User experience in automobiles considering gender differences

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Today, I'd like to talk about:

- What is user experience design
- Who our users are
- Gender differences: causes and results
- What we've done to deal with the differences
- Technology efforts for safety

Patentirt in allen Industriestaaten!

Neu! **Praktisch!**

Patent-Motorwagen

mit Gasbetrieb durch Petroleum, Benzin, Naphta etc.

Immer sogleich betriebsfähig! — Bequem und absolut gefahrlos!

Vollständiger Ersatz für Wagen mit Pferden.
Erspart den Kutscher, die theuere Ausstattung, Wartung und Unterhaltung der Pferde.

Lenken, Halten und Bremsen leichter und sicherer,
als bei gewöhnlichen Fuhrwerken. — Keine besondere Bedienung nöthig.
Sehr geringe Betriebskosten.

Patent-Motorwagen mit abnehmbarem Halbverdeck und Spritzleder.

von

BENZ & Co.

Rheinische Gasmotoren-Fabrik

MANNHEIM.

Neue Fabrik: **Waldhofstrasse.**

Druck von Schatt & Ratsberger in Mannheim.

First automobile, Patent Motorwagen
Invented by Karl Benz

Built in 1886
265kg (=584.2 lb)
Maximum speed of 16km/h

A vehicle designed to be propelled by an internal combustion engine

Bertha Benz

First person to drive an automobile, Patent-Motorwagen, over a long distance

Drove 106km (approx. 66 miles) from Manheim to Pforzheim in Germany, 1888

Requirements after driving:
- Durable brake leather
- Easy handling
- Stronger power

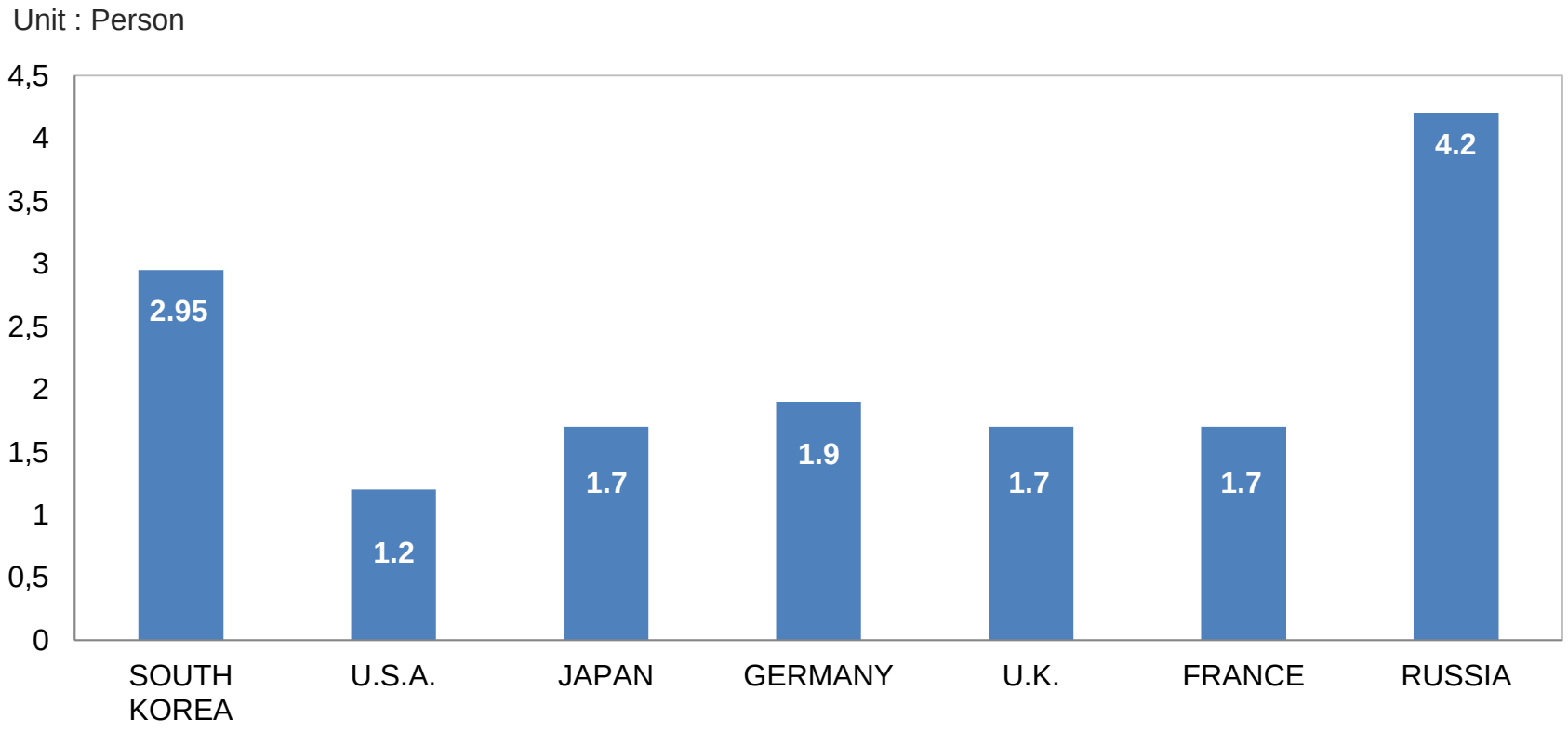
User Experience Design

User Centered Problem Solving

- Finding problems while using the products and fixing them in creative ways
- Both creating new values and enhancing usability
- The first step is to know who our users are

Population per a registered car (2014)

