# Quality of shift schedules and absenteeism in public transport operations

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## Background

- Bus and tram drivers in public transport operations are long and well known for an increased sick leave rate as compared to other populations / occupations (e.g. *Kompier, 1996; Garbe, 1981*)
- this has in part been associated with their specific tasks and working conditions
- but also to a substantial part with their special working hours

## Background (2)

- and these working hours are indeed very special, including
  - irregular start and end times
  - long working hours
  - split shifts
  - leading to long shifts
- which may lead to health and psychosocial impairments

## Research project

- for these reasons a research project was launched to make an account of working hours in the transportation sector, including
  - transportation of goods
  - public transport in
    - rural
    - urban areas

## Research questions

- what kinds of shift schedules are used in transport operations
- How can these shift schedules be evaluated with respect to health and safety
- Is there any empirical indication that these shift schedules could compromise for the health and safety of the drivers
- What should be done to improve this situation

## Methods

- Comparing different solutions to the problem of the design of working hours in public transport in urban areas
  - companies using very strict schedules
  - companies using less strict schedules
    - with relatively higher or lower abstenteeism rates
    - based on a priori knowledge

## Methods (2)

- Comparing shift schedules
- Comparing absenteeism rates of bus/tram drivers under different schedules
- Trying to establish relations between the design of shift schedules and absenteeism rates

## Methods (3)

- Sample
- arbitrary sample of 5 public transport companies operating in densly populated urban areas and using different shift schedules
- with (preferably) both bus and tram operations

## Methods (4)

**Sample**

| Company | n total | n drivers | n garage | n admin | n other | n vehicles | Operations (bes. line opers.) |
|---|---|---|---|---|---|---|---|
| A | 637 | 496 | 33 | 77 | 31 | 320 | students factory service |
| B | 1905 | 1036 | 408 | 461 | 236 | 388 | night specials |
| C | 2262 | 1302 | 412 | 210 | 338 | 378 | factory service specials |
| D | 546 | 272 | 123 | 136 | 15 | n.a. | students nights |
| E | 2745 | 1329 | 1034 | 382 | n.a. | 455 | nights specials |
| | | | | | | | |

## Methods (5)

Data

- Shift schedules
- Working times
  - scheduled
  - real
- rest breaks (1 out of 4)
- Absenteeism - broken down to shift groups (4 out of 5)
- Accident rates (3 out of 5)
- Driving hours could not been ascertained
- Interruptions of driving times n.a.

***NO PRIMARY DATA – ONLY AVAILABLE DATA AT THE COMPANY / DEPARTEMENT / GROUP LEVEL***

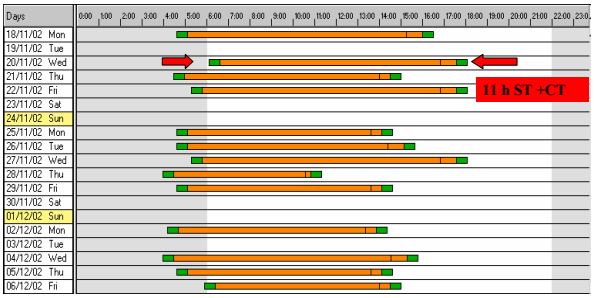
## Methods (6)

**Evaluation of shift schedules according to a set of criteria**

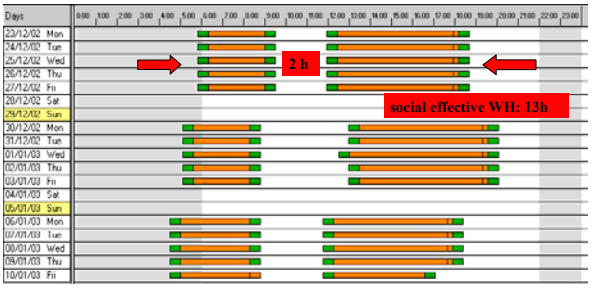
| **Source of criteria** | **Number of criteria** |
|---|---|
| Arbeitszeitgesetz (ArbZG) | 5 |
| German / European prescriptions on driving hours | 5 |
| collective agreements | different<br>depending on the agreement |
| Ergonomic criteria | 15 |

