

# Scientific Symposium

## The Health Effects of Shift Work

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# Shift work and sleep(iness)

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# Contents

- Sleep
- Sleepiness
- The main problem – SWD?

# Effects on sleep

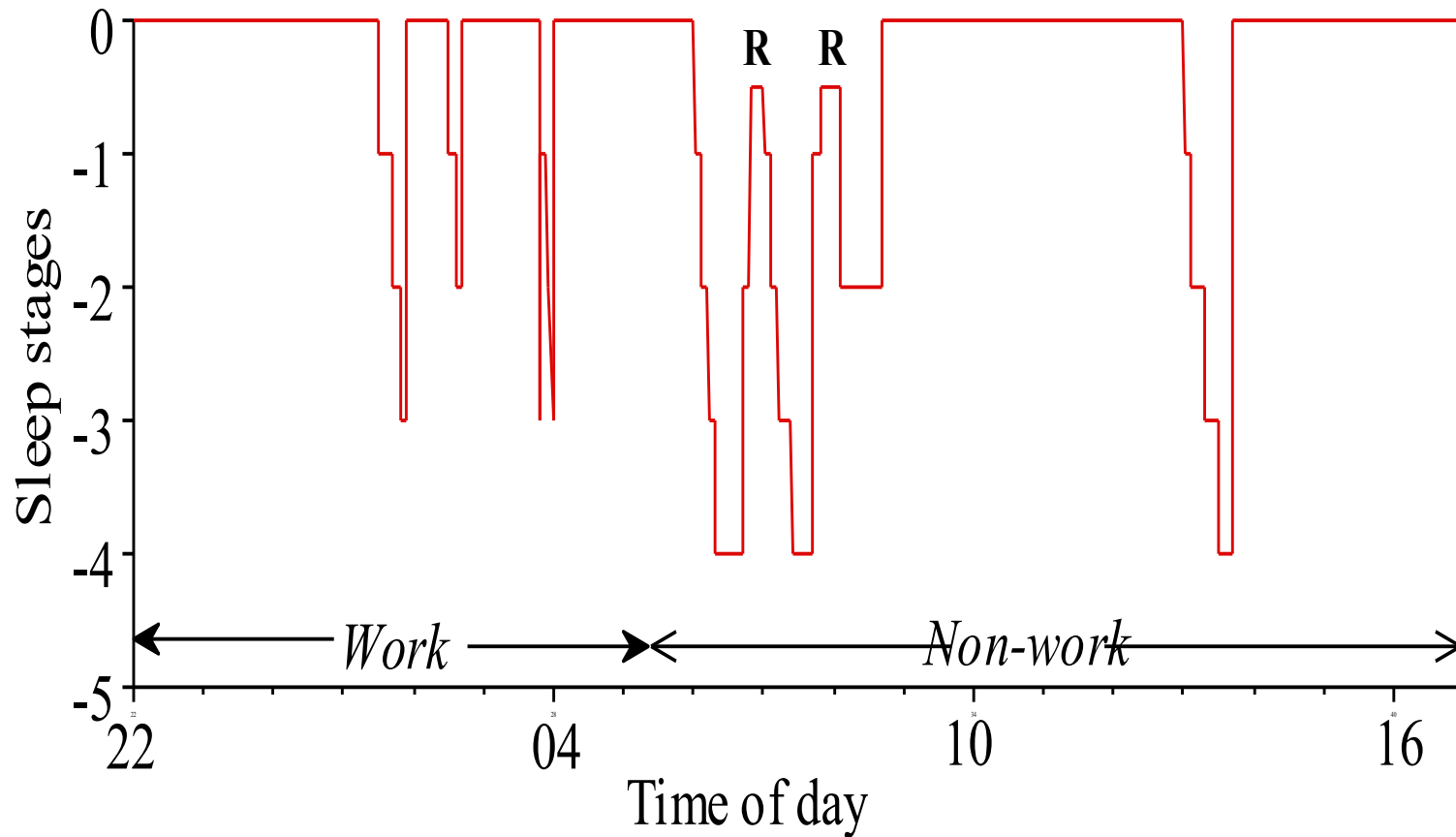
Åkerstedt, T. Shift work and disturbed sleep/wakefulness.  
Occup. Med., 2003, 53: 89-94.

Sallinen, M. and Kecklund, G. Shift work, sleep and  
sleepiness - differences between shift schedules and  
systems. Scand. J Work Environ. Health, 2010, 36: 121-133.

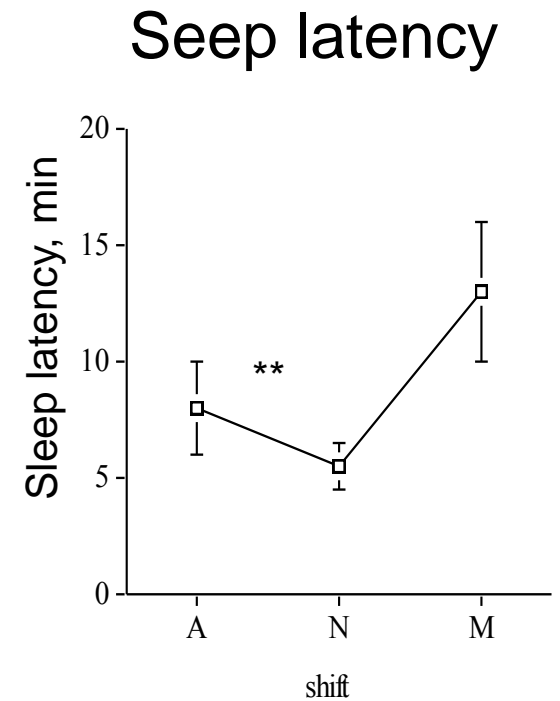
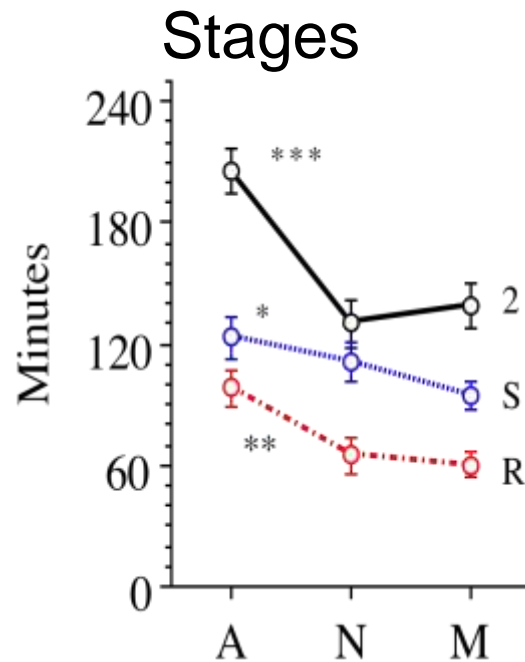
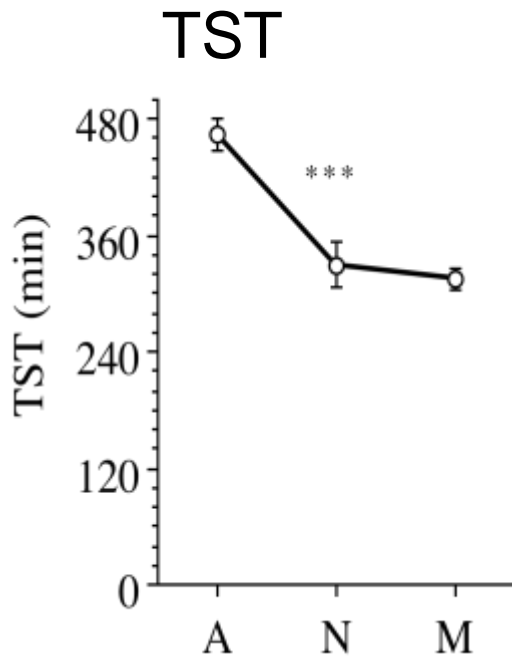
# Self reported sleep

	<b>Eff size</b>	<b>TSTh</b>
Rapid nights	-1.07	5.69
Slow nights	-0.53	6.40
Rapid Mornings	-0.34	6.62
Perm Nights	-0.35	6.60
Slow Mornings	-0.32	6.64
		<b>Day =7.0h</b>

