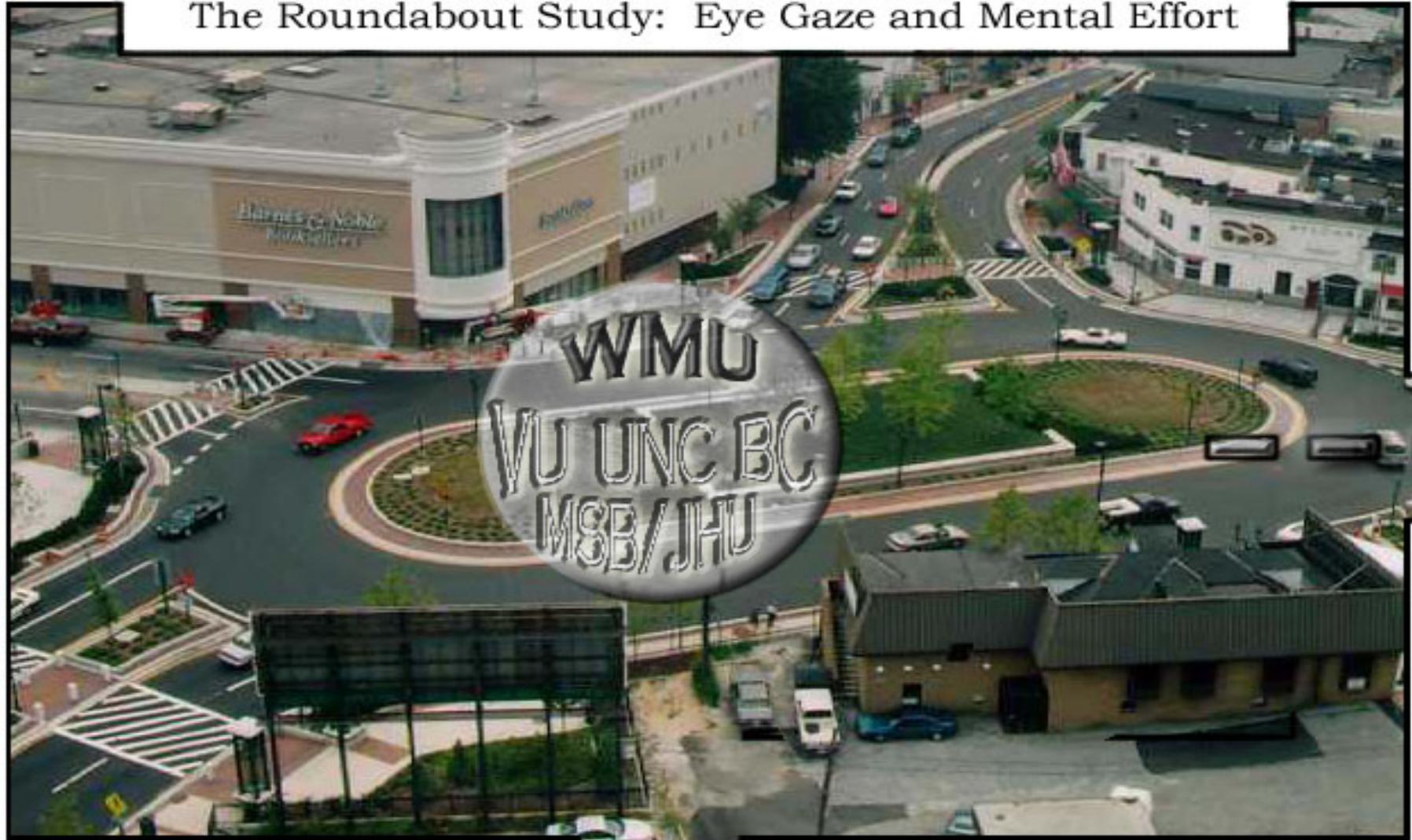


MARYLAND SCHOOL FOR THE BLIND/JHU

The Roundabout Study: Eye Gaze and Mental Effort



The Effects of Vehicle Speed and Pedestrian Behavior on Driver Yielding at Roundabouts

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The Law and The Pedestrian

The driver of a vehicle shall come to a stop when a pedestrian crossing the roadway in a crosswalk is; (i) On the half of the roadway on which the vehicle is traveling; or (ii) Approaching so closely from the other half of the roadway as to be in danger. 21-502(a2)

The Law and The Pedestrian

The driver of a vehicle shall yield the right-of-way to:

- (1) A blind or partially sighted pedestrian using a guide dog or carrying a cane predominantly white or metallic in color (with or without a red tip)... 21-511

