The benefits of napping for safety & How quickly can the brain wake-up from sleep?

Cassie J. Hilditch, PhD
San Jose State University Research Foundation
Fatigue Countermeasures Laboratory
NASA Ames Research Center

Fatigue Management & Human Factors in our 24-hour society
Singapore | 9 December 2019

How much sleep did you get last night?

Defining Fatigue

Acute sleep loss

(e.g., staying awake too long)

Cumulative sleep loss

(e.g., losing a little sleep several nights in a row)

Circadian misalignment

(e.g., trying to stay awake at night when your body is designed to sleep)

Poor sleep quality

(e.g., disrupted by noise, sleep disorders)

Fatigue Countermeasures

NAPS

CAFFEINE

Napping

- Naps are the best countermeasure to fatigue
- Longer naps tend to give longer benefits
- Short naps can also be beneficial
- Benefits of a nap depend on:
  - Duration and quality of sleep
  - Timing of nap
  - Sleep/wake history

How to make the most of a nap

- Sleep environment
- Listen to your body clock
- Nap before your head nods

How to make the most of a nap

- Sleep environment
  - ➢Dark
  - ➢Quiet
  - ➢Cool
  - ➢Flat/reclined
  - ➢Safe
- Listen to your body clock
- Nap before your head nods

How to make the most of a nap

- Sleep environment
- Listen to your body clock
- Nap before your head nods

➢Aim for: afternoon / night

➢Avoid: evening

How to make the most of a nap

- Sleep environment
- Listen to your body clock
- Nap before your head nods

➢Nap proactively at work

➢Head nodding = sleep

Nap benefits vary

Which statement is correct?

a) A 10 minute nap can improve performance for up to 3 hours!

b) A 10 minute nap can stabilize performance for up to 1 hour.

c) A 10 minute nap does nothing to change performance.

d) All of the above.

