

Navigation Signing for Roundabouts

Study Performed for:
Traffic Control Devices Pooled Fund Study

TRB National Roundabouts Conference
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Problem

- Growing and Widespread Adoption of Roundabouts
- No Standard for Navigation Signing at Roundabouts

Approach

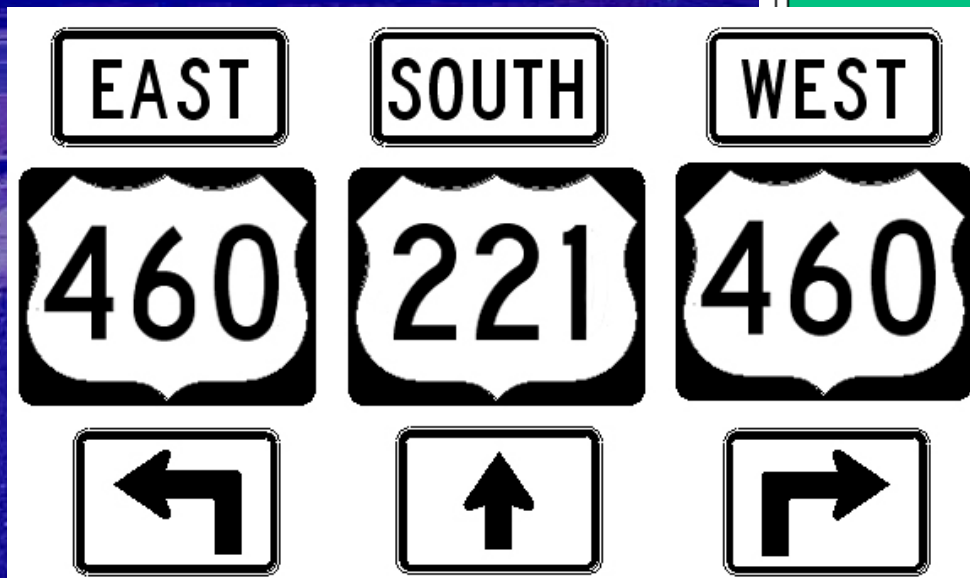
- State of Practice Review of Roundabout Navigation Signage
- Selection of Four Representative Signing Approaches for Evaluation
- Conduct Laboratory Evaluation of Comprehension of Representative Signs

Four Signing Alternatives

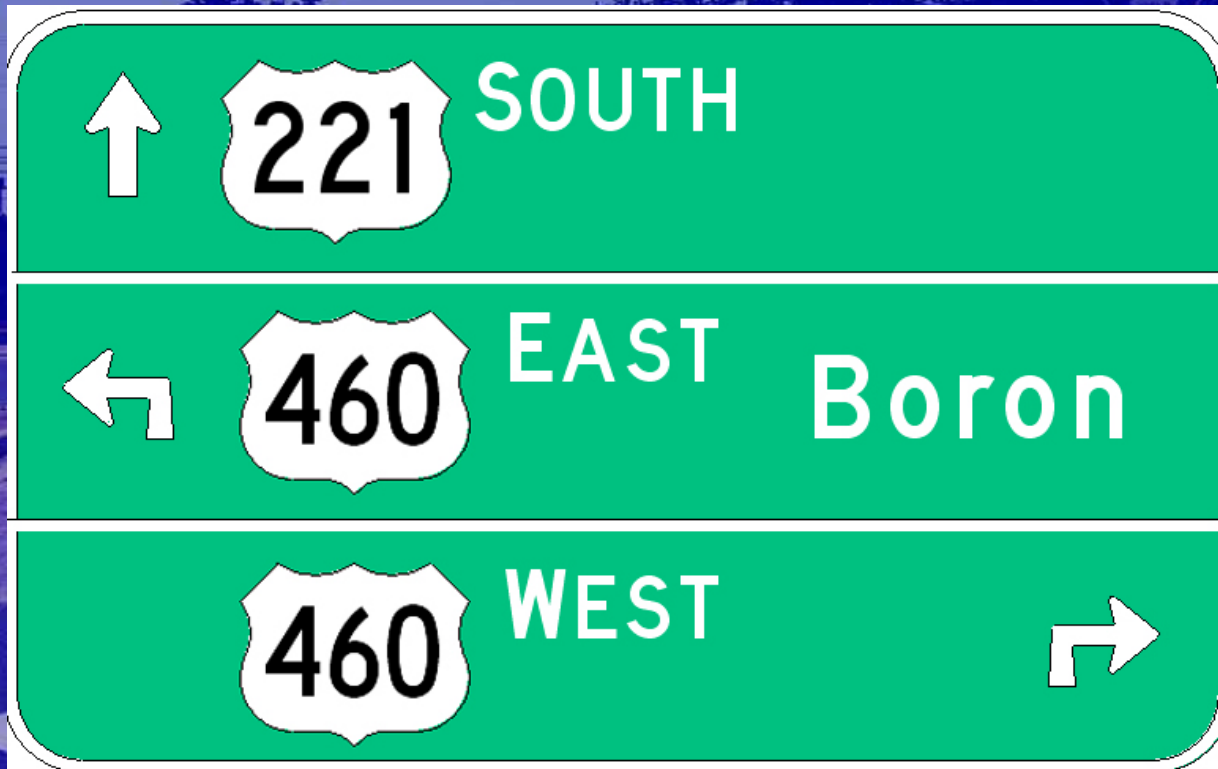
- Conventional
- Maryland
- Diagrammatic
- New York

