

A photograph of a person sleeping in a bed with white linens. A nightstand with a lamp and a watch is visible to the right. A patterned rug is on the floor. The image is dimmed to serve as a background for text.

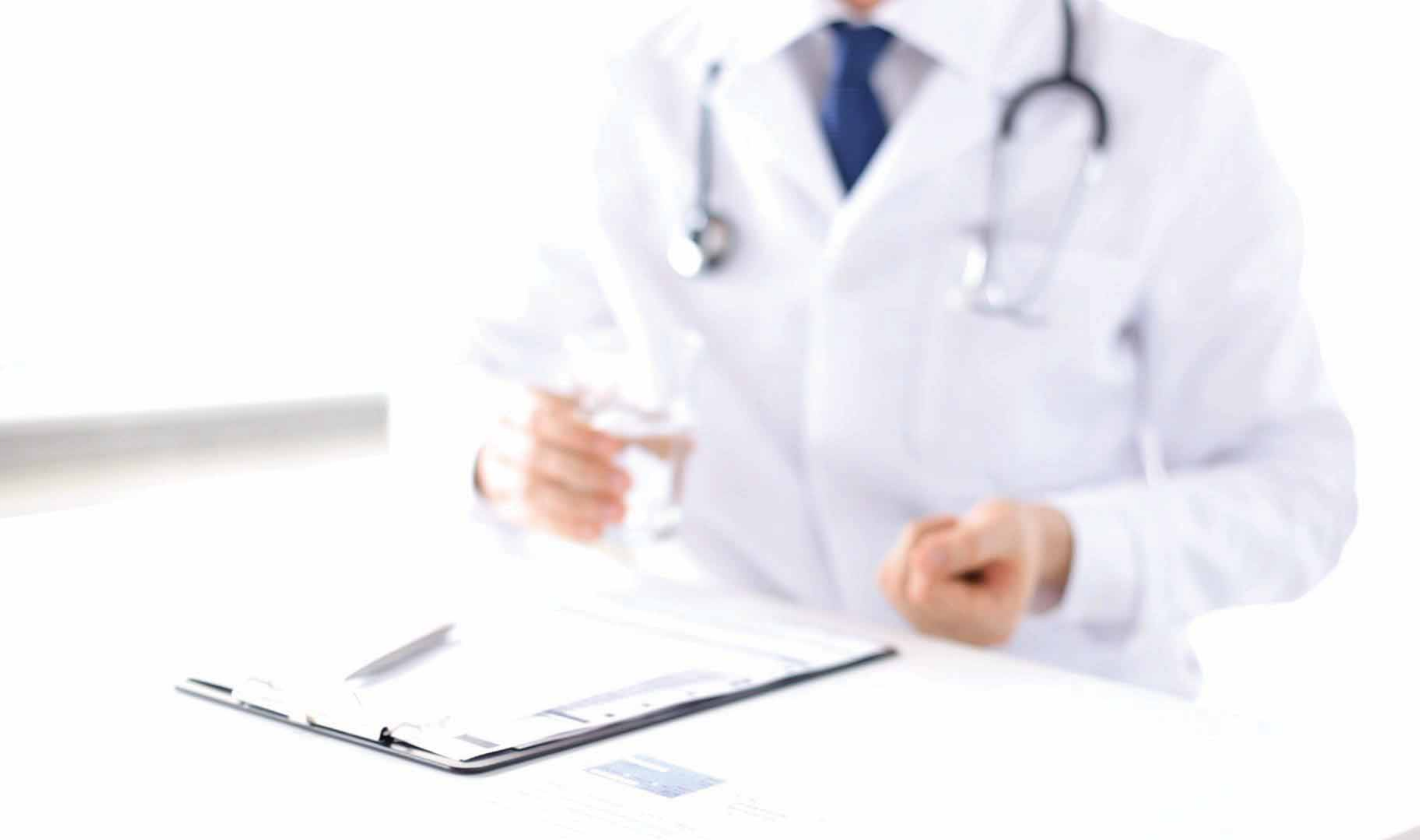
Haresh T Suppiah, PhD

National Youth Sports Institute, Singapore +
Ministry of Culture, Community and Youth

Sleepless in Singapore: Causes, Consequences and Challenges for the Singaporean Youth Athlete

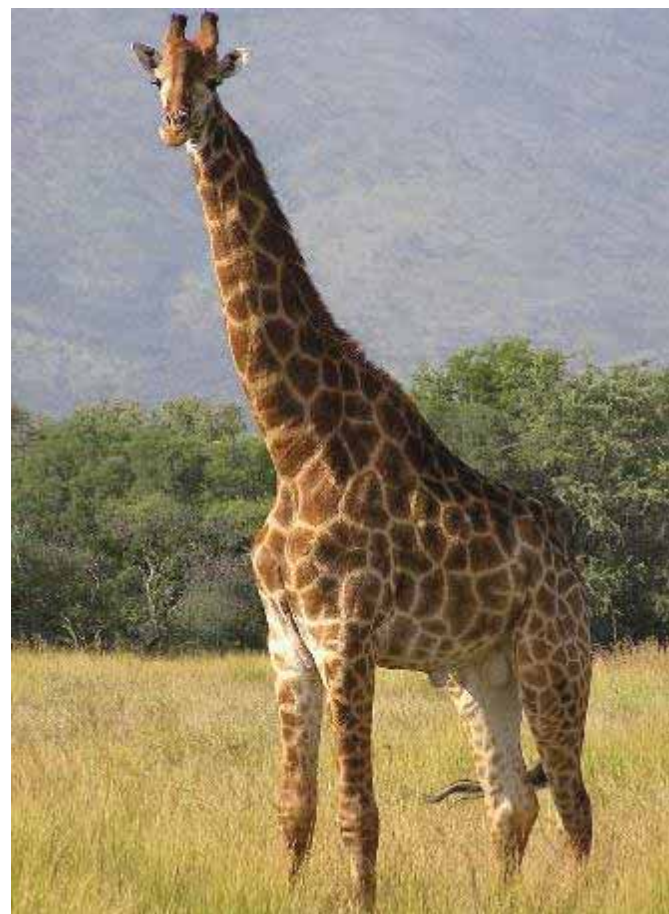
Singapore Sport Science Symposium 2018, Singapore, 8 Nov 2018







