HUMAN-MACHINE-
INTERACTION

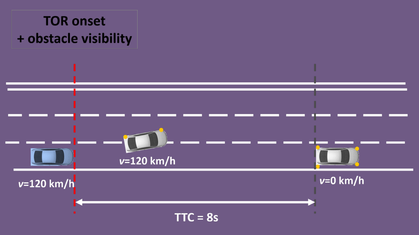
Ko-HAF
KOOPERATIVES
HOCHAUTOMATISIERTES FAHREN

Simulator Studies on Take-over Times following naturalistic Non-Driving-Related Tasks

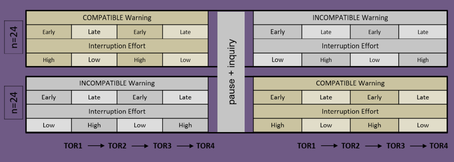
STUDY 4: ADAPTIVE WARNING TIMING

N=48

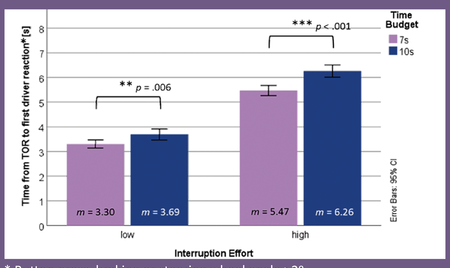
Test Scenario



Study design

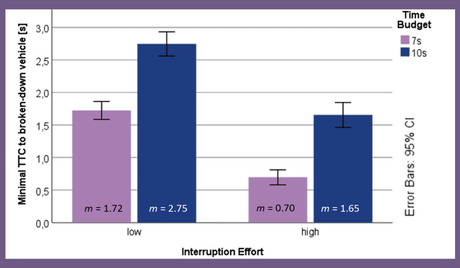


Point of first driver reaction
(button press, braking or steering wheel angle >2°)



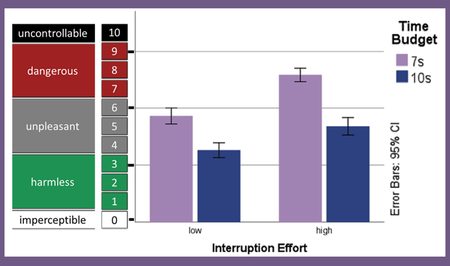
* Button press, braking or steering wheel angle >2°

Minimal Time To Collision (TTC) to broken-down vehicle

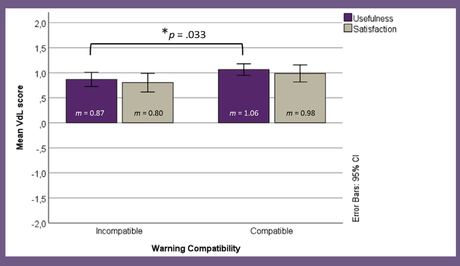


- High Interruption Effort of the NDRT strongly increases take-over times and decreases TTCmin
- Results also differ between time budgets: Drivers „hurry up“ more with short take-over time budget - they take over vehicle control up to 800ms earlier than with larger time budget

After each situation:
„How critical was the situation?“



Final inquiry:
Van-der-Laan Scale



- Shorter time budgets as well as increased interruption effort raise criticality ratings
- Compatible combinations of warning and interruption effort were rated significantly more useful

KEY RESULTS:

- Take-over times and quality, as well as subjective ratings of take-over situations **vary significantly as a function of the investigated NDRTs** (IZVW study 1)
- An important factor in that context is the **number of motoric steps necessary to interrupt the NDRT** (e.g., pausing, laying objects aside, packing and stowing), which may vary considerably within naturalistic NDRTs (IZVW studies 2+3)
- Drivers adapt to the remaining take-over time budget especially when task interruption effort is high. They take over vehicle control quicker when time budget is small than when time budget is larger. Explanation: They perform motoric interruption steps faster or slower, respectively (IZVW study 4)

IZVW

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