

Conversing while driving

The importance of visual information on conversation modulation

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Phone or passenger?

Is it dangerous?



Increased accident risk when using the phone

(McEvoy et al., 2005; Hahn & Prieger, 2006)

Lower accident risk when passengers are present

(Vollrath, 2002; Engström, 2008)

Possible reason: Conversation modulation

(Gugerty, 2004; Charlton, 2009)

What is conversation modulation?

Conversation is adapted to driving:

- Passengers and drivers talk less in difficult situations (Crundall et al. 2005) – this is not found when phoning
- Complexity of utterances is reduced when talking with passengers (Drews et al. 2008) – not when phoning
- Additional visual information may support this modulation (Charlton, 2009)

What is the reason for the modulation?

- Information vs. same fate

How is conversation adapted?

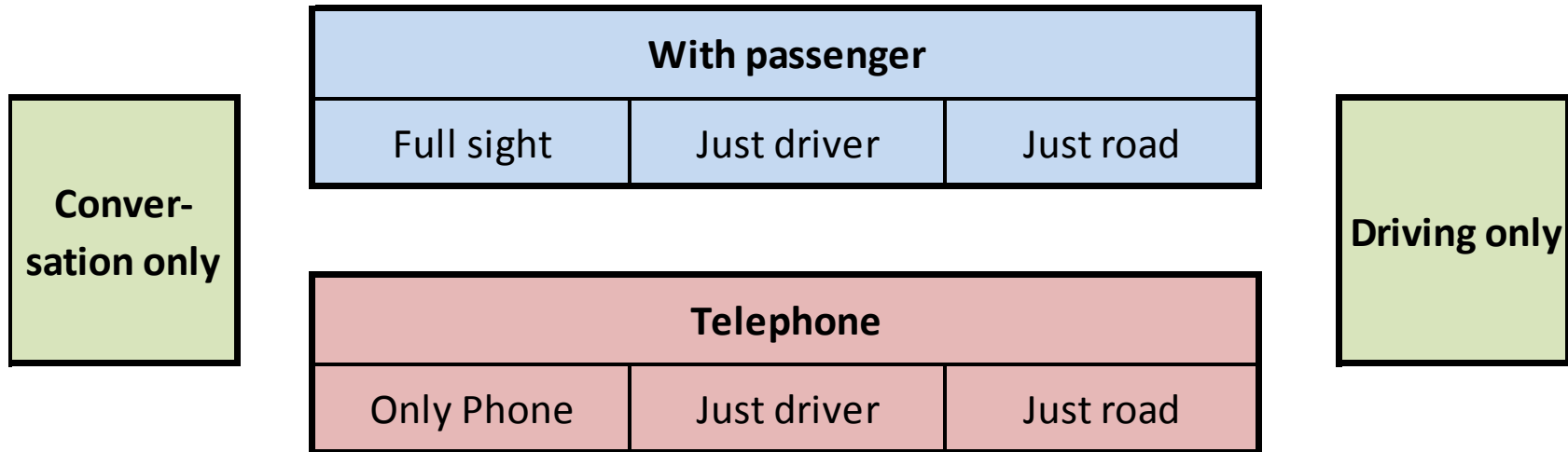
- Less talking, simpler talk,...





METHOD

Experimental design



- Within-subjects design, random order of situations
- N = 33 pairs (33 male and 33 female, all combinations)
- Driver selected per random
- 10 minutes training before the experiment
- Small talk, self-selected topics based on suggestions

