

# Is there any difference between conversing by phone & conversing with a passenger while driving?

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# Context

- Conversing while at the wheel requires additional mental resources from the driver and interfere with the driving
- Comparison between conversing by phone and with a passenger; findings are differing
  - No difference on driving measures (Nunes & Recarte, 2002)
  - Small but non significant increase in RT (Consiglio et al, 2003)
  - More errors and crashes (Charlton, 2009; Hutan & Rose, 2005)
  - Decrement in the navigation task (Drews et al, 2008)
  - ...

# Objectives

- Present work: to analyse the spontaneous drivers' speech in phone and passenger condition  
**=> to better understand specificities of both conversations**
- Hypotheses:
  - Phoning is more complex than speaking to a passenger
  - Speech is more degraded while driving as compared with vehicle stopped, and even more under high driving demand

# Method (1/4)

- Participants:
    - 16 drivers (21-50 years): 8 women and 8 men
    - All have already used a mobile phone while driving, at least occasionally
  - Driving:
    - Real road experiment: driving on motorway (50km)
    - 3 driving conditions:
      - Vehicle stopped
- 2 types of road situations distinguished & coded afterwards:
- Low demanding situations: driver drives straight away
  - High demanding situations: driver overtakes a vehicle or has the intention of doing it (verified by mirror checking while following a vehicle)

# Method (2/4)

- 4 conversations (mean duration = 3 minutes 1/2):
  - 2 by phone (hands free) & 2 with the passenger
  - Conversations initiated by two experimenters
  - 4 discussion guides constructed to provoke highly interactive conversations, related to aspects of daily life:
    - choices for holidays and preferred transport modes
    - characteristics of car and knowledge on highway code
    - participants' culinary dietary habits and preferences
    - audio and video home equipment and habits concerning watching the TV
  - Order in which topics are discussed and order of conversation mode randomly determined
  - Same topics continued vehicle stopped (mean duration 2 minutes).
- Objective: to evaluate naturalistic conversations

# Method (3/4)

- Speech coding
  - Conversations recorded (microphone)
  - Total time of conversations: 4h 47min  
3h 39 min while driving & 1h 8 min vehicle stopped
  - Total time of driver speech: 2h 39 min  
2h 6 min while driving & 33 min vehicle stopped
- Conversations audio-taped & transcribed verbatim
  - All words, silences, repetitions and fillers (“euh”, “um”...) written precisely
  - TextStat 3.0 software used to compute the number of words, fillers and repetitions for each conversation

# Method (4/4)

- Four Dependant variables
  - *Speech rate*: number of words plus fillers per minute
  - *Speech rate, fillers excluded*: number of words per minute
  - *Fillers*: number of hesitations (“euh”, “um” ...) per word pronounced.
  - *Repetitions*: number of time a word is repeated at least twice before a new one is pronounced divided by the total number of words
- Statistical procedure: ANOVAs with repeated measures for 2 within-subjects factors:
  - The conversation: by phone (*Phone*) or with the passenger (*Passenger*)
  - The driving condition: vehicle stopped (*Stopped*), low demanding driving situations (*Driving Low*) and high demanding driving situations (*Driving High*).