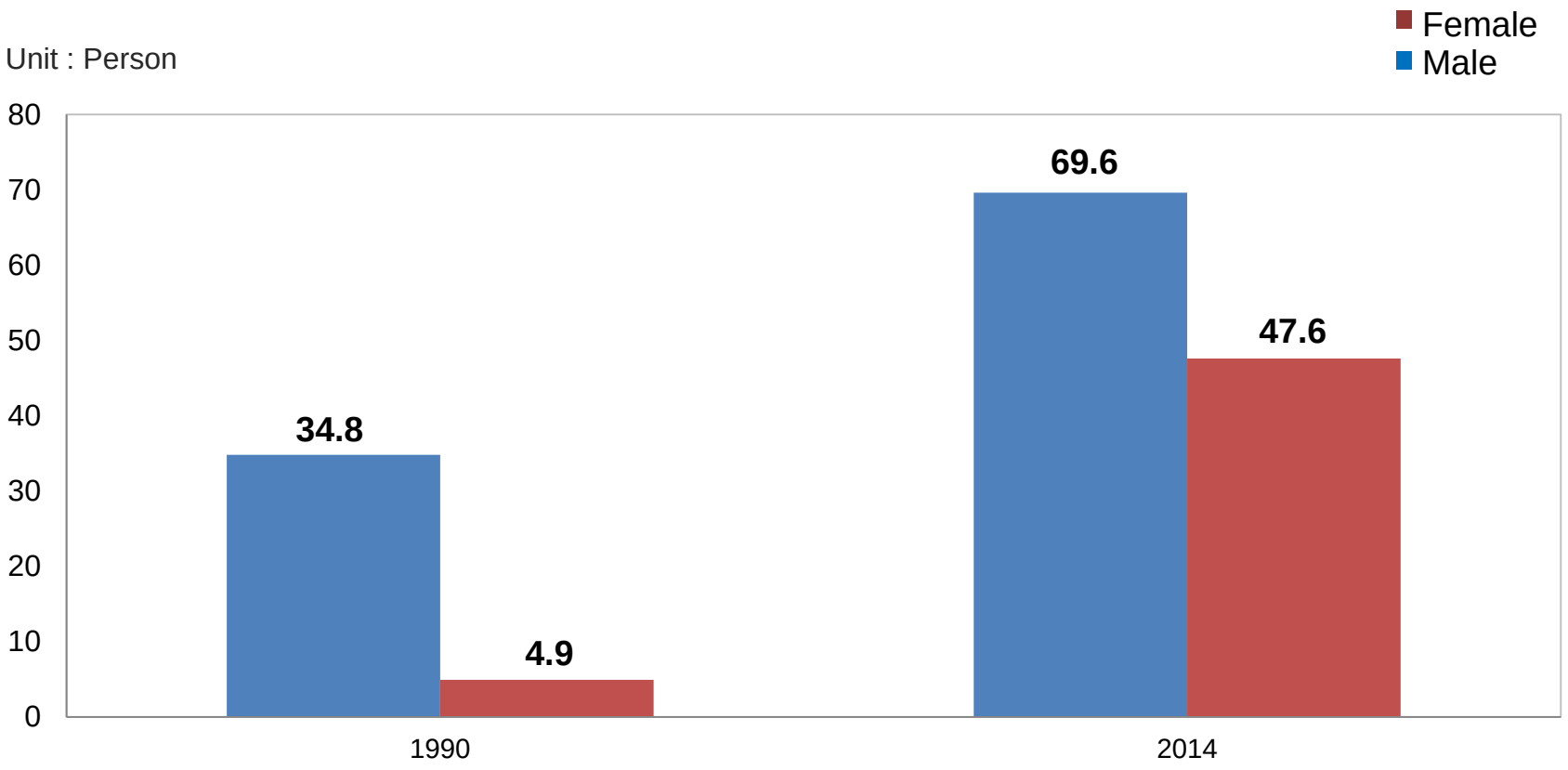
- 29 millions registered cars, less than 3 persons per a registered car in South Korea
- 1.2 persons per a registered car in the US



[Reference = Ministry of Land, Transport and Maritime Affairs]

Number of licensed drivers per 100 persons, S.Korea

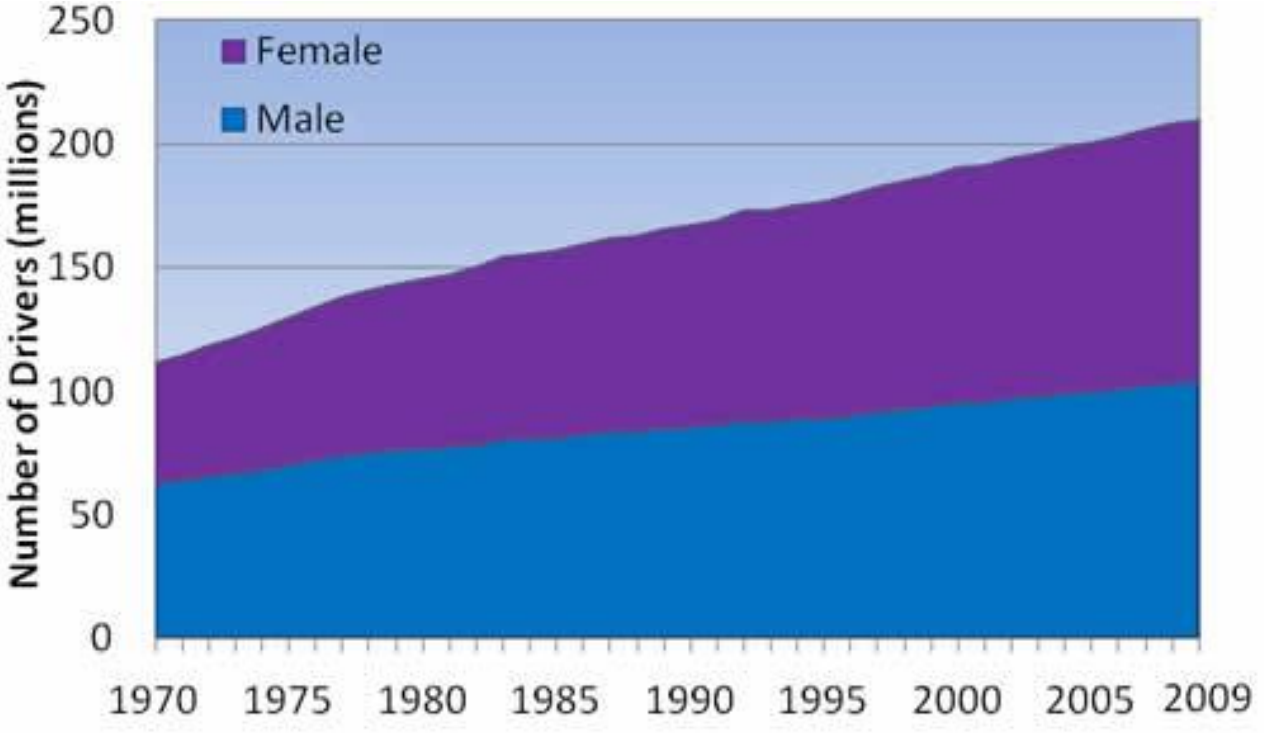
- Female drivers increased almost ten times in the last 14 years
- Male drivers only doubled in the same period



[Reference = Ministry of Land, Transport and Maritime Affairs]

Number of licensed drivers by gender, USA

- In 1970, 112 million drivers were licensed. There were 1.3 male drivers for every female driver.
- In 2005, the number of licensed female drivers exceeded the number of licensed male drivers.



[Reference = US department of transportation federal aviation administration]

Frost & Sullivan: Women in Cars - A Mega Trend for the Automotive Industry

A new Frost & Sullivan analysis on how the empowerment of women is transforming the auto industry will be launched during the annual workshop 'Urban Mobility 3.0: Future of Mobility and New Mobility Business Models'

LONDON - 16 June, 2014 - Women are gaining increasing power in an important segment traditionally owned by men: cars. How the empowerment of women is transforming the future automotive industry will be one of the key trends that will dominate Frost & Sullivan's annual workshop 'Urban Mobility 3.0: Future of Mobility and New Mobility Business Models'. A new analysis on women and cars will be launched during the event that will take place on 25th June, 2014 at the Honourable Artillery Company in London. As it has been the case in the past, this one-day workshop will focus on emerging trends that are to shape the auto industry and our lives behind the wheel during the coming years.

The new Frost & Sullivan analysis finds that, for the first time ever, in the USA female driving licence holders have tipped the balance at 51 percent. And this not just among the younger age groups, but consistently across all ages greater than 25. Canada and the UK are set to follow by 2016. Canada is already very close to having a majority of women with driving licenses. The ratio of licenses granted to women is currently 49.95 percent. In the UK new driving license applications for men are declining whilst those for women have grown by 2.5 percent during last three years. The number of female driving licences in Britain will reach parity with men within the next two to three years. Women are already making more trips and driving more mileage than men.