Conditions



Driving scenario with different environments

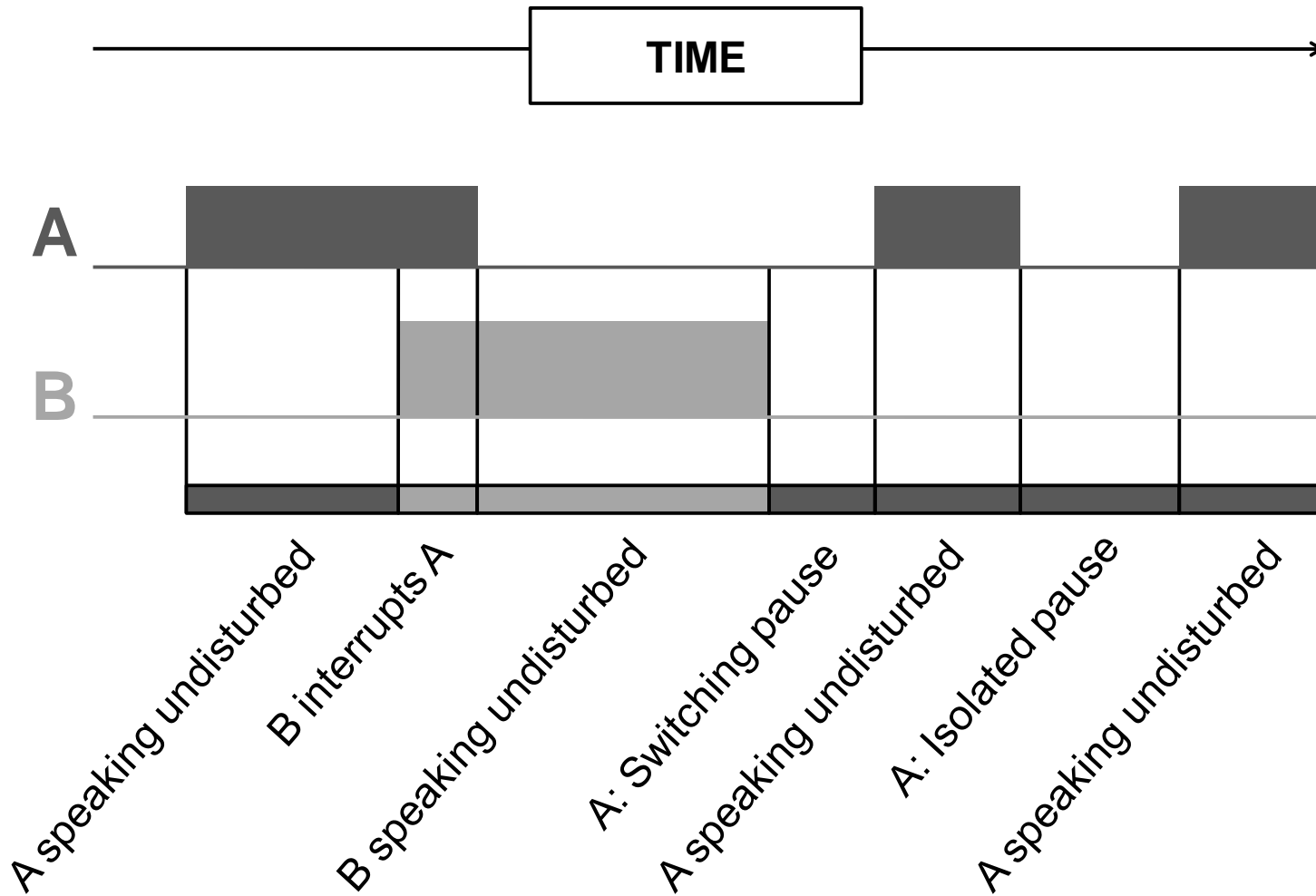




