# Hang on a Sec! Effects of Proactive Mediation of Phone Conversations while Driving

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**Workshop on ICT and Road Safety**
WSIS - Geneva 18May11

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# Driving is no longer a single attention task



| No calls at all for novice drivers | No calls at all for bus drivers | Handheld banned for all drivers, handsfree ok |
|---|---|---|
| 30 states | 19 states | 8 states |

**No US state bans all use of cell phones while driving**

# Cars of the future adding more multitasking capabilities



Nokia and CE4A encourage adoption of Terminal Mode specification

Nokia and CE4A (Consumer Electronics for Automotive) working group have released Nokia's Terminal Mode technology specification as a proposed industry standard for the integration of mobile applications into the car environment. The specification is open to all automotive and mobile device manufacturers. Here is the latest release:

## BMW Drivers Tweet as Luxury Brands Chase Ford for IPhone Crowd

By Chris Reiter and Tim Higgins - Apr 27, 2011 3:01 PM PT

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## Breaking News / Infotech

You are here: Home > News > Breaking News > Infotech

## Microsoft to power Toyota cars on Internet highway

Agence France-Presse
First Posted 08:41:00 04/07/2011

Filed Under: Internet, Road Transport, Investments, Computing & Information Technology

# "But these interactions will be hands-free!"

- Demands on cognitive resources are key, not the motor interactions [Strayer and Johnston, 2001]

## *If, When, How*

- Interleave activities with driving
  - [Brumby and Salvucci]

- Activities may be accommodated during non-complex driving
  - [Iqbal, Ju and Horvitz]
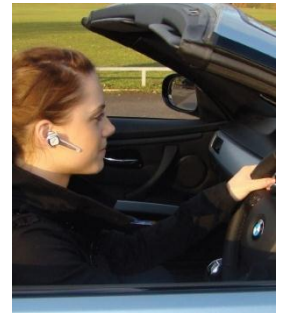
# New Direction: Mediation

- Core direction for attention management
  - [McFarlene 2001]
  - Desktop domain → safety critical domain?

Can system that knows about driving complexity effectively intervene during conversations so as to enhance safety?

How do interventions by a mediator influence
- Driving safety
- Conversations
- Perceptions of participants

# Study



=18 pairs

- Medium fidelity driving simulator

- Hands free mechanism for phone calls

- Caller in separate room

# Interventions

**Mode**

General message

Specific message

**Call on hold?**
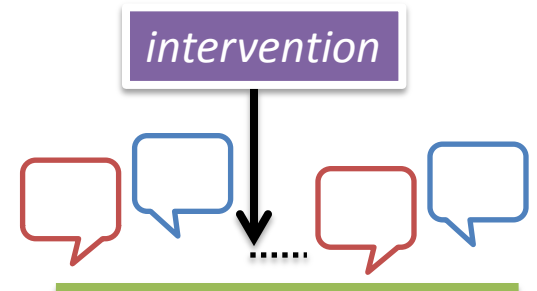
Call not on hold
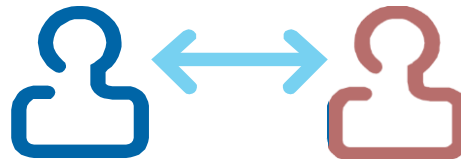
Call on hold

