

# Factors influencing usage of extended functionalities on smartphone while driving



Marie-Pierre Bruyas  
Myriam Hugot  
Hugues Julliard

DDI 2017 – Paris



IFSTTAR

# Introduction: Objectives

- **Investigate phone usages while driving**
  - Technological advances in mobile telephony multiply functionalities that can be used on the phone
  - Internet access facilitated by unlimited packages
  - New usages? Equipment (speech-based interfaces)?
  - Driver profiles?
- **Investigate driver' motives, attitudes towards phone use**
  - Social norm, peer pressure
  - Perceived risk
  - Perceived control
  - Phone dependence, addiction (*Walsh, White & young, 2010*)
  - Driving behavior (*Mini DBQ, Martinussen, Lajunen, Møller, Ozkan 2013*)



# Method: Two complementary approaches

- **Focus groups:** Qualitative study
  - 6 focus groups => 36 participants (different profiles in terms of age, car equipment...)
  - To identify and describe phone usages
  - To understand when and why drivers use their phone
- **Survey:** Quantitative study

Sample **3,189 Internet users** (aged 18 and over) representative of French people (sex, age, socio-professional categories, locality)

⇒ **2,843 drivers** (89% of French people aged 18 and over)

⇒ **1 081 phone users while at the wheel** (38% of French drivers)



# Main usages of phone while driving

- 38% of the French drivers use their phone while driving

– FOR:

Phone usage While driving	% of drivers	% of phone users
Conversations	36%	94%

*Regular use: 43%  
Everyday: 17%*

*Perceived risk decreases  
with frequency of use*

*Hand free: 58%  
Almost always: 28%*



# Main usages of phone while driving

- 38% of the French drivers use their phone while driving

– FOR:

Phone usage While driving	% of drivers	% of phone users
Conversations	36%	94%
Other usages	33%	87%

Texting:  
70%

GPS: 55%

Internet: 22%  
Photos/selfies: 20%  
Social network: 17%

Music:  
41%



# Phone for communication: Texting and emails

- **Texting: 70% of phone users**

- 19% **only read** messages (auto-limitation? Lower perceived control, higher peer pressure when requested to answer)
- **Age**: very common among the younger
  - 84% of 18-34 year olds, but still 75% of 35-44 year olds
  - Perceived control higher for the younger
- **Handheld** phone is the preferred option:
  - For 73% of drivers who read messages & 77% of drivers who write
- **Perceived risk** is high (whatever the driver profile & the frequency of use)

- **Emails: 23% of phone users**

- Generally not read in full (so as attach files)
- Profile: More men than women, high mileage, professional drivers
- Used for professional exchanges rather than SMS



# Phone for communication: Photos & Social network

- **Photos/Selfies: 20% of phone users**
  - **Age:** determinant factor:
    - 29% of 18-34 year olds, but still 21% of 35-44 year olds

=> **not reserved to the youngest**
  - **High mileage:** 49% of those who drive more than 50 000 km/year
  
- **Social network: 17% of phone users**
  - **Age:** determinant factor
    - 28% of 18-34 year olds, but still 15% of 35-44 year olds
  - **Higher perceived control,**
  - Higher phone dependence, addiction,
  - Engagement in risky behavior, more violations of highway code



# Phone for communication

- **Radical changes in the communications**
  - New contents: combine text + images + sounds
    - **Of statics become dynamic**
  - New types of exchanges via instant messaging that facilitate group communications
    - **Of dual become collective**
- **Increased number of notifications during short times**
  - Each notification provokes a solicitation that encourages the consultation
- **Age effect or generational effect?**
  - It seems that new behavior are experienced by the youngest ones, but when experienced, still used when getting older:
    - E.g. Facebook vs Snapchat





# Phone for getting information – Driving aid

- **Internet: 22% of phone users**
  - Apps & internet navigation
  - Significant share of drivers doing complex operations
  - Multiplies the demands and diverts cognitive and visual attention for a **time often longer than initially envisaged** (linking of the windows)
- **GPS : 21% of phone users**
  - The most used function of the phone for 29% of phone users
  - Frequent use: 37% of phone users
  - Parameters generally set while driving
  - GPS apps acclaimed: (preferred to embedded and nomadic systems)
    - free, judged more reliable, more complete (real-time information),
    - automatic update,
    - Can be integrated into other phone functions (ex calendar)
  - One regret: no dedicated space in the car!