# Sleep and shift work

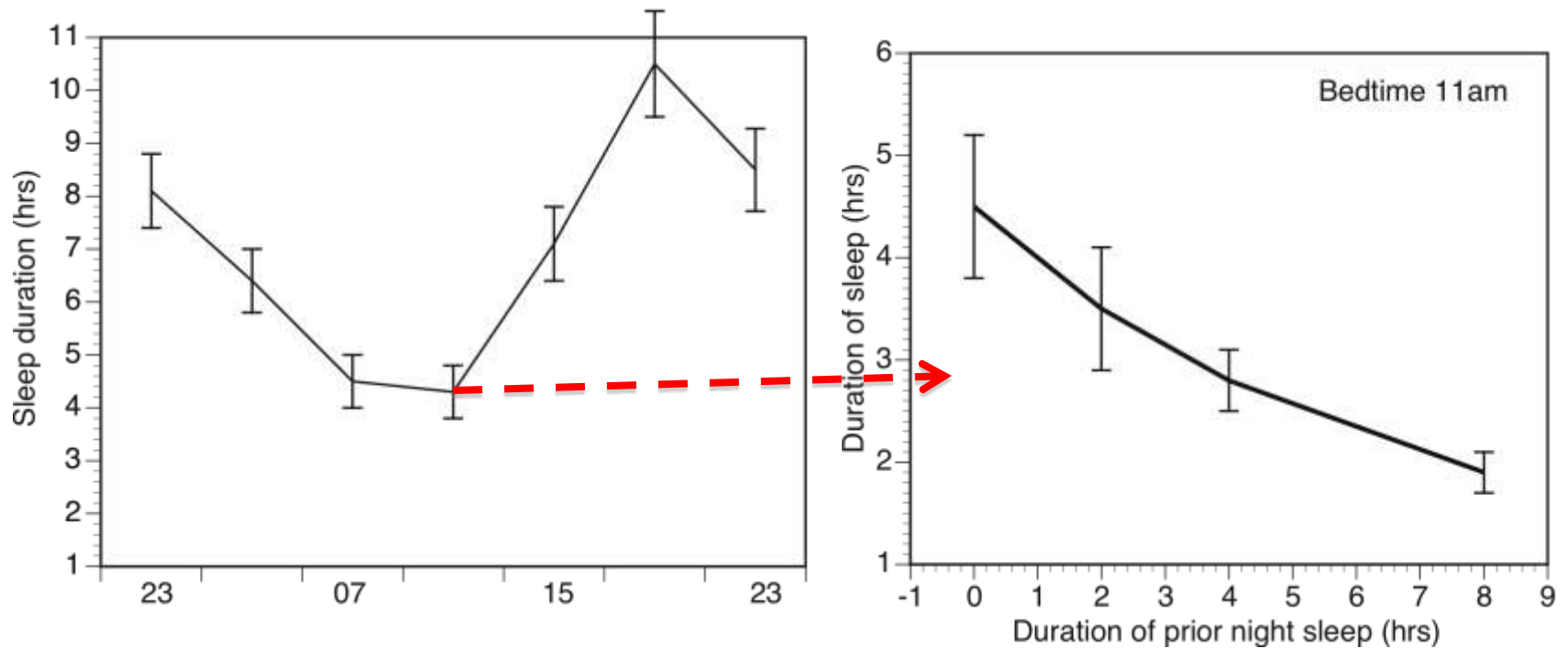


# PSG and shift work sleep



7 similar PSG studies

# The mechanism





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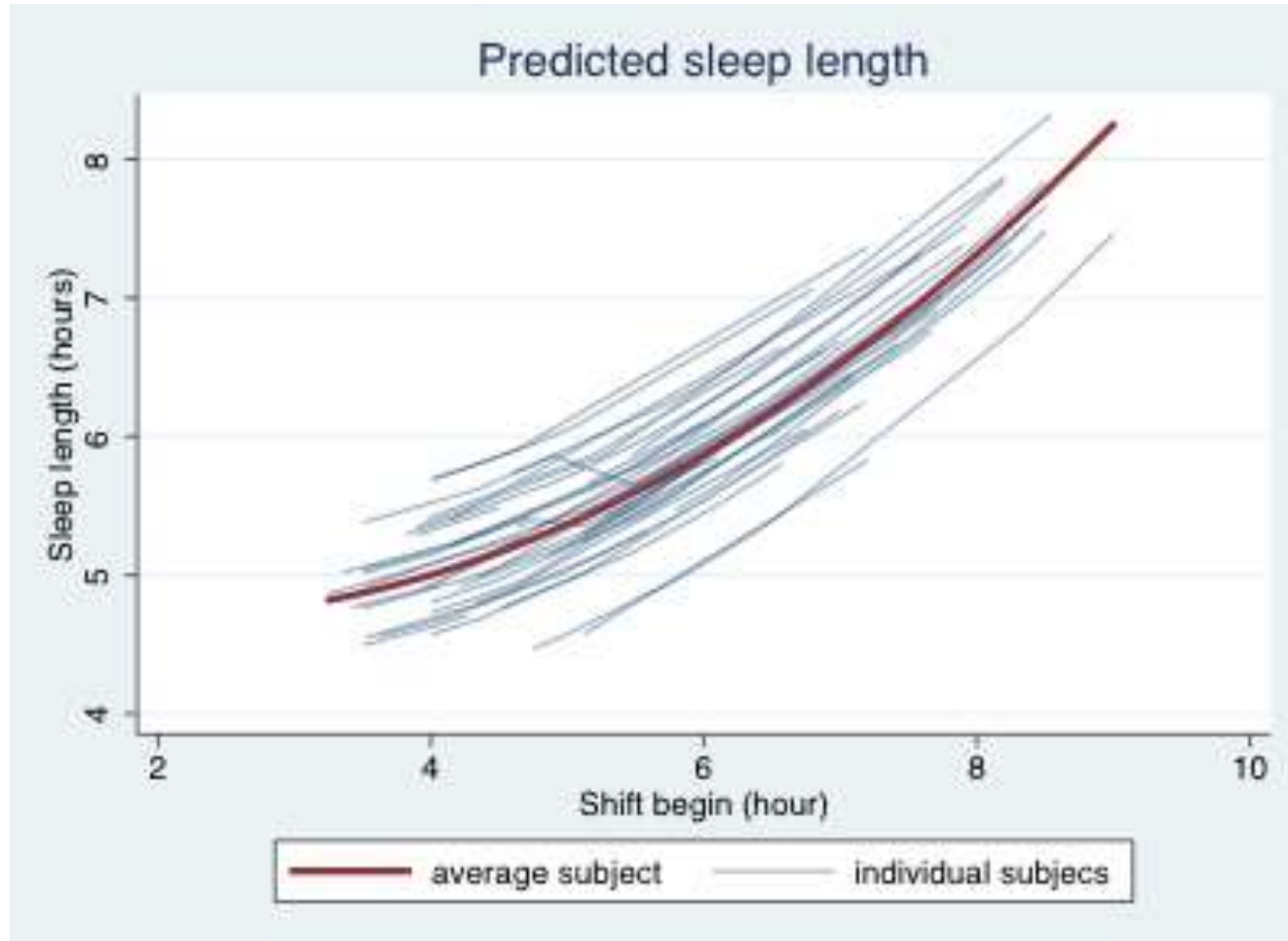


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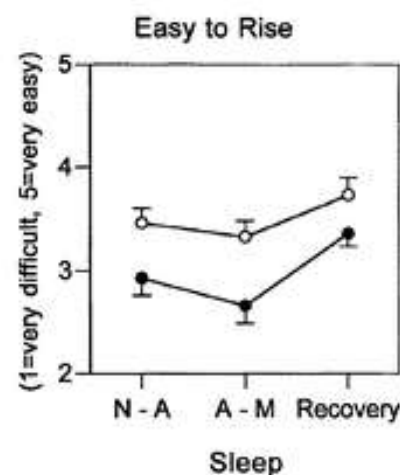
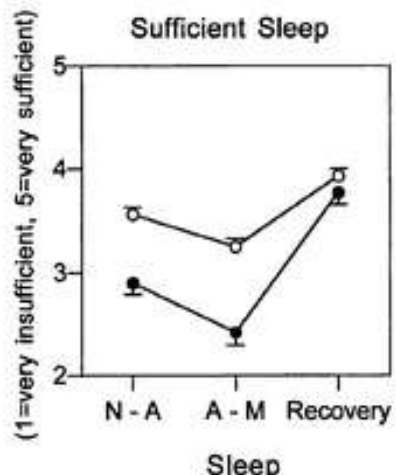
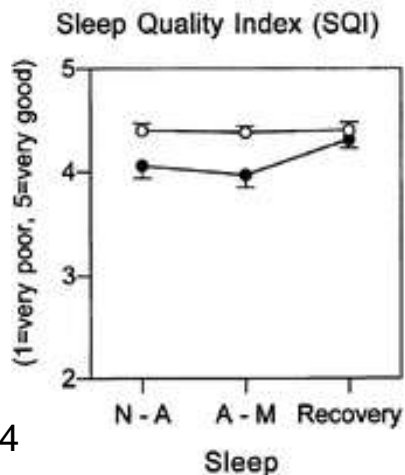
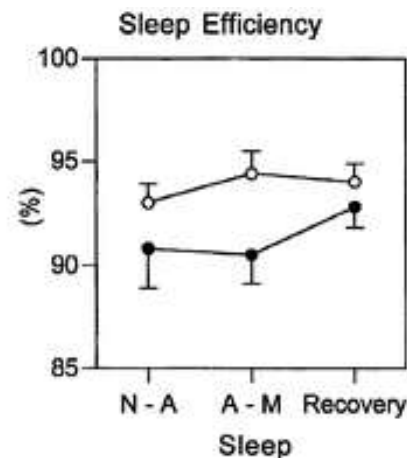
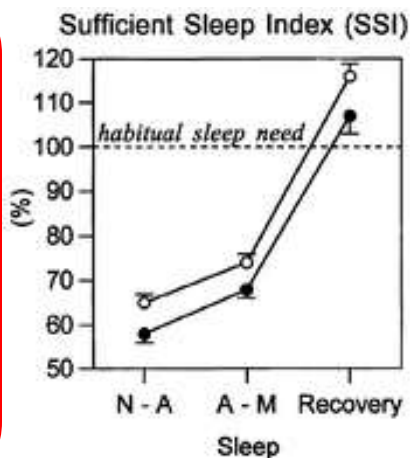
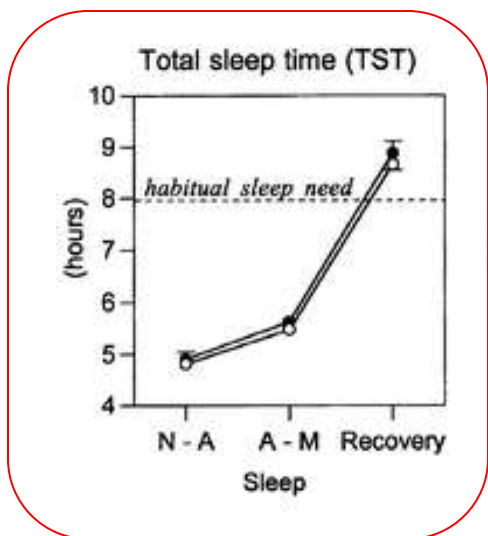
# Two modifiers



