

# Rules of Conduct for Autonomous Vehicles

*Jacques Terken  
Industrial Design*

# Research topics

- Physical comfort through situation awareness (preventing motion sickness)
- Mental comfort (conveying information to users about what the vehicle sees, decides and will do)
- Ethics of autonomous vehicles

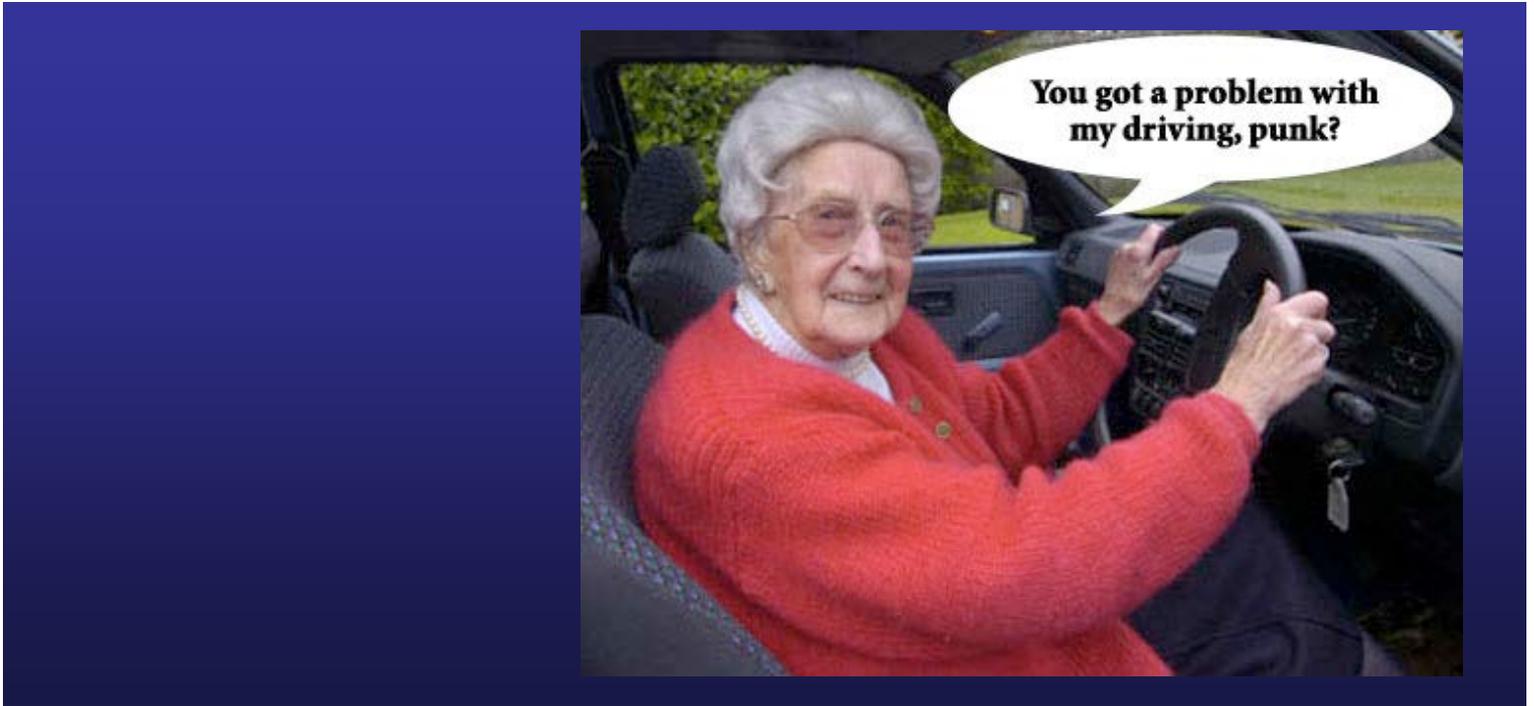
# How should autonomous vehicles behave?

- Robot paradigm:
  - Autonomous cars are robots
  - The only difference being that we sit in them
- Behavioural rules for robots
  - Asimov's 1<sup>st</sup> law of robotics (1942):
    - First law: "A robot may not injure a human being or, through inaction, allow a human being to come to harm"

# **Safety first: Accidents should be avoided at any rate**



# But does this give acceptable behaviour?



# Asimov's second Law of Robotics

- “A robot must obey the orders given to it by **human beings**, except where such orders would conflict with the First Law.”



Who  
decides?

