Topic 3
Consciousness

Overview

- Introduction
- Variations in consciousness
- Attention
- Sleep
- Drugs

History of Consciousness

- Psychology began as a science of consciousness.
- Behaviorists argued about alienating consciousness from psychology.
- However, after 1960, mental concepts (consciousness) started reentering psychology.

Consciousness

- Subjective awareness of ourselves and our environment
- An awareness of the sensations, thoughts, and feelings that one is attending to at a given moment.
- More controlled/focused when learning a complex concept or behavior
- Becomes automatic by practice

Subjective awareness of ourselves and our environment

Some states occur spontaneously	Daydreaming	Drowsiness	Dreaming
Some are physiologically induced	Hallucinations	Orgasm	Food or oxygen starvation
Some are psychologically induced	Sensory deprivation	Hypnosis	Meditation

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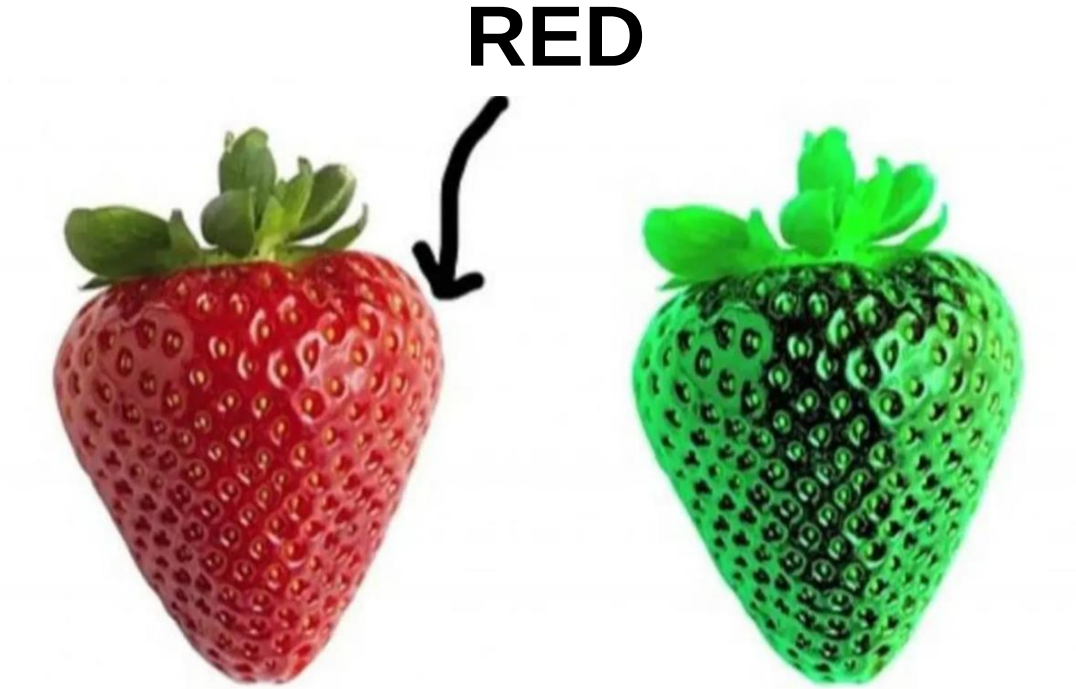
Introduction

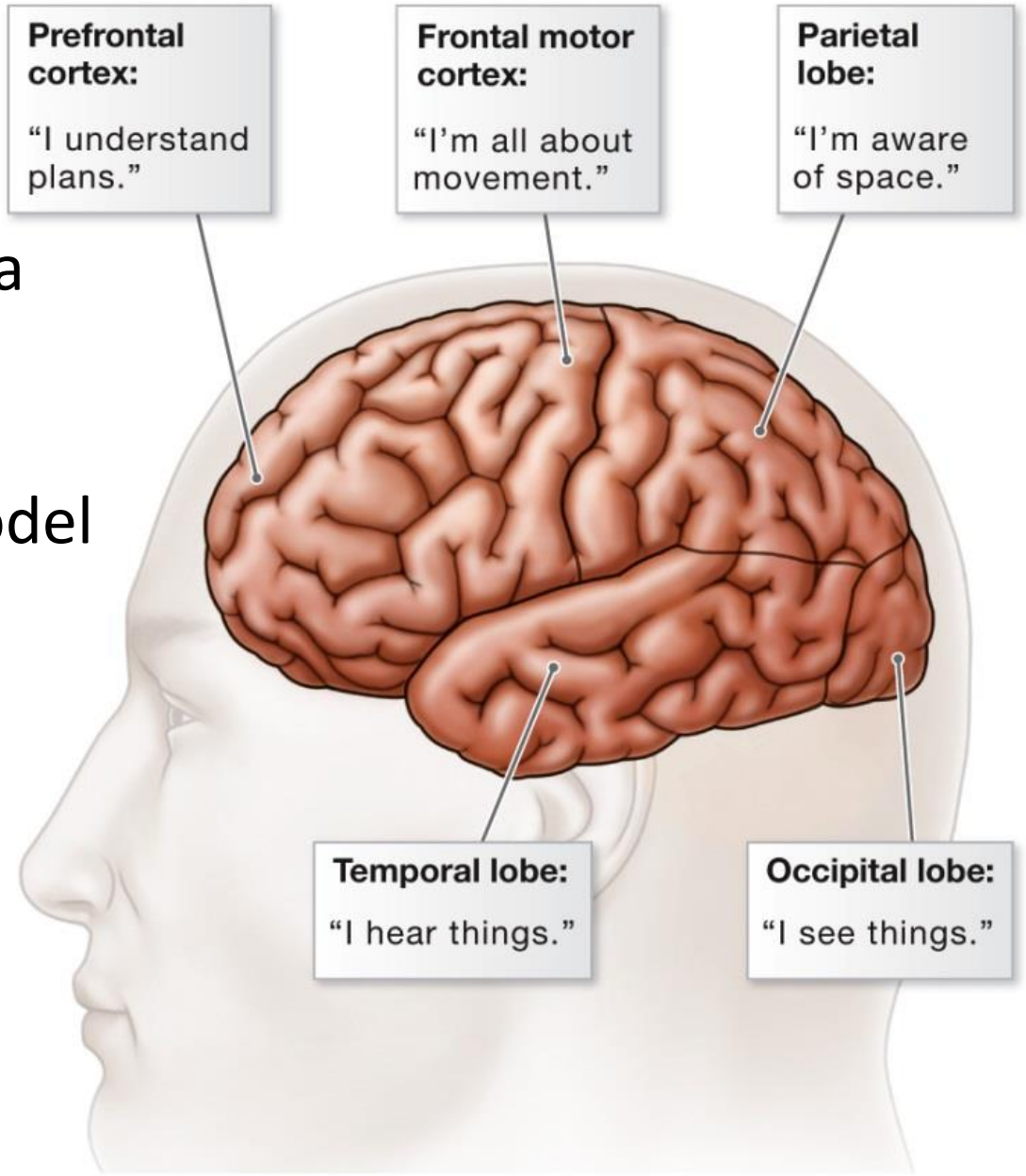
- **Consciousness**: one's subjective experience of the world, resulting from brain activity
  - The brain and the mind are inseparable.
  - Each of us experiences consciousness personally.
    - We cannot know if two people experience the world in exactly the same way.

QUALIA



Introduction

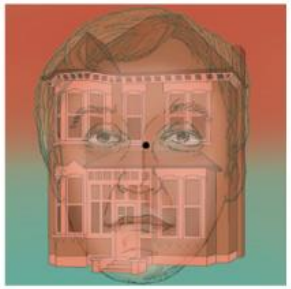
Consciousness arises as a function of which brain circuits are active
-> Global Workspace Model



Introduction

HYPOTHESIS: Specific patterns of brain activity can predict what a person is seeing.

RESEARCH METHOD:



