2. LÉKAŘSKÁ FAKULTA
UNIVERZITA KARLOVA

Emotions and fear

Lecture on Medical Physiology

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Content

- Emotion
- Fear
- Anxiety
- Stress
- Aggression

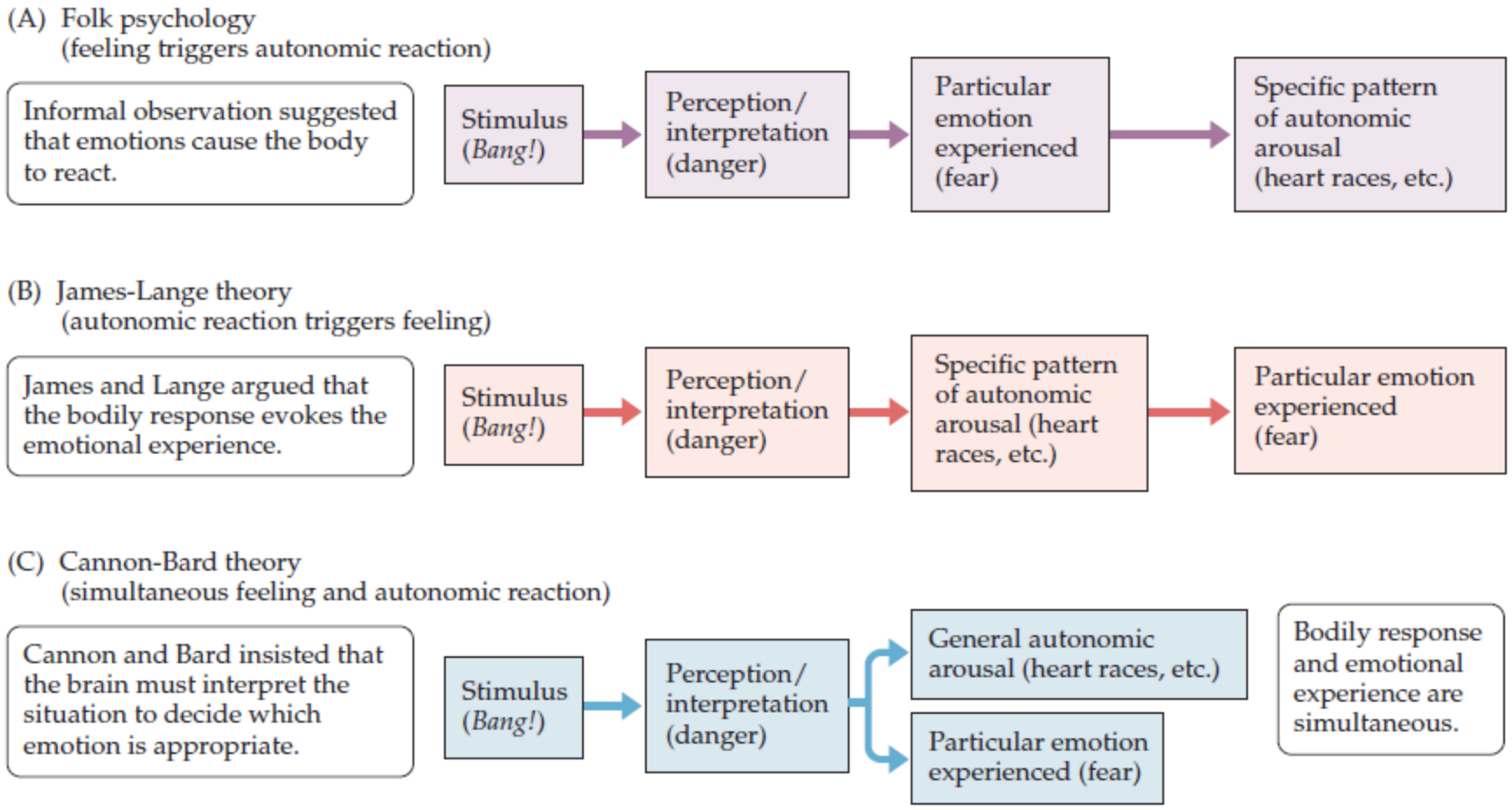
Emotion

- Individualized feeling
- Accompanied by behavioral changes
  - Face expression
  - Gestikculation
- Accompanied by physiological changes
  - Cardiovascular
  - Muscle tone
  - Respiratory
  - Other autonomous changes (sweating, mydriasis)
- Individualized mental state accompanied by behavioral changes and involuntary physiological changes

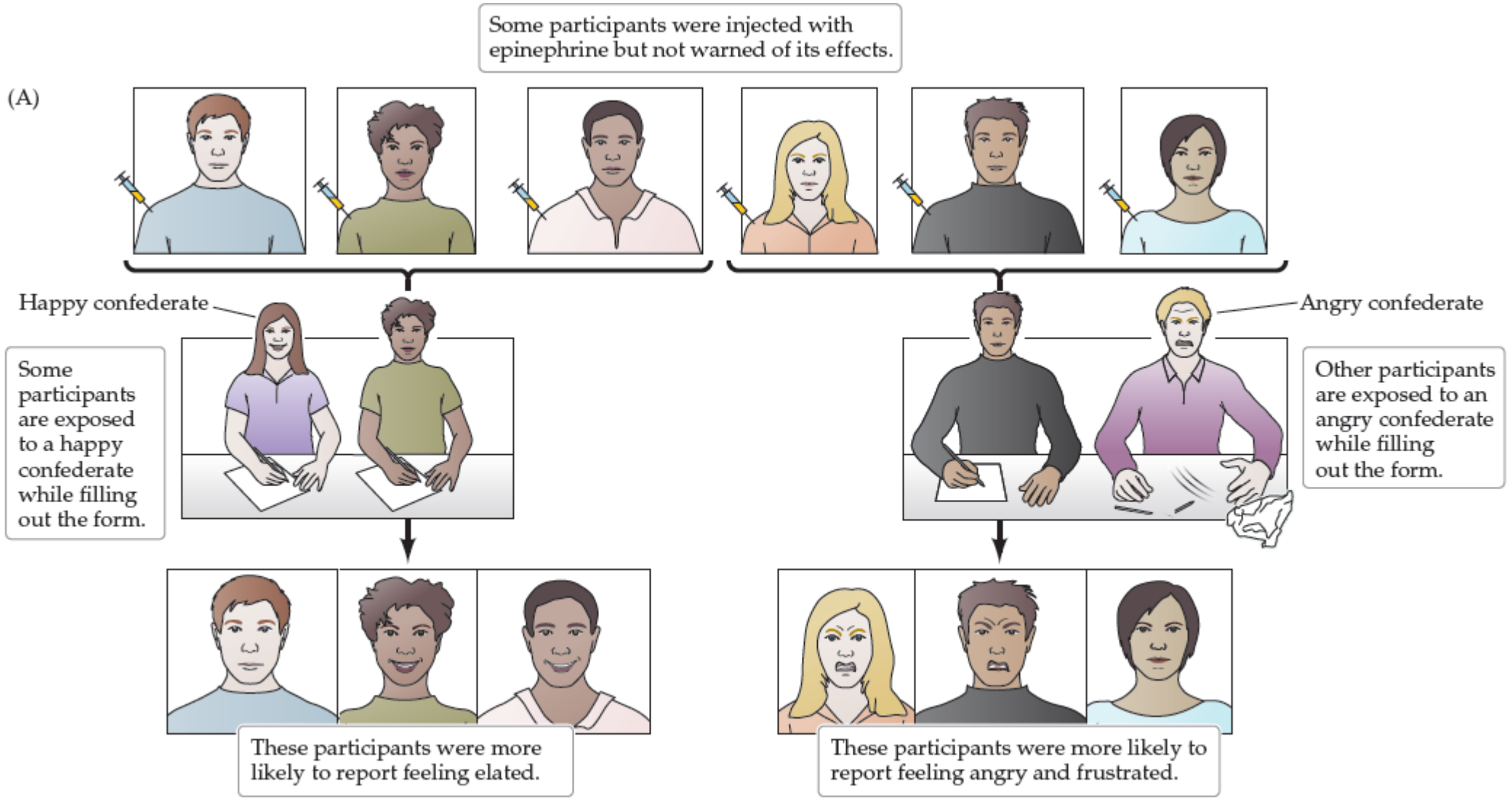
Emotion

- Subjective mental state accompanied by behavioral changes and involuntary physiological changes
- Sympathetic
  - Fight or flight reaction
- Parasympathetic
  - Relaxation

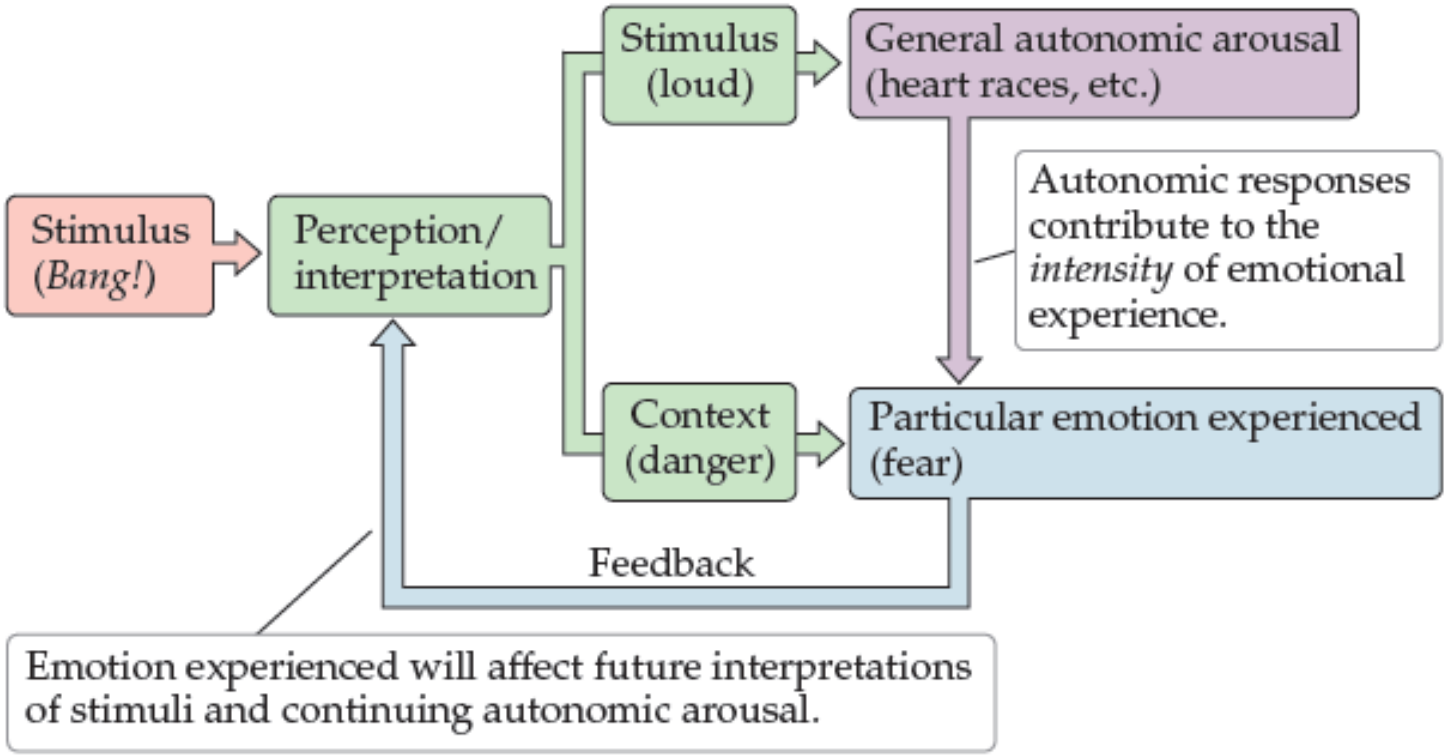
Emotions and physiological changes



Emotions and physiological changes



Emotions and physiological changes



The developmental significance of emotions

- Evolutionary psychology
- Incentive programs
- Coordinated responses
- Strategy, adaptation and problem solving
  - Cooperation in a group
  - Finding a partner
  - Finding food sources
  - Avoiding predators
- Individual level of responses

The developmental significance of emotions

The movements of expression in the face and body… are… of much importance for our welfare. They serve as the first means of communication between the mother and her infant; she smiles approval, and thus encourages her child on the right path, or frowns disapproval. We readily perceive sympathy in others by their expression; our sufferings are thus mitigated and our pleasure increased; and mutual good feeling is thus strengthened. The movements of expression give vividness and energy to our spoken words. They reveal the thoughts and intentions of others more truly than do words, which may be falsified.