We conducted a test on two different user groups who have the same car

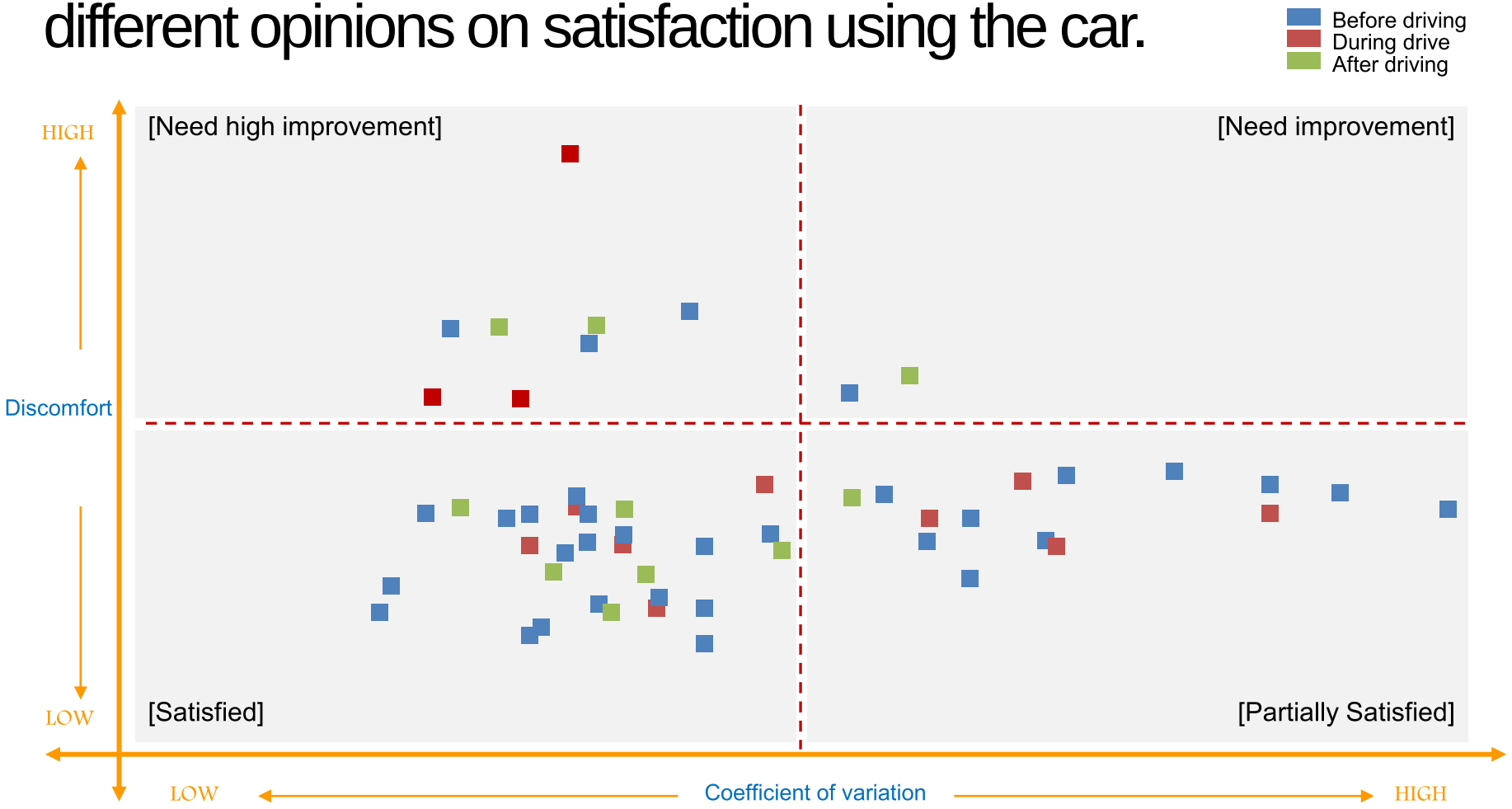
Robin

Age: 48 years
Job: IT professional
Marital status: Married
Family: Wife, 2 kids

Elicia

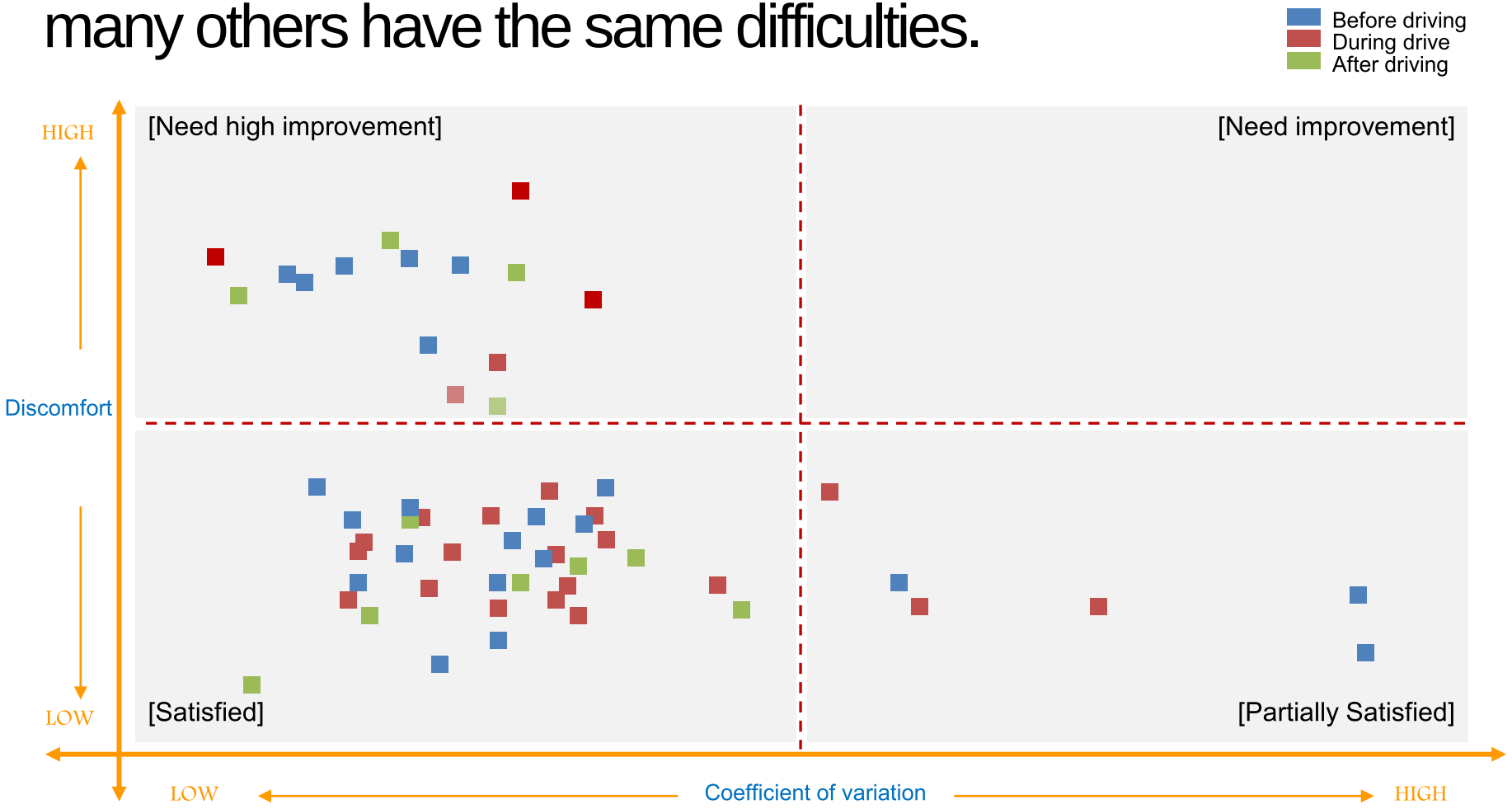
Age: 28 years
Job: Graphic designer
Marital status: Single
Family: N/A

Men have relatively low-scores of discomfort and high-scores of coefficient of variation. They tend to have different opinions on satisfaction using the car.