# Phone for getting information – Driving aid

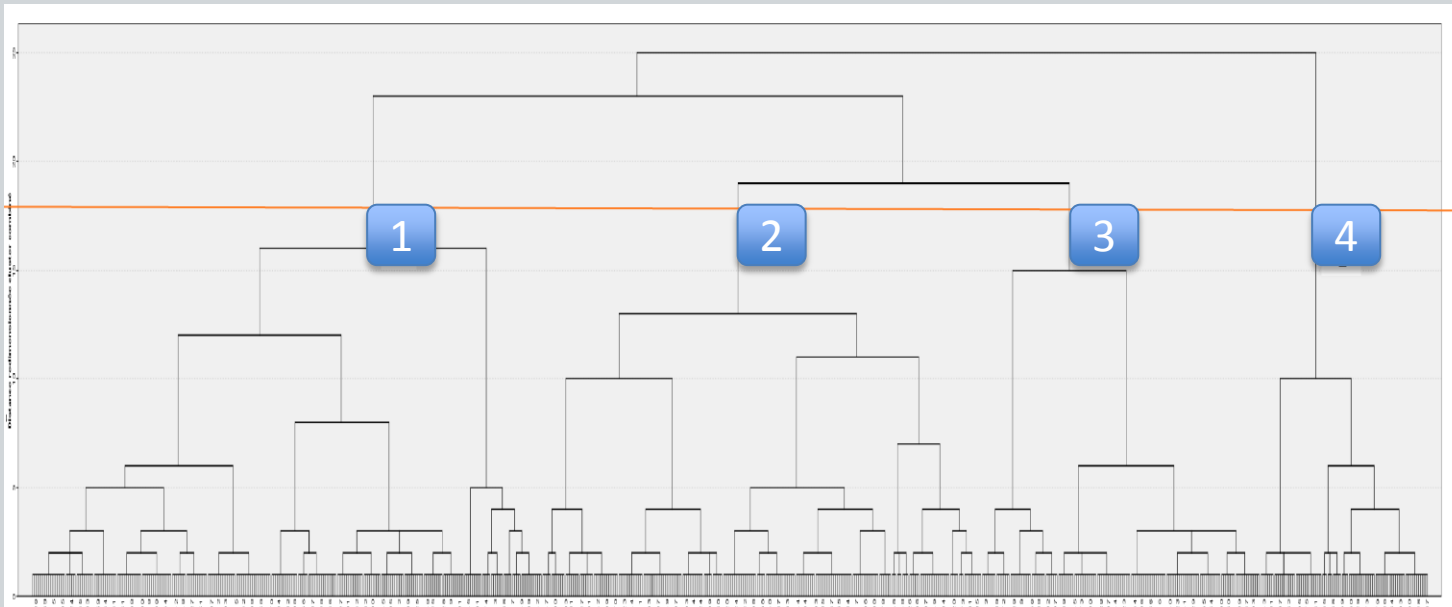
- **Concentration of different functions on one single device**
  - End of proliferation of screens around the driver's?
  - But multiplication of solicitations (frequency of appearance and relevance)