## Examples

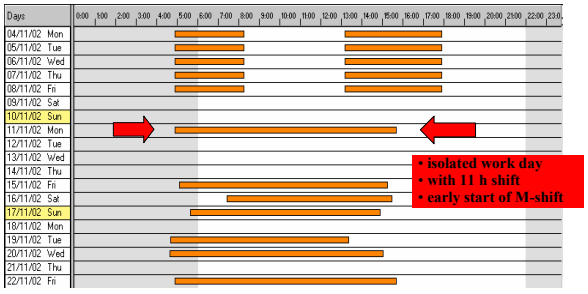
## Extended shift hours



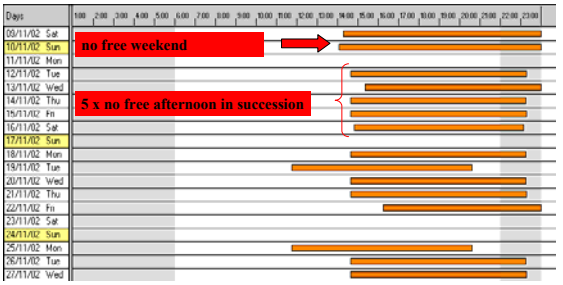

## Split shifts



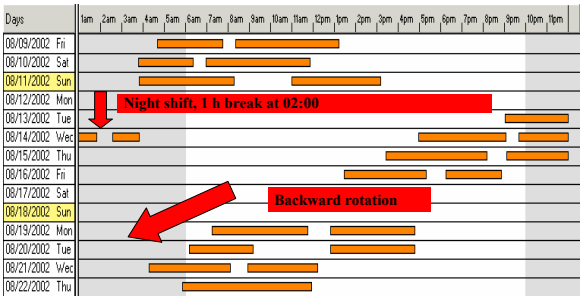

## Split shifts, isolated work day



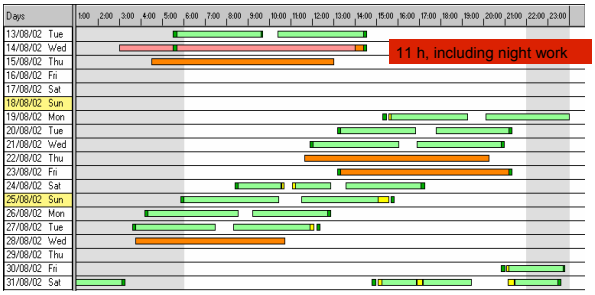

## Afternoon shifts only



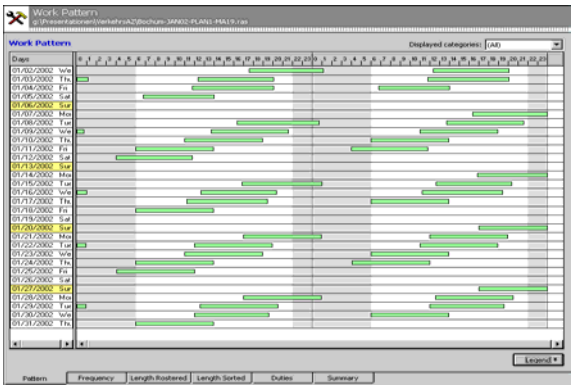

## Backward rotation, break




## Backward rotation, split shifts

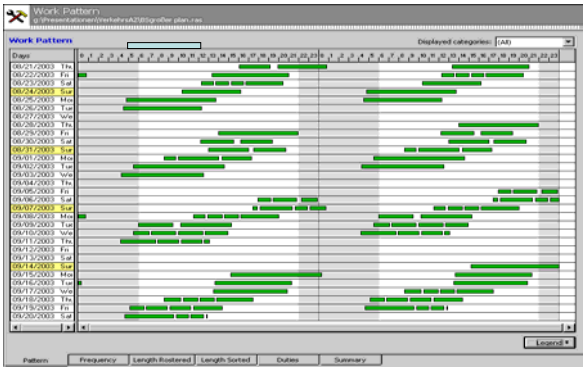


## Backward rotation



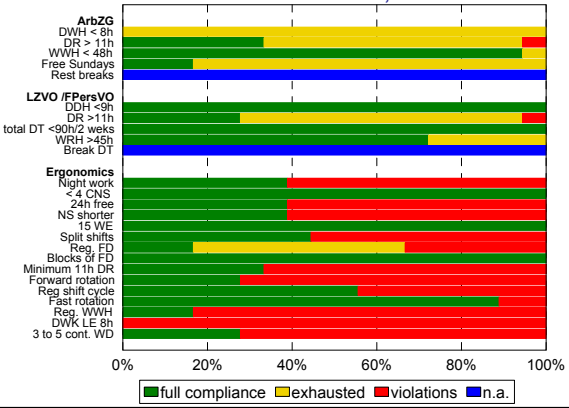