* ANOVA (ANalysis Of VAriance) : analyze the differences among group means
* Coefficient of Variation : standardized measure of dispersion of a probability distribution

Women have relatively high-scores of discomfort and low-scores of coefficient of variation. If someone has difficulties, many others have the same difficulties.

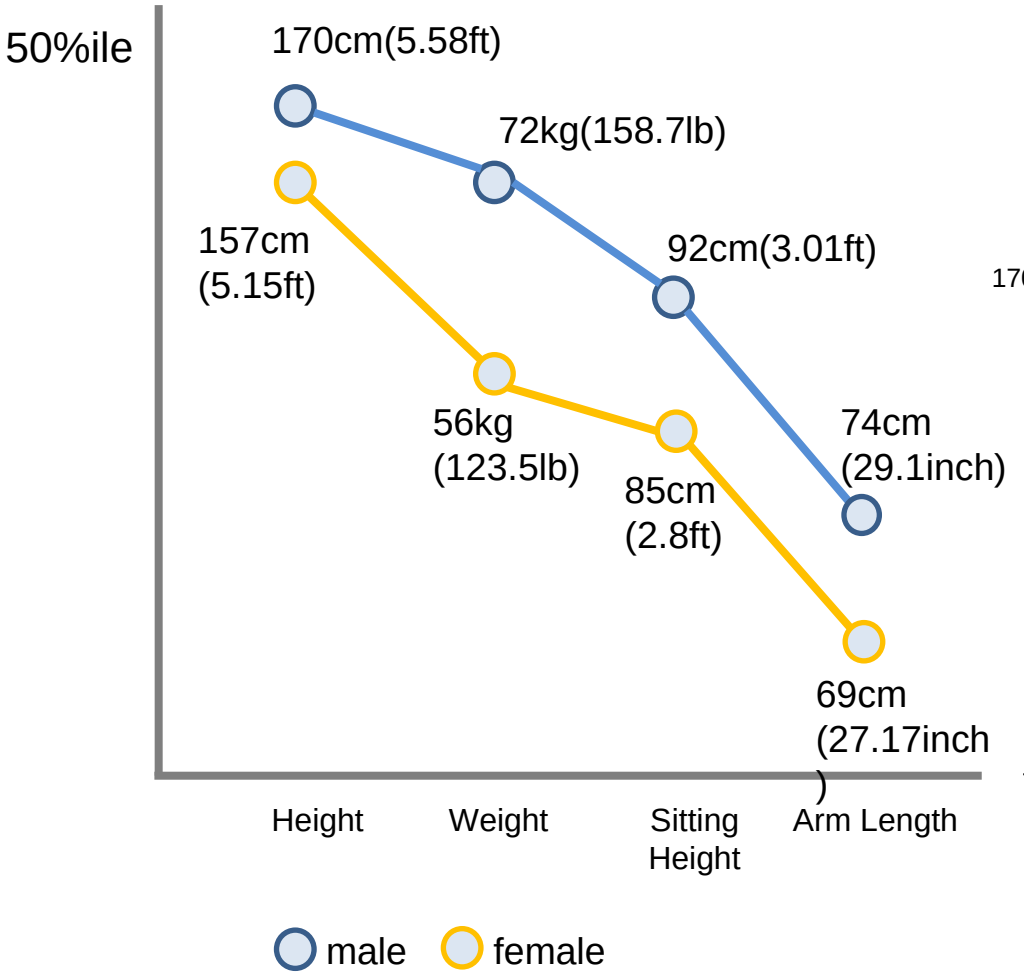


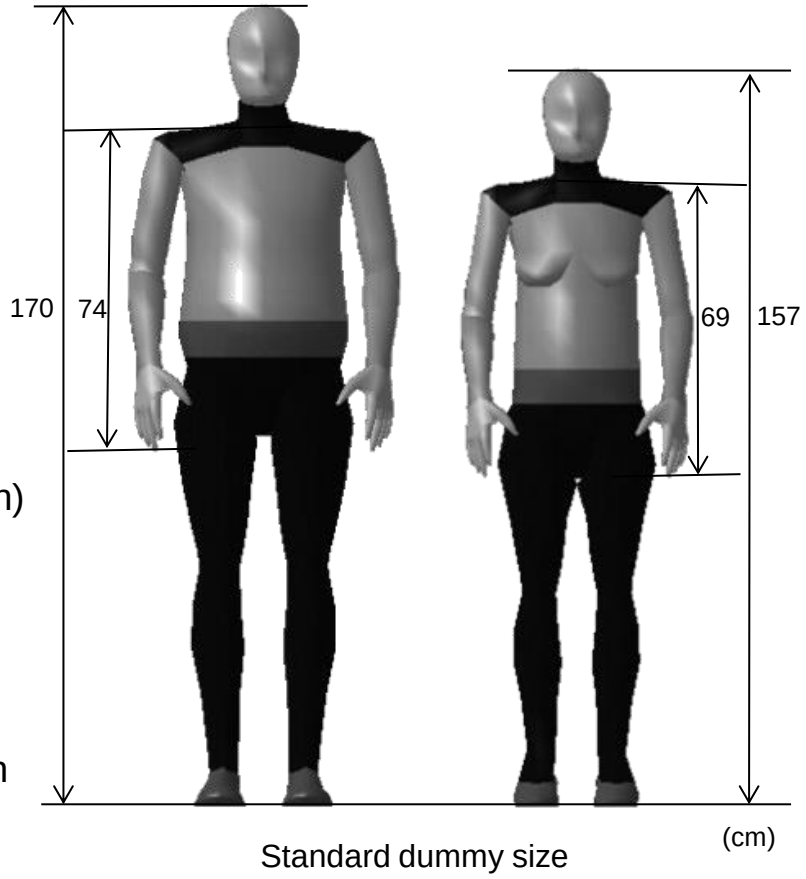
* ANOVA (ANalysis Of VAriance) : analyze the differences among group means
* Coefficient of Variation : standardized measure of dispersion of a probability distribution

Why is the results are different among the 2 user groups? We found out that the causes of the differences are based on:

- Body size
- Muscular strength
- Cognition
  (Cognition is the mental process involved in knowing, learning, and understanding things)
- Behaviors
  (Women tend to multi-task, while men focus on one thing.)

