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Why we act in the traffic the way we do

Human Factor in Traffic

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I. Traffic sustainability – heading Vision 0

The goal of inherently of sustainably safe traffic is to prevent crashes and, where this is not possible, to reduce the chance of deaths and severe injury to zero.

This approach recognizes **people`s physical vulnerability**, but also what they are **capable** of (people make errors, after all) and what they are **willing** to do (people do not always abide by the rules).

Education and training should optimally prepare people for the traffic task and their final behavior must be **checked** (and for high risk drivers must be support available).

I. Traffic sustainability – heading Vision 0

Traffic should be sustainably safe **for everybody** and not just for the the car driver.

The proactive approach of sustainable safety means that measures are taken in the **chain of “system design” to “traffic behavior”** as early as possible. By preventing system errors, the probability of human error and/or serious outcomes of crashes can be reduced.

Road safety thus becomes less dependent on the **individual choices of road users**. This implies that responsibility for safe traffic not only lies with road users but also with those who design and manage the elements of the traffic system such as infrastructure, vehicles, education, training and testing.

I. Traffic sustainability – heading Vision 0

There are five principles that lead to sustainably safe traffic:

1. Functionality of roads/environment (monofunctionality of roads)
2. Homogeneity (of masses and speed and direction)
3. Predictability (of road course and road user behavior)
4. Forgivingness (of the environment and road users) – injury limitation through a forgiving road environment and anticipation of road user behavior
5. **State awareness (by the road user) - ability to assess one's own task capability**

(Advancing Sustainable safety, SWOV, 2013).

I will talk mostly about last one.

II. Traffic psychology

Traffic psychology is primarily related to the study of **the behavior of road users** and the **psychological processes underlying that behavior** (Rothengatter, 1997, 223) as well as to the **relationship** between behavior and accidents.

But we – as psychologists – don't deal only with humans' behavior. We work with **holistic approach and understand traffic as very complex system**. In broader sense, traffic psychology deals with issues such – put in another words, when assessing measures we consider:

1. Quality of life
2. Public and individual health
3. Environmental issues
4. Safety
5. Land use
6. Economical sustainability

II. Traffic psychology - 3 E's

1. Education and training

- Popular with those who receive it
- Popular with those who deliver it
- Politically uncontroversial
- Authorities seen to be acting

But there is no general evidence that they produce a public health benefit.

Brown, et al (1987);

Christie, (2001);

Christie, (2007);

Ker et al., (2005);

Mayew et al (1998);

Mayew & Simpson, (2002);

Vernick et al., (1999)

II. Traffic psychology - 3 E's

Harm mechanism = normalizing risky behavior, risk exposure, overconfidence. Skills training without understanding leads to risky behavior. Increase confidence without competence. Driver education can lead to an increase in crash involvement (Roberts et al, 2001; Mayew & Simpson, 2002; Vernick et al 1999)

Thought, education and training must play an important role. Each education and training must be **evaluated and ensure, that leads to evident public benefit.**

Education may have an important role in enabling and expanding interventions that **work** and that they should be designed and evaluated accordingly.

II. Traffic psychology - 3 E's

Education and training should be:

- Driven by theory and evidence
- Designed to avoid
 - Overconfidence
 - Increased risk exposure
 - Normalising risky behaviour
- Evaluated

(McKenna, 2012)

II. Traffic psychology - 3 E's

2. Engineering

Concept of self explaining road/ environment – helps human to act according to the situation.

We act as surrounding tells us to act.

We have to construct roads and environment the way, which allows to **absorb humans' errors** and let us stay alive and learn from our mistakes.

II. Traffic psychology - 3 E's

3. *Enforcement*

Strong evidence that enforcement in **traffic leads to benefits in public health** (Tay, 2005).

Deterrence assumptions:

- people must know the rules
- must be able to use this knowledge
- benefits of rule breaking must be less than cost of threat

II. Traffic psychology - 3 E's

Deterrence does not work – public policy should not be based on deterrence but **retribution** (Robinson & Darley, 2003) .