Charles Darwin

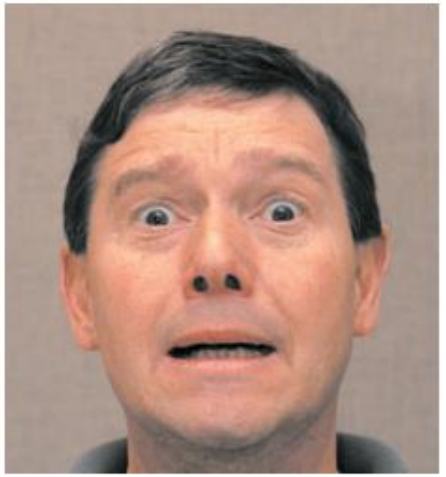
Basic types of emotions

Anger

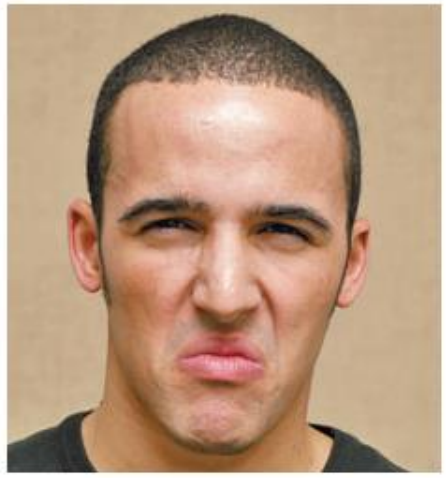
Sadness

Happiness

Fear



Disgust



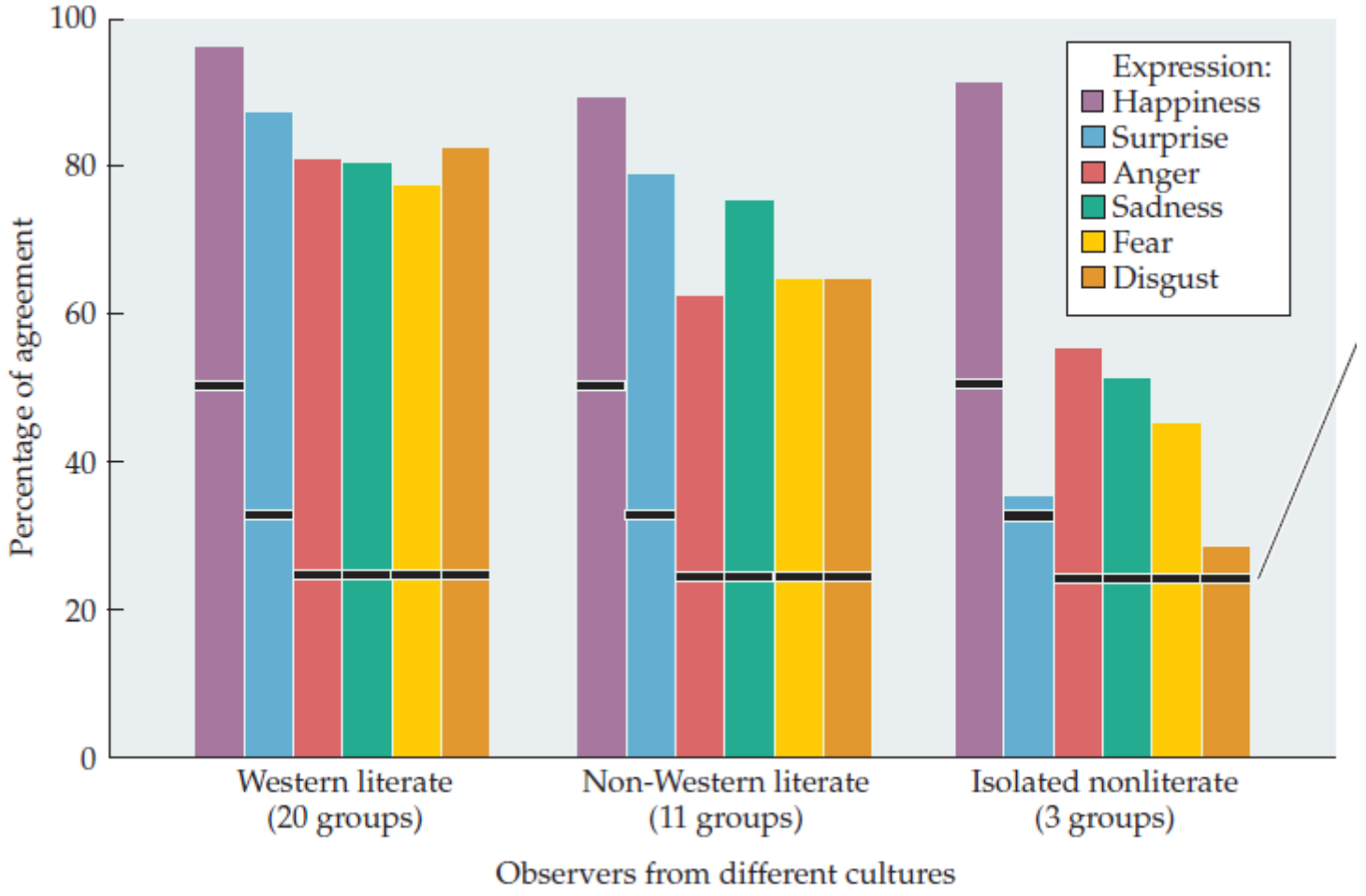
Surprise

Contempt

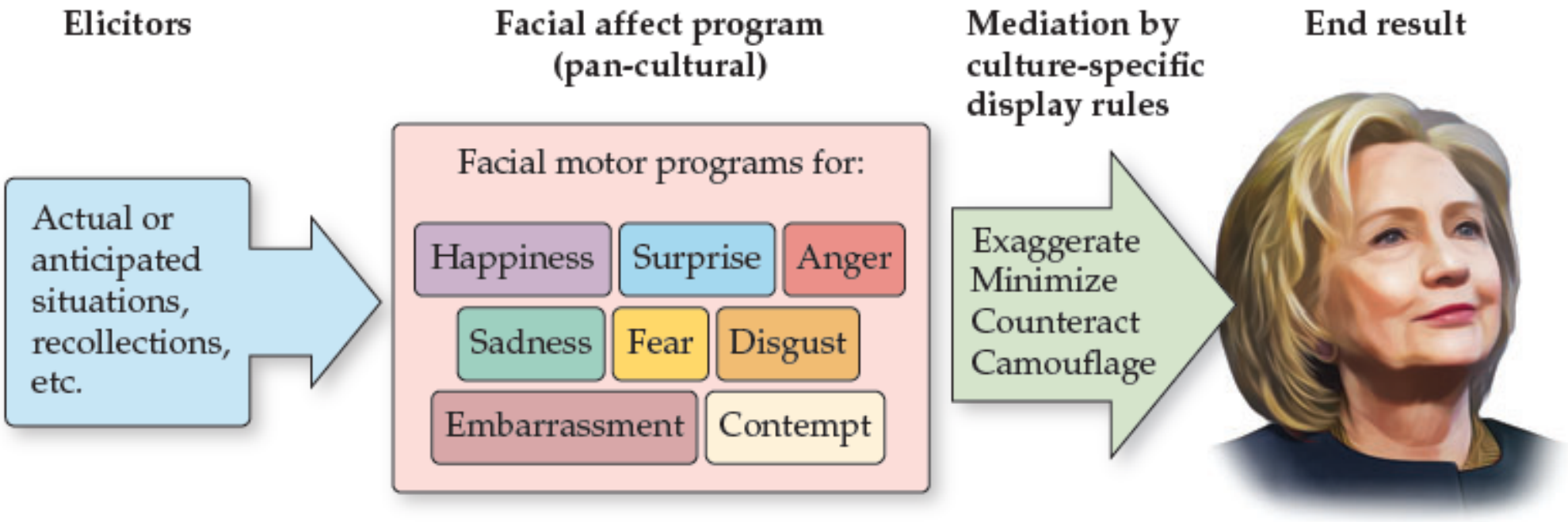
Embarrassment

Physiological changes - intensity of emotions

The influence of culture on emotions

