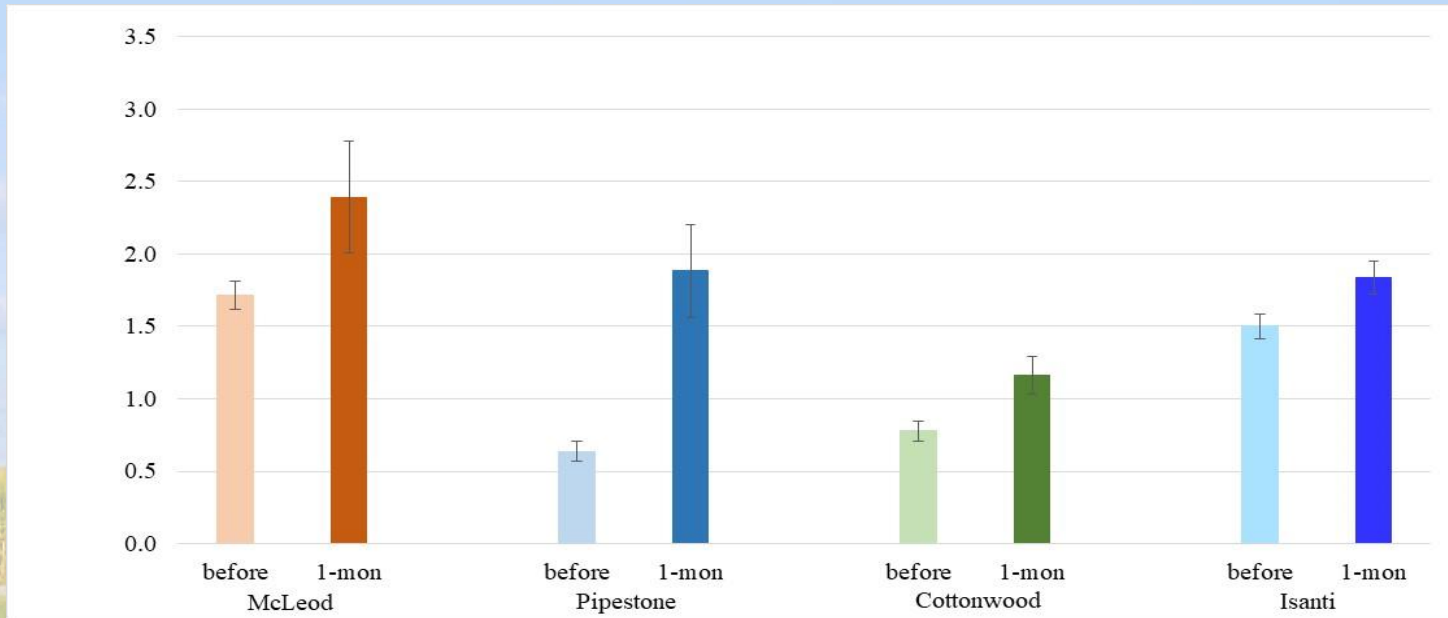


Image source: Shutterstock

Analysis

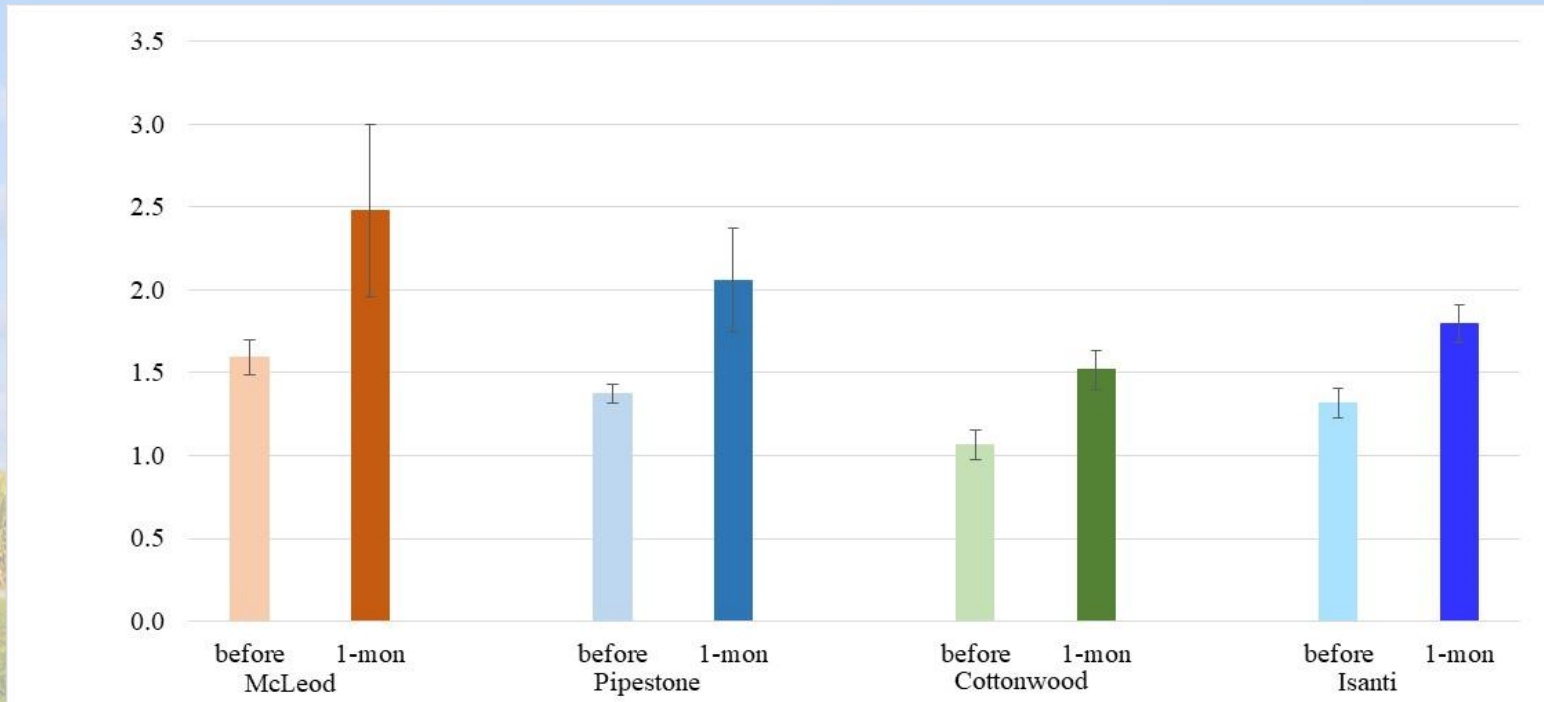
- Drivers scan intersection to identify on-coming traffic
- Assumes multiple scans have positive safety benefit
- Concerns with ICWS drivers would rely on system to indicate oncoming resulting in less scanning
- No information on what entails good scanning
- Compared glances left and glances right