## Forward plus backward rotation


## Multiple split shift

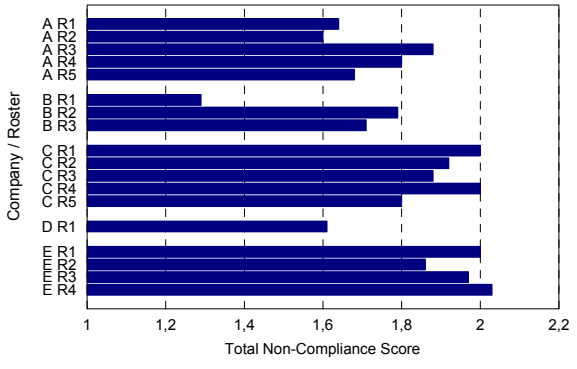



## Evaluation of shift schedules

## Evaluation of shift schedules, all schedules

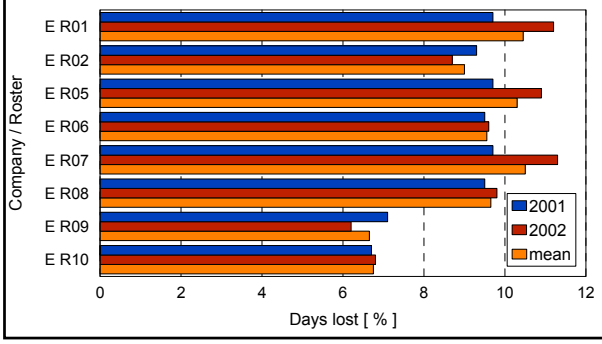



## Evaluation of individual shift schedules

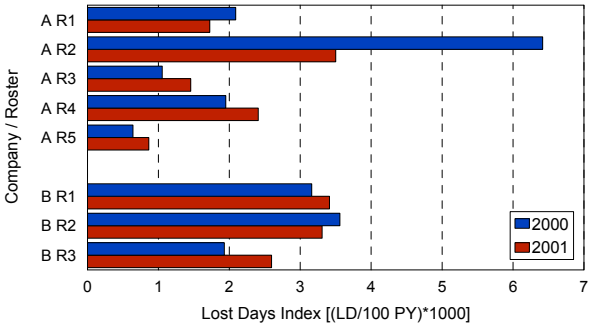


# Absenteeism

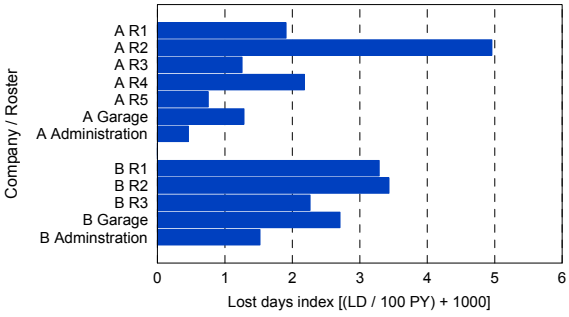
## Days lost for two successive years Company E, different rosters