Standard Body Sizes (South Korea)



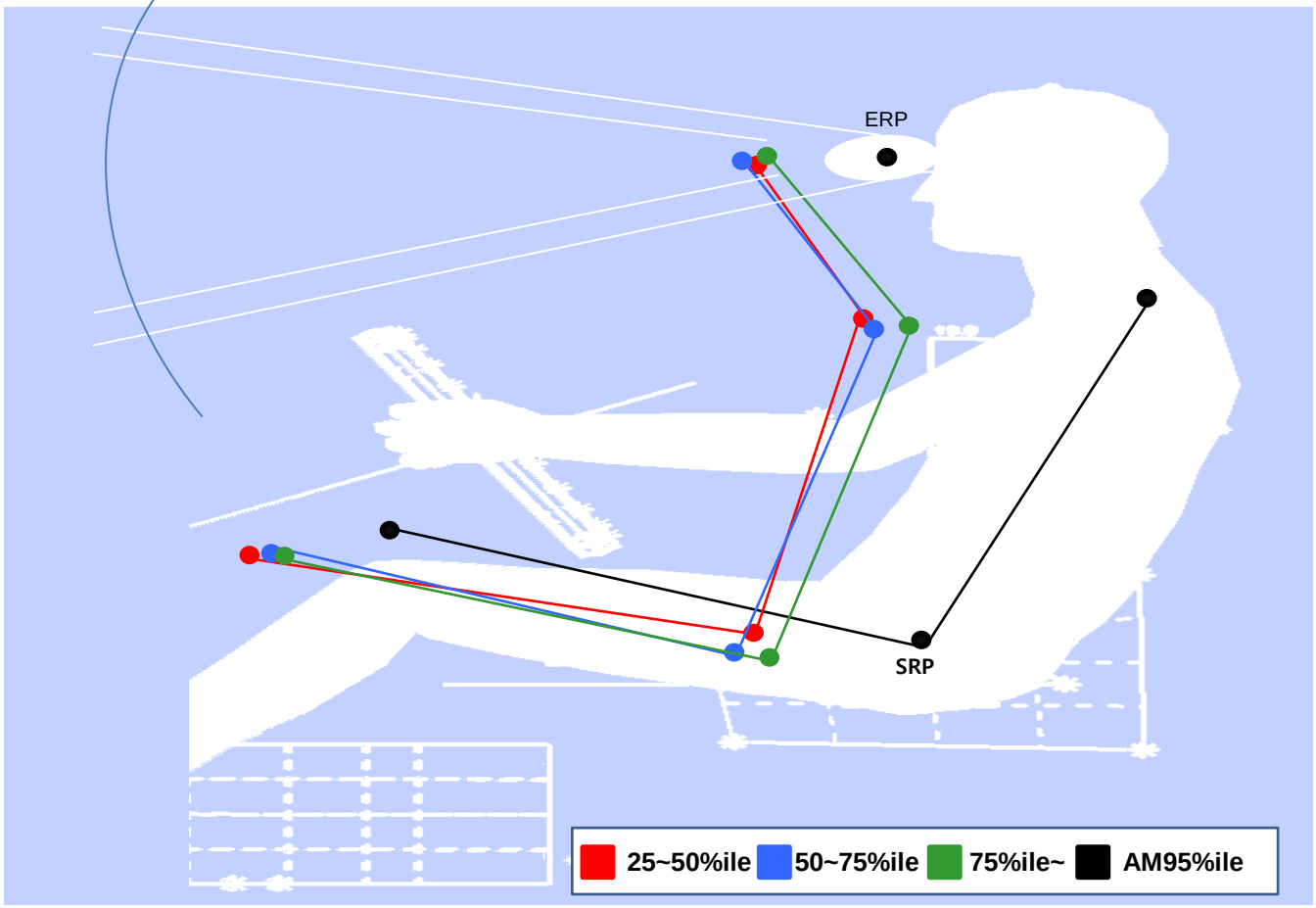


Standard dummy size

* Reference : Size Korea 2004, Age of 30's

Men and women have different seating postures.

- Women are relatively short and sit upright, close to the steering wheel
- Eye positions are different so it is harder for women to look wider

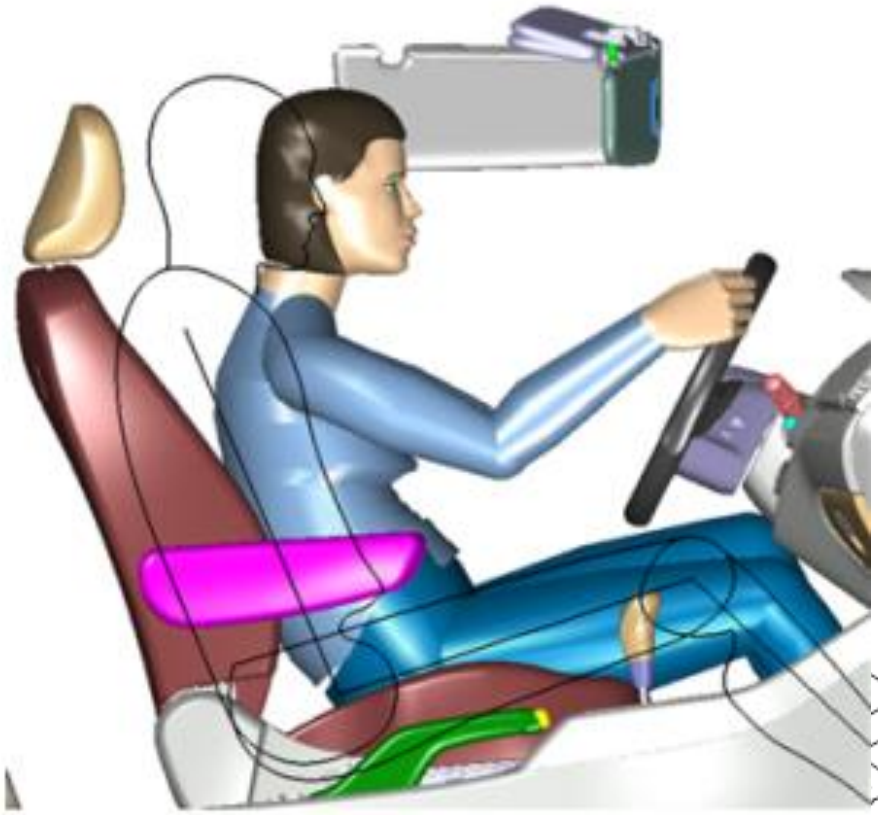


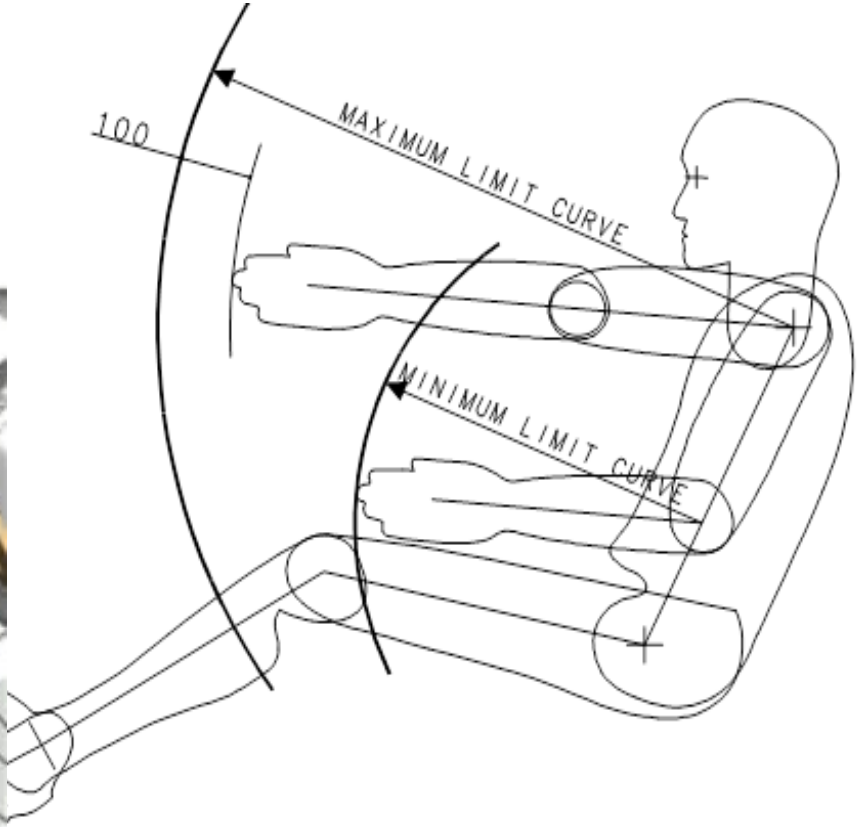
American Male 95%ile vs. Korean Female

* ERP: Eye Reference Point
* SRP: Seating Reference Point

Interior space and layouts

Should be carefully designed considering the difference of seating postures. All the controls must be located in the drivers' limit curves so the users have easy controllability.