The Law and the Pedestrian

Intent of the law

- Pedestrian has the right of way in the crosswalk
- Specific identification of the blind pedestrian, *with or without traffic controls*



Questions

- **At roundabouts are pedestrians granted the right of way?**
- **What conditions effect driver yields?**
- **At roundabouts are blind pedestrians granted the right of way?**
- **What conditions effect driver yields?**

Hypotheses

- **2 primary vehicle factors that effect yield**
 - **Vehicle speed and entry/exit**
- **Pedestrian behavior effects yield**
 - **Position relative to the curb**
 - **Presence/absence of long cane**

Method: The Roundabouts

Roundabout I

15.5 mph (0.73)

Roundabout II

20.0 mph (3.7)

Located in Annapolis < 2 miles apart

Speed Measure

Bushnell Speedster

- **Exact speed**
- **1.5% error < 10 degrees off center**

Roundabout II



Procedures

- **PEDESTRIAN BEHAVIORS**

- 1 foot from curb

- At the curb

- In the crosswalk

- With and without long cane

- Neutral

- **Assertive**

- **Aggressive**

One Foot From Curb



Standing At Curb



In Crosswalk



Procedures

- Roundabout I entry and exit
- Roundabout II entry and exit

2 Roundabouts X 2 locations X 3 Ped locations X w/wo cane X 40 trials per condition = 960 trials

Procedures

DRIVER CRITERIA

- **Lead vehicle**
- **Cars, vans, 1/2 ton pickup truck**
- **No police/fire, buses, large trucks**
- **No queuing**
- **No tail-gaiting**

Questions

At roundabouts are pedestrians granted the right of way (blind pedestrian)?

58% of the time

Without cane 52%

With cane 63% n.s.