Conventional

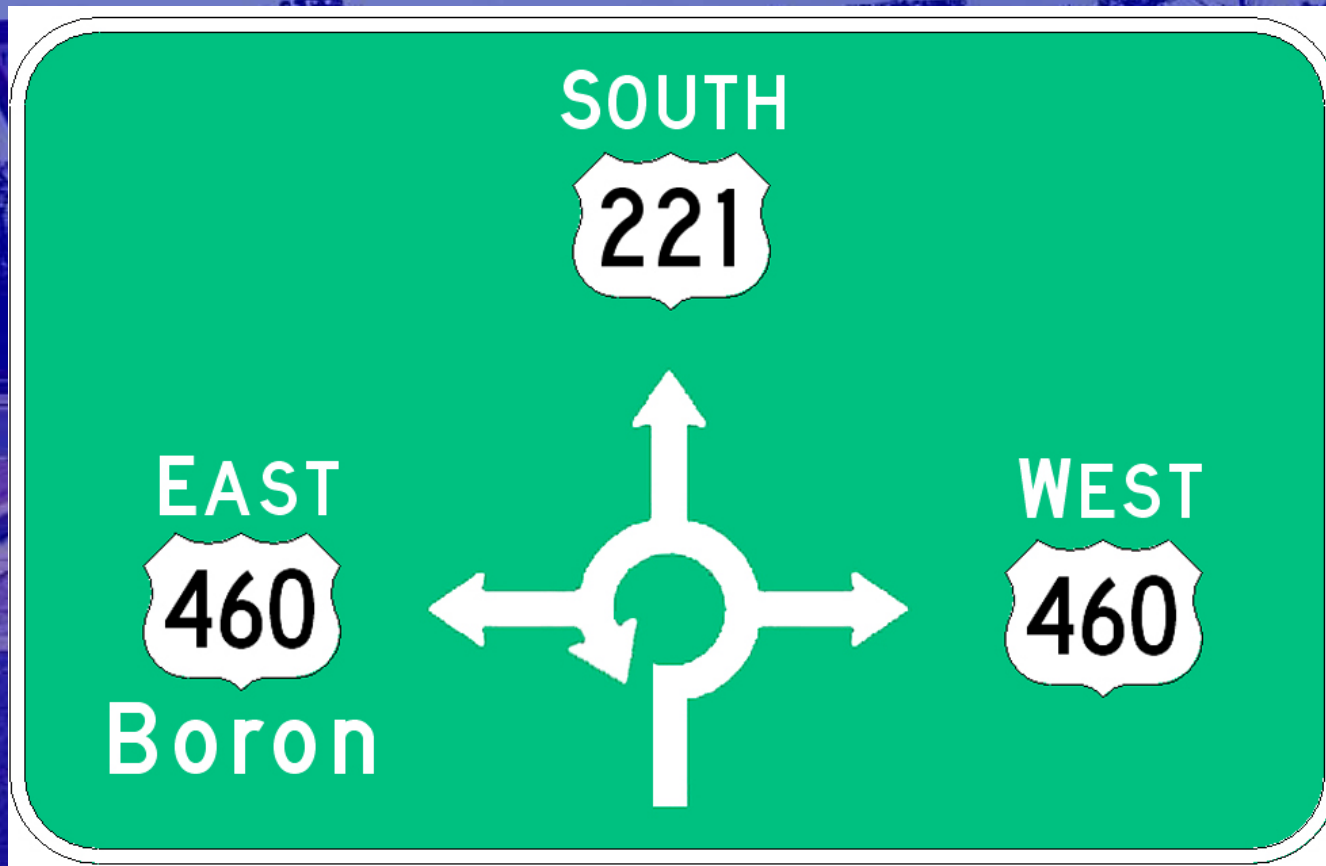
Route Number Shields on One Assembly,
Destination Names on
Separate Guide Sign



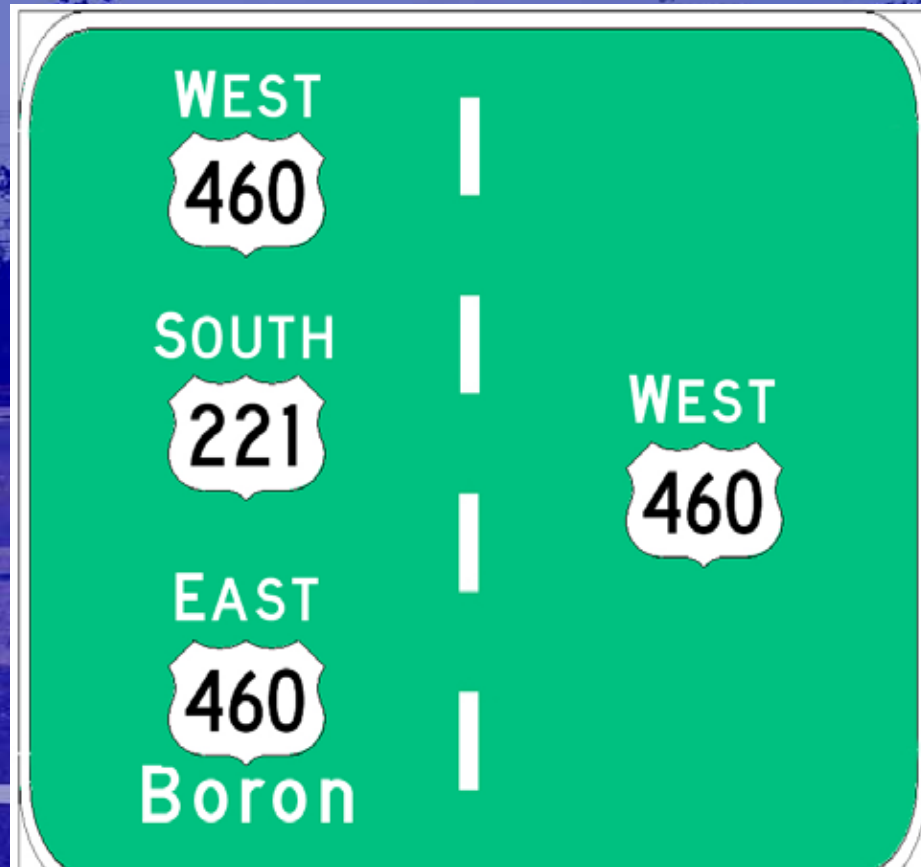
Maryland



Diagrammatic



New York



Evaluation Method

- Study Conducted in FHWA Sign Research Laboratory
- Signs Presented in Context with NCUTCD Proposed Lane Markings
- 64 Participants, 16 in Each of 4 Sign Type Groups
- Measure Accuracy, Latency, and Confidence in:
 - Lane Choice
 - Leg Identification

Anatomy of a Trial

1. Destination Displayed Until Participant Presses Key – Participant Reads Name Aloud
2. Signs shown for 2 s Each
3. Roundabout Approach with Lane Markings Shown Until Participant Makes Lane Selection
4. Roundabout Diagram Shown Until Participant Makes Leg Identification

Navigation Sign Route-Destination Combinations

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Number of Names	Number of Route Shields	Items of Information
0	3	3
1	3	4
2	3	5
3	3	6
3	2	5
3	1	4
3	0	3

Turn Restriction Lane Markings (5)

