Class 15
Emotions and memory

Thursday

13/10/2022

Does everyone emote the same way, are we hard wired?

- Not all humans manifest (or interpret) emotional displays the same way
- Cultural rules about emotion display are different, but physiological responses and conscious feelings associated with human emotions seem to be innate and universal

What Is Emotion?

- Paul Ekman suggested that a small set of distinct emotions are hardwired in humans from birth
  - Happiness, sadness, anger, fear, disgust, and surprise

Emotion: a cluster of three distinct but interrelated sets of phenomena—physiological responses, overt behaviors, and conscious feelings—produced in response to an affecting situation

Ekman & Matsumoto, Japanese and Caucasian Facial Expressions of Emotions

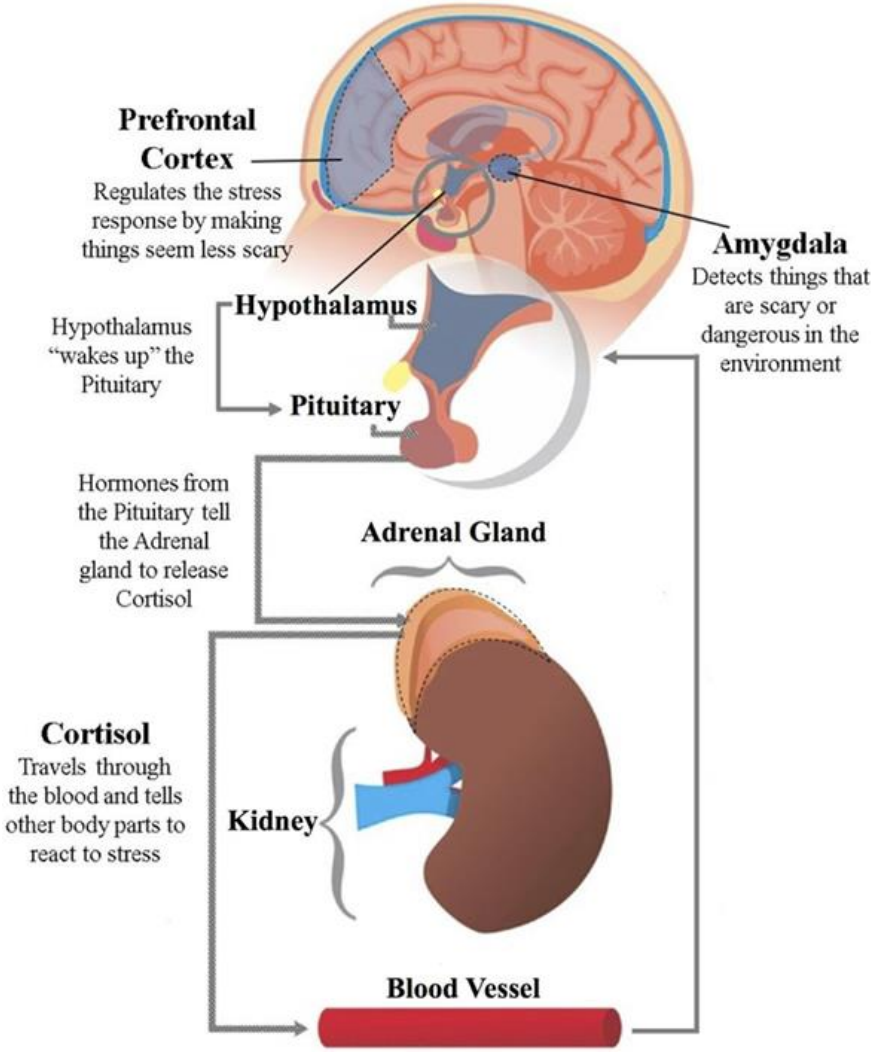
Autonomic Arousal and the Fight-or-Flight Response (Fear response)

- **Arousal (fight-or-flight response):** a collection of bodily responses (including increased blood flow to muscles, increased respiration, and depressed digestion and immune function) that prepare the body to face a threat

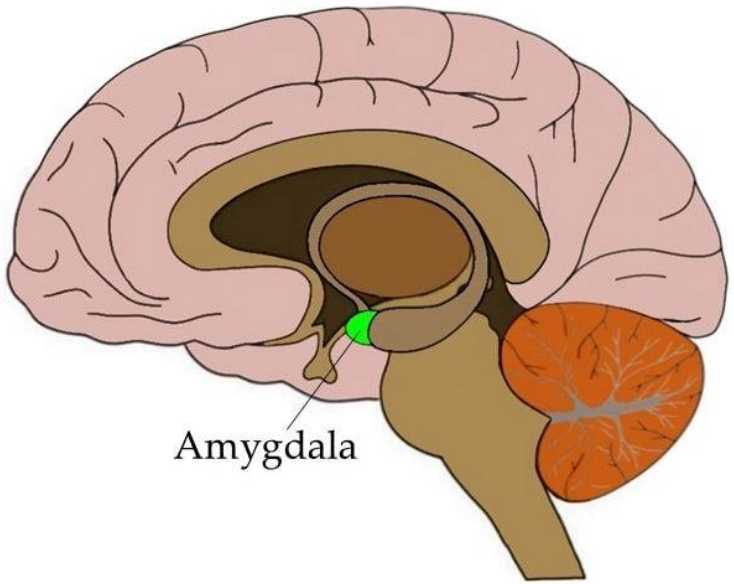
Increases in . . .	**Decreases in . . .**
Blood pressure and heart rate	Digestion
Respiration	Immune system function
Blood glucose level	Sexual arousal
Pain suppression	Touch sensitivity
Perception and awareness	Peripheral vision
Blood flow to large muscles in legs and arms	Growth