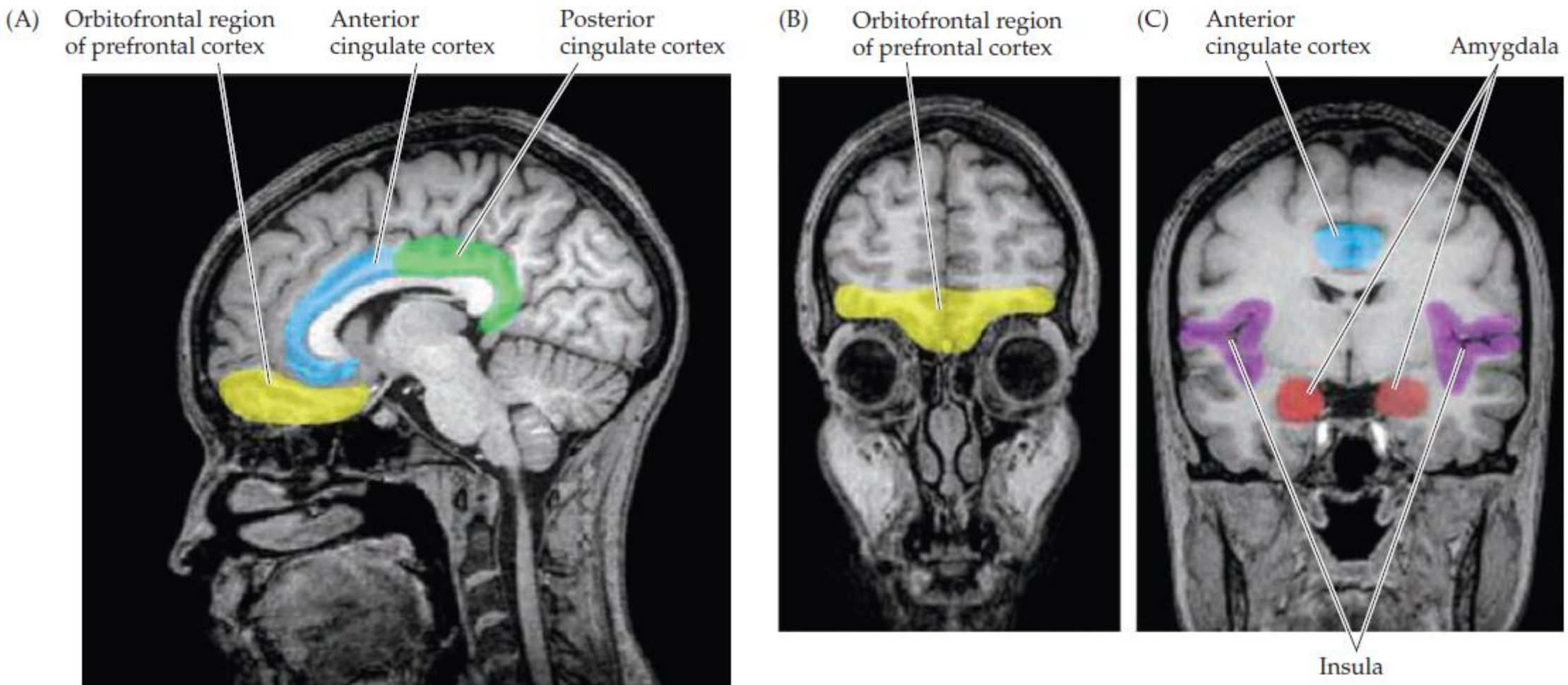


The influence of culture on emotions

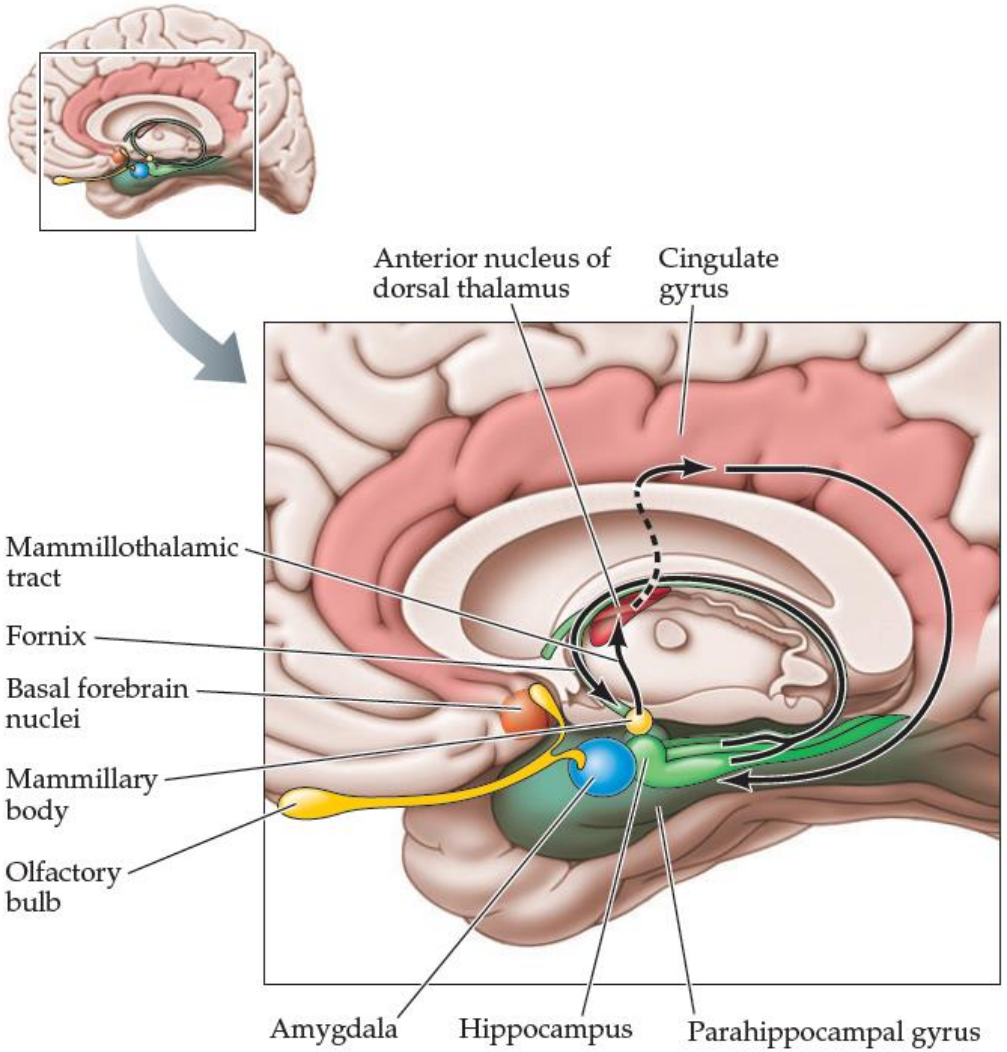


Emotions and feedback

Emotional brain



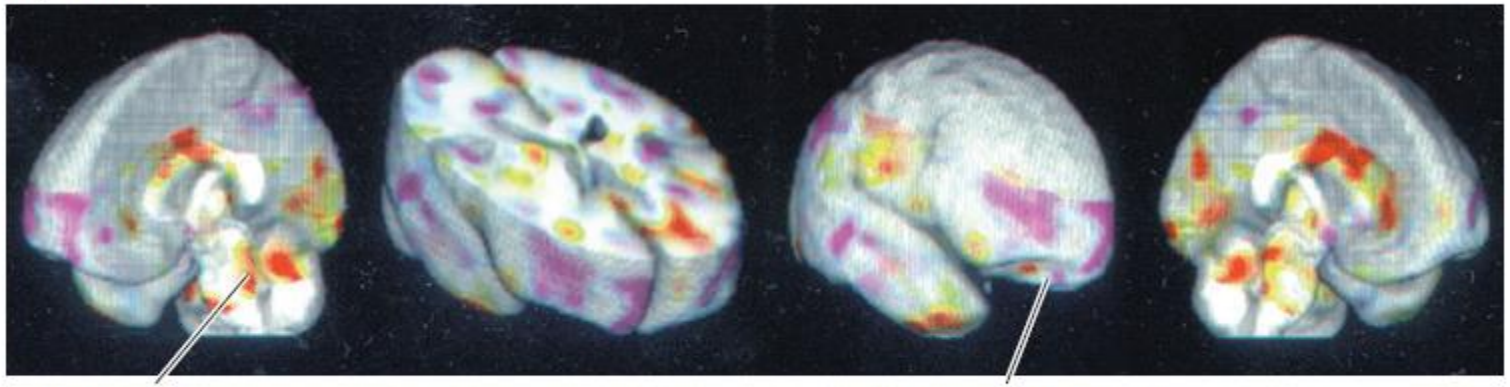
Brain lesions and emotions



- Decortication rage
- Limbic circuits
- Inhibition by the cerebral cortex
- Kluver-Bucy syndrome
- Fear
- Aggression, rage
- Limbic motor skills