**=> Major factor of distraction**



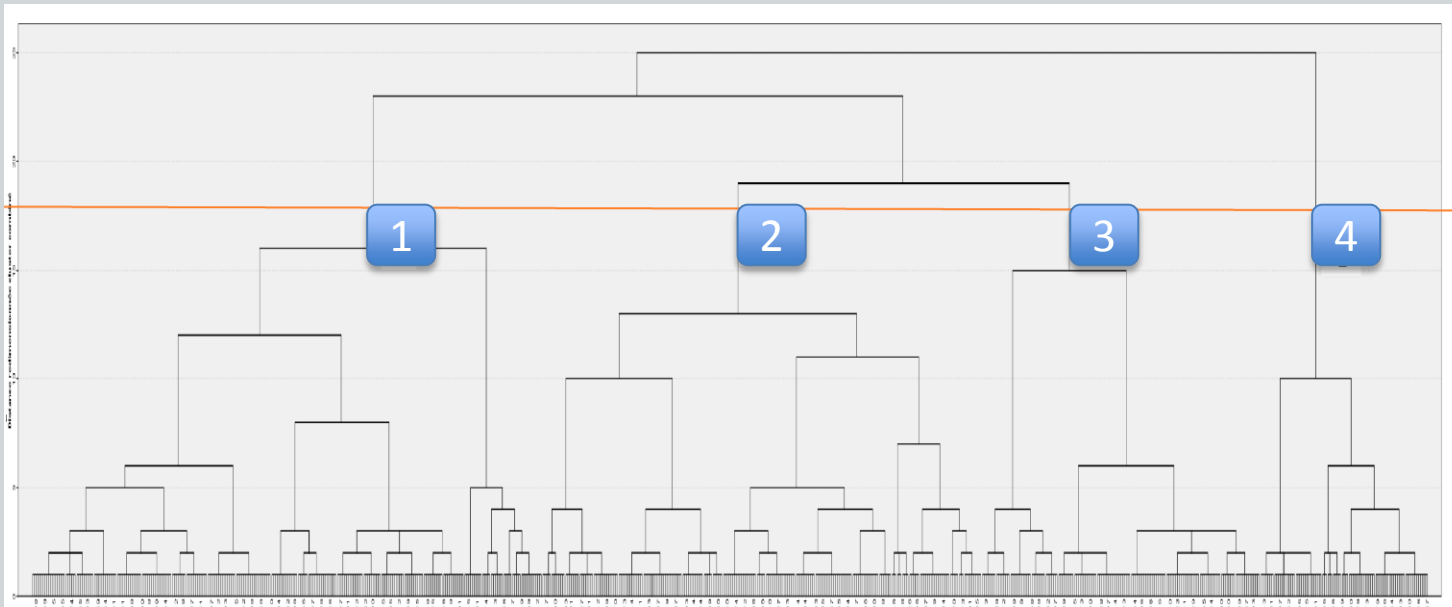
# Drivers' classification

- **PCA (Principal Component Analysis)**
  - 38 variables: sex, age, type of uses (conversation, SMS, GPS, internet, photo...), phone dependence, control perceived, risk perceived, driving behavior
  - 788 participants,
  - 10 axis,
  - **60.5%** variance explained
- **Hierarchical classification** based on 10 PCA axis => dendrogram (hierarchical cluster tree)



# Drivers' classification

- Class 1 : Low users (N=288) => “cautious and not at ease”
- Class 2 : Frequent conversations (N=248) => “basic functions of the telephone users”
- Class 3 : “Averages users” (N=157) => “good perceived control & self limitation”
- Class 4 : Frequent and varied uses (N=95) => “intensive users”
  - Quite homogeneous
  - Phone dependence, intense use of all phone functionalities



# Intensive use of smartphone

- Linear regression on intensive uses (backward selection)
  - **Dependent variable** : maximum frequency of extended functionalities (SMS, photos, social networks, email, films, games, internet)
  - Significant regression ( $p=0,0001$ )
- Adjust  $R^2 = 0,464$

Model	B	Bêta	t	Sig.
(Constante)	0,223		1,278	0,202
<b>Engagement in risky behavior</b>	,368	,419	13,328	,000
<b>Perceived control</b>	,066	,126	4,294	,000
<b>Phone dependence</b>	,054	,094	3,460	,001
<b>Frequency of long trips (100km)</b>	,113	,085	3,417	,001
<b>Error &amp; Violation<sup>1</sup></b>	,134	,064	2,410	,016
<b>Pressure to answer</b>	-,021	-,055	-2,226	,026
<b>Age</b>	-,207	-,217	-8,440	,000

<sup>1</sup> Mini BBQ (Martinussen et al., 2013)

- **Perceived risk** does not appear as a factor influencing phone usage (Atchley, Atwood, Boulton, 2011)



# Conclusion

- New content & new types of exchanges could become increasingly prevalent
  - Animated pictures, films...
  - Group channels
- Age is a determinant factor
  - But could be more a generational effect than an age effect
- Perceived risk decrease with frequency of usage
  - Not for texting and phone manipulation => perceived risk remain high  
=> not sufficient to restrain
- Smartphones concentrate many functions that were held by other devices
  - Multiply solicitations => multiply factors of distraction at the wheel