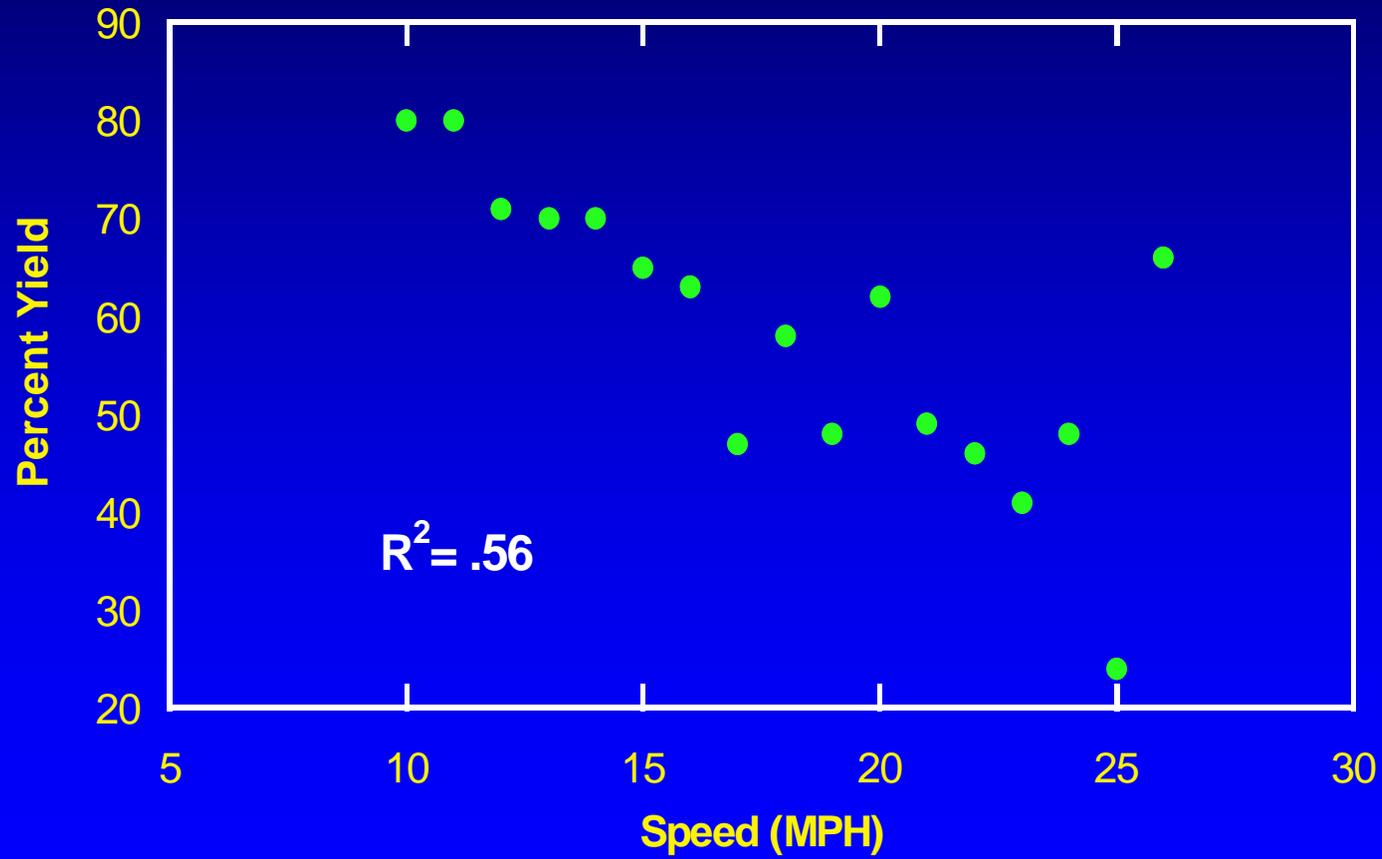
FLIP OF THE COIN

Hypotheses

2 primary driver factors that effect yield

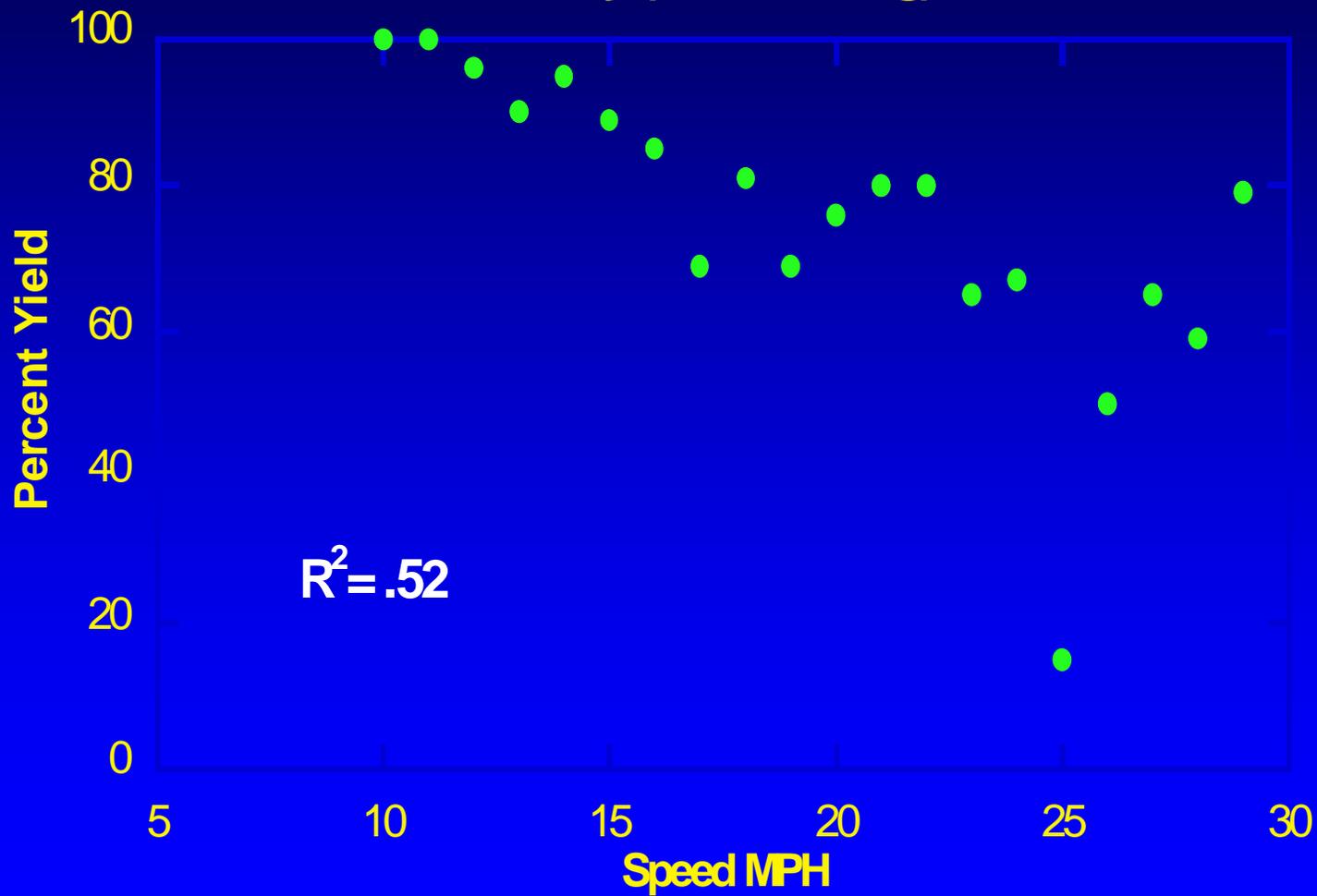