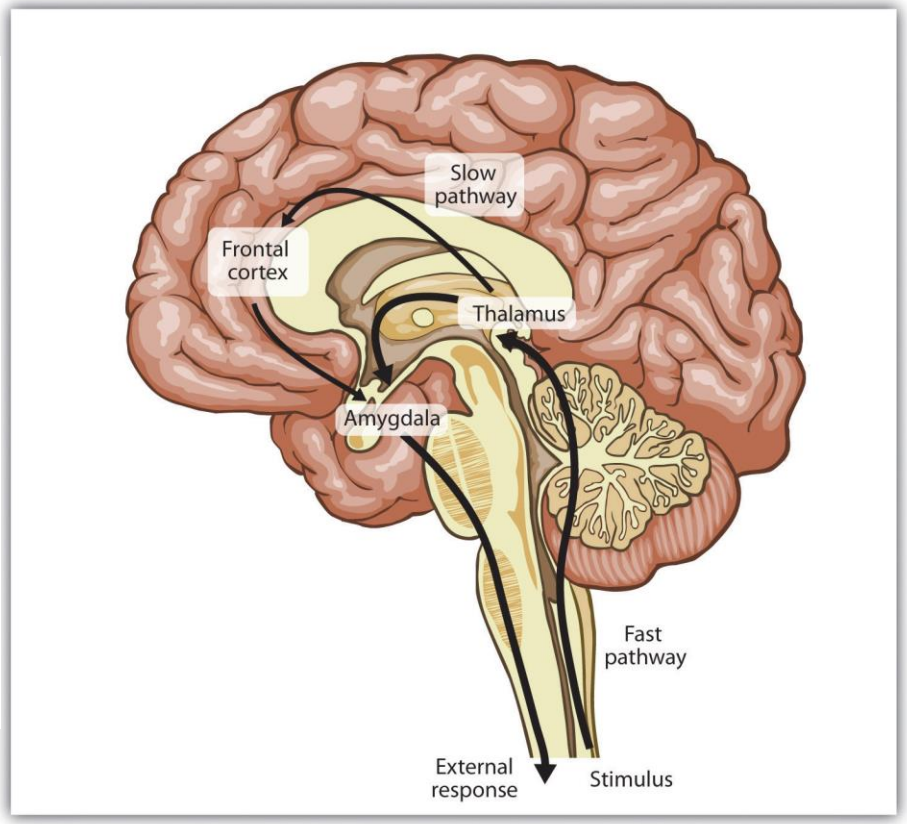
Autonomic Arousal and the Fight-or-Flight Response

- The physiological components of arousal are mediated by the **autonomic nervous system (ANS)**
- When the brain senses a challenge or threat, the ANS signals the adrenal glands to release **stress hormones**
  - Major stress hormones include **epinephrine** (also called **adrenaline**) and **glucocorticoids**
  - The chief glucocorticoid in humans is **cortisol**
- Strong pleasant emotions, such as happiness and surprise, can cause physiological arousal that is very similar to the components of the fight-or-flight response