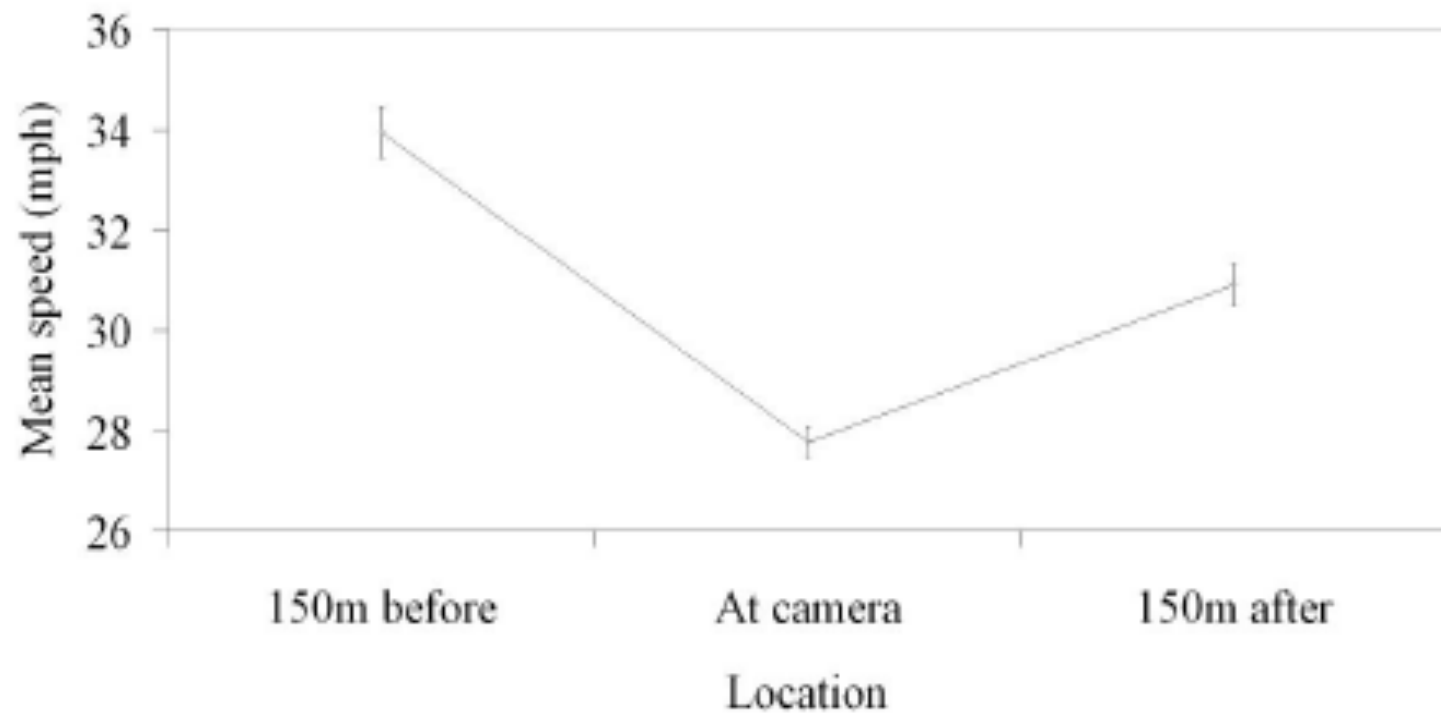
Deterrence theory:

Deterrence increases as a function of:

- certainty
- severity
- imminence of punishment

II. Traffic psychology - 3 E's

(McKenna, 2012)



III. Human behavior

Human as irrational being - we can not expect pure rational behavior

GADGET model

A four-level descriptive model in which **driver behaviour** is conceptualised as a hierarchy, in which the **goals and motives** of the driver play an essential role.

An analysis of the driver's task and accidents has shown that adequate psychomotor skills and physiological functions **are not sufficient for good and safe performance as a driver**. This conclusion is in line with the notion that driving is a **self-paced task** (Näätänen & Summala, 1974).

III. Human behavior

Rothengatter (1997) has pointed out, that research in traffic psychology shows not only the importance of **performance factors**, but also the importance of **motivational and attitudinal factors**.

Skill vs. Will dilemma

III. Human behavior

Four levels of GADGET model (Hataka et al, 2002):



III. Human behavior

5th level - Traffic as a culture (Good brakes, good horn, good luck!)