Driver's speed and entry vs. exit

Vehicle Speed - Driver Yield



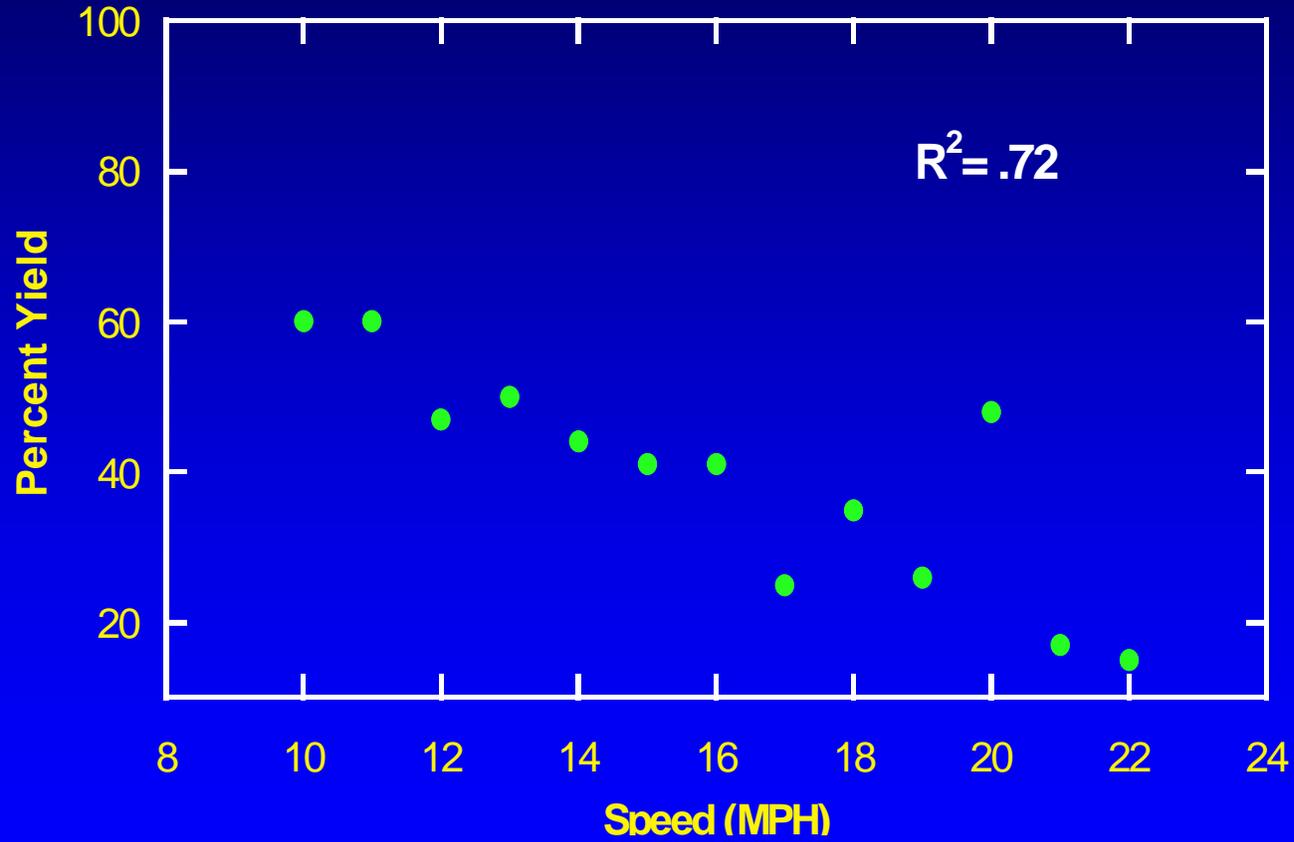
Vehicle Speed - Driver Yield

Entry (Decelerating)