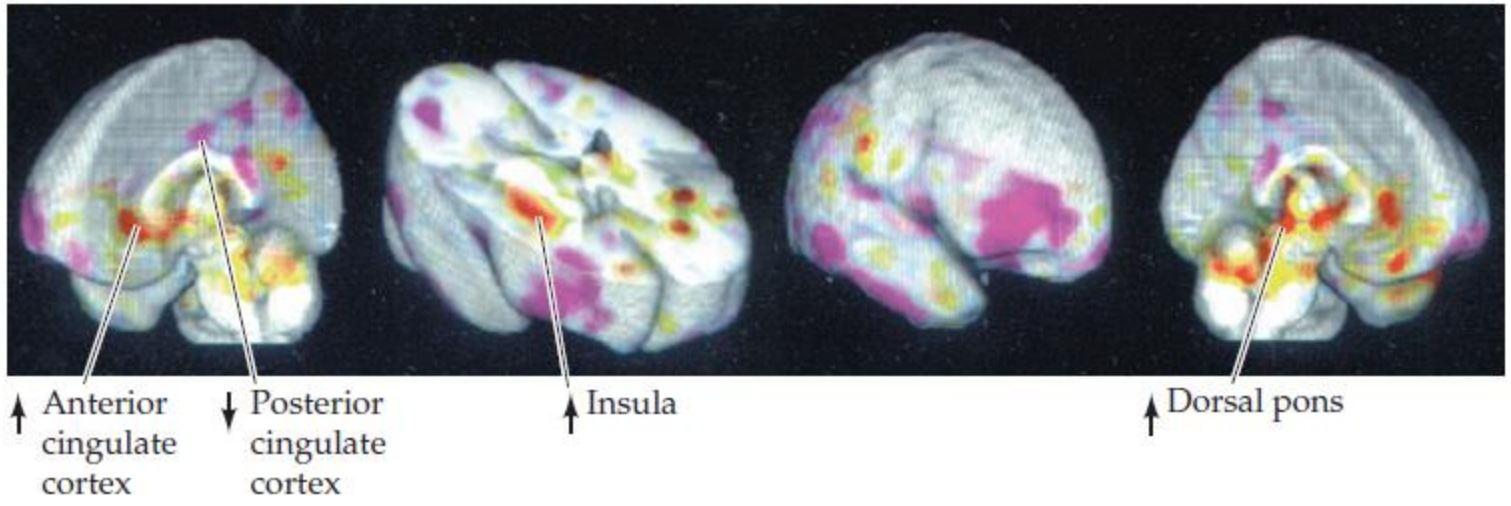
Neuronal circuits of emotions – fear

(C) Fear

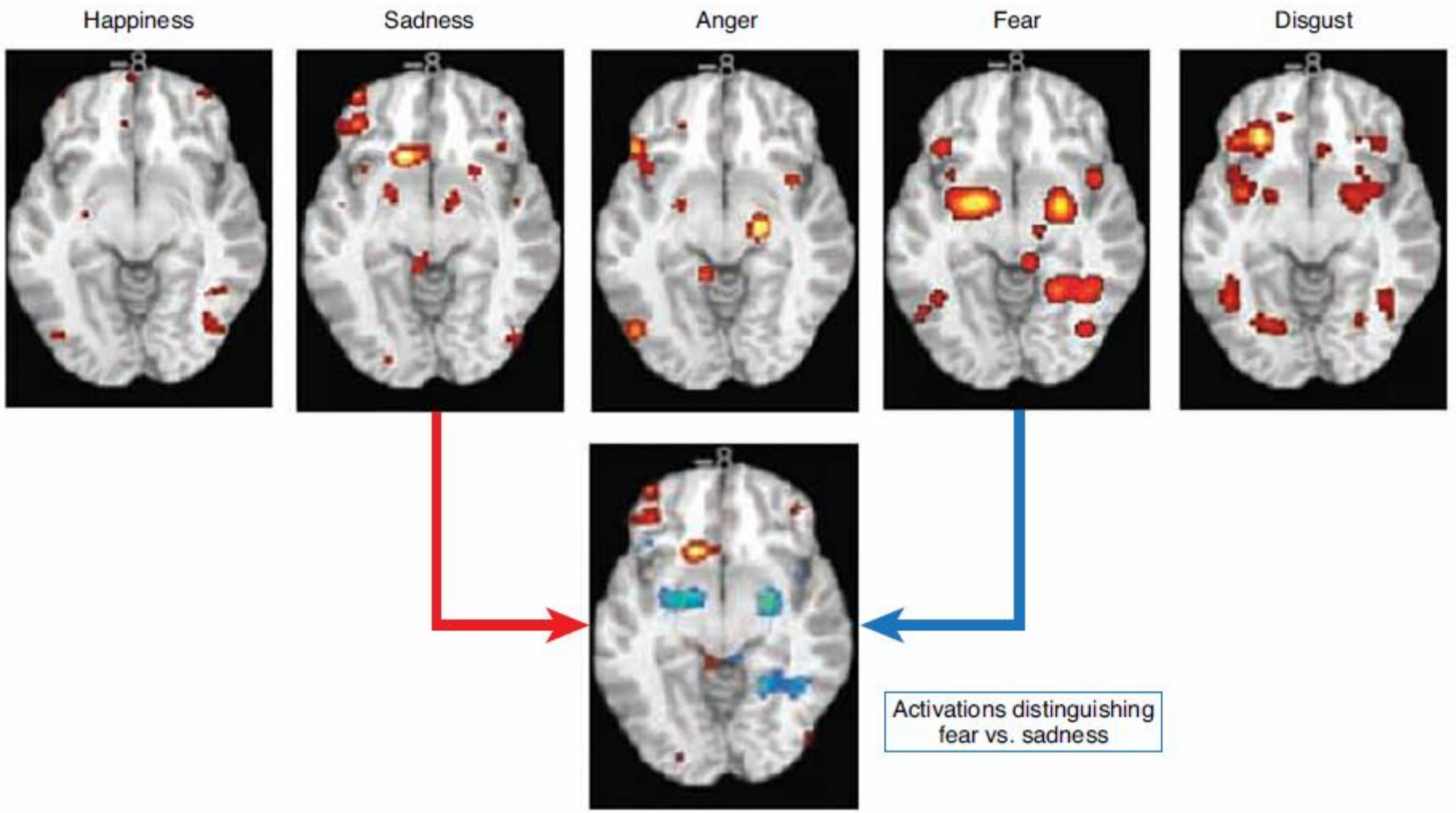


Neuronal circuits of emotions – sadness

(A) Sadness

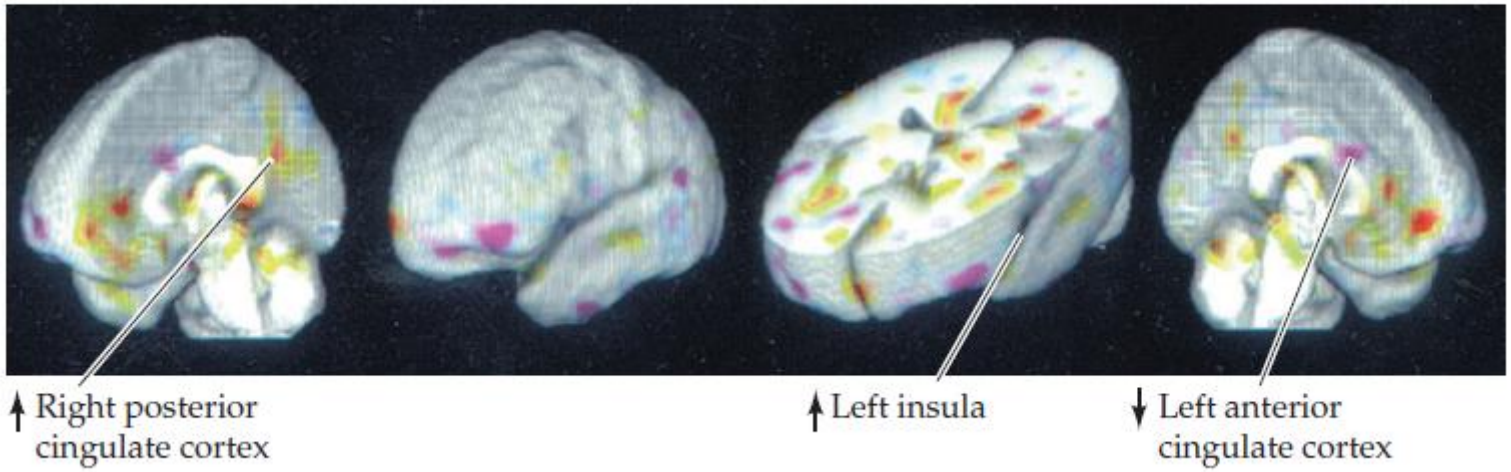


Neuronal circuits of emotions



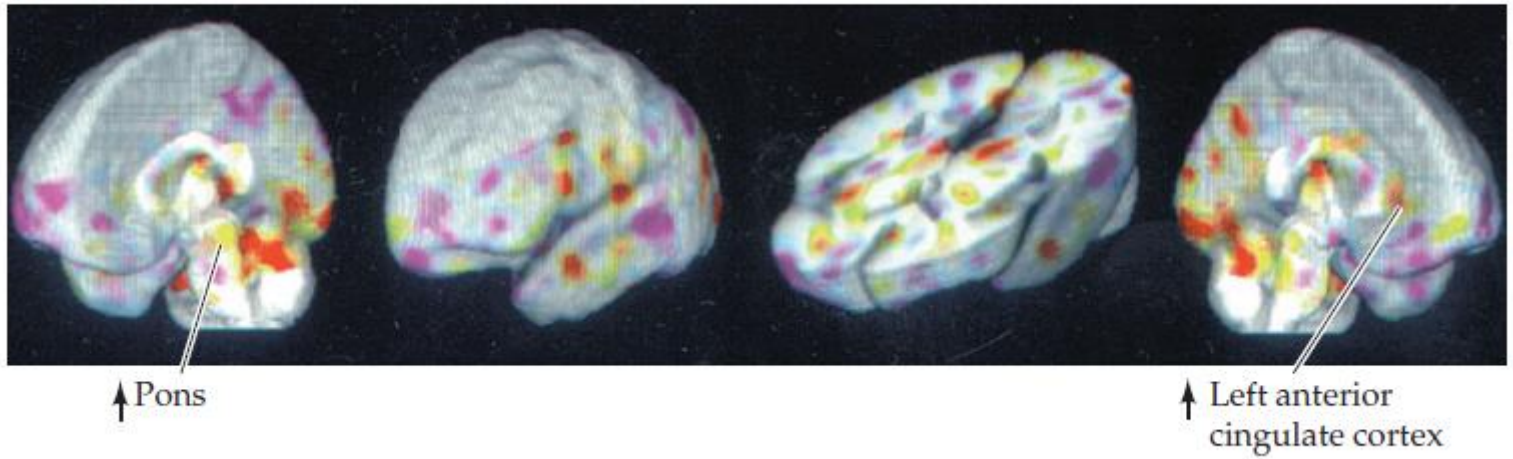
Neuronal circuits of emotions – happiness