**Timing**

Immediate

intervention

Breakpoint

intervention

# Study Design

- 2X2X2 Repeated measures within subjects design

8X2 = 16 trials  **+**  **+** intervention

2 trials  **+** 

baseline 2 trials 

2 trials 
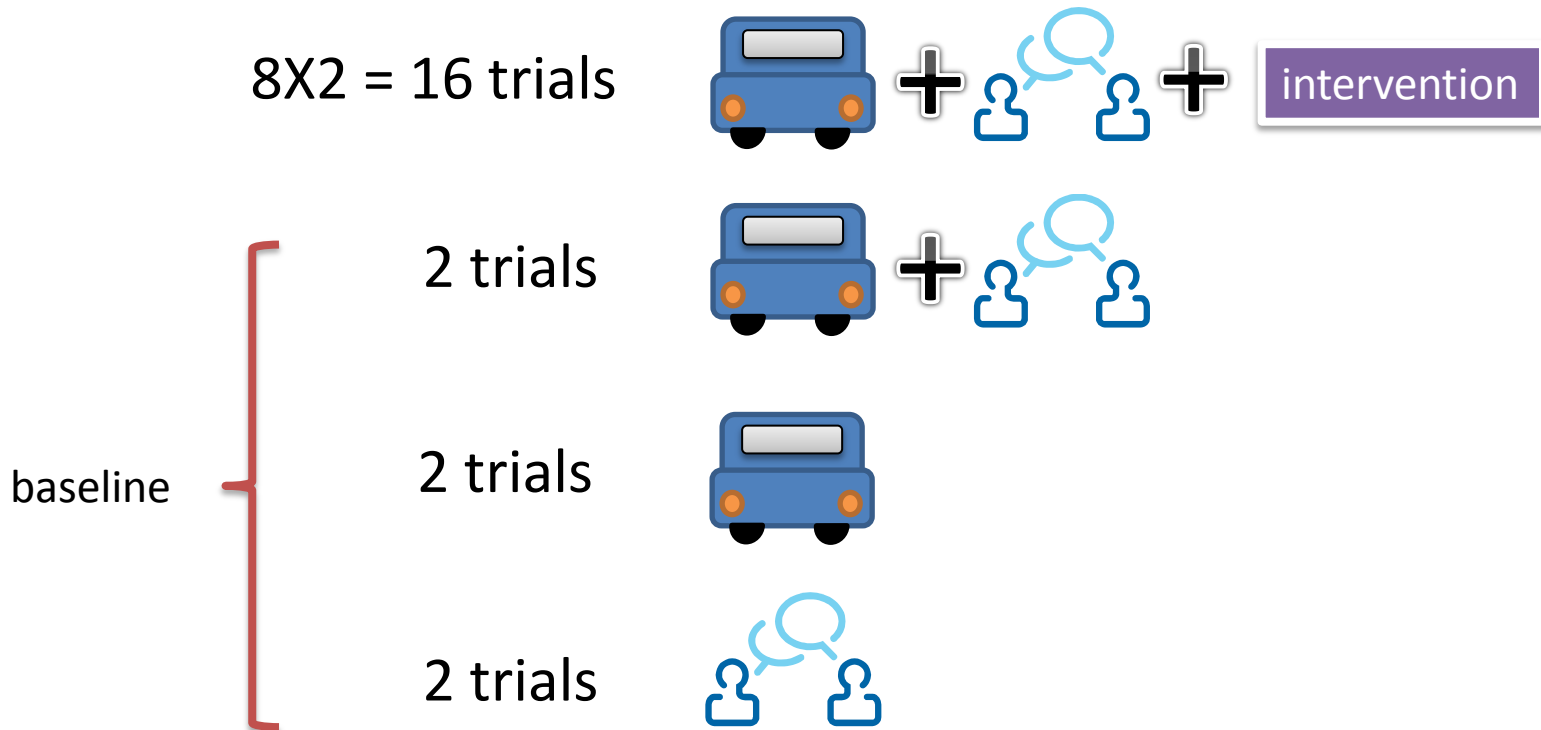
# Methodology

- Answer a set of 25 questions for each trial
  - Information recall questions [Iqbal, Ju and Horvitz CHI 2010]
  - Caller asks, driver answers, caller records answer
- Intervention message before upcoming event
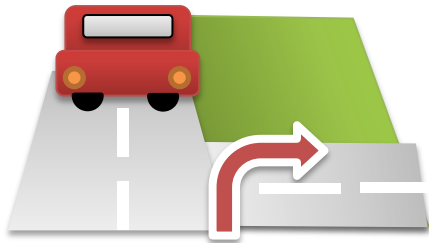  - Turns, Construction, Traffic, Pedestrian, Residential area