# Earlier start – shorter sleep



# Restricted daily rest (8h)





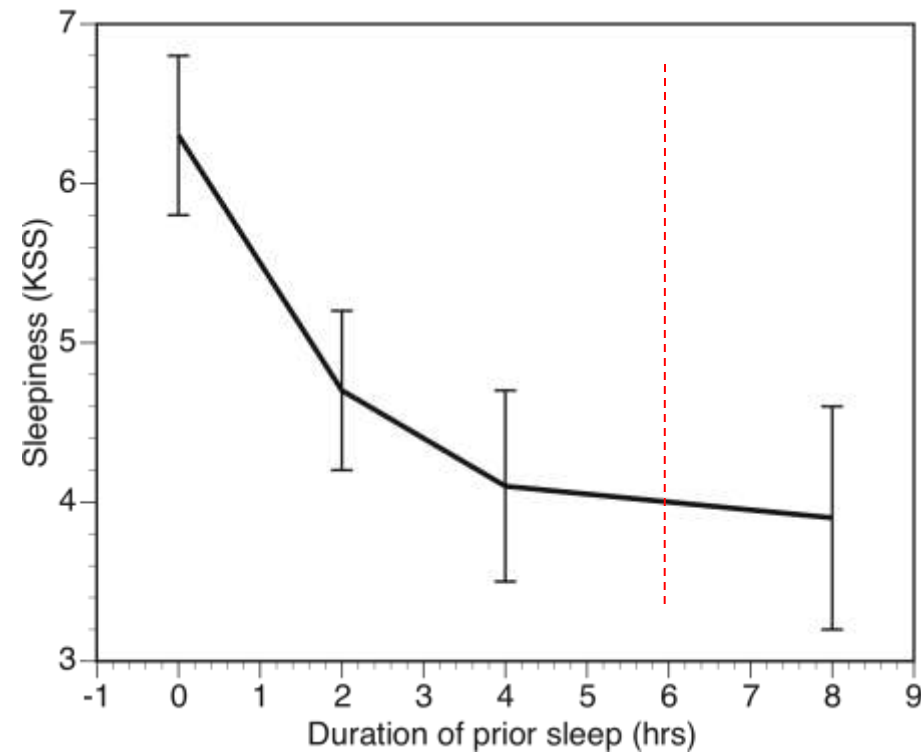
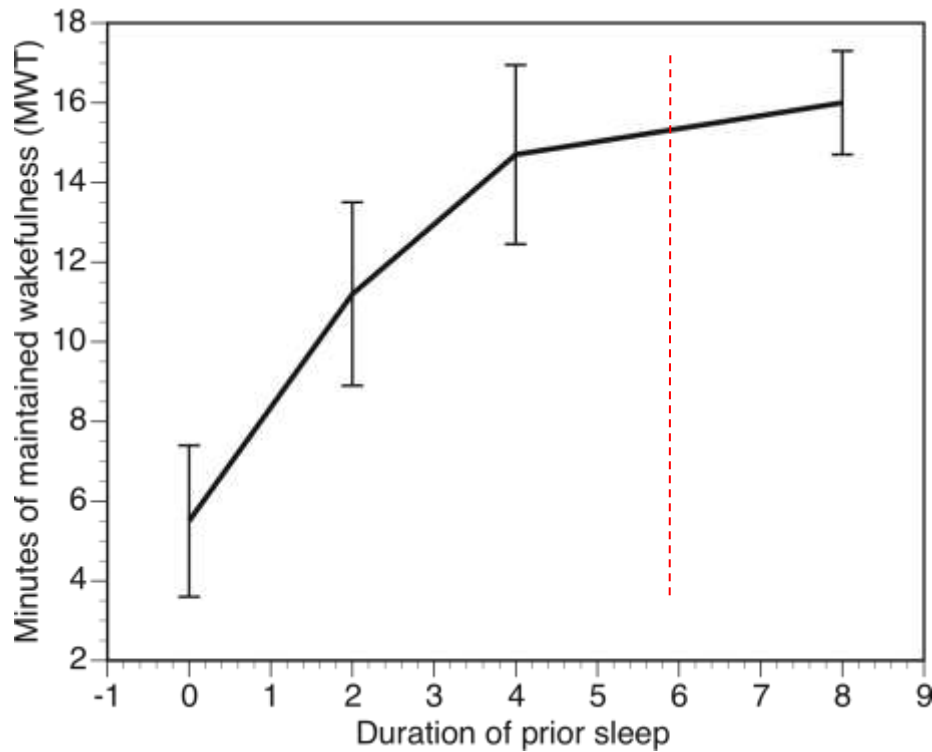
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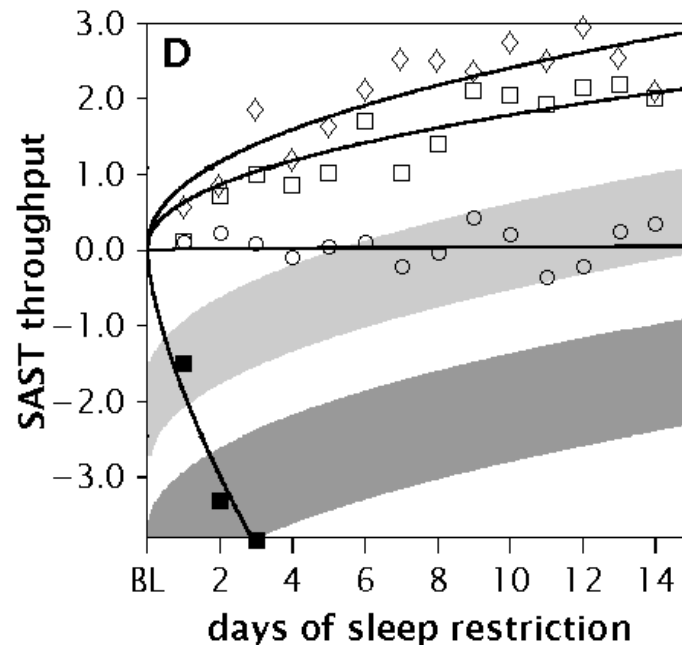
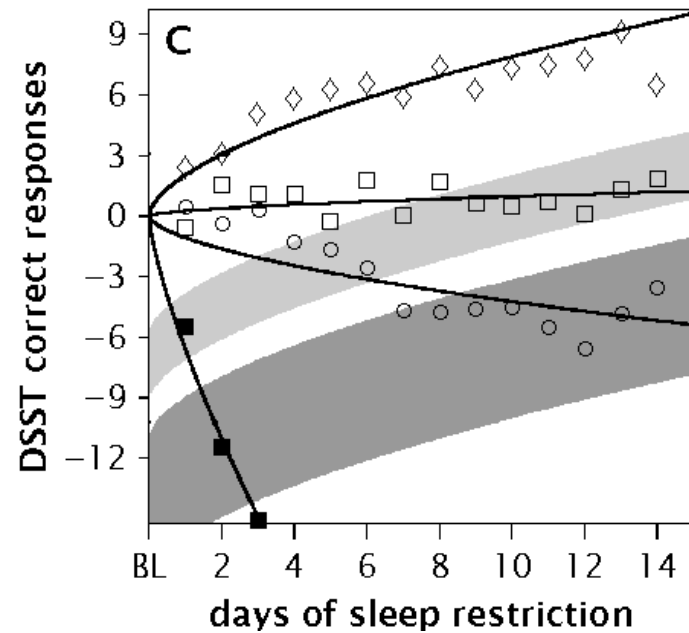
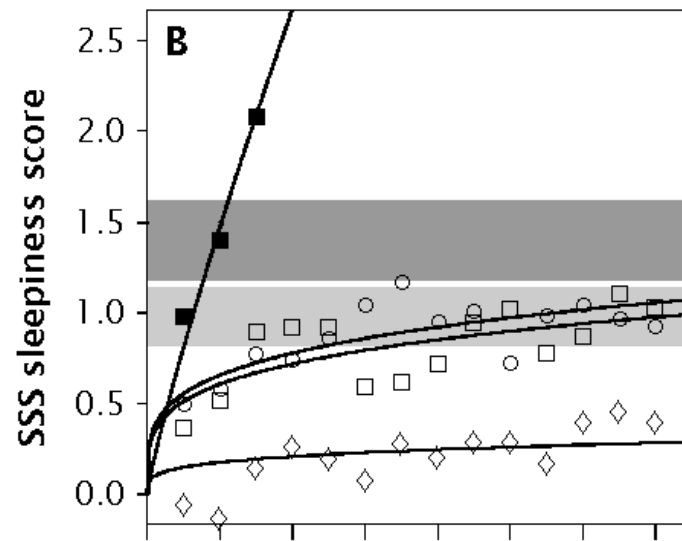
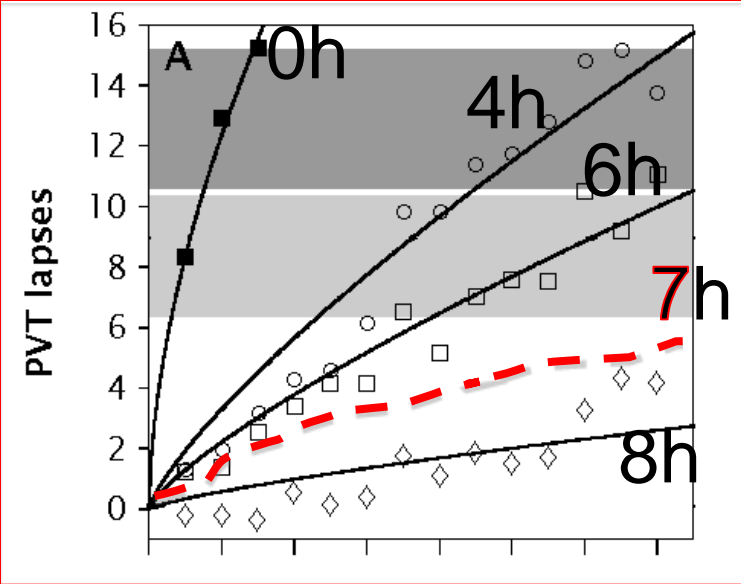