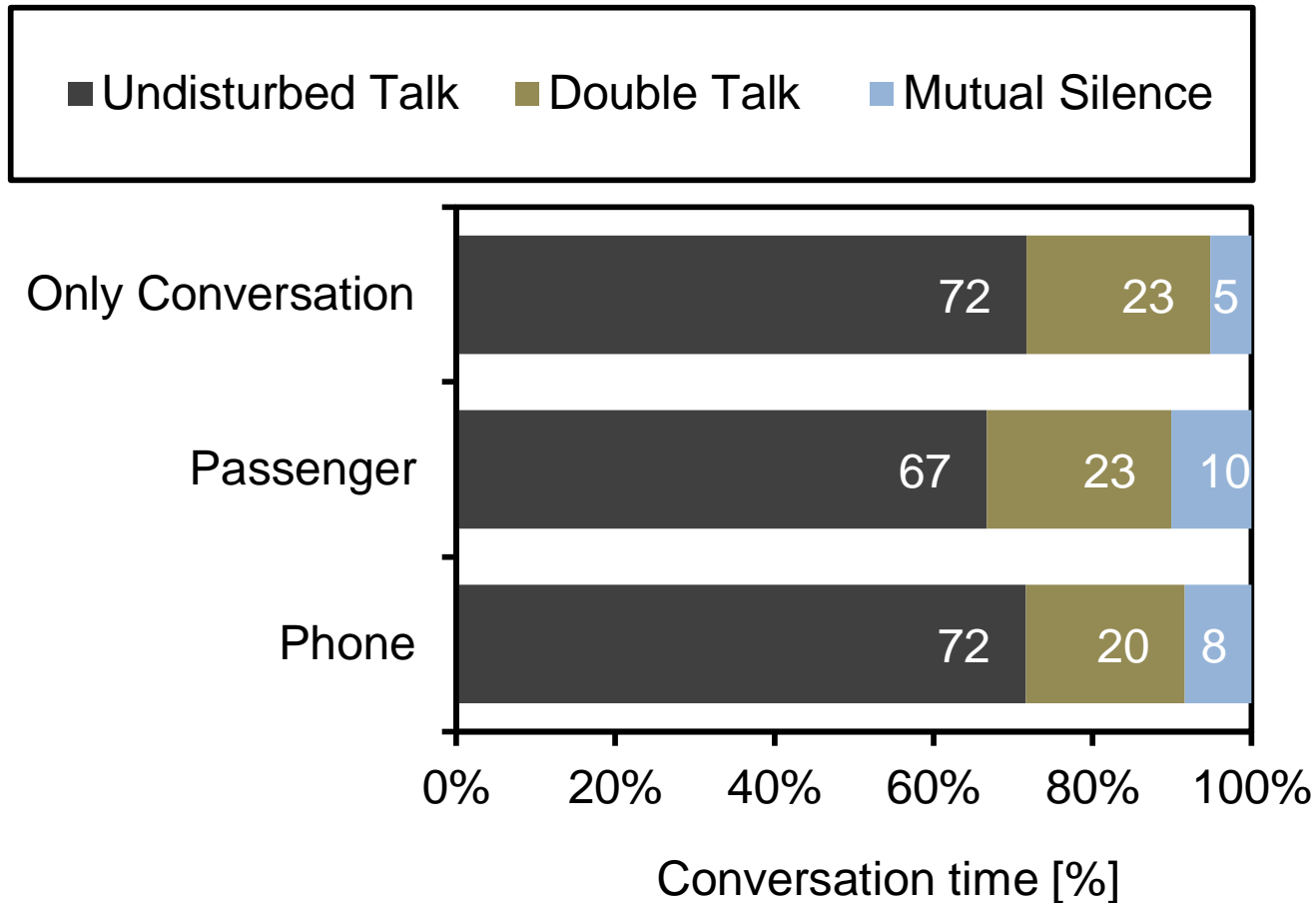
RESULTS

Speech variables

Krüger & Vollrath (1996)