1. Participants were shown images with houses superimposed on faces.

2. Participants were asked to report whether they saw a house or a face.

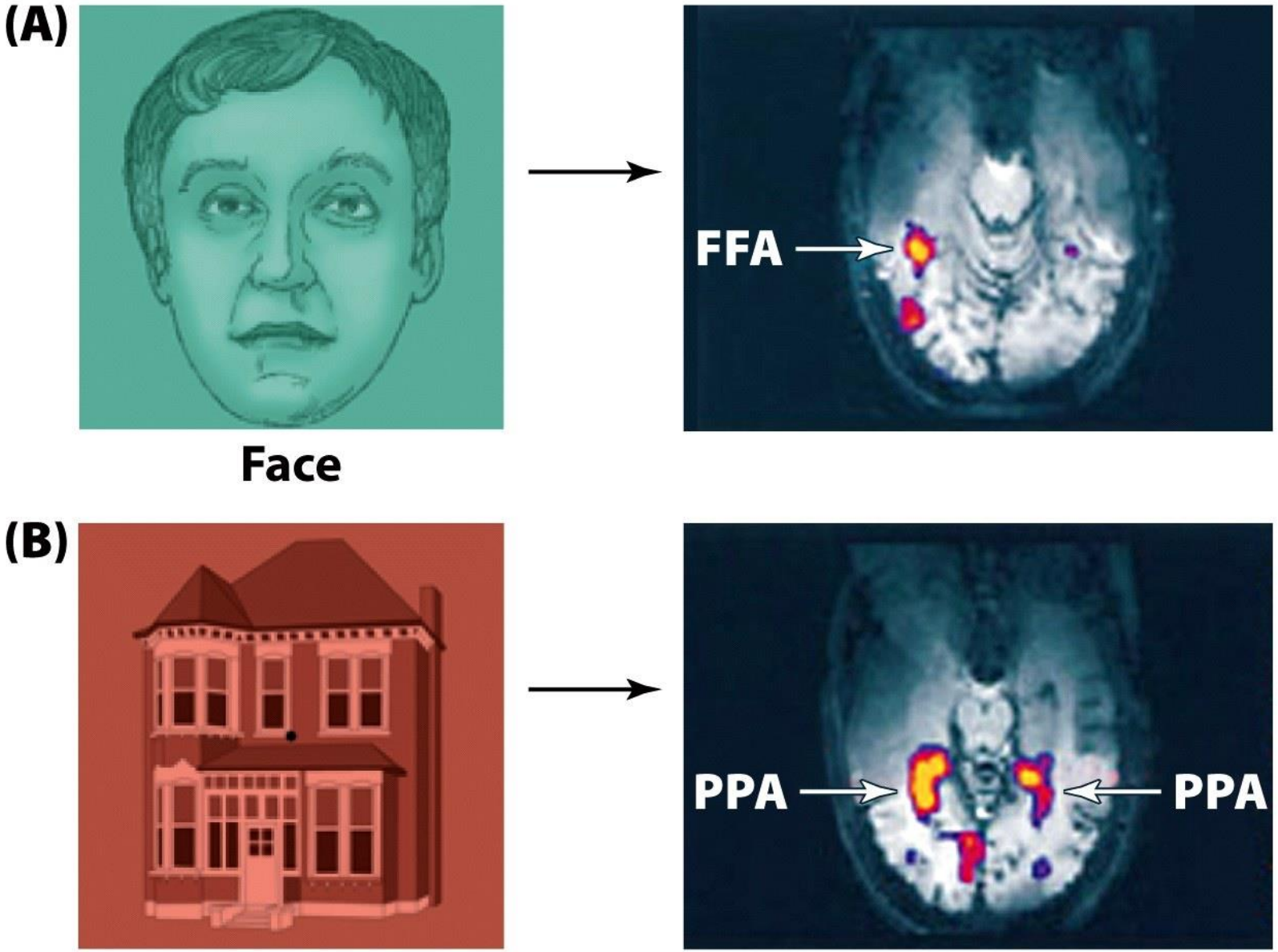
3. Researchers used fMRI to measure neural responses in participants' brains.

RESULTS: Activity increased in the fusiform face area when participants reported seeing a face, but activity increased in temporal cortex regions associated with object recognition when participants reported seeing a house.

CONCLUSION: Type of awareness is related to which brain region processes the particular sensory information.

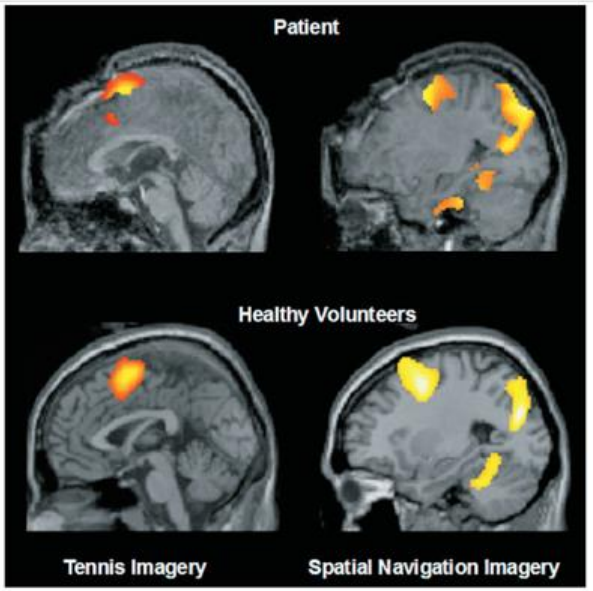
SOURCE: Tong, F., Nakayama, K., Vaughan, J. T., & Kanwisher, N. (1998). Binocular rivalry and visual awareness in human extrastriate cortex. *Neuron, 21,* 753–759.

Introduction



Cognitive Neuroscience

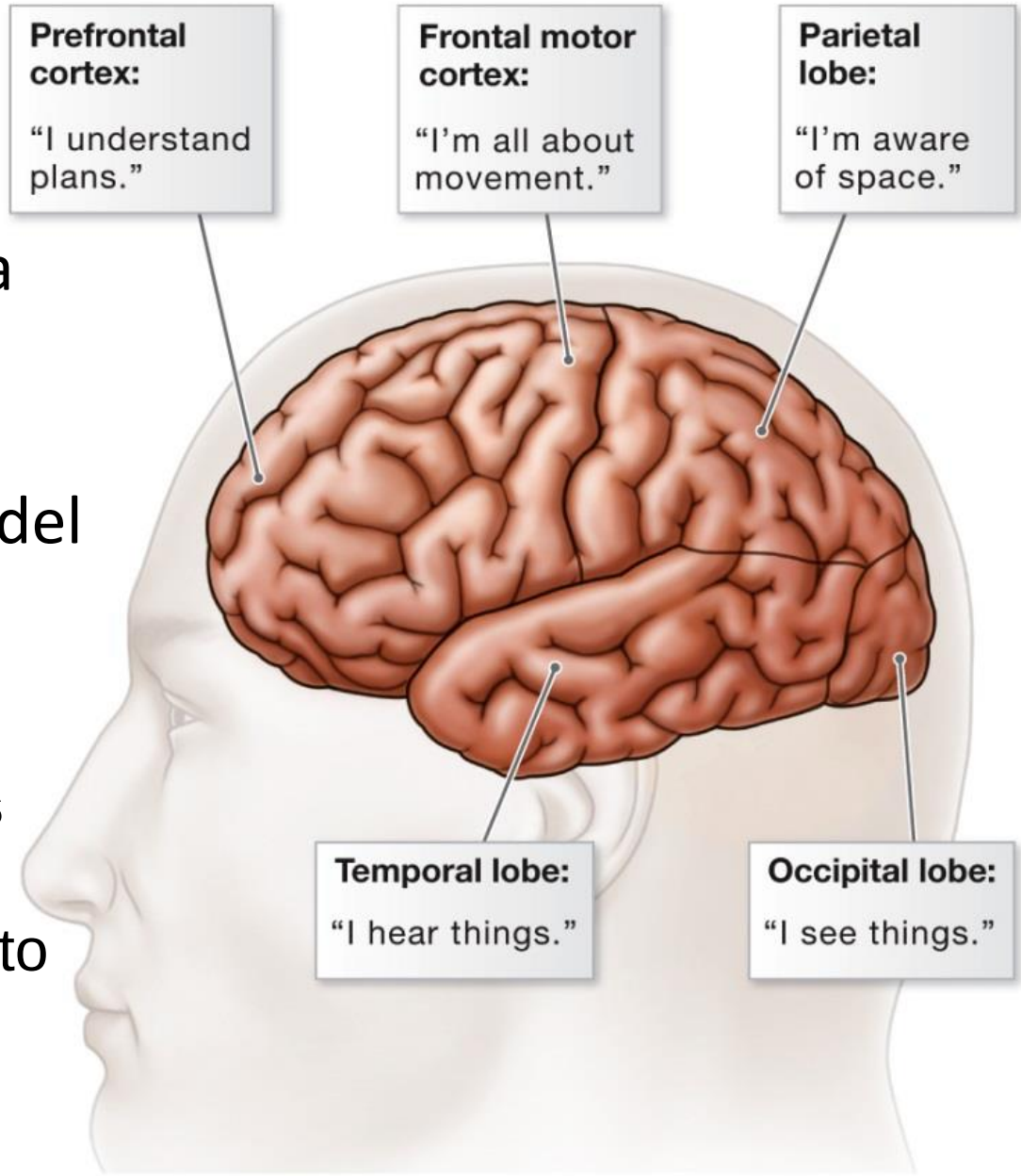
- If you think about throwing a basketball, the areas of the brain involved in the planning are activated.
  - Responsiveness in comatose patients