Nap benefits vary

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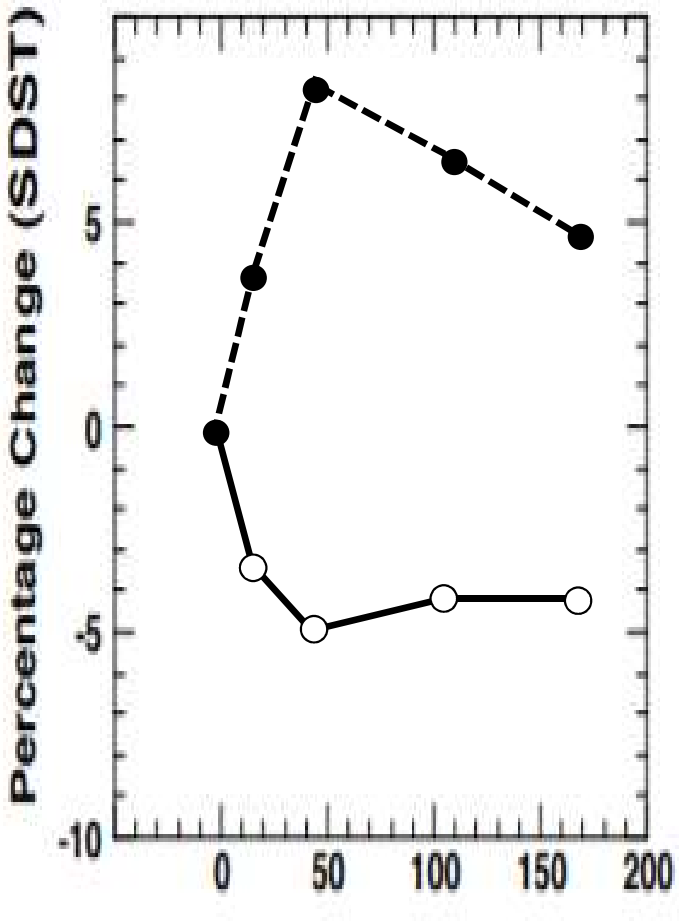
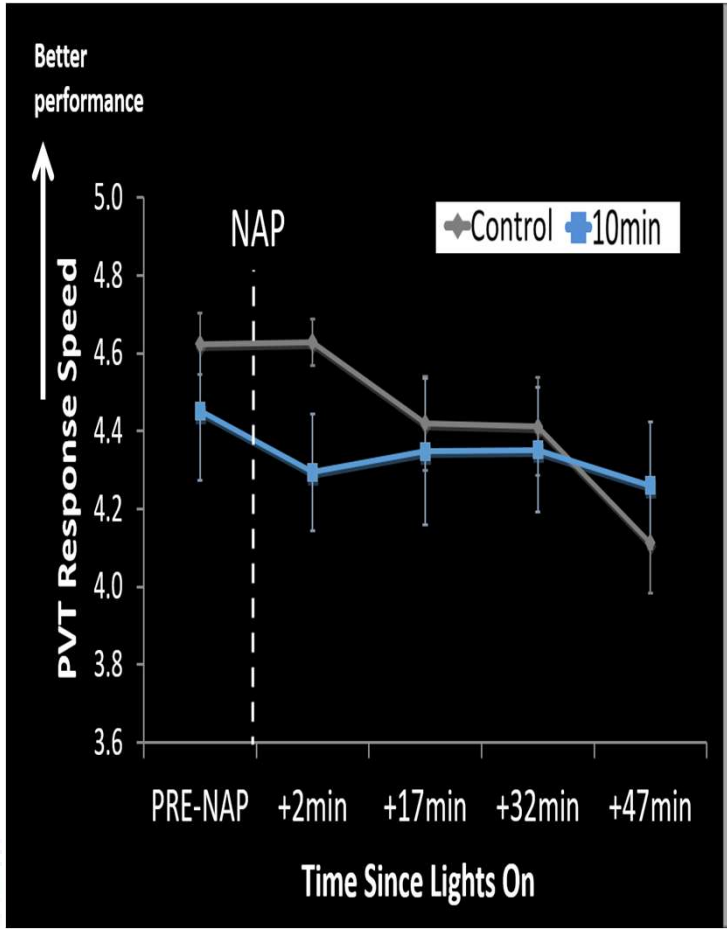
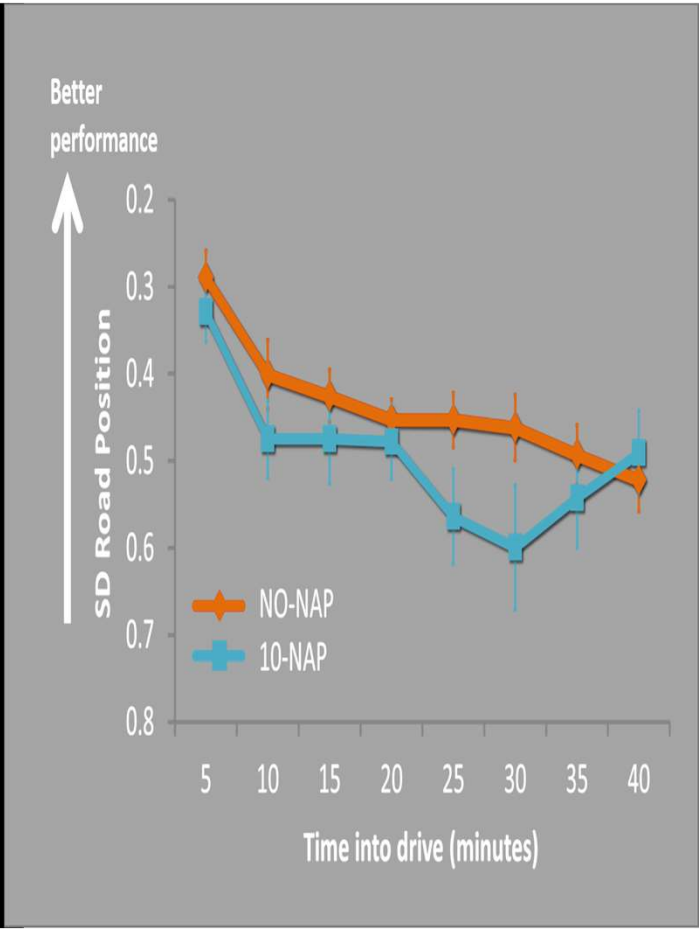
A 10-minute nap at…