Vehicle Speed - Driver Yield

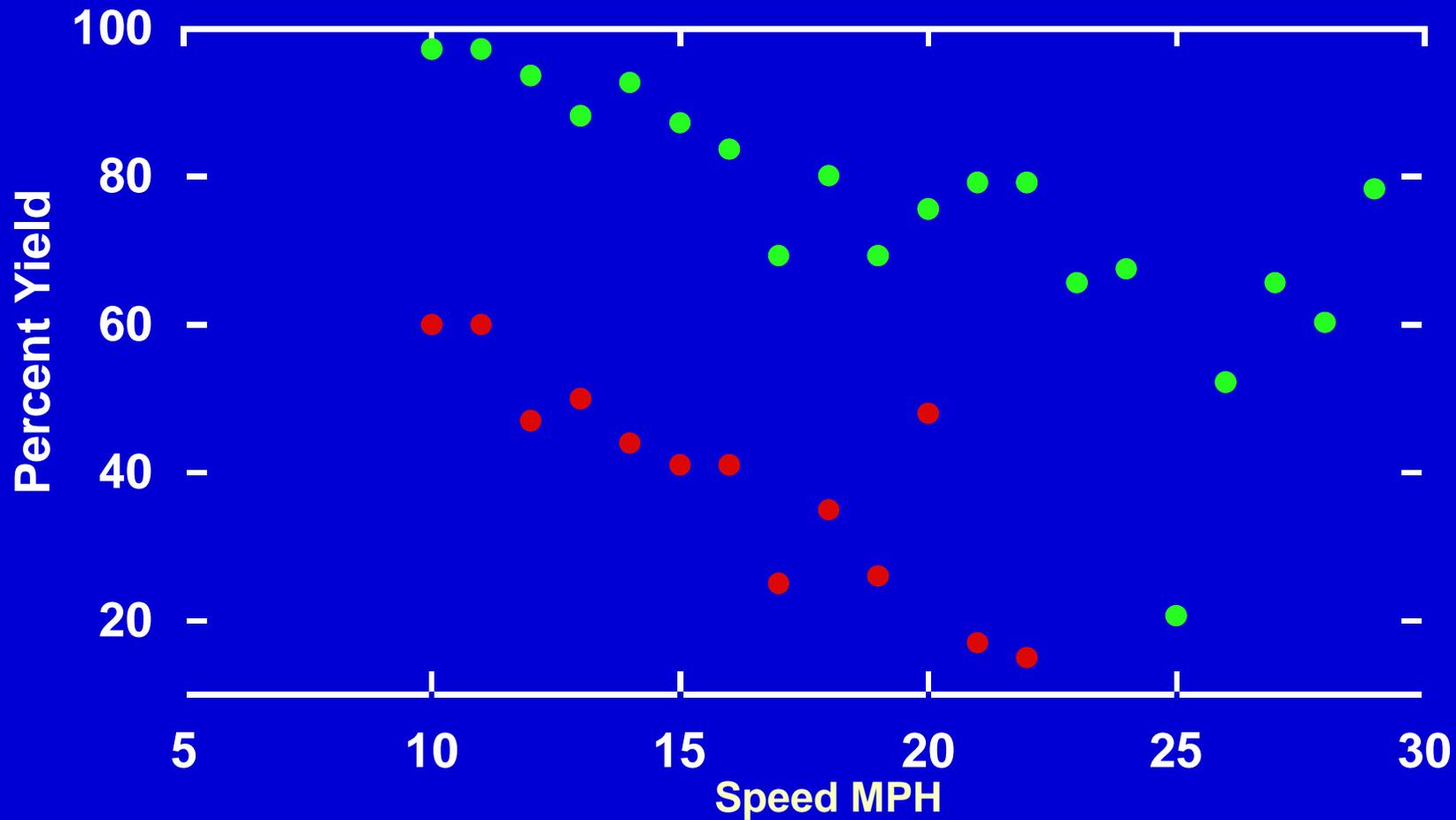
Exit Lane (Accelerating)