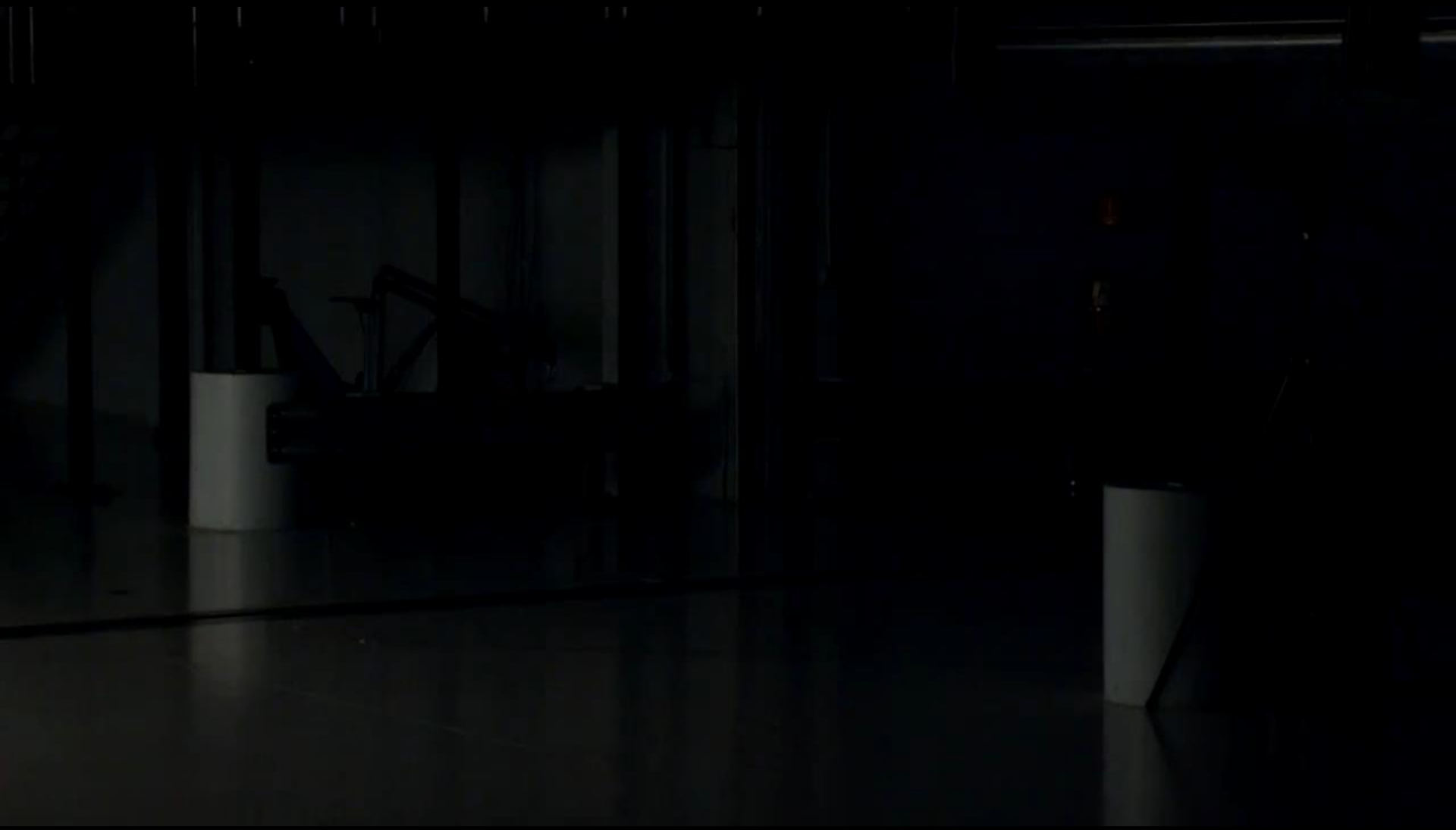





We check the layouts with different user groups so all the controls are located in their reach zones.

Women are more vulnerable in case of collision because of their smaller size and preferred seating posture. Crash test with female dummies are legalized in 1998 in the US.