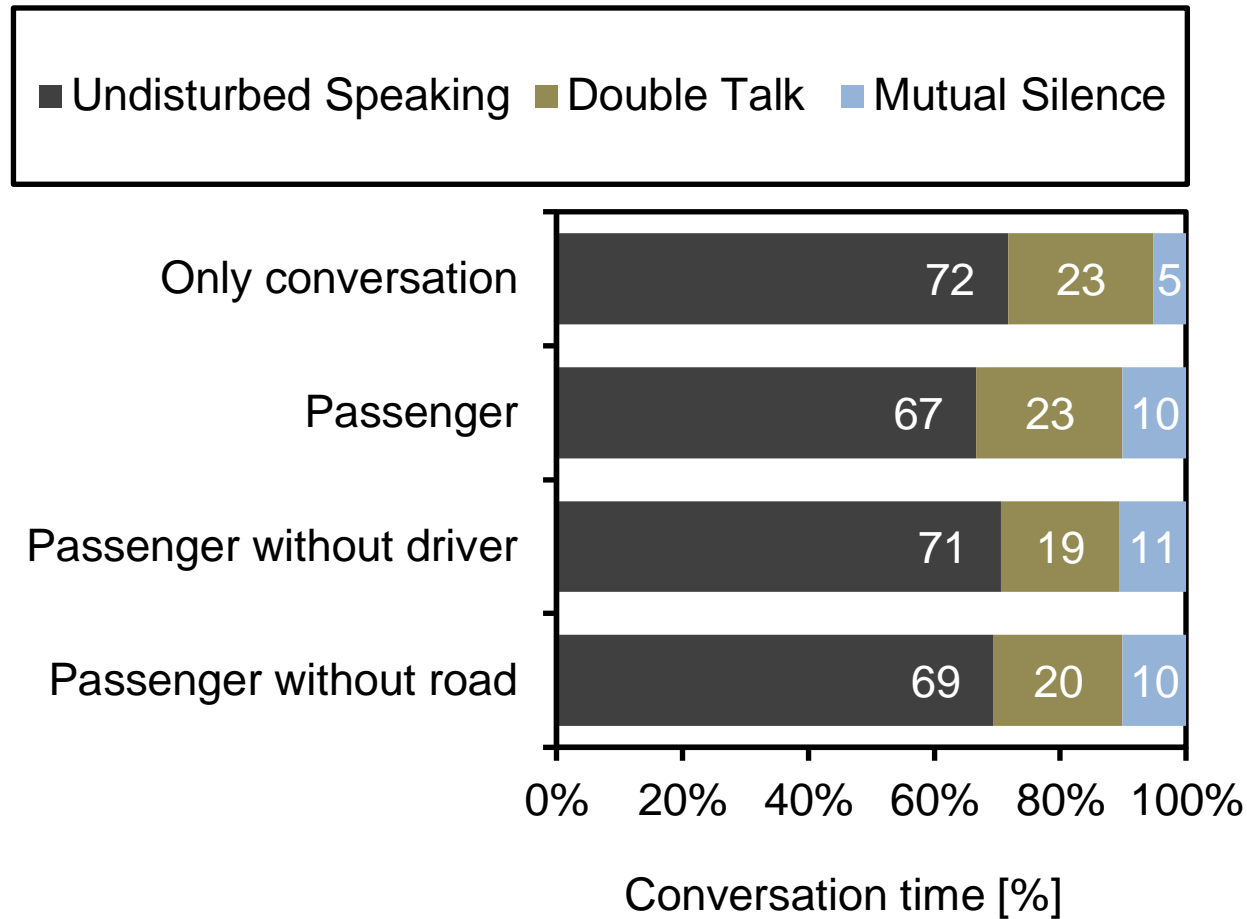


The conversation



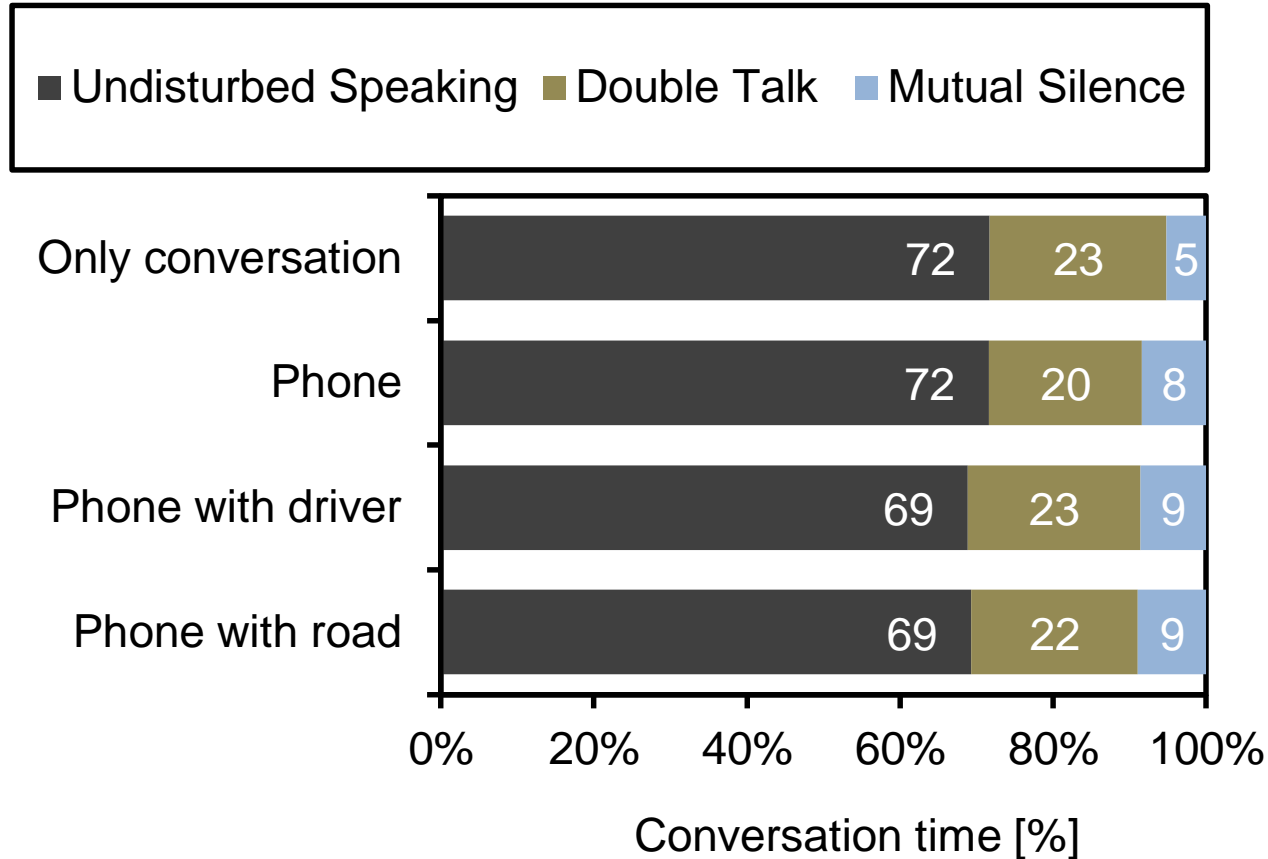
Undisturbed Talk: $p = 0.001$, Double Talk $p = 0.088$, Mutual Silence $p < 0.001$