Fast vs Slow Fear processing



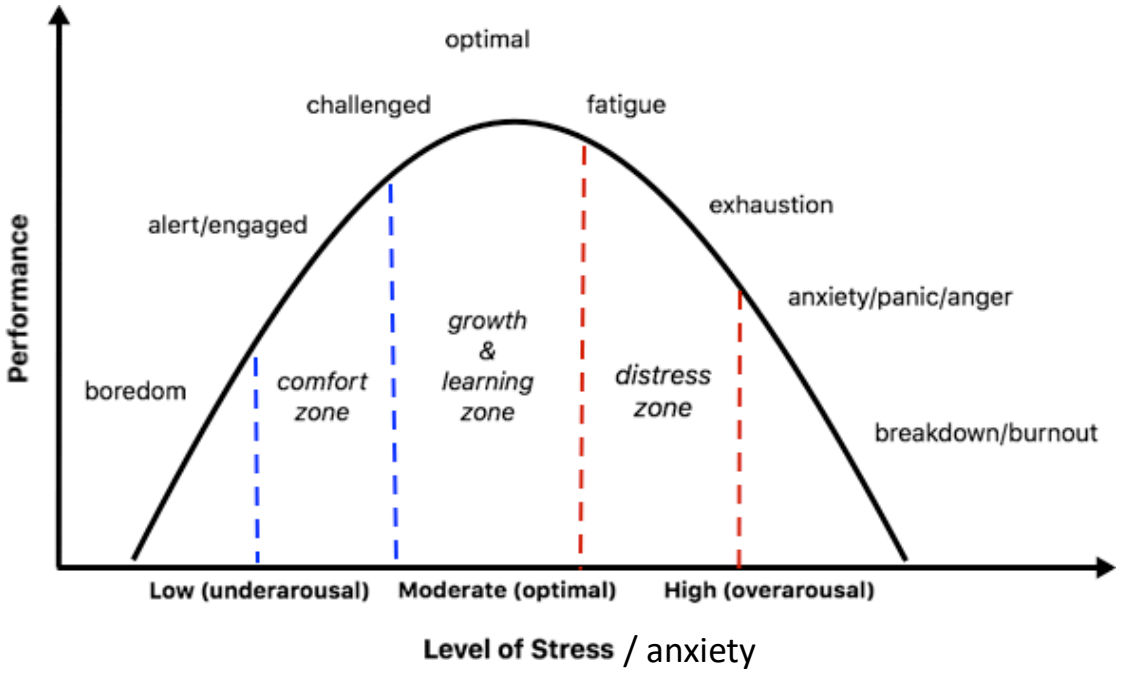


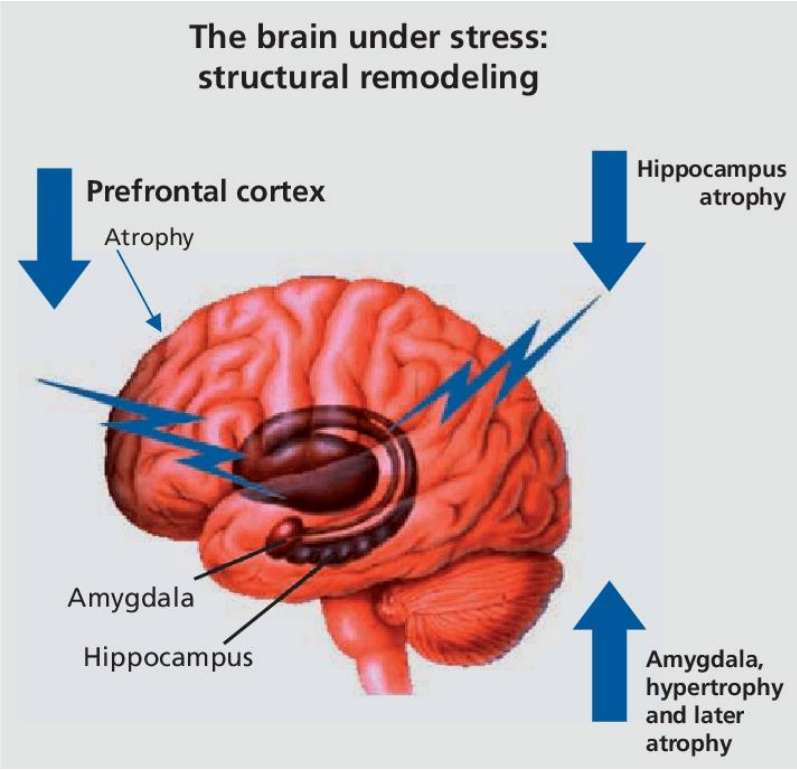
Slow vs fast route

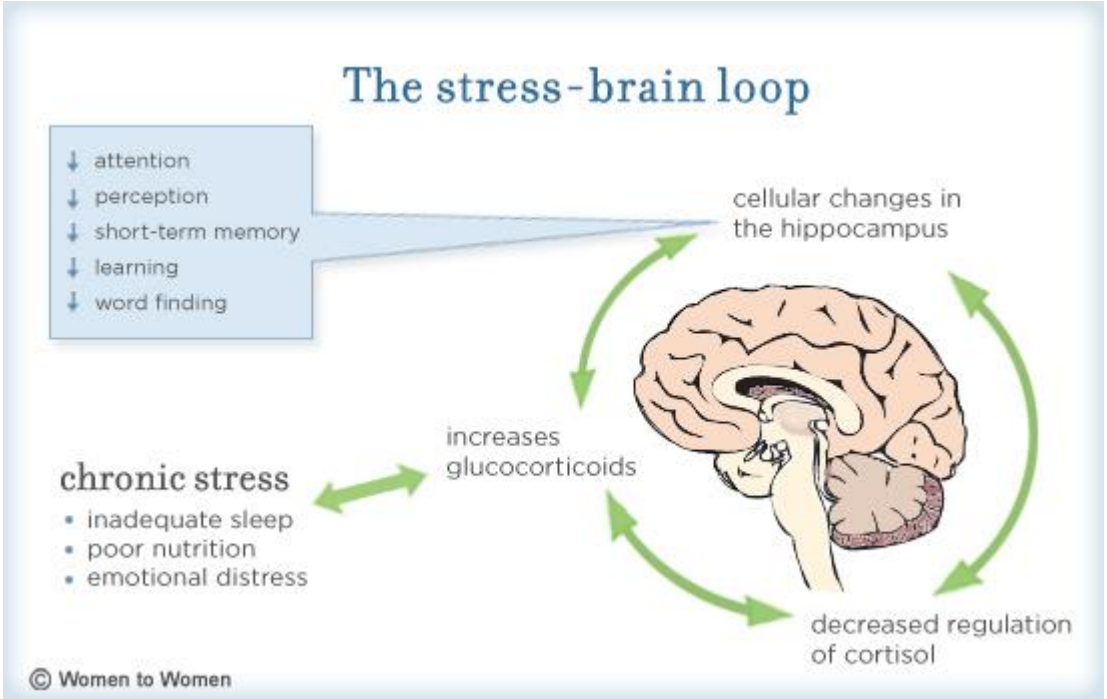
Fear Responses Across Species