3-4 hours



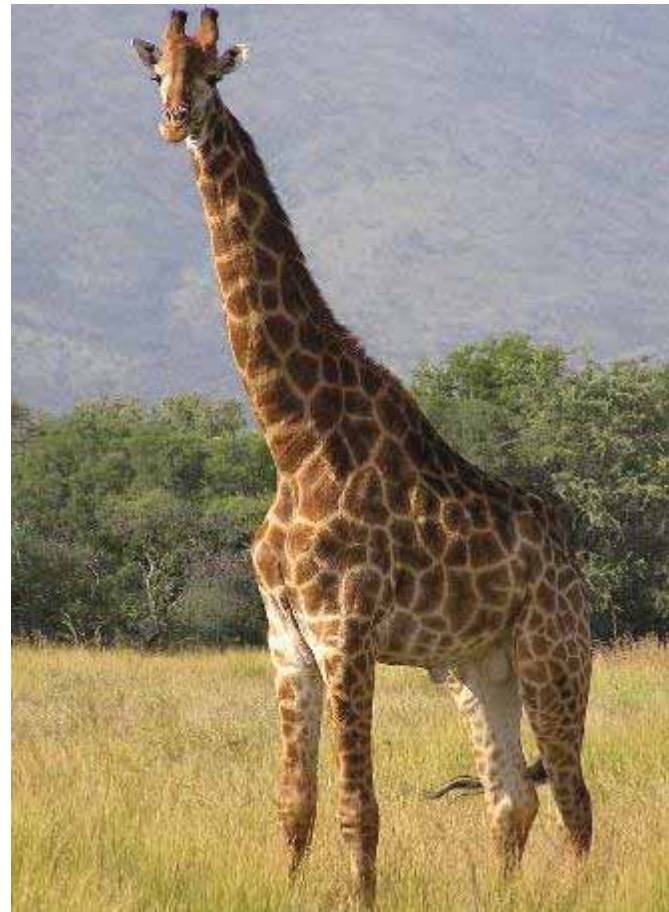
? hours



14-20 hours



3-4 hours



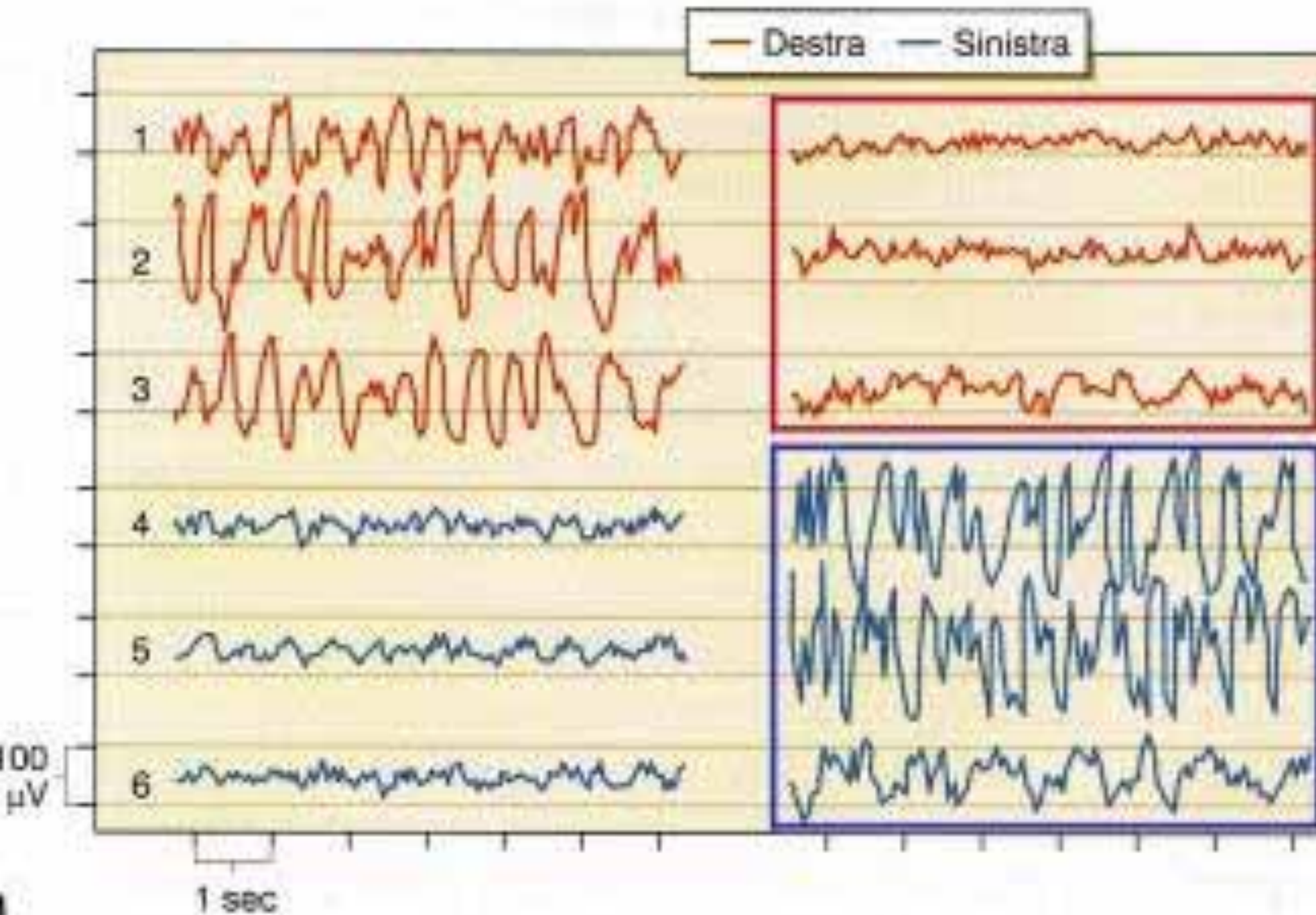
7-9 hours



14-20 hours

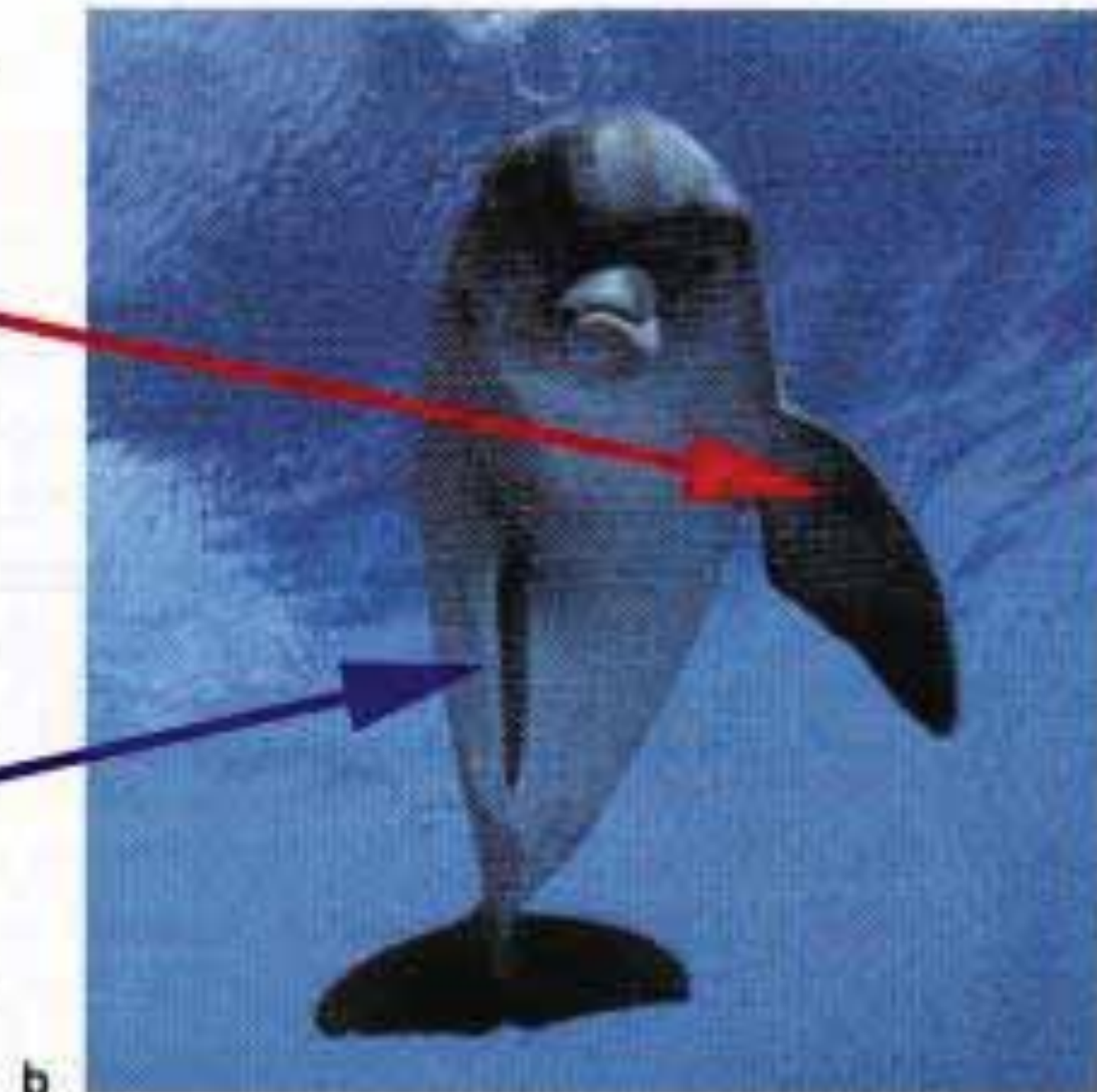
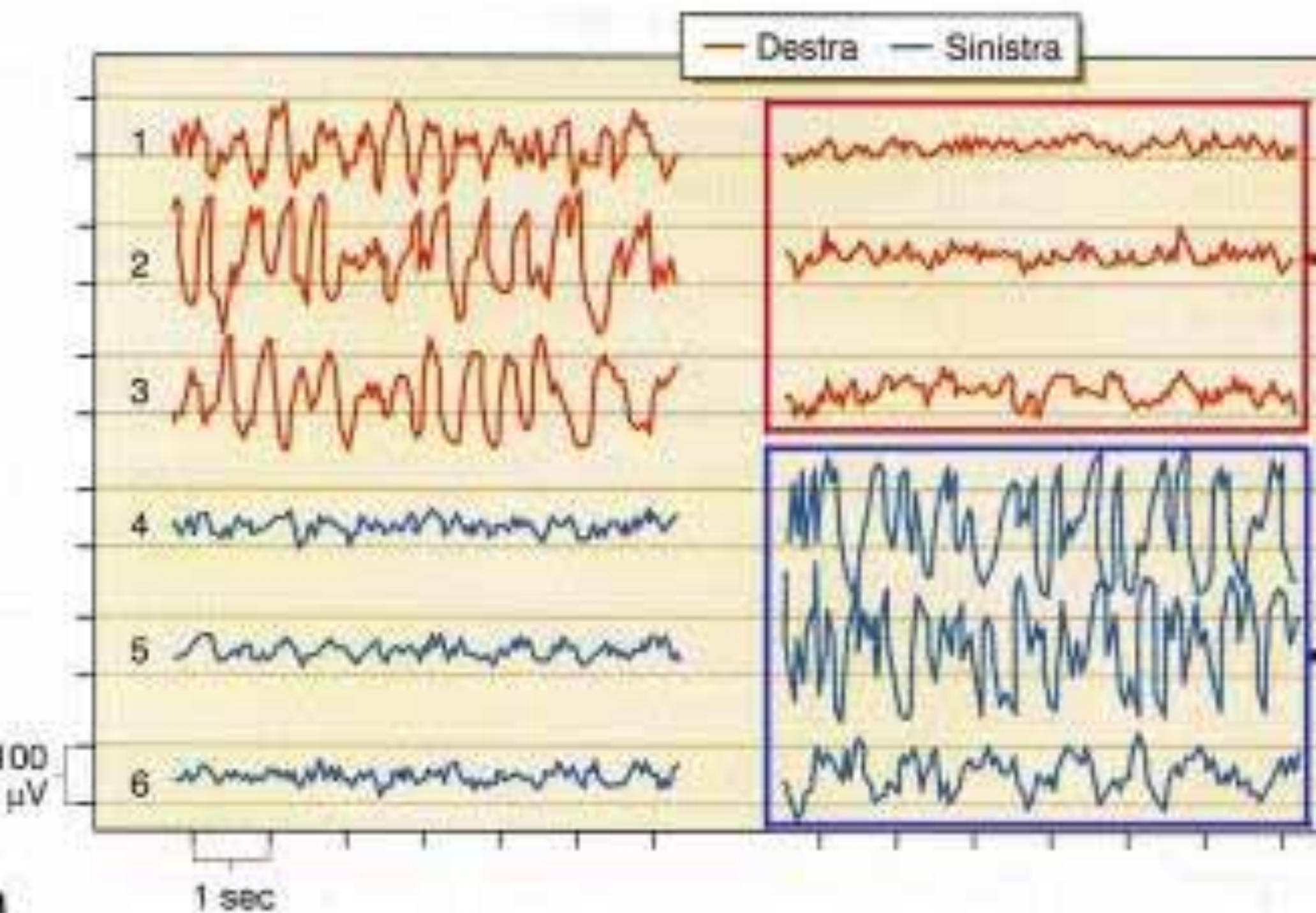
We don't all sleep the same way!

Dolphins/Wales have unihemispheric sleep

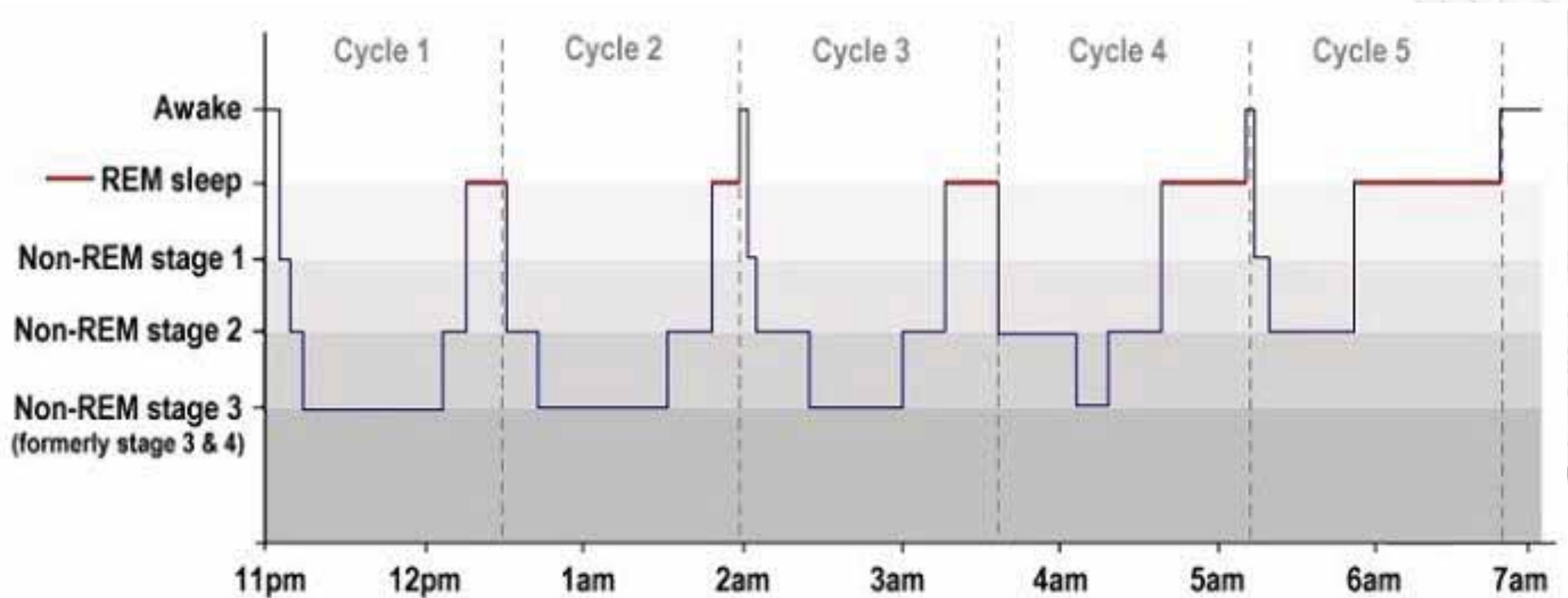


We don't all sleep the same way!

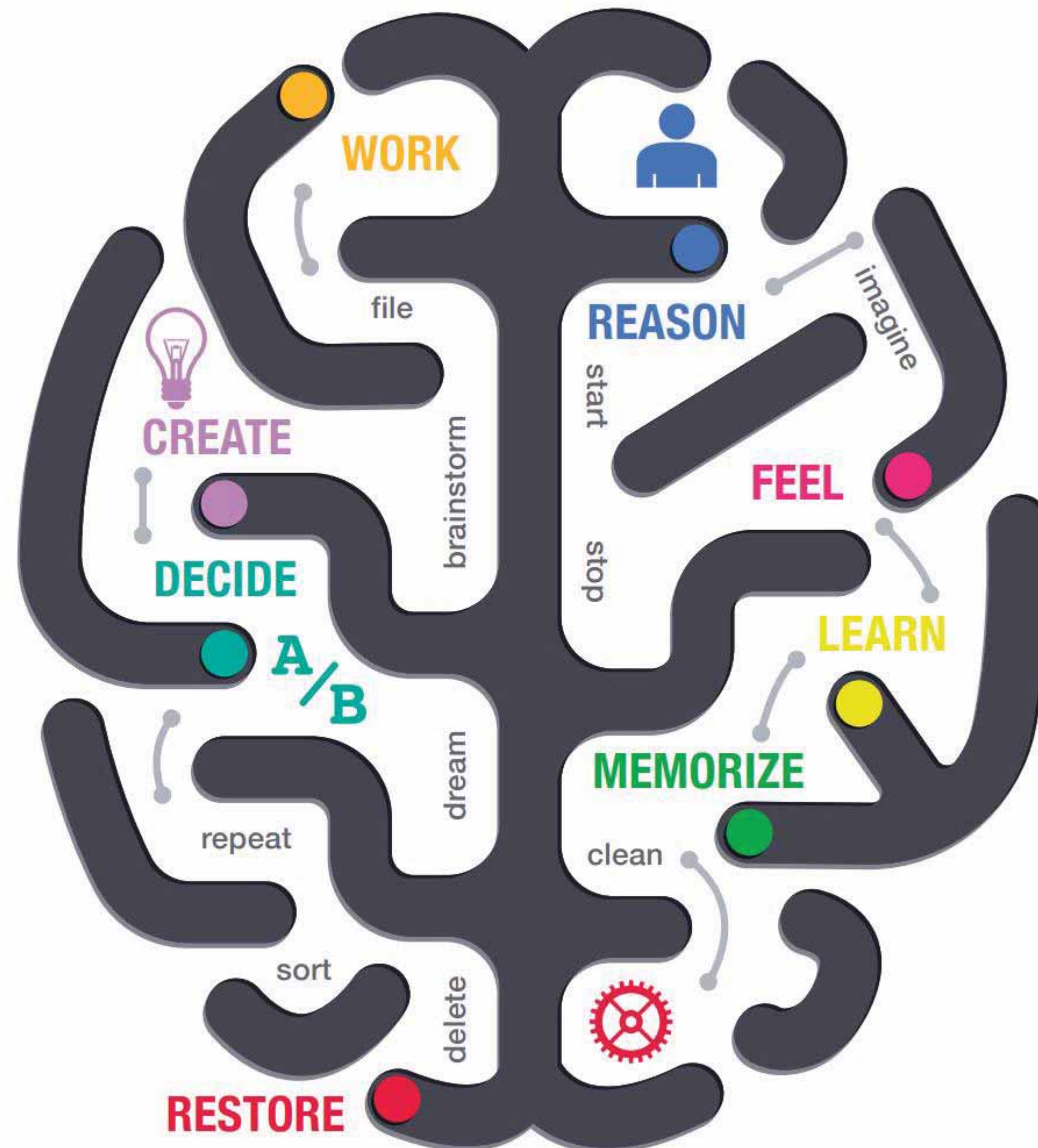
Dolphins/Wales have unihemispheric sleep



Sleep stages & sleep cycles



Stage 1 (Light): 5%, Stage 2 (Light): 45%, Stage 3 (Deep): 25%, REM: 25%





“I woke up with a lovely tune in my head.”

-Sir Paul McCartney on writing “Yesterday”



