

Falling Asleep on The Job

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The New York Times

Published: June 28, 1893

THE SWITCHMAN WAS ASLEEP

M'GARRY'S NEGLIGENCE CAUSED THE
MANHATTAN DISASTER.

He Worked Twelve Hours a Day for \$50 a Month and Was Evidently Careless—Asleep on Duty, and When Aroused by Water Boys He Became Bewildered and Turned the Wrong Switch—An Inquest Held and McGarry Committed Without Bail by the Coroner.

Sleepiness at Work

Exxon - Valdez



“...the impact of environmental factors such as long work hours... monotony and sleep deprivation. "This can create a scenario where a pilot and/or crew members may become the 'accident waiting to happen'...”

“excessive work hours (sleep deprivation) contributed to an overall impact of fatigue, which in turn contributed to the Exxon Valdez grounding”

Sleepiness at the Wheel



Set off at 5am, ran of the road 6.10am. By his own admission, he had “had no sleep”

100 fatal and serious casualties

Suspected Sleep-Related



The lorry ended up in a ditch on the opposite carriageway

2014 – January - lorry driver had lucky" escape after he crashed through the central reservation of the M1 in Northamptonshire and into a ditch. The accident happened near junction 16 northbound at about 06:15 GMT.

Topics

- Body Clock
- Sleepiness at work
 - Driving
 - ‘Executive’ decision making
 - Shiftwork
- Insomnia and Well-being
- Disorders causing excessive sleepiness

Most Dangerous Outcome From Lack of Sleep:

**falling asleep when driving or
operating machinery**

Sleepiness & Driving:

Driver Falling Asleep at the Wheel: Most Likely Cause of:

Accidental death of someone at work, or
death of another person by someone at
work

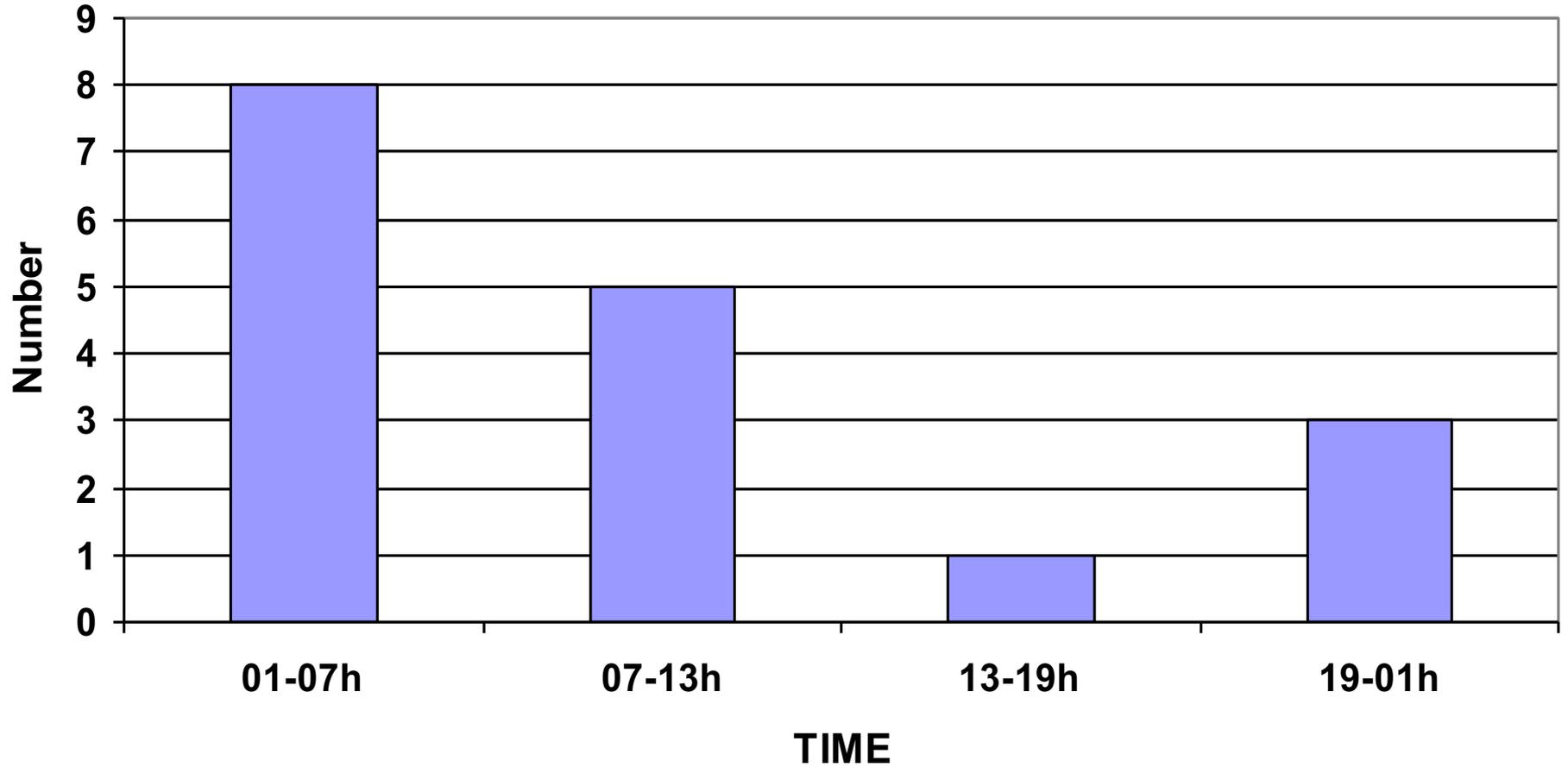
UK: 50% sleep related crashes are caused by drivers at work

(Reyner et al. 2001, UK Dept Transport, Research Report 22)