Vehicle Speed - Driver Yield

Exit Lane Red

Entry Lane Green



Yield Percents Entry vs Exit

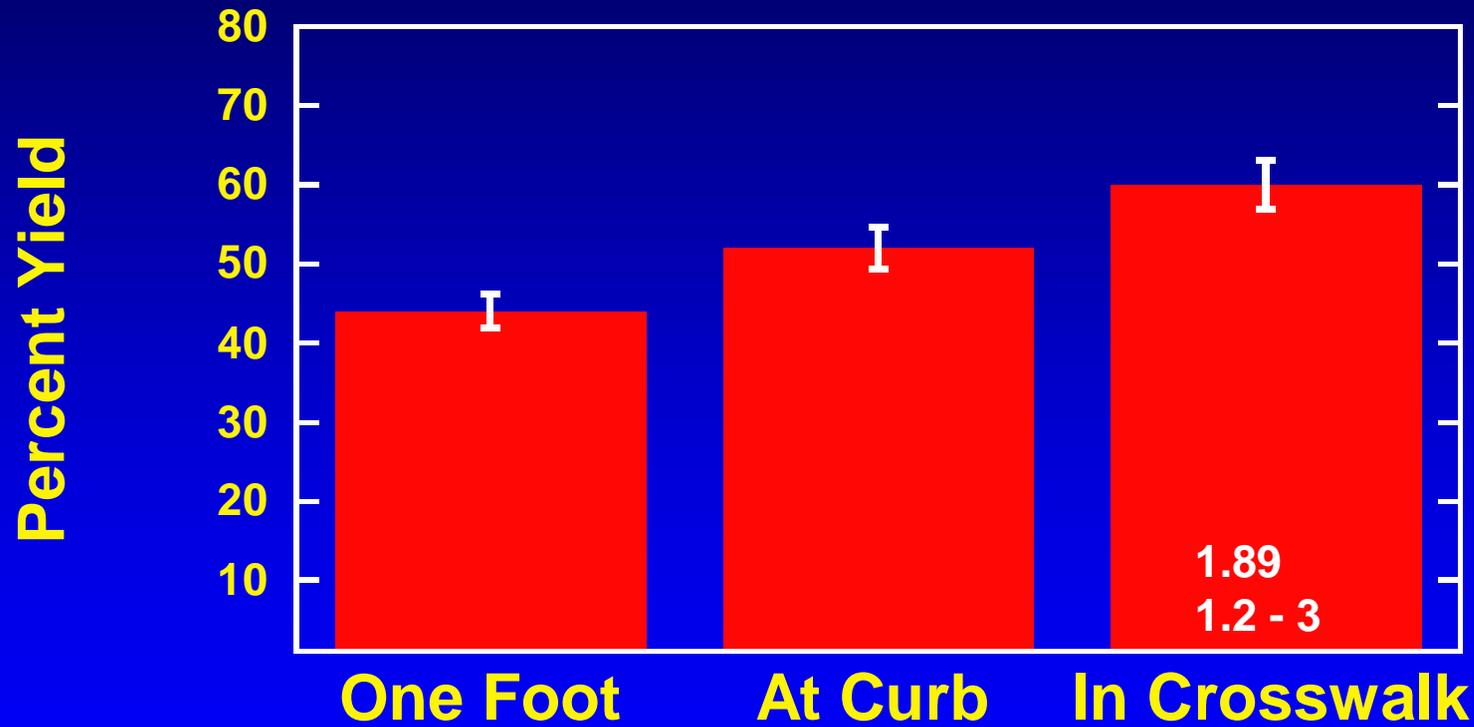
- **Entry Lane 79%**
- **Exit Lane 37%**
- **Odds ratio 6.4**