# “Extension of the Self” paradigm

- We act in the world
- Tools are extensions of the body
- Car is an extension of the self: tool for acting in the world
- People display different behaviours, rooted in personality
- Driving styles: self vs other-oriented

- **Autonomous vehicle is an advanced extension of the self**
- **Prediction: People will differ with respect to expectations/requirements for driving styles of autonomous vehicles**

# Driving styles

- How do we want our vehicle to drive?  
Assertive vs defensive



- Implications for other road users  
Driving is a social activity > Politeness

# Politeness research: “Would you brake”

Skater



1,5

Backpacker



1,7

Cyclist



2,6

Elderly lady



3,8

Mother and child



4,6

Low vulnerable



High vulnerable

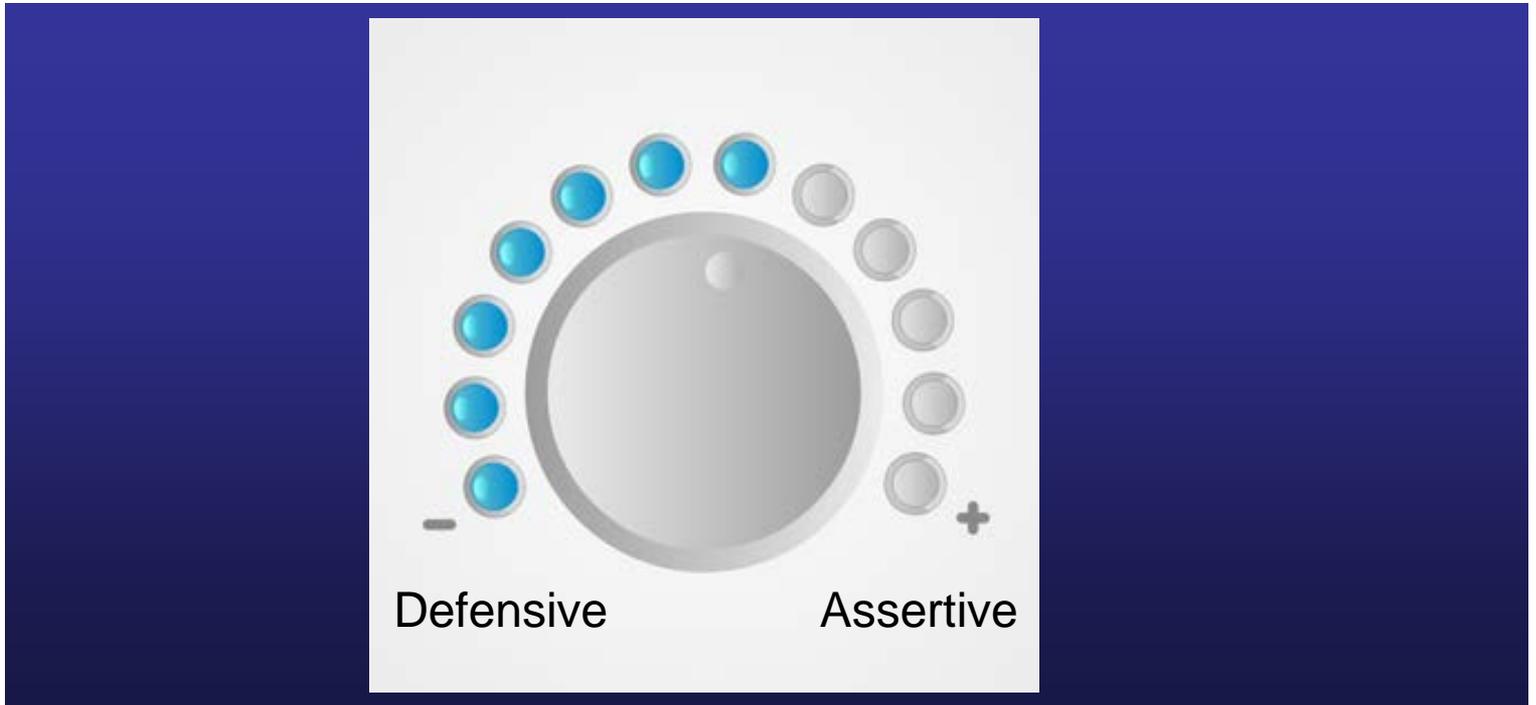
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# Findings

- Effect of weather conditions  
Effect of vulnerability
- No all or none answers: differences between people  
Influence of driving style (inertia vs vulnerability)
- Interpretation:  
Differences between people for desired driving style  
Need for adjustable driving style for AVs

# Design implications



# A body language for AV

- How to express politeness



using LED arrays

Using thermochromic paint



**Thanks  
for your interest**

**[j.m.b.terken@tue.nl](mailto:j.m.b.terken@tue.nl)**

# Driving ethics 1: P. Lin - Trolley problem



Autonomous vehicles should be equipped  
with decision rules for minimizing damage

Minimize damage ←  
for occupants?

→ Minimize  
overall damage?

# Driving ethics 2: P. Lin - Gridlock situations





**What would an autonomous vehicle do?**

**Autonomous vehicles  
need discretionary judgement  
for exception handling:  
Know when they should break the rules**