# Measures

## Driving

Collisions
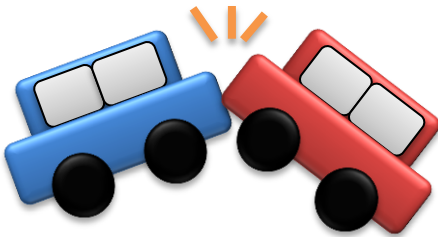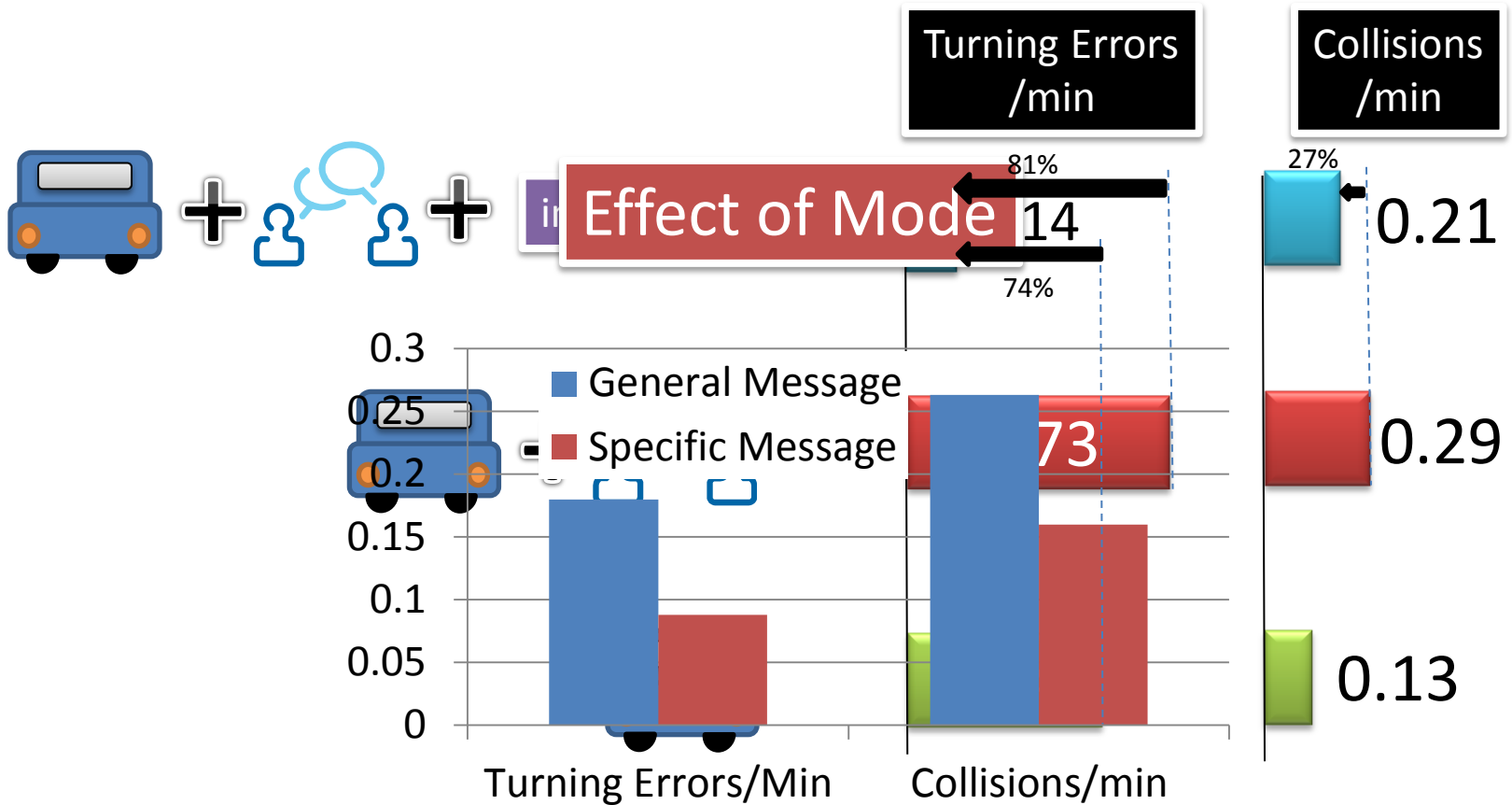
Turning Errors