Courtesy of Adrian M. Owen, the Brain and Mind Institute, Western University

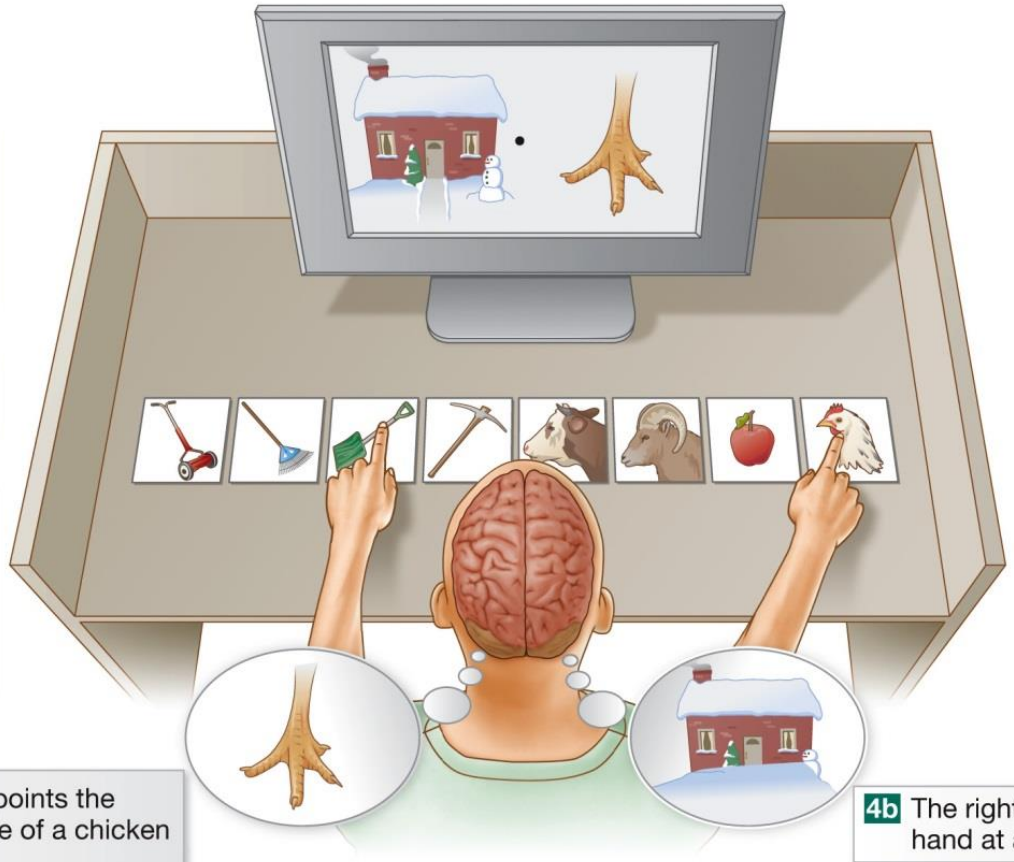
Introduction

Consciousness arises as a function of which brain circuits are active
-> Global Workspace Model



After-the-fact-explanations

- unconscious acts that the conscious mind struggles to explain



1 A split-brain participant watches as different images flash simultaneously on the left and right.

2 Below the screen is a row of other images.

3 The patient is asked to point each hand at a bottom image most related to the image flashed on that side of the screen.

4a The left hemisphere points the right hand at a picture of a chicken head.

4b The right hemisphere points the left hand at a picture of a snow shovel.

5 When the split-brain participant is asked to explain these selections, the verbal left hemisphere provides the answers. To explain the right hand's selection of the chicken head, the left hemisphere says that the chicken claw goes with the chicken head. To explain the left hand's selection of the shovel, the left hemisphere must interpret, because it does not see the snow scene. The left hemisphere decides that the shovel is used to clean up after chickens.

Psychological Review

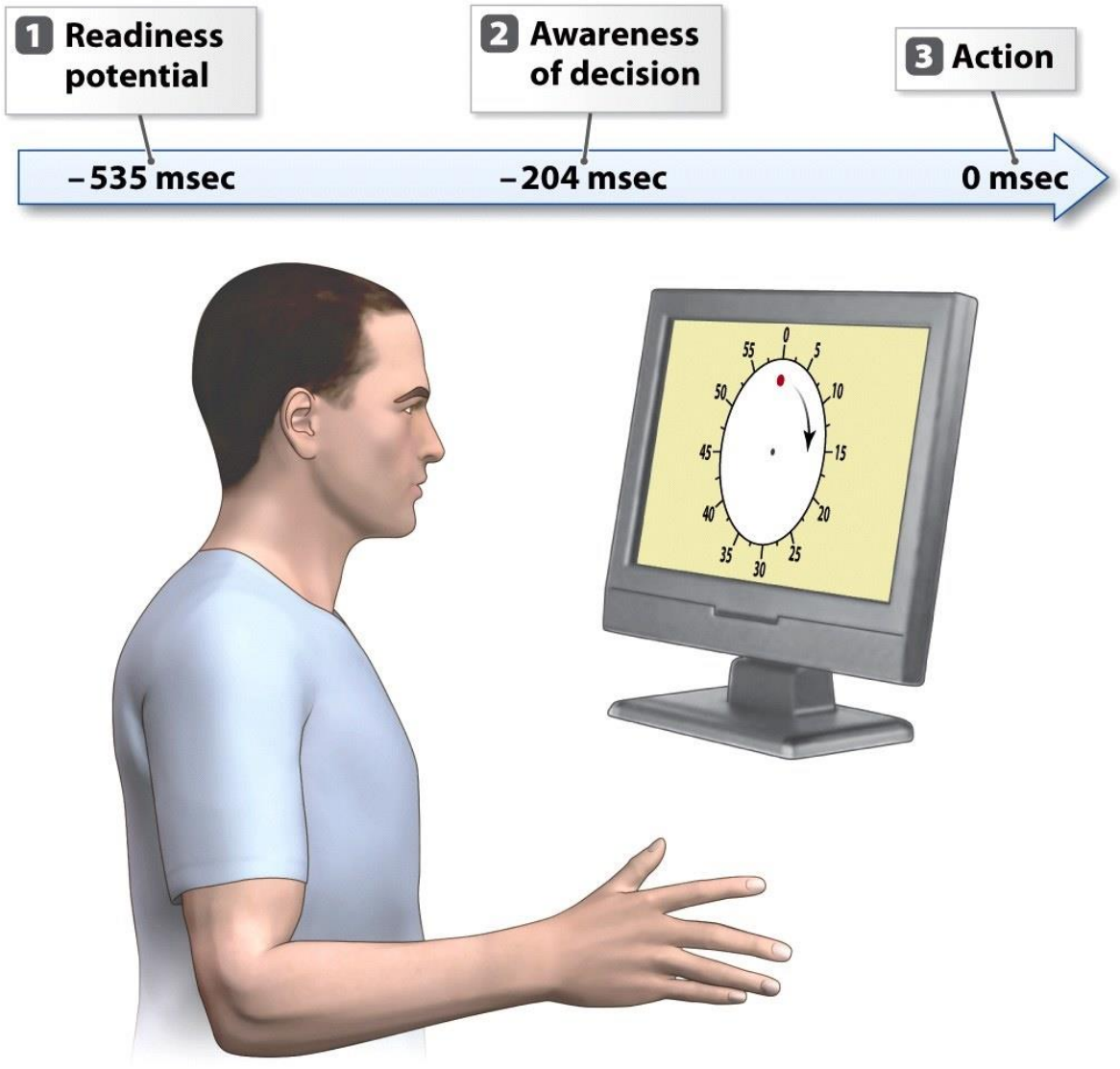
VOLUME 84 NUMBER 3 MAY 1977

Telling More Than We Can Know: Verbal Reports on Mental Processes

Richard E. Nisbett and Timothy DeCamp Wilson
University of Michigan

Evidence is reviewed which suggests that there may be little or no direct introspective access to higher order cognitive processes. Subjects are sometimes (a) unaware of the existence of a stimulus that importantly influenced a response, (b) unaware of the existence of the response, and (c) unaware that the stimulus has affected the response. It is proposed that when people attempt to report on their cognitive processes, that is, on the processes mediating the effects of a stimulus on a response, they do not do so on the basis of any true introspection. Instead, their reports are based on a priori, implicit causal theories, or judgments about the extent to which a particular stimulus is a plausible cause of a given response. This suggests that though people may not be able to observe directly their cognitive processes, they will sometimes be able to report accurately about them. Accurate reports will occur when influential stimuli are salient and are plausible causes of the responses they produce, and will not occur when stimuli are not salient or are not plausible causes.

Introduction



Variations in consciousness

- Variations in “normal” consciousness
  - Attention
  - Sleep
  - Drugs

Attention

Attention

- Attention refers to the process tha
  focus selectively on some things a
  others
  - Cocktail party phenomenon (Cherry,
    - The ability to attend selectively t
      many.