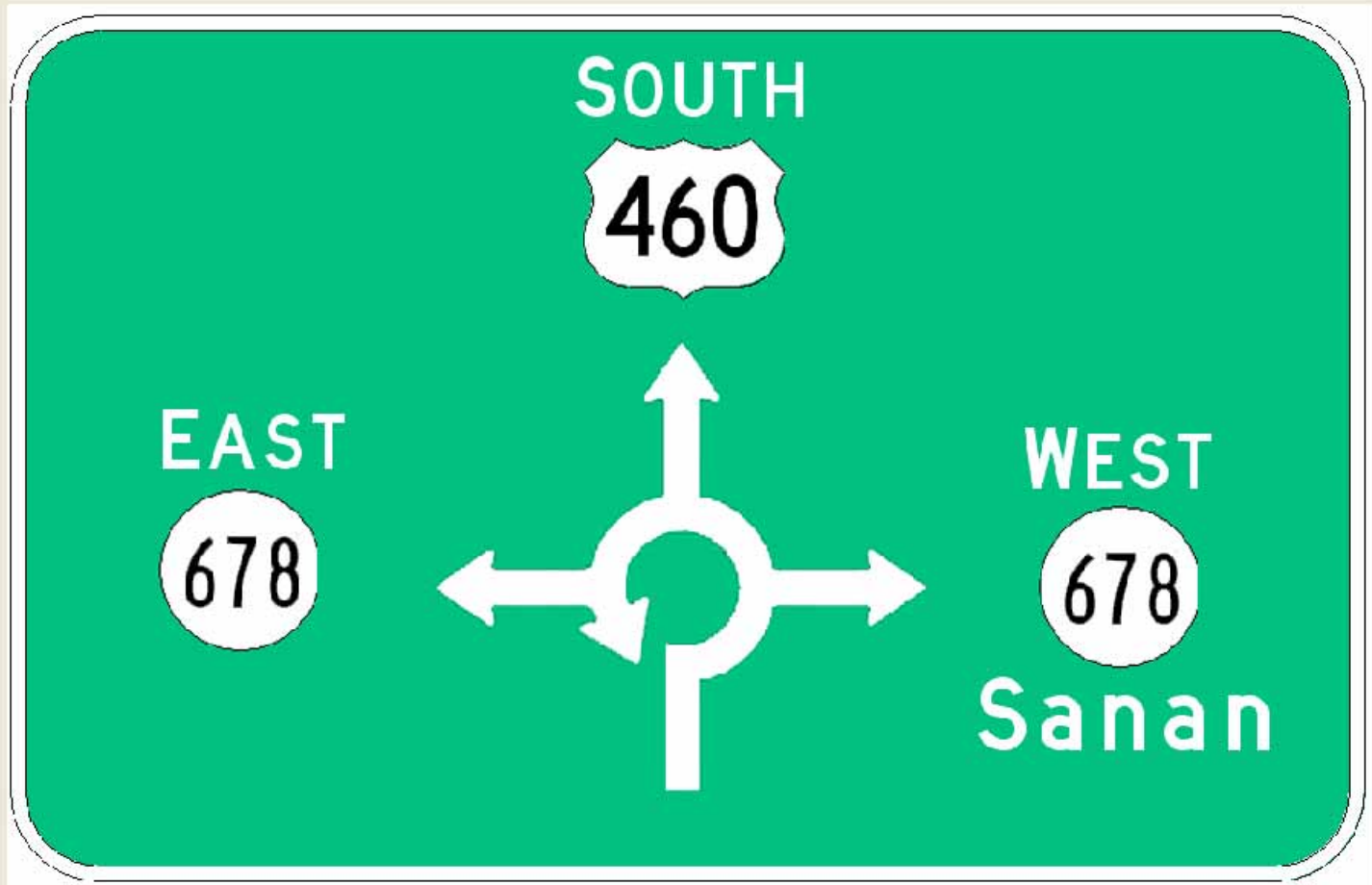


1. Destination

Your Destination Is:

Sanan

2. Navigation Sign(s)



3. Lane Choice



3b. Confidence Rating

How confident are you in the lane choice you just made?