## Conversation

# of questions answered

## Subjective Feedback

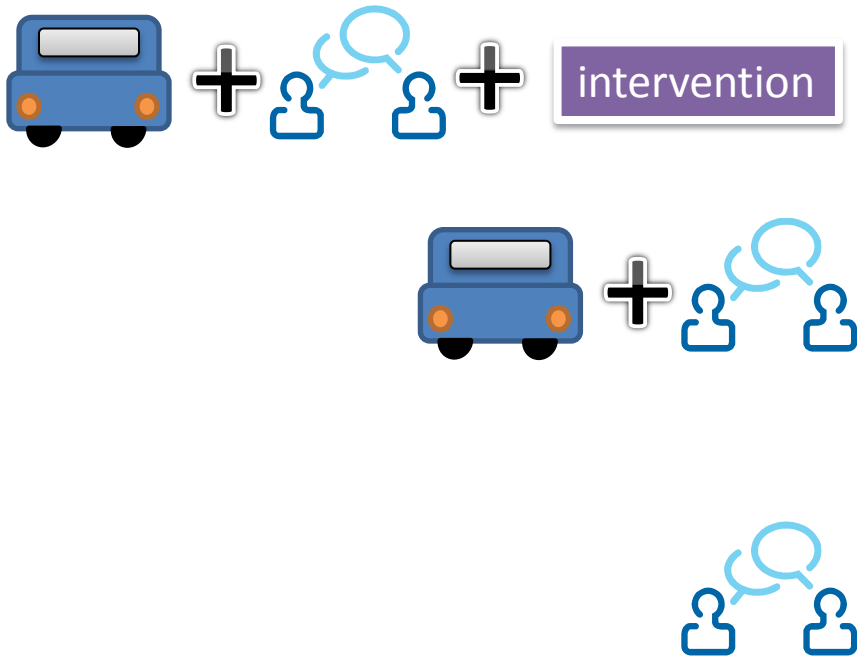- Difficulty
- Perceived Impact
- Preference