Side-crash test with dummies

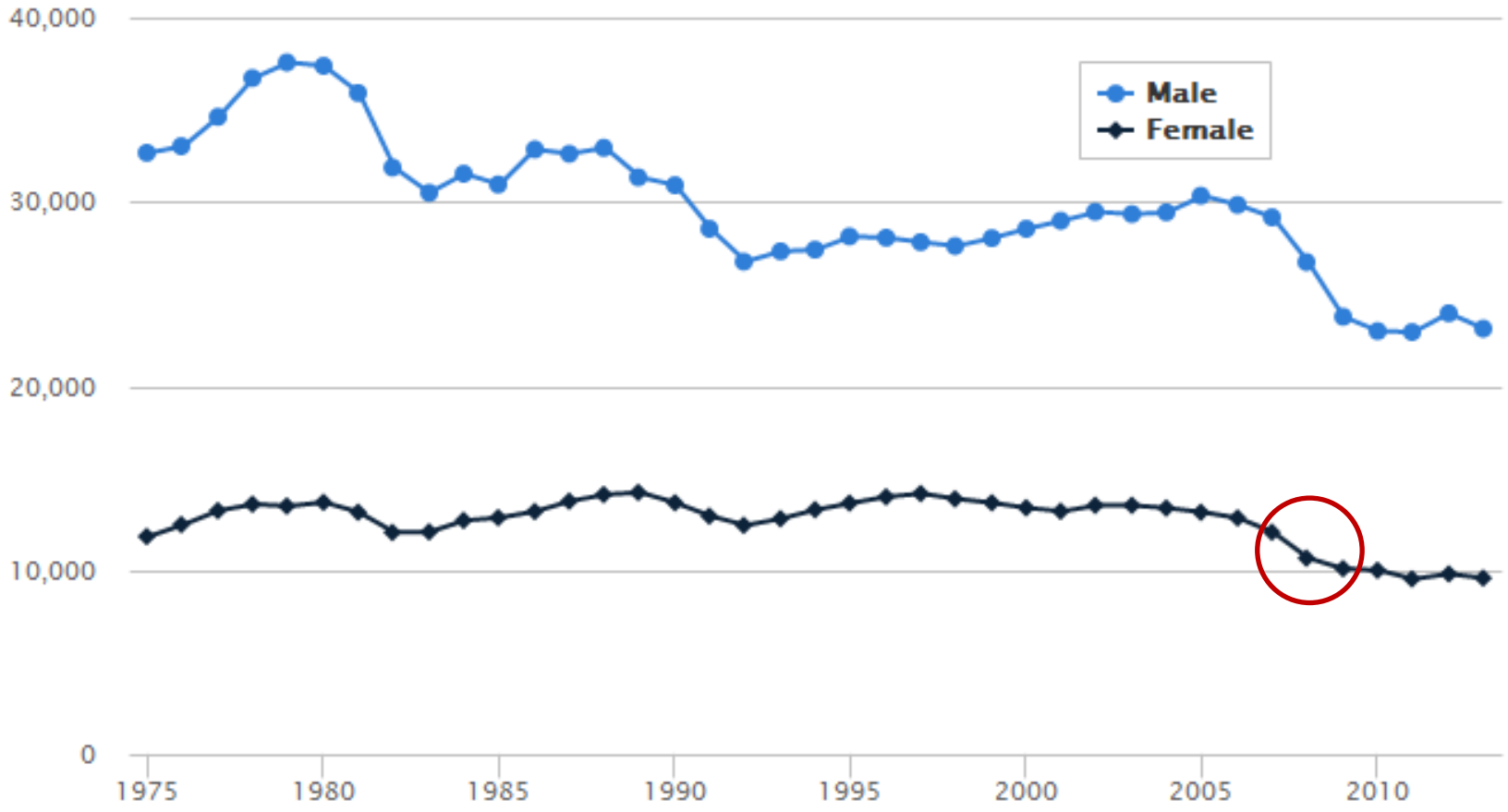


Side-crash test with dummies (in slow motion)

We provide with adjustable seatbelt anchor zone and headrest for safety.

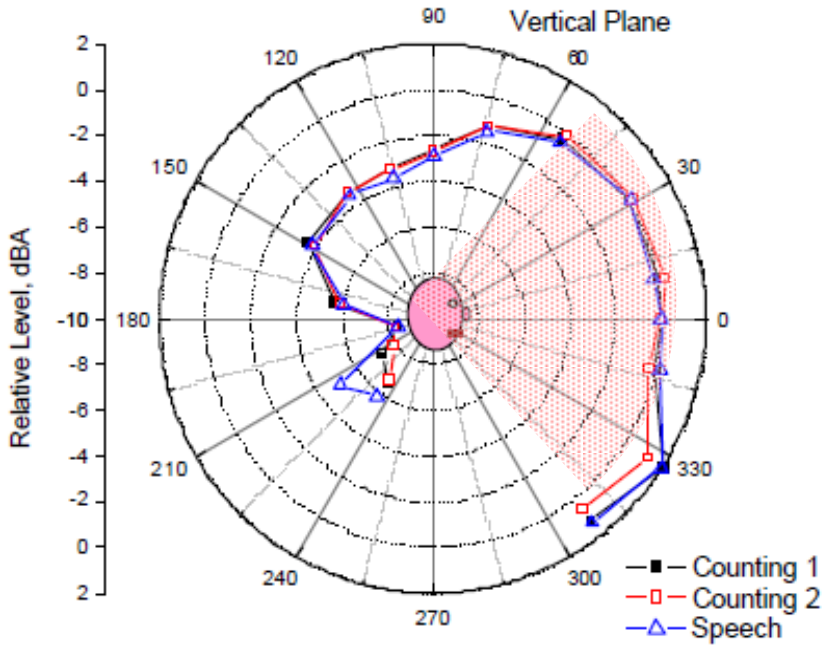
Headrest adjustment

Motor vehicle crash deaths by gender, 1975-2013
The numbers are decreased after 2008.

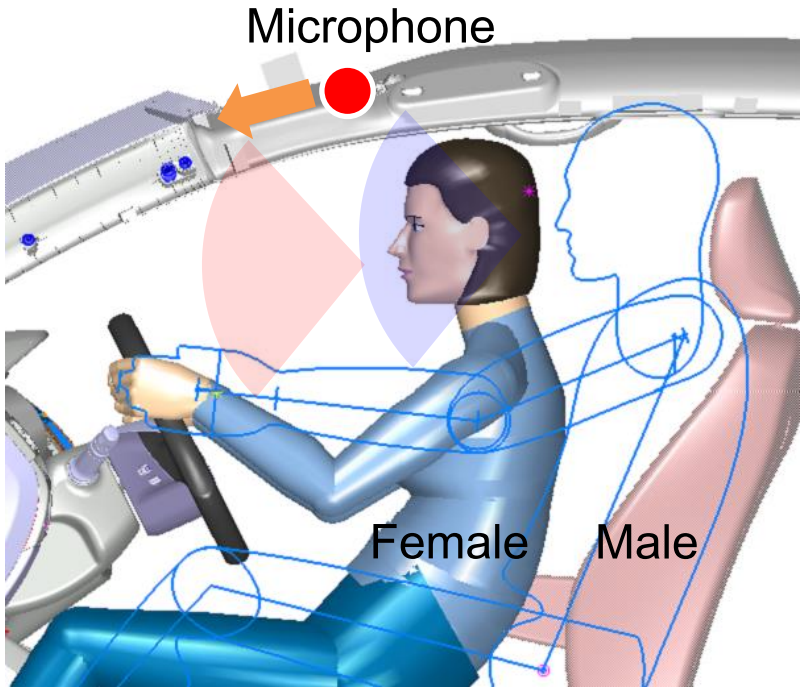


* Reference: Insurance Institute for Highway Safety (2013)

Seating postures also affect the voice recognition. Microphone need to be located inside the angle of sound directivity.



Detailed Directivity of Sound Fields Around Human Talkers (by Chu, W.T., 2002.12)



Microphone location

Women feel heavier of the weight of trunk doors because muscular strength of women is only a 2/3 of men's.

Smart Trunk

It’s very dangerous when drivers loose their concentration while driving.