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# Severity

# TST and sleepiness

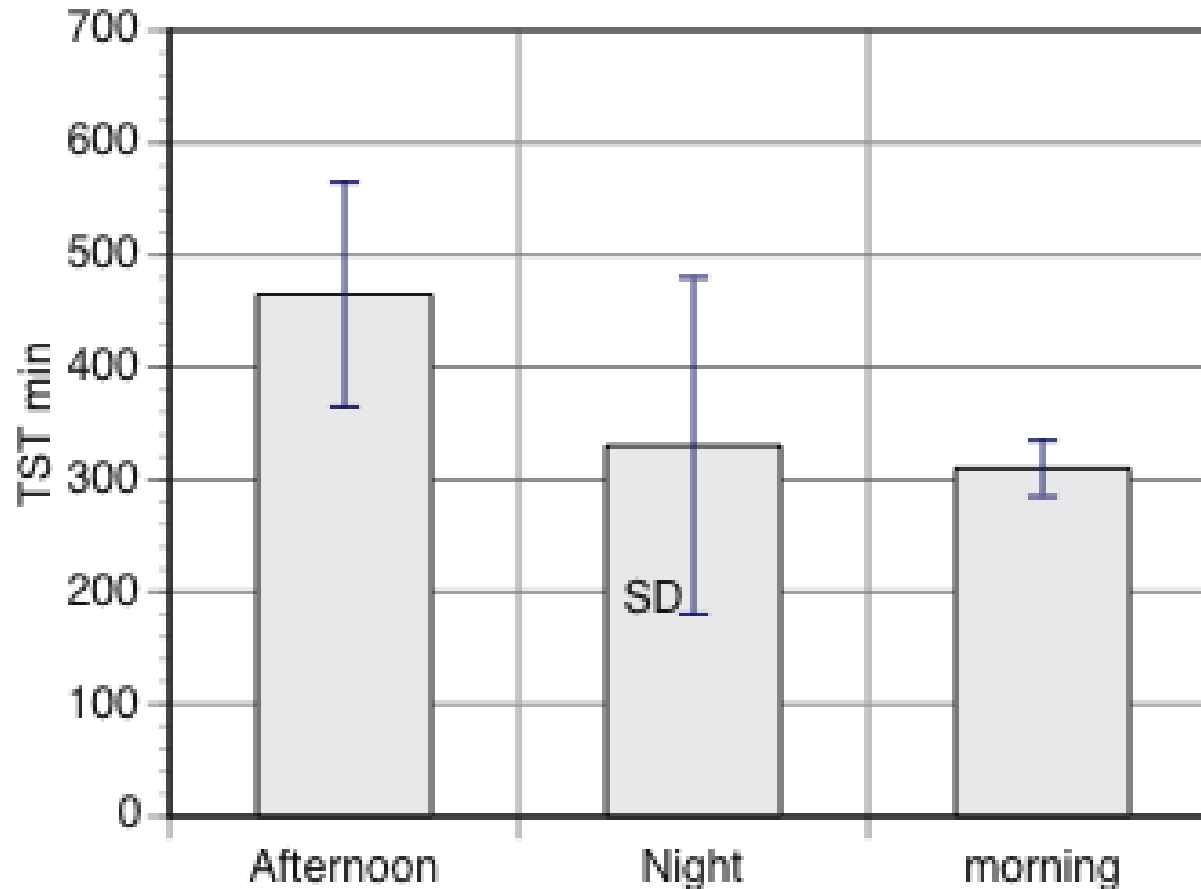




How  
much is  
needed?



# Individual differences TST



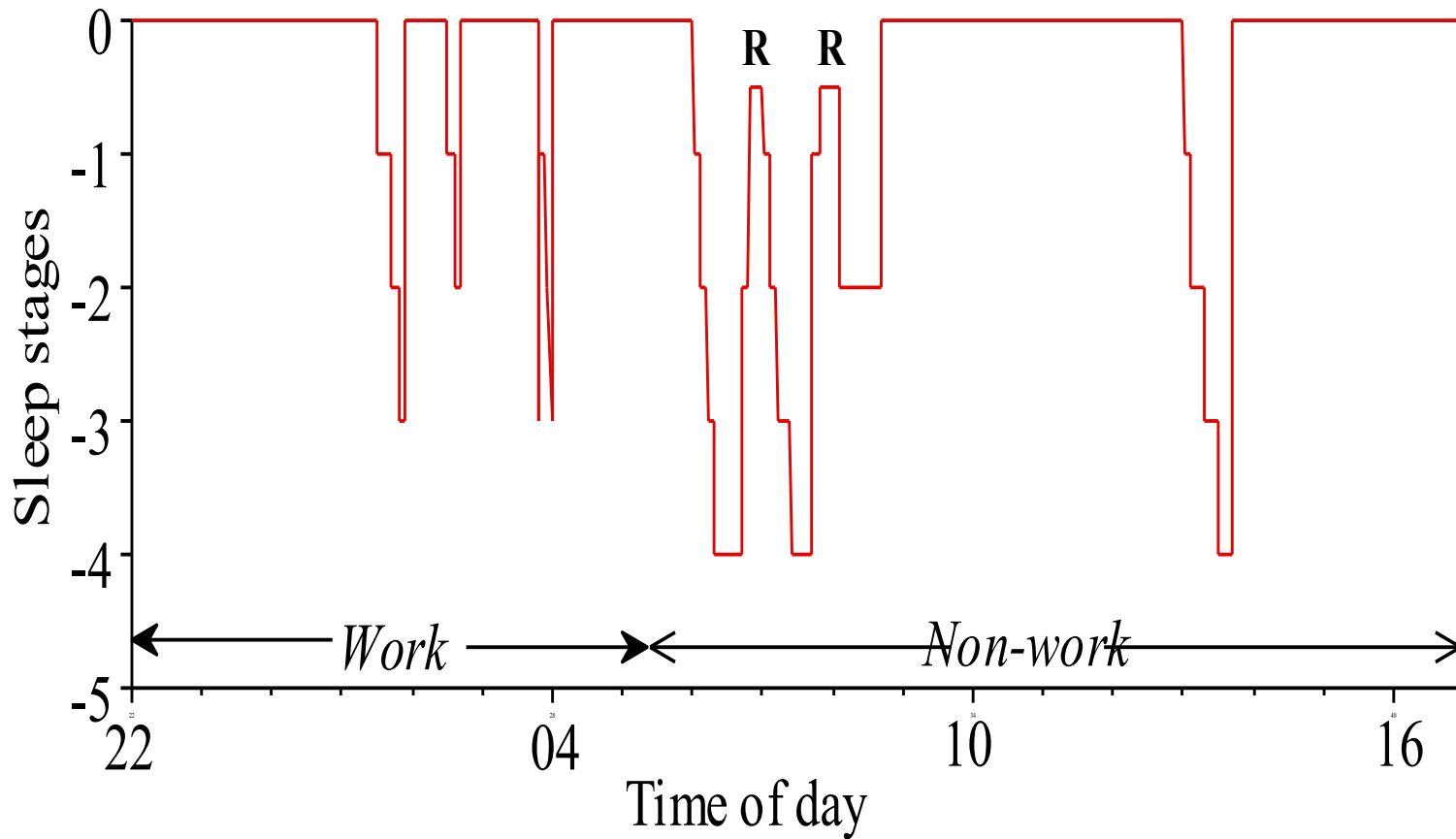
# Sleepiness

Åkerstedt, T. Shift work and disturbed sleep/wakefulness. *Occup. Med.*, 2003, 53: 89-94.