Left: Nick Stubbs/Shutterstock; right: Eliot Lyons/Nature Picture Library

Effects of stress





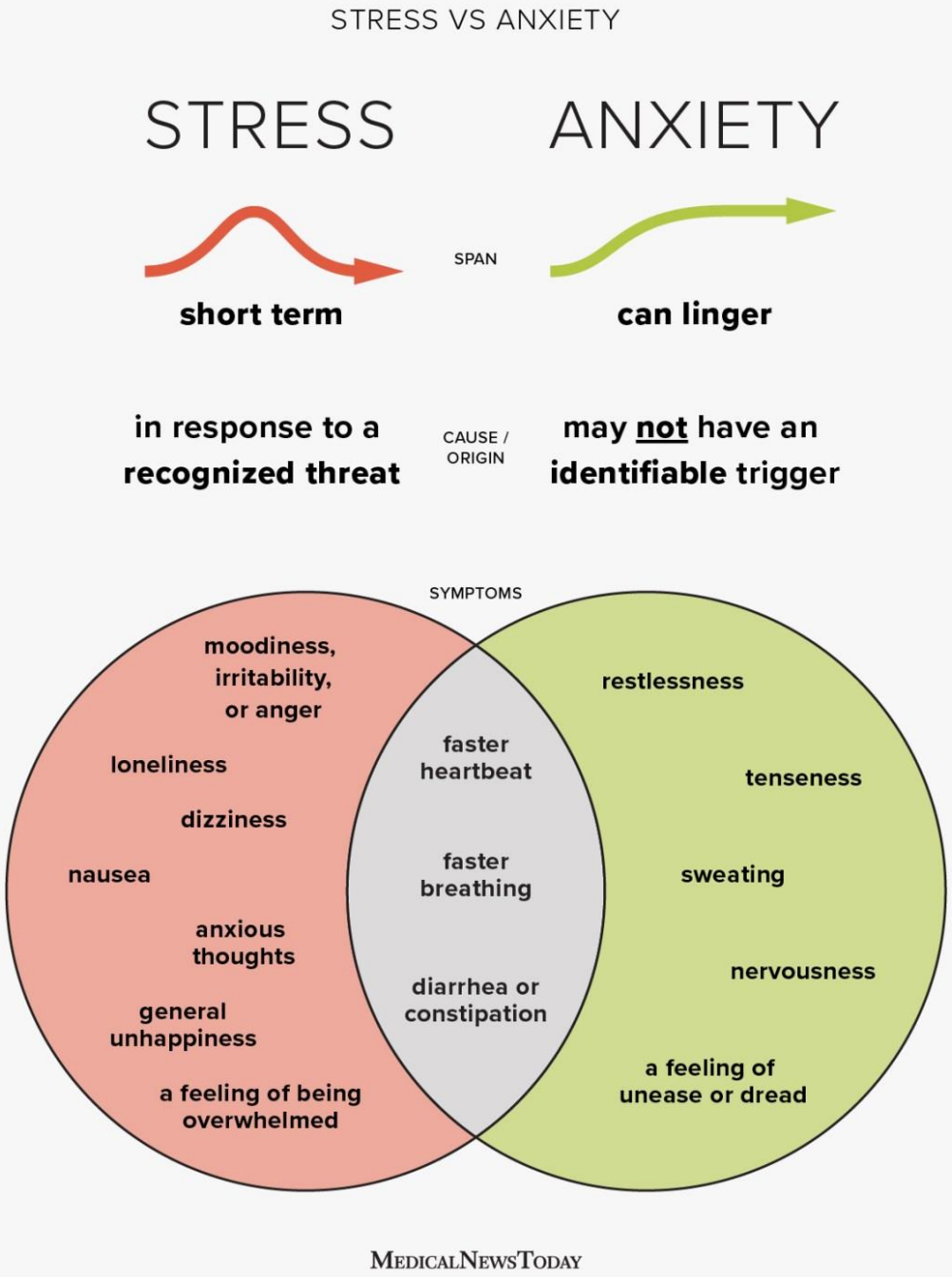


Anxiety

- Persistent worry or apprehension (in absence of a stressor)