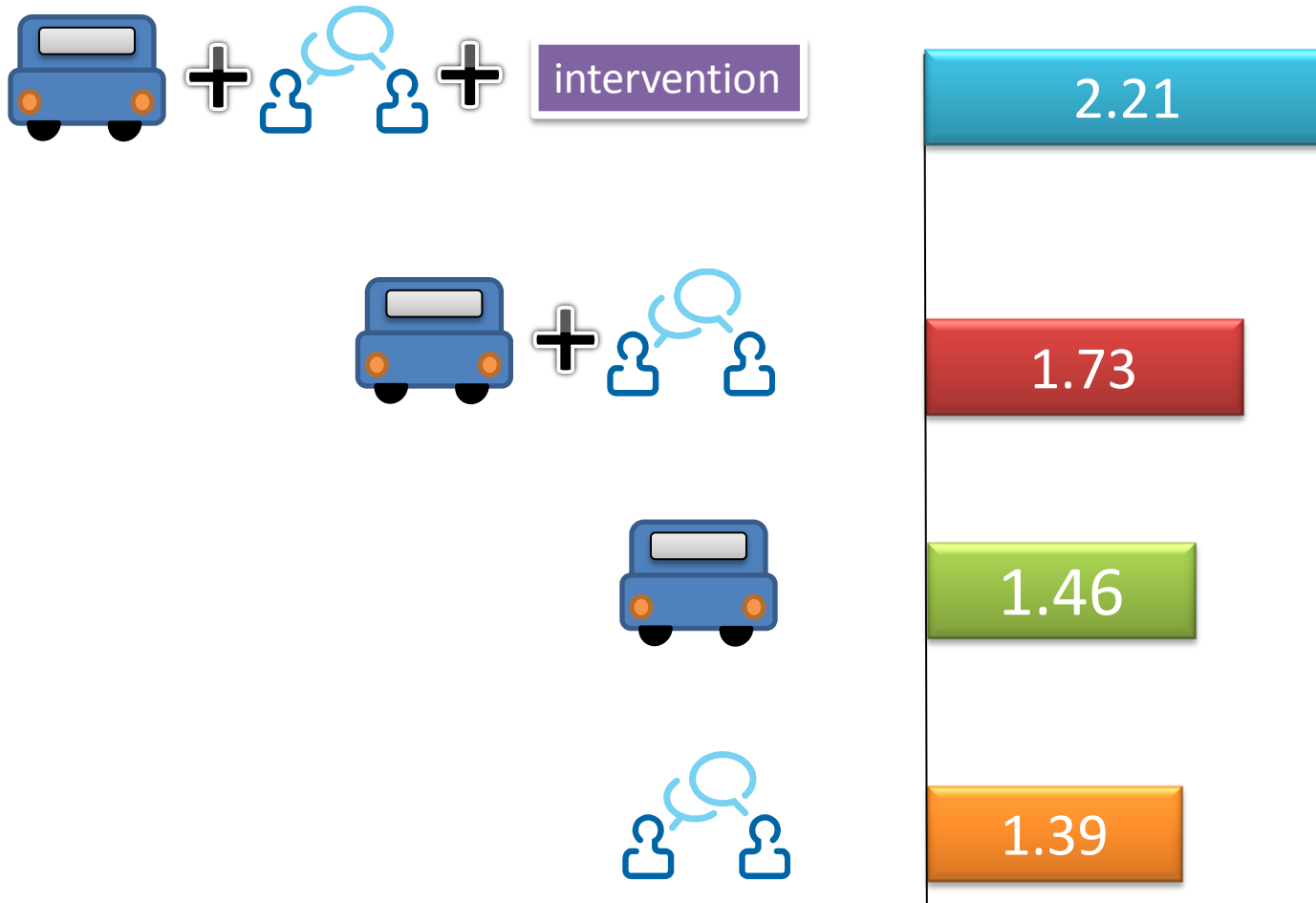# Results: Impact on Driving

# Impact on conversation