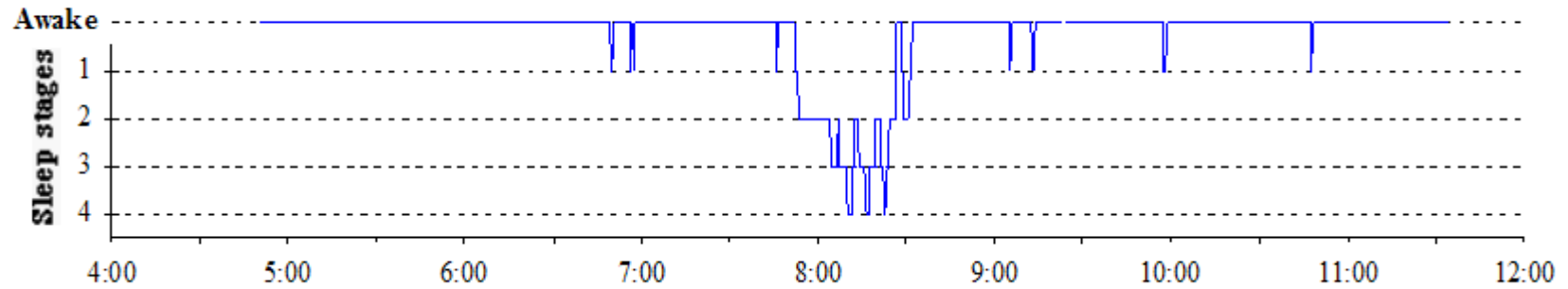
Sallinen, M. and Kecklund, G. Shift work, sleep and sleepiness - differences between shift schedules and systems. *Scand. J Work Environ. Health*, 2010, 36: 121-133.