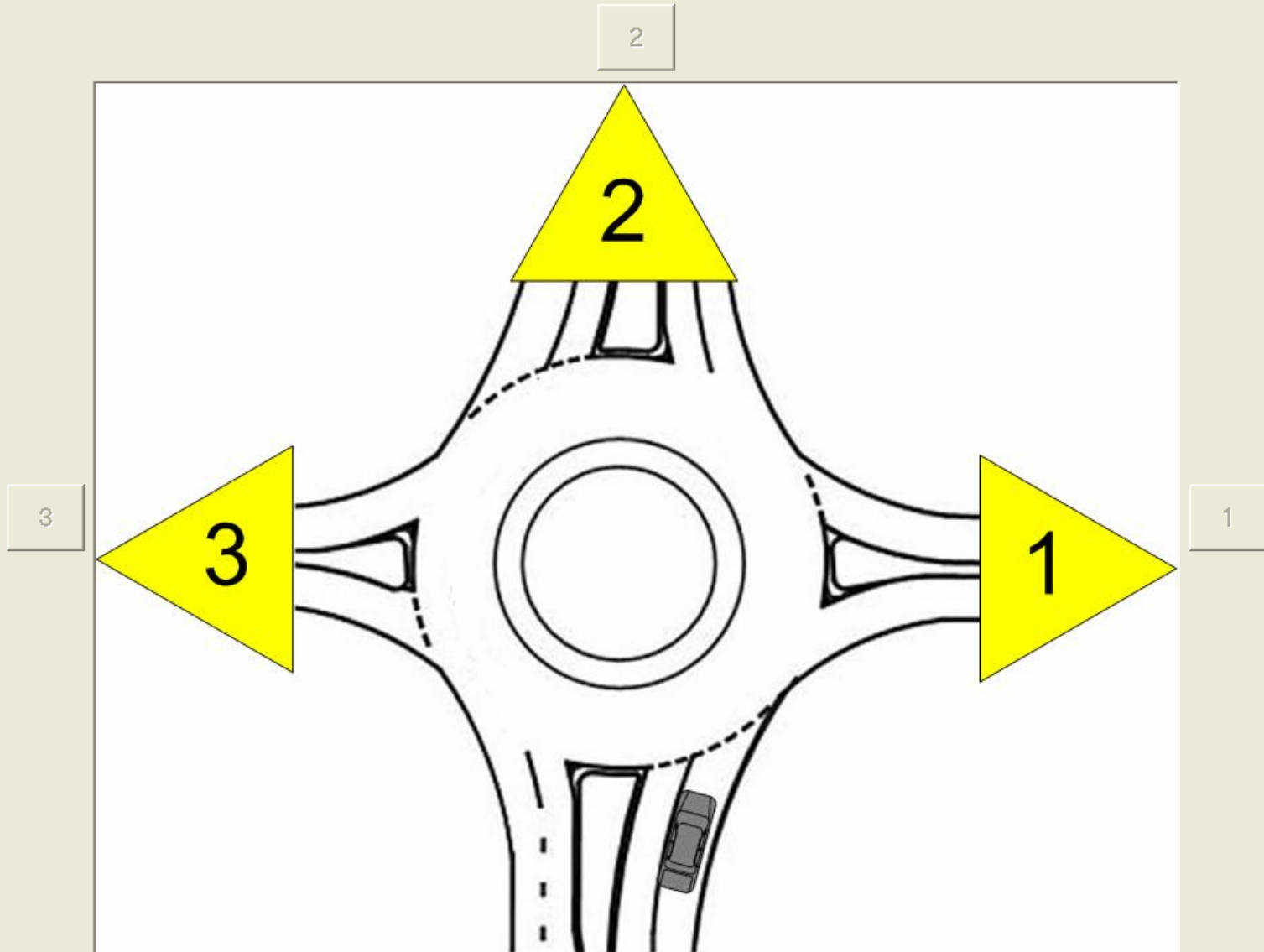
Very
Sure

Not
At All
Sure

1	2	3	4	5	6	7
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4. Leg Choice

On which leg of the roundabout will you exit?



4b. Leg Choice Confidence

How confident are you in the lane choice you just made?

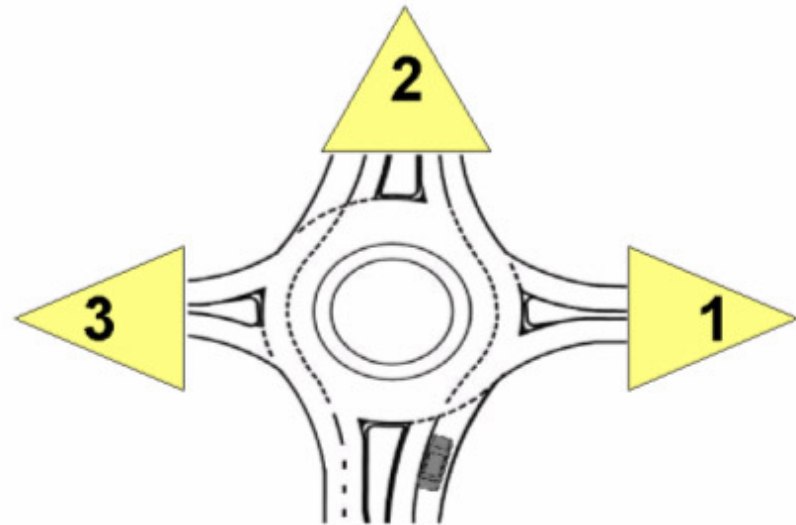
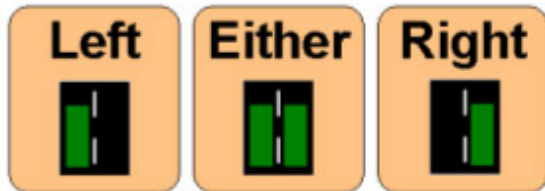
Very
Sure

Not
At All
Sure

1	2	3	4	5	6	7
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Customized Keyboard