Number of questions answered/min

No hold

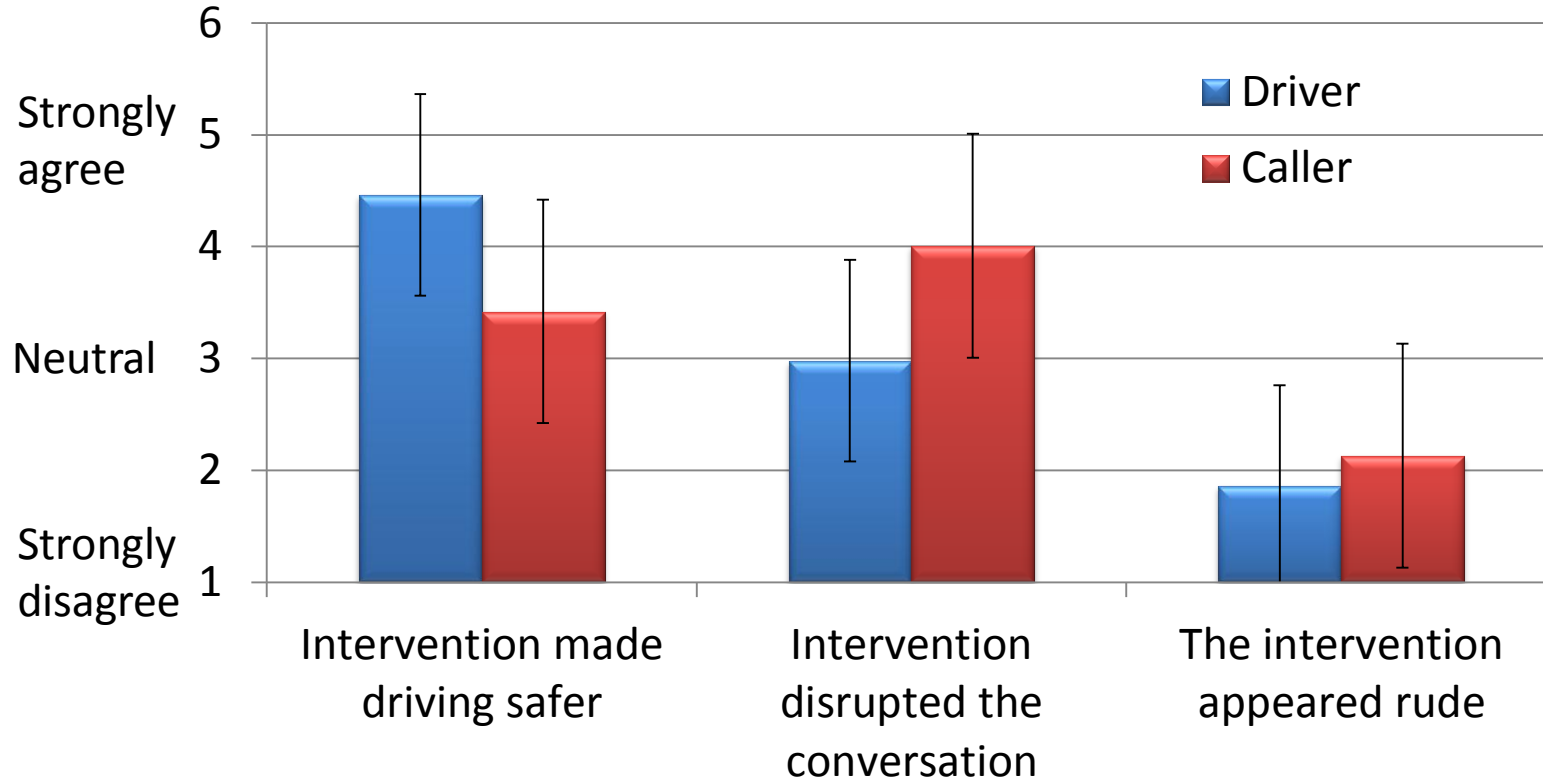