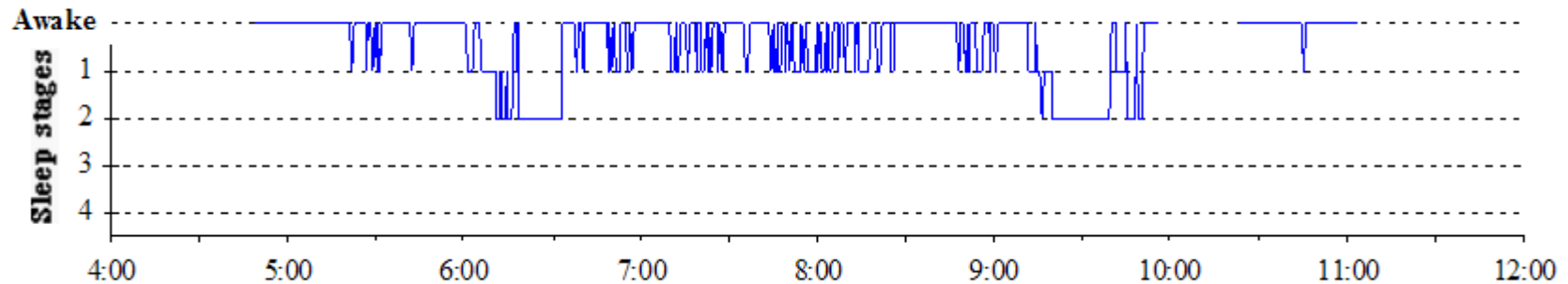
# Sleepiness and shift work



## Vol New-York -> Bruxelles - CDB

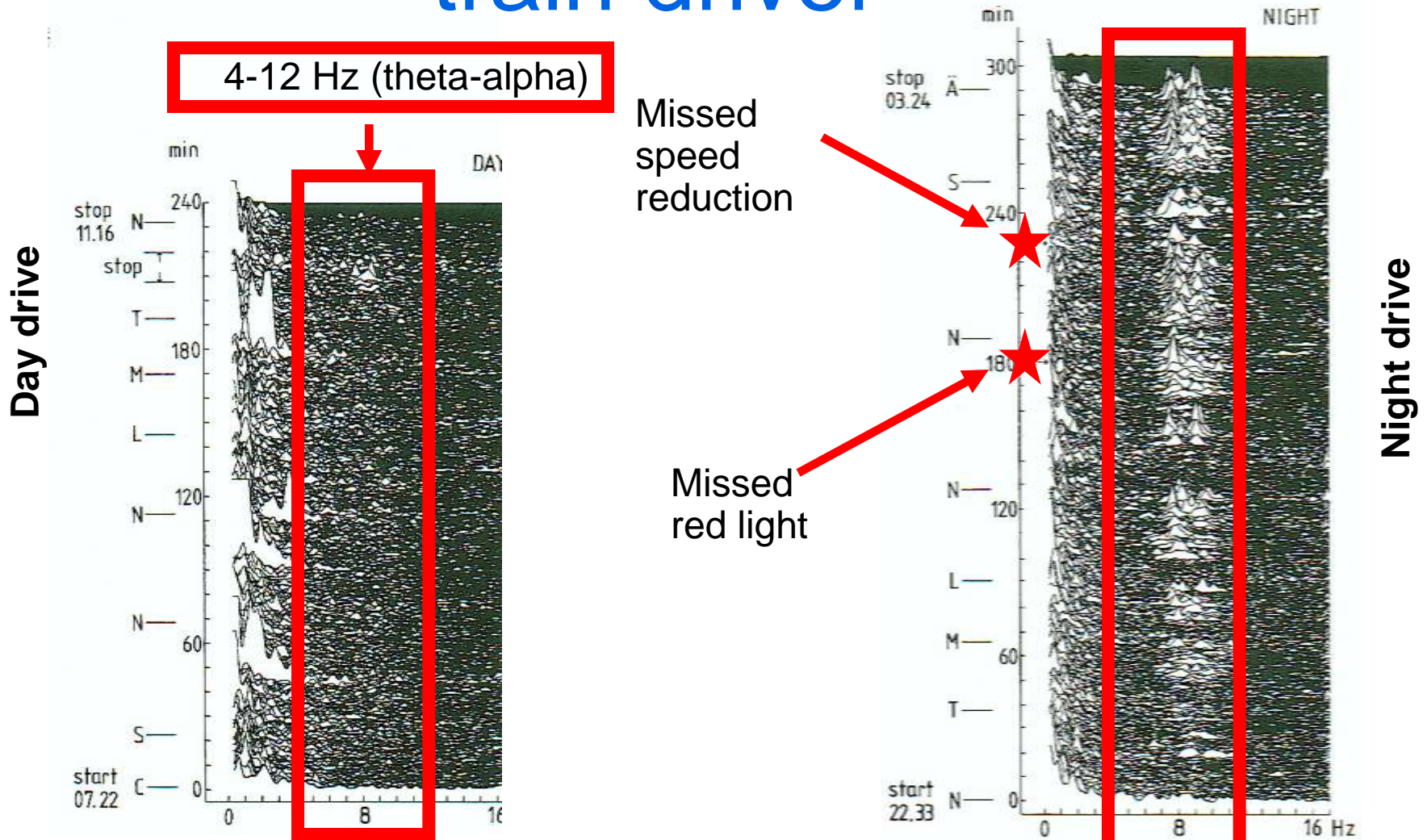


## Vol New-York -> Bruxelles - Copilote



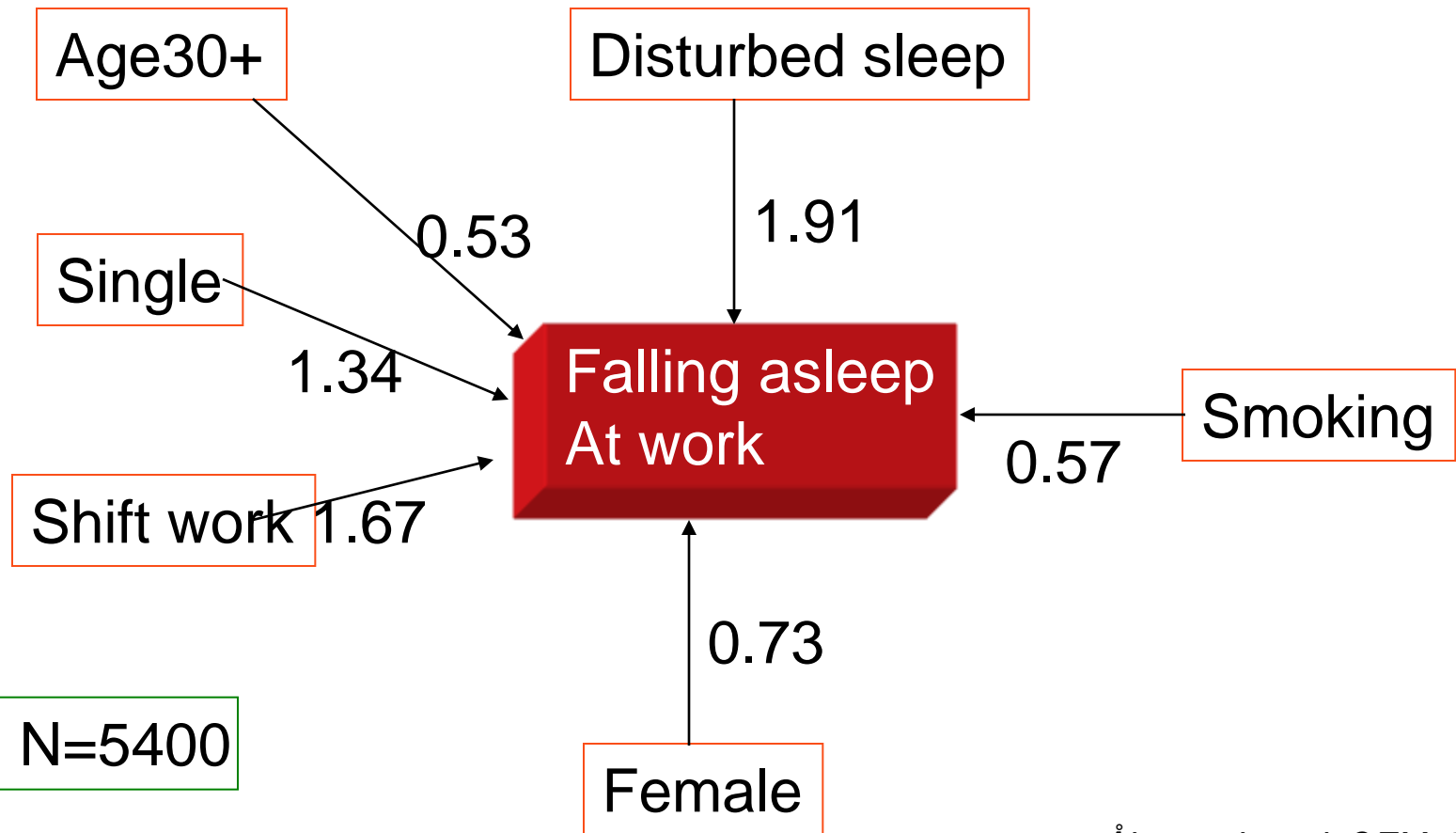
Hypnogramme au cours de siestes en vol

# Sleep EEG in a train driver



(Torsvall & Åkerstedt, 1987)

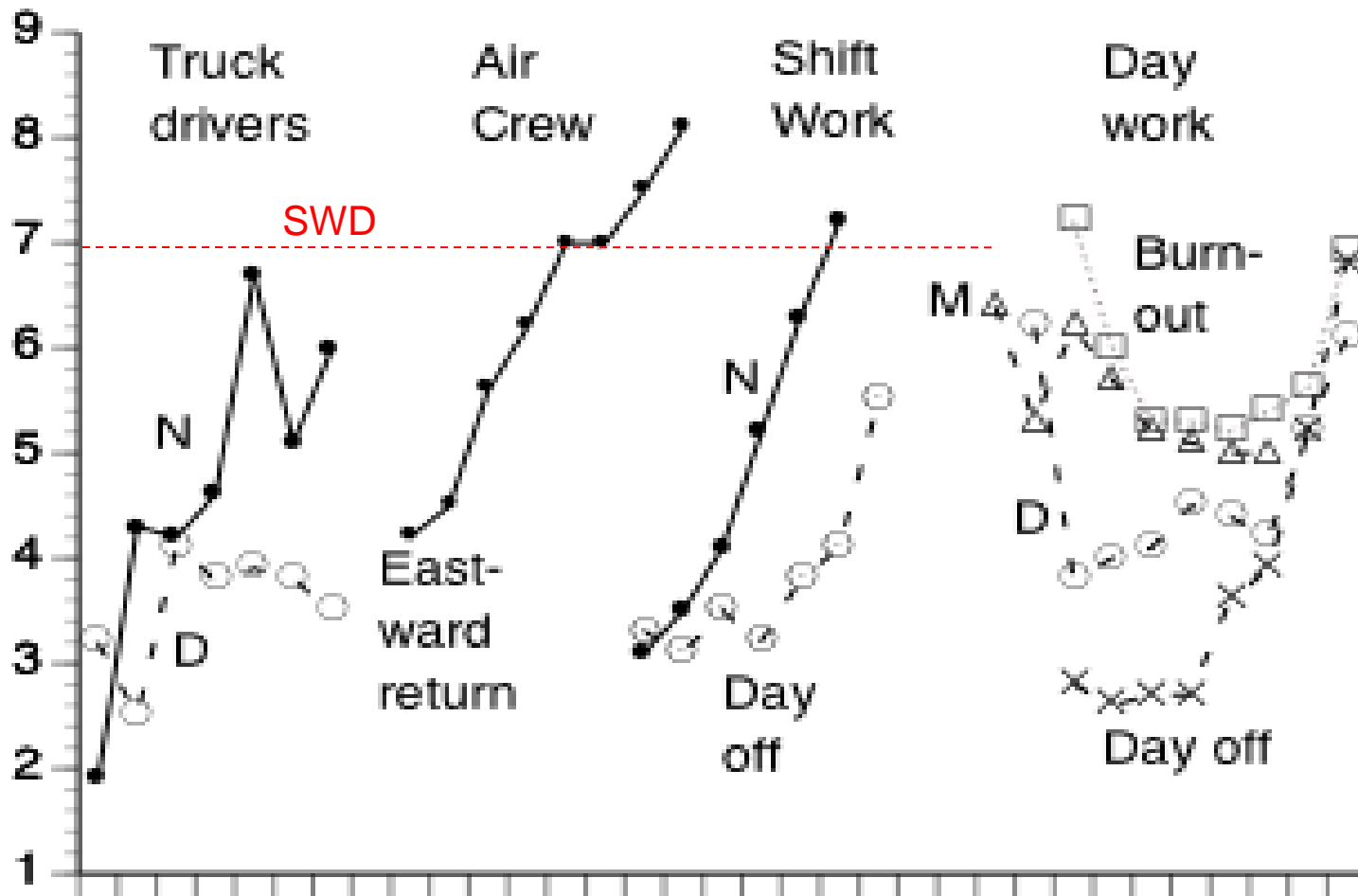
# Falling asleep during work



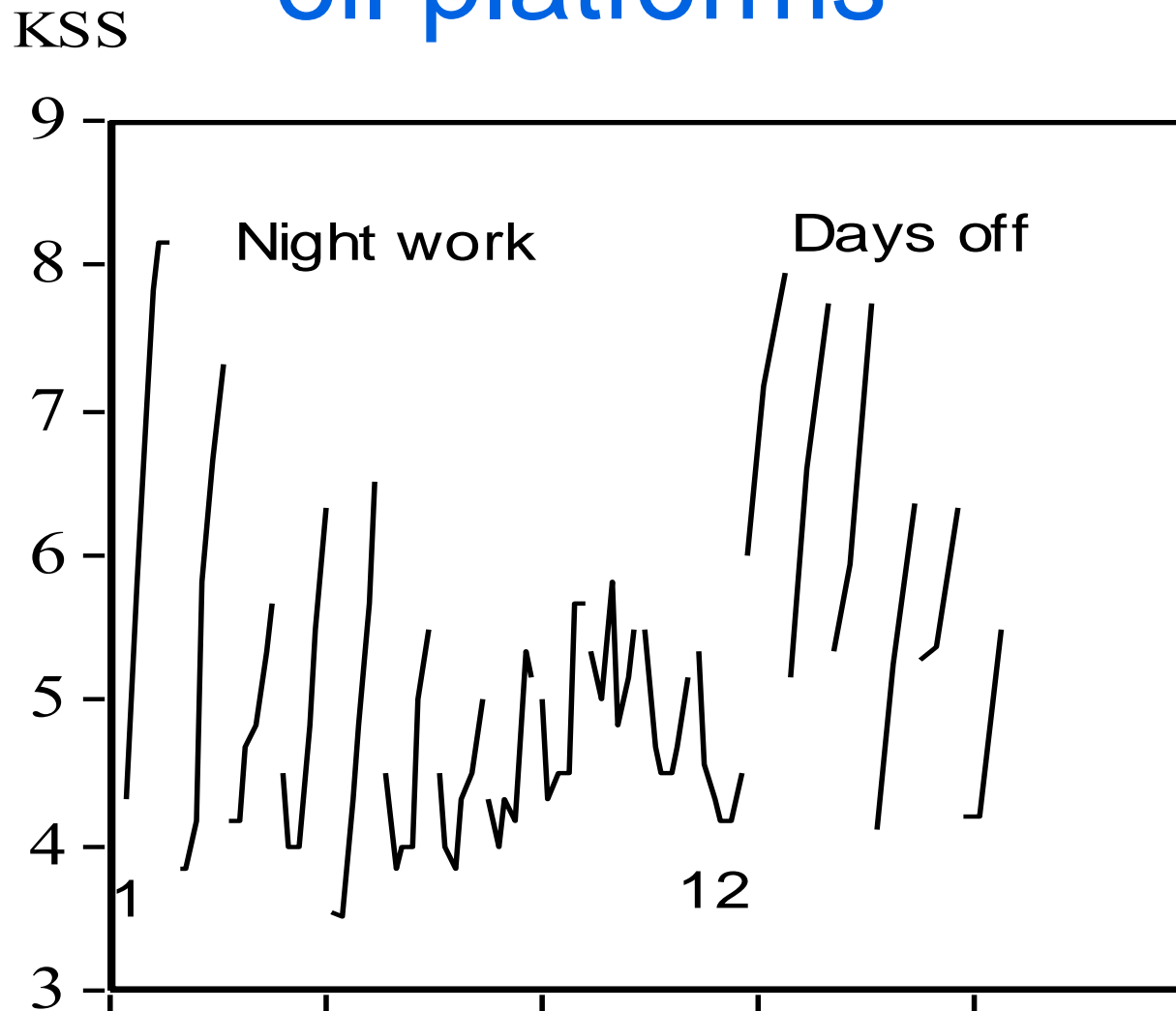
Åkerstedt et al, OEM, 2002

Ingen relation till: barn, ålder, fysisk belastning, fysiskt rörligt arbete, deltid, övertid, utbildning, rökning, fetma