Navigation Signing For Roundabouts



Very Sure

1

2

3

4

5

6

7

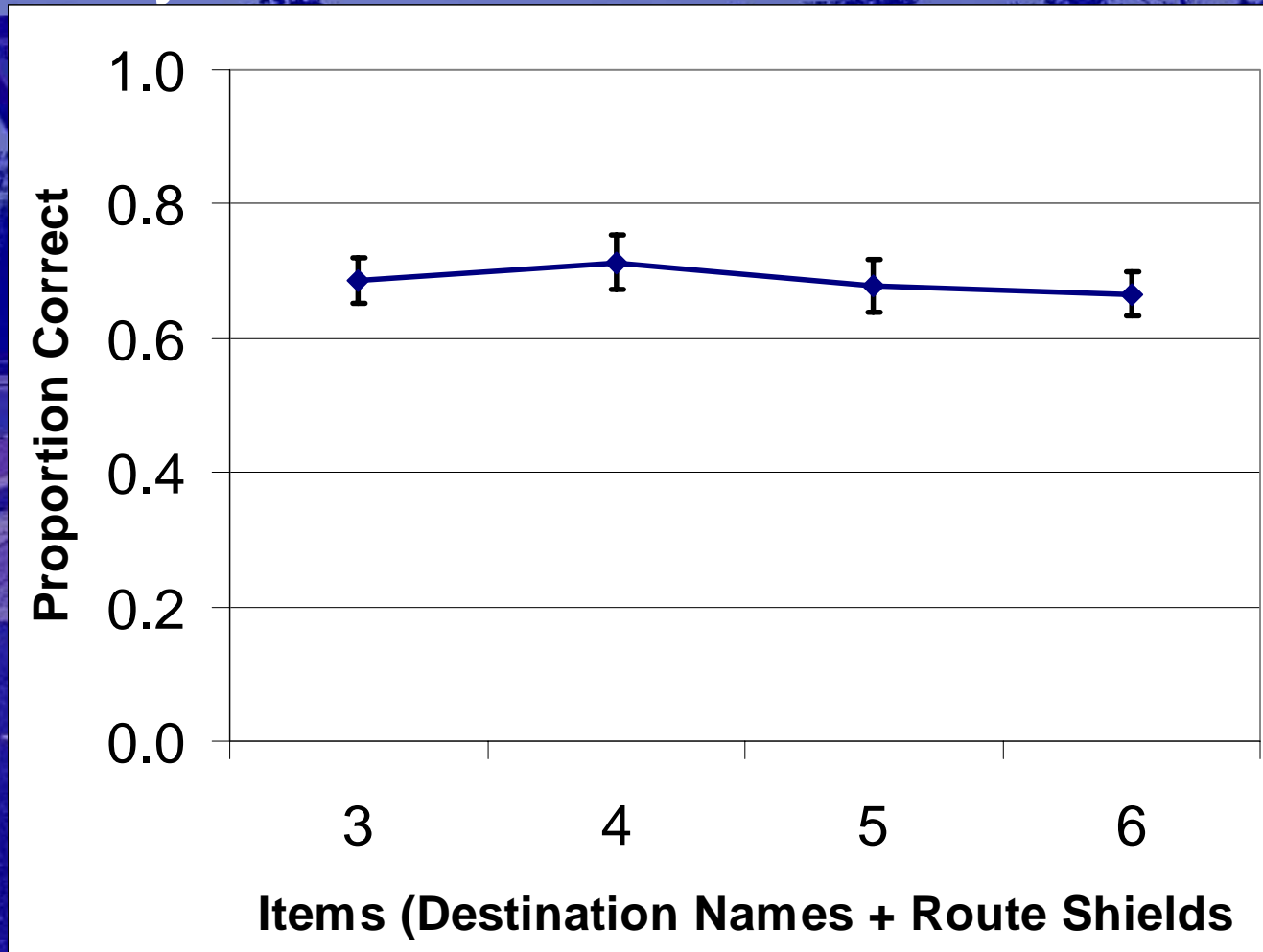
Not at All Sure

Lane Choice Findings

- Participants Chose the Correct Lane Only 68.6 Percent of the Time
- Performance Only 3.6 Percent Above Chance
 - With 3 equally probable choices chance performance would be 33.3 percent
 - However, assuming right lane for right turns, left lane for left turns, and either lane for straight through, chance performance would be 65 percent

Lane Choice by Number of Items on Sign

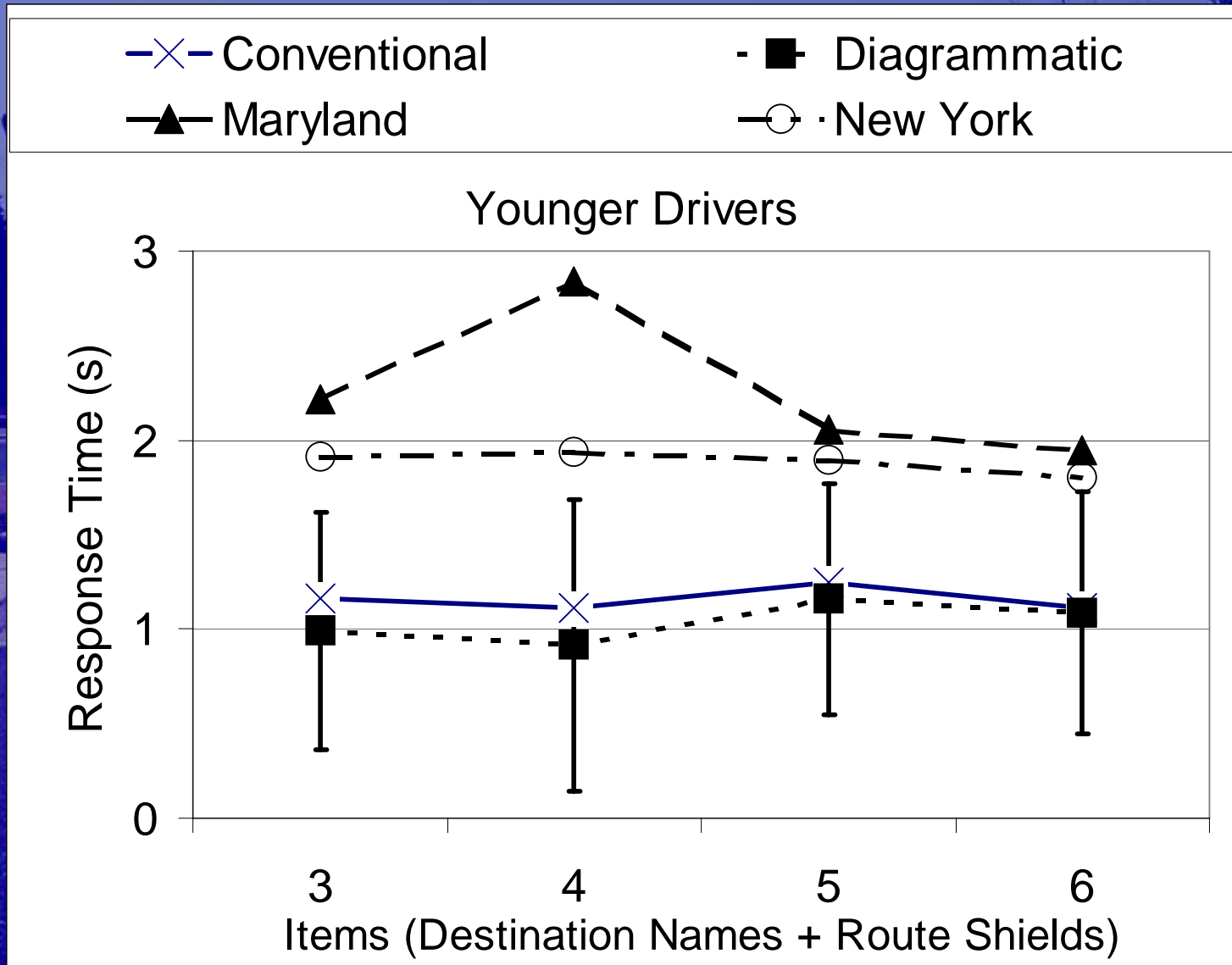
- Accuracy with 4 items was better than with 6