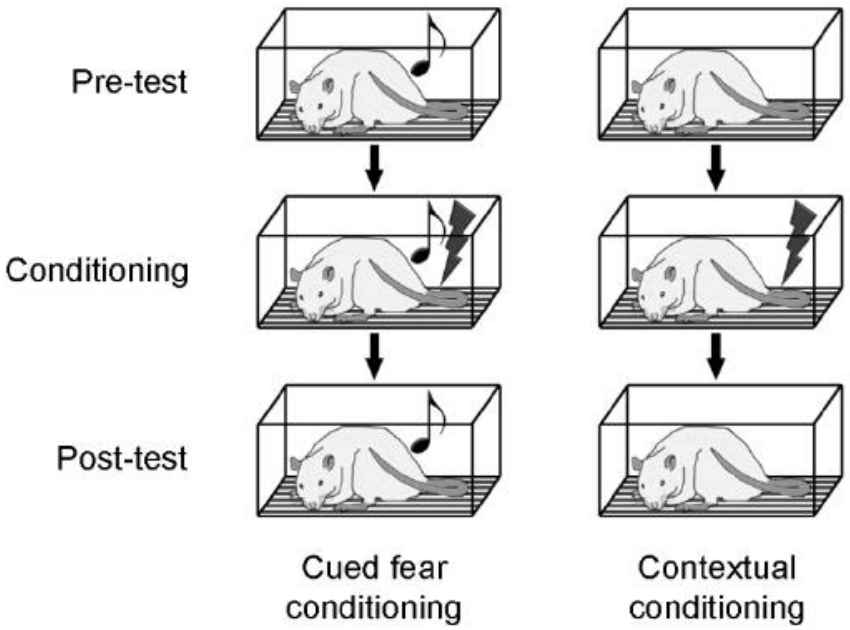
Stress

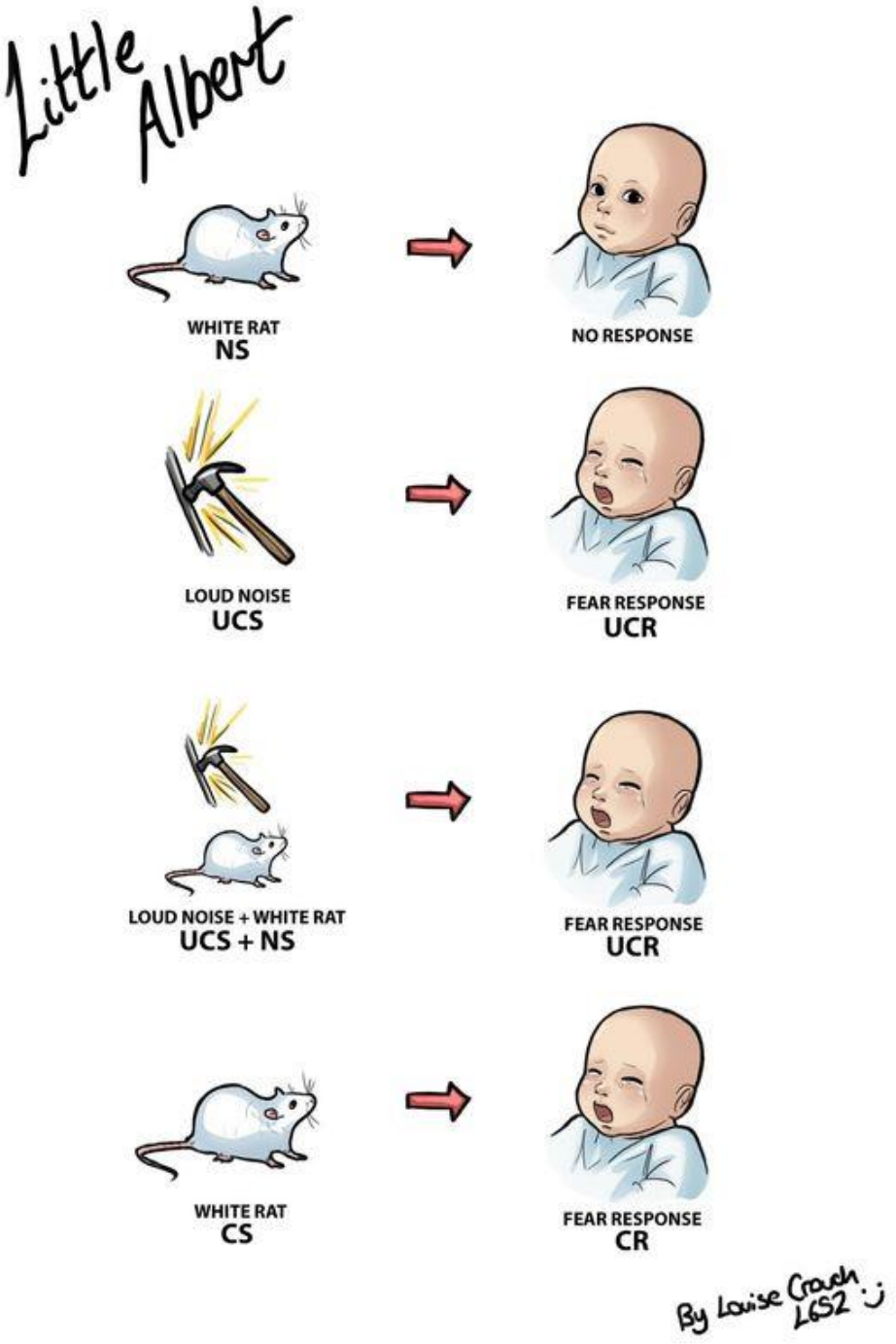
- Response to a threat or stressor (an ongoing situation)



Conditioned Emotional Responses: Learning to Predict Danger

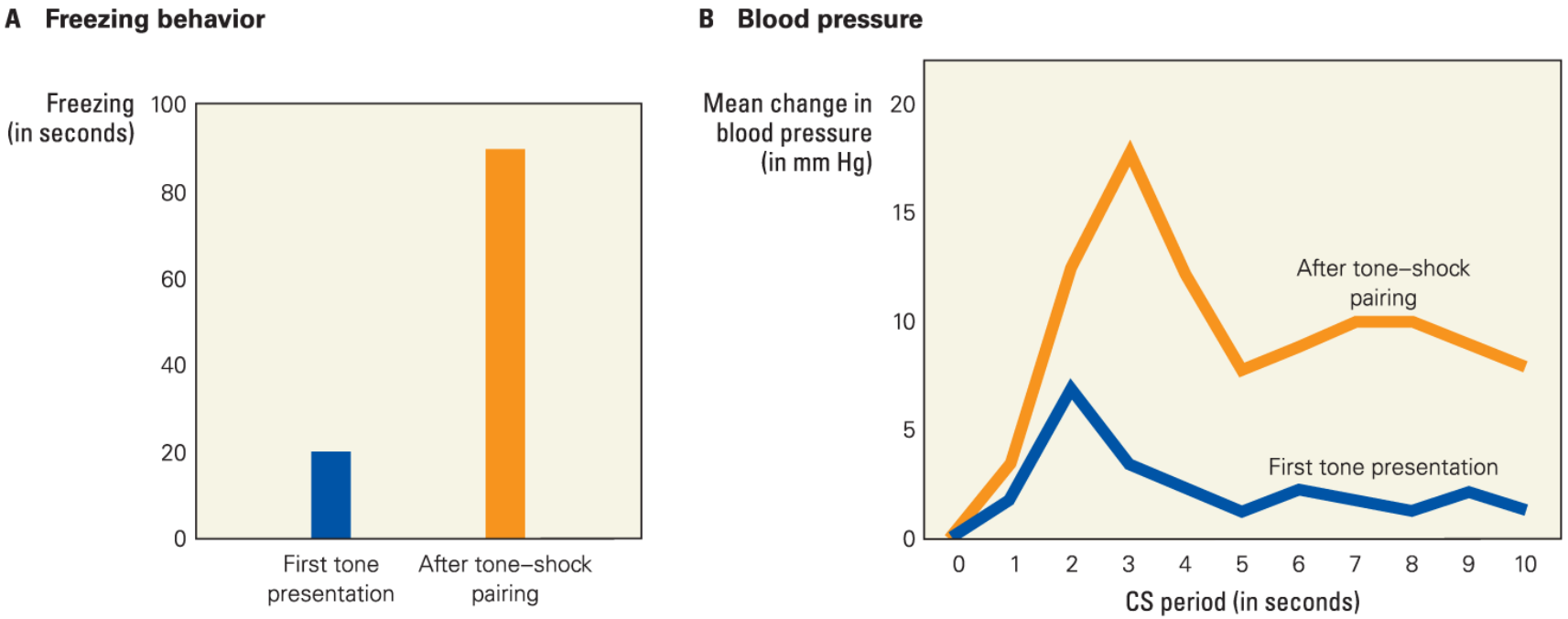
- When a rat is given an unpleasant surprising stimulus, such as an unexpected electric shock, it typically displays a short period of alert immobility
  - This freezing response can also be seen in humans and gorillas; it is innate and not learned
- **Conditioned fear response**





Conditioned Fear Response

What is a fear response in humans?