Passengers without information



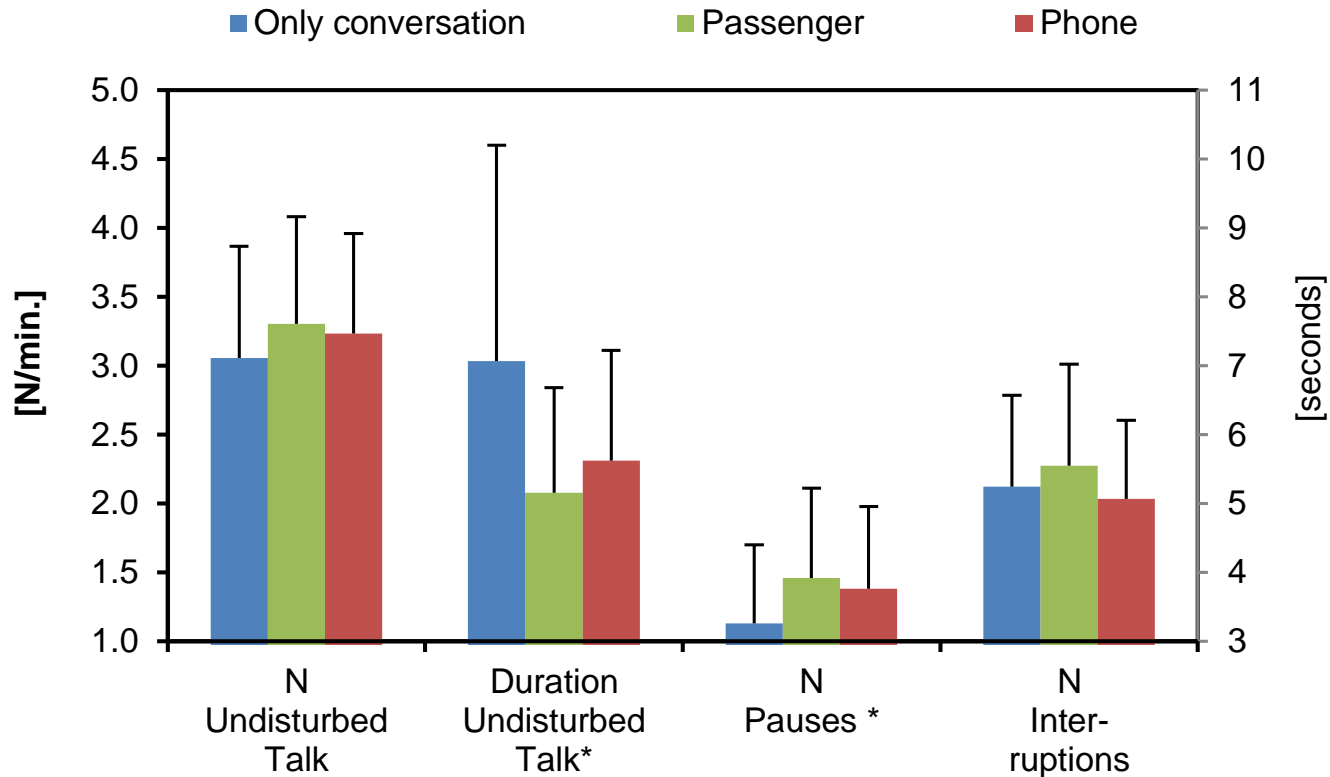
Undisturbed Talk: $p = 0.043$, Double Talk $p = 0.083$, Mutual Silence $p = 0.910$