(B) Happiness



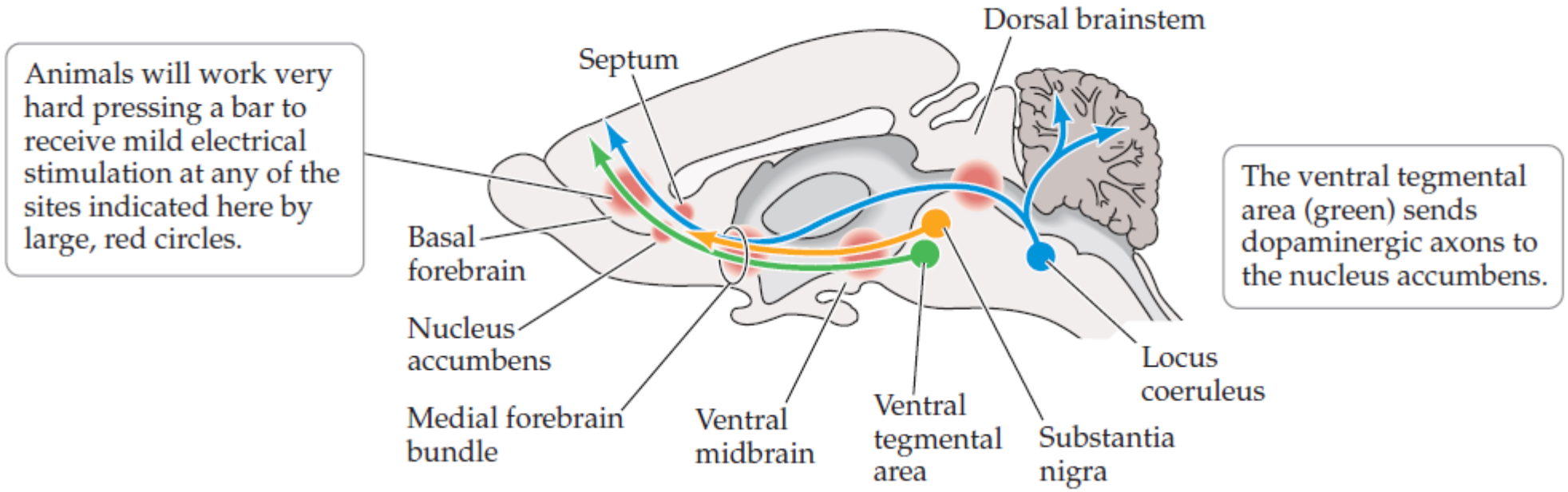
Neuronal circuits of emotions – anger

(D) Anger

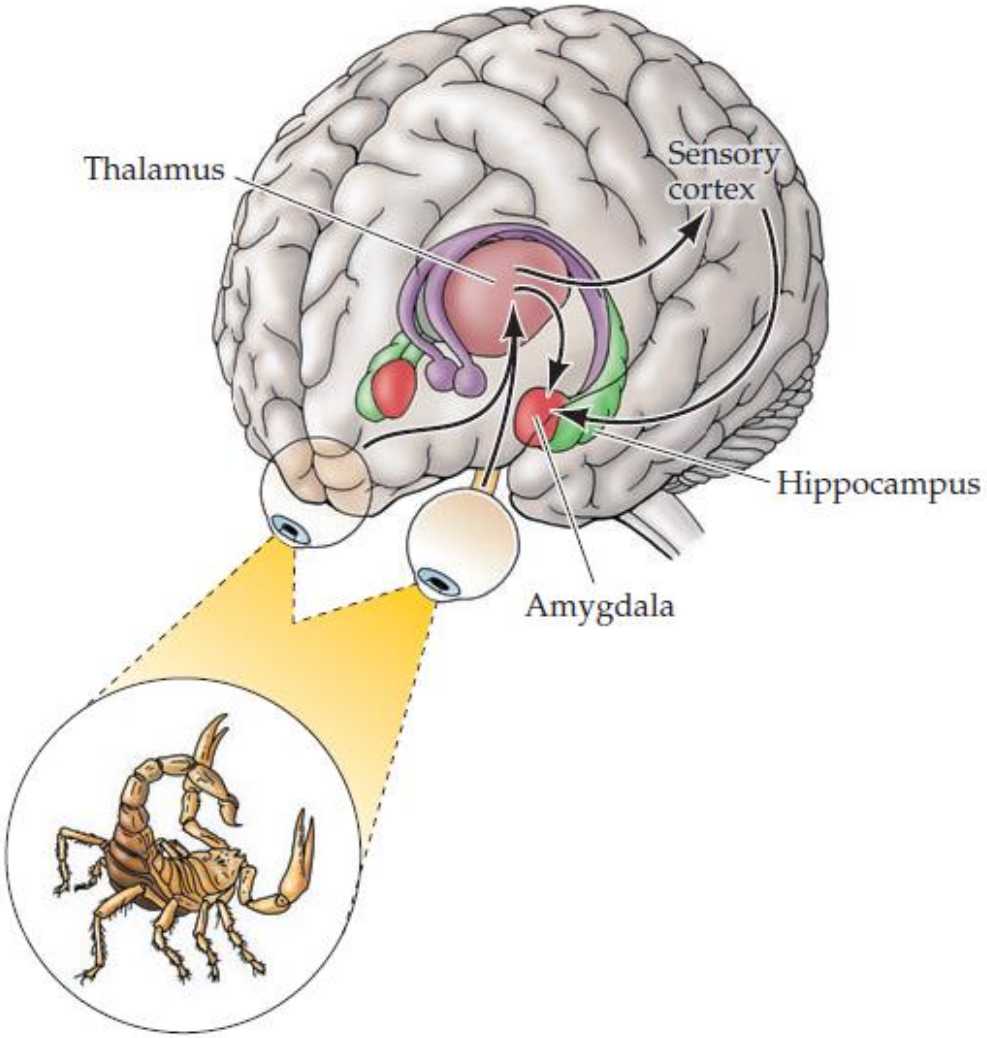


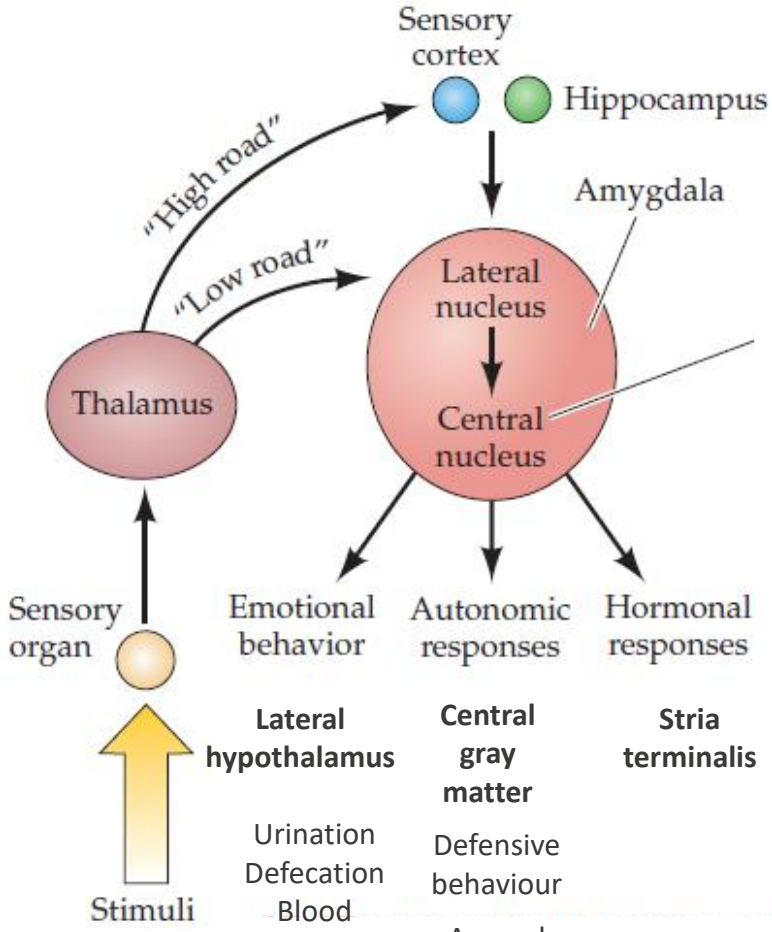
Centers and networks of happiness

Centres of satisfaction, joy or reward

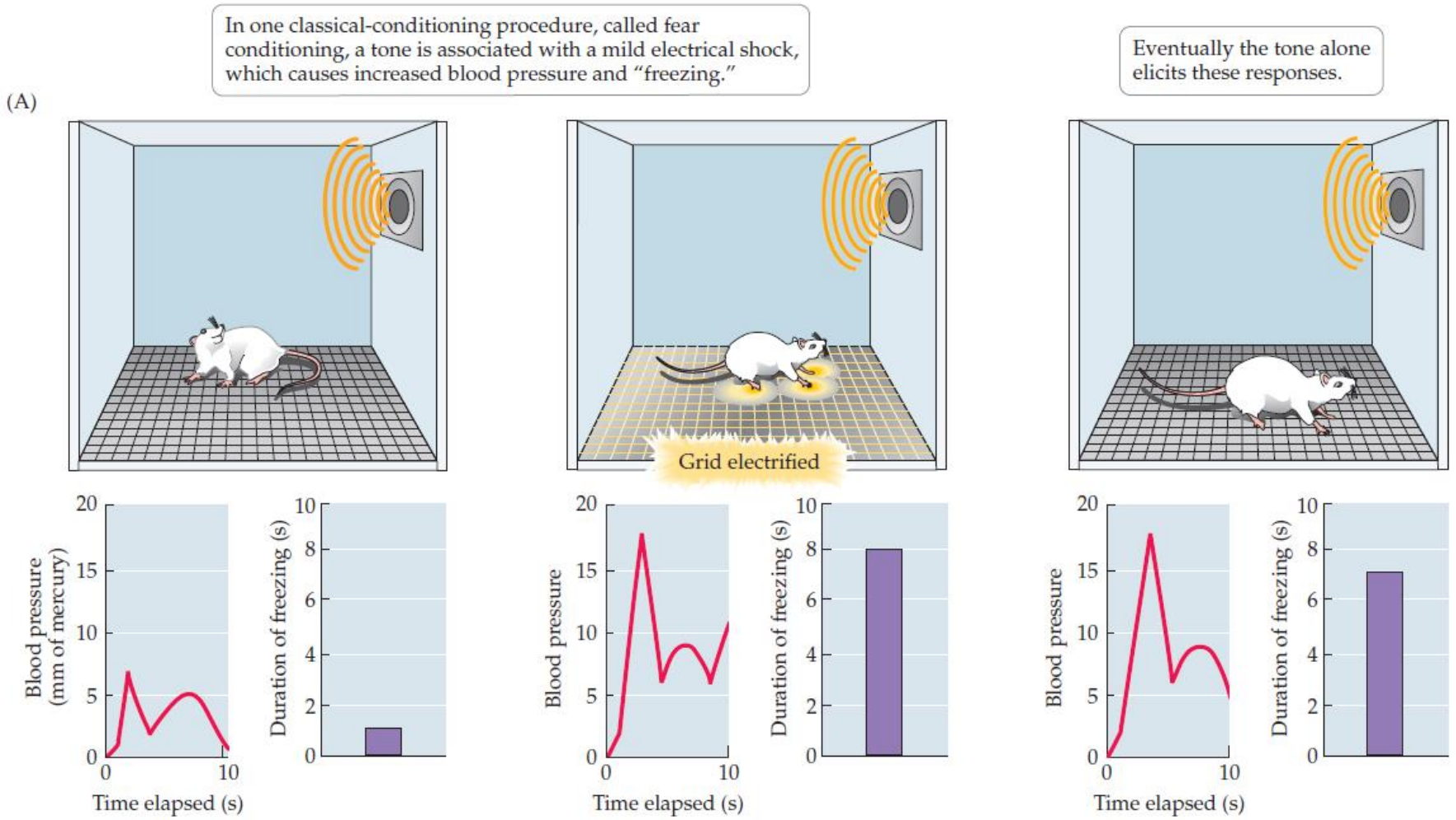


Fear networks

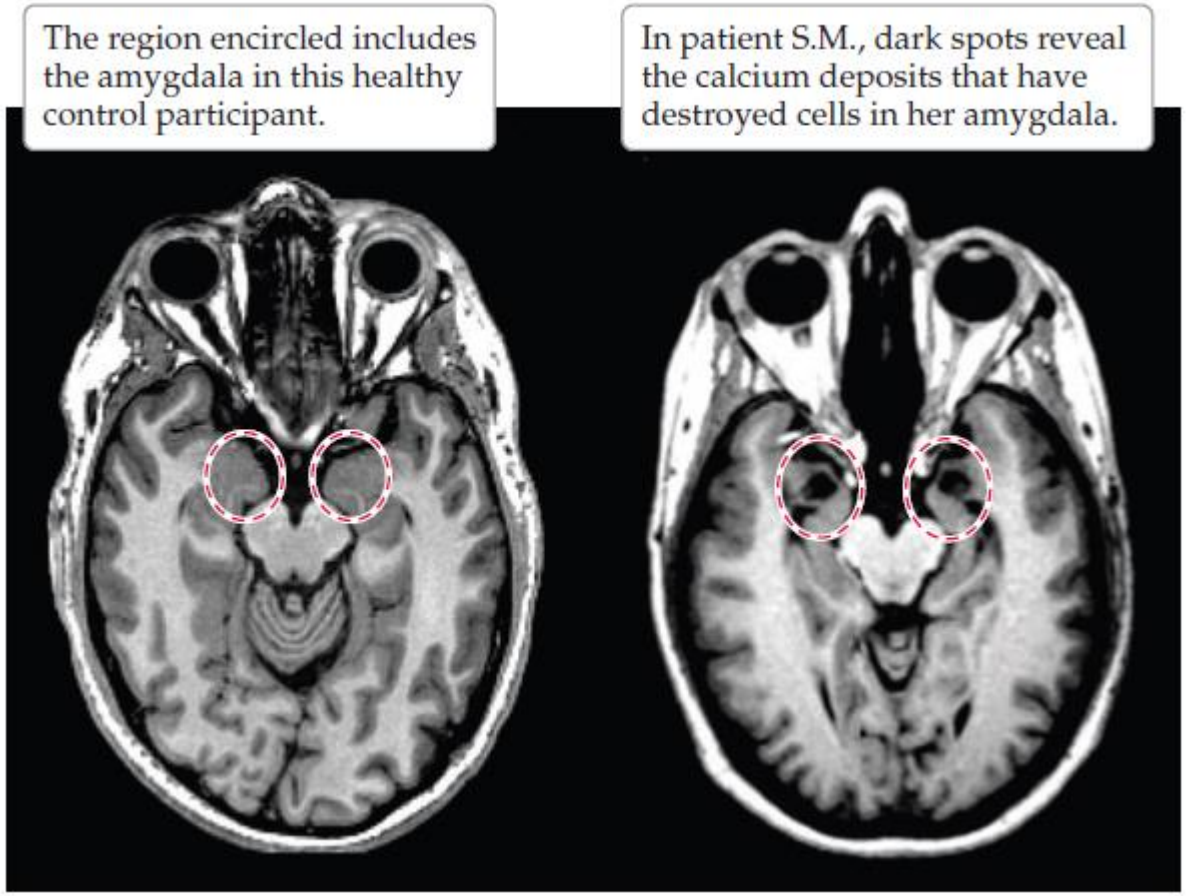




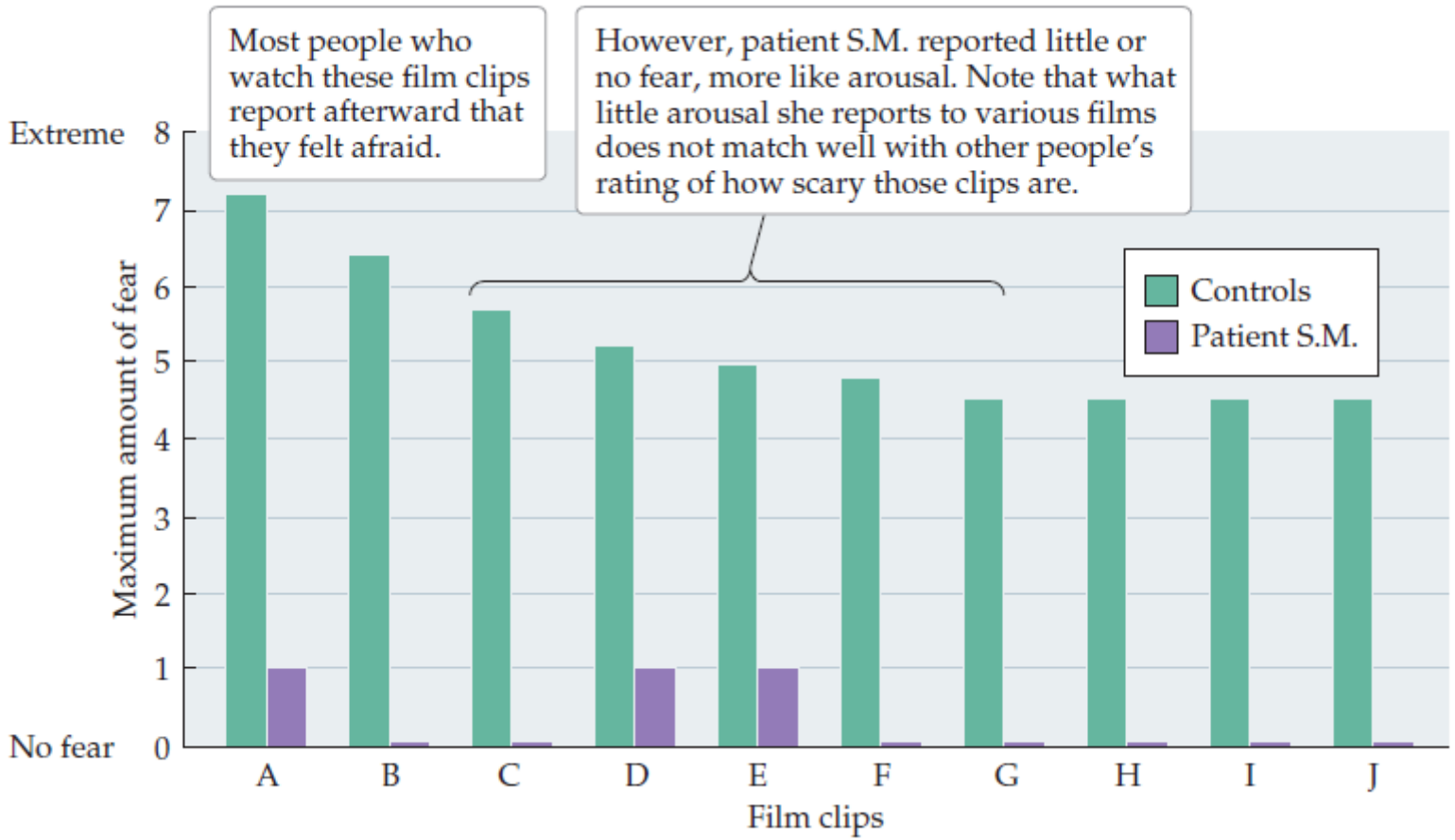
Fear conditioning



Patient S.M.


The region encircled includes the amygdala in this healthy control participant.
In patient S.M., dark spots reveal the calcium deposits that have destroyed cells in her amygdala.

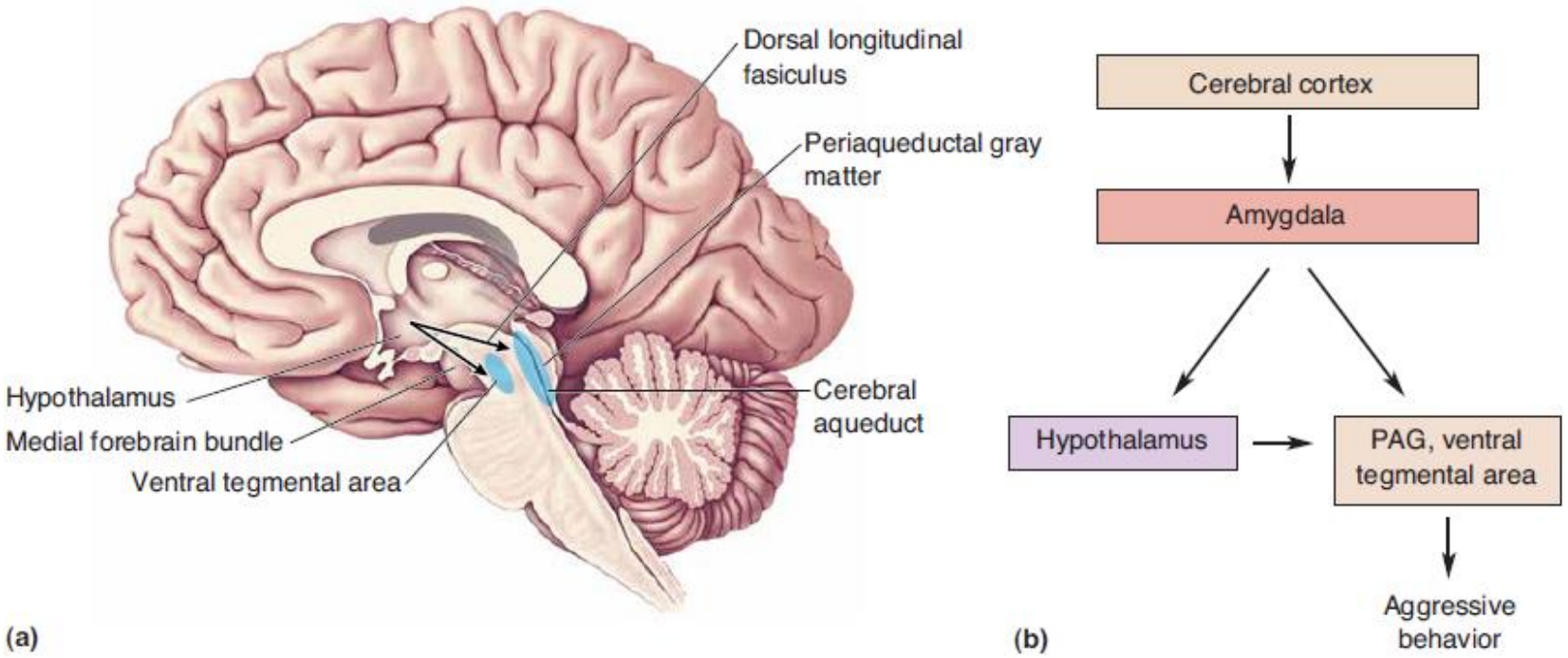
Patient S.M.