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Conditioned Escape: Learning to Get Away from aversive situations

- In **conditioned escape**, animals learn to make particular responses in order to escape from or terminate an aversive stimulus
- Escape learning is a form of operant conditioning

Discriminative stimulus S^D (shock initiation) → Response R (lever press) → Outcome O (escape from shock)

E.g. every time a mother opens a book to take HW the child starts to cry or throw a tantrum

OCD? Escape anxiety

Conditioned Avoidance: Learning to Avoid aversive situations

- In **conditioned avoidance**, animals learn to make particular responses to avoid or prevent arrival of an aversive stimulus

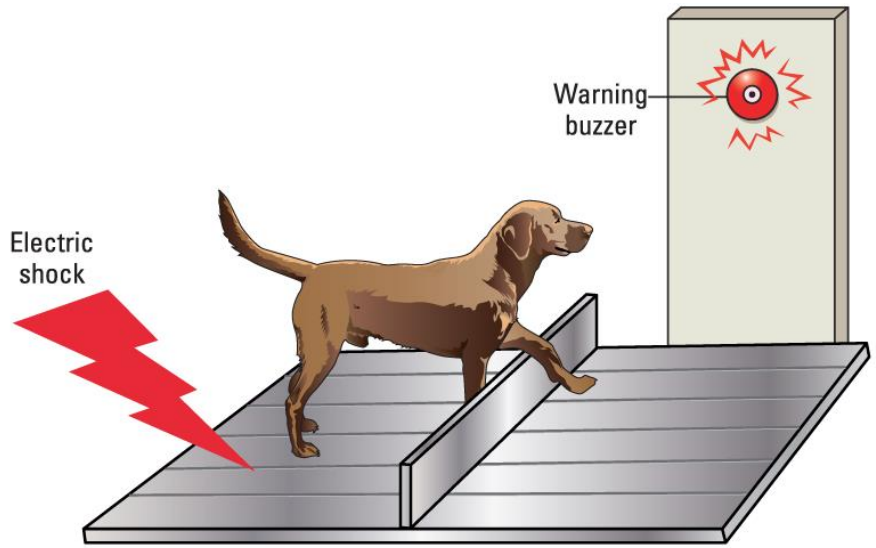
E.g. avoiding unpleasant situations

Child not going to school to avoid a strict teacher
Avoiding to take a route due to fear of dogs

Learned Helplessness

Seligman's Learned Helplessness Experiment

- Seligman concluded that the prior exposure to an inescapable shock (during the classical-conditioning phase) had taught the animals that they were helpless to escape *any* shock—even in the operant-learning phase



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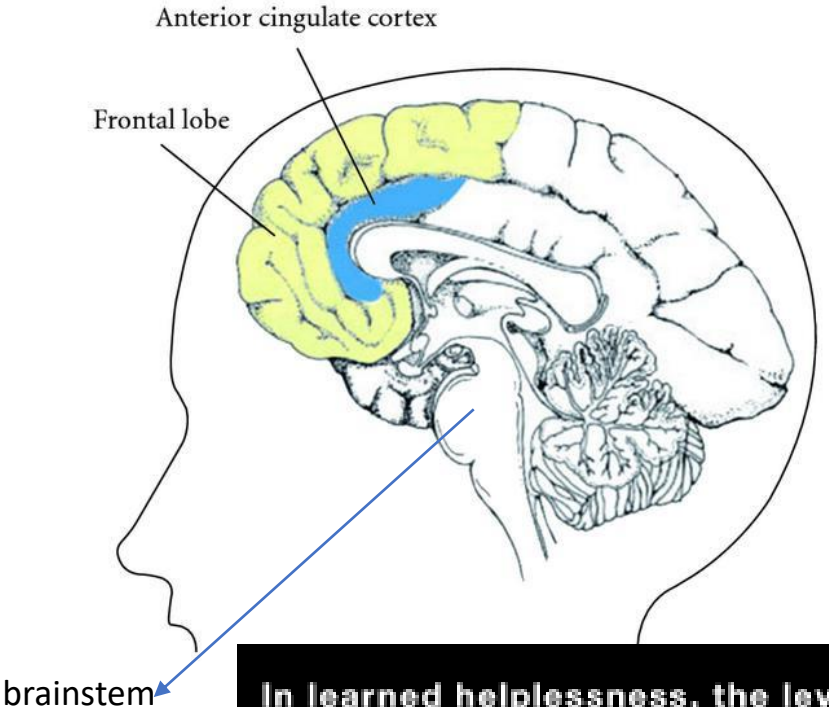
E.g. bullying, sexual harassment, domestic violence, child abuse,

Learned helplessness

- An individual comes to believe that they are unable to control or change the situation, so they do not try — even when opportunities for change become available.
- They accept that the stress causing factor is part of their life
- The PFC plays a roles in reducing learned helplessness by inhibiting the helpless behaviour.