2pm, 7h awake = **improve**	4am, 21h awake = **stabilize**	7am, 24h awake = **no change**







(Brooks & Lack, 2006; Hilditch et al, 2016; Hilditch et al., 2017)

Napping in the Workplace

- Benefits
- Challenges

Napping in the Workplace: Benefits

- Medical Interns
- Commercial pilots

Napping in the Workplace: Benefits

- Medical interns can work up to 30-hour shifts
- Unprotected napping opportunities result in low rates of adherence, short sleep
- Trialed a 3-hour protected napping opportunity
  - Nap 1: 00:00-03:00; Nap 2: 03:00-06:00
  - Compared to group who could nap at any time, but had no protected time window

Napping in the Workplace: Benefits

Protected nap group

- ≥2.4h sleep in both sleep periods
- Slept longer than controls (1.6h)
- Less likely to have nights with no sleep
- Better performance (reaction time task)
- No differences in patient outcomes
- Not observed: general quality of life for interns, traffic accidents, etc.

Napping in the Workplace: Benefits

Fatigue in aviation

- 58% of pilots report unintentionally falling asleep while flying
- Pilots have been observed having microsleeps during cruise and critical phases of flight
- Up to 56% of US pilots surveyed admit to taking an unapproved nap in the cockpit

CBS NEWS

Aug 3, 2009

NTSB: Both Pilots Asleep on Hawaii Flight

"The National Transportation Safety Board determines the probable cause(s) of this incident as follows:

- The captain and first officer inadvertently falling asleep during the cruise phase of flight.
- Contributing to the incident were the captain's undiagnosed obstructive sleep apnea and the flight crew's recent work schedules, which included several consecutive days of early-morning start times."

(NSTB Report SEA08IA080, 2009)

Napping in the Workplace: Benefits

Controlled Rest Study

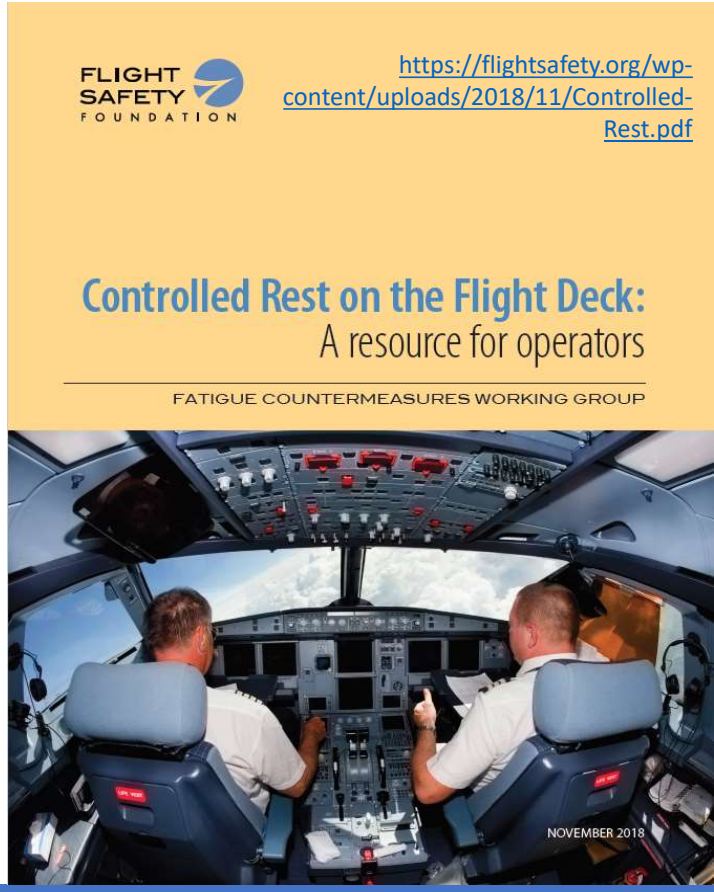
- Pilots given a 40-min nap opportunity in-seat
- Sleep achieved in nap: 93%
- Average total sleep time: 26 min
- Increased performance & alertness
- Reduced risk of unintentional sleep in cruise
- Eliminated microsleeps in critical phases of flight