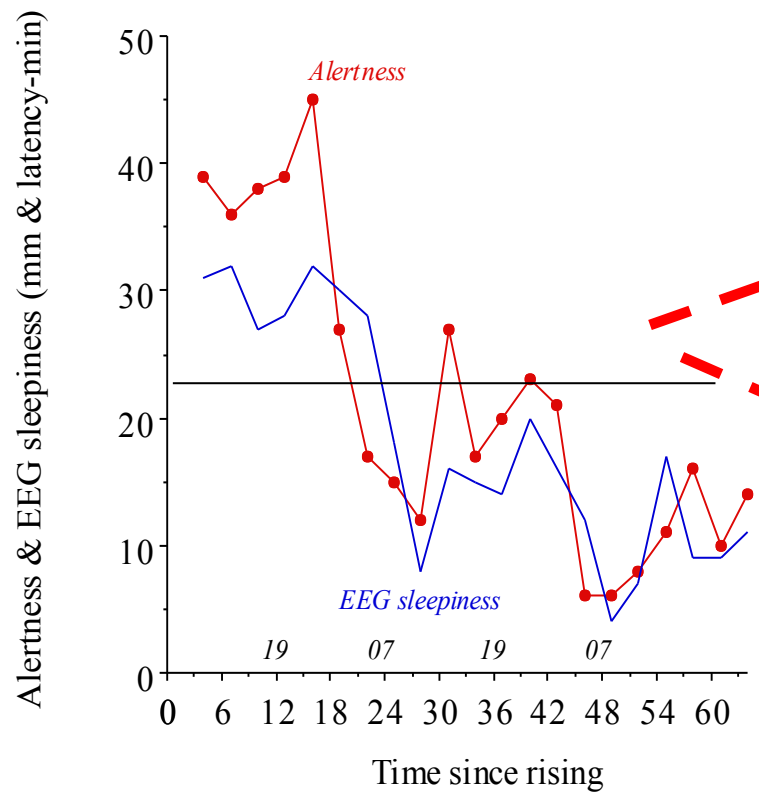
# Sleepiness in different groups



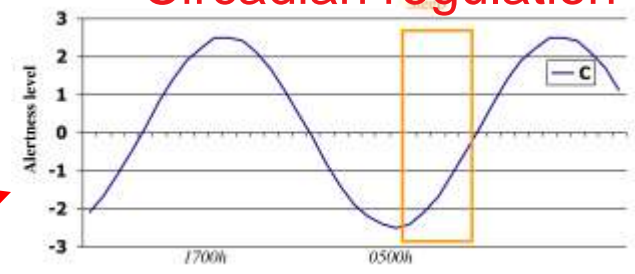
# Adjustment across night shifts oil platforms



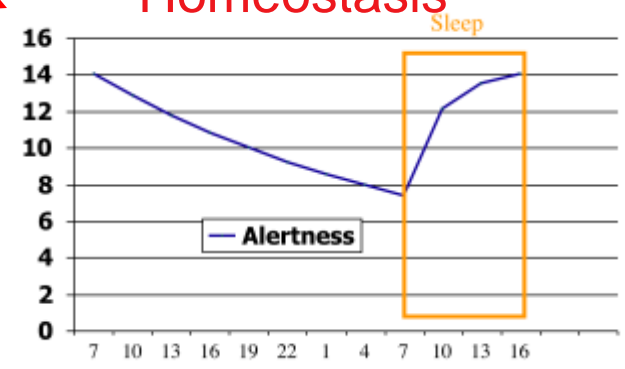
# The mechanism



## Circadian regulation



## Homeostasis



# Sleepiness masked by

- Physical activity
- Social interaction
- Stimulating task

Driving a vehicle is probably  
the most sensitive task



# Accidents

Philip, P. and Akerstedt, T. Transport and industrial safety, how are they affected by sleepiness and sleep restriction? *Sleep Medicine Reviews*, 2006, 10: 347-356

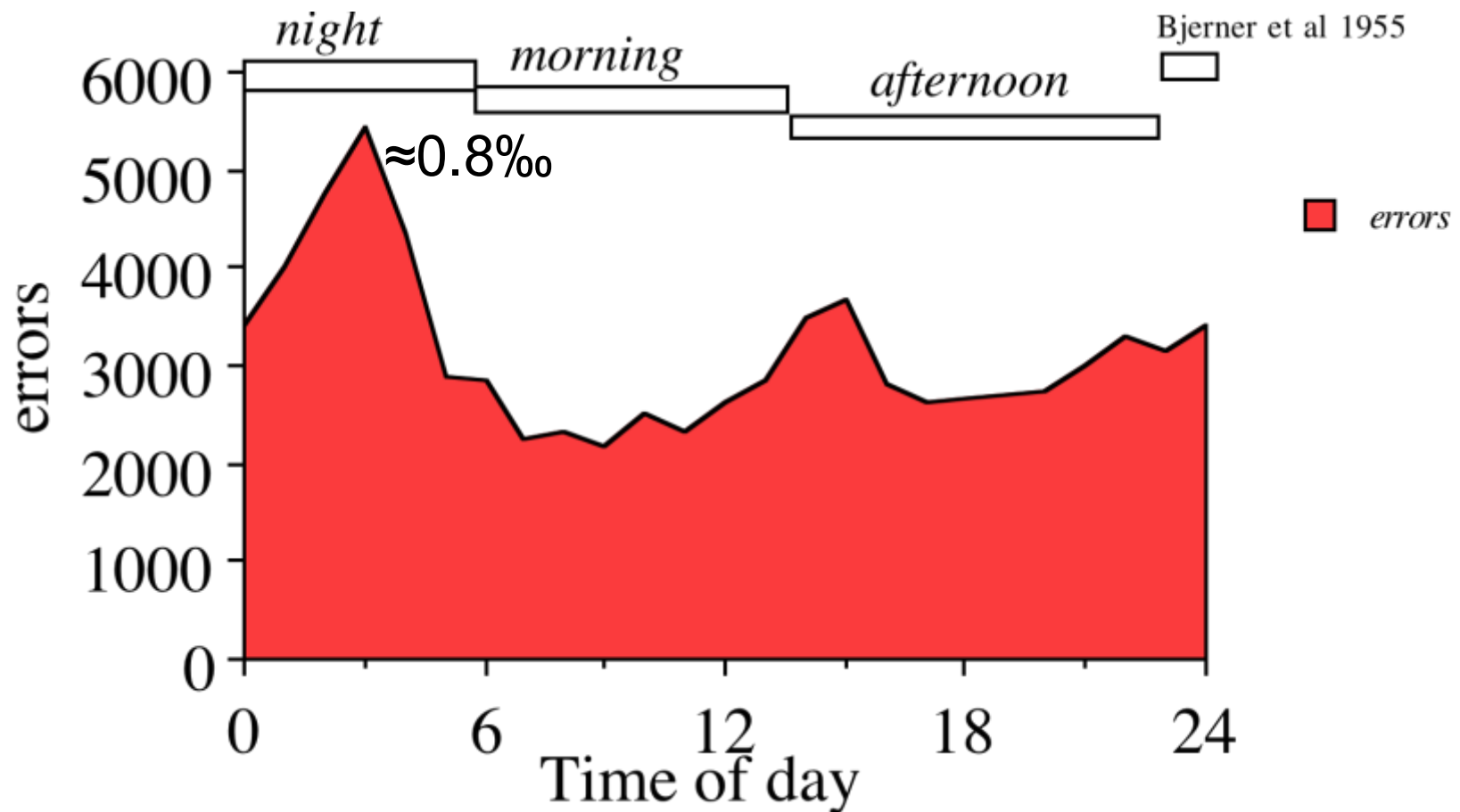
Folkard, S., Lombardi, D. A. and Tucker, P. T. Shiftwork: safety, sleepiness and sleep. *Ind. Health*, 2005, 43: 20-23.