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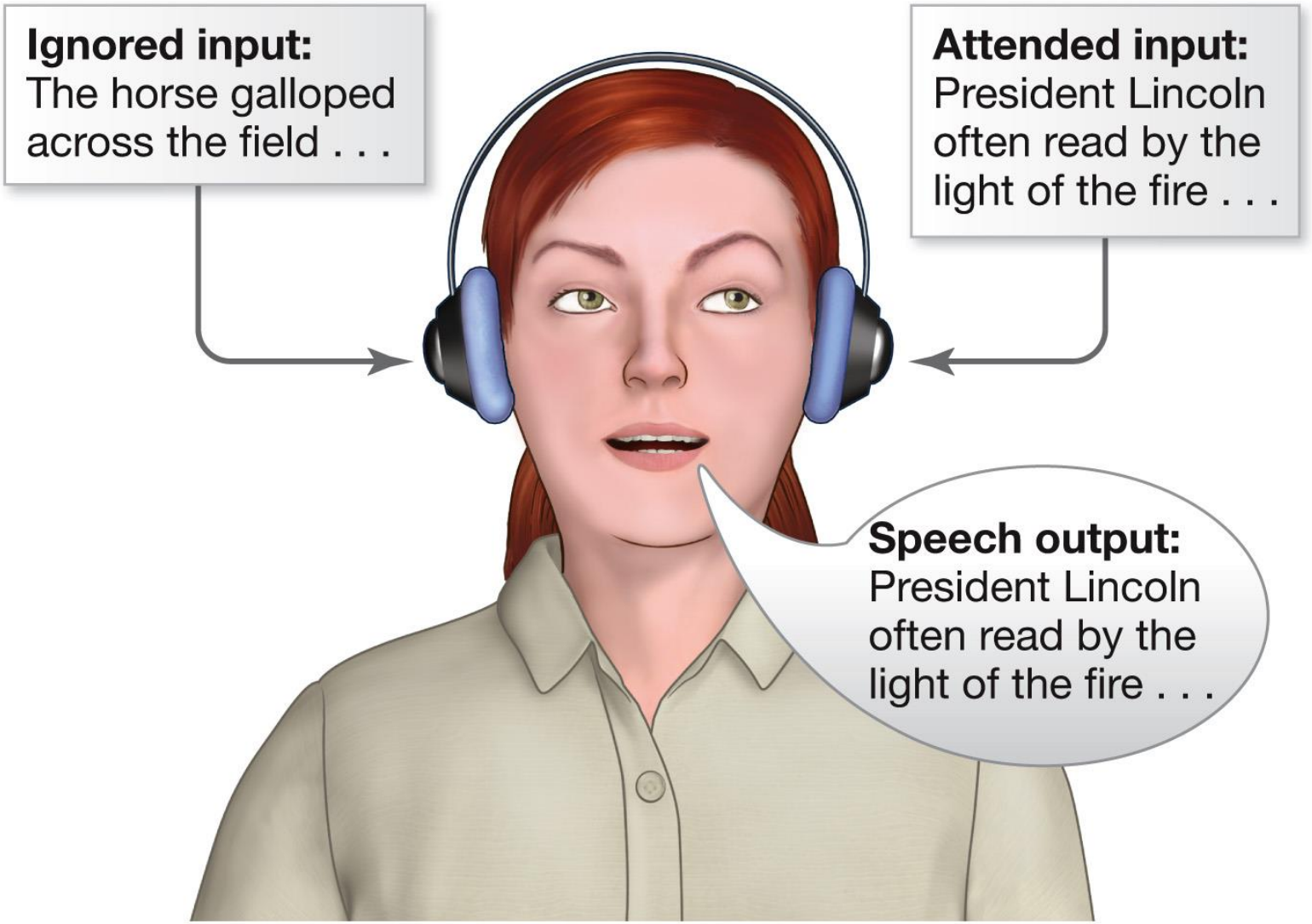
- Rapid toggling between activities is the enemy of sustained, focused attention!

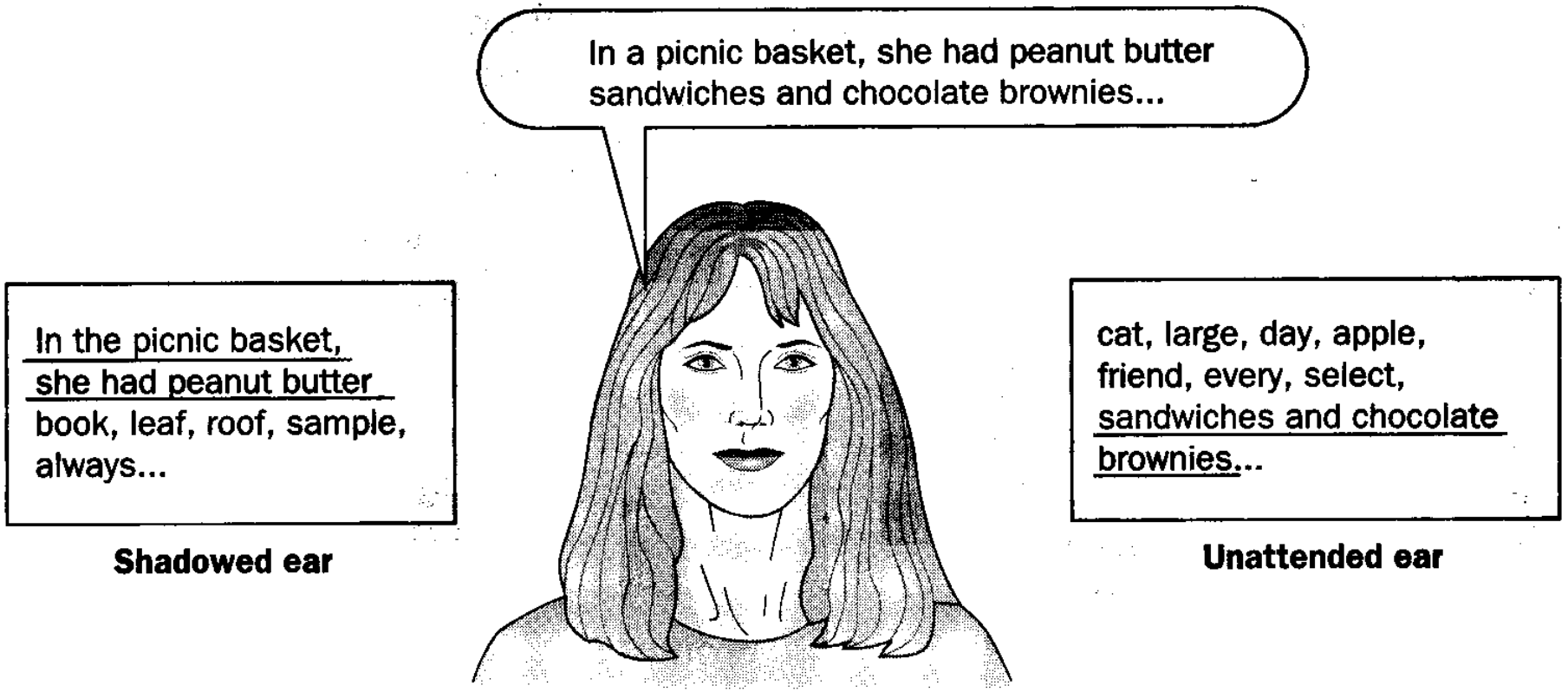
Attention - Dichotic listening (Shadowing)



Attention

- Attention refers to the process that enables you to focus selectively on some things and avoid focusing on others
  - Cocktail party phenomenon (Cherry, 1953)
    - Sometimes the unattended information breaks through