www.nasa.gov

Napping in the Workplace: Benefits

Best Practice Guidelines

- Sleep inertia and napping science
- Recovery period
- When to use
- Minimum Safeguards
- Handover briefing
- Cabin crew check
- Education
- Integrate into FRMS
- Not a replacement for other FRMS standards



Napping in the Workplace: Challenges

- Safety culture
- Sleeping environment
- Sleep inertia

Napping in the Workplace: Challenges

- Safety culture
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- ➢ Transparent and effective communication
- ➢ Involve all stakeholders from the start and throughout

Napping in the Workplace: Challenges

- Safety culture
- Sleeping environment
- Sleep inertia

- ➢ As good as you can get it
- ➢ Unique challenges

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Napping in the Workplace: Challenges

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How do you feel when you first wake up?

1 – Extremely alert
2
3 – Alert
4
5 – Neither alert nor sleepy
6
7 – Sleepy, but no effort to stay awake
8
9 – Extremely sleepy, fighting sleep

What is sleep inertia?

"Immediately after getting up … one is not at one's best"

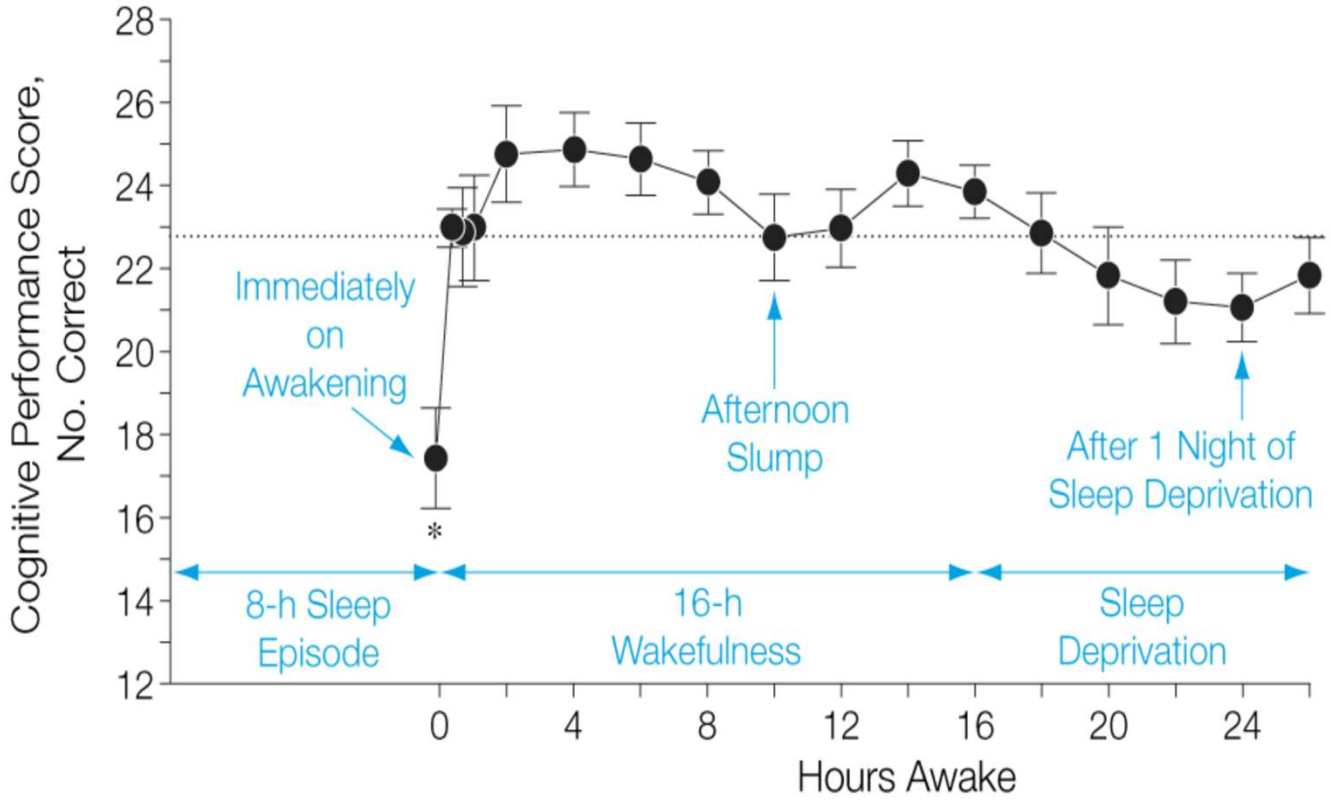
(N. Kleitman, 1939)

