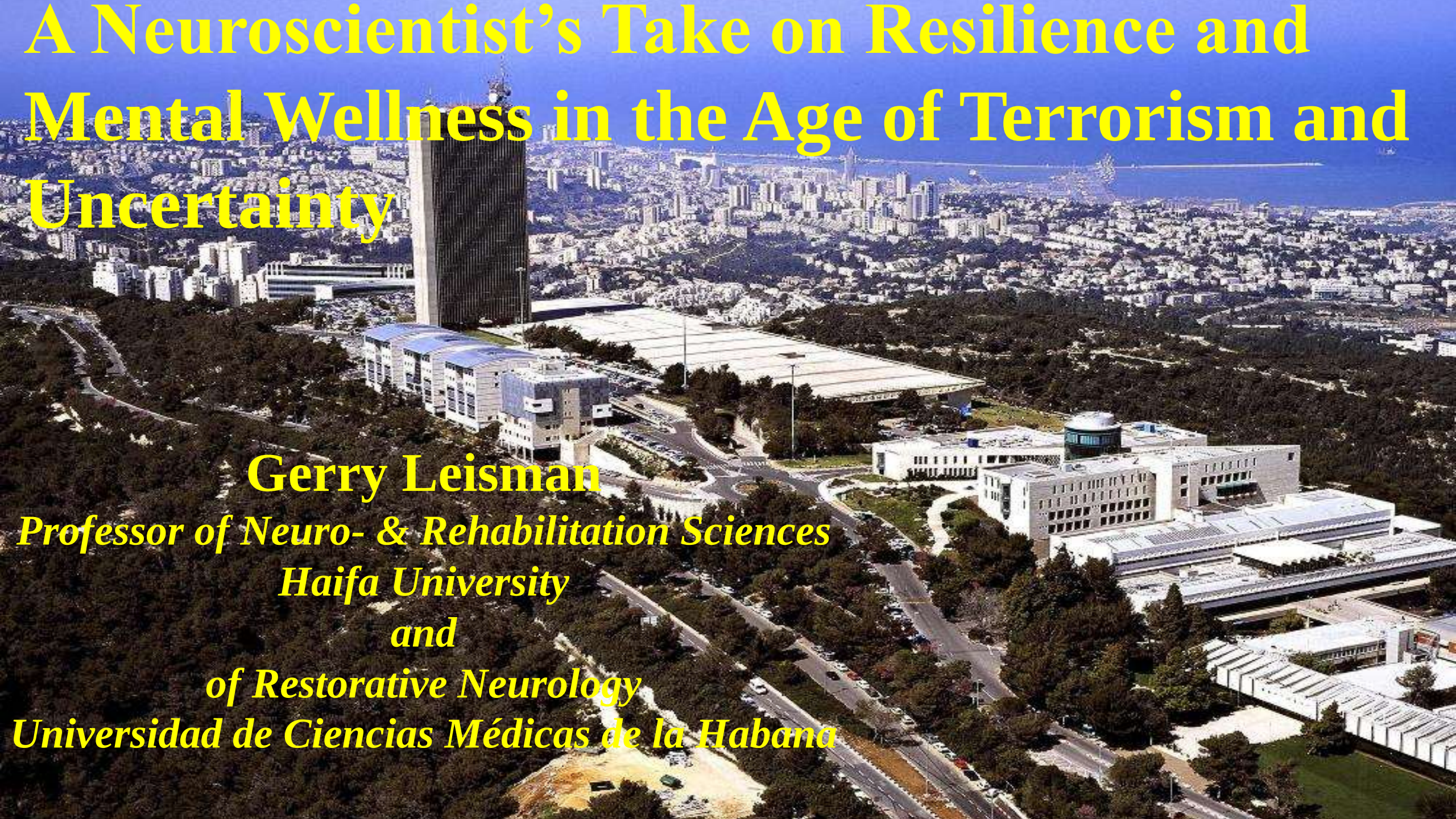
A Neuroscientist's Take on Resilience and Mental Wellness in the Age of Terrorism and Uncertainty



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and
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Universidad de Ciencias Médicas de la Habana

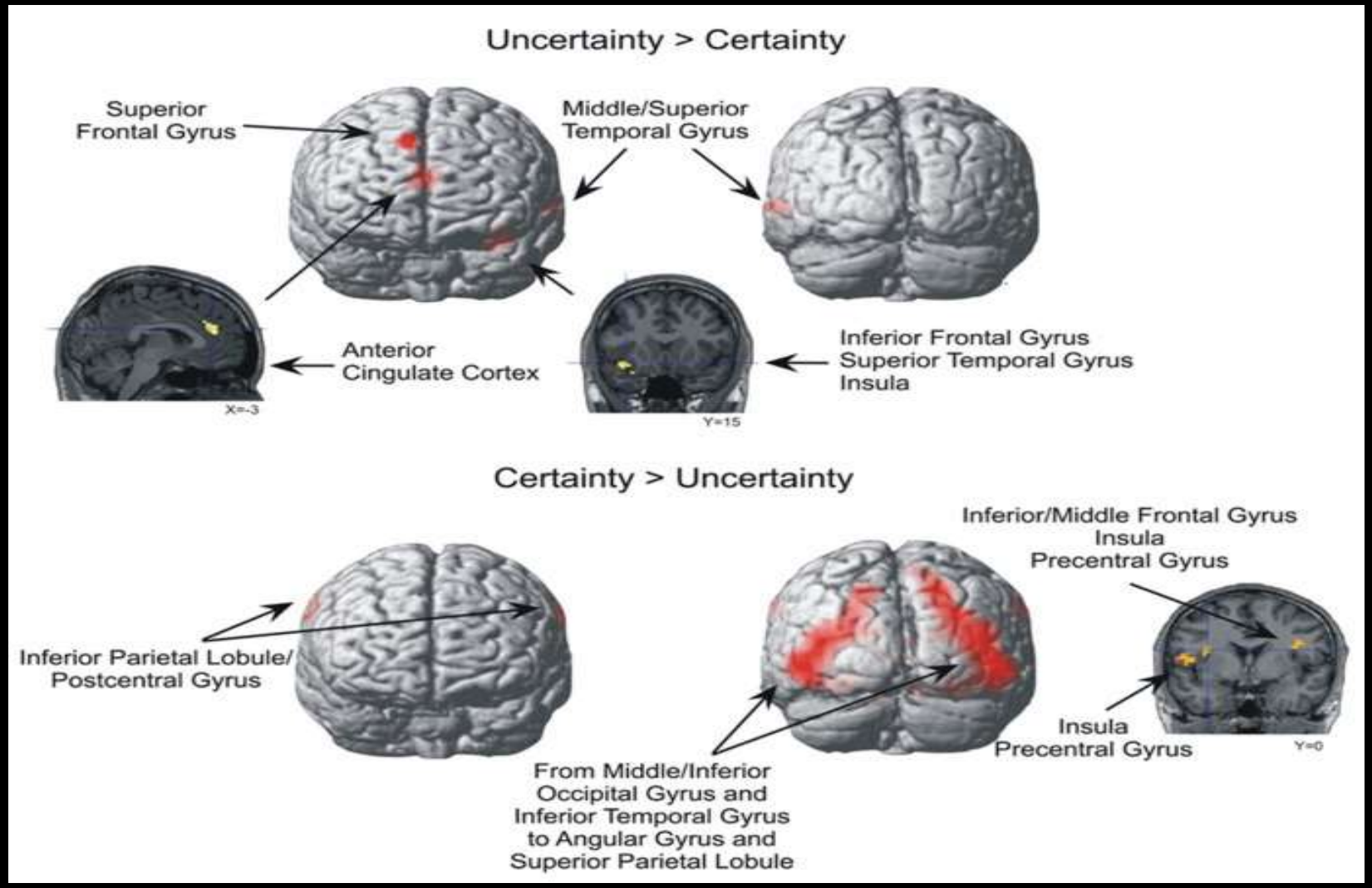
Terrorist Incidents in Israel 2017

PROPORTION DEATHS FROM TRAFFIC ACCIDENTS IN ISRAEL IN 2017

.0114

PROPOPRTION DEATHS FROM TERRORISM IN ISRAEL IN 2017

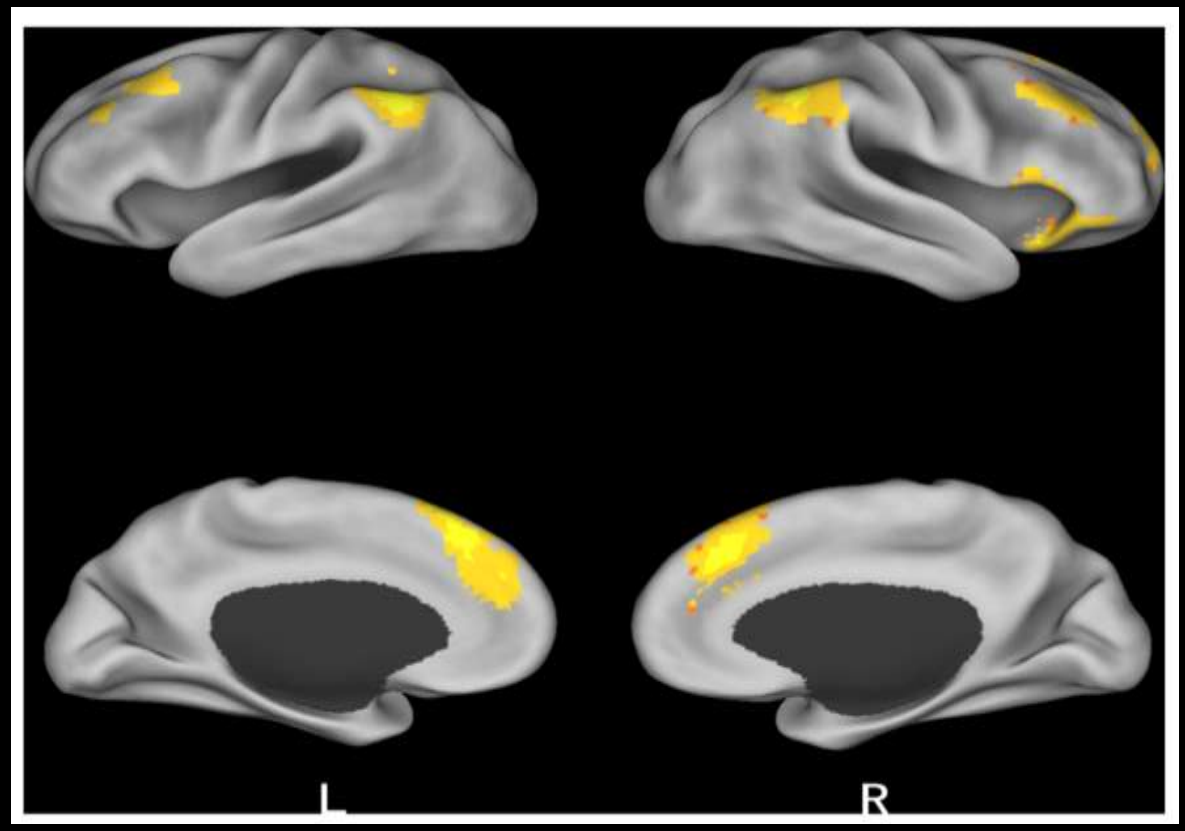
.00000137


Uncertainty > Certainty
Superior
Frontal Gyrus
Middle/Superior
Temporal Gyrus
Anterior
Cingulate Cortex
X=-3
Inferior Frontal Gyrus
Superior Temporal Gyrus
Insula
Y=15
Certainty > Uncertainty
Inferior Parietal Lobule/
Postcentral Gyrus
From Middle/Inferior
Occipital Gyrus and
Inferior Temporal Gyrus
to Angular Gyrus and
Superior Parietal Lobule
Inferior/Middle Frontal Gyrus
Insula
Precentral Gyrus
Insula
Precentral Gyrus
Y=0

Group Think: Social Conformity

Aash Experiment of Social Conformity

Brain and Social Conformity



The effect noted in the medial frontal gyrus when subjects viewing others' choices after they rejected the offers in the first decision.

What We Are Not Dealing With

Psychopaths

PROCESSING EMOTIONAL WORDS

THEY CAN'T FEEL IT ... ONLY THINK IT

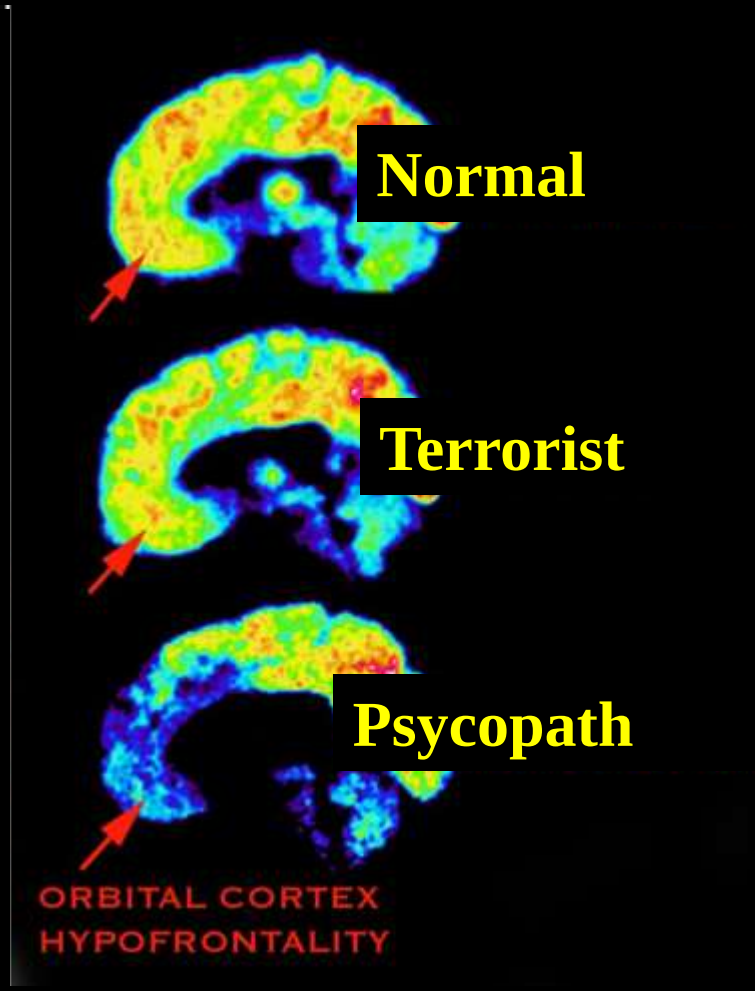
Limbic

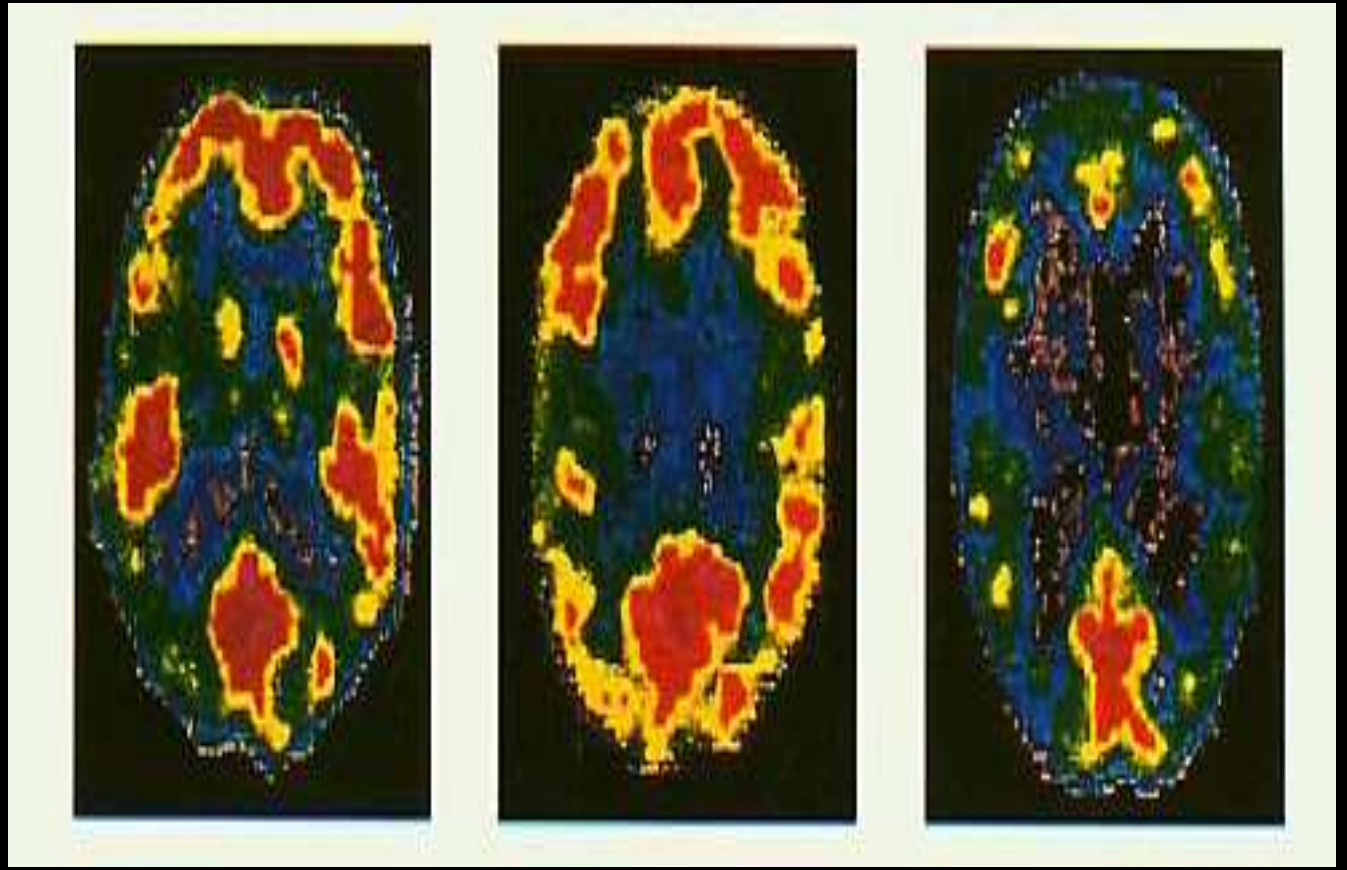
Non-Psychopath
Activates the emotion regions of the brain

Frontotemporal

Psychopath
Activates the reasoning & language regions

fMRI of Terrorist v.Psychopath



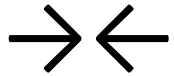


VUCA+H

VUCA+H Elements	Principal Psychological Effects:	Principal Physiological Effects:
Volatility:	Chronic anxiety, difficulty concentrating, restlessness, and irritability.	Increased HR, BP & muscle tension, cardiovascular issues & other stress-related health problems.
Uncertainty:	Anxiety and sense of powerlessness. may find it challenging to make decisions or plan for the future.	Ongoing alertness, with sympathetic nervous system in persistent state of activation
Complexity:	Cognitive overload, exhaustion, and burnout; difficulty prioritizing tasks and maintaining focus.	Chronic fatigue, disrupted sleep, and increased susceptibility to illnesses.
Ambiguity:	Confusion, indecision, lack of clarity, heightened stress & frustration, impacting well-being.	Increased levels of hormone cortisol, affecting metabolism, immune function, & cardiovascular health.
Hyper-connected	Information overload, stress, anxiety, & difficulties maintaining work-life. Exposure to traumatic content may trigger PTSD.	Disrupted sleep, increased stress-related hormones, contribute to development of PTSD symptoms in response to traumatic events.

Elements of the Behavioral Functions of a Healthy Mind

Awareness

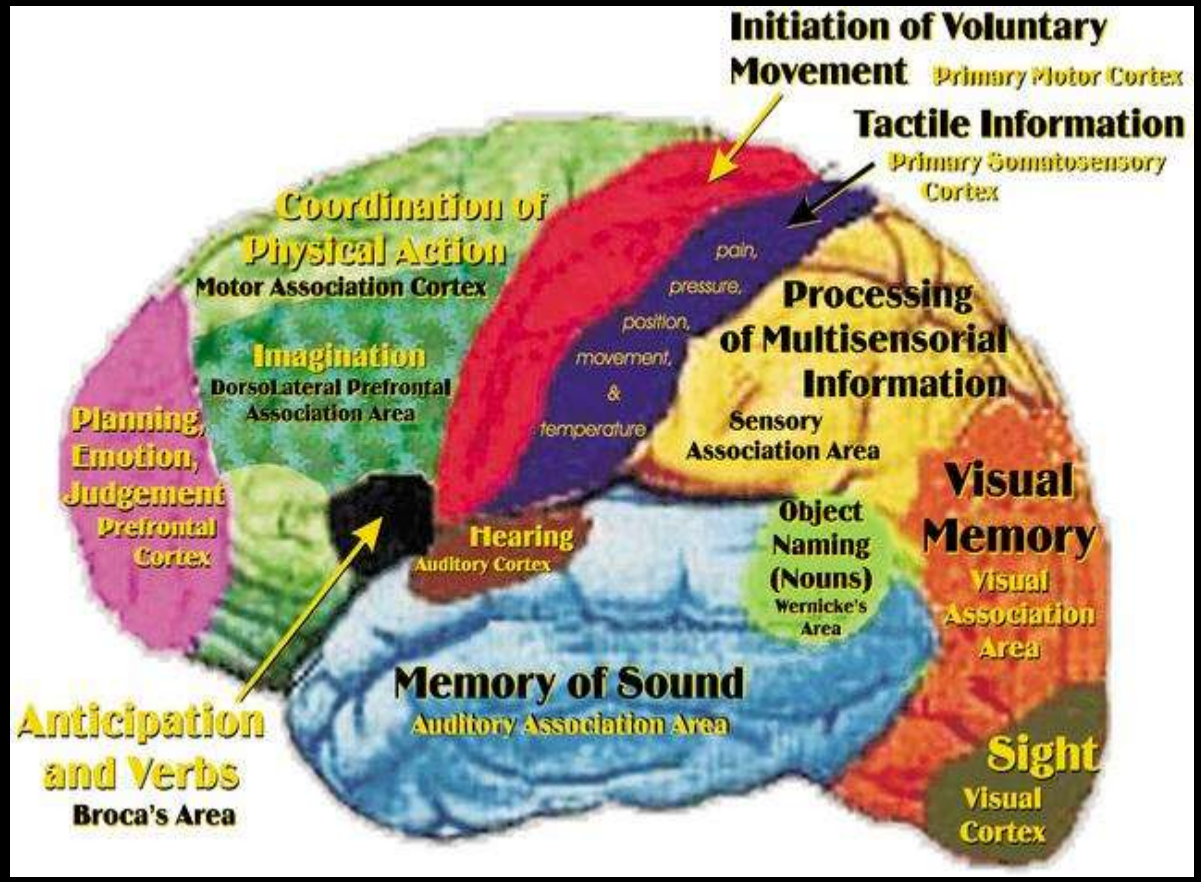


Connection

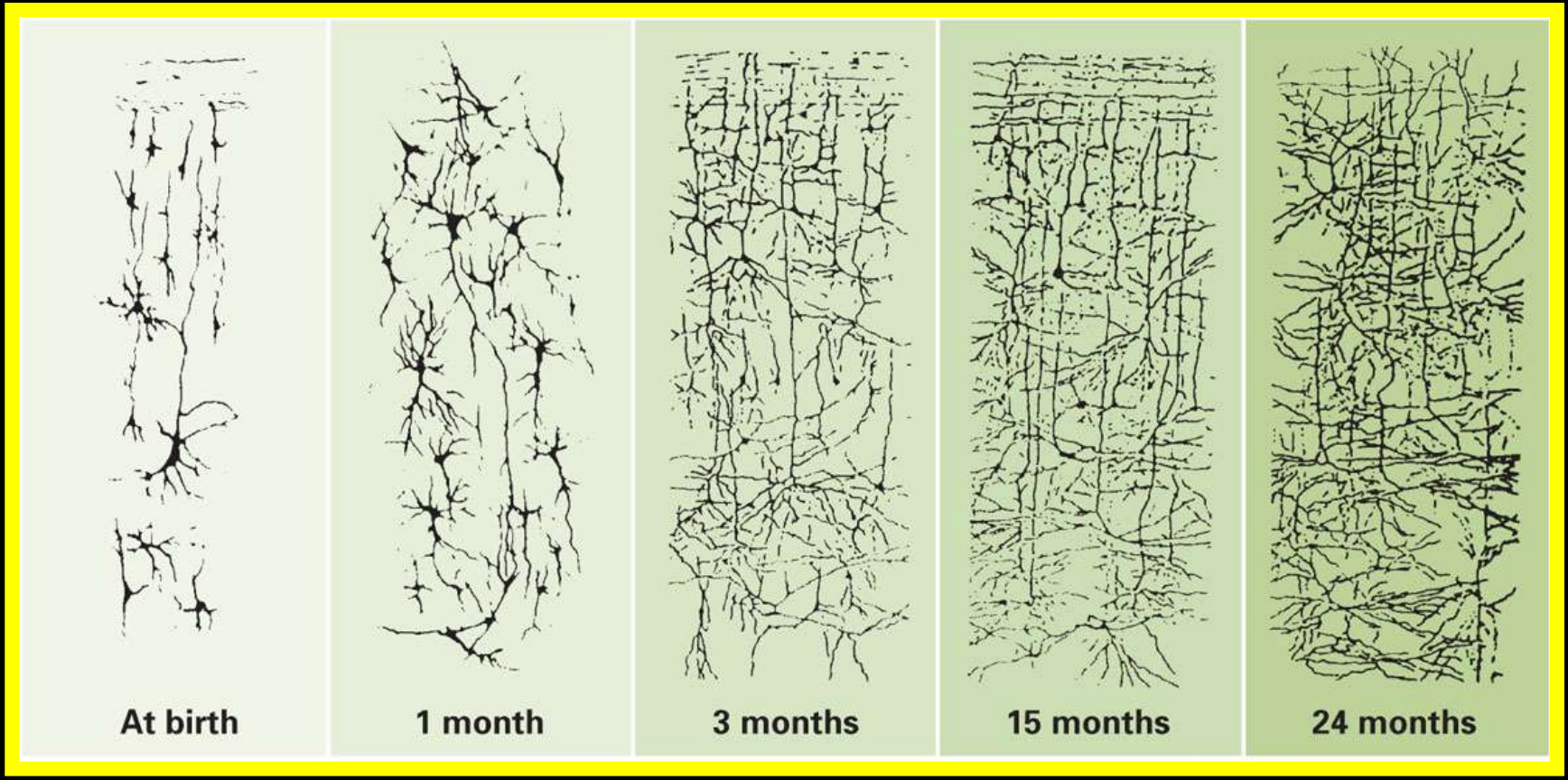
Insight

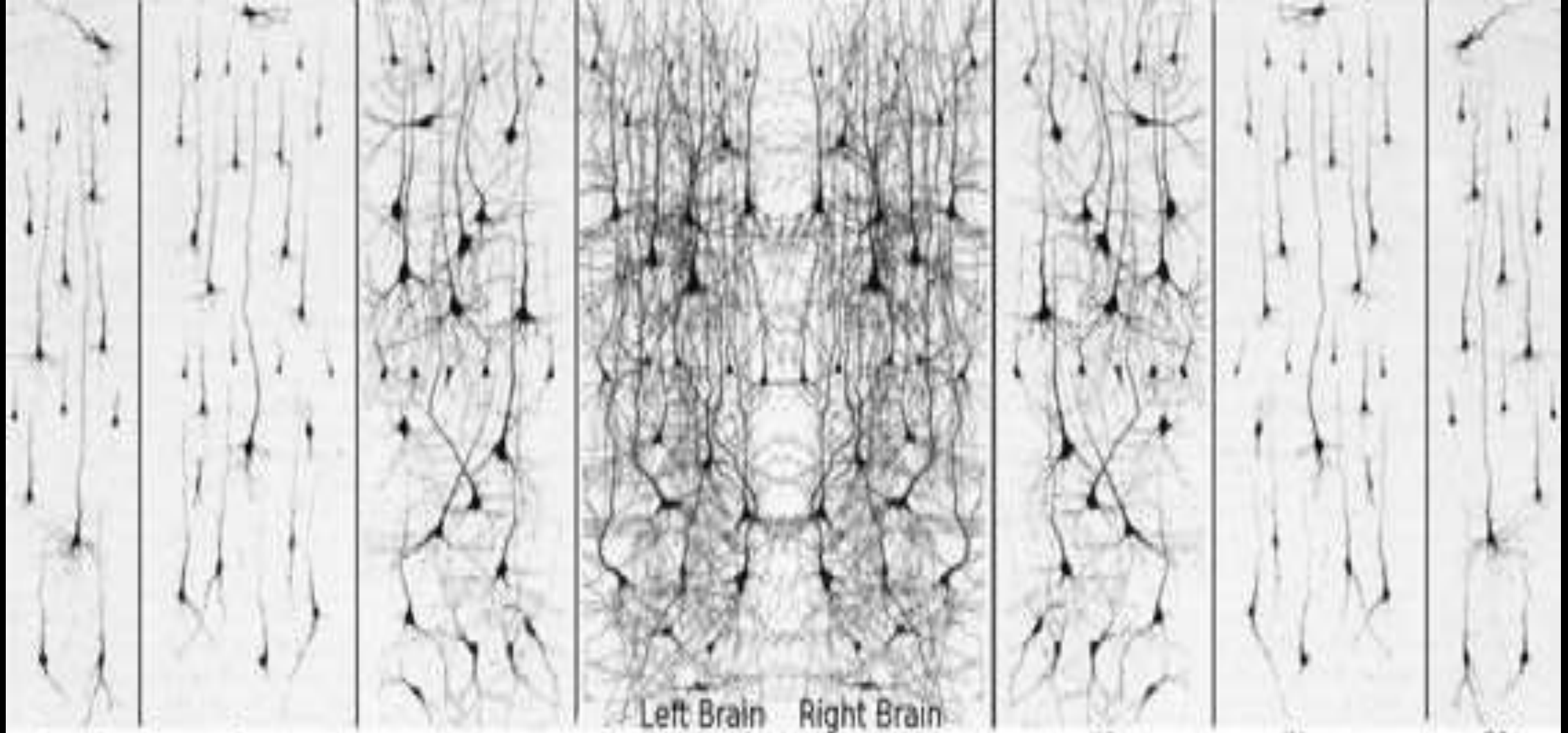
Purpose

Localization of Function



Development of Neural Connectivities

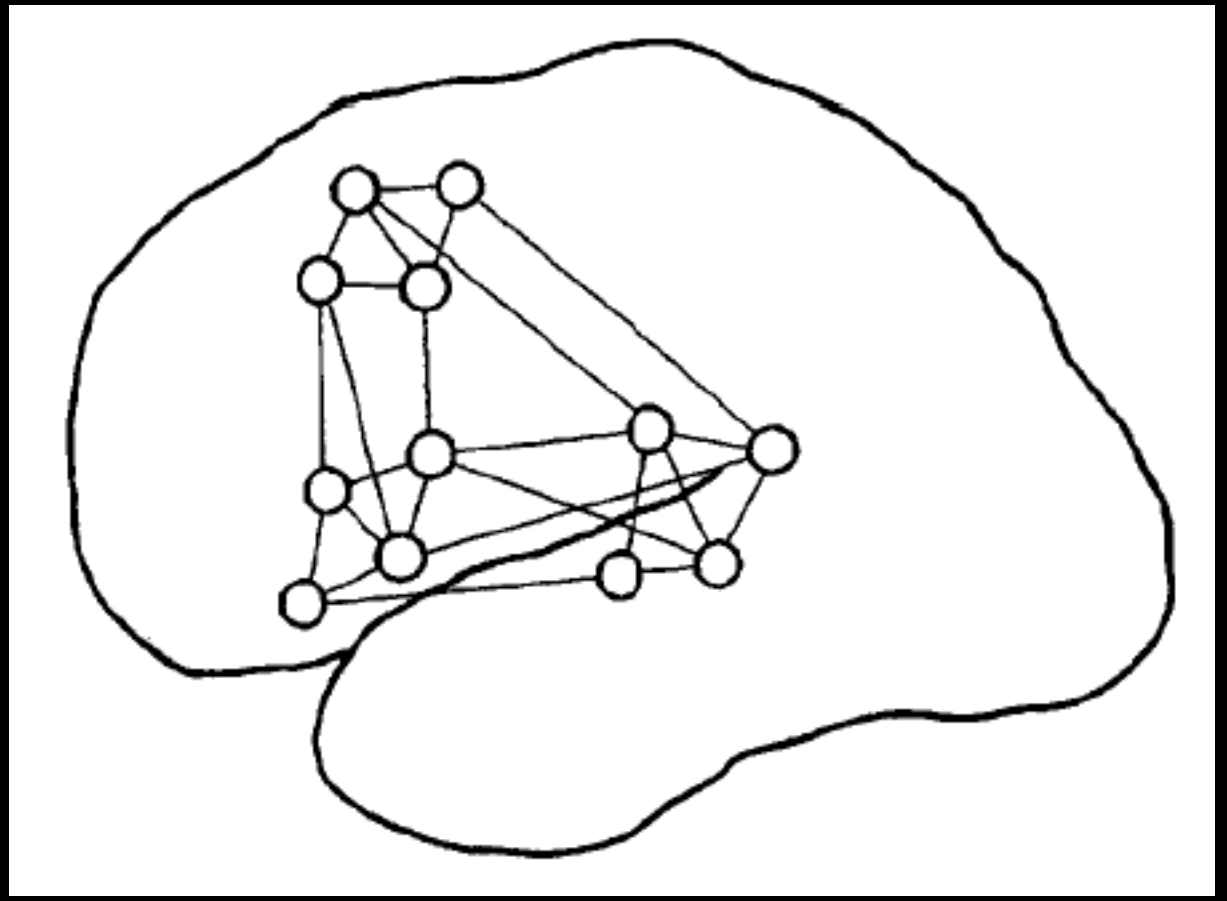



Left Brain
Right Brain
Age 1+
Infant
birth
7+
Child
13+
Teen
(Stimulation and Growth)
30-60
Adult (Peak)
65+
Senior (Decay starts)
70+
Demetia
80+
Alzheimer's
(No Neural
Communication

FUNCTIONAL CONNECTIVITIES

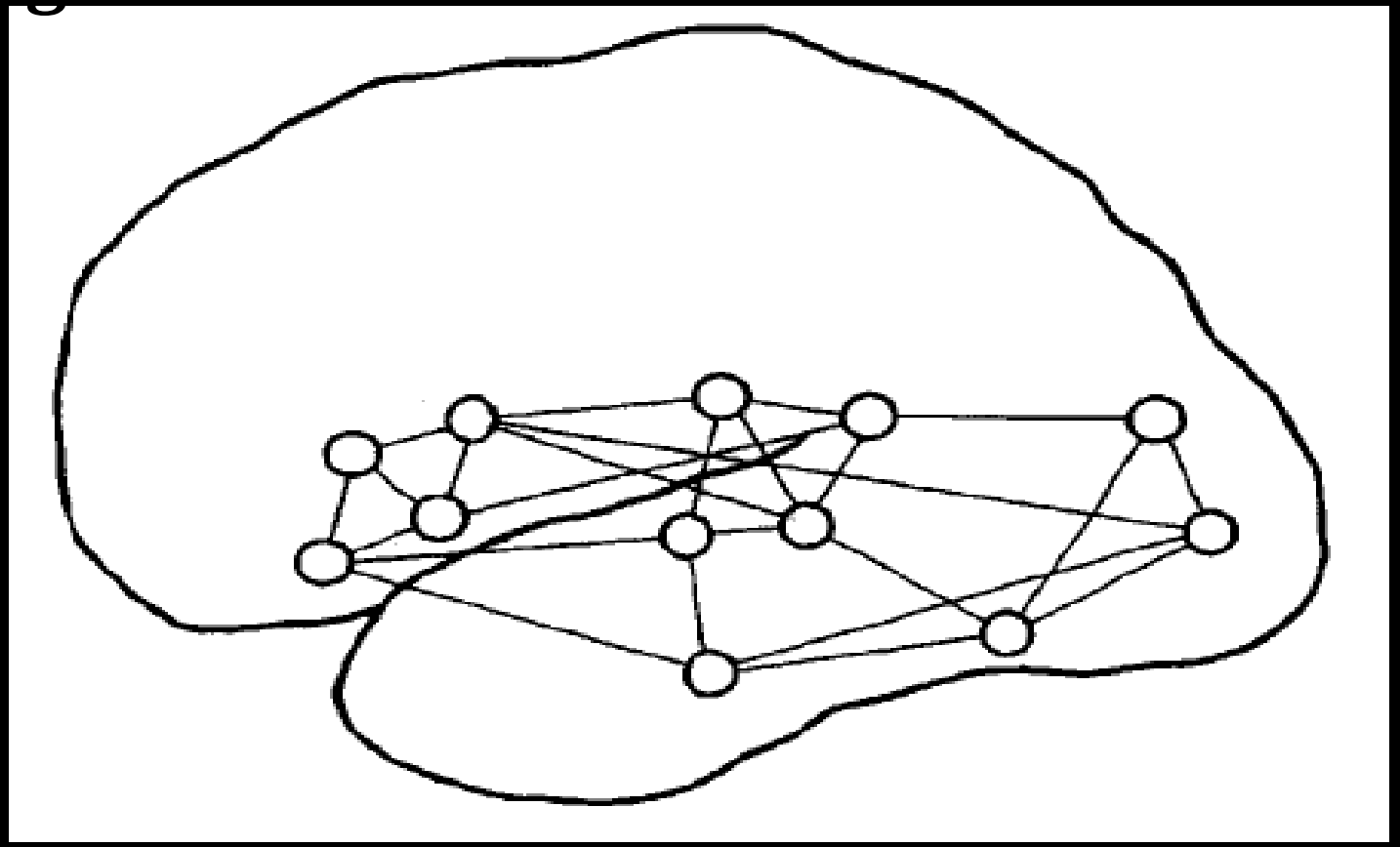
Embodied Language

Language Networks Associated with Actions

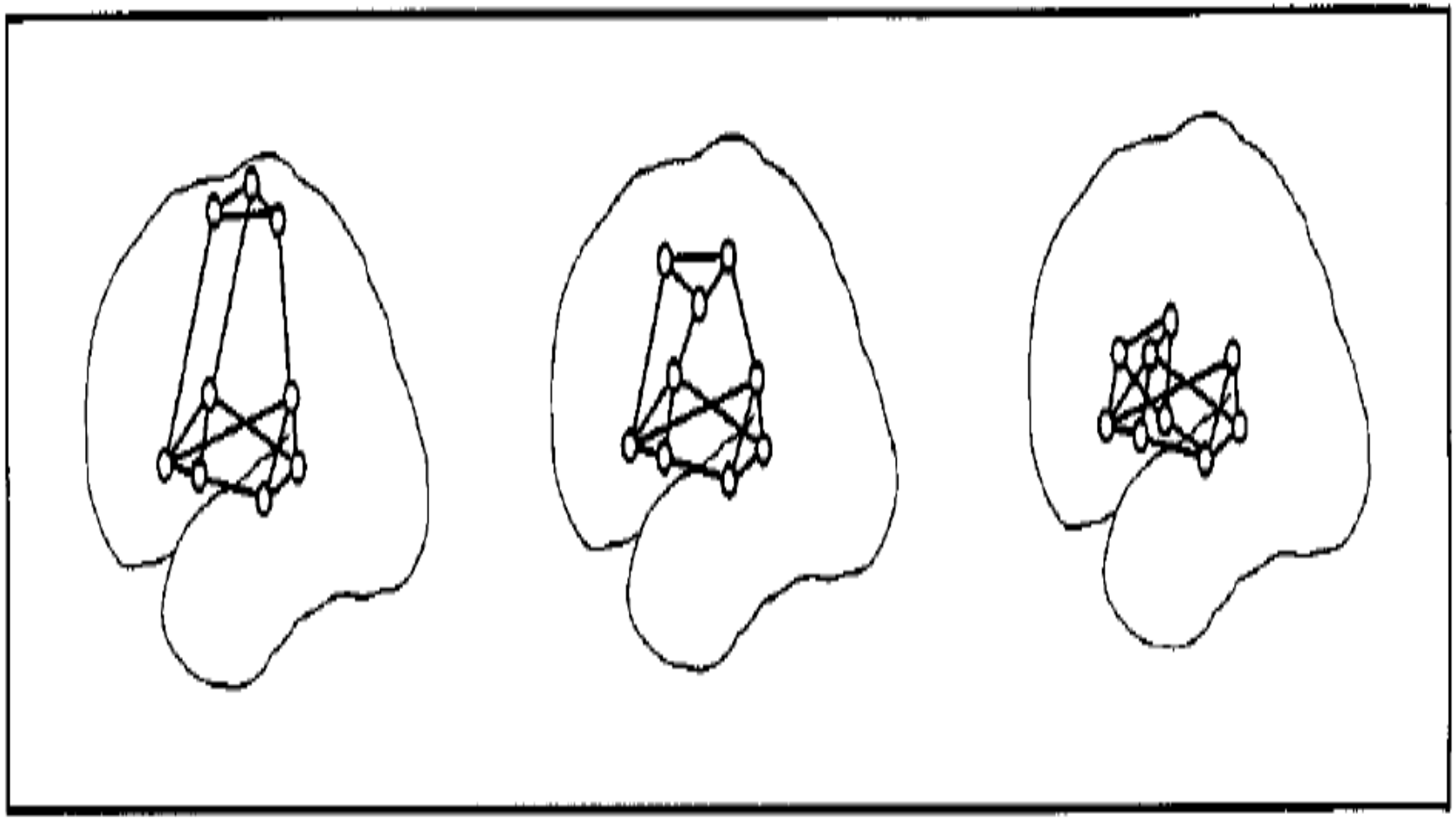


Embodied Language