This is how people drive, how people cross the street, how power relations are made manifest in those interactions, what sort of patterns emerge from traffic.

It's the reason why horn in Rome does not mean the same thing as a horn in Stockholm, why flashing headlights at another driver is understood one way in the German autobahn and quite another way in Los Angeles.

Why pedestrians jaywalk in New York City and don't in Copenhagen? In New York City it's a way to distinguish yourself from crowd, in Copenhagen an act against law. In NYC pedestrians look at cars, not at lights.

III. Human behavior

What explains traffic culture?

- 1) traffic laws
- 2) cultural norms
- 3) accepted behavior of a place

III. Human behavior

Risk homeostasis theory – The risks of safety

Risk homeostasis theory maintains that, in any activity, **people accept a certain level of subjectively estimated risk** to their health, safety, and other things they value, in **exchange for the benefits they hope to receive from that activity** (transportation, eating, recreation, drug use etc.).

In an ongoing activity, people continuously check the amount of risk they are exposed to. They compare this with the amount of risk they are willing to accept, and try to **reduce the difference between the two to zero**. Thus, if the level of subjectively experienced risk is lower than is acceptable, people tend to engage in actions that increase their exposure to risk. If, however, the level of subjectively experienced risk is higher than is acceptable, they make an attempt to exercise greater caution.

III. Human behavior

Gerald J. S. Wilde gives following argument:

“A river empties into the sea through a delta. The delta has three channels, all of equal size. Therefore, damming two of the channels will reduce the flow of water to the sea by two-thirds.”

In all likelihood, nobody would accept this argument. One cannot stop the flow as long as there remain alternative routes to the destination. One cannot reduce mortality due to accidents unless all opportunity for premature death were **eliminated by law or made impossible through technological intervention.**

III. Human behavior

The theory of risk homeostasis predicts that people become **accustomed to some acceptable level of risk**, and that when they are required to reduce a risk they are exposed to, they **will increase other risks until they have re-established the level of risk they have become accustomed to**.

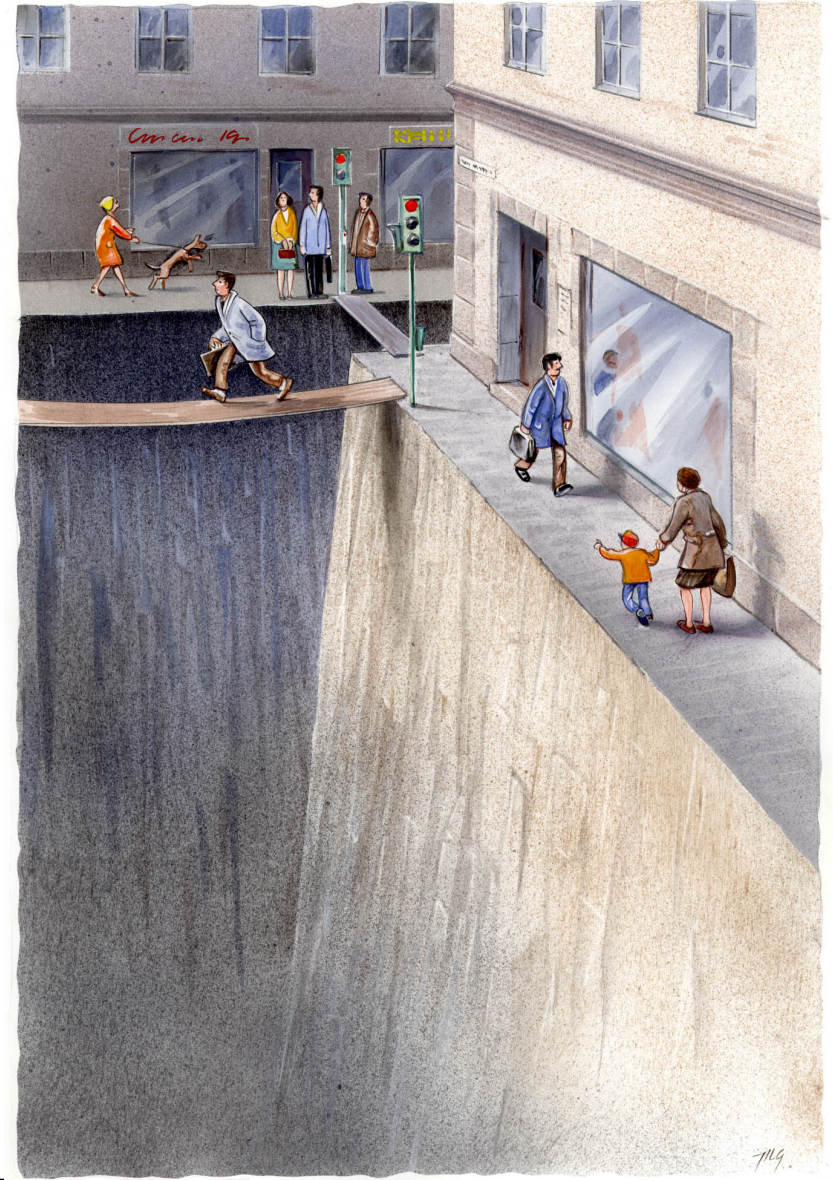
If drivers are required to wear a seat belt, the evidence suggests that they drive faster, pass other cars more dangerously, put on make up while driving and so on, so as to maintain the level of risk they are comfortable with (Wilde, 2000).