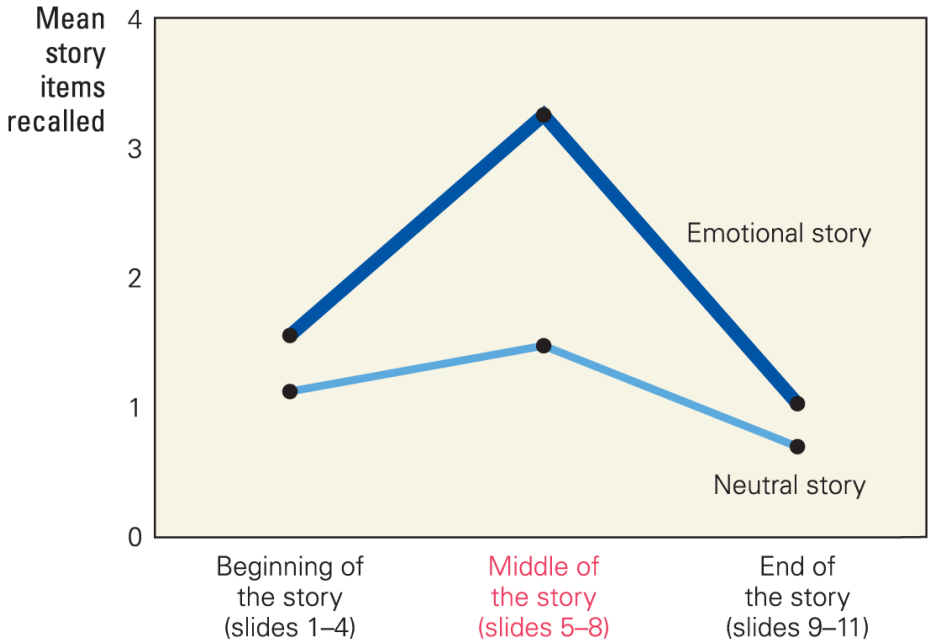
- Leads to increased feelings of anxiety and depression

Understanding this phenomenon may provide clues for how to treat or protect against **depression**



Emotion and Encoding of Memories

- Researchers can study the effects of emotional content on the strength and specificity of memories by creating emotional experiences in the laboratory and then testing for memories of them



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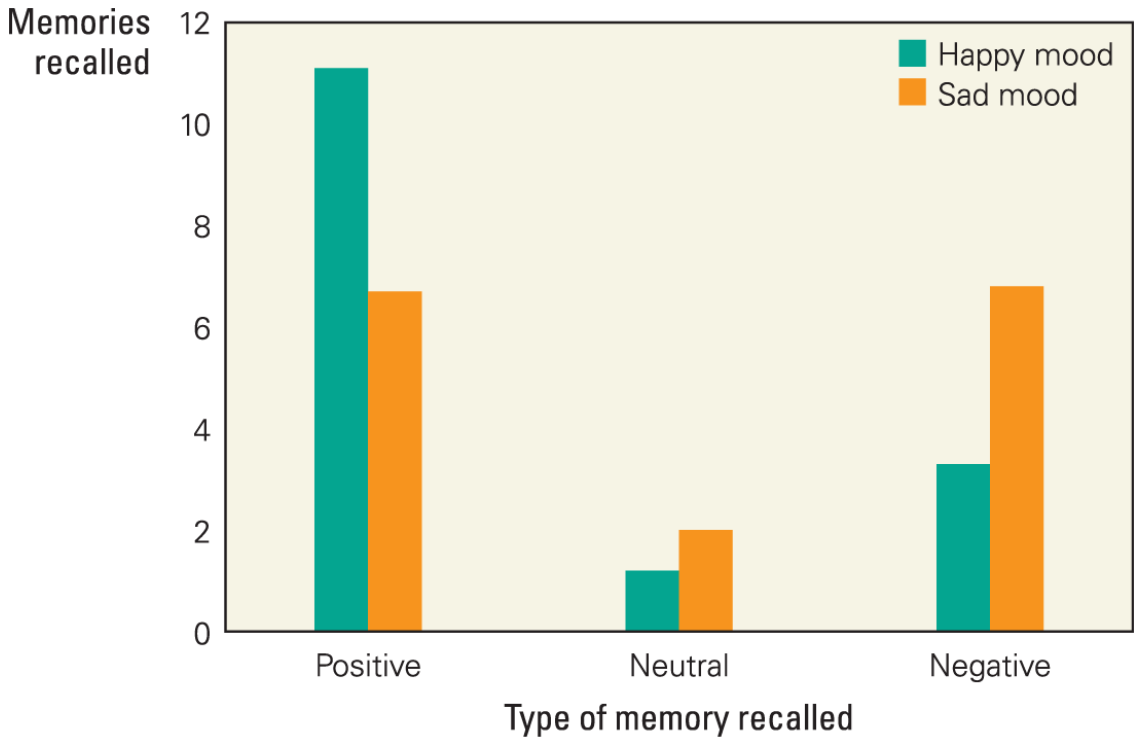
Emotion and Retrieval of Memories