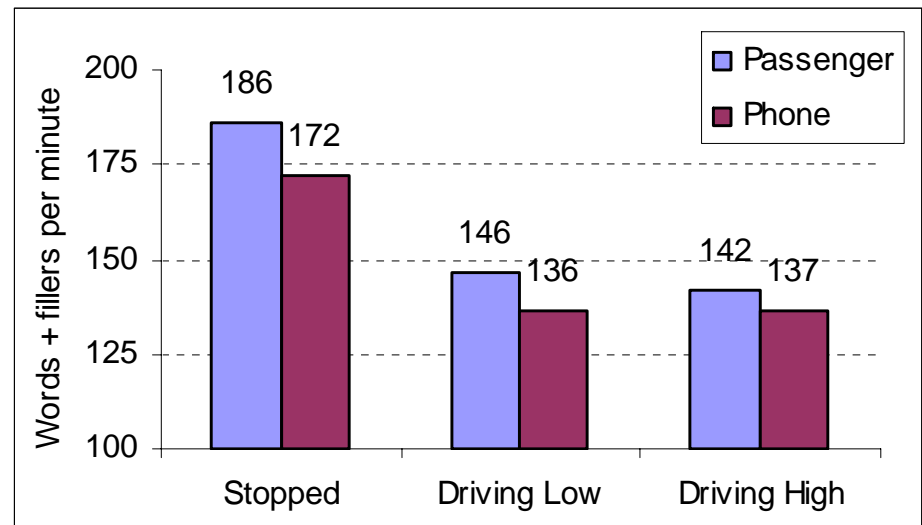


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# Results (1/4)

## Speech rate (words + fillers)

- No difference between *Passenger & Phone* conversation ( $p = .122$ ):
- Effect of driving conditions ( $p < .001$ ):
  - higher while car *Stopped* than while driving
  - No difference between *Driving Low & Driving High*





# Results (2/4)

## Speech rate (fillers excluded)

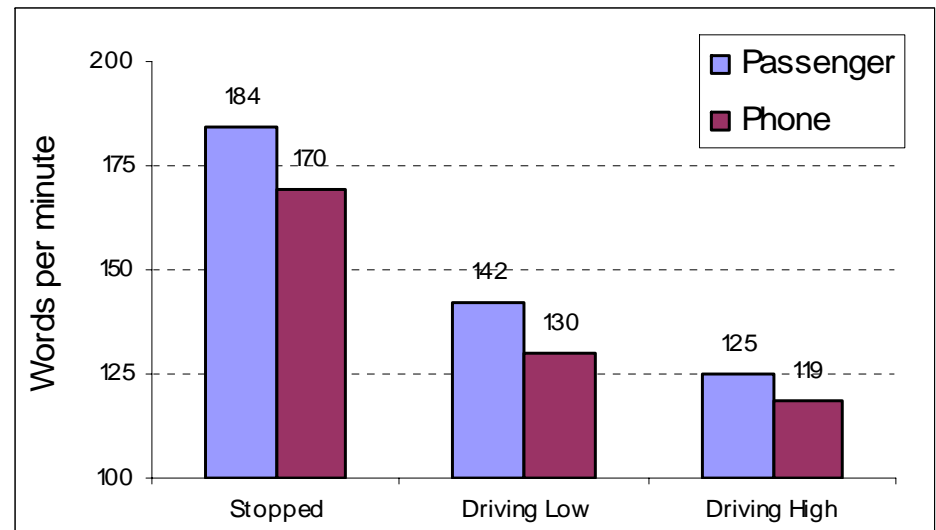
- **Effect of conversation**

( $p = .031$ ):

- speech rate higher for *Passenger* than for *Phone* conversation

- **Effect of driving conditions** ( $p < .001$ ):

- higher while car *Stopped* than while driving
- higher in *Driving Low* than in *Driving High*