Attention – Dichotic Listening

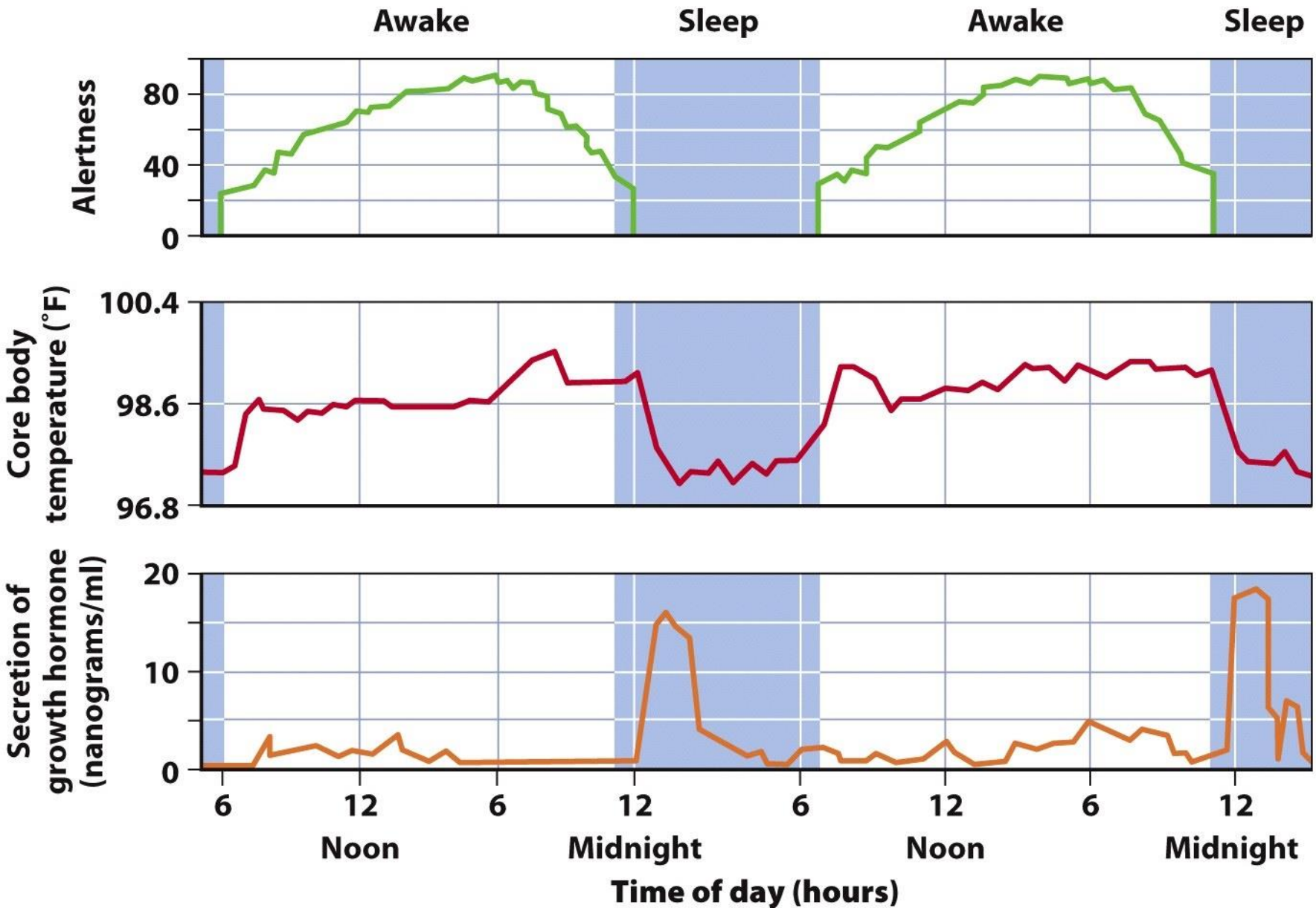


Attention

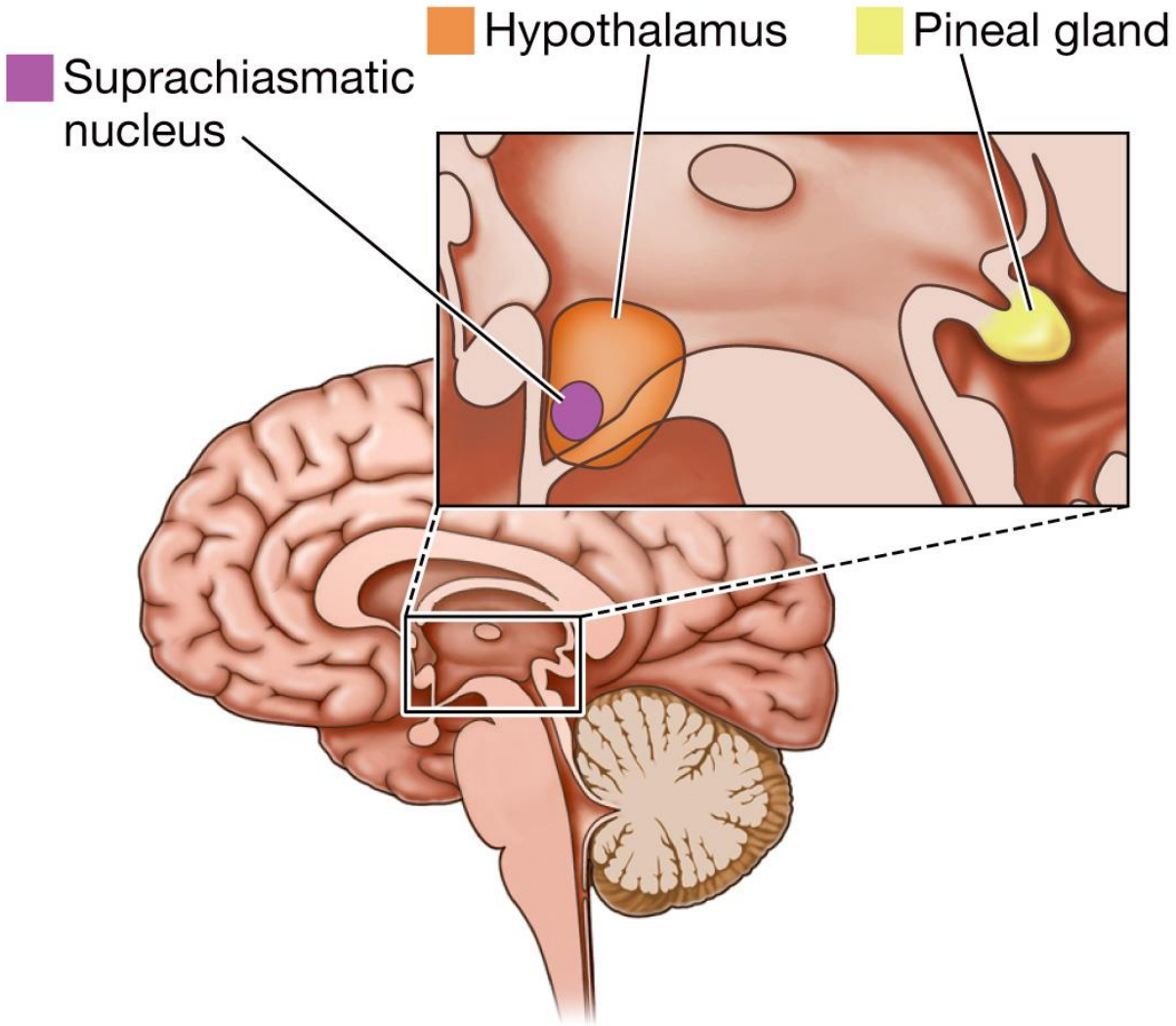
- Attention refers to the process that enables you to focus selectively on some things and avoid focusing on others
  - Cocktail party phenomenon (Cherry, 1953)
    - Sometimes the unattended information breaks through
  - Unattended information may sometimes affect behavior -> subliminal perception
  - Yet, without much awareness -> change blindness