What is sleep inertia?

- Grogginess
- Disorientation
- Tendency to fall back to sleep
- **Impaired cognitive performance**
- Typically short-lived (<30min)

- Reaction time
- Memory
- Calculations
- Information processing
- Decision making
- Tactical planning

Level of impairment



Wertz et al., 2006

Who is at risk?

- Working on-call; napping on-shift
- Tasks performed soon after waking:
  - Driving/flying to/for/from work
  - Processing information
  - Making decisions

Inertia in the real world

Air India pilot's 'sleep inertia' caused crash

Updated 11/18/2010 1:12 PM | Comments 57 | Recommend 5 E-mail | Print |

Enlarge AFP/Getty Images

Crews work amid the smoldering wreckage of an Air India Boeing 737-800 that crashed on landing in Mangalore, India.

By Alan Levin, USA TODAY

The senior pilot of an Air India jet that crashed in May was asleep for most of the flight and then made critical errors because he was disoriented after waking up, according to Indian news reports.

The crash on May 22 in Mangalore, India, killed 158 people after the jet overran the runway and plunged off a cliff.

Capt. Zlatko Glusica was captured loudly snoring on a cockpit recorder, the accident investigation found, according to the *Hindustan Times*. The Associated Press confirmed the account from a government official who spoke on condition of anonymity because the report had not been presented to the Indian Parliament.

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After waking, Glusica did not respond when his co-pilot H.S. Ahluwalia repeatedly urged him to abort the landing.

Indian investigators said that Glusica was suffering from "sleep inertia," a condition that can be deeply disorienting when someone is awoken suddenly from deep sleep, according to the reports.

Air Canada pilot suffering from 'sleep inertia' put the whole flight in trouble: TSB