Hypotheses

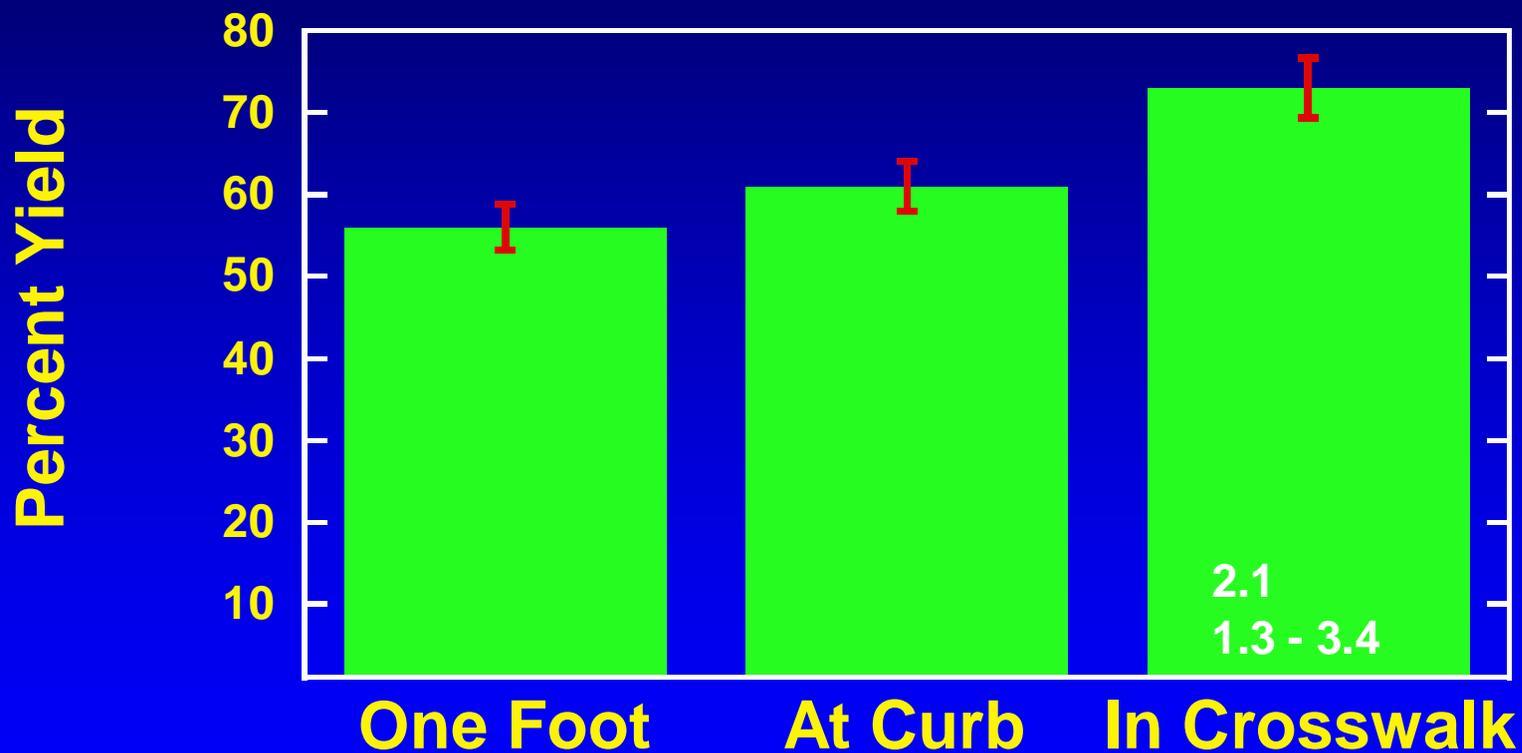
Pedestrian Behavior and Yield

- **Position relative to the curb**
- **Presence/absence of long cane**

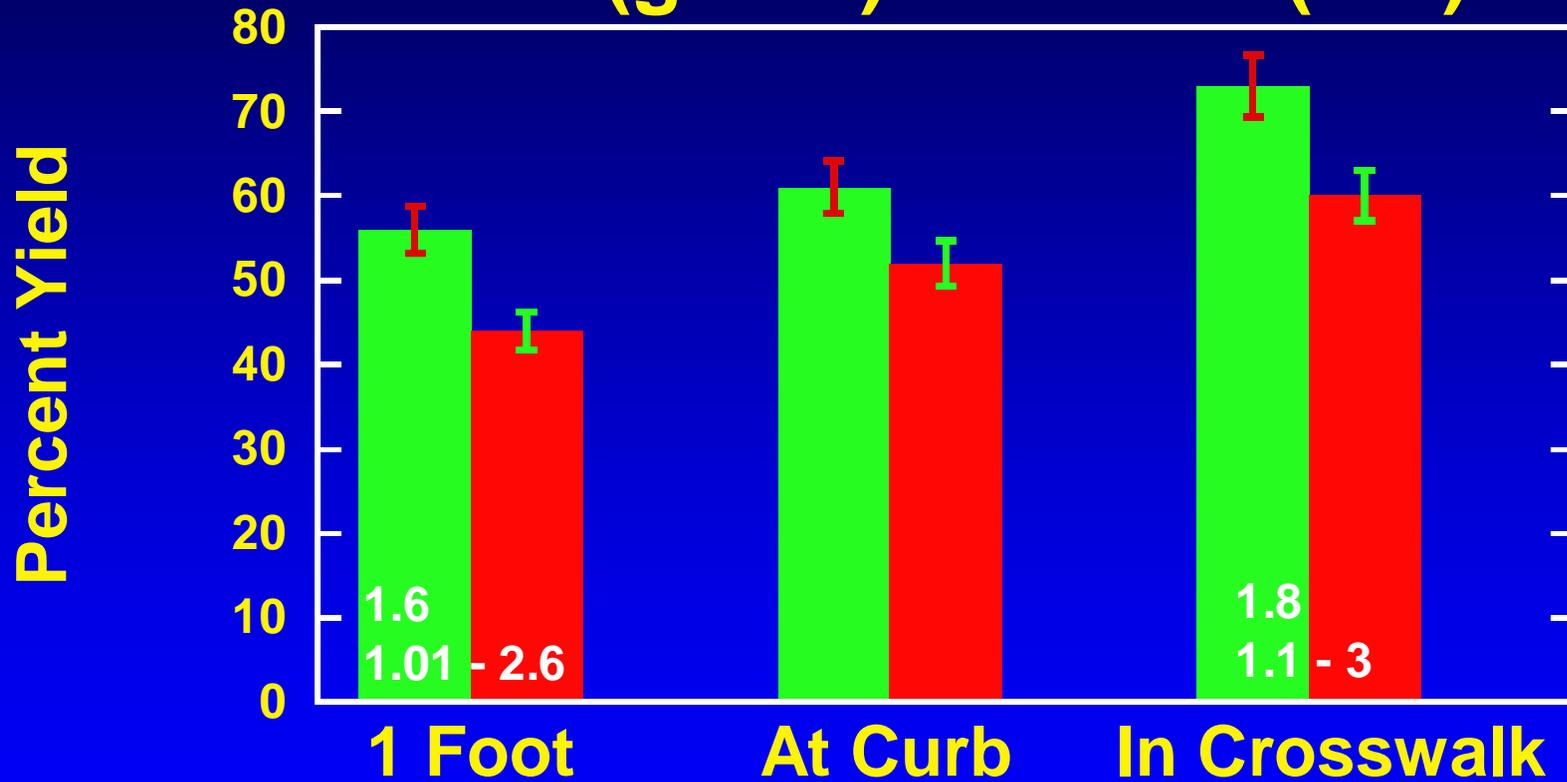
Pedestrian Behavior and Yield (no cane)