Sleep

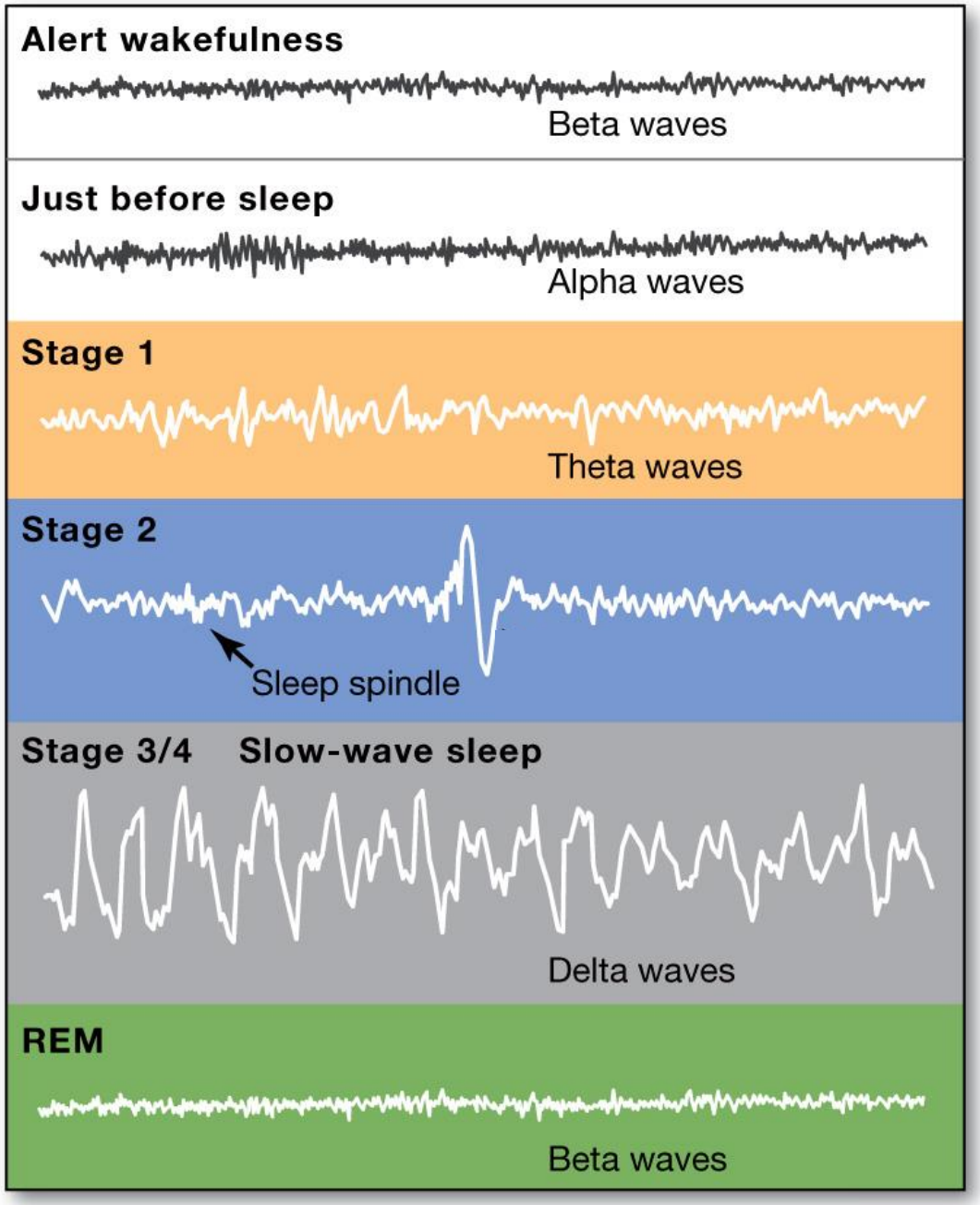
Sleep

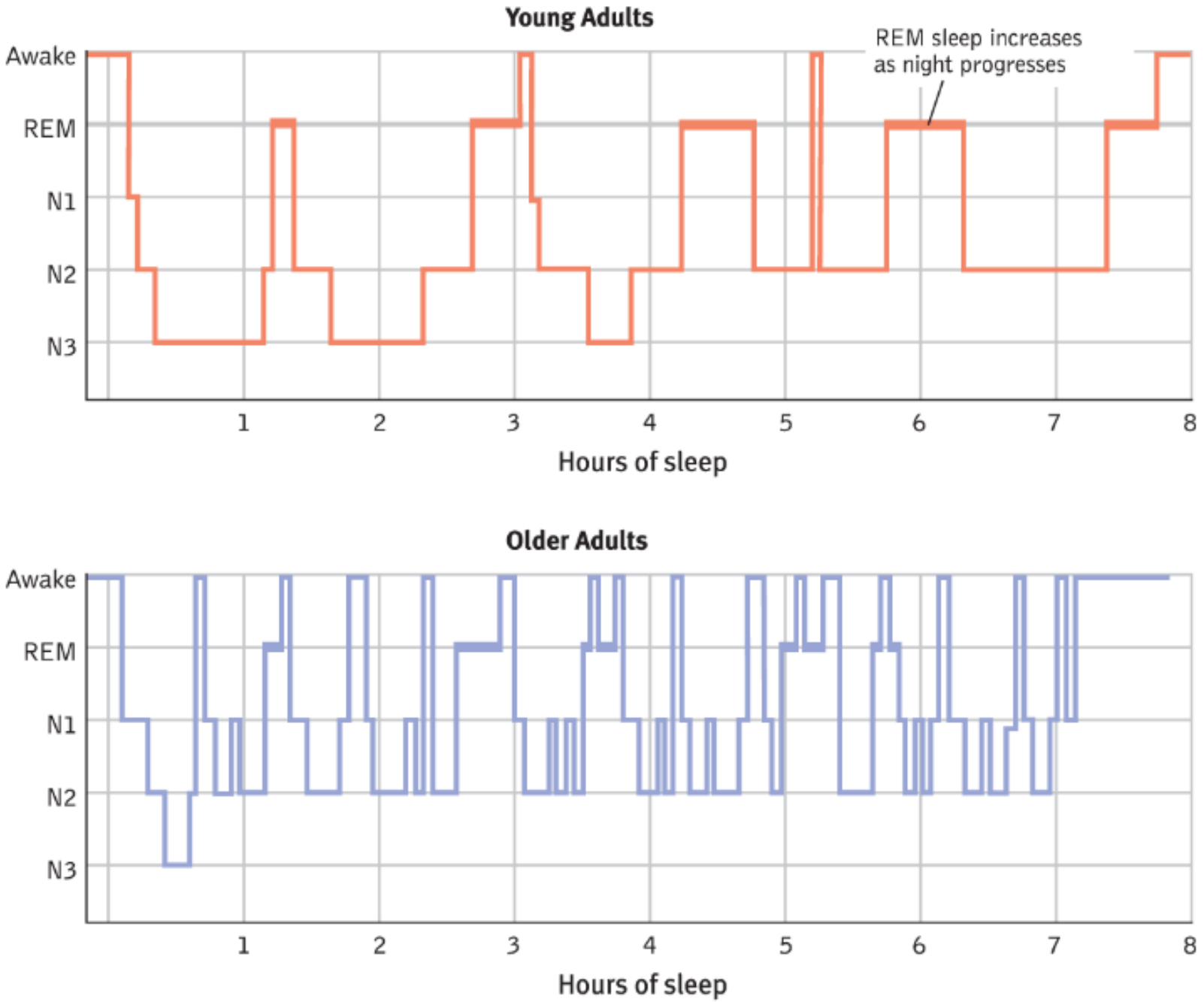

Awake
Sleep
Awake
Sleep
Alertness
80
40
0
Core body temperature (°F)
100.4
98.6
96.8
Secretion of growth hormone (nanograms/ml)
20
10
0
6
12
6
12
6
12
6
12
Noon
Midnight
Noon
Midnight
Time of day (hours)

Sleep



Sleep


Alert wakefulness
Beta waves
Just before sleep
Alpha waves
Stage 1
Theta waves
Stage 2
Sleep spindle
Stage 3/4 Slow-wave sleep
Delta waves
REM
Beta waves



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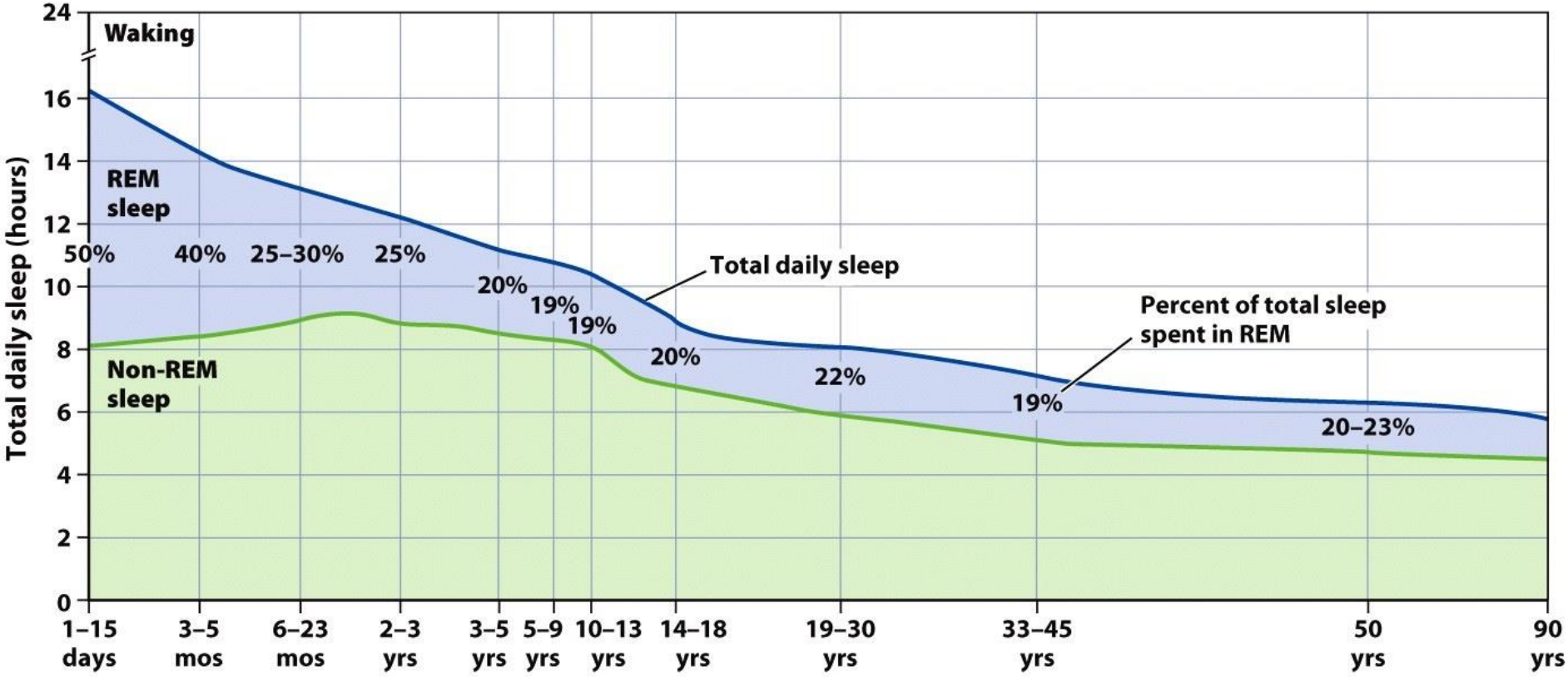
Sleep


Total daily sleep (hours)
24
16
14
12
10
8
6
4
2
0
Waking
REM sleep
Non-REM sleep
50%
40%
25–30%
25%
20%
19%
19%
20%
22%
19%
20–23%
Total daily sleep
Percent of total sleep spent in REM
1–15 days
3–5 mos
6–23 mos
2–3 yrs
3–5 yrs
5–9 yrs
10–13 yrs
14–18 yrs
19–30 yrs
33–45 yrs
50 yrs
90 yrs

Match the sleep stage (i–iii) with the cognitive experience (a–c):

i. N1	a. story-like dream
ii. N3	b. fleeting images
iii. REM	c. minimal awareness

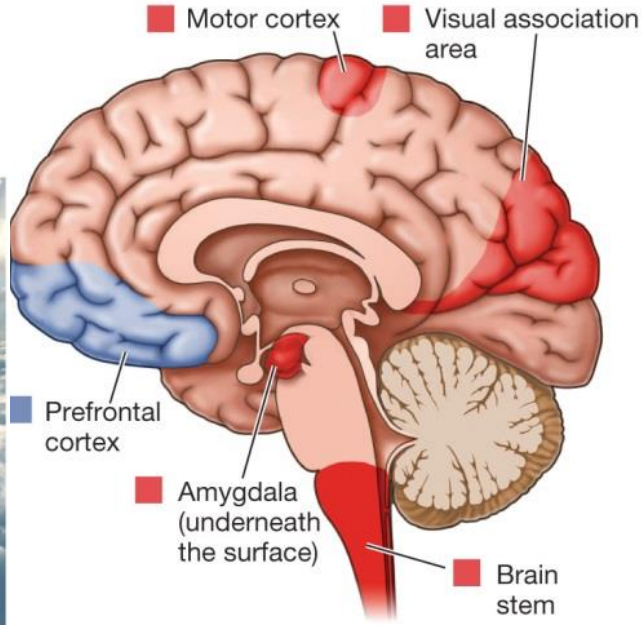
Sleep

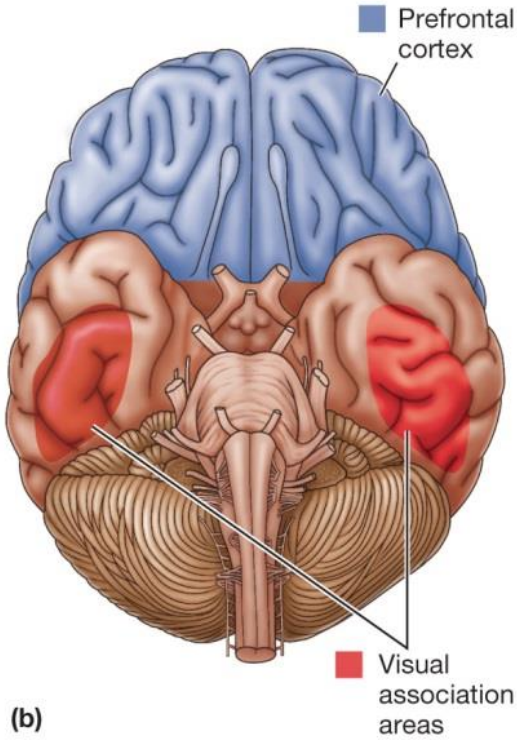
- Why do we sleep? -> theories about sleep
  - Restorative theory
  - Circadian rhythm theory
  - Facilitation of learning theory