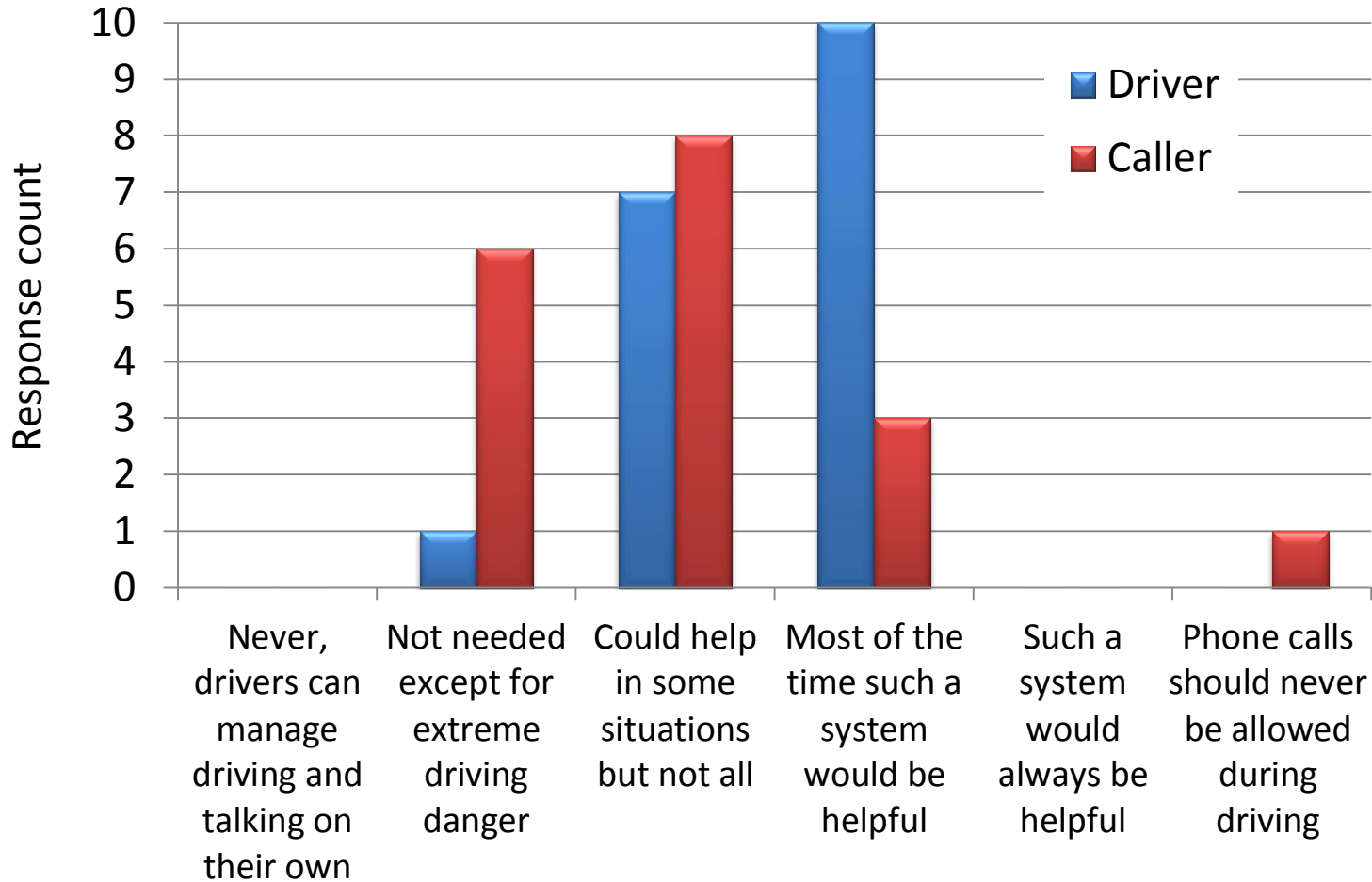| | intervention | 2.9 | 5.9 |
| | | 7.7 | 7.6 |
| | | 8.36 | |