- 70% of which = trucks (LGVs)
- 15% = company cars
- 15% = vans
- < 1% coaches

Signals Passed At Danger by Train Drivers

ToD of 17 Sleepiness SPADs on UK Rail Network: 2002-2006



SLEEPINESS KILLS

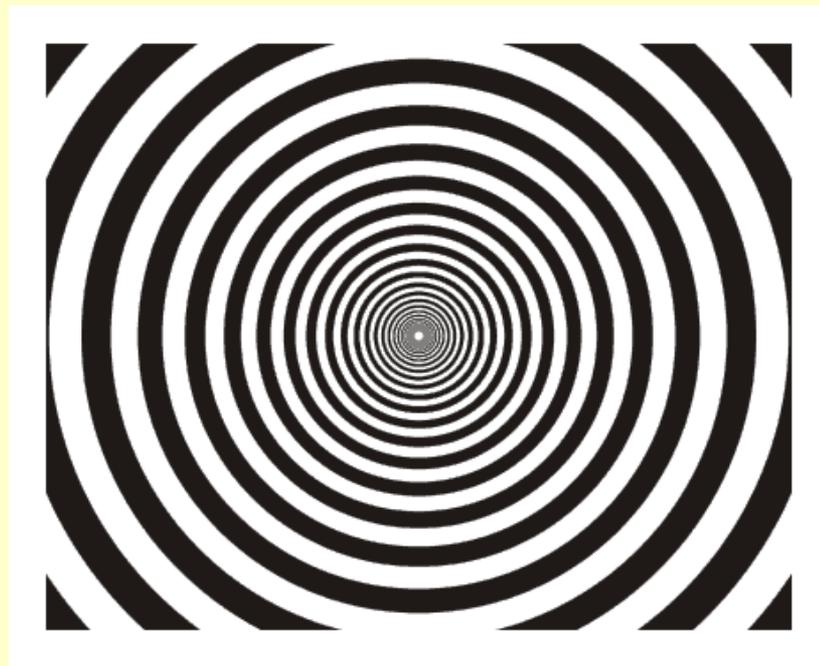
UK Findings

About 10% of all road crashes (attended by police) are caused by sleepiness

Can almost double this for major, non-urban roads

These crashes are worse because of the higher impact speed

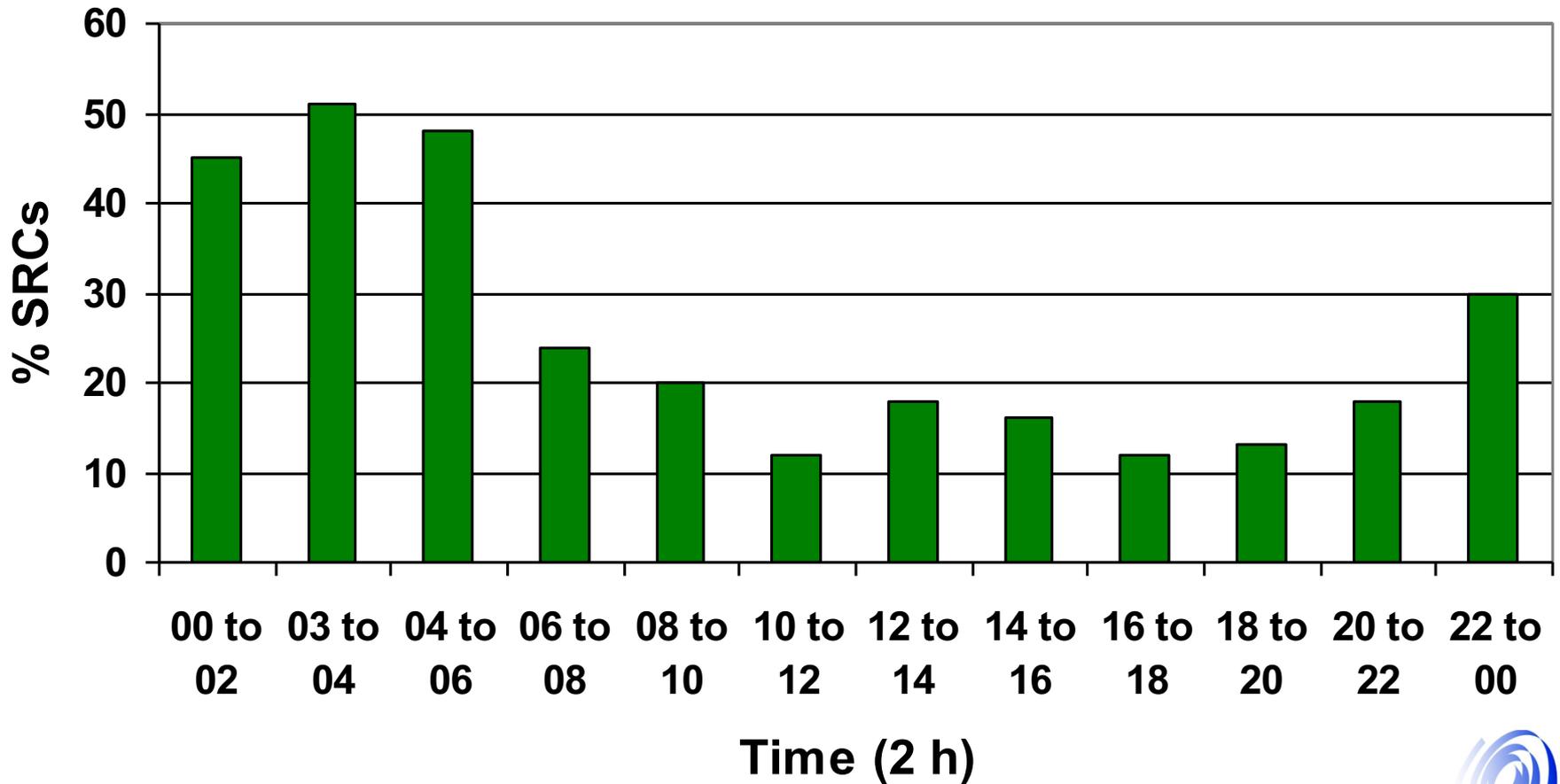
Myth about driver sleepiness



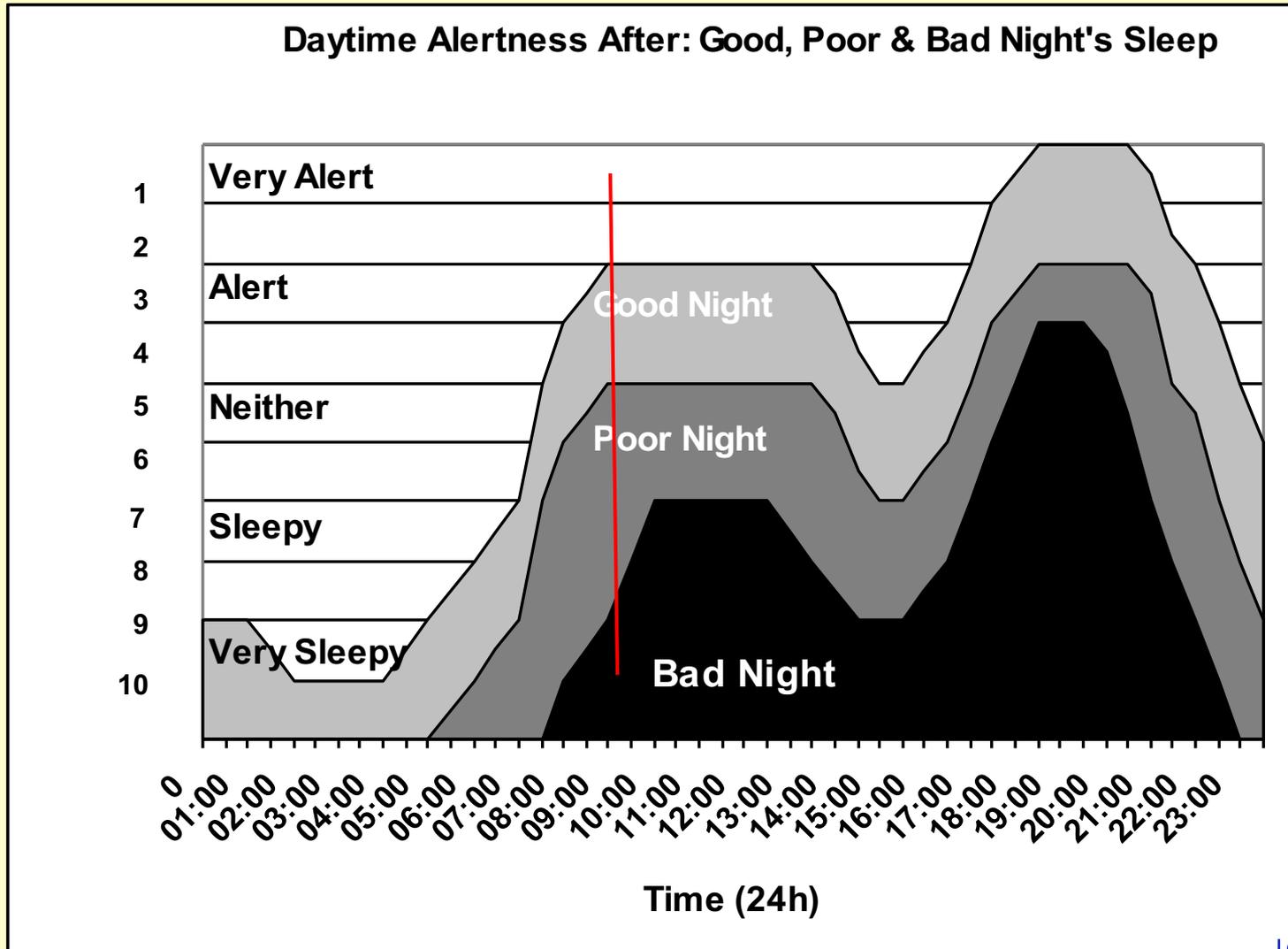
“HIGHWAY HYPNOSIS”