Dmitri Mendeleev

PERIODIC TABLE

PERIODIC
TABLE

1
H
Hydrogen
1.008

3
Li
Lithium
6.941

11
Na
Sodium
22.990

19
K
Potassium
39.098

37
Rb
Rubidium
84.468

55
Cs
Cesium
132.905

87
Fr
Francium
223.020

4
Be
Beryllium
9.012

12
Mg
Magnesium
24.305

20
Ca
Calcium
40.078

38
Sr
Strontium
87.62

56
Ba
Barium
137.328

88
Ra
Radium
226.025

21
Sc
Scandium
44.956

39
Y
Yttrium
88.906

57-71

89-103

22
Ti
Titanium
47.88

40
Zr
Zirconium
91.224

72
Hf
Hafnium
178.49

104
Rf
Rutherfordium
[261]

23
V
Vanadium
50.942

41
Nb
Niobium
92.906

73
Ta
Tantalum
180.948

105
Db
Dubnium
[262]

24
Cr
Chromium
51.996

42
Mo
Molybdenum
95.95

74
W
Tungsten
183.84

106
Sg
Seaborgium
[266]

25
Mn
Manganese
54.938

43
Tc
Technetium
98.907

75
Re
Rhenium
186.207

107
Bh
Bohrium
[264]

26
Fe
Iron
55.845

44
Ru
Ruthenium
101.07

76
Os
Osmium
190.23

108
Hs
Hassium
[269]

27
Co
Cobalt
58.933

45
Rh
Rhodium
102.906

77
Ir
Iridium
192.217

109
Mt
Meitnerium
[268]

28
Ni
Nickel
58.693

46
Pd
Palladium
106.42

78
Pt
Platinum
195.085

110
Ds
Darmstadtium
[269]

29
Cu
Copper
63.546

47
Ag
Silver
107.868

79
Au
Gold
196.967

111
Rg
Roentgenium
[272]

30
Zn
Zinc
65.38

48
Cd
Cadmium
112.414

80
Hg
Mercury
200.592

112
Cn
Copernicium
[277]

5
B
Boron
10.811

13
Al
Aluminum
26.982

31
Ga
Gallium
69.723

49
In
Indium
114.818

81
Tl
Thallium
204.383

113
Uut
Ununtrium
unknown

6
C
Carbon
12.011

14
Si
Silicon
28.086

32
Ge
Germanium
72.631

50
Sn
Tin
118.711

82
Pb
Lead
207.2

114
Fl
Flerovium
[289]

7
N
Nitrogen
14.007

15
P
Phosphorus
30.974

33
As
Arsenic
74.922

51
Sb
Antimony
121.760

83
Bi
Bismuth
208.980

115
Uup
Ununpentium
unknown

8
O
Oxygen
15.999

16
S
Sulfur
32.066

34
Se
Selenium
78.971

52
Te
Tellurium
127.6

84
Po
Polonium
[208.982]

116
Lv
Livermorium
[298]

9
F
Fluorine
18.998

17
Cl
Chlorine
35.453

35
Br
Bromine
79.904

53
I
Iodine
126.904

85
At
Astatine
209.987

117
Uus
Ununseptium
unknown

2
He
Helium
4.003

10
Ne
Neon
20.180

18
Ar
Argon
39.948

36
Kr
Krypton
84.798

54
Xe
Xenon
131.249

86
Rn
Radon
222.018

118
Uuo
Ununoctium
unknown

57
La
Lanthanum
138.905

89
Ac
Actinium
227.028

58
Ce
Cerium
140.116

90
Th
Thorium
232.038

59
Pr
Praseodymium
140.908

91
Pa
Protactinium
231.036

60
Nd
Neodymium
144.243

92
U
Uranium
238.029

61
Pm
Promethium
144.913

93
Np
Neptunium
237.048

62
Sm
Samarium
150.36

94
Pu
Plutonium
244.064

63
Eu
Europium
151.964

95
Am
Americium
243.061

64
Gd
Gadolinium
157.25

96
Cm
Curium
247.070

65
Tb
Terbium
158.925

97
Bk
Berkelium
247.070

66
Dy
Dysprosium
162.500

98
Cf
Californium
251.080

67
Ho
Holmium
164.930

99
Es
Einsteinium
[254]

68
Er
Erbium
167.259

100
Fm
Fermium
257.095

69
Tm
Thulium
168.934

101
Md
Mendelevium
258.1

70
Yb
Ytterbium
173.055

102
No
Nobelium
259.101

71
Lu
Lutetium
174.967

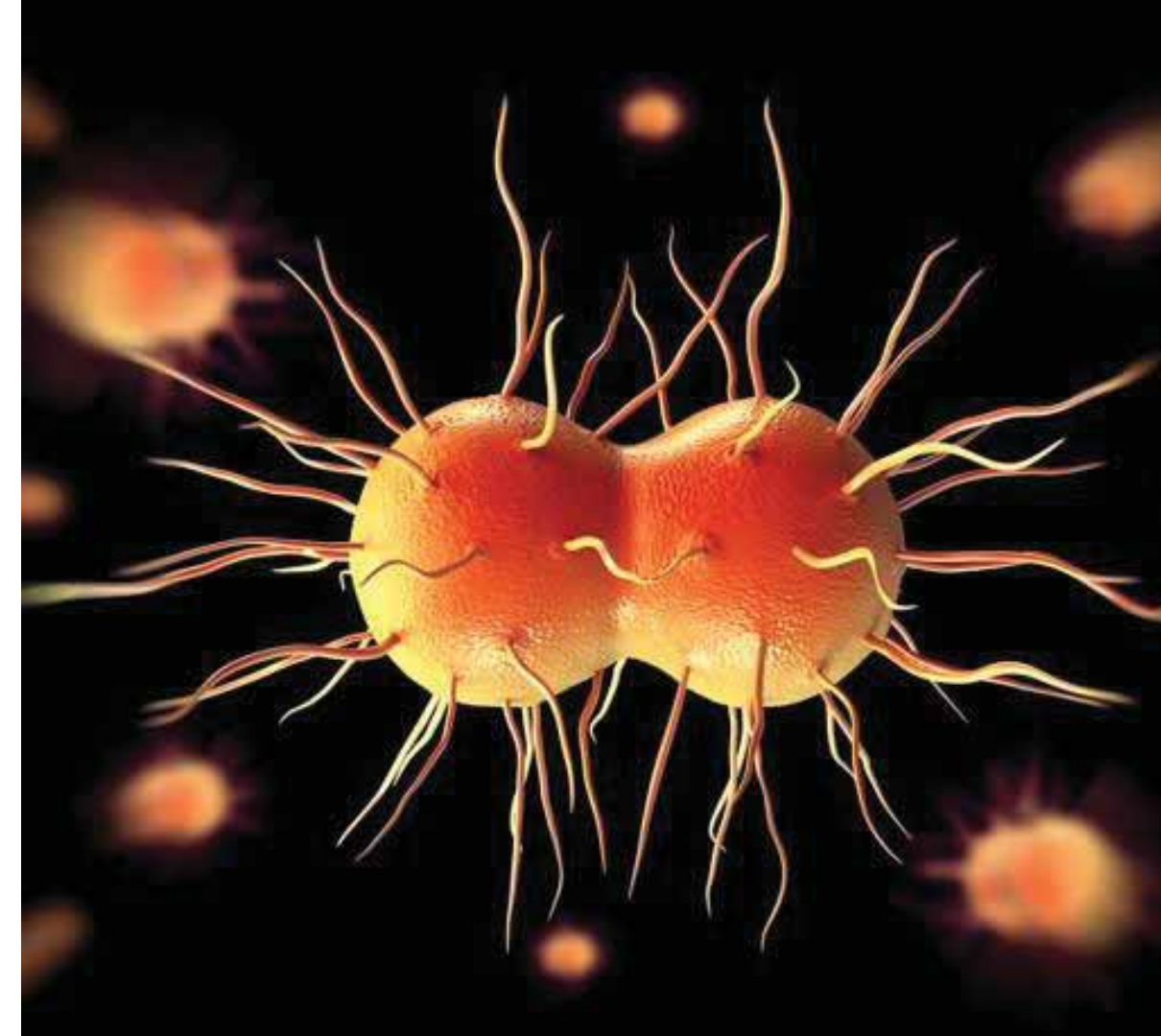
103
Lr
Lawrencium
[262]

©2015 Todd Helmenstine



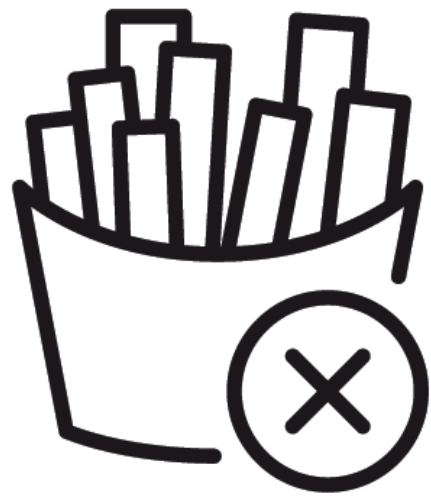
SPORT PERFORMANCE

TISSUE REPAIR & REGENERATION



**IMMUNE STRENGTH,
RESPONSE & MEMORY**





Avoidance of high sugar/fat



Healthier food choices



Improved body composition

- Lowered body fat
- Increased lean muscle mass




But doesn't sleeping more mean I'm less productive?


Long Working Hours Does Not Equate to Higher Productivity



- ✓ A point of diminishing returns is reached when work hours reaches 60 hours per week
- ✓ Replacing sleep hours for work may lead to poorer workplace productivity



USA
US \$411 Billion per year
2.3% of GDP



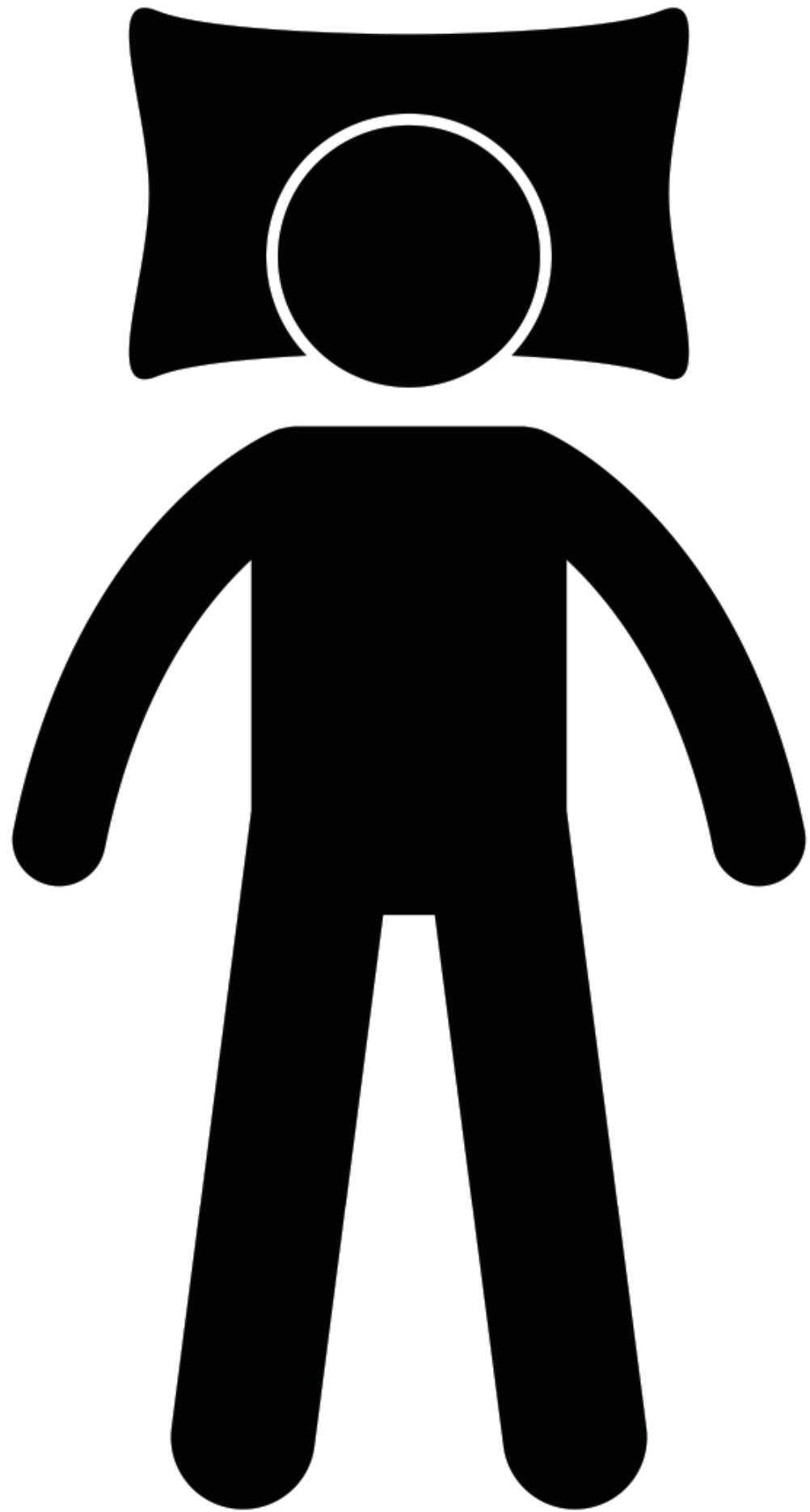
Japan
US \$138 Billion per year
2.9% of GDP

Leading cause of death in
U.S. teenagers





ABS technology resulted
in 20-25% reductions in
accident rates



Delaying school start times
(7.35 to 8.55am) reduced
accidents by 70%

Insufficient sleep results in...