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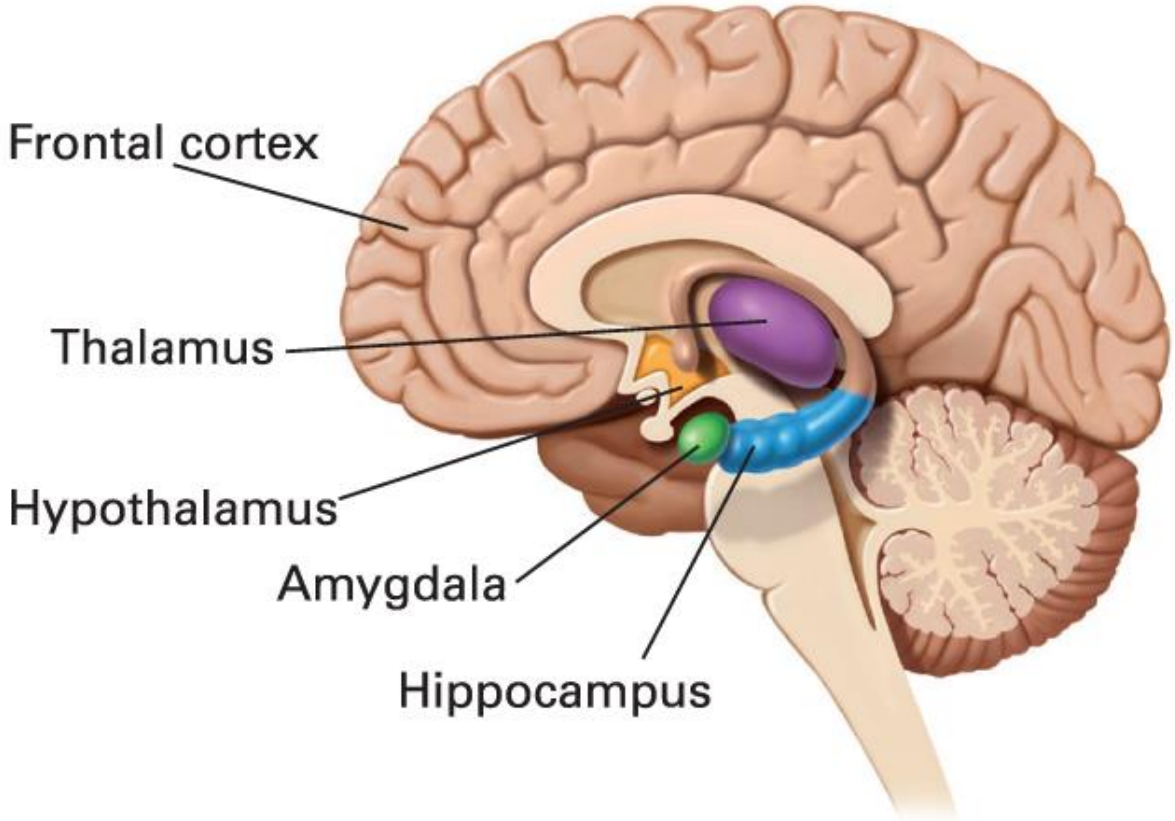
- **Mood congruency of memory:** the principle that it is easiest to retrieve memories that match our current mood or emotional state

- 2008 terror attacks in Mumbai
- 2011 cricket world cup

Flashbulb Memories

- **Flashbulb memory:** a memory formed under conditions of extreme emotions that seems especially vivid and long-lasting
- Flashbulb memories are episodic memories that are experienced with great vividness and confidence, but not necessarily with greater accuracy
- Studies have shown that while emotion often enhances memory for key events, this benefit does not always extend to background details

Key Brain Structures Involved in Processing Emotion



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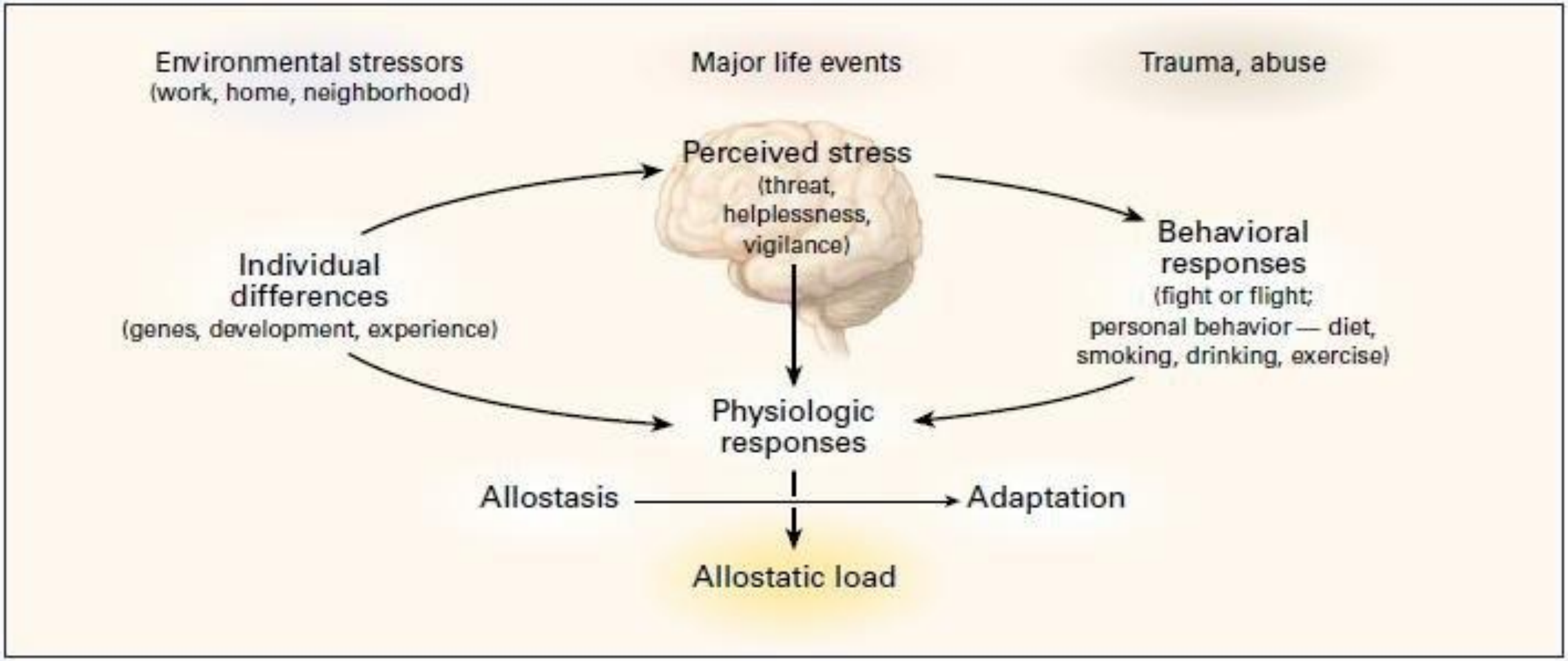
Environmental stressors
(work, home, neighborhood)
Major life events
Trauma, abuse
Perceived stress
(threat, helplessness, vigilance)
Individual differences
(genes, development, experience)
Behavioral responses
(fight or flight; personal behavior — diet, smoking, drinking, exercise)
Physiologic responses
Allostasis
Adaptation
Allostatic load