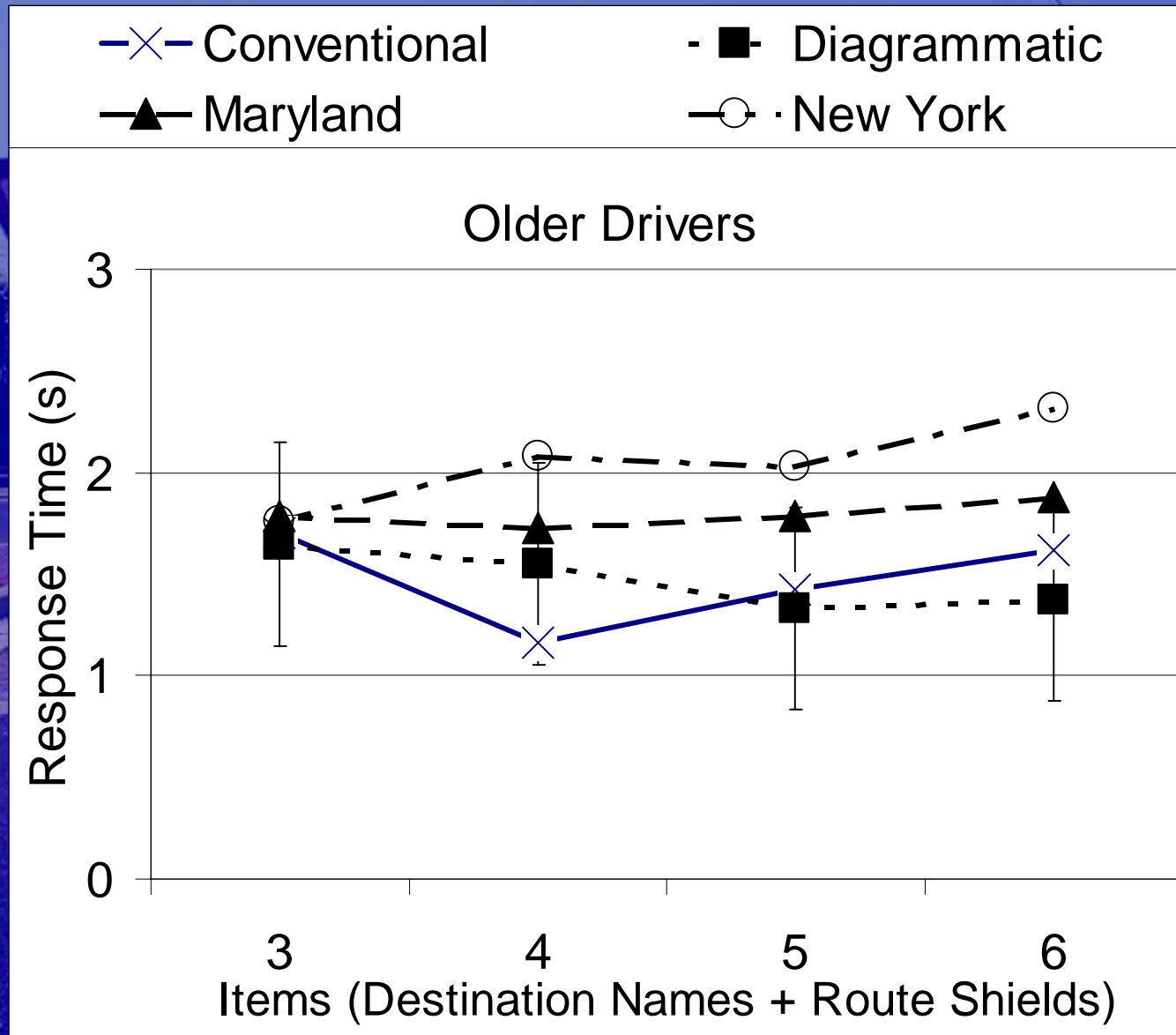
Speed in Making Lane Selection

- Younger Group Responded More Quickly Than the Older Group to the Conventional and Maryland Type Signs
- Responses to New York and Maryland Sign Responses were Slower than to Conventional or Diagrammatic Signs

Lane Choice Response Times (< 65 Years of Age)



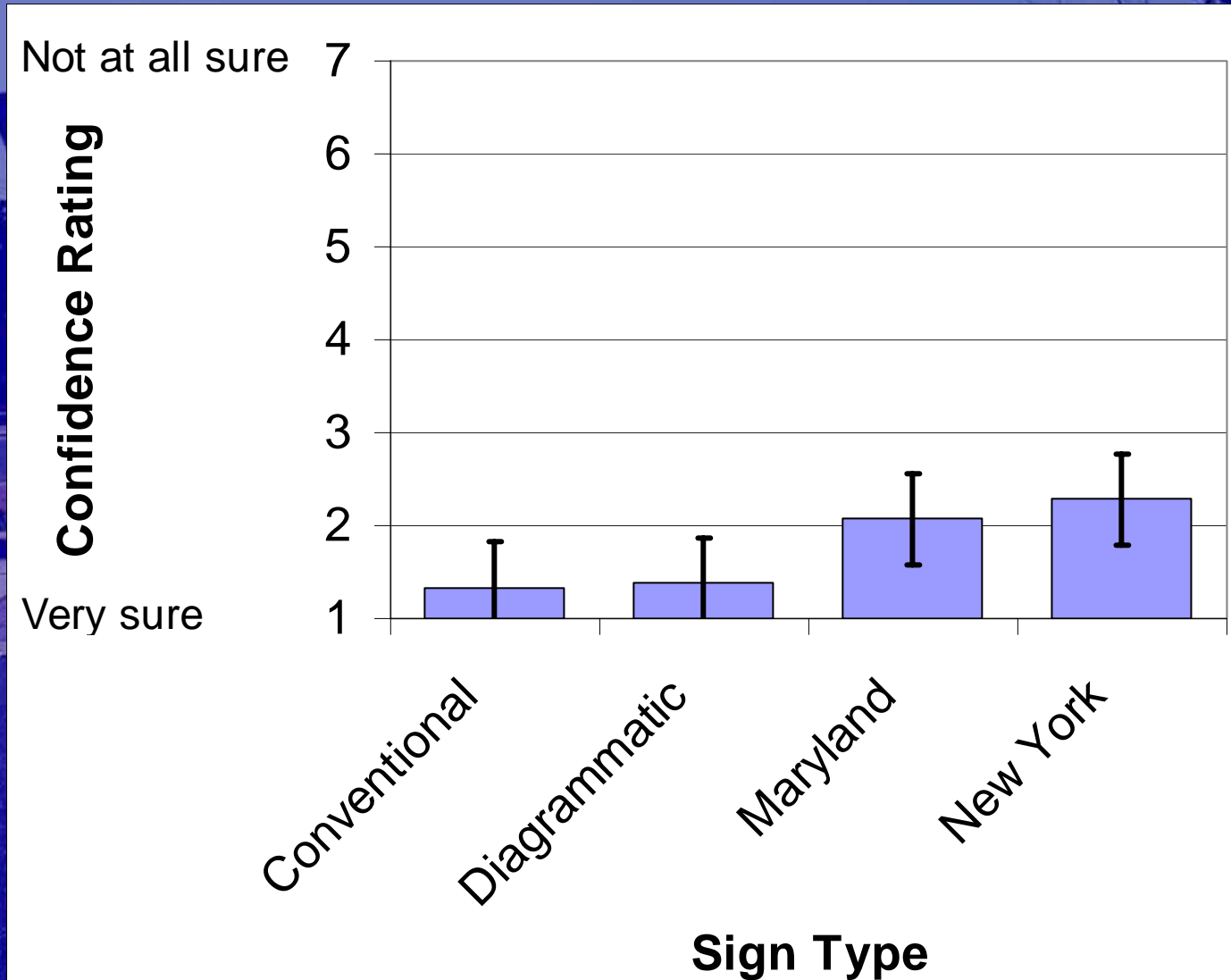
Lane Choice Response Times (≥ 65 Year of Age)