Most people who watch these film clips report afterward that they felt afraid.
However, patient S.M. reported little or no fear, more like arousal. Note that what little arousal she reports to various films does not match well with other people's rating of how scary those clips are.
Extreme
No fear
Maximum amount of fear
8
7
6
5
4
3
2
1
0
Controls
Patient S.M.
A
B
C
D
E
F
G
H
I
J
Film clips

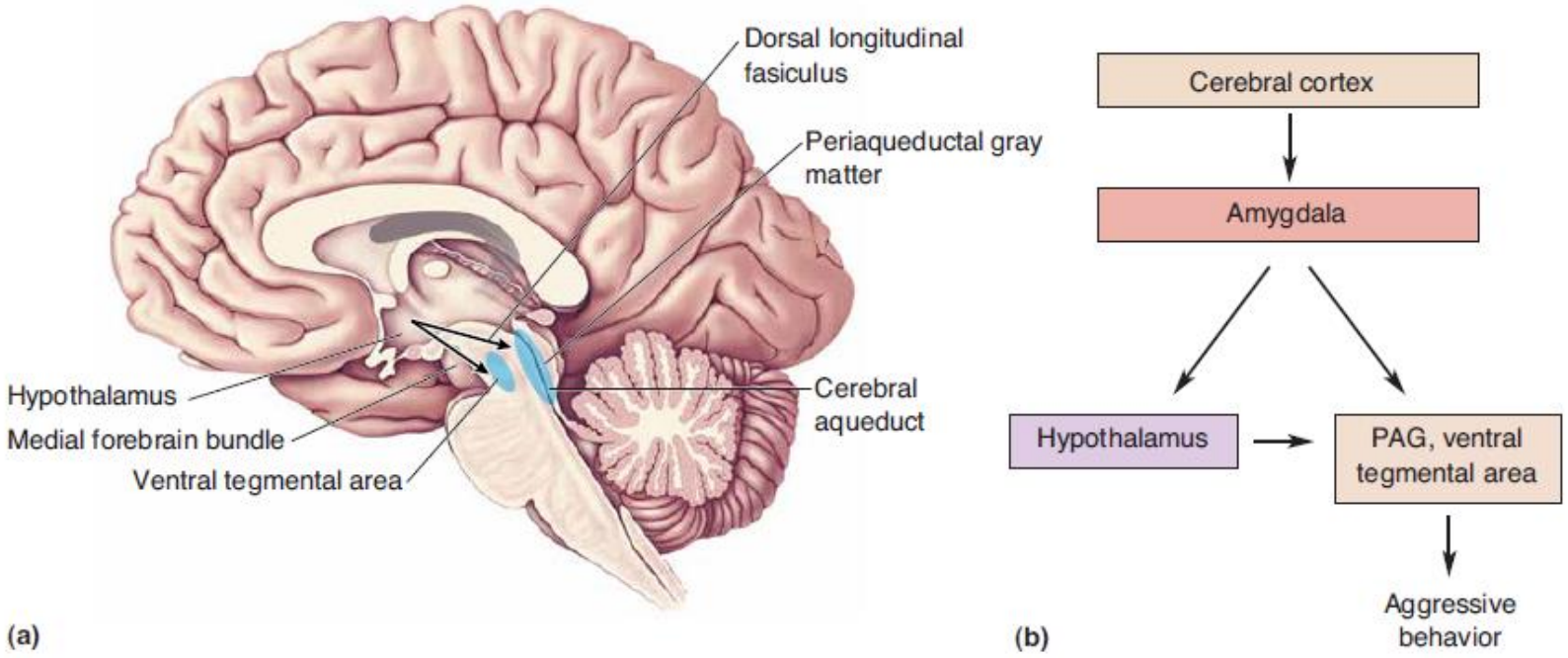
Anger and aggression

- Strong emotion
- Hate, the need to hurt others
- Physical violence, verbal abuse
- Passive aggression
- Envy, maliciousness
- Aggression between males
  - Fight for partner
  - Dominance
- Testosteron
- Centers of aggression
  - Ventromedial hypothalamus