Doesn't exist - just another name for falling asleep

Sleep Related Crashes (n = 539) as % of All Crashes (2646), by Time of Day



24h (Circadian) Rhythm of Sleepiness



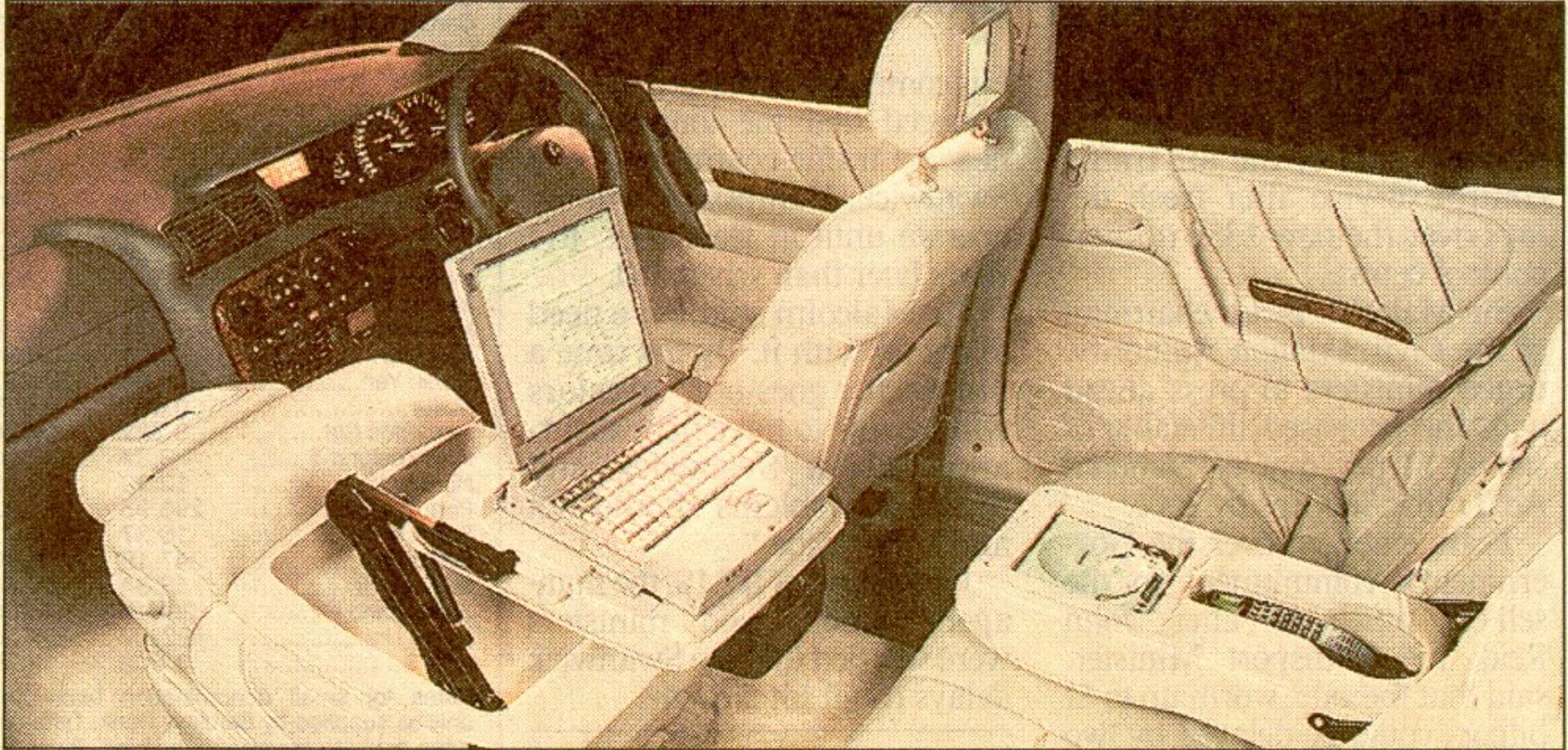
Karolinska Sleepiness Scale (KSS)

Åkerstedt & Gillberg, 1990

1. Extremely Alert
2. Very Alert
3. Alert
4. Rather Alert
5. Neither alert, nor sleepy
6. Some signs of sleepiness
7. Sleepy, but no effort to keep awake
8. Sleepy, some effort to keep awake
9. Very sleepy, great effort to keep awake – fighting sleep.

Vehicle Design

Mobile Office? Beds on Wheels ? Ergonomic Design – too much comfort ?



Driven to succeed: Vauxhall has created a mobile office prototype for its Omega range

Driver has little knowledge of having fallen asleep – WHY ?

- We can't remember being asleep - unless sleep lasts beyond 2 min
- Can't drive for this period of time
- Therefore, if a driver falls asleep – won't remember doing so.

WHY :

do drivers deny prior sleepiness?

Rapidly forgotten – pointless information

- Can you remember the extent of your sleepiness last night, or when it began ?
- Similarly - poor recollection of hunger & thirst
- No excuse for drivers falling asleep at the wheel
- **WE DO KNOW WHEN WE ARE SLEEPY**

Drivers' Poor Recollection of Prior Sleep & Sleepiness

Falling asleep

Unlikely to acknowledge this unless asleep for over 2 min

Prior Sleepiness

Can't remember this either - can you ?

Little point in pursuing either in subsequent interviews with driver

When drivers experience any effort to stay awake, and utilise methods to stay awake (cold air to face, turn up radio etc) :

