Nordic Human Factors Guideline project:

Road users' demands to the design of road systems related to the physical and mental abilities of road users.

- Project under The Nordic Road Geometry Group (2005)
- Workshops

The aim of the project has been:

- *Bring together* practitioners and researchers + engineers and phycologists
- *to collect* a fairly comprehensive research based knowledge on road user behaviour
- *and disseminate* the existing knowledge in a short and usable form for practical use among technicians and planners working in the practical field

Nordic research team

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The 4 sub-projects:

1. ***Collection of existing knowledge (comprehensive literature studies) is presented in five thematic notes on road users´ physical and mental abilities*:**
   - Reaction time – break response time and decision response time
   - Reading distance and reading time for drivers
   - Walking speeds
   - Assessment of speed and distance
   - Inattention and distraction

2. ***Development of an explanatory model for road user behaviour***
   To increase the understanding of how drivers act in traffic and how our actions are influenced by road design and traffic environment.
   Conclusions from the model form the basis of "The self-explaining road"

3. ***Execution of a number of case analyses*** for verification of the applicability of the explanatory model as a tool for problem analyses and solution of specific traffic problems in practice.

4. ***Three power point presentations*** for the dissemination of the main findings of the project. In Nordic languages.

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Explanatory Model

The explanatory model defines some general principles for road user behaviour

<u>Development of a practical usable explanatory model - a several step process:</u>

- ***Basic characteristics of <u>human behaviour</u> are described > general principles for <u>road user behaviour</u>***

- ***The general principles - a tool to analyse specific problem areas in traffic:***
  Behavioural incidents are predicted
  > confirmed/rejected in impirical studies
  > adjustments of the model

- ***The applicability of the model is tested several times > operationel model***
  - ***ghost driving***
  - ***speed choice and conditions for speed adaptation***
  - ***reading and understanding of road signs and markings***

- ***Case analyses – verification of the applicability of the model as a tool for problem analysis in practise.***

- ***"greatest possible benefit with the least possible effort"***
- ***we are born without skills - we must acquire everything through learning***
- ***We perceive the immediate surroundings as a whole***
- ***At the same time, our perception of the immediate situation is dynamic:***
  - the direction we are moving in
  - what will happen "shortly" in the current space - just before it actually happens.
- ***The more detailed the information we receive through our senses, the sooner we get a proper perception of the surroundings***

Driving a car is a learned skill – primarily an automatic action

Comfortable safety margin – perceived safety margin is subjective

Driving a car involves 3 tasks:

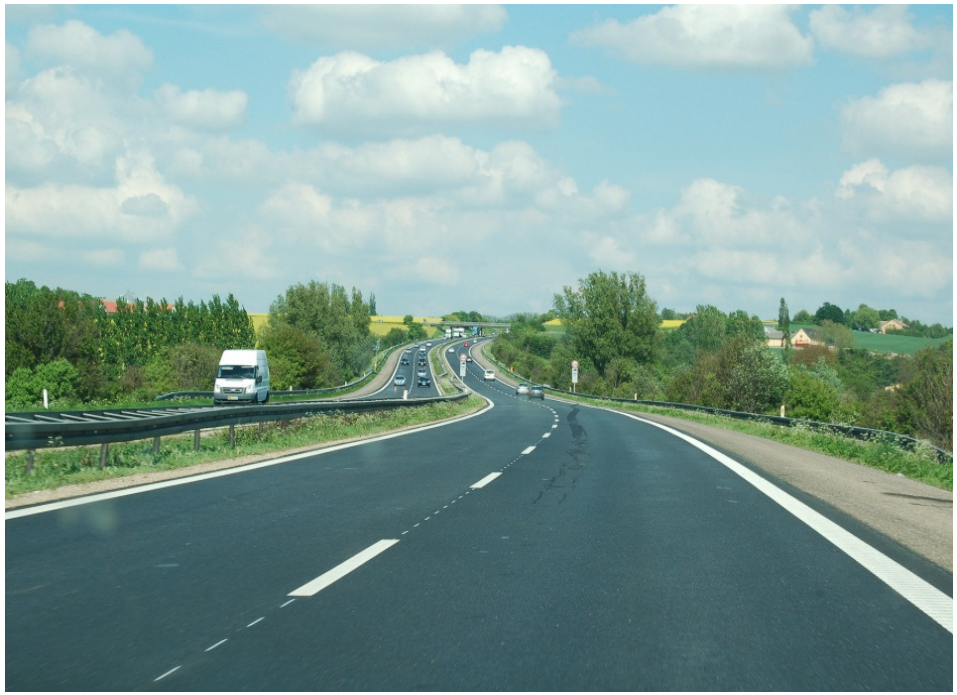
- *Control task* - automatically without conscious decisions
  - mental reserve capacity
  - large functional field of vision
- *Guidance task* - *perceptual assessments and conscious decisions*
  - *high degree of focus*
  - *functional field of vision is reduced*
  - *the entire mental capacity required*
- *Navigation task* - the most complex task/ problem solving
  - understanding of symbols and logical thinking required
  - full attention and entire mental capacity required