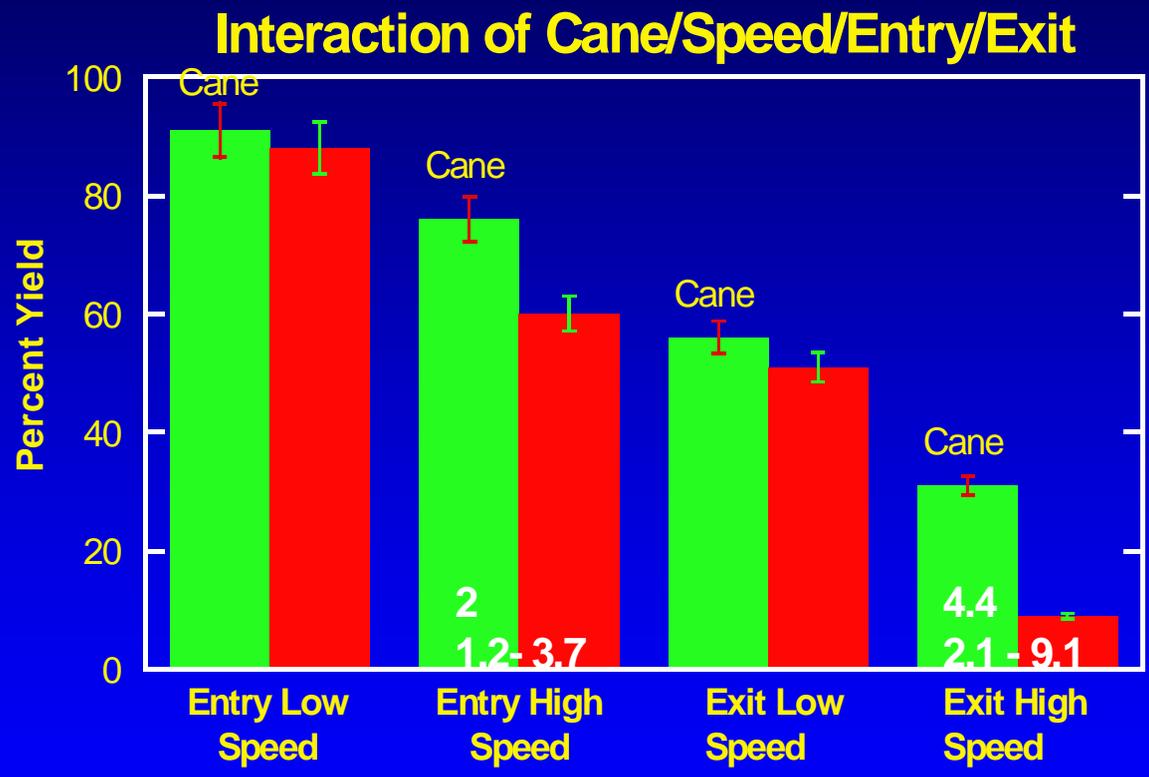


Pedestrian Behavior and Yield (with cane)



Pedestrian Behavior and Yield Cane (green) No cane (red)





Conclusions

Driver Factors

- **Overall drivers yield at the flip of a coin**
- **Vehicle speed is important**
- **Accelerate/decelerate is related to yield**

Conclusions

Pedestrian Behavior

- **Aggressive** behavior can increase yield
- Increase odds ratio from neutral to aggressive

We are not advocates for this type of behavior

Conclusions

The Long Cane

- **Overall, the cane does not significantly increase yield**
- **Under certain conditions the cane has some statistical effect and increases the odds**

Conclusions

The Long Cane

- **Specifically, the effect of cane occurs with vehicle speed at high speed entry (2X) and high speed exit (4X)**
- **Cane effect (2X) for cane and behavior (aggressive)**