Telephone with information



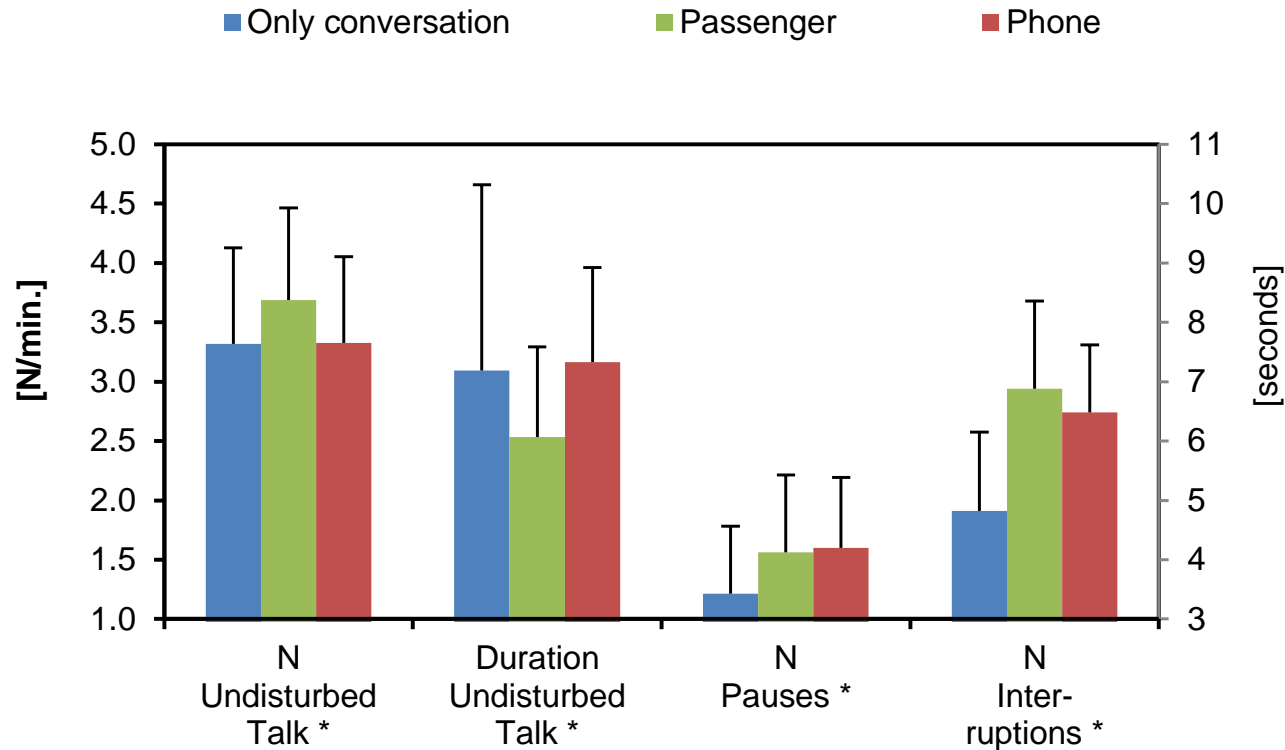
Undisturbed Talk: $p = 0.046$, Double Talk $p = 0.245$, Mutual Silence $p = 0.887$

What does the driver do?



N Undisturbed: $p = 0.236$, Duration $p < 0.001$, N Pauses $p = 0.003$, N Interruptions $p = 0.149$

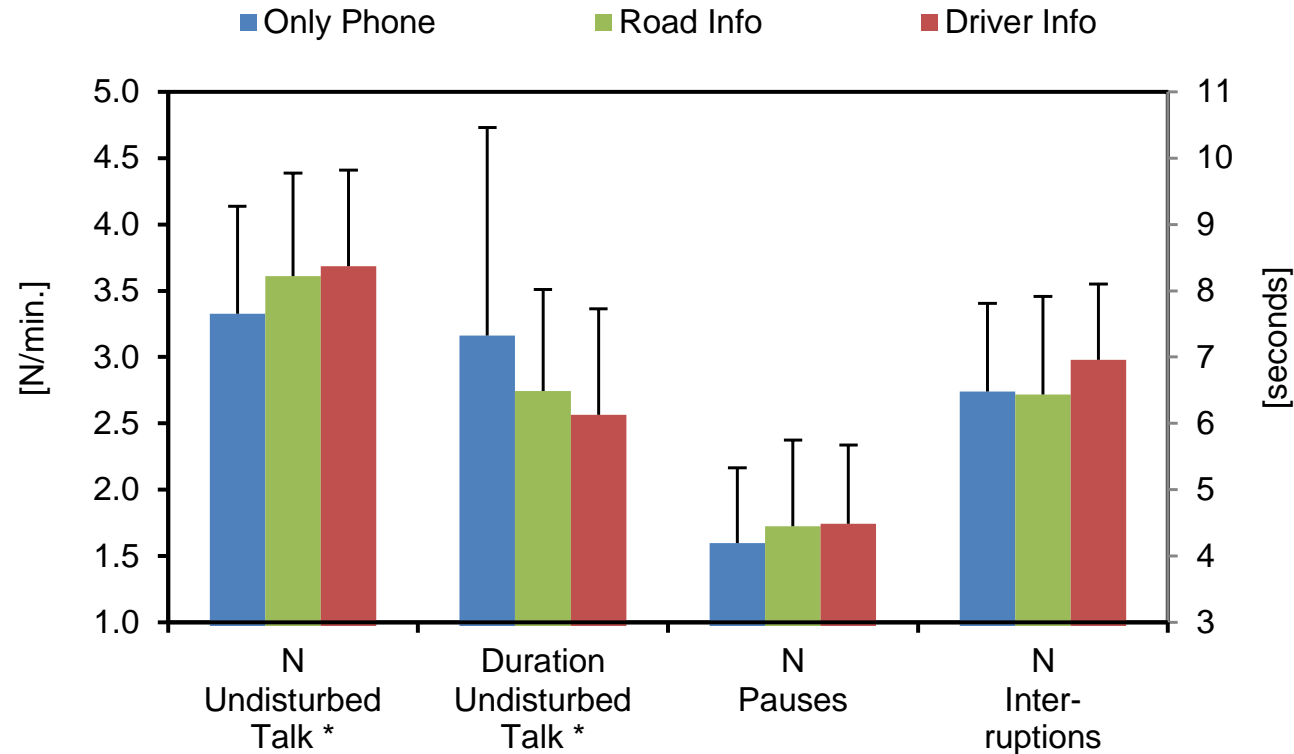
And the passenger / partner?