The question of subjective and objective safety.

III. Human behavior

Transforming “vertical risk” to
“horizontal risk” makes the
world look much less
dangerous

(Risser 2013, showing a drawing
by Carl Jilg)



III. Human behavior

(Risser, 2013)

Site characteristics	Significance for practice
Subjectively and objectively safe	Enhances attractiveness, positive from objective safety perspective → politically fully acceptable
Objectively safe but subjectively unsafe	Reduces attractiveness; objective safety achieved by avoidance of walking; deteriorates mobility (e.g. senior citizens) → sometimes sold as positive with respect to safety
Subjectively safe but objectively unsafe	Safety problems not perceived by pedestrians (e.g. pedestrian crossings) → alarm mechanisms necessary (e.g. traffic conflict research to detect risk indicators)
Subjectively and objectively unsafe	Obvious safety problems. Is it possible that such places exist? Answer: It is! Question: How is this possible? What is the role of authorities?
Low attractiveness in other aspects than just safety	<ul style="list-style-type: none"> * Comfort problems: narrow boardwalks, lack of space, stair cases, etc. * No smooth flow: long waiting times at traffic lights, design leading to long distances at intersections, etc. * "Second class road user" syndrome, priority to car traffic obvious, "everything is made for car traffic"

III. Human behavior

We can think of risk in 2 different ways:

Risk analysis – reason, logic and careful considerations about the consequences of choices (*Statistically, flying is much safer than driving*)

Risk as feelings – something like survival instinct

We rely more on feelings when we have less time to make a decision.

Eg. In collisions between car and deer, the greatest risk to the driver comes in trying to avoid hitting the animal. (*Don't veer when you see a deer!*)

III. Human behavior

Consider this:

1. *For every 130 million kilometers (crossing EU 30 000x times) driven in vehicles, there are 1.3 deaths.*
2. *If you drive average of 20 000 Km per year, there is roughly **1 in 100 chance**, you **will die in fatal crash** over a lifetime of 50 year driving.*

Does it sound as the same?

III. Human behavior

Why our eyes and minds betray us on the road

- Human speed according to evolution – max 30 km/h - Our senses are not adjusted to speeds higher than 15 – 30 km/h
- The gap between subjective safety and objective safety
- Information overload leads to errors, little workload leads to highway hypnosis
- Cars and environment are constructed the way which gives us false feeling of safety
- Why we are not as good drivers as we think we are – most of the drivers think, they are better drivers than average
- Lack of feedback – drivers lack feedback. Lack of negative feedback leads drivers to false feeling that they don't make mistakes.