Sleep

- **Dreams**: products of an altered state of consciousness in which images and fantasies are confused with reality
  - Non-REM dreams: dull
  - REM dreams: bizarre and intense

(a)

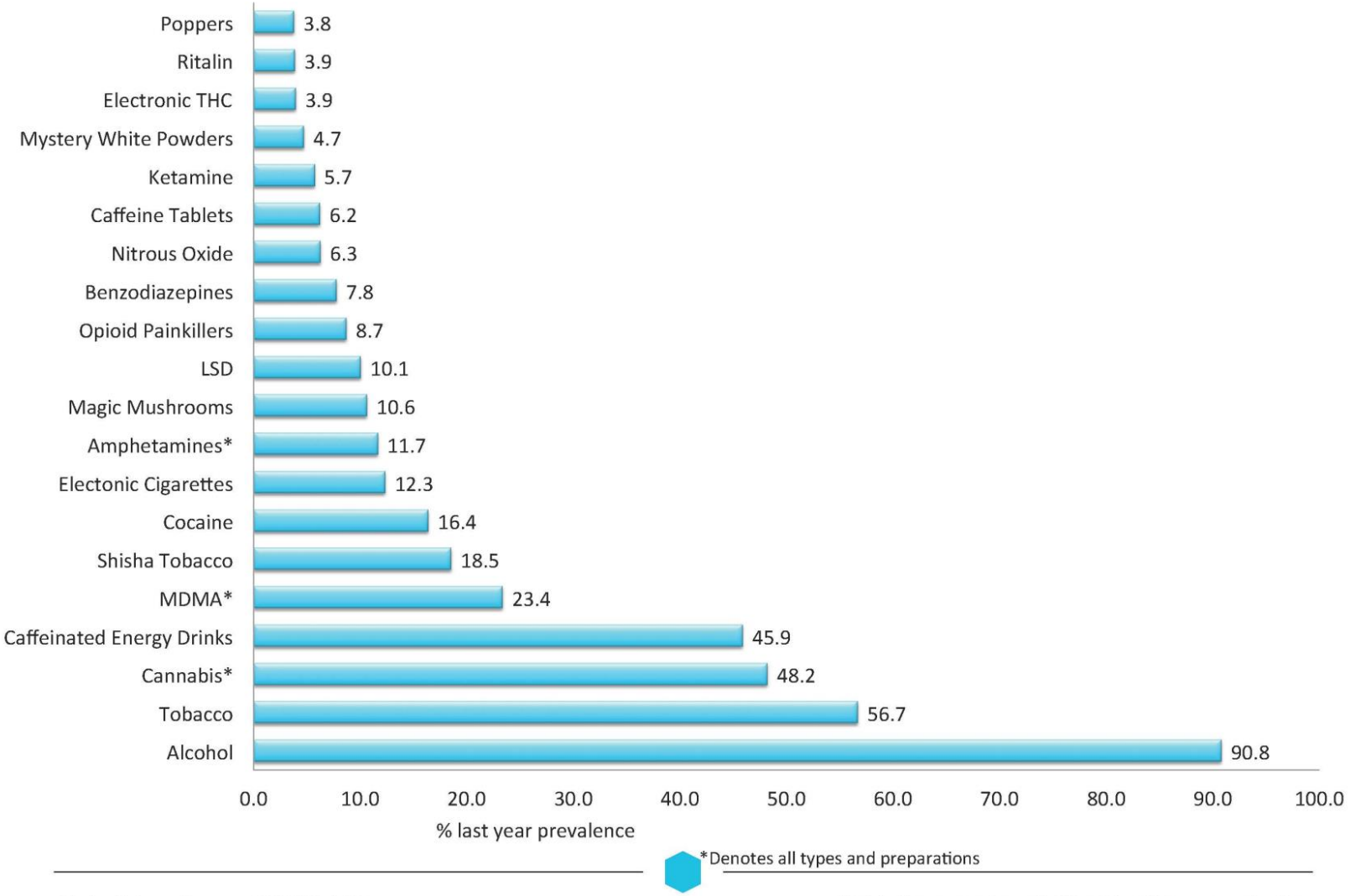




(b)

Drugs

Top 20 Drugs – Last 12 Months – Whole Sample (N=78,819)



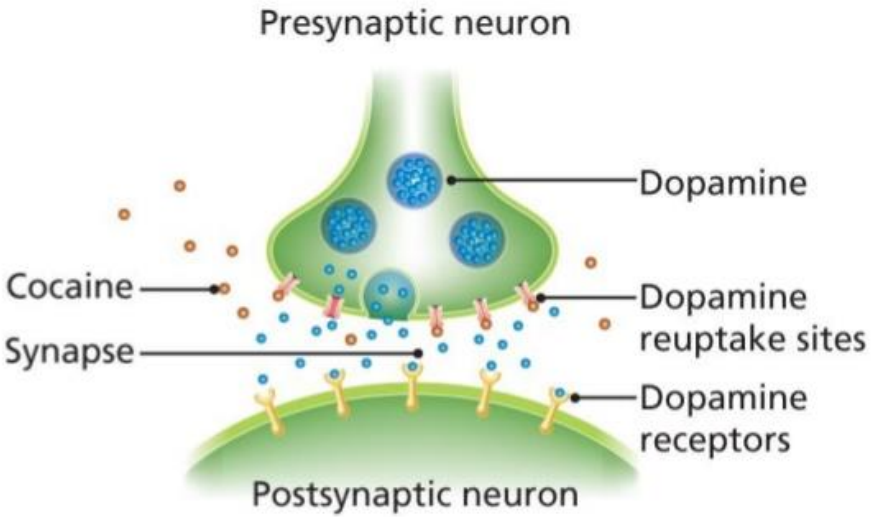
Drugs

- **Addiction**:
  - drug use that remains compulsive despite its negative consequences
  - Physical and psychological dependence
- **Tolerance**:
  - increasing amounts of a drug needed to achieve the intended effect
- **Withdrawal**:
  - physiological and psychological state characterized by feelings of anxiety, tension, and cravings for the addictive substance

Many organs suffer damage despite the "tolerance".

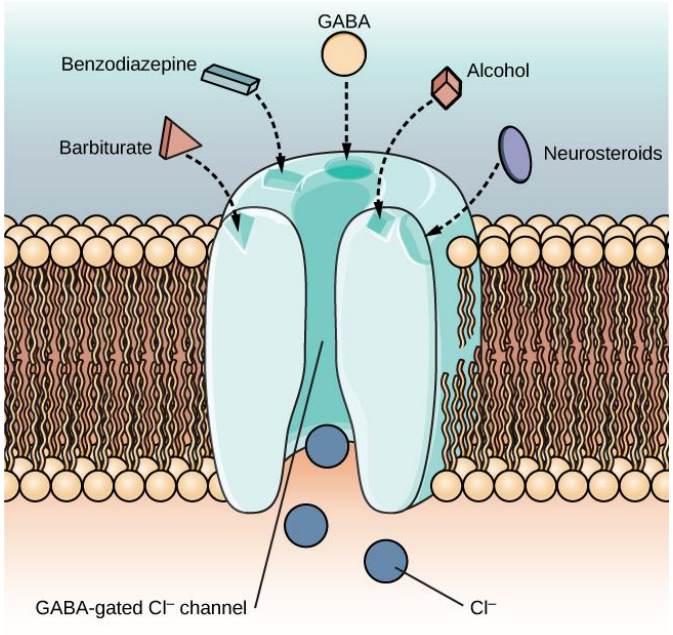
Drugs

- **Stimulants**
  - drugs that increase behavioral and mental activity and activate the sympathetic nervous system
    - Amphetamines
    - Methamphetamine
    - Cocaine
    - Nicotine
    - Caffeine