N Undisturbed Talk: $p = 0.023$, Duration $p = 0.008$, N Pauses $p = 0.003$, N Interruptions $p < 0.001$

Does information help the partner?

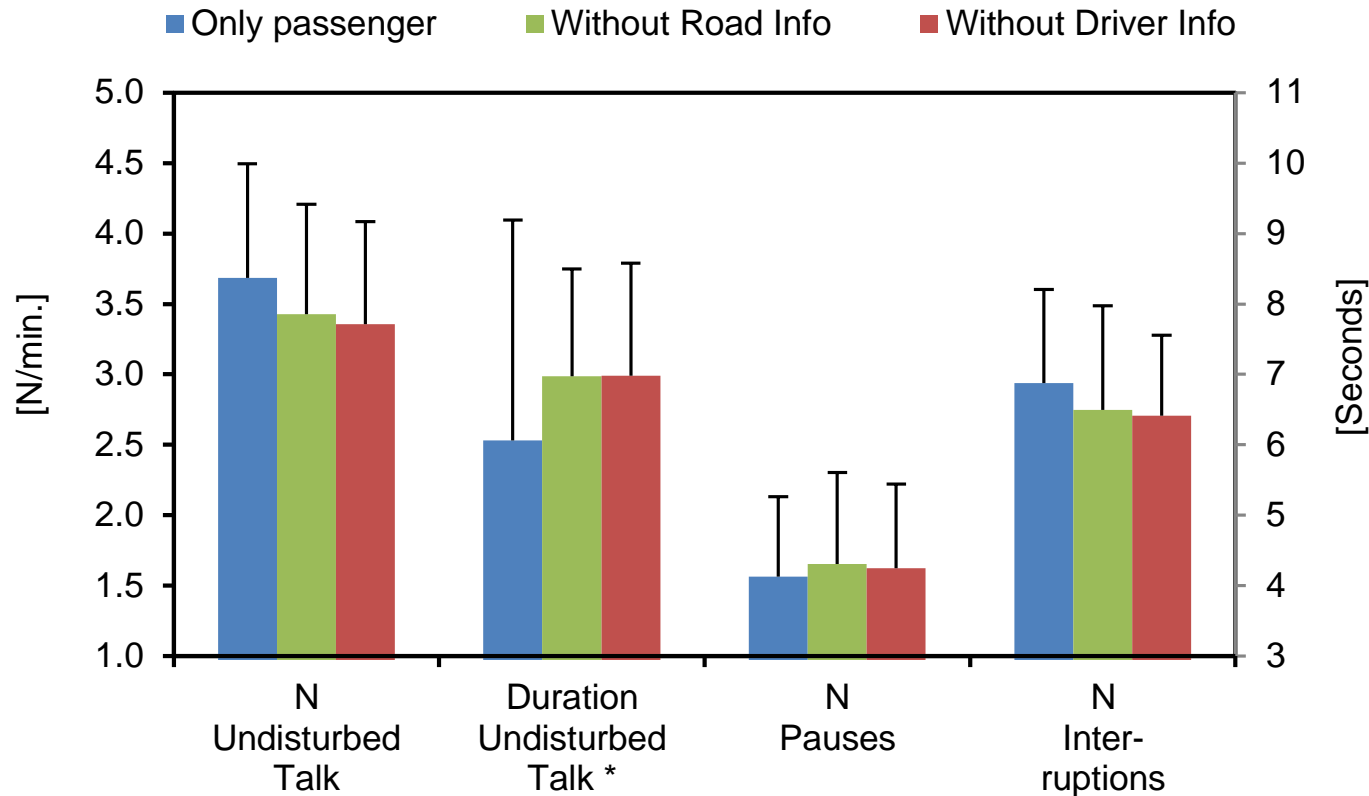
Providing information for phone partners