# Fatal work accidents

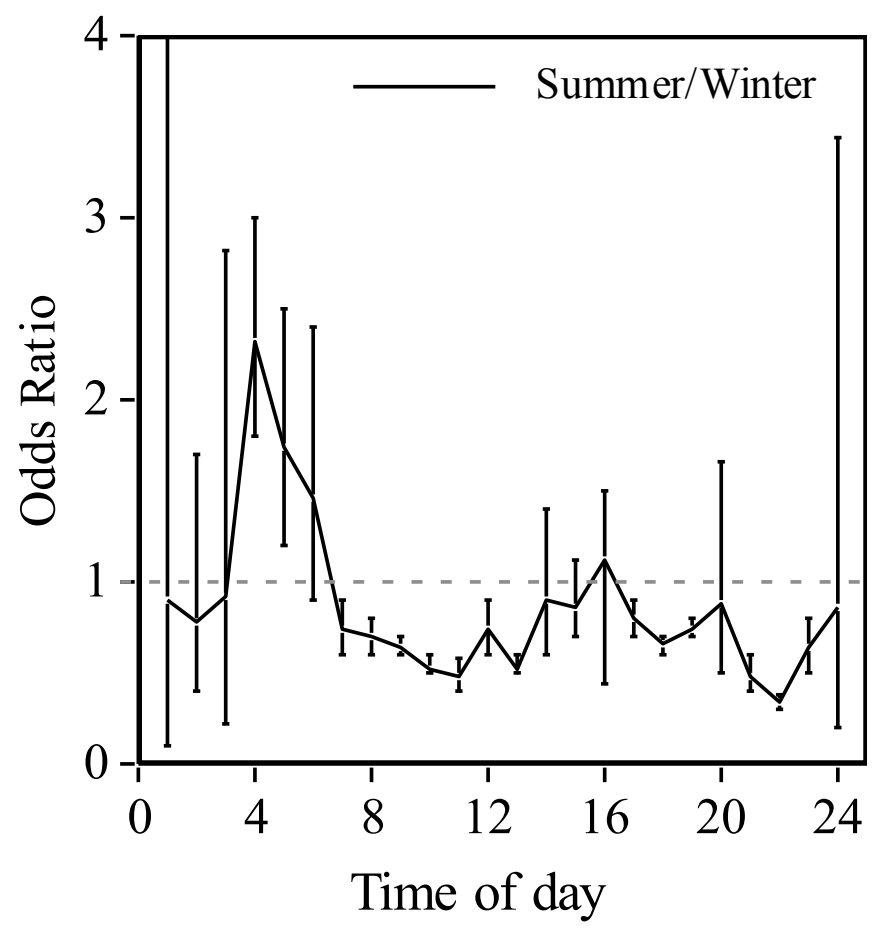
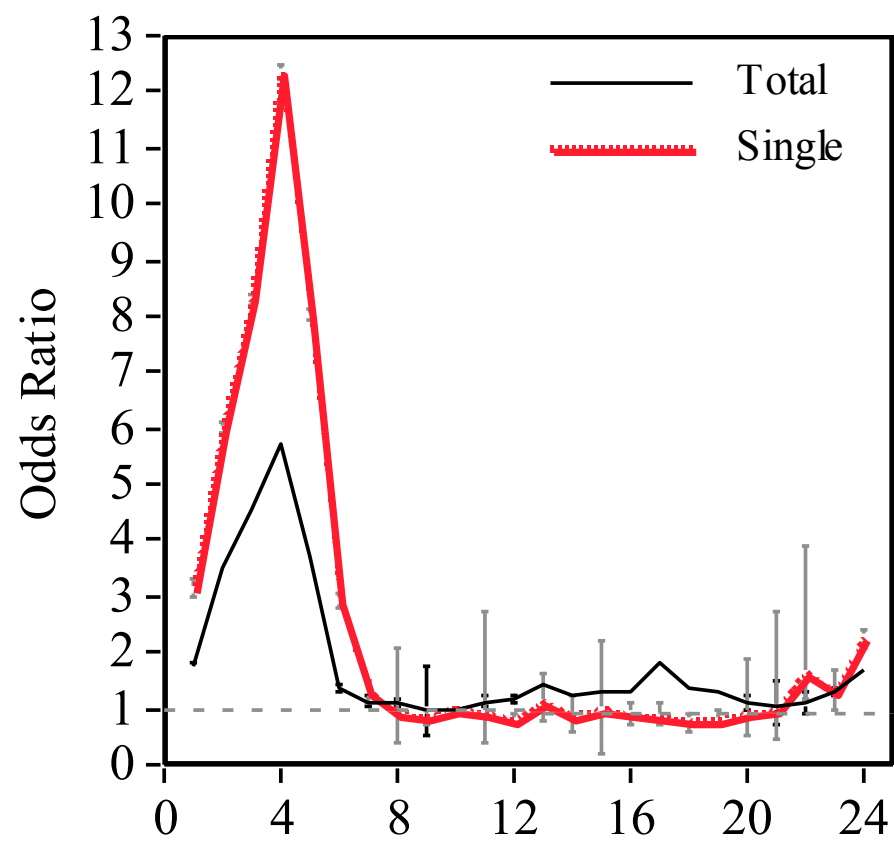
<i>Variable</i>	<i>OR</i>	<i>95%Ci</i>
Disturbed sleep	1.78	1.14-2.77*
Males	2.35	1.60-3.44*
Physical work load	0.94	0.61-1.45
Higher age	0.91	0.56-1.49
Blue collar	0.70	0.39-1.25
Stress	1.42	0.86-1.80
Overtime >50h	0.77	0.33-1.80
Shift work	1.52	1.01-2.28*

National sample

# Mistakes in power industry



# Road accident with injury





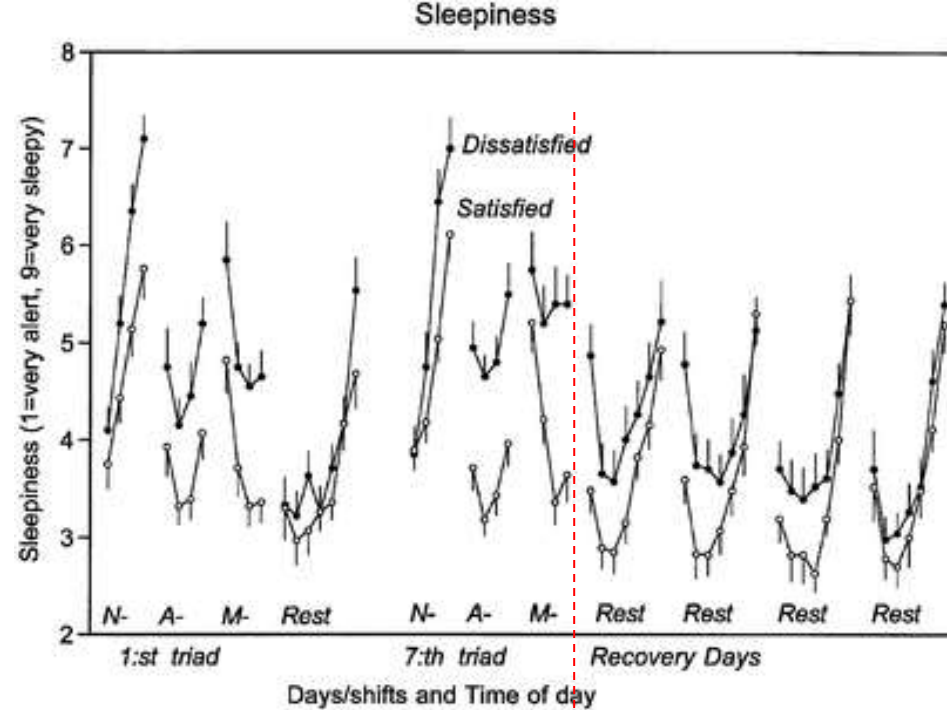
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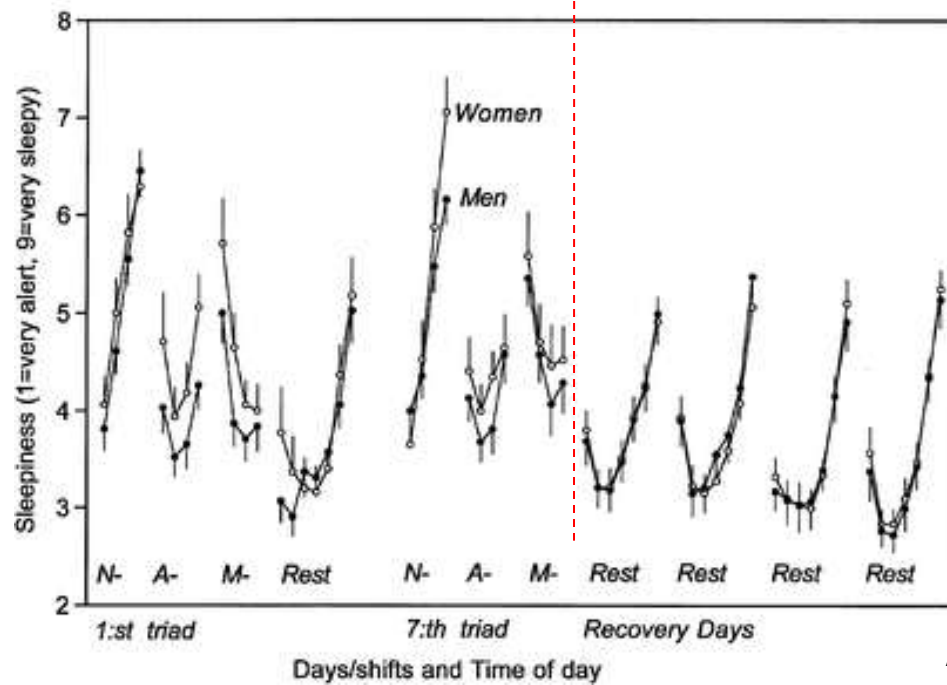
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# Is sleep the problem?

# Sleepiness in satisfied and dis- satisfied shift workers



No  
Difference  
In  
TST



# Shift work (sleep) disorder

- Inability to sleep or sleep being non-restorative -
  - in connection with night shifts
  - but not in connection with day work or days off
- Of "clinical significance"

Probable prevalence 8-10 %

(Drake et al , 2005, Axelsson et al 2004)

# Conclusions

- Sleep is temporarily reduced by shift work but hardly across longer periods of time
- Doubtful if sleep quality is disturbed
- The main problem is probably sleepiness/fatigue
- Need to adress several unresolved issues:



# Important issues

- Is there a group with a chronic sleep deficit?
- What is its characteristics / cause (circadian dysregulation, low melatonin, immune regulation?)
- How does it relate to shift work tolerance?

- Need for longitudinal studies with PSG and frequent blood sampling, preferably before – into shift work
- Need for generic studies of "good" and "bad" shift schedules – what are their characteristics?