Confidence Ratings

- Despite High Error Rates, Participants Were Confident in Their Lane Choices
- Confidence in Choices was Significantly Lower for New York and Maryland Signs than to Conventional and Diagrammatic

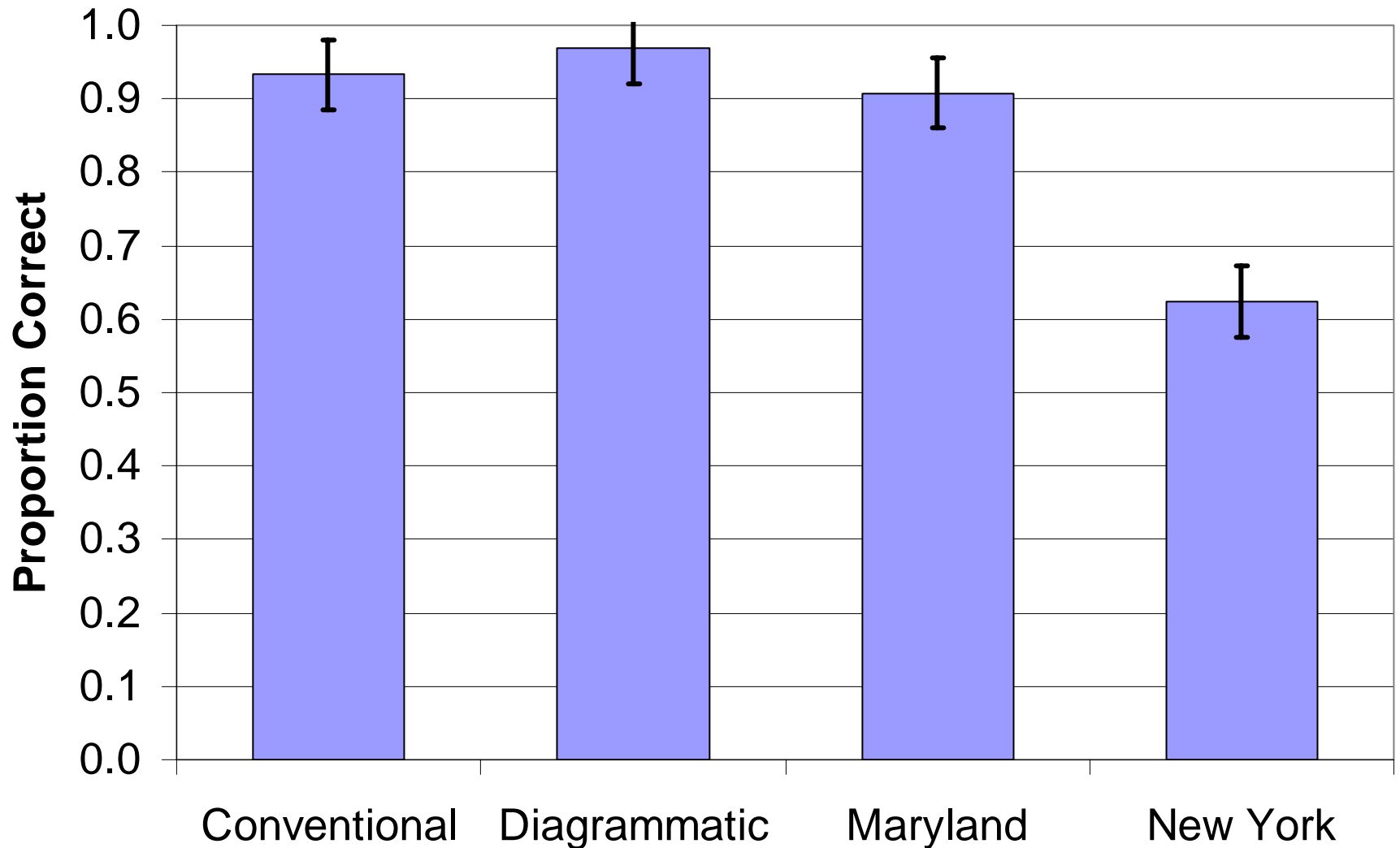
Lane Choice Confidence



Leg Choice

- Leg Choices Accuracy was High Except for the New York Signs
 - New York Sign Only One that Contains No Leg Information
- Best Performance was with Diagrammatic Sign, but Not Significantly Better than with Conventional Sign