Malignant Neoplasm



Diabetes



Heart & Hypertensive Diseases



Transport Accidents



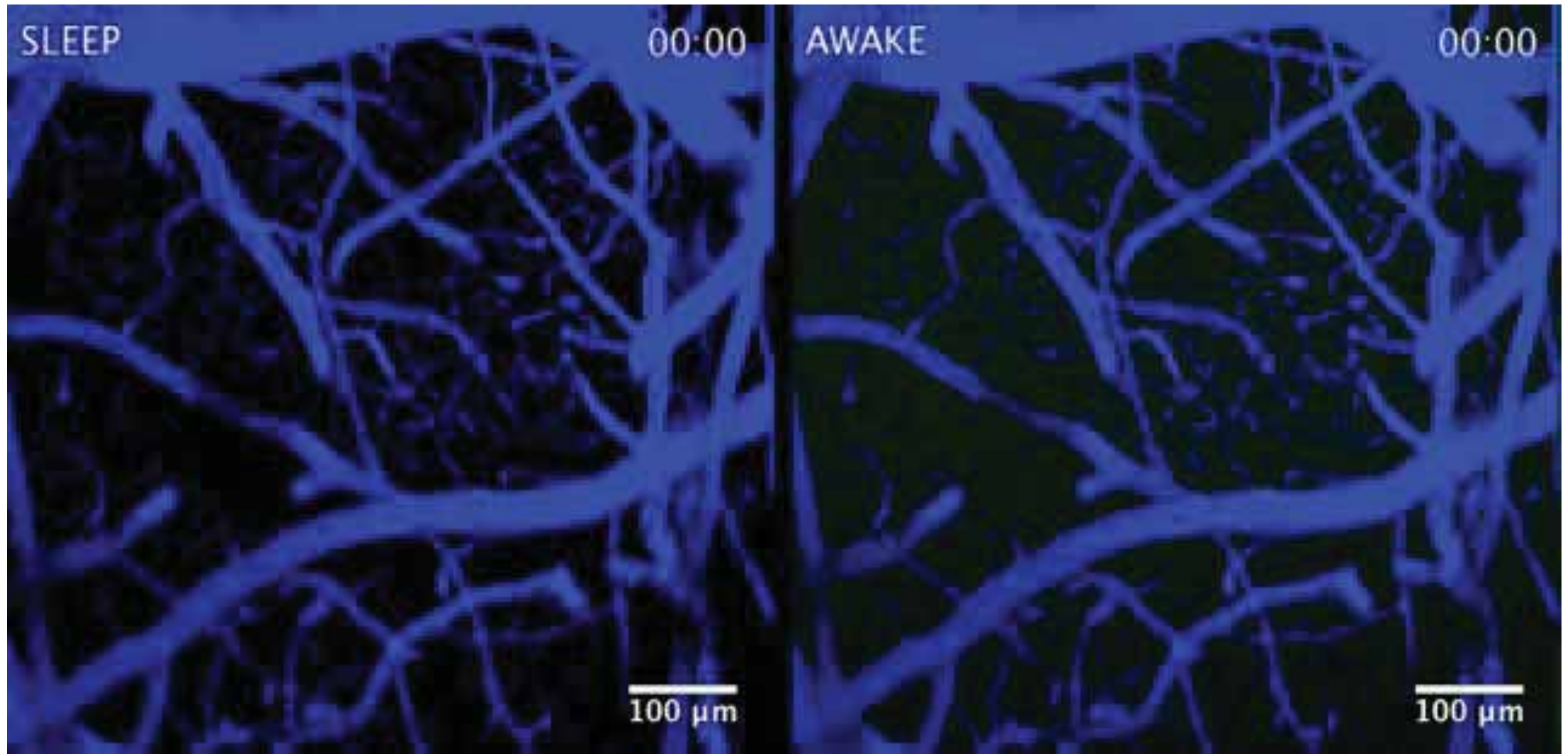
Cerebrovascular Diseases

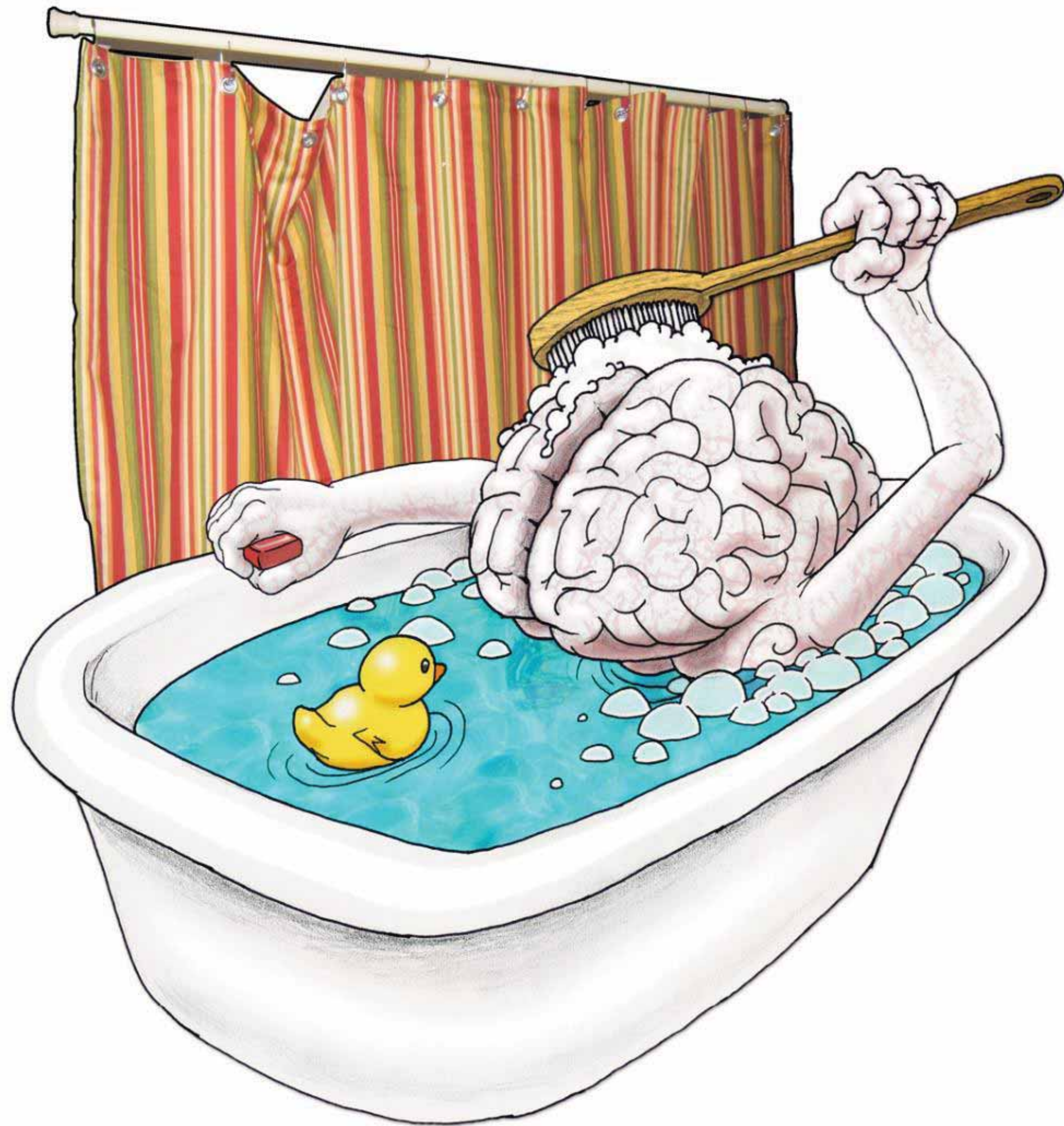


Alzheimer's

Asleep brain

Awake brain





Can sleep help in school?





Sleep



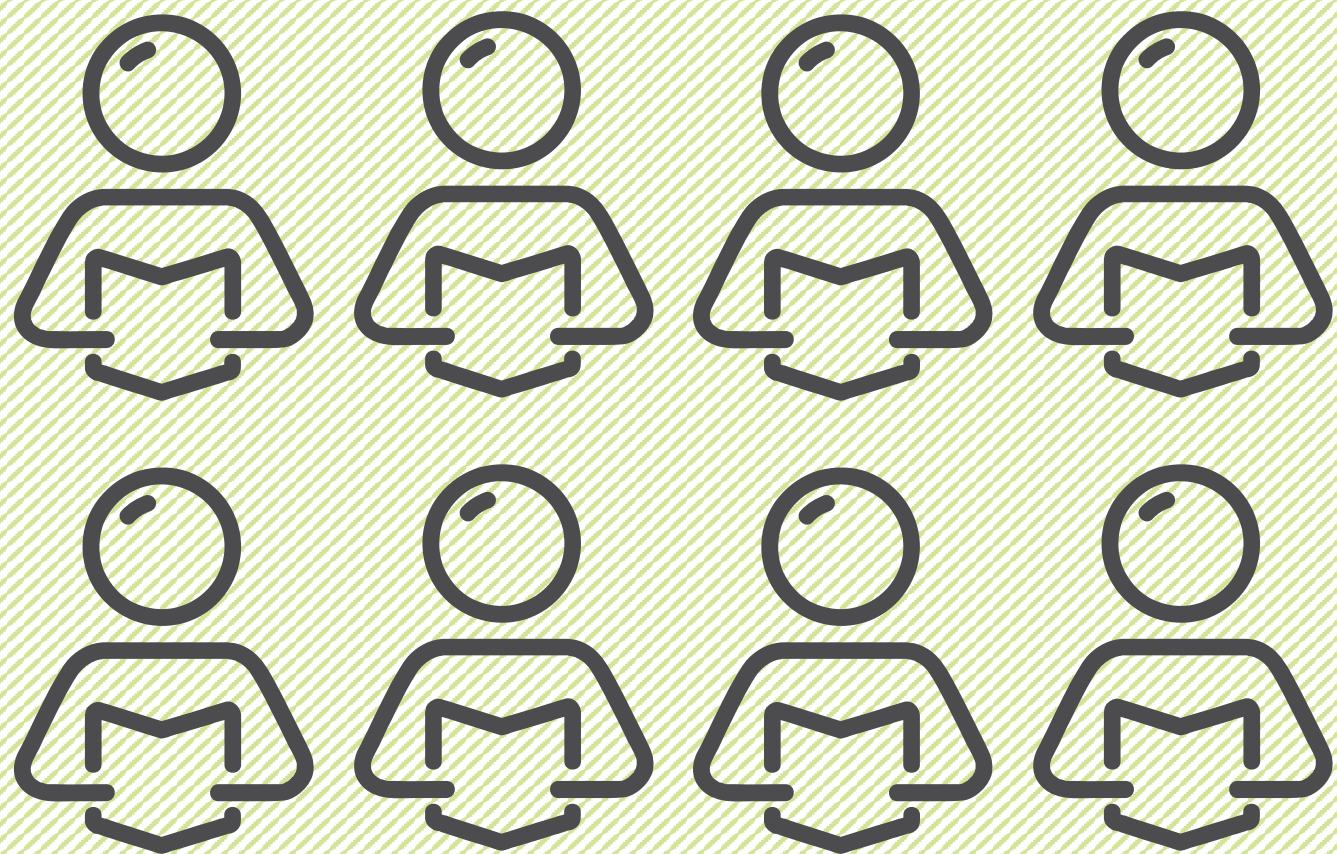
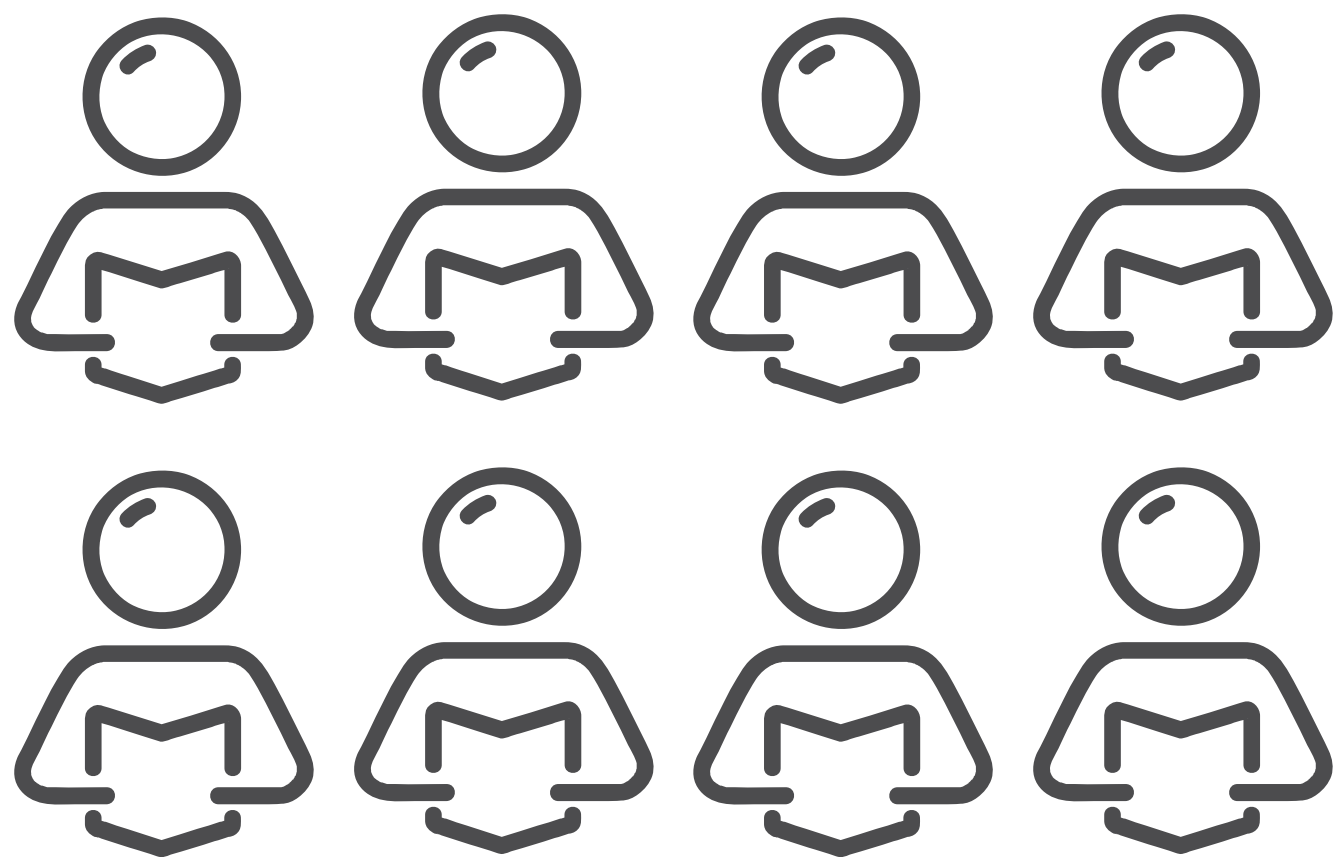
No sleep



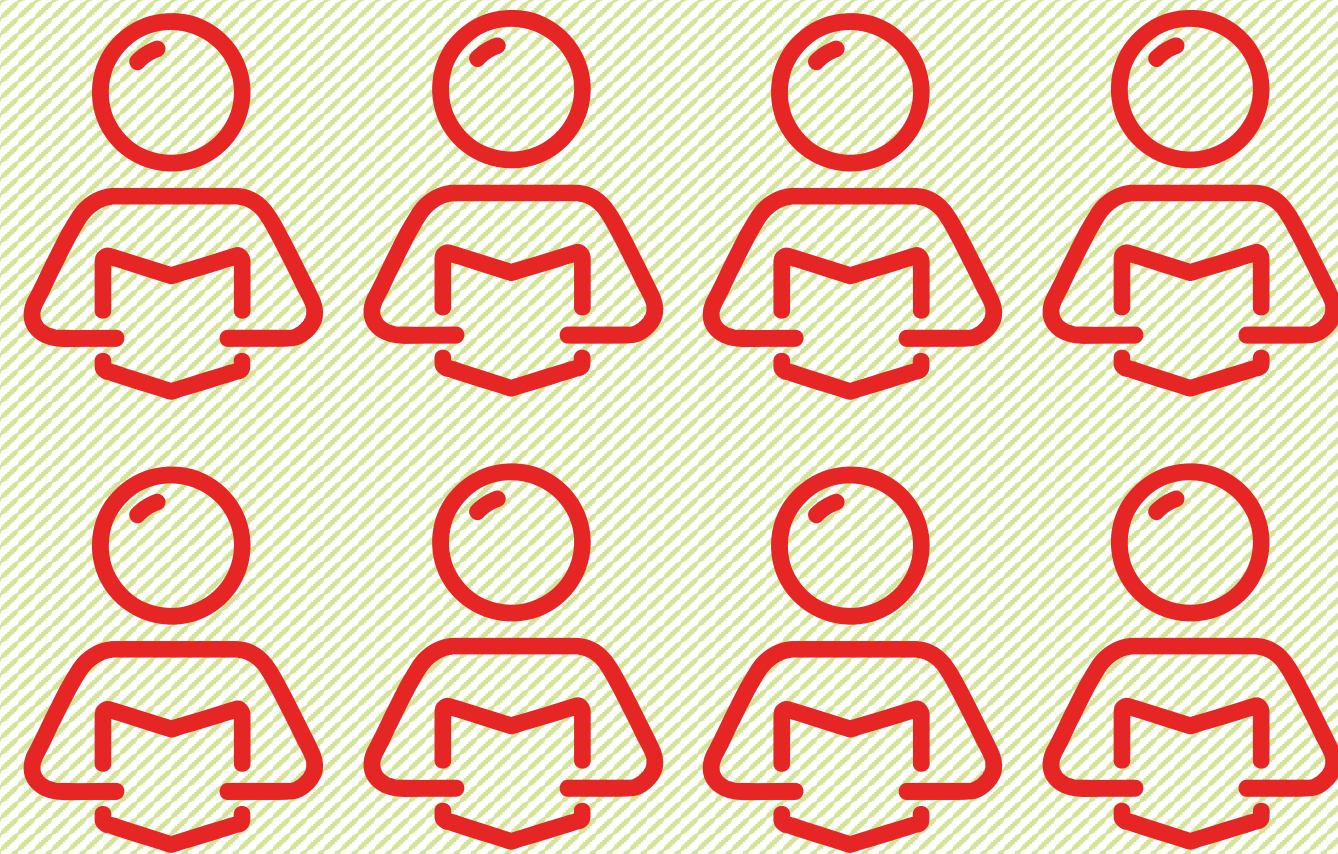
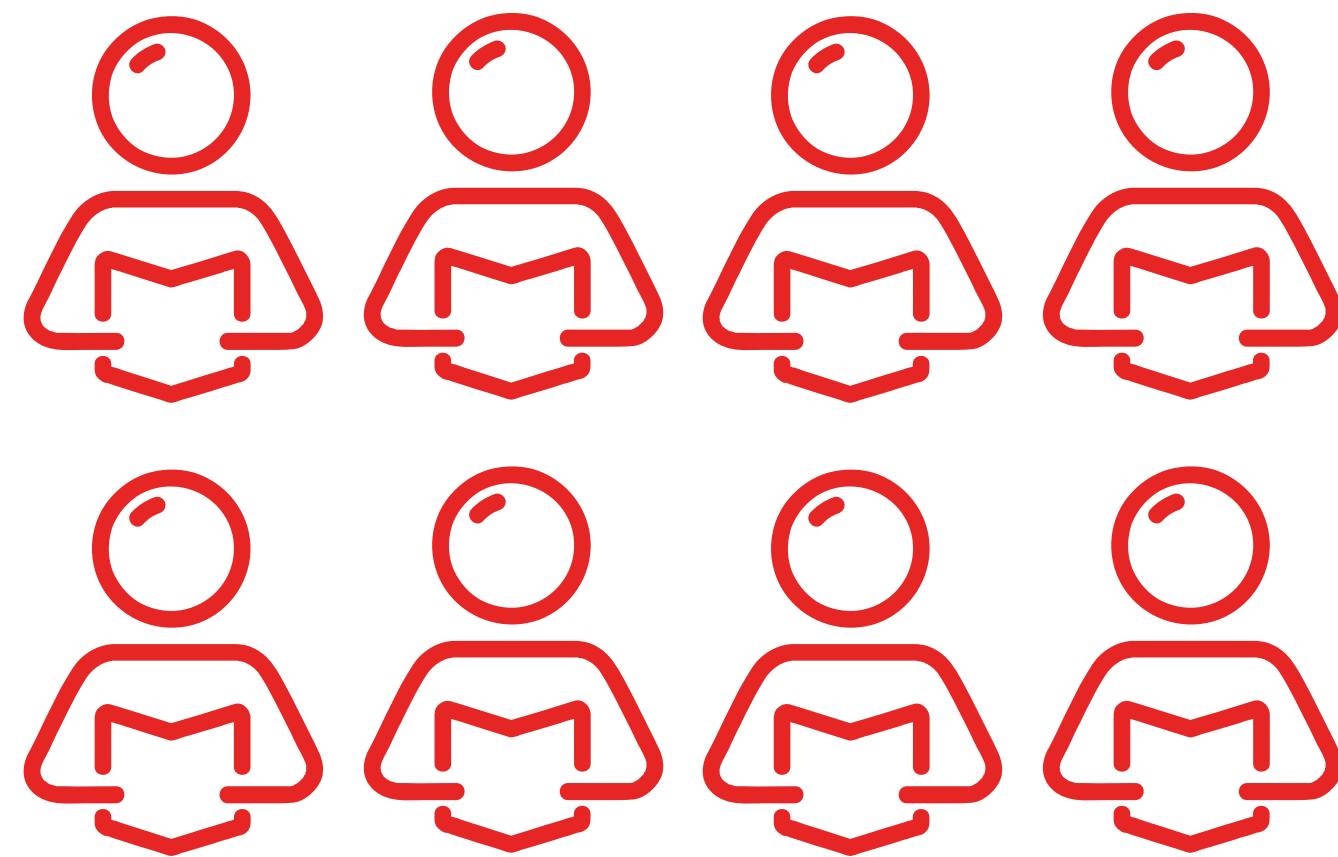
Did not expect a test