Centers and networks of aggression

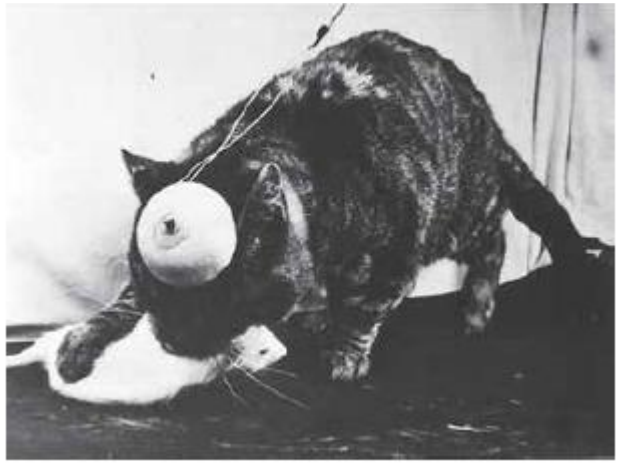


Centers and networks of aggression



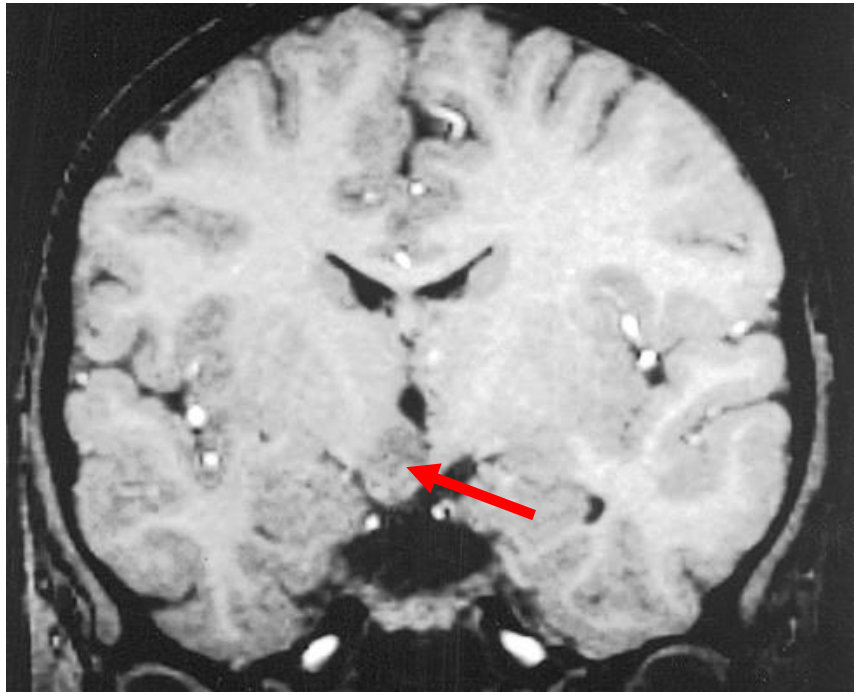
Medial hypothalamus stimulation

Lateral hypothalamus stimulation



Anger and aggression – hypothalamic stimulation

Centers and networks of emotions



Centers and networks of emotions

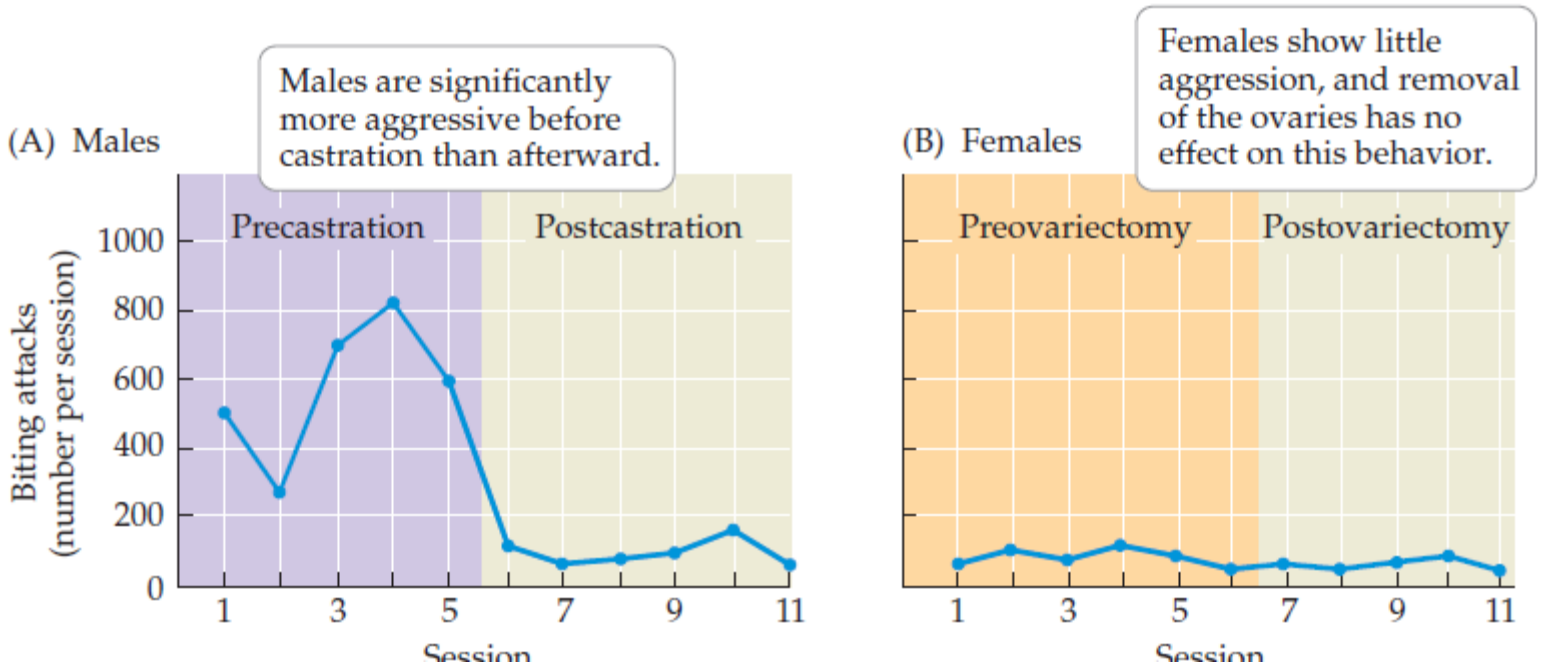
Severe forms:

- gelastic seizures (GS)
- early onset of GS
- other seizure types (refractory to AED)
- progressive impairment of cognitive function
- mental retardation
- behavioural disorders
- precocious puberty
- HH more then 1,5 cm

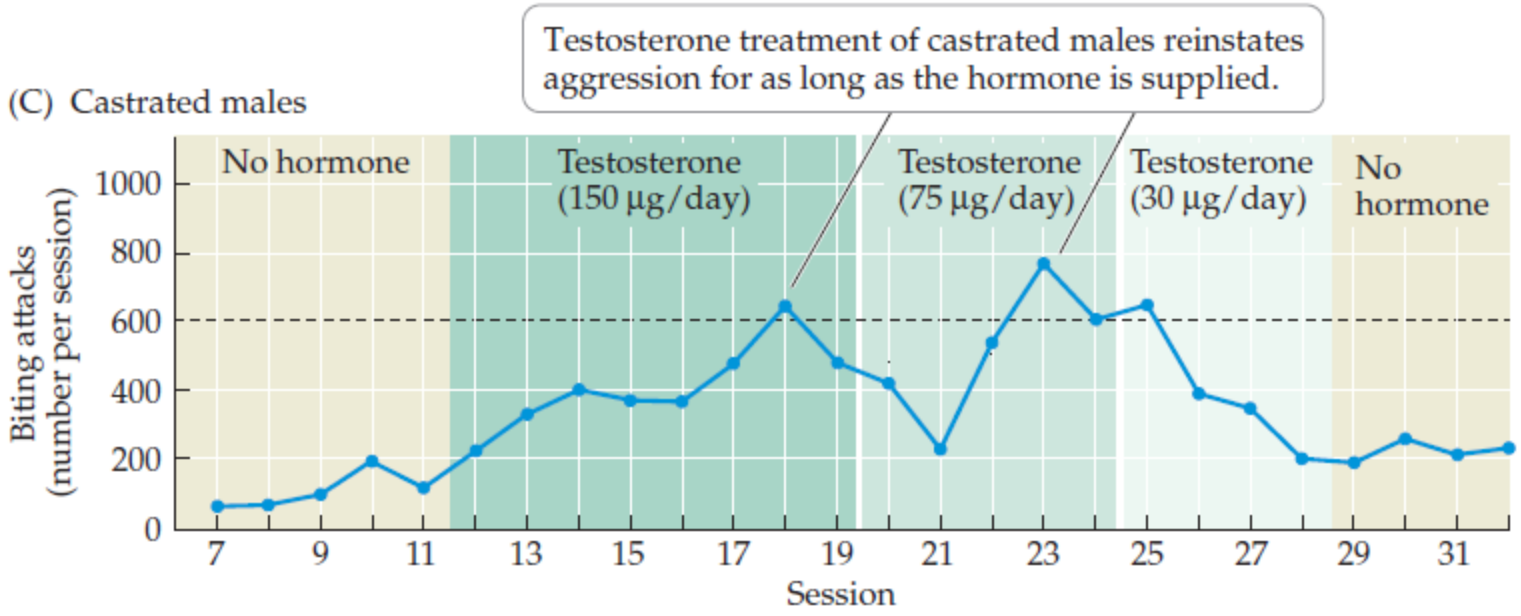
Mild forms:

- gelastic seizures or „pressures to laugh“
- late onset od GS
- other seizure types (controlable by AED)
- normal neuropsychology
- no precocious puberty
- HH less than 1 cm

Anger and aggression – the influence of testosterone



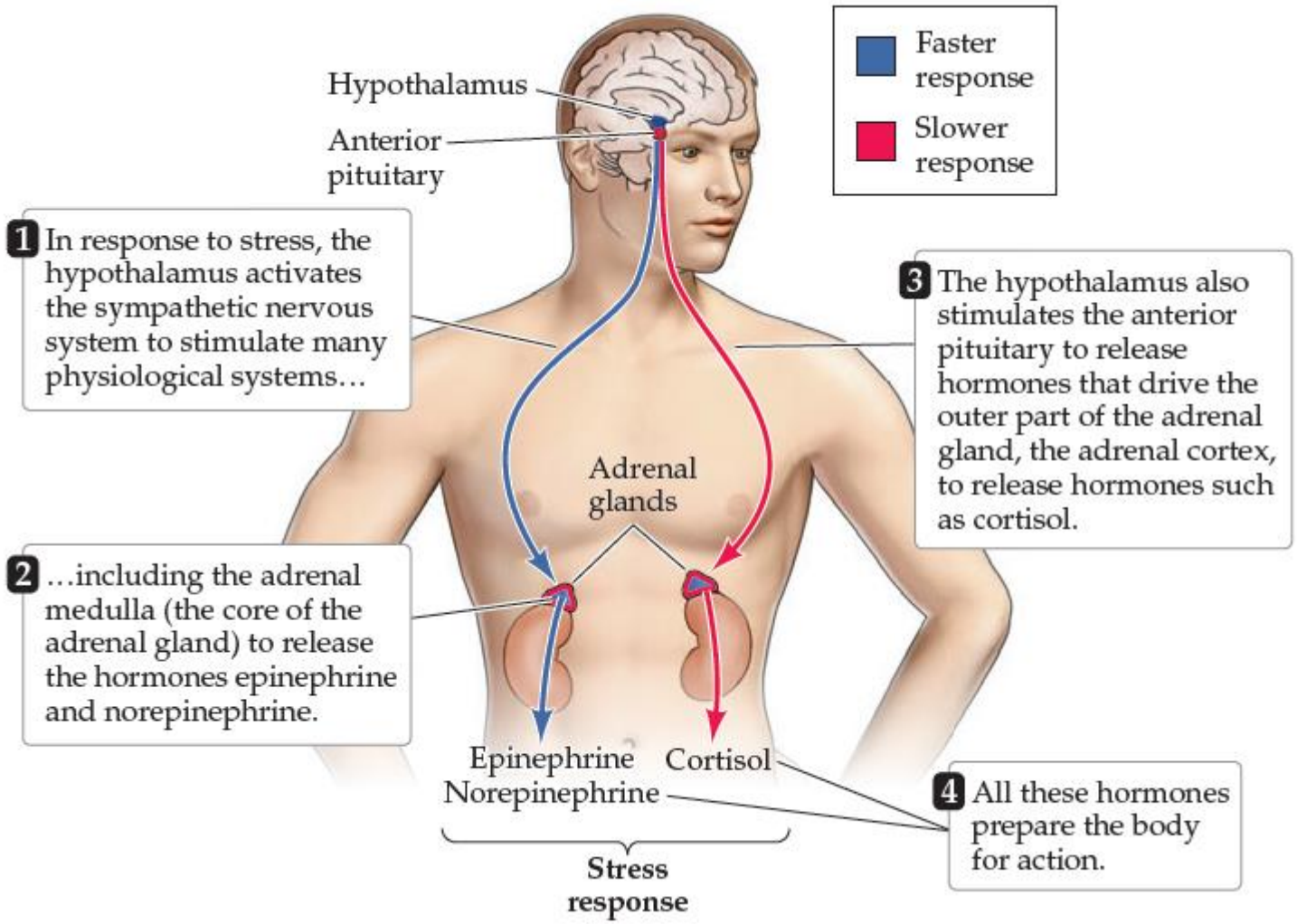
Anger and aggression – the influence of testosterone



