



Simultaneous use of In-vehicle technologies

What is happening in real life situations?

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Four systems were chosen to be studied in the project:

Cruise Control (controls rate of motion of engine maintaining a set speed)



Speed Limiter (allows presetting of maximum speed)



Navigation System (sends navigation instructions)



Mobile phone (allows voice communications)



In the market
Frequently used
Existence of paradox (CC vs ACC & SL vs ISA)



Simultaneous use of In-vehicle technologies

Not many articles that disclose or discuss the simultaneous/multiple use of in-vehicle technologies.

1) Works that evaluated the effects of simultaneous use of in-vehicle systems

Lansdown, Brook-Carter, Kersloot (2004)

Regan et al. (2005)

Portouli et al. (2006)

Pereira et al. (2009)

Pereira, Bruyas, Simões (2010)

2) Works that evidenced the existence/tendency of a multiple in-vehicle use scenario

(Jamson et al, 2011)

Studies do not consider long term interaction/drivers with long-term experience

To understand:

why, when and **where** drivers interact with IVT

how drivers use the systems

which functions are used or not

if systems provide the **expected assistance**

why some drivers **do not use** a system

what drivers think about the effectiveness of the system

possible **misuse** of the system

what **features** would drivers **change** to have the ideal system

Qualitative technique

Highlight important aspects

Serve as basis for further research

Collect particular information not possible to be collected by other methods

Background

Objectives

Methodology

Results

Conclusion

Partners



Sessions

Group 1
(more experience)

Group 2
(adults medium exp.)

Group 3
(young /novice)

Cruise Control
Speed Limiter

Navigation Sys.
Mobile Phone

35 to 55 years-old
More than 10 years of driving
Minimum of 50 000 Km last year

35 to 55 years-old
More than 10 years of driving
10 000 to 30 000 Km last year

Up to 24 years-old
1 to 5 years of driving
Minimum of 10 000 Km last year

Own the systems for at least 1 year

Sessions between 5 to 10 participants

Users and non-users (users > non-users)

Groups 1 and 2 = 2 participants in each age category [35-45] [45-55]

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Sessions

Group 1
(more experience)

Cruise Control
Speed Limiter

28

Navigation Sys.
Mobile Phone

37

65

Group 2
(adults medium exp.)

38

38

76

Group 3
(young /novice)

45

47

92

111

122

233

65 females; 168 males

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Session procedure

Reception of participants	Introductory information about the study Inform about ethical requirements Read & sign the consent form
Questionnaire	General information; Driving habits; General use of IVT
Present the systems	Photo presentation showing main functions Clarify the systems under discussion
Discussion	Questionnaire 1st system (Frequency of use; Characteristics of the system; Use of specific functions)
	System 1
	<i>Pause</i>
	Questionnaire 1st system (Frequency of use; Characteristics of the system; Use of specific functions)
	System 2

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Questions (e.g.)

1. *"In which situations do you use your cruise control system?"*
2. *"Do you avoid using the cruise control in any situation?"*
3. *"Imagine that you are travelling and want to set a specific speed with the help of the cruise control. What speed do you choose?"*
4. *"What do you usually do while the system is active?"*
5. *"What would you improve in the system?"*

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Categories for analysis

Categories of analysis for each system
(based on the objective of the FG)

(Ex. CC)

Situations to use CC

Non-use of CC

Learn to use the CC

Choice of speed

Behaviour while CC is active

Knowledge about functions “set last speed”
and “speed up/down”

Unattended use of CC

Advantages of using CC

Disadvantages of using CC

Dangerous Behaviour

Improvements for CC

Transcript-based analysis: complete transcriptions of the FG sessions; supplemented with field notes taken by the moderator and assistant during the session.

Template/guidelines for transcription
Contents in categories
Added categories

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Results

Situations to use and not use system
Learning process
Knowledge about functions
Behaviour while system is active
Unattended use of system
Advantages of using system
Disadvantages of using system
Dangerous Behaviour
Improvements for system

Simultaneous use of IVT

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Using the Cruise Control

Talking on the **mobile phone**Interacting with **radio**

Eat

Watch **movies**

Augmented comfort while driving (relaxed) → change behaviour while driving
Monotony (inattention and drowsiness) → Strategies to control monotony

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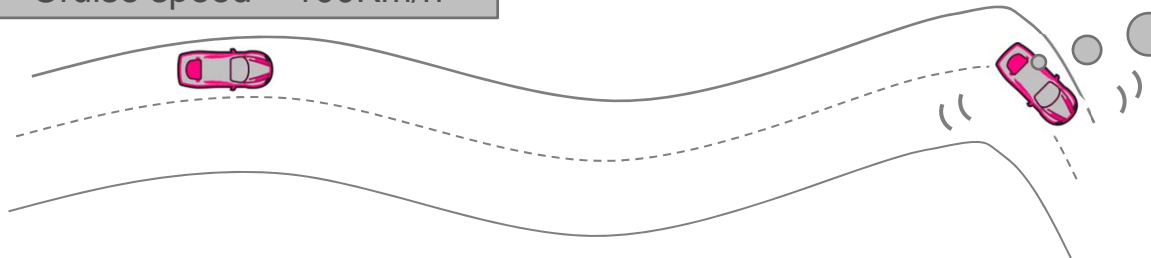


Using the Cruise Control

Use the **navigation system**

Get important information about road → Avoid/anticipate dangerous situations

Cruise speed = 100Km/h



Ups!! Speed is
too high for
this curve



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Using the Speed Limiter

Use the **navigation system**

Get important information about speed → Adjust speed

Using the Speed Limiter

Use the **mobile phone**
Writing/taking notes

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Using the Navigation
System

Cruise control

Other types of information: radar warnings → Control speed

Using the Navigation
SystemRadio
Mobile PhoneWhile using the navigation system a call arrived → independent of systems
being connected

Important aspects that came out of this work:

1) _____

Highlighted the **importance of studying the systems** that are **already in the market** .

New behaviour or user patterns are discovered: useful for improvement of systems and optimization of the next systems generation.

e.g. CC → ACC
 MP → PCs with access to internet.

2) _____

In spite of their **market penetration** CC and SL, research community **does not know much about them**.

Existence of paradox (CC vs ACC & SL vs ISA)

Important aspects that came out of this work:

3) _____
Confirmed the simultaneous interaction with multiple in-vehicle systems.

Existence of assistance systems might free the driver from parts of driving task giving possibilities to perform tasks not driving related.

Simultaneous use give driver more possibilities:

- a) **Make driving more advantageous** (doing more things & not surpassing speed)
- b) **But cope with new disadvantages** (entertainment to cope with monotony)

4) _____
Solutions to ease the simultaneous use of technologies or to reduce the safety concerns (NS+MP) are not accepted by all.

Driver might perceive they bring disadvantages or that the added value is not high enough.



Thank you for the attention!

The research leading to these results has received funding from the European Commission's Seventh Framework Programme (FP7/2007-2013) under the grant agreement n°218560. (INTERACTION _ Understanding driver interactions with in-vehicle technologies)