Expected a test

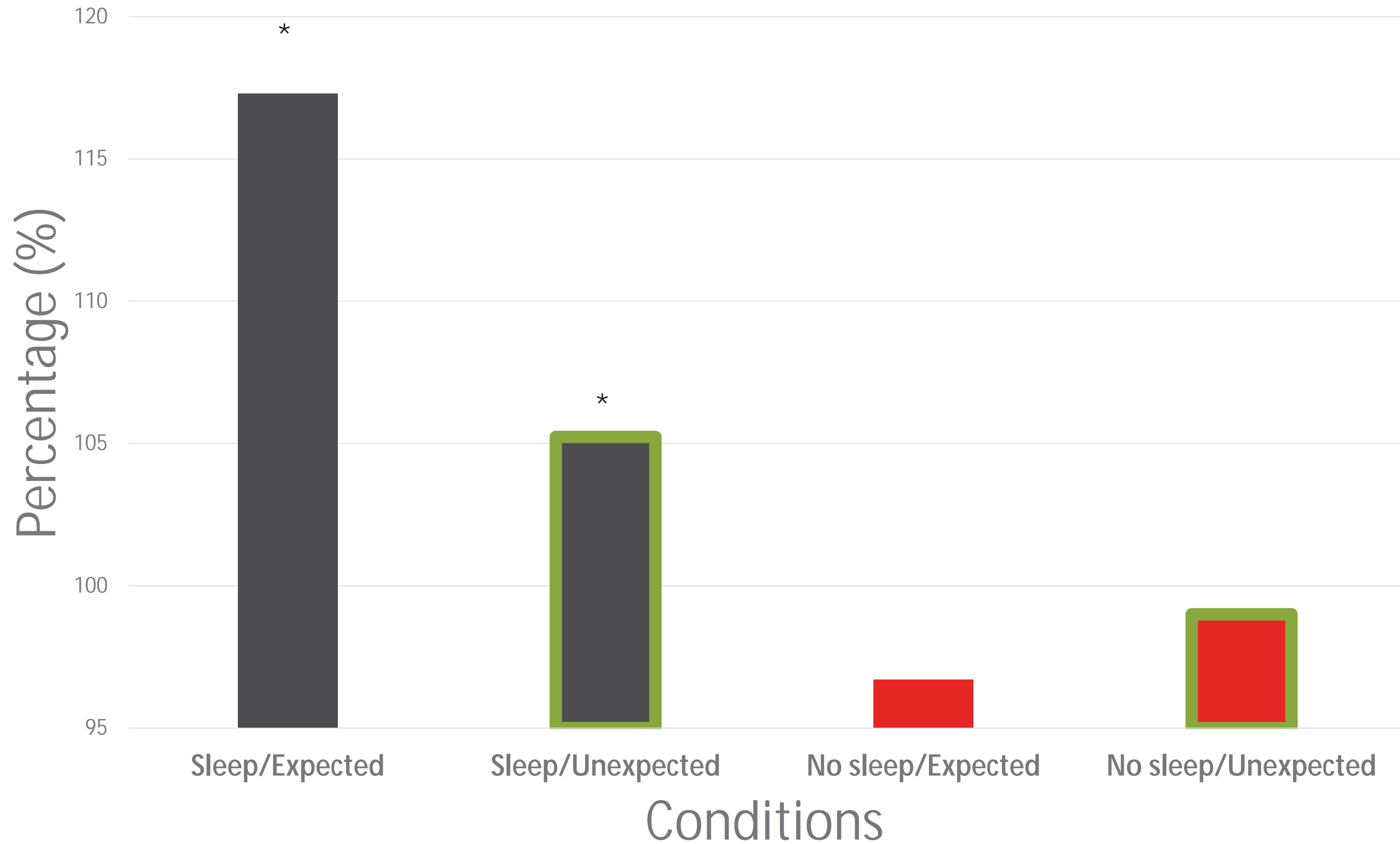
Sleep



No sleep



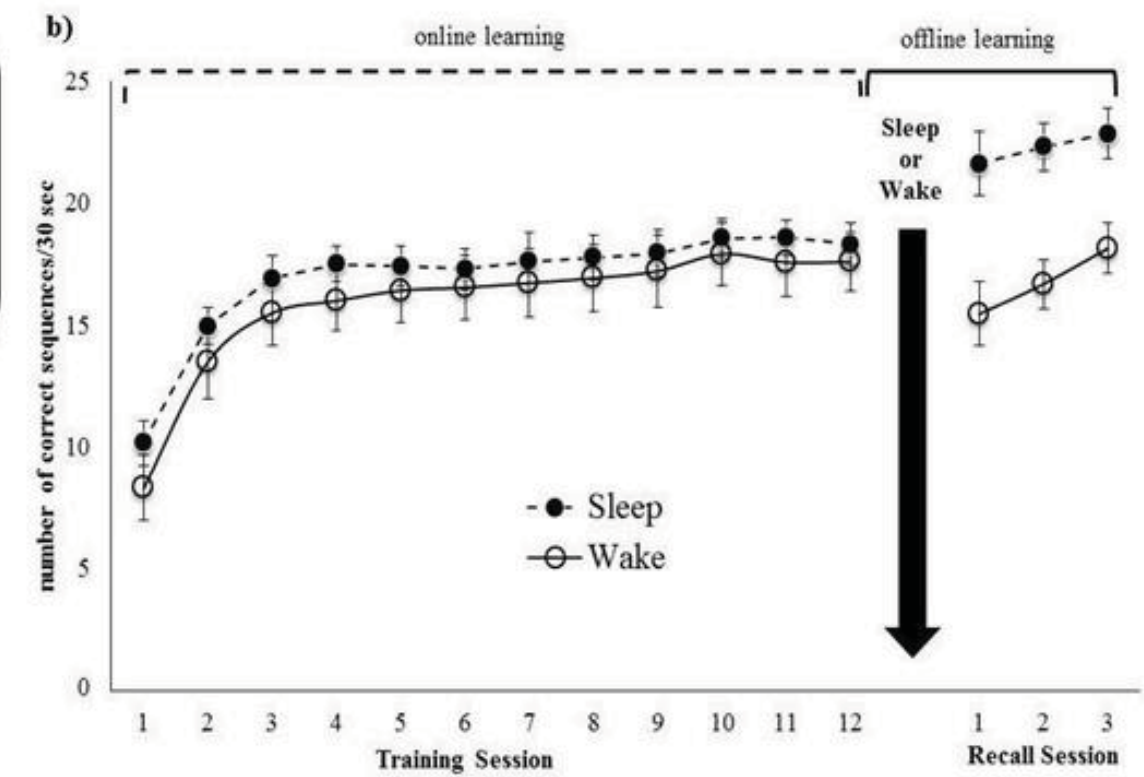
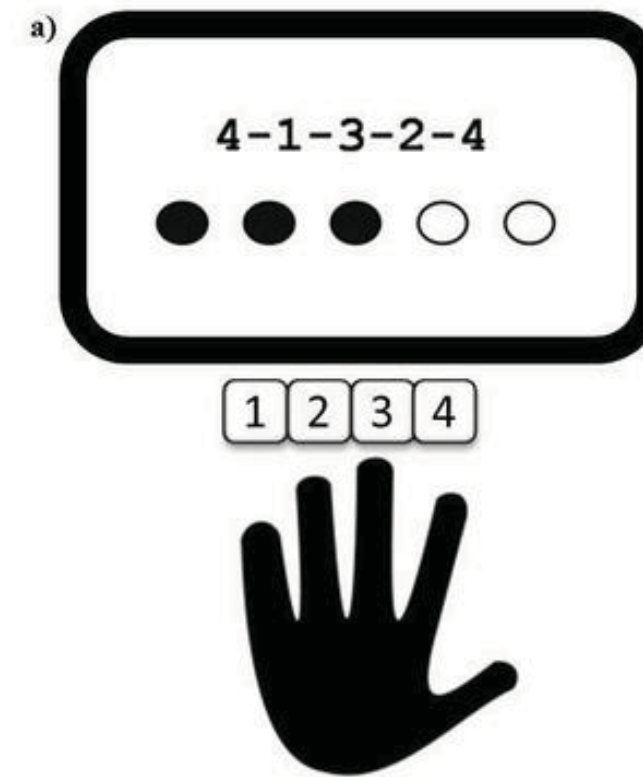
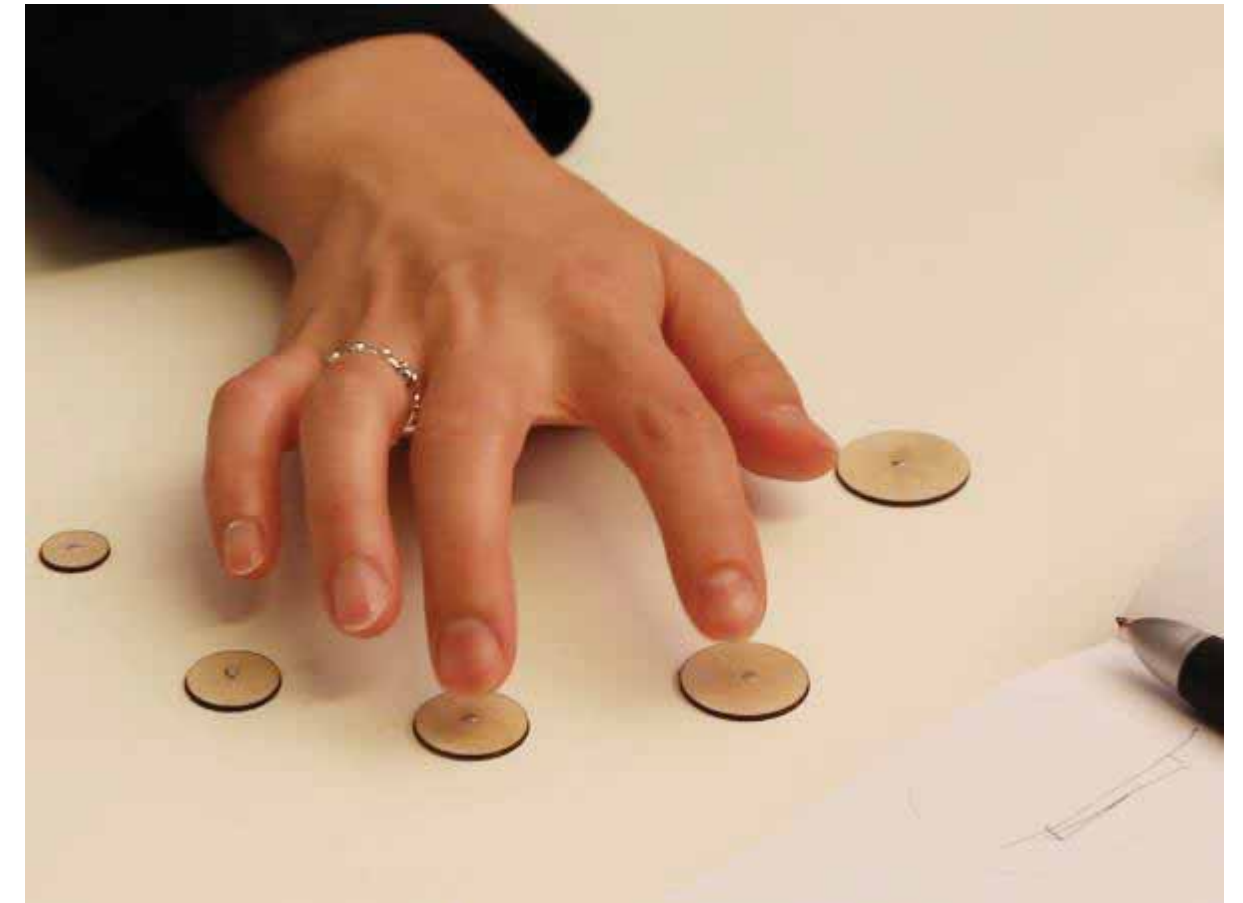
Memory recall



Sleep improves fine-motor performance

- *Improved performance on finger-tapping task*
- *No improvement without sleep*


(Tamaki et al., 2013)



“4-1-3-4-2-4-4-3-1-2-3-1-4-4-2-3-3-1.....”

1 2 3 4





 4-1-3 -4-2-4 -4-3-1 -2-3-1 -4-4-2 -3-3-1

“4-1-3-4-2-4-4-3-1-2-3-1-4-4-2-3-3-1.....”