# Subjective rating: Difficulty

Likert scale: 1 (easiest) – 5 (most difficult)
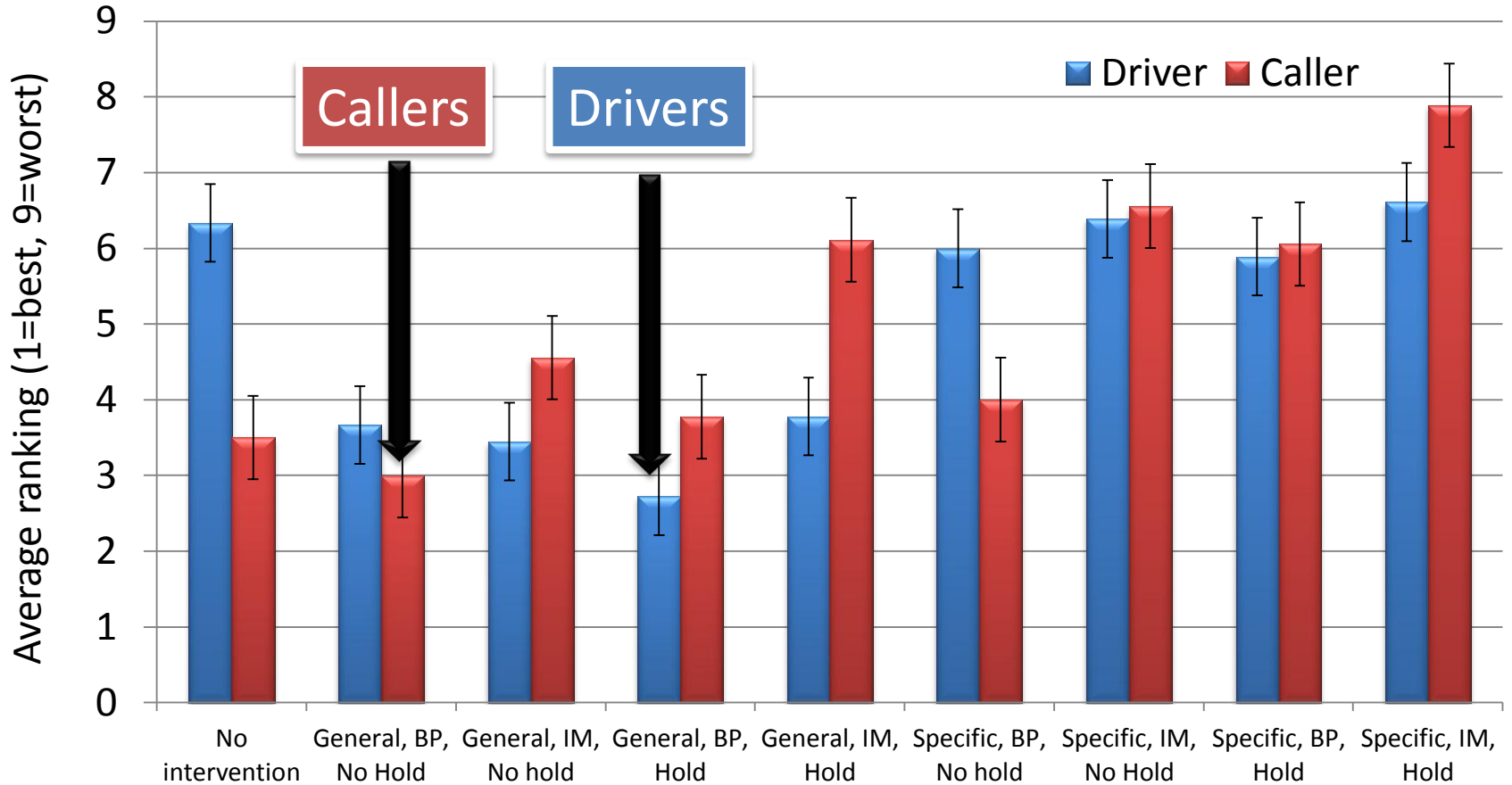
# Perceived Impact
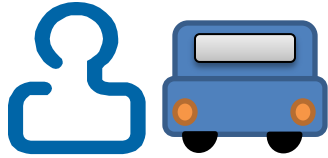
# Do we need such a system?

# Preferences

1=best, 9=worst

# Quotes

*"Prompts to pay attention were really useful, wish I had them in my current system"*

*"Announcement of turns was helpful"*

*"Being put on hold doesn't help me, makes me wonder what happened…. after using it I seemed to be getting used to the interruptions!"*

*"I really liked the shorter notifications, focus needed is plenty of info"*

*"It was nice to have the detail about the driver focusing, but shorter message is better"*

*"Not sure if I like my behavior being dictated by a computer"*

*"Being put on hold was an annoyance-- but it also gave me a few seconds to collect my thoughts"*

# Summary

Interventions with more explicit messages effectively reduce driving errors

Traded off with a corresponding slowing down of conversation

Drivers prefer interventions more than callers

Need to educate on dangers of driving and conversing

Feasibility of building intervention systems

# Questions?

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