



Project 54

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# Video Call, or Not, that is the Question

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## 1. Problem:

With the proliferation of smart-phones, it is possible not only to talk to but also to see other people during in-vehicle conversations. The influence video-calling has on driving is unknown.

## 2. Hypotheses:

- H1: video calling will reduce the driver's visual attention to the road ahead.
- H2: reduced visual attention will contribute to the deterioration of driving performance.

## 3. Approach:

- Pairs of participants (*driver* and *other conversant*) engaged in a spoken task: *Taboo game*.
- *Driver* operated a simulated vehicle.
- *Other conversant* seated in a separate room.

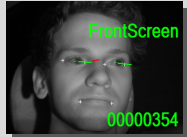
## 4. Research method

### Apparatus

- High fidelity driving simulator: 180 degree view, motion platform, realistic visuals, sounds and vibration



- Eye-tracker mounted on simulator dashboard



### Driver



### Other conversant



### REHEARSAL

Theater Practice Dress Play Actor

- Spoken task involved playing a game of Taboo
- Other conversant gives spoken clues to driver about a secret word

## 5. Experiment design and procedure

### Independent variables

(within subjects)

- *interface type* (speech-only [SO], video-call [VC])
- *road type* (straight, curvy)



### Simulated environment

- three lane highway (15 km)
- traffic
- single lead vehicle traveling at 89 km/h (55mph)

### Procedure

- 16 subjects (8 pairs) participated in the experiment
- 2 routes, one for each interaction type
- order counterbalanced

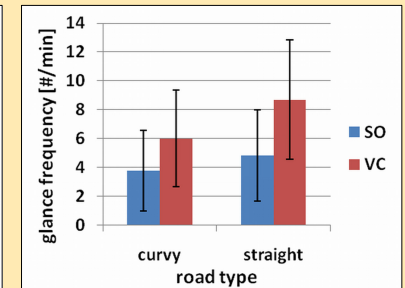
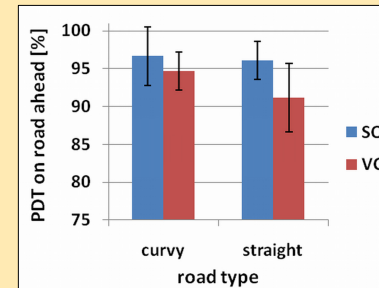
### Dependent variables

- percent dwell time (PDT) on the road ahead
- glance frequency [gazes/min] away from road
- NASA-TLX
- levels of agreement with preferential statements
- variances of lane position and steering wheel angle

## 6. Results

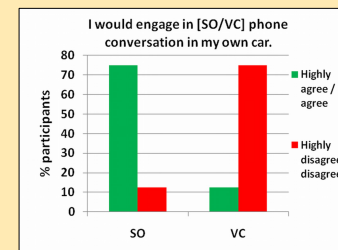
### Visual attention

- repeated measures ANOVA showed significant main effects ( $p < 0.05$ ) of both *Interface type* and *Road type* on PDT and glance frequency away from the road. For both dependent variables, significant differences were observed between SO and VC on straight ( $p < 0.004$ ), but not on curvy roads ( $p > 0.05$ ).



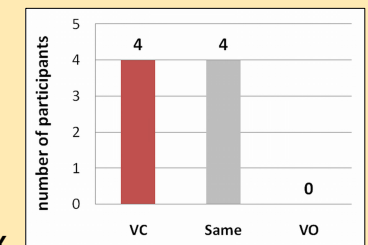
### Preferential statements

- significant difference in drivers' willingness to engage in SO and VC conversations in their own vehicles ( $p = 0.017$ ).
- no difference between SO and VC in perceived distraction from driving.



### Written and verbal comments

- 5 out of 8 drivers evaluated VC as distracting.
- 7 out of 8 drivers reported that seeing the other conversant did not provide any additional information.
- 4 drivers decided VC was more distracting, while 4 were undecided



## Acknowledgements

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## 7. Conclusions

- H1 clearly supported: video-calling can impact visual attention.
- H2 not supported: no differences between SO and VC on any road.
- Possible explanation: drivers realized the potential for distraction of video calling and decided not to engage in it too heavily (supported by visual attention and subjective assessments).
- Designers should take caution when implementing video-calling.

### Driving performance and NASA-TLX

- no significant differences observed between SO and VC

Video Demo