1 2 3 4



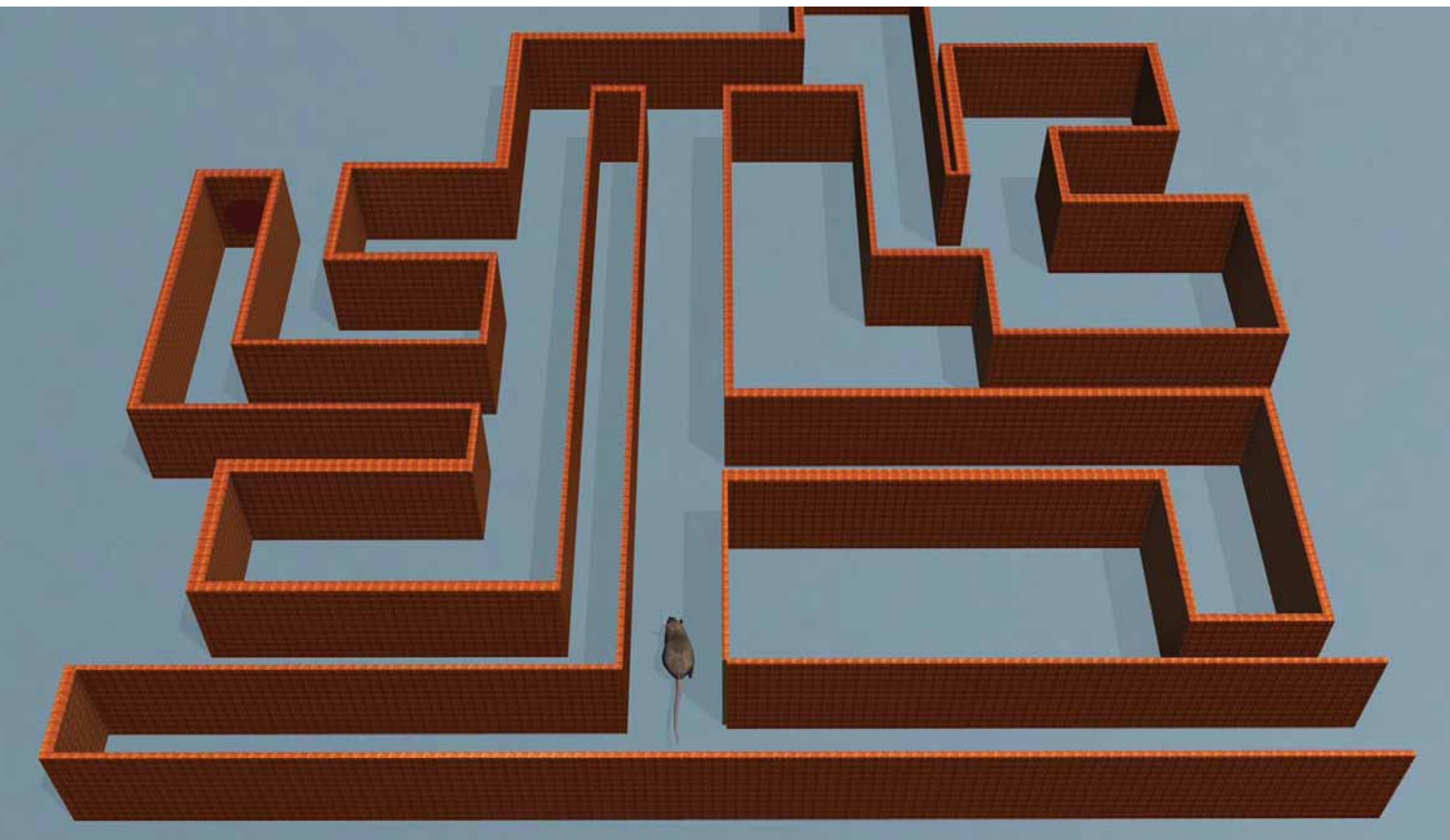
 4-1-3 -4-2-4 -4-3-1 -2-3-1 -4-4-2 -3-3-1

 4-1-3-4-2-4 4-3-1-2-3-1 4-4-2-3-3-1

“4-1-3-4-2-4-4-3-1-2-3-1-4-4-2-3-3-1.....”

1 2 3 4





Learning continued during sleep

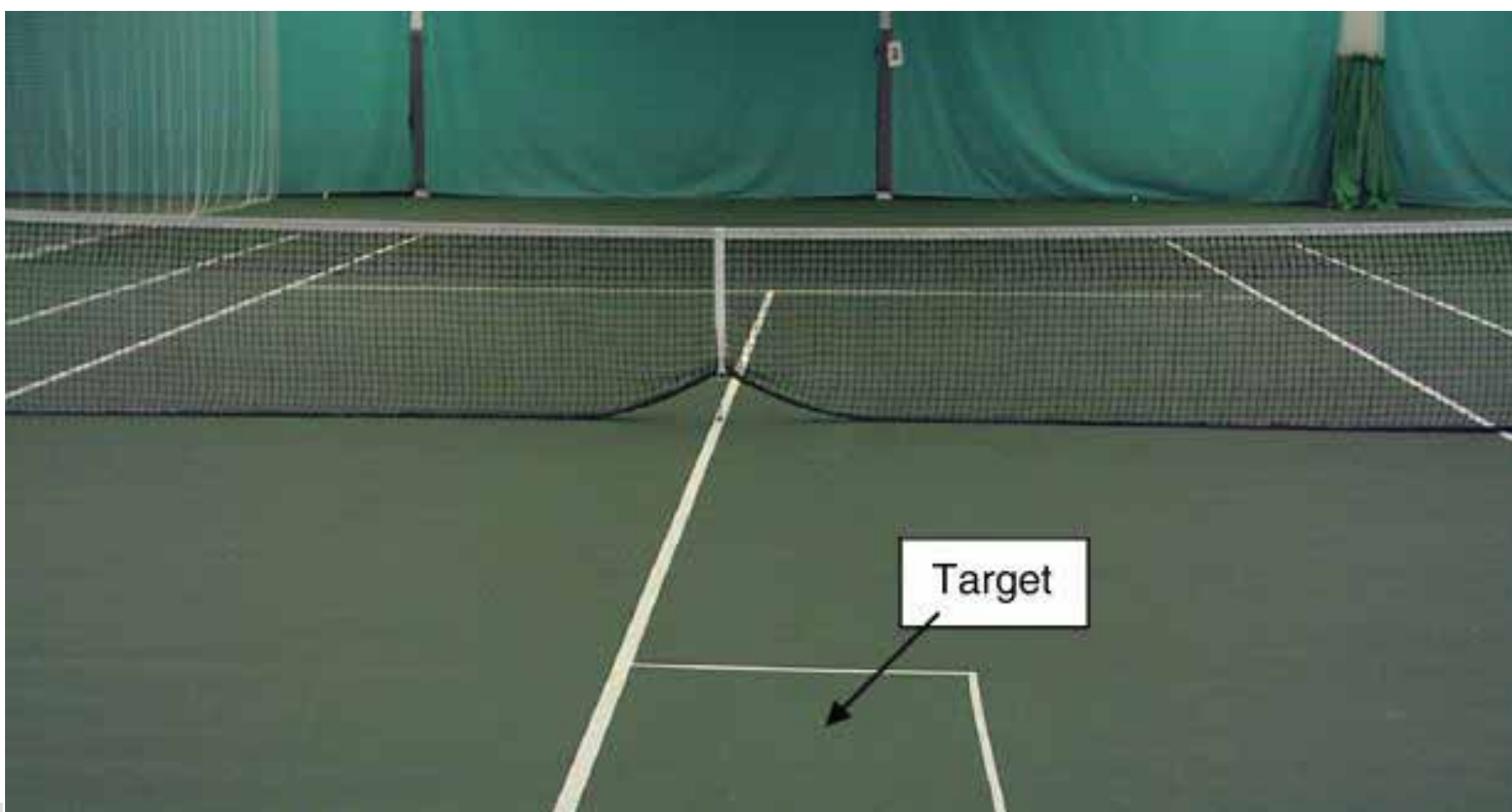
20X the original task speed

2002, Lee & Wilson

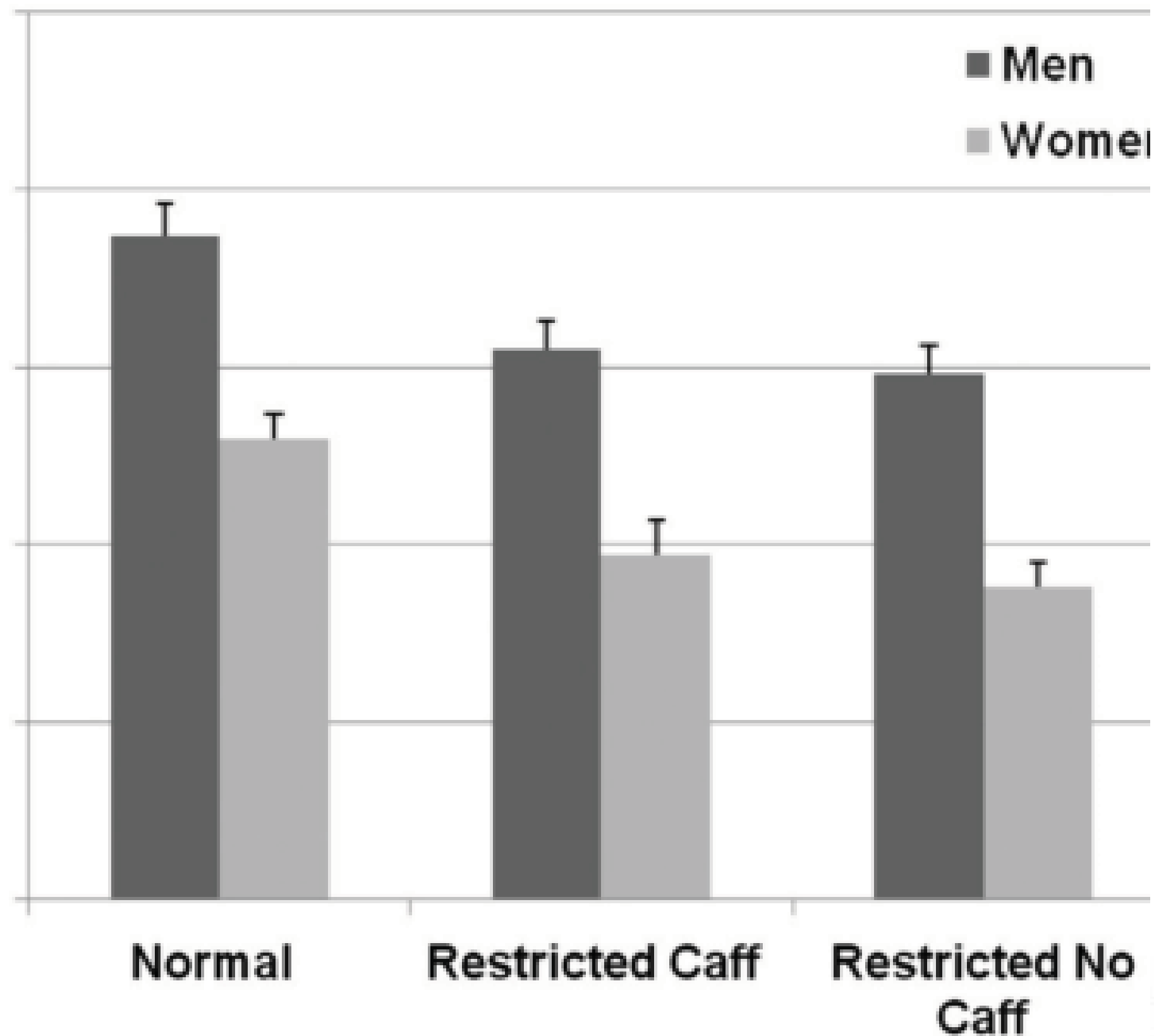
Awake

Asleep





Hits for men (n=6) and women (n=6)