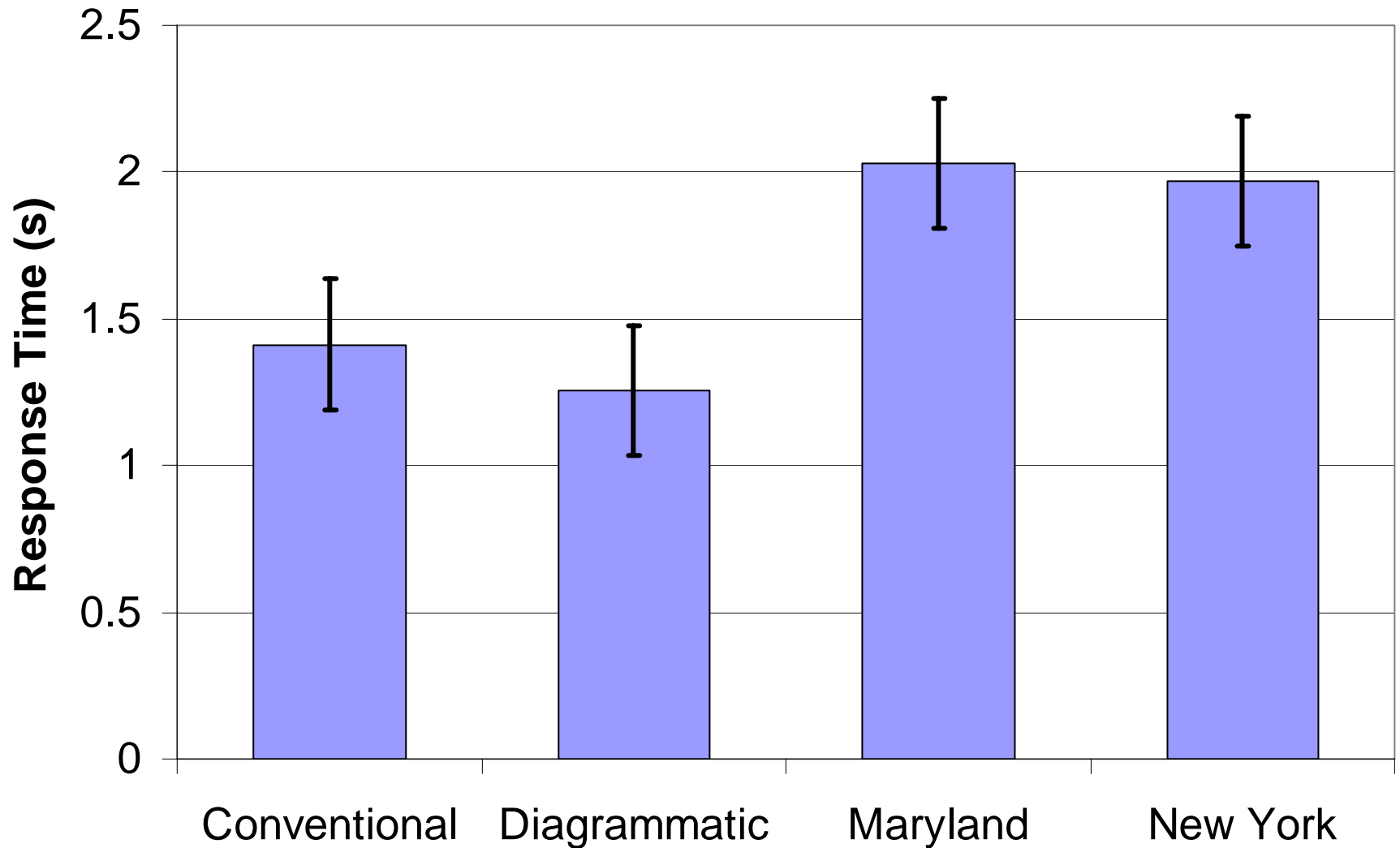
Leg Choice Accuracy



Leg Choice Speed

- Leg Selections Took Significantly Longer for Maryland and New York Signs Compared to Conventional and Diagrammatic
- Response Time Differences between Sign Types were Limited to Older Driver Group and Largest for Signs with 5 and 6 Items

Leg Choice Speed

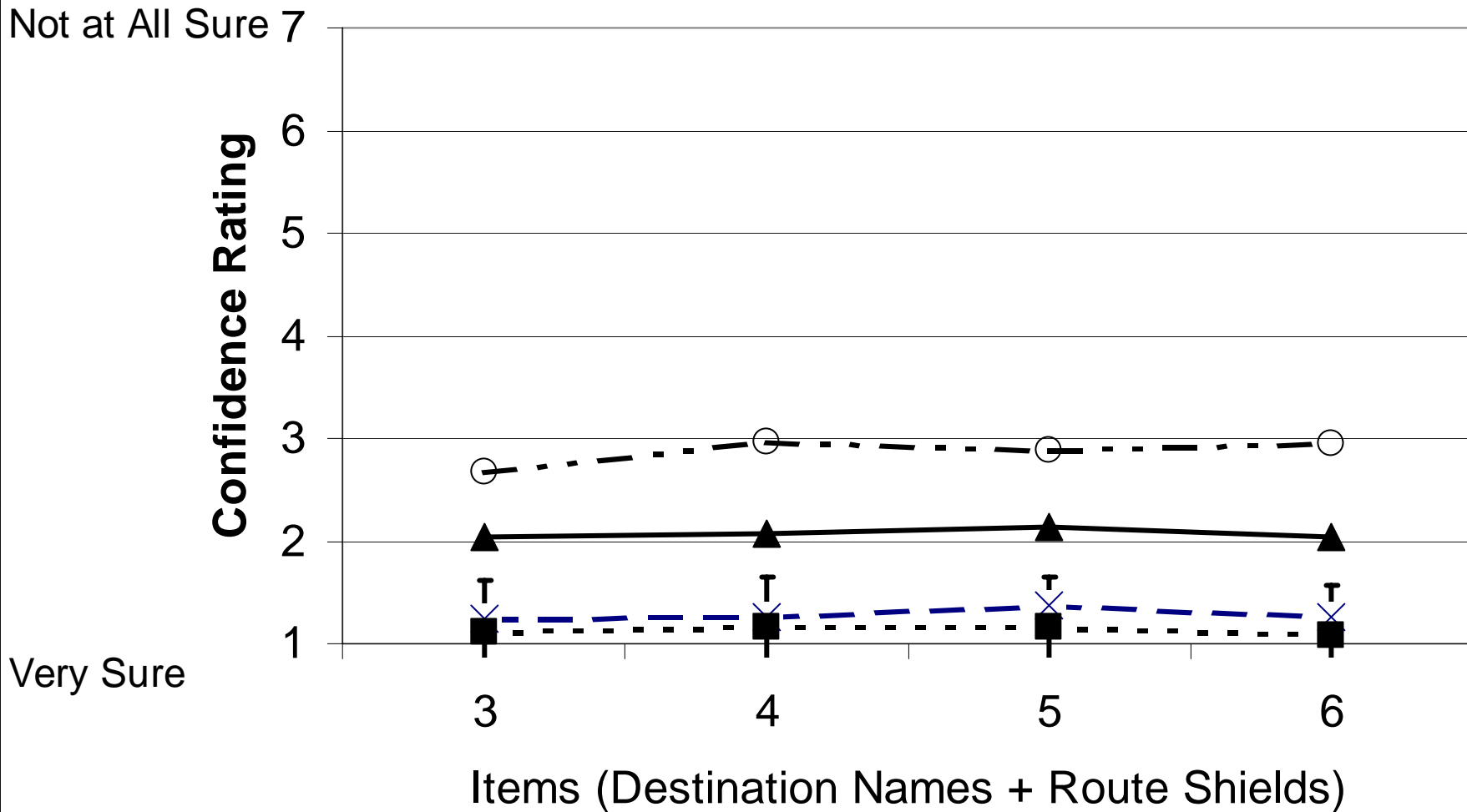


Leg Choice Confidence

- With Conventional and Diagrammatic Signs Drivers were Very Confident of Leg Choices
- Drivers were Significantly Less Confident of Leg Choices with Maryland Signs
- Drivers were Least Confident with New York Sign (Significantly Less confident than with Maryland Sign)

Confidence in Leg Choice

—x— Conventional - ■- Diagrammatic —▲— Maryland —○— New York



Conclusions and Recommendations

- Conventional and Diagrammatic Signs are Recommended over the Maryland or New York Styles
- The Turn Restriction Markings were Not Effective
 - Either because they were noticed in context of this experiment, or
 - Traditional turn restriction markings are not appropriate for US roundabouts
 - Additional turn restriction research needed