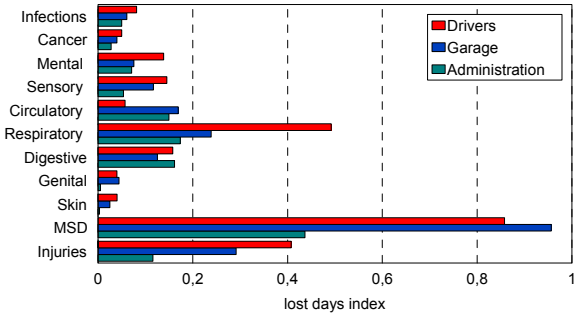

## Absenteeism by company and roster




## Lost days by company, shift schedule, and occupational group

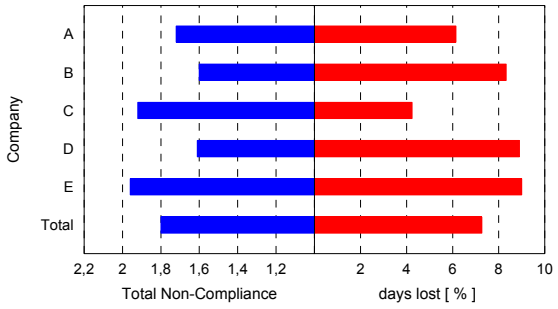



## Lost days by occupational group Company B

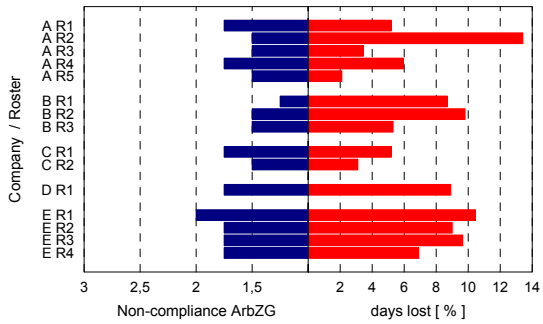



## Schedule evaluation and absenteeism

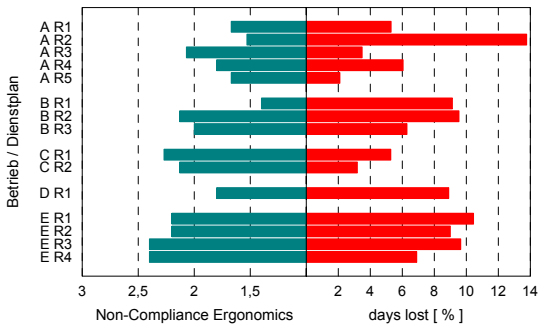
## Schedule evaluation and absenteeism *across companies*



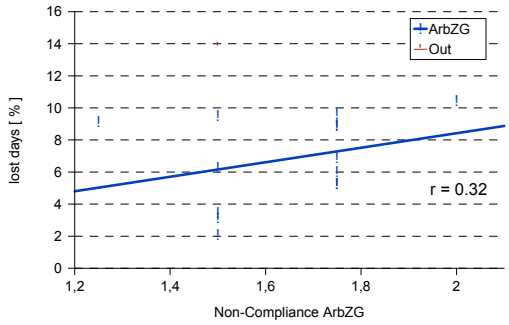

## (Non-)Compliance with legal requirements and absenteeism



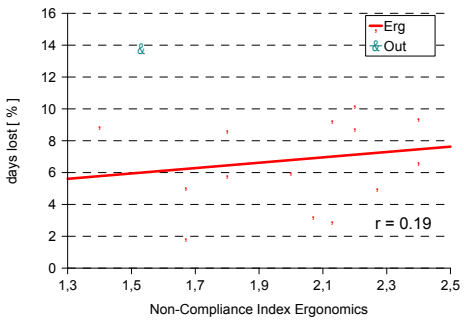

## (Non-)Compliance with ergonomic requirements and absenteeism



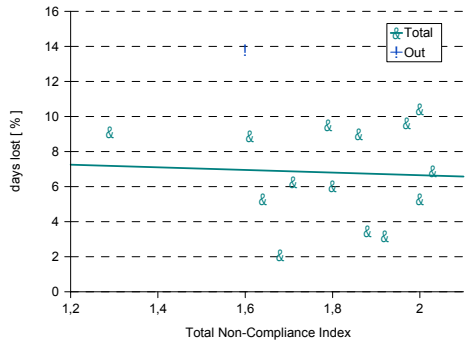

## (Non-)Compliance with legal requirements and absenteeism




## (Non-)Compliance with ergonomic requirements and absenteeism




## Total (non-)compliance and absenteeism



## Conclusions

- Shift schedules in public transport operations are indeed quite special - at least in Germany
- A lot of them do not comply with legal or agreed requirements or fully exhaust any exceptions
- This, however, is only in part due to the rather complicated regulation of working hours and the very special requirements of operation in this sector
- Many of the problems are due to a lack of knowledge of ergonomic requirements or the difficulties in implementing them into the rostering

## Conclusions (2)

- According to the results presented here, these deficiencies in the design and operation of the shift schedules seem to affect the health of the drivers
- Ongoing, more detailed reserach indicates that it is especially the length of shifts, problems associated with rest periods and the dynamics of work/rest sequences that are responsible for increased sick leave
- Rota design should thus definitely take these points into consideration

## Conclusions (3)

- More and more detailed research with sufficient samples and adequate data is required to better understand the underlying relations
- We will continue with using more elaborate and more detailed evaluations of the shift schedules (e.g. by using BASS 4) for more extensive analyses of the available data

*Thank you for your attention !*

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