**Adolescents that
slept <8 hours were
1.7 times more likely
to have an injury**





25% increased risk
following DST onset

21% decreased risk
following DST offset



37.5% increased
risk of injuries
following DST

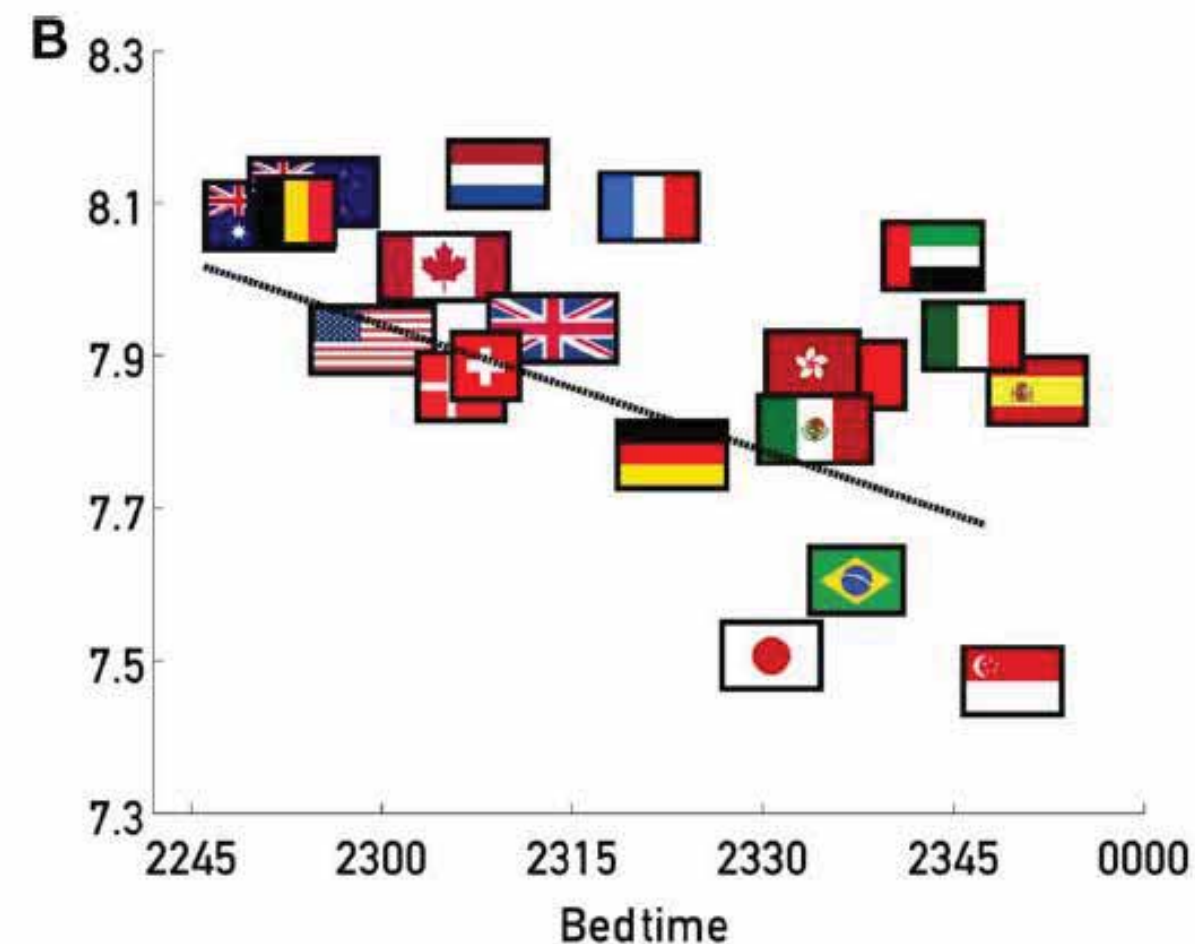
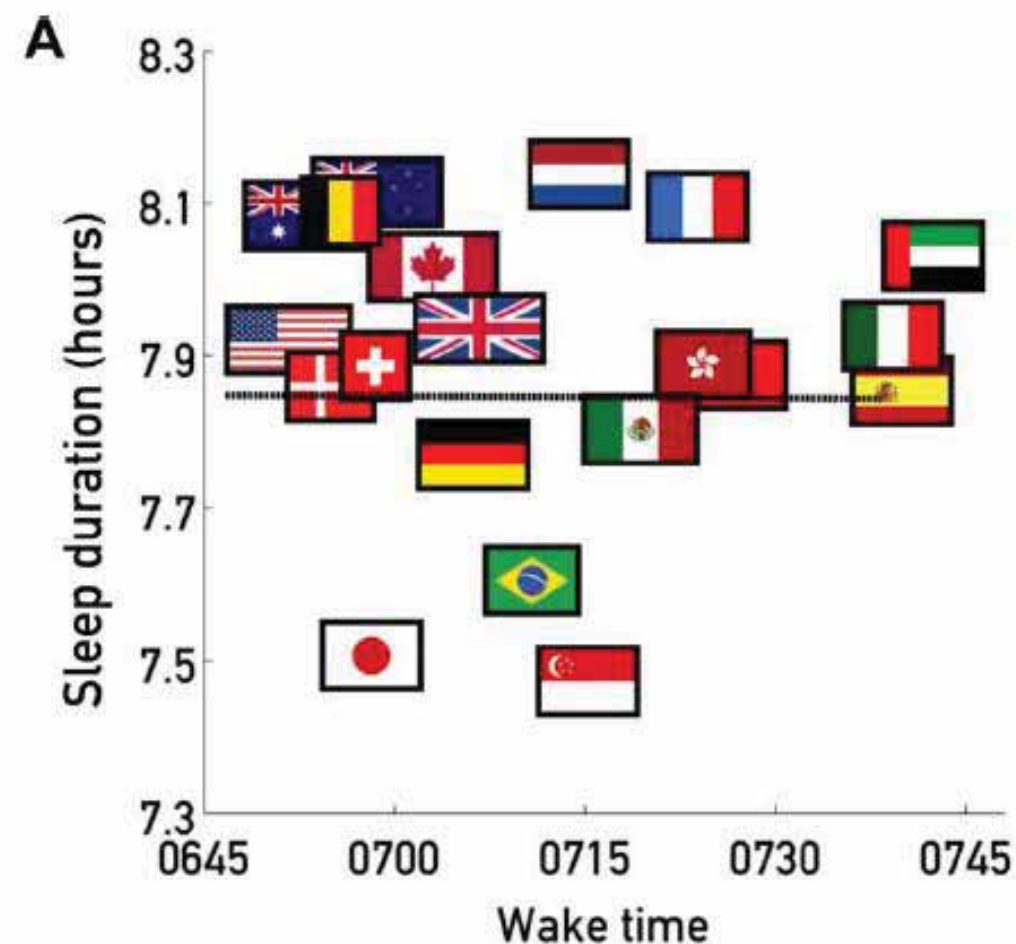
The need to consider context & culture

RESEARCH ARTICLE

SLEEP RESEARCH

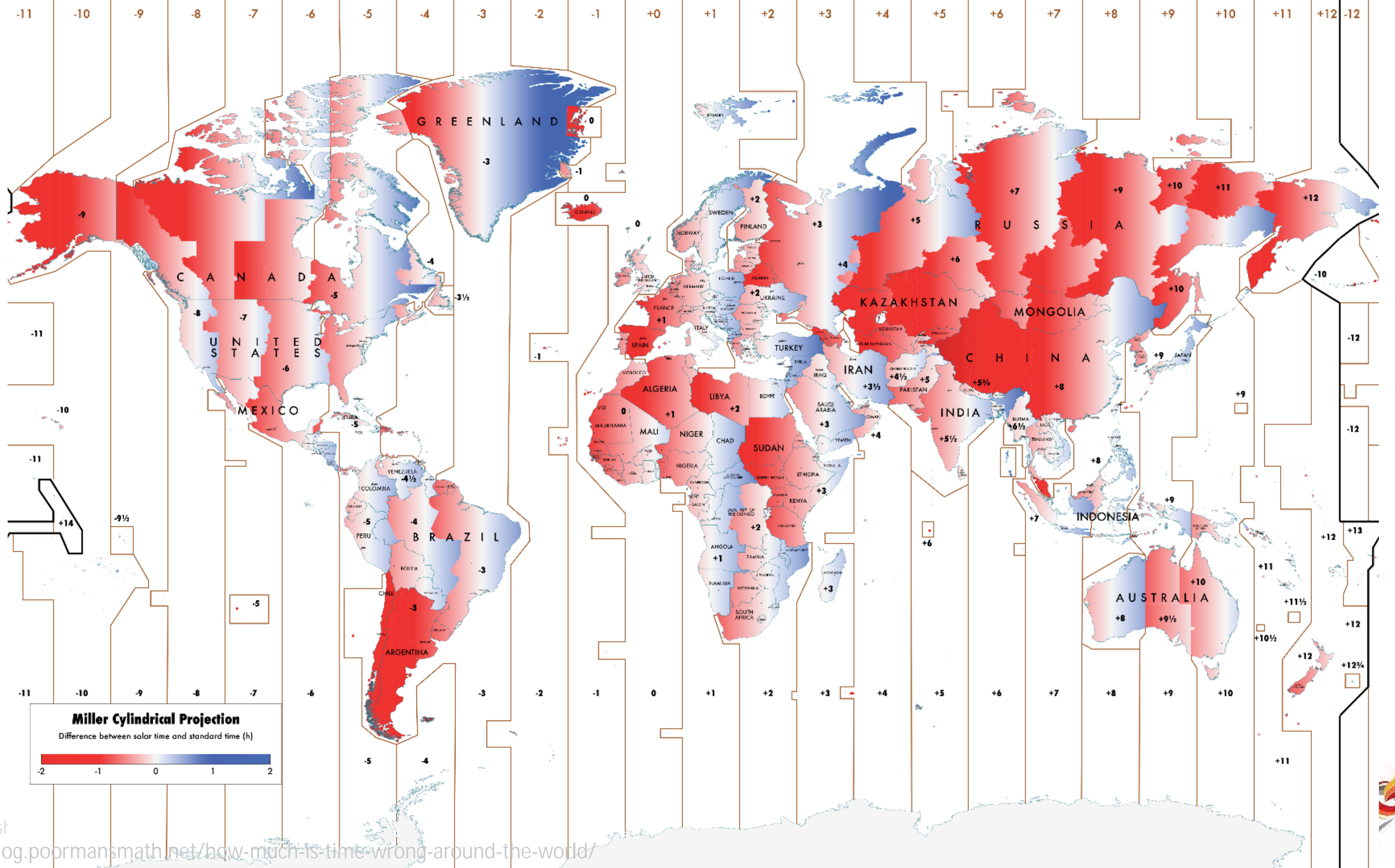
A global quantification of “normal” sleep schedules using smartphone data

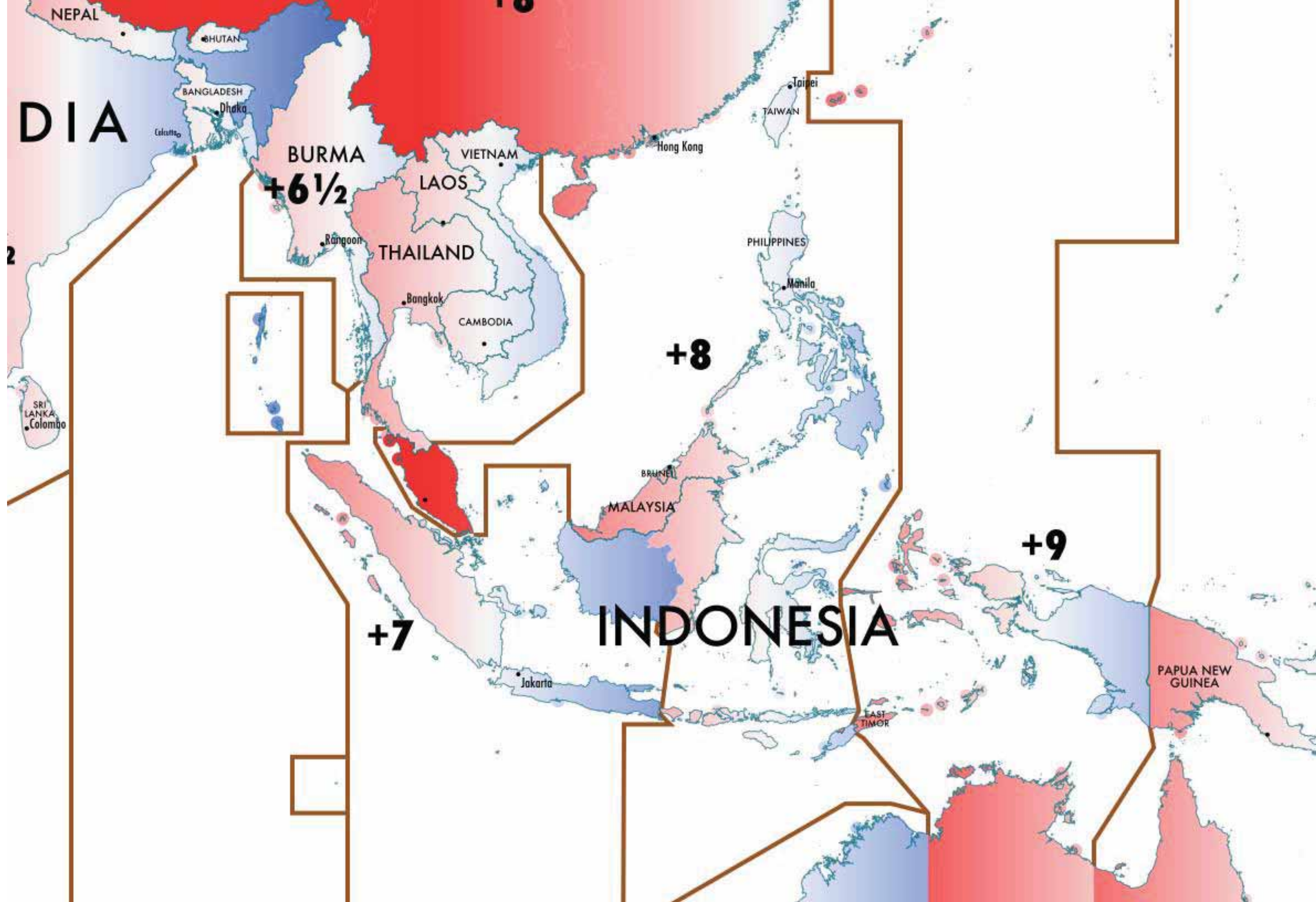
Olivia J. Walch,¹ Amy Cochran,¹ Daniel B. Forger^{1,2*}





Does our standard time coincide with solar time?





The Time Zone Dilemma



Sun sets later in
Singapore



Primed to sleep at
later timing
(due to delayed
melatonin secretion)