Driving ability is markedly worse

Sleepiness Increases Risk Taking

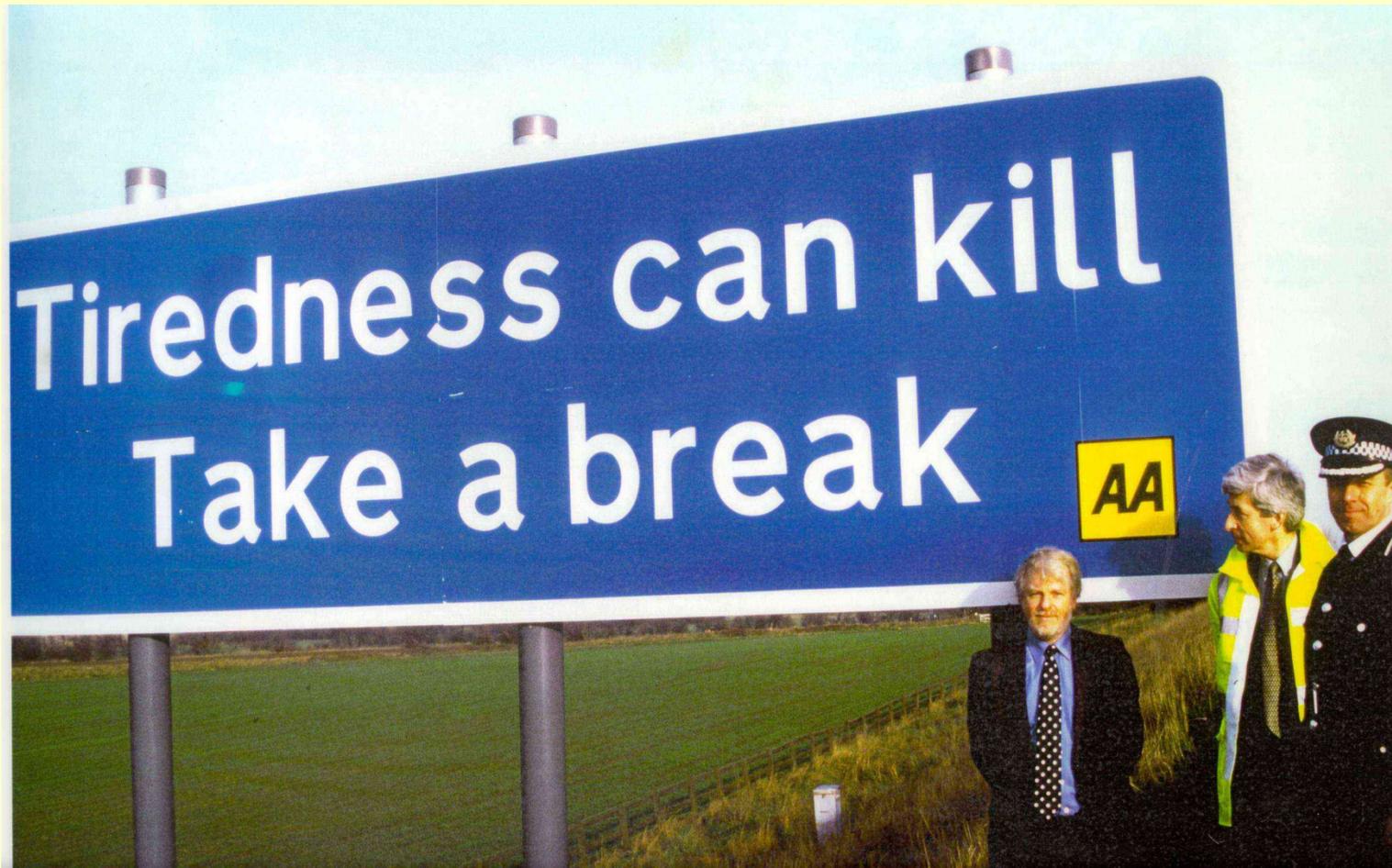
PEOPLE ARE AWARE OF SLEEPINESS, BUT:

Sleepiness increases risk taking – less able to appreciate danger

Sleepiness may make people optimistic about their (driving) abilities

May not know when to cease working/driving and– under other pressures to continue

Get off the road - take a break



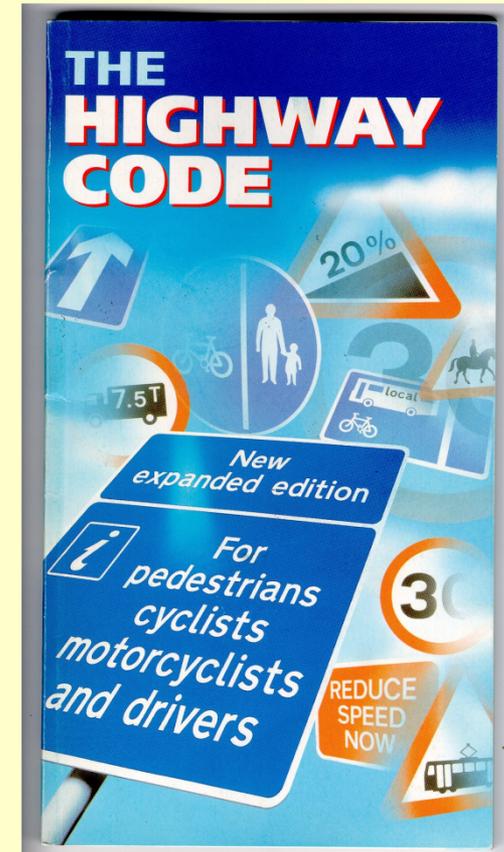
30 min Break:

outcome from our published research

**IF NOT TOO SLEEPY
FIND SAFE PARKING SPACE**

THEN:

- 150 mg caffeine
(not effective for 20 min)
- Followed by nap of max 15 min
("resting eyes"/dozing is also good)
(set phone alarm)
- "Freshen up" - 5 min



Caution - coffee can be unreliable source of caffeine

- taste, colour, smell & cost - no guide to caffeine content
- (caffeinated) “functional energy drinks” - more reliable source of adequate caffeine

ALCOHOL + SLEEPINESS

- Alcohol is soporific
- Alcohol worsens sleepiness
- Any alcohol intake is dangerous for an already sleepy driver
- Breath/blood alcohol levels are a poor guide to impairment in sleepy drivers

OTC Medicines and unwanted sleepiness

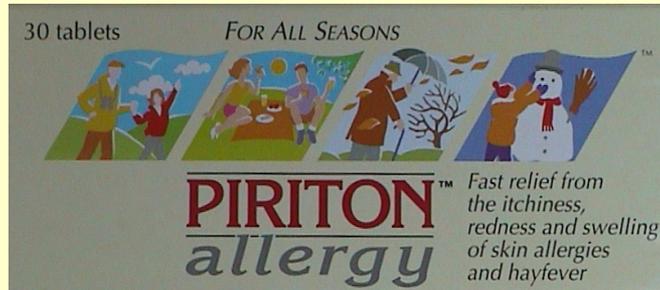
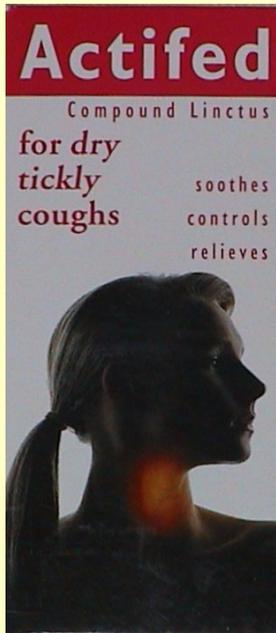
(e.g. for colds, hayfever, seasickness)

Inadequate warning labels

“may cause drowsiness”

usually means

“will cause drowsiness”



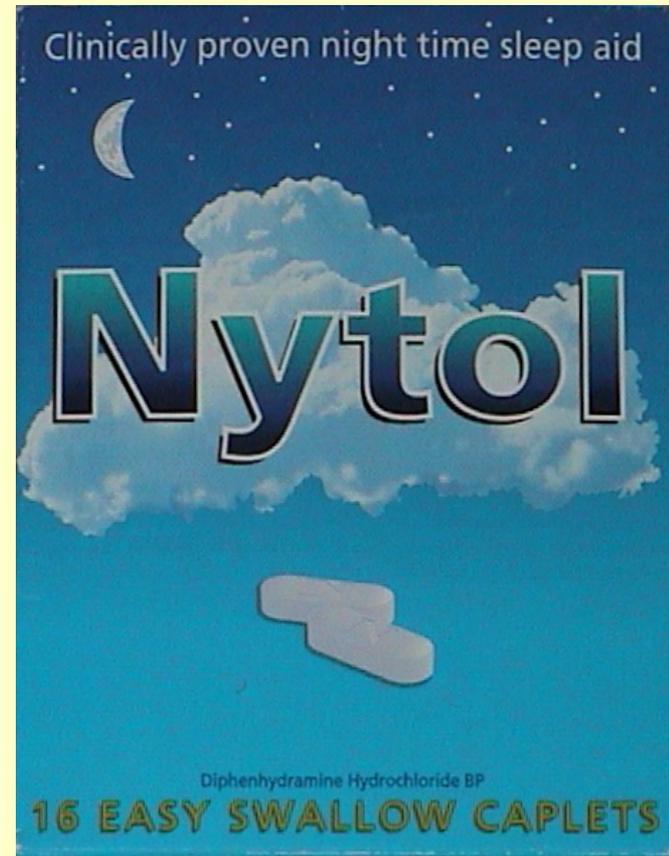
Over-the-counter medicines and the potential for unwanted sleepiness in drivers: a review