# Results (3/4)

## Fillers

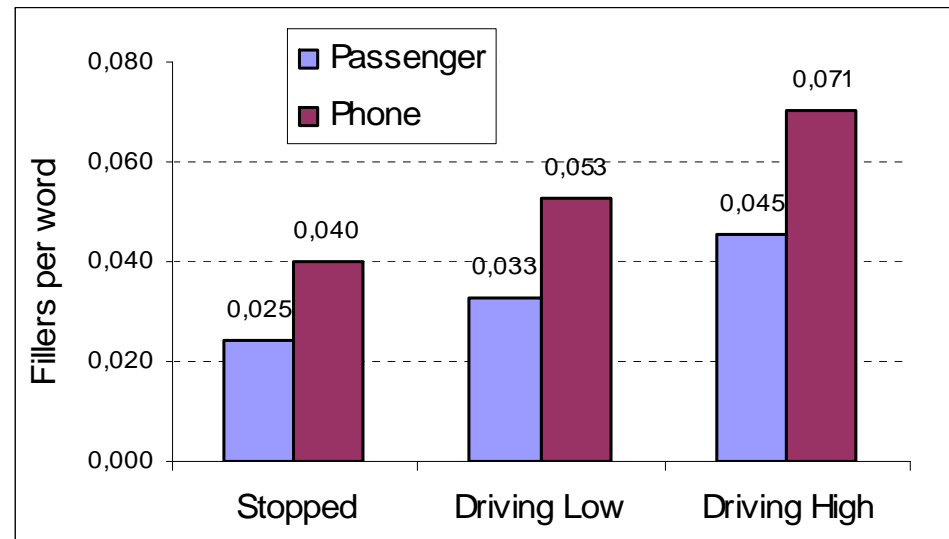
- **Effect of conversation**

( $p < .001$ ):

- Proportion of fillers lower in *Passenger* than in *Phone* conversation

- **Effect of driving conditions** ( $p < .001$ ):

- Lower while car *Stopped* than while driving
- Lower in *Driving Low* than in *Driving High*



# Results (4/4)

## Repetitions

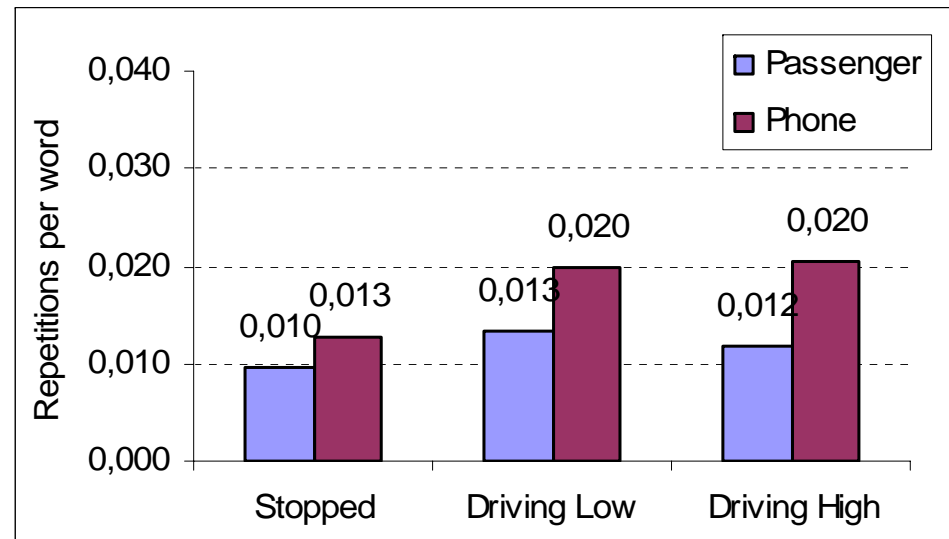
- **Effect of conversation**

( $p = .018$ ):

- Proportion of repetitions lower in *Passenger* than in *Phone* conversation

- **Effect of driving conditions** ( $p = .033$ ):

- Lower while car *Stopped* than while driving
- No difference between *Driving Low* & *Driving High*



# Discussion (1/2)

- Comparison between the 2 conversation modes:
  - Speech delivery kept constant by using fillers when conversing by phone, but speech rate in terms of words per minute decreases
  - Speech quality decreases: more fillers and repetitions used
  - Fillers and repetitions used to keep the line
  - ⇒ Traduce the greater difficulty of a phone conversation
  - ⇒ Greater expectation of a continuous conversation
- Comparison between the 3 driving conditions
  - Drivers modulate their speech delivery according to the changes in the complexity of the driving task:
  - Speech delivery slows
  - More fillers and repetitions used



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# Discussion (2/2)

- Conversing by phone could be more dangerous than conversing with a passenger  
because phoning is more difficult and more difficult tasks may generate a greater interference with driving
  - More sustained attention due to the expectation of the conversation continuity (silence could be misunderstood)
  - Lack of non-verbal cues (gestures and mimics) requires additional attention to compensate for these missing cues
  - Increased workload, rendering conversation more effortful to the detriment of the primary driving task

# Thank you for your attention

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