The road users expectations

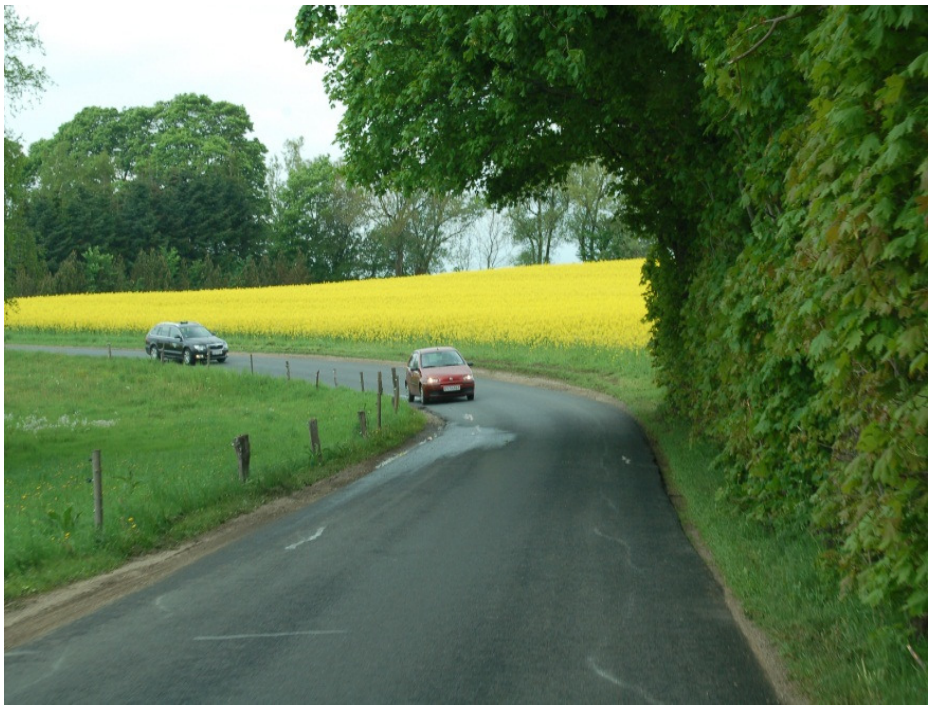
Road users´expectations **to the road is** ***based on previous experiences*** **from simular roads and traffic environments.**

Even before entering a road for the first time we have certain expectations

When the road is a national highway we expect the standard to be relatively high



When the road is a minor rural road we expect it to be narrow and winding



General principles

- ***The road leading up to a change in the road environment must make the driver gradually reduce recognition and thereby consciously begin to reorient in the new road environment***

- ***When the road and the traffic conditions are in line with our expectations, no unexpected surprises occur.***

- ***Correct expectations with respect to road design are an important precondition for a well adapted and safe driving***

The general principles for road user behaviour defined in the explanatory model form the basis of the self-explaining road:

- ***The self-explaining road refers to a road which is designed in such way that road users immediately perceive how to drive on this***
- ***Road user behaviour is mainly determined by the driver's expectations. Consequently the road must be designed to meet drivers expectations***
- ***This means that the road must have a clear and recognisable standardised design***
- ***The self-explaining road must make it easy to go right and difficult to go wrong***
- ***The idiom of the self-explaning road should make symbolic information dispensable***. Symbolic information given on road signs and markings shall only confirm the natural information expressed by the road design and must never be in conflict with this information

Thank you for your attention!

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<u>Ghostdriving</u>:
When a driver un-intended and without noticing it runs against the traffic in one-way direction

Meeting a ghost driver is not in line with the drivers' expectations

<u>Two main design principles to avoid ghost driving</u>:

- ***Design of ramp connections must follow the "Fish – Trap" principle***
- ***A road – which to the driver appears to be going straight ahead – must always allow continued driving straight ahead***

”going straight ahead” principle