III. Human behavior

(Strayer, 2011)

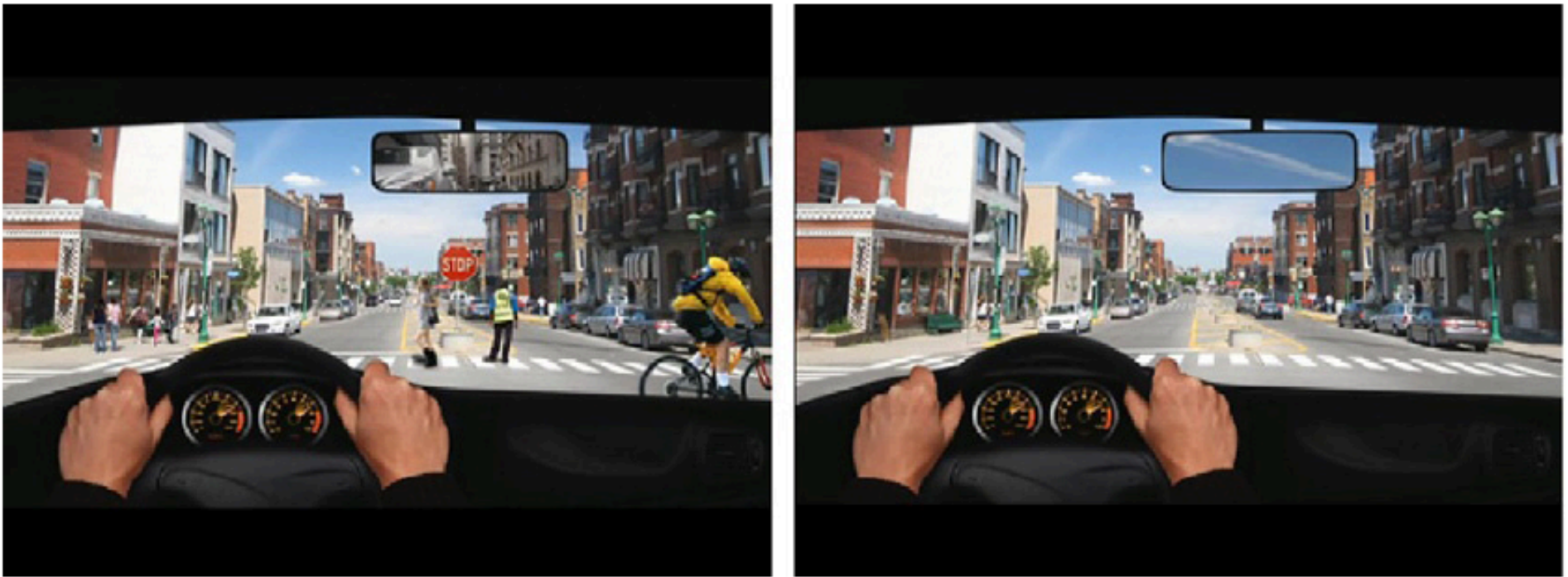


Figure 8 A representation of what a driver might perceive when they are not talking on the phone (left panel) and when they are talking on a hands-free cell phone (right panel).