Both have similar doses of
diphenhydramine –
both ‘may cause drowsiness’



Can be taken
during day



‘proven sleep
aid’

Driver Training Programmes

MAKE TIME FOR SLEEP

GOOD SLEEP IS AN ESSENTIAL PART OF A HEALTHY HAPPY LIFE

TIPS FOR GETTING GOOD SLEEP:

- Sleep in a cool, dark, restful room.
- Establish a regular sleep routine - same bedtime, same wake time.
- Take a warm bath/shower before bed to help you relax.
- Don't go to bed too full or too hungry.
- Avoid caffeine or alcohol before bed.
- Deal with worries by making a 'to do' list for tomorrow.



AWAKE

SLEEP WELL • LIVE WELL



SOUND FAMILIAR?

- EXCESSIVE SNORING
- CHOKING OR STOPPING BREATHING DURING SLEEP
- COLLAR SIZE OVER 17 INCHES
- OVERWEIGHT

are indicators of sleep apnoea - a medical condition that can cause excessive daytime drowsiness.

If you think you may suffer from this common sleep disorder speak to your GP and your Company Medical Officer.

AWAKE

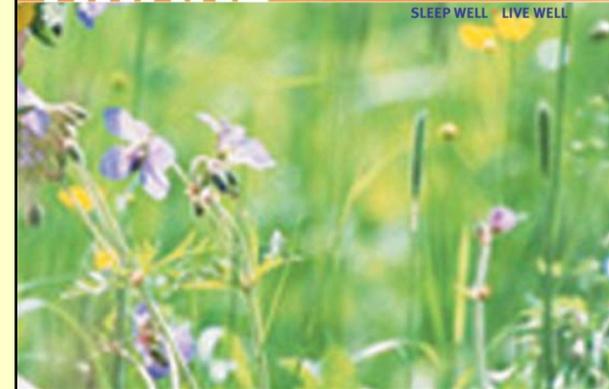
SLEEP WELL • LIVE WELL

THE DAY YOU HAVE TOMORROW DEPENDS ON THE SLEEP YOU HAVE TONIGHT

Sleep loss results in slowed responses, slower work pace, poor reaction time, and an increase in mistakes. That's why people with sleep problems are twice as likely to have an accident at work than their better rested colleagues.

AWAKE

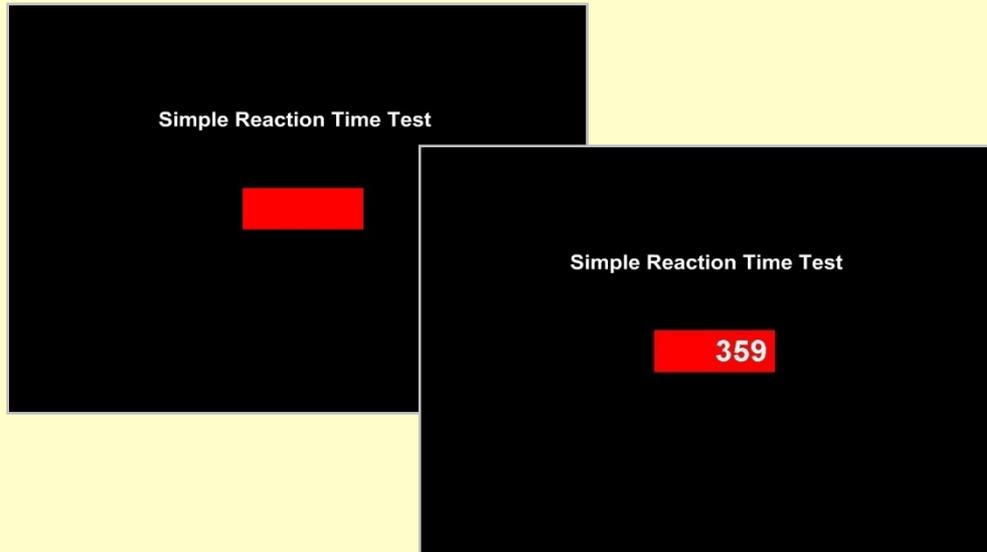
SLEEP WELL • LIVE WELL



Reaction Time

very sensitive to sleepiness

- Watch screen - push key when clock appears – stop clock
- Repeats about every 10 seconds for 10 minutes or so
- Very tedious & boring



Causes 'lapses' (microsleeps)

Sleep loss not only makes us sleepy but impairs 'executive' thinking

Other, subtle effects on the brain, with 'high level thinking'

Space Shuttle Challenger Disaster

Report of the Presidential Commission:

“Poor judgement related to sleep loss and shift-work during early morning..... working excessive hours, while admirable, raises serious questions when it jeopardises job performance, particularly when critical management decisions are at stake”

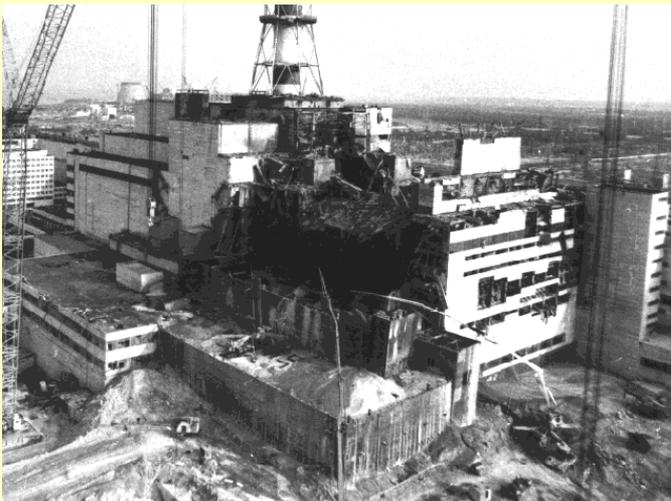


- Managers had less than 2h sleep previous night & on duty since 01:00h
- Unable to grasp crucial facts - overlooked amongst much distracting information
- Concentrated on trivia

All 4 nuclear near-disasters

human error: wrong decisions, linked to sleep loss

Chernobyl, Three Mile Island, Davis-Beese (Ohio), Rancho Seco (Sacramento)