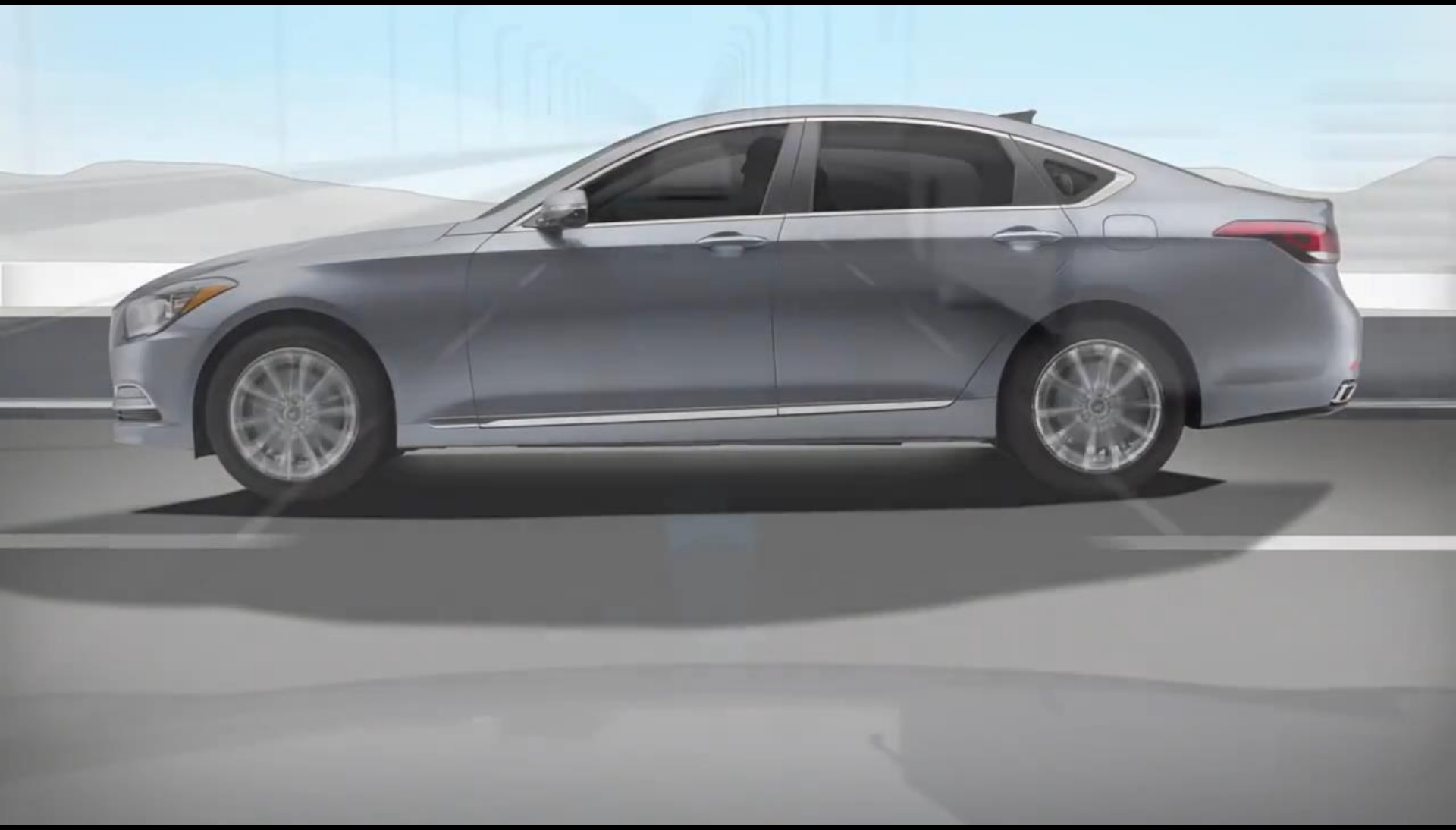
There exist many reasons for attention dispersion.
Besides drowsiness, navigation system, phone calls, texting, watching videos, etc., we have all the high-technologies are converged into vehicles.

Women’s brain system is more suitable for multi-tasking so, female drivers need more assistant for attention dispersion.

Lane departure warning system (LDWS) and auto emergency braking (AEB) will help you avoid potential collision or reduce its impact.

Lane Departure Warning System (LDWS)

Automatic Emergency Braking (AEB)



Parking in a narrow space is painful to everyone.

Drivers can view 360 degree of the surroundings through the monitor and will find parking a lot easier.

Also, smart parking assist system will provide you with semi automatic parking.

Surround View and Backup Camera

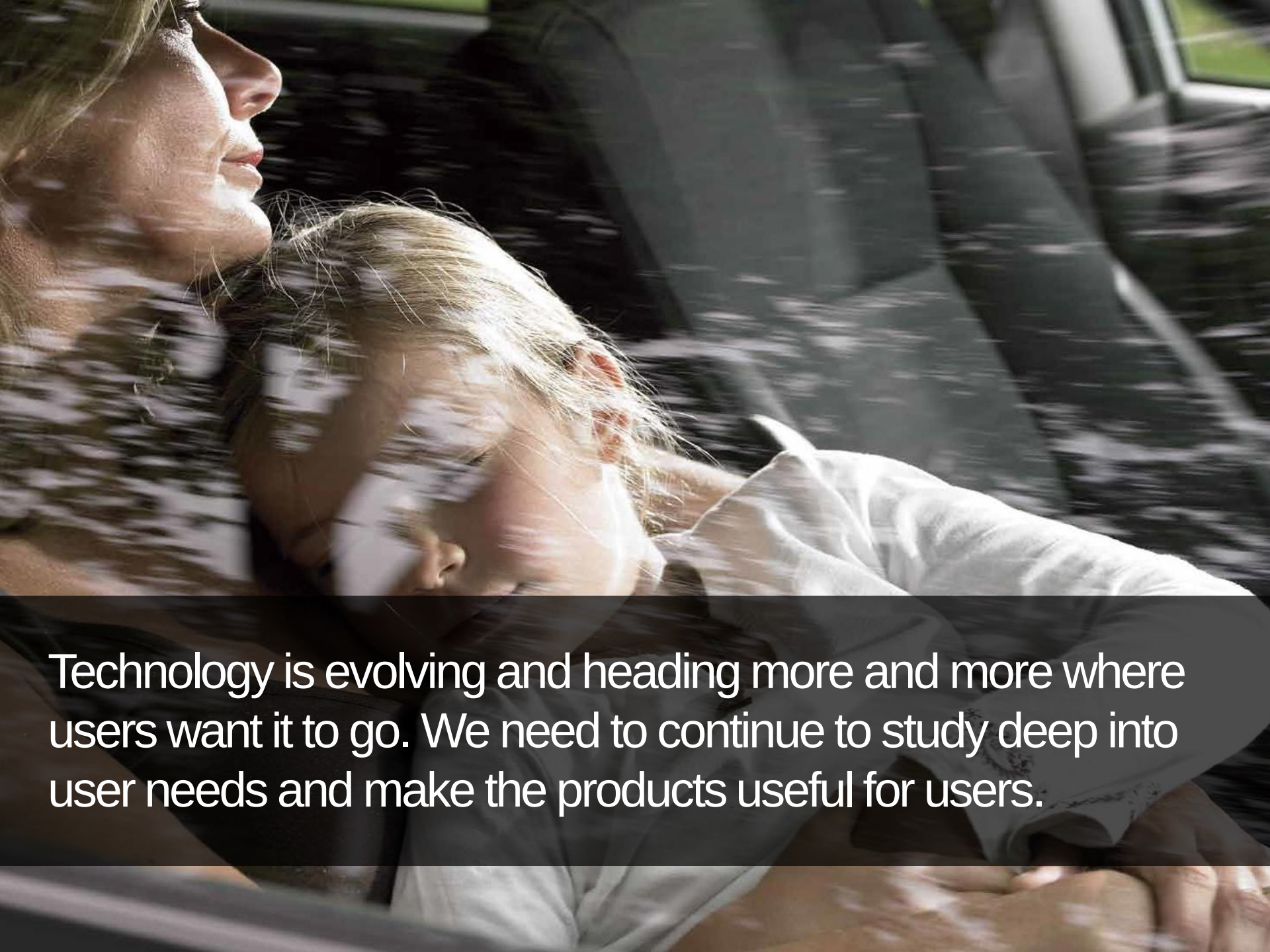
Smart Parking Assist

Changing the lane while high speed driving is the most difficult task for inexperienced drivers, and even for experienced drivers.

This is because there is a blind spot from the driver's seat.

Blind spot detection (BSD) will let you know if there's another car in your invisible area. And, the lane changing assist (LCA) system will let you know if there's a car approaching further back at high speed.

Blind Spot Detection and Lane Changing Assist


Technology is evolving and heading more and more where users want it to go. We need to continue to study deep into user needs and make the products useful for users.