III. Human behavior

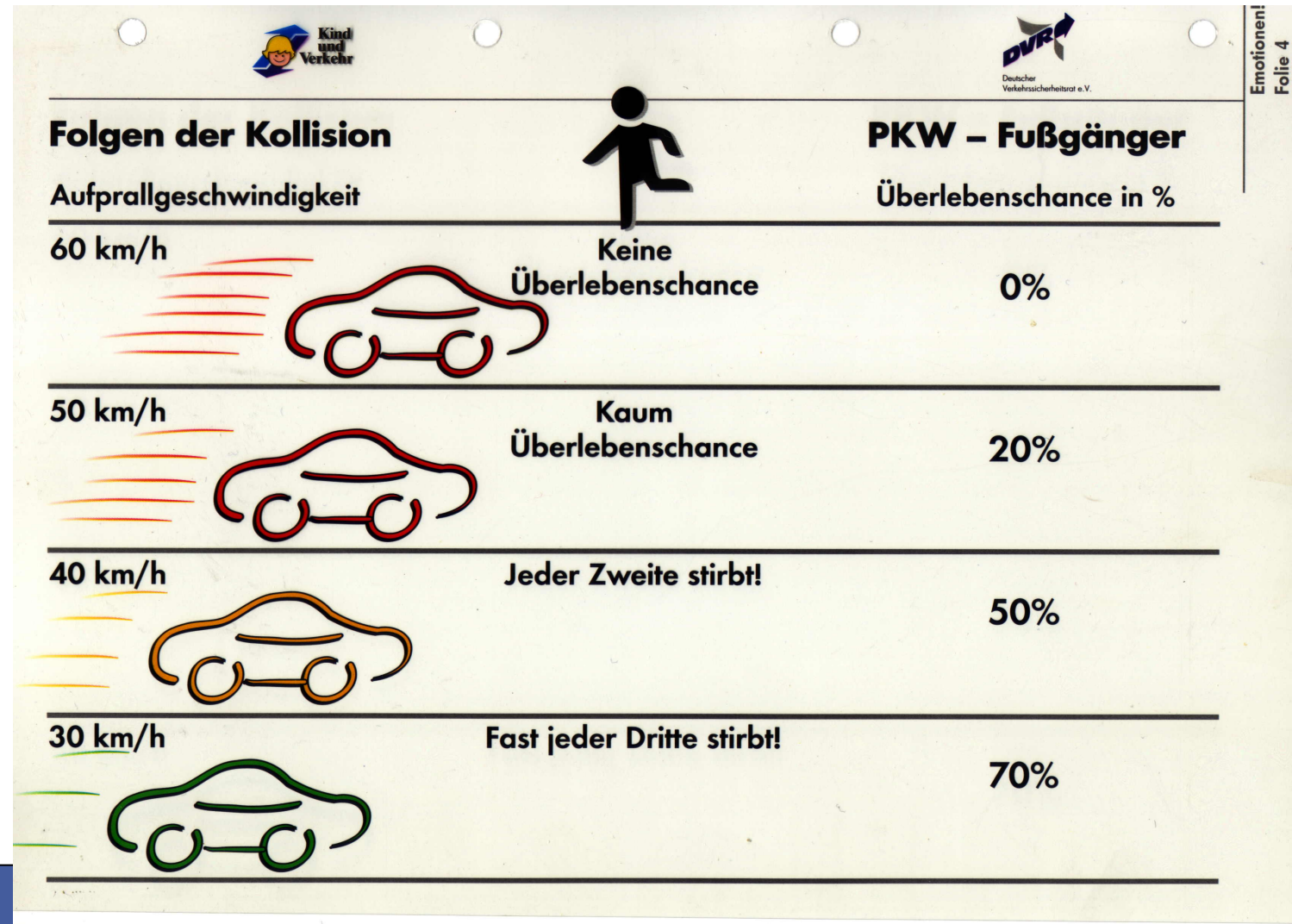
Pedestrians and commuters

Walking is very important mean **for children, school pupils and elderly to participate in traffic**. In sustainably safe traffic, these vulnerable road users should be separated from other traffic as much as possible. If this is not possible, there is the “**safe speed**” of **30 km/h or less** (homogeneity). To limit severe injury, vehicle adaptations also remain important (forgivingness).

Crossing the **road is the most dangerous manoeuvre for pedestrians** and most of the killed are over the age of 75. Most of the in-patients are children under the age of 11 (SWOV, 2006).

III. Human behavior

(Risser, 2013)



III. Human behavior

Walking is logically connected to public transport.

- Most natural mode
- Freedom & independence
- Is healthy and keeps you fit
- Is silent and environmentally friendly
- Cheap & efficient
- Puts life into public space
- Enhances communication among people
- Supports & enhances trade
- Democratic mode (everybody walks)
- Safe for others, no harm to others

(Risser, 2013)

III. Human behavior

Commuting homeostasis – it seems that people all over the world are willing to commute about 45 minutes per day. If traffic modes are faster they commute larger distances. Time seems to be relatively independent.



(Photo shown by
Risser, 2013)

IV. Data and research methods

Accidents data and accidents indicators

- **we do not need to wait for accidents to happen**
- place without accidents \neq safe place
- accidents are very complex events and it is complicated (or impossible) to describe all factors and relationships
- to understand roots, we need **to explore** and interpret data (not only analyse)
- there are “too few” accidents to use them as predictive measure
- rather we should use **traffic safety indicators**, data that we can get from:
 - observations (cameras, naturalistic driving...)
 - interviews (with drivers, passengers, pedestrians....)
 - analysis of possibly unsafe events (emergency brakings, near accidents, conflicts...) ...& explorations and interpretations



Thank you for listening!