Attend school/work
same time as
GMT+8 counterparts

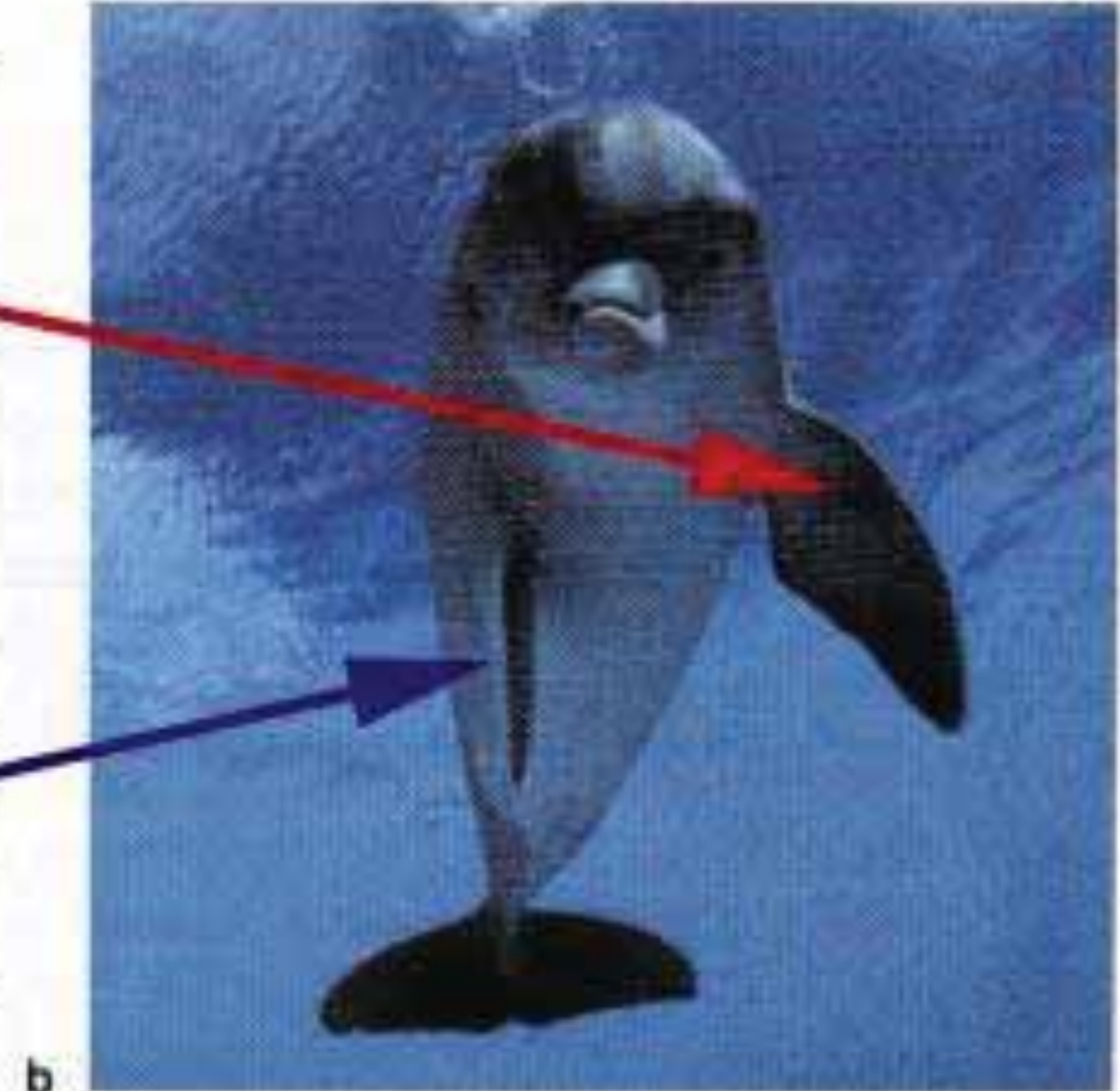
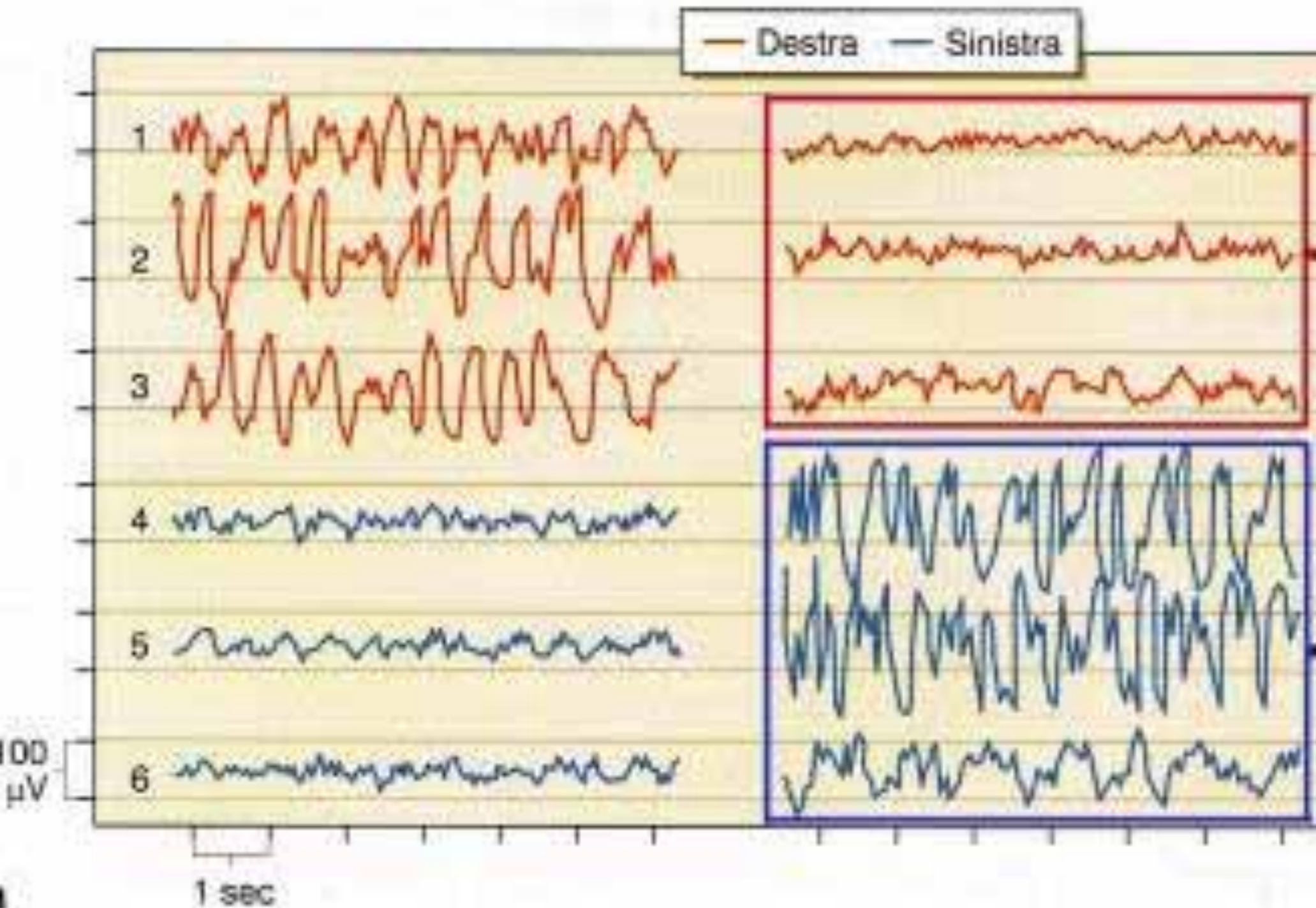


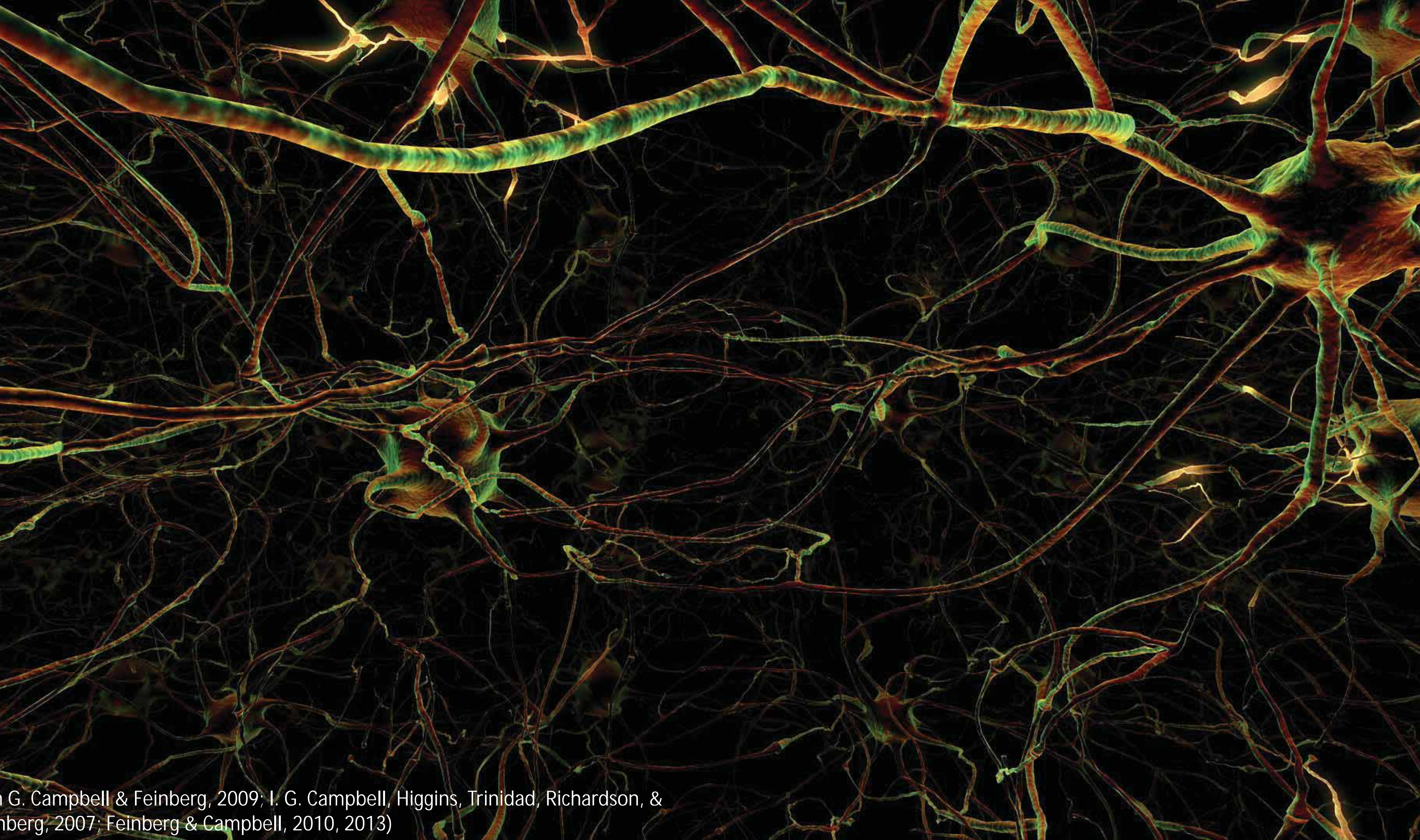
Experience lower
quantity and quality
of sleep

“You just have to sleep earlier!”

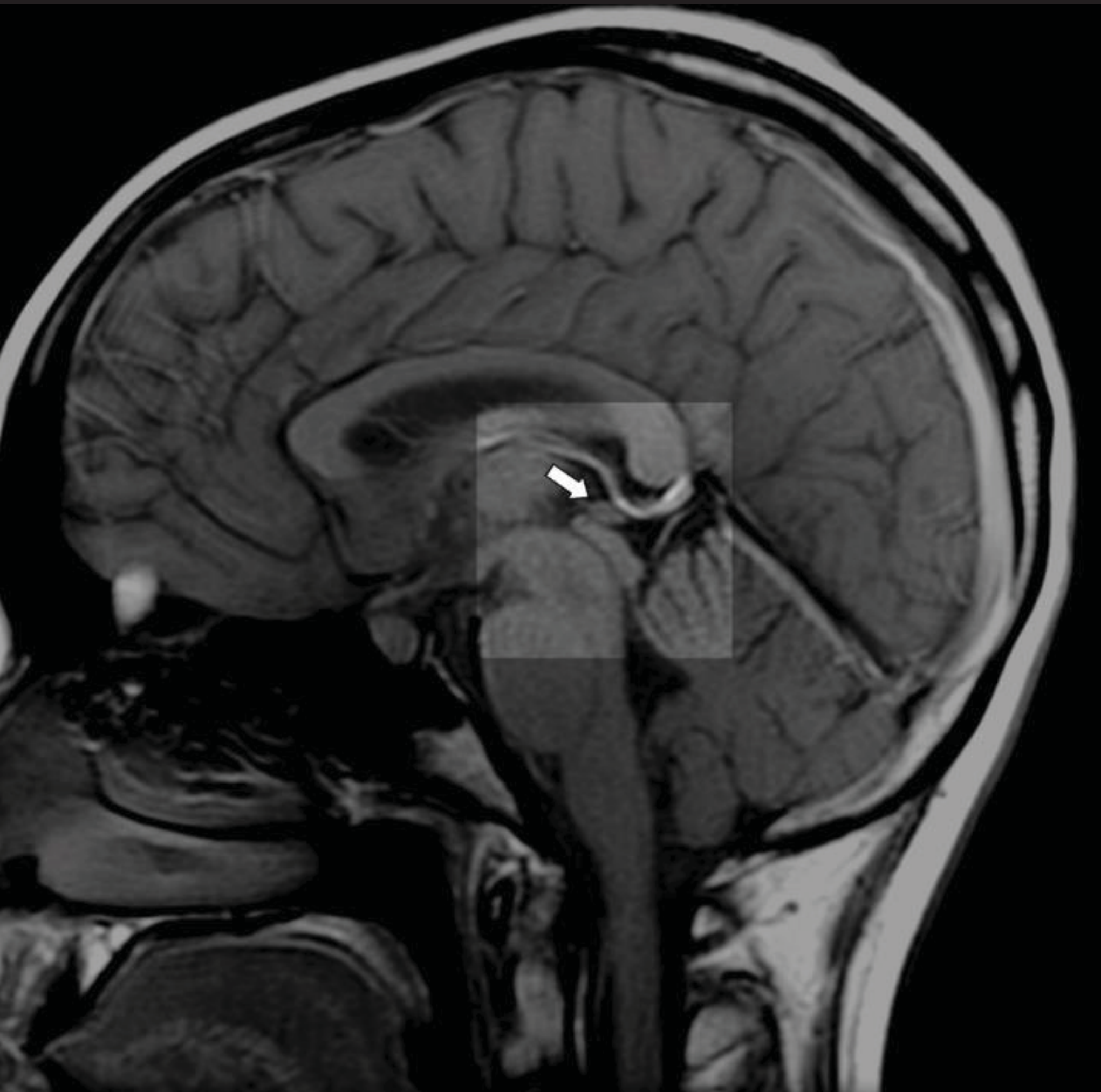
We don't all sleep the same way!

Dolphins/Wales have unihemispheric sleep





I. G. Campbell & Feinberg, 2009; I. G. Campbell, Higgins, Trinidad, Richardson, &
Feinberg, 2007; Feinberg & Campbell, 2010, 2013)



Melatonin influences
“drive” to sleep

Adolescents have **later**
melatonin onsets

Light from
electronic devices
further **delay**
melatonin release
in adolescents





CNA Insider

Yesterday at 12:54pm · 🌐

At Nanyang Girls' High School, classes now begin 45 minutes later than most schools, at 8.15am.

The impact on their students has been telling.

READ MORE: <http://bit.ly/2pxYt5L>



For a long time, we know that our girls are not sleeping enough.

402K Views

👍 Like 💬 Comment ➦ Share

“I was in the toilet and I fell asleep. I fell down and hurt myself.”

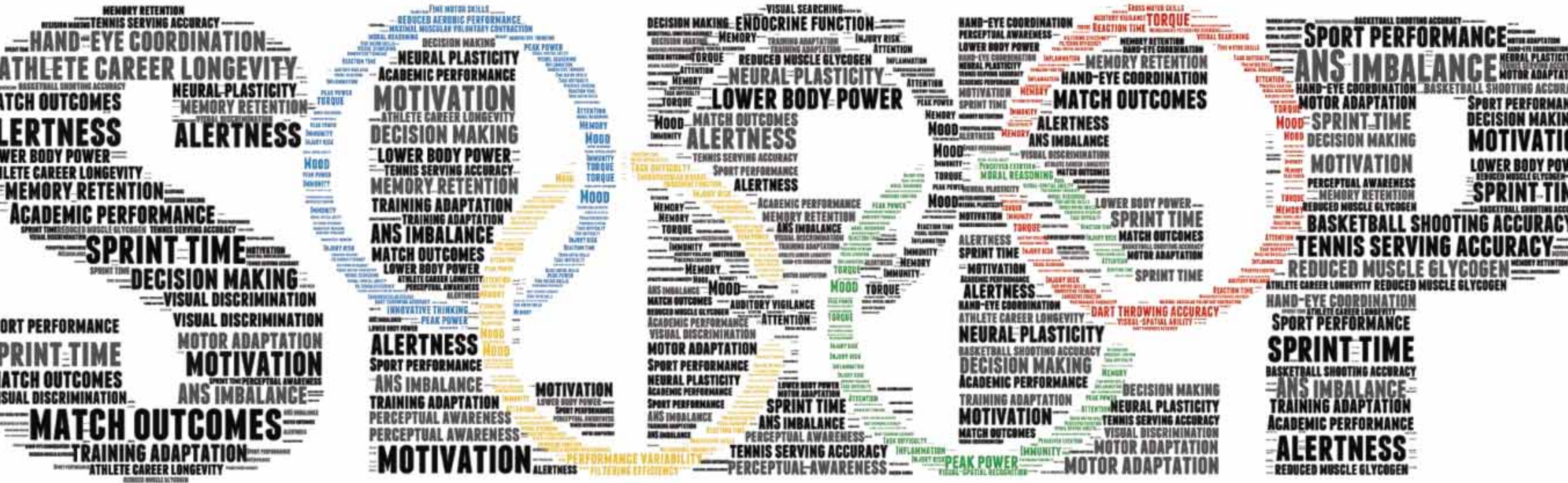
Sleep in Singaporean Youth Athletes



7 in 10 Singaporean youth get
insufficient sleep



4 in 10 suffer from excessive
daytime sleepiness



How do we shape the habits of a nation?



haresh_suppiah@nysi.org



hareshsuppiah