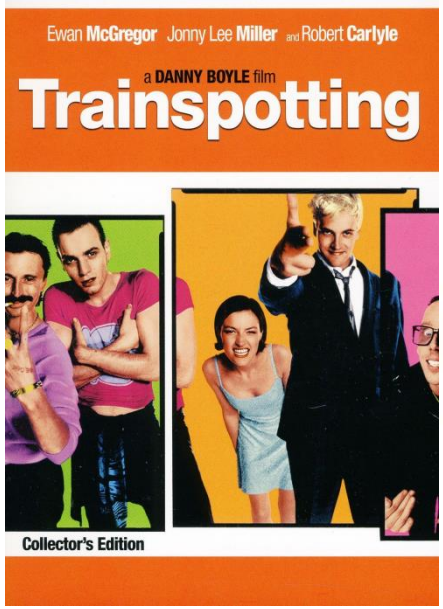
Drugs

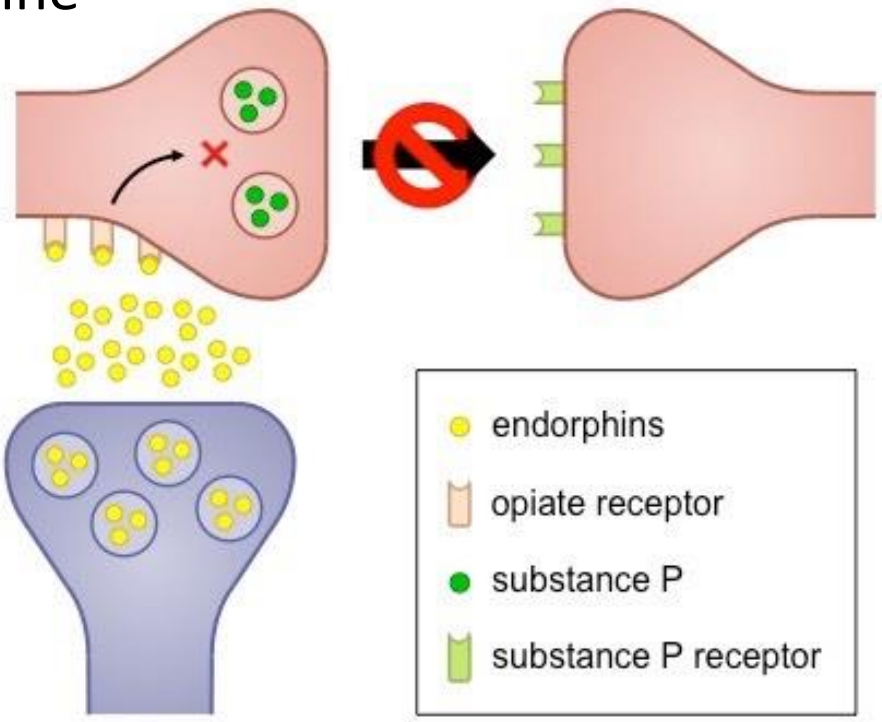
- **Depressants**:
  - reduce behavioral and mental activity by depressing the central nervous system
    - Alcohol
    - anti-anxiety drugs –benzodiazepines
    - barbiturates



Drugs

- **Opiates (narcotics)**:
  - depress or slow down the central nervous system; relieve pain and suffering
    - Heroin
    - Morphine
    - codeine





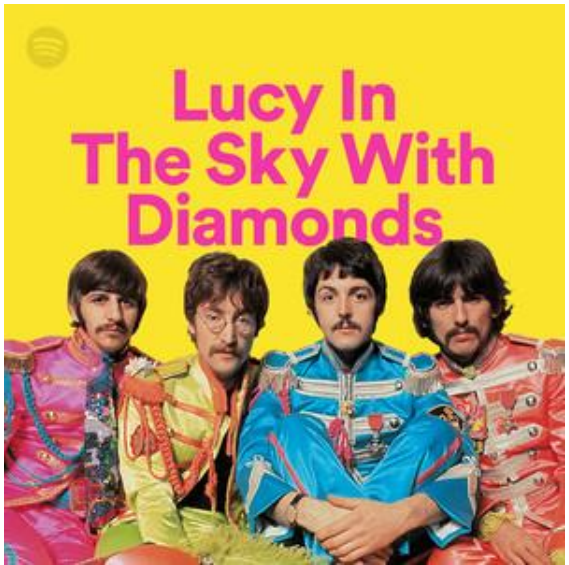
Substance P is a neurotransmitter involved in *pain responses*

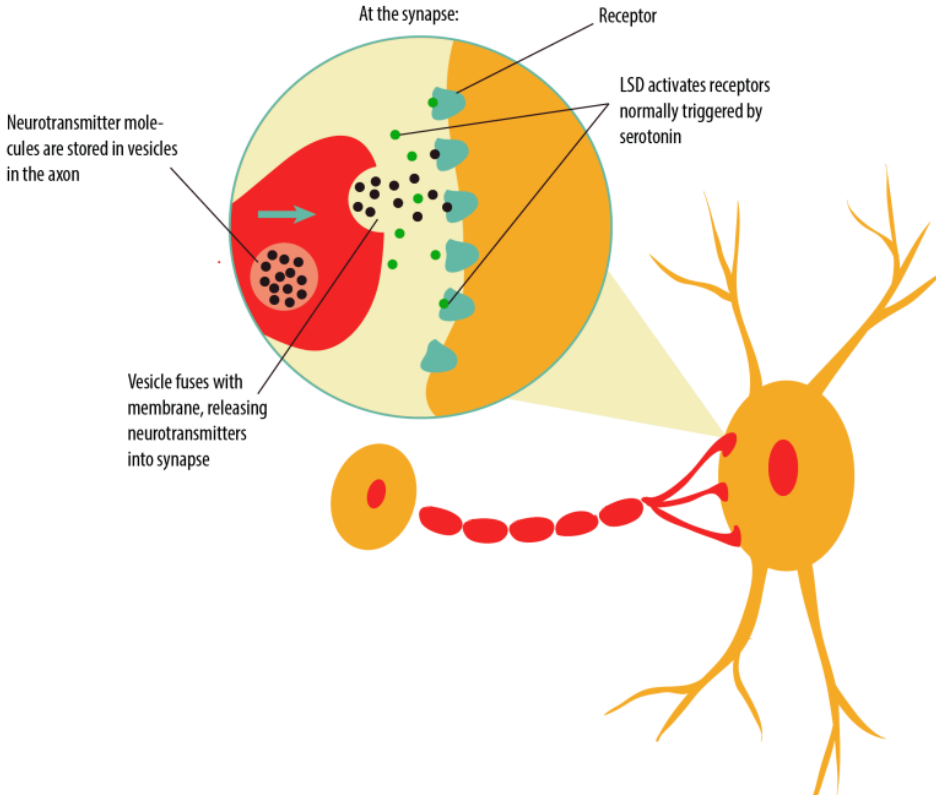
Endorphins are released by the pituitary gland in order to *block pain perception*

Endorphins bind to opiate receptors located on the presynaptic membrane and *block the release of* ***substance P***

Drugs

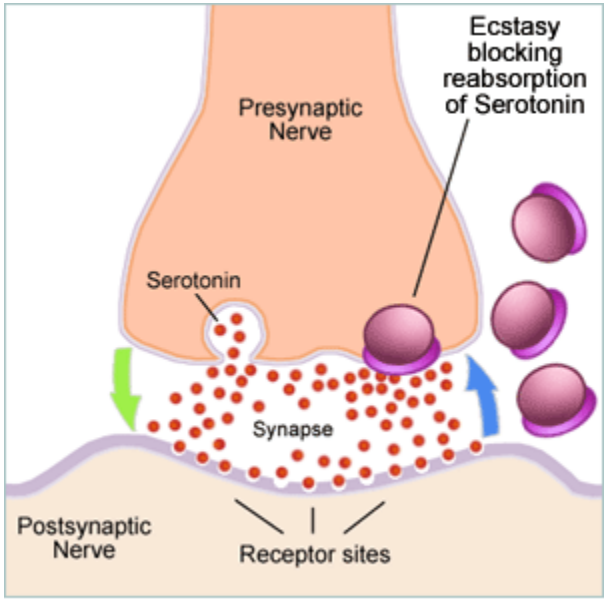
- **Hallucinogens (psychedelics)**:
  - produce alterations in cognition, mood, and perception
    - LSD
    - Mescaline –from Peyote cactus-
    - psilocybin mushrooms





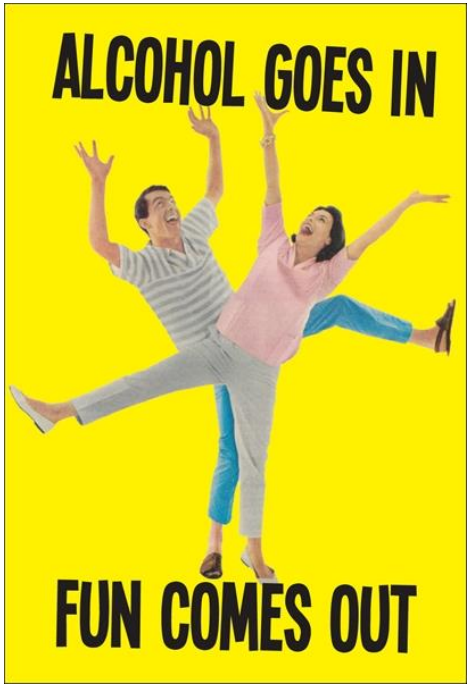
Drugs

- Many commonly used drugs do not fit into these four major categories (e.g., Marijuana, MDMA)



Drugs

- Drugs can have some positive effects…
- Yet, in the long run drugs are extremely harmful (to your body and your brain!)



when your lecturer asks if you have any questions

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