Biology 200 Final Paper
Spring 2014

Big Picture Issue to resolve:
What are the functions of sleep?

We can't always answer big questions with one data set, but we can chip away in steps. One arm of research into sleep compares sleep patterns among mammal species. There is a semi-rigorous set of data for addressing the following questions. The data are not entirely real. When using real data I just get students searching the literature and copying the mistakes found in the original authors' papers. These data are close to real. You are expected to use the tools provided in this course to review the data. You are not allowed to collaborate on this final A level project.

Questions to Directly Address in Your Report:
1. **Does risk of predation modulate sleep patterns among mammals?**
2. **Are these patterns (if identified) associated with REM and/or Slow Wave Sleep?**
3. **Are these associations driven by potential confounding variables such as brain size?**

Due Dates:
The paper is due by 5/20. Complete drafts are can be submitted for review prior to 5/11.

Paper's Structure:
This paper will have an Introduction, Methods, Results, Conclusion, and Literature Cited section. The contents and style of the results section will conform to the TIPS paper. The other sections will conform to the writing handbook (see the syllabus or bookstore).

At least 3 literature citations must be made (and be from authoritative and peer-reviewed sources). The 3 must pertain to sleep in humans or aspects of mammal biology other than sleep. Literature directly related to non-human sleep can be included, but not counted toward the 3 required citations.

Each section is expected to be less than a page, except the results section which may extend beyond a page, but remember to avoid redundancy, work toward brevity, and to focus on the important points. For the methods section, you will fabricate a feasible methodology that could have been used obtain the data used in your study (this is an exercise on study design).

JMP NOTE:
You may need to set the missing value codes in the column properties menu.

NOTES on Variables:

Column Names
body weight in kg

brain weight in g

slow wave ("nondreaming") sleep (hrs/day)

Rapid eye movement ("REM") sleep (hrs/day)

total sleep (hrs/day) (sum of slow wave and REM sleep)

maximum life span (years)

gestation time (days)

predation index (1-5)
1 = minimum (least likely to be preyed upon)
5 = maximum (most likely to be preyed upon)

sleep exposure index (1-5)
1 = least exposed (e.g. animal sleeps in a well-protected den)
5 = most exposed

overall danger index (1-5)
(based on the above two indices and other information)
1 = least danger (from other animals)
5 = most danger (from other animals)

Note: Missing values denoted by -999.0

Species Name
This is the scientific name of the species spelled and reported exactly as it is in the actual paper.

Common Name
This is the common name of the species spelled and reported exactly as it is in the actual paper.

Sex
This is the sex of the sampled animals. For some papers, there is a mix of males and females in the papers because the authors did not always separate the sleep data according to sex.

Type of animal
This is whether the animal is a marine mammal or a land mammal.

Age class
This is the age class of the animal lass that the authors of the paper classify the animals as (infant, juvenile, adult, etc.)

Number of Animals in Calculated Mean
This is the number of animals in the study subjected to EEG recordings, telemetry, or behavioral observations.

Number of animals sampled
This is the number of animals used in the study (should be the same as number of animals in calculated mean).

EEG
This is whether sleep stages were recorded electrically through either electroencephalogram (EEG) or electrocorticogram (ECoG).

Temperature
In the test environment, investigators maintained a temperature that was normal/ambient for the animal or subjected the animal to extreme temperatures.

Recording Period
This refers to how long sleep was recorded.

Light
This is whether investigators manipulated light during the test conditions. Abnormal light/dark conditions were manipulated; normal light/dark conditions were not manipulated.

Adaptation
Was the animal allowed time to adapt to recording conditions prior to the recording of sleep?

Animal Restrained
Was the animal
Monophasic or/Hibernation
Did the animal enter torpor, hibernation, both, or not?

Type of Paper
This is whether the paper is an abstract, scientific paper, review paper, letter to the editor, or other.

Foreign language
Was the paper published in a language other than English?

Post1988
Was the paper published after the year 1988?

Further Data Notes
Daily PS Time in Water Bihemispheric
This is the total number of hours that the animal spent in bihemispheric paradoxical (REM) sleep in water during the recording period.

Daily PS Time on Land Bihemispheric
This is the total number of hours that the animal spent in bihemispheric paradoxical (REM) sleep on land during the recording period.

Quiet Sleep Time on Land Bihemishperic
This is the total number of hours that the animal spent in bihemispheric quiet (Non-REM) sleep on land during the recording period.

Quiet Sleep Time in Water Bihemishperic
This is the total number of hours the animal spent in bihemispheric quiet (Non-REM) sleep in water during the recording period.

USWS
This is the total number of hours the animal spent in unihemispheric slow-wave sleep (also known as unihemispheric non-REM or unihemispheric quiet sleep) during the recording period.

BSWS
This is the total number of hours the animal spent in bihemishperic slow-wave sleep (also known as bihemishperic non-REM or bihemispheric quiet sleep) during the recording period.

ASWS
This is the total number of hours the animal spent in asynchronous slow-wave sleep (also known as asynchronous non-REM or asynchronous quiet sleep) during the recording period.
Quiet Sleep Time in water

This is the total number of hours the animal spent in quiet sleep (also known as non-REM) in water during the recording period.

Quiet Sleep Time on Land
This is the total number of hours the animal spent in quiet sleep (also known as non-REM) on land during the recording period.

Sleep Time Including Drowsiness
This is the total number of hours the animal spent asleep and drowsy.

Total Daily Sleep Time
This is the total number of hours the animal slept during the recording period.