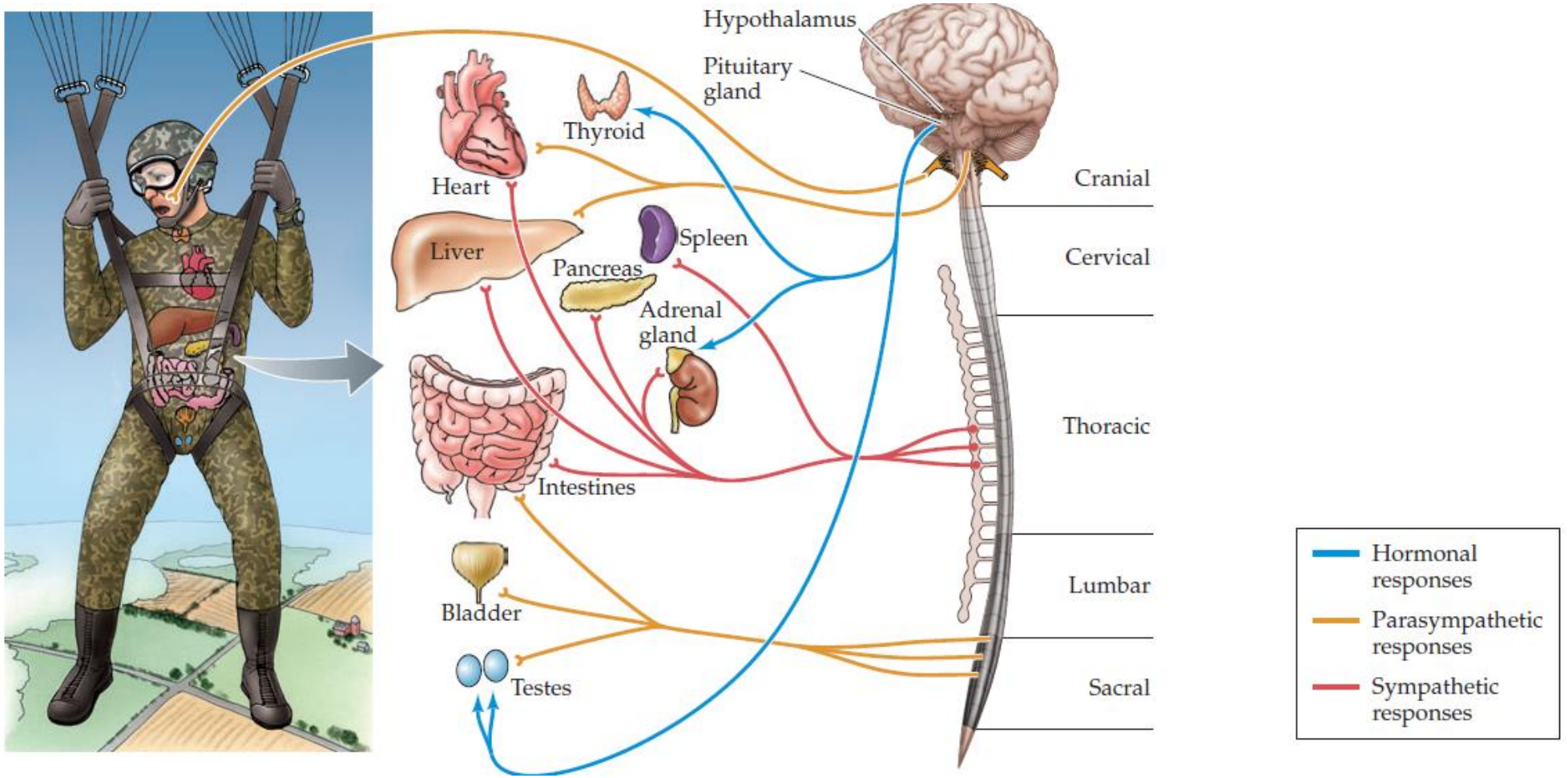
Anxiety, stress, and fear

- Anxiety – anticipating the event you fear
- Fear – emotion associated with anxiety
- Stress – chronic application of anxiety or fear in daily life

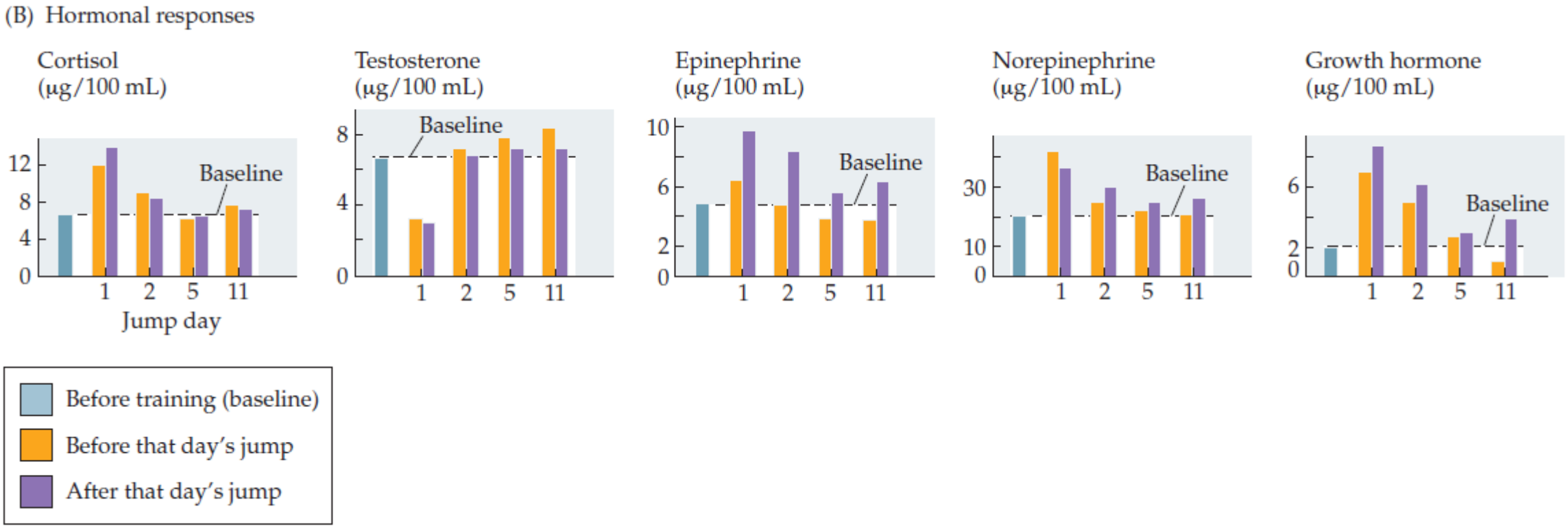
Stress – autonomic and hormonal responses



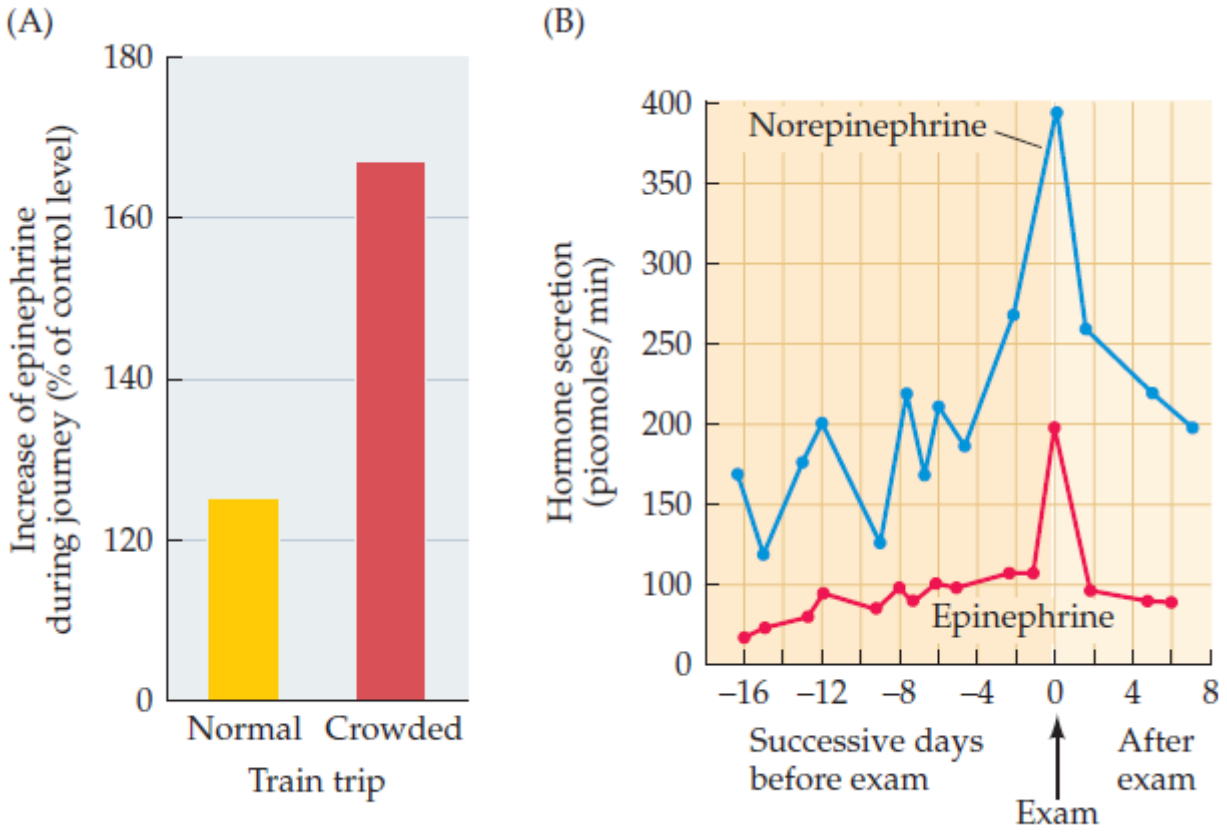
Stress – autonomic and hormonal responses



Stress – hormonal responses and accommodation



Stress – hormonal responses



Stress response and consequences of prolonged stress

- Mobilization of energy
- Fatigue, muscle wasting, steroid diabetes
- Increased cardiovascular and cardiopulmonary tone
- Hypertension
- Suppression of growth
- Psychogenic dwarfism and bone decalcification
- Suppression of reproduction
- Suppression of ovulation, impotence, loss of libido
- Suppression of immunity and inflammatory response
- Impaired disease resistance
- Neural responses, including altered cognition and sensory threshold
- Neural degeneration in the hippocampus and prefrontal cortex

Stress reduction