Changes in Glances to the Right



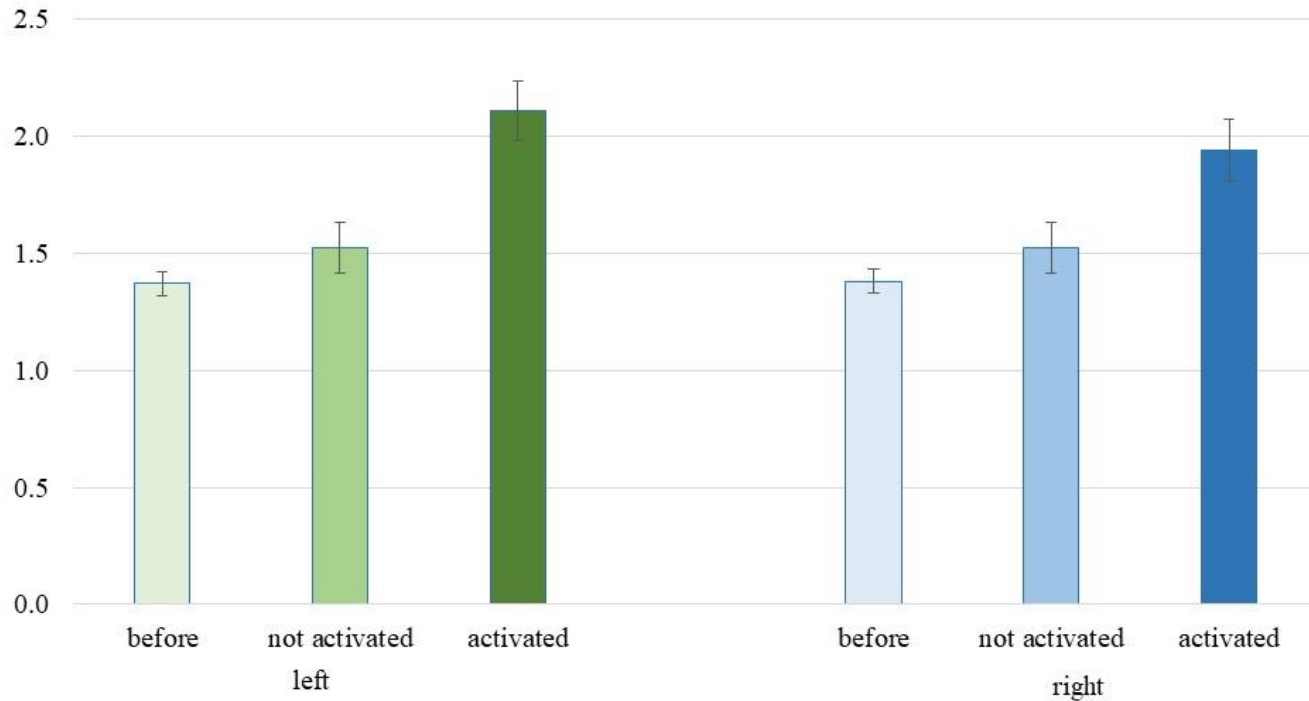
- Right glances increased at all locations
- Most significant increase 0.6 to 1.9 glances at Pipestone

Changes in Glances to the Left



- Left glances increased at all locations
- Most significant increase 1.6 to 2.5 glances at McCleod

Changes With System Active



- Compared with system active (approaching vehicle) versus not active (no on-coming)
- Increased glances when system was active
- Glances slightly higher but not statistically different when not active

Summary

- ICWS warn drivers on minor stop controlled approach about on-coming traffic
- May lead to drivers relying on the system to determine when they can proceed
- Evaluated scan behavior
- Glances left and right increase after ICWS was installed
- More likely to glance when system is active

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