Toronto : Canada | Apr 17, 2012 at 6:17 PM PDT

BY madn3wz

2 0

VIEWS: 86

BACK 1 of 5 NEXT

Factors that affect sleep inertia

Prior sleep loss

Circadian rhythm

Prior sleep duration

Sleep stage/depth

Proactive countermeasures

Minimize prior sleep loss

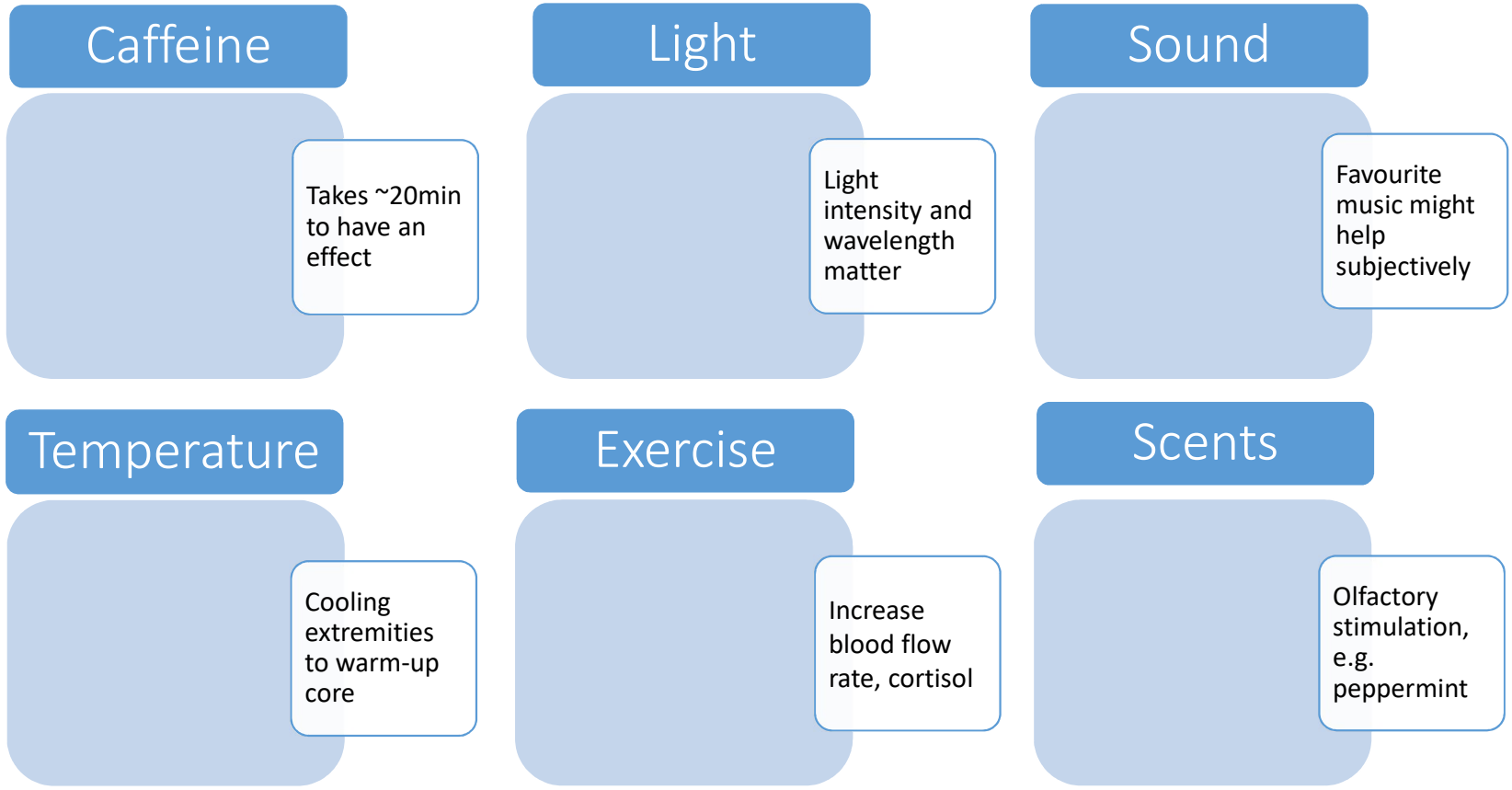
Avoid nocturnal awakenings

Keep naps short ("<30min"…)

In reality…

- Sleep inertia can occur after ANY sleep period
- Always include a recovery period (~20min)
- Re-arrange safety-critical tasks
- Operational constraints often prevent proactive countermeasures

Potential reactive countermeasures?



Key points

- Napping is beneficial for improving:
  - alertness, performance, safety
- Nap benefits vary based on:
  - length, timing, quality, prior sleep
- Unique challenges to overcome in each workplace
  - Learn from other industries, consult your workforce & stakeholders
- Sleep inertia must be managed
  - Try proactive countermeasures, protect the recovery period, stay tuned for reactive countermeasures!


Thank you
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Personal photo