N Undisturbed Talk: $p = 0.039$, Duration $p = 0.003$, N Pauses $p = 0.519$, N Interruptions $p = 0.295$

And if the passenger lacks information...

Blocking information for the passenger



N Undisturbed Talk: $p = 0.093$, Duration $p = 0.042$, N Pauses $p = 0.847$, N Interruptions $p = 0.542$

What is conversation modulation while driving?

Causes of the positive effect of passengers

Overall:

- Less talking, more silence

Driver:

- Shorter utterances, more pauses (phoning and with passengers)
- Due to adaptation to the driving task (dual task situation)

Passenger:

- Shorter utterances, more pauses
- Adaptation with regard to the current abilities (mental capacities) of the driver

Telephone partner:

- Talks as long and as much with a driver as with others
- More interruptions
- Poses additional demands to the driver

Common Fate or Information?

What triggers the adaptation of the passenger?

Telephone partner:

- Less and shorter utterances with information
- Modulates conversation behavior if information about road or driver are presented

Passenger:

- Longer utterances when information is withdrawn
- Modulation disappears when information is lacking

Information, not common fate!

Discussion

Passengers protect:

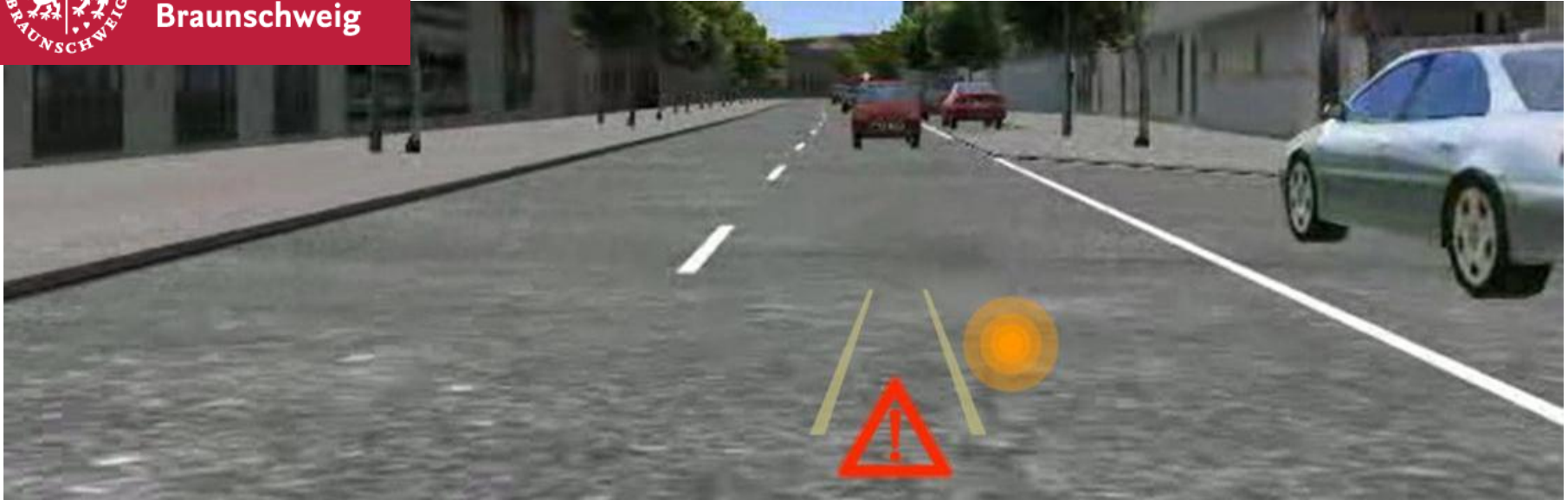
- Can this be transferred to speech HMI?



Partners need (visual) information

- Does it have to be the real driver and driving situation?





**Converse while driving –
but keep it simple and short!**

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