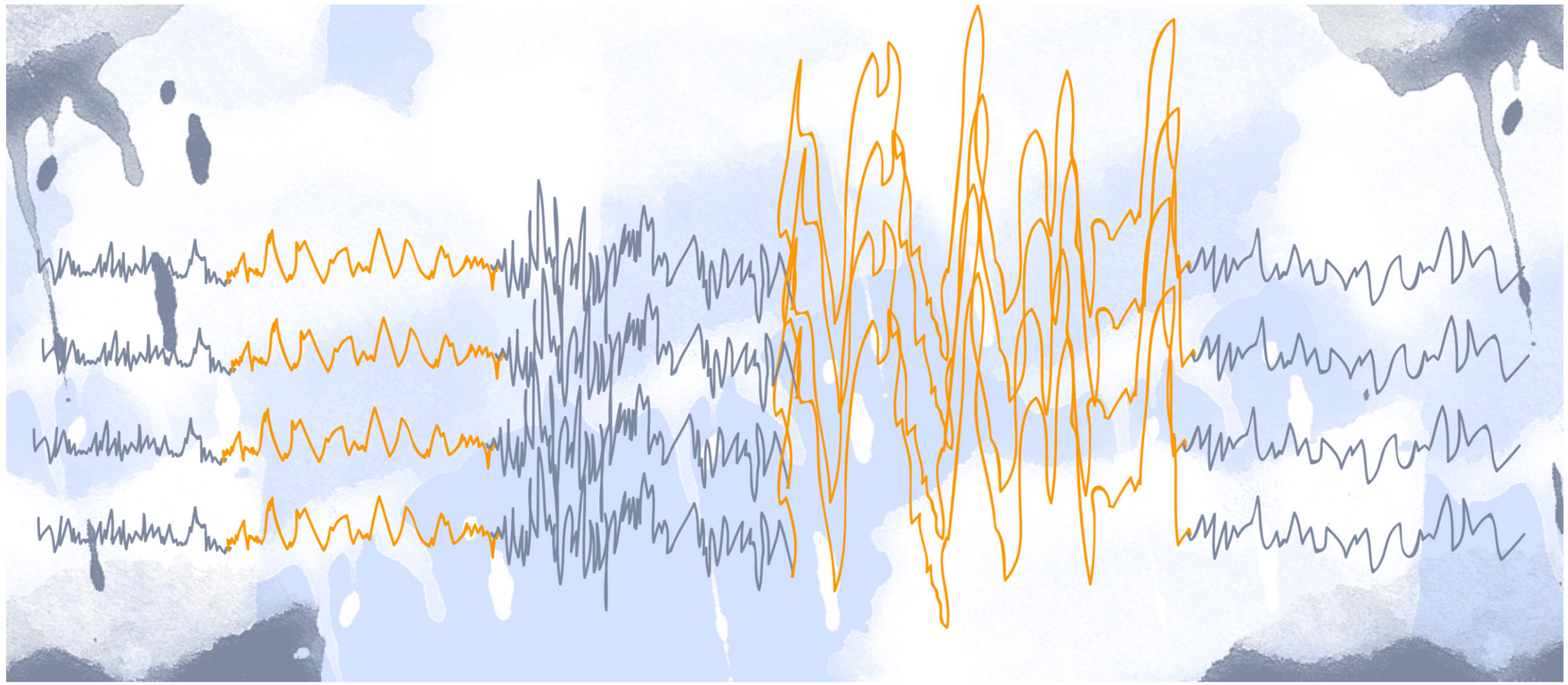
How Much Sleep Do We Need?



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- How much sleep do we need? Discuss the evidence from sleep deprivation studies and contrast that with the evidence from sleep reduction studies and polyphasic sleep studies.

Learning Goals

Sleep Deprivation Increases the Efficiency of Sleep

Important effect of sleep deprivation: Individuals who are sleep deprived become more "efficient" sleepers. They display more slow-wave sleep (SWS) and more intense SWS. Accordingly, many believe that SWS is the restorative factor.

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1. Sleep regained following deprivation is primarily SWS.

2. Short sleepers get as much SWS as long sleepers.

3. People who reduce their sleep, get less stage 1/2 sleep, but their SWS stays about the same.

4. Waking people during SWS has major effects on sleepiness.

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4. Waking people during SWS has major effects on sleepiness.

If sleep becomes more efficient in people who sleep less, this means that conventional sleep-deprivation experiments are not the ideal way of determining how much sleep humans need.

How Much Sleep?

Long-Term Sleep Reduction

There have been two sorts of studies on long-term sleep reduction:

1. Studies in which participants slept nightly (monophasic).

2. Studies in which participants only took naps (polyphasic).

How Much Sleep?

Gradual Long-Term Reduction

In a study by Friedman et al. (1977), participants reduced nightly sleep by 30 min every 2 weeks until they reached 6.5 h/night; then by 30 min every 3 weeks until they reached 5 h/night; then by 30 min every 4 weeks. Once a participant indicated a lack of desire to reduce sleep further, they slept for 1 month at their shortest duration, then for 2 months at the shortest duration plus 30 min; then for a year at whatever duration they wanted.

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Durations achieved: 5.5 h (n=2) 5 h (n=4), 4.5 h (n=2)

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All participants experienced increases in daytime sleepiness after they reduced their sleep below 6 h/night; but there were no notable changes in mood, physical health, or performance on tasks of vigilance or memory.

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After 1 year, all participants had reduced their sleep duration by between 1-2.5 h/night with no excessive sleepiness.

How Much Sleep?

Gradual Long-Term Reduction

Subjective responses were often not in line with the objective measures, nor with their performance at work or school.

> "I am noticeably less efficient, less energetic; e.g., I can't seem to study as long as I used to, I get discouraged more easily, slightly depressed about overcoming difficulties, very much like I feel when I am sick with a cold."

How Much Sleep?

Gradual Long-Term Reduction

Other studies of gradual nightly sleep reduction have reported comparable results--though one study did report a decline in performance of cognitive tasks (in 1 of 2 participants) when sleep was reduced below 5 hrs/night.

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Long-Term Reduction by Napping

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These days, most adult humans display monophasic sleep cycles: We sleep once per day.

Still, we regularly display polyphasic cycles of sleepiness: with periods of sleepiness often occurring in the later morning and late afternoon.

How Much Sleep?

Long-Term Reduction by Napping

Leonardo da Vinci is perhaps the most famous polyphasic sleeper. It is believed, based in part on his journals, that Leonardo napped 15 min every 4 hours--thus sleeping ~1.5 h/day.

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This sleep schedule has been replicated in several studies by the researcher Claudio Stampi.

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