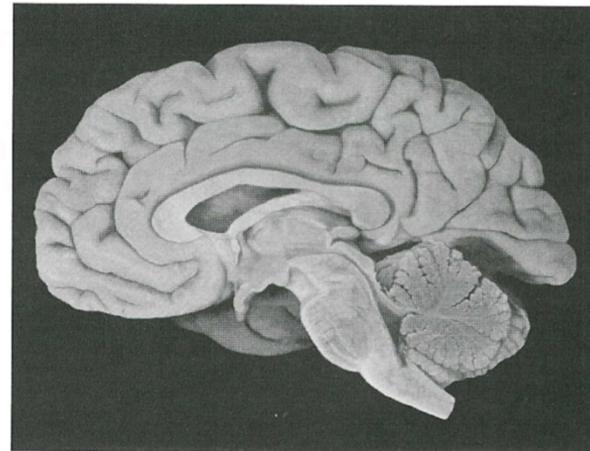
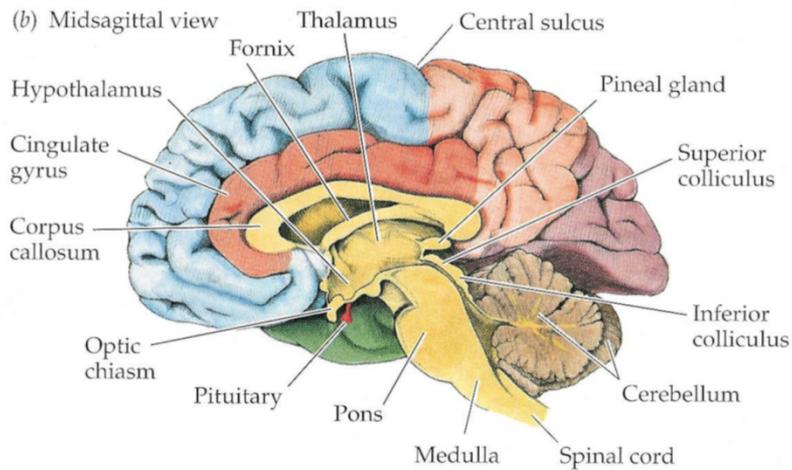
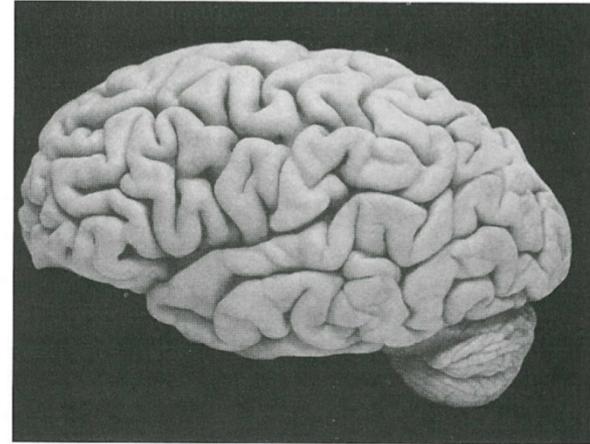
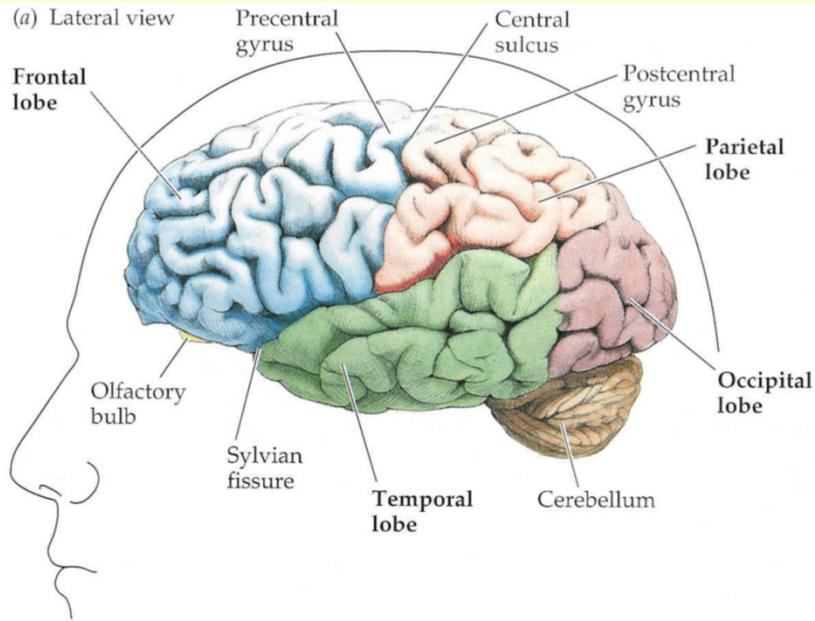


- Early morning,
- Controllable, unexpected malfunctions
- Misdiagnosed problem
- Inappropriate action
- Persevered - clear indications of wrong diagnosis
- 'Blinkered' thinking.
- Additional stress and panic

Sleep loss impairs 'Executive Functions'

- Unwilling to try out new strategies, perseverates
- Difficulty comprehending a fast changing situation
- Unable to plan effectively, can't 'update'
- Distracted by irrelevancies
- Impaired language and communication skills
- Unreliable memory for when events occurred
- Unable to plan effectively, can't 'update'
- Difficulty in assessing risk
- Less control of mood/"uninhibited" behaviour
- Less insight into own performance

The 'Frontal Lobes'



One Night of Sleep Loss

Potential Problems for Managers

- Inability to deal with surprise and the unexpected
- Greater attention to peripheral concerns or to distractions
- Rigid thinking - inflexibility of thought process
- Over-reliance on previous strategies

All these reflect frontal lobe impairment

SLEEP LOSS & EMERGENCIES

Well learned automatic responses not affected, but the following are vulnerable:

- Understanding a complex situation and ignoring irrelevancies
- Assessing risks and anticipating the range of consequences
- Dealing with surprise and the unexpected
- Keeping track of changing events
- Developing and updating strategies
- Thinking laterally and being innovative
- Communicating effectively

Sleep loss does NOT affect

- Old and well-rehearsed routines
- Logical thinking and IQ
- WHY? – These are not ‘Executive Functions’



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Review

Working throughout the night: Beyond ‘sleepiness’ – impairments to critical decision making

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ABSTRACT

By the end of the first night on a 12 h night-shift, wakefulness may have lasted up to 24 h since the previous sleep. Although most work situations requiring critical decisions are foreseen and effectively resolved by well trained staff, such wakefulness can produce impairments in dealing with unexpected challenging situations involving uncertainty, change, distractions and capacity to evaluate risks. Also compromised can be the ability to engage in and keep abreast of protracted negotiations undertaken throughout the night. These effects, which are not just ‘sleepiness’, seem due to deteriorations with ‘supervisory executive functions’ of the prefrontal cortex; a region that appears particularly vulnerable to prolonged wakefulness. Recent research findings are presented to support this case, and some evidence-based recommendations made about practical countermeasures.

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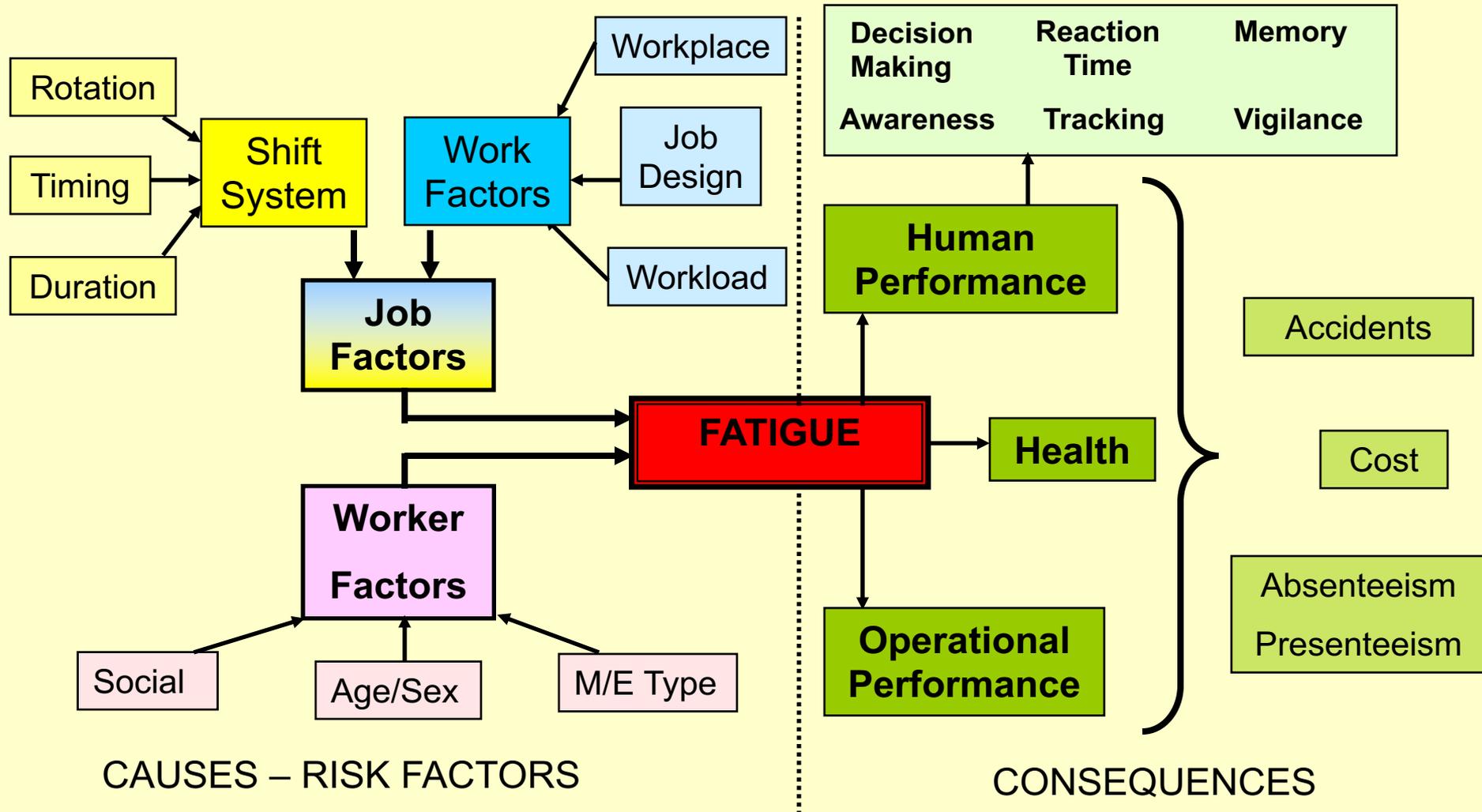
Shift work



- cumulative sleepiness
- poorer health, & ability to cope with stress
- disrupted body clock
- increased fragility of sleep



Causes/Consequences of Fatigue in Shiftwork



Shift-work – Risk factors

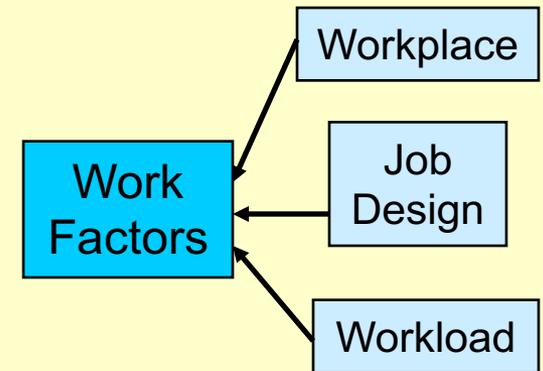
- Work Factors
 - Workload, Work Place & Job Design
- Shift System
 - Rotation, Timing & Duration of shift
- The Shiftworker
 - Social Commitments, Age, Sex & Morning/Evening Types, Poor sleep management
- Sleep
 - All managable to limit sleepiness and lost production

Health & Shift-work

- Excessive Shiftwork has been associated with:
 - Lower ratings of health status.
 - Lower birth weight/gestational age in children
 - Increase in corticosteroid output
 - Increased alcohol intake in men
 - Cardiovascular mortality
 - Possibly – breast cancer in women

Not necessarily due to Sleep Loss !

Work Factors



- The Workplace
 - Lighting
 - Temperature
 - Promoting Employee Health
- Job Design
 - Encourage Interaction
 - Frequent Breaks Allowed
 - Task Rotation
 - Supervision
- Work Load
 - Finding the balance
 - Flexibility

'Worse' case scenario

- THE SHIFT

- Shift starting before 7am
- Weekly rotating shifts
- Backward rotation
- 12hr shifts requiring critical monitoring
- Excessive regular overtime
- Not enough time between shifts

- THE SHIFTWORKER

- Age over 50y
- Second job ('moonlighting')
- Heavy domestic workload
- Morning type
- Poor sleep
- Sleep disorder ?
- Psychiatric illness

Shift/Nightworkers

- Homeward drive
- Early morning
- After 12h night-shift
- Especially after “first night” on this shift
- **Jet-lag** is similar - after over-night flight
- On a dull road
- If no caffeine then:

DRIVER UNFIT TO DRIVE

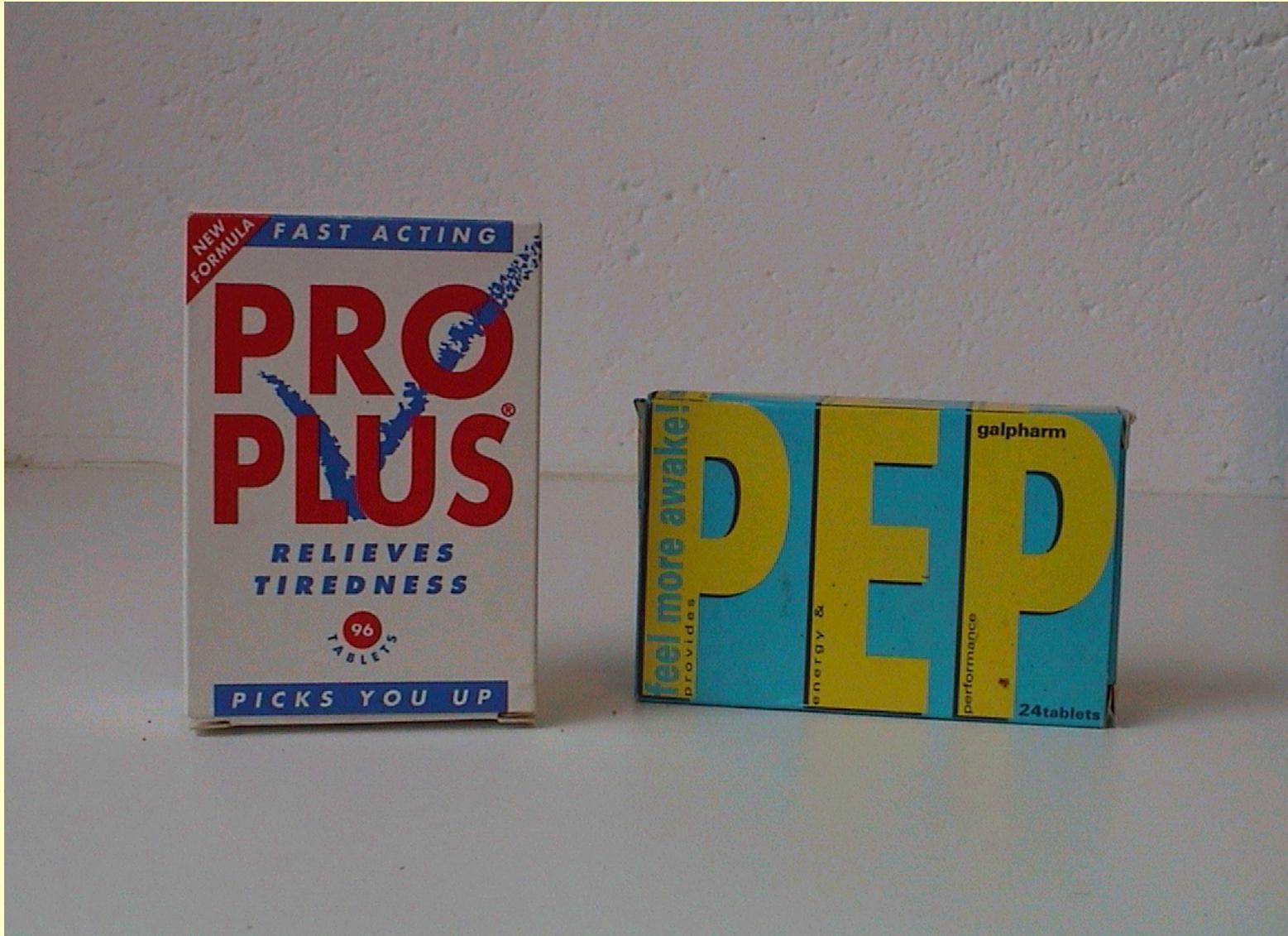
Countermeasures to Sleepiness During Shiftwork

- Appropriate workplace
- Effective design of shifts system
- Responsible sleep hygiene
- Scheduled naps
- Caffeine
- Hypnotics
- Bright light
- Education!!!



Time for a nap

Too Many Of These?



SOFT SOAP

‘No time for morning shower & coffee?’

Use caffeinated soap’

 This image cannot currently be displayed.

- "Every full body wash provides the equivalent of around two cups worth of coffee"
- "The caffeine is absorbed through the skin and into the bloodstream..same effect as if you were drinking coffee".
- "The caffeine lasts in your system for approx. 4 h - same as two cups of coffee".
- "Really are time-savers as you don't have to wait around for your coffee to brew in the morning."

SHIFTWORK SUMMARY

- Why is shiftwork problematic?
 - E.g. working at circadian nadir, lack of sleep, etc.
- What are the risk factors for shiftwork?
 - Work factors, shift systems, individual differences/responsibilities
- What can we do to minimise fatigue?
 - Good work environment, effective shift system (forward rotating, safe no. hours, be responsible!)
- What are the repercussions of inadequately managed shiftwork?
 - **FATIGUE → ACCIDENTS → COST**
(Financial & Human!)

**KEY SYMPTOM OF INSUFFICIENT
OR IMPAIRED SLEEP**

IS

**EXCESSIVE DAYTIME
SLEEPINESS (EDS)**

INSOMNIA

Not usually a cause of

“Sleeplessness”

British Medical Journal 1894:

editorial –Sept 29th

“The subject of sleeplessness is once more under public discussion. The hurry and excitement of modern life is held to be responsible for much of the insomnia of which we hear; and most of the articles and letters are full of good advice to live more quietly and of platitudes concerning the harmfulness of rush and worry. The pity of it is that so many people are unable to follow this good advice and are obliged to lead a life of anxiety and high tension.”

Anxiety–Related Insomnia

- Commonest form - about 50% of all insomnia
- Anxious, angry and often depressed
- Complain of “non-restorative” sleep
- Despite “loss of sleep” – usually no daytime sleepiness
- “Tiredness” often not sleepiness but may be depression
- Undue worry about consequences of ‘sleep loss’
- Hypnotics largely work by removing anxiety

Sleeping Tablets

- Will not improve daytime alertness
- Unlikely to increase sleep length by more than 20 min
- Unlikely to reduce sleep onset by more than 15 min
- Useful temporary crutch

**KEY SYMPTOM OF INSUFFICIENT
OR IMPAIRED SLEEP**

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**EXCESSIVE DAYTIME
SLEEPINESS (EDS)**

How to work out your Epworth Sleepiness Scale (ESS) score

How likely are you to doze off or fall asleep during the following situations, in contrast to just feeling tired?

For each of the situations listed below, give yourself a score of 0 to 3 where 0 = Would never doze; 1 = Slight chance; 2 = Moderate chance; 3 = High chance. Work out your total score by adding up your individual scores for situations 1 to 8.

(If you have not been in the following situations recently, think about how you would have been affected.)

Situation	Score at start of week	Score at end of week
1. Sitting and reading		
2. Watching television		
3. Sitting inactive in a public place e.g. theatre, meeting		
4. As a passenger in a car for an hour without a break		
5. Lying down to rest in the afternoon		
6. Sitting and talking to someone		
7. Sitting quietly after lunch (when you've had no alcohol)		
8. In a car, while stopped in traffic		
Total		

OBSTRUCTIVE SLEEP APNOEA

Most common serious sleep disorder

- Collapse of upper airway in sleep
- Continued respiratory movements (heaving) of chest with gagging noise
- Hypoxia etc causes brief awakening - upper airway opens – air inrush & loud snoring
- Sleep returns – awakening too brief to remember
- Frequent episodes severely disrupt sleep, and excessive daytime sleepiness (EDS)

OBSTRUCTIVE SLEEP APNOEA

TYPICAL CAUSE

- Fat neck
- 'Pot belly'
- Nasal obstruction – sleeps with mouth open
- Small lower jaw, large tongue
- Enlarged tonsils (children)
- Predisposition :
- obese, male, aged over 50 years, sleep on back, alcohol

Sleep apnoea – Treatment

- Surgery for 'blocked nose' & other airway obstructions
- 'Nasal continuous positive air-way pressure' (CPAP)
- Night-time dental plate for moving lower jaw forwards in sleep
- Weight loss



Truck Drivers with Undiagnosed Sleep Apnoea

- High exposure to driving – 70,000 miles/year
- More likely to be at night – during the ‘trough’
- **Many obese** – probably half of whom have undiagnosed sleep apnoea, but ‘sleep well’
- There is a need for screening, here, and because:
 - rapid, effective treatment
 - undertaken in positive manner
 - beneficial to driver
 - job not compromised

MOST UNDER-DIAGNOSED SERIOUS SLEEP DISORDER (CAUSING EDS):

PERIODIC LIMB MOVEMENTS IN SLEEP (PLMS)

TWO RELATED SYNDROMES :

Restless Legs

- **“Crawling“ sensation in thighs causing need to move legs**

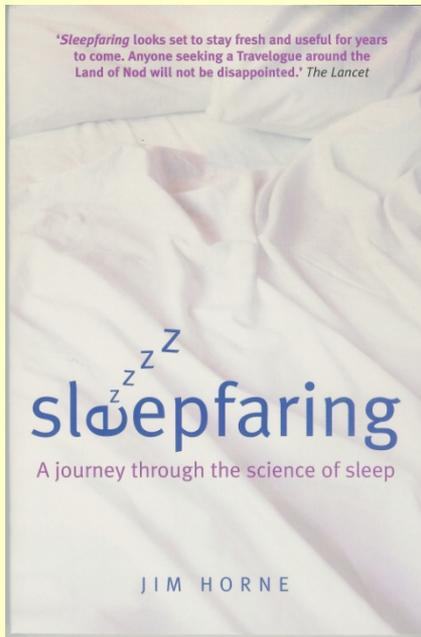
Nocturnal Myoclonus

- **Kicking of lower leg**

Usually rapidly treatable with ‘dopamine agonists

Topics Covered

- Sleepiness at work
 - Driving
 - Shiftwork
 - ‘Executive’ decision making
- Insomnia and Well-being
- Disorders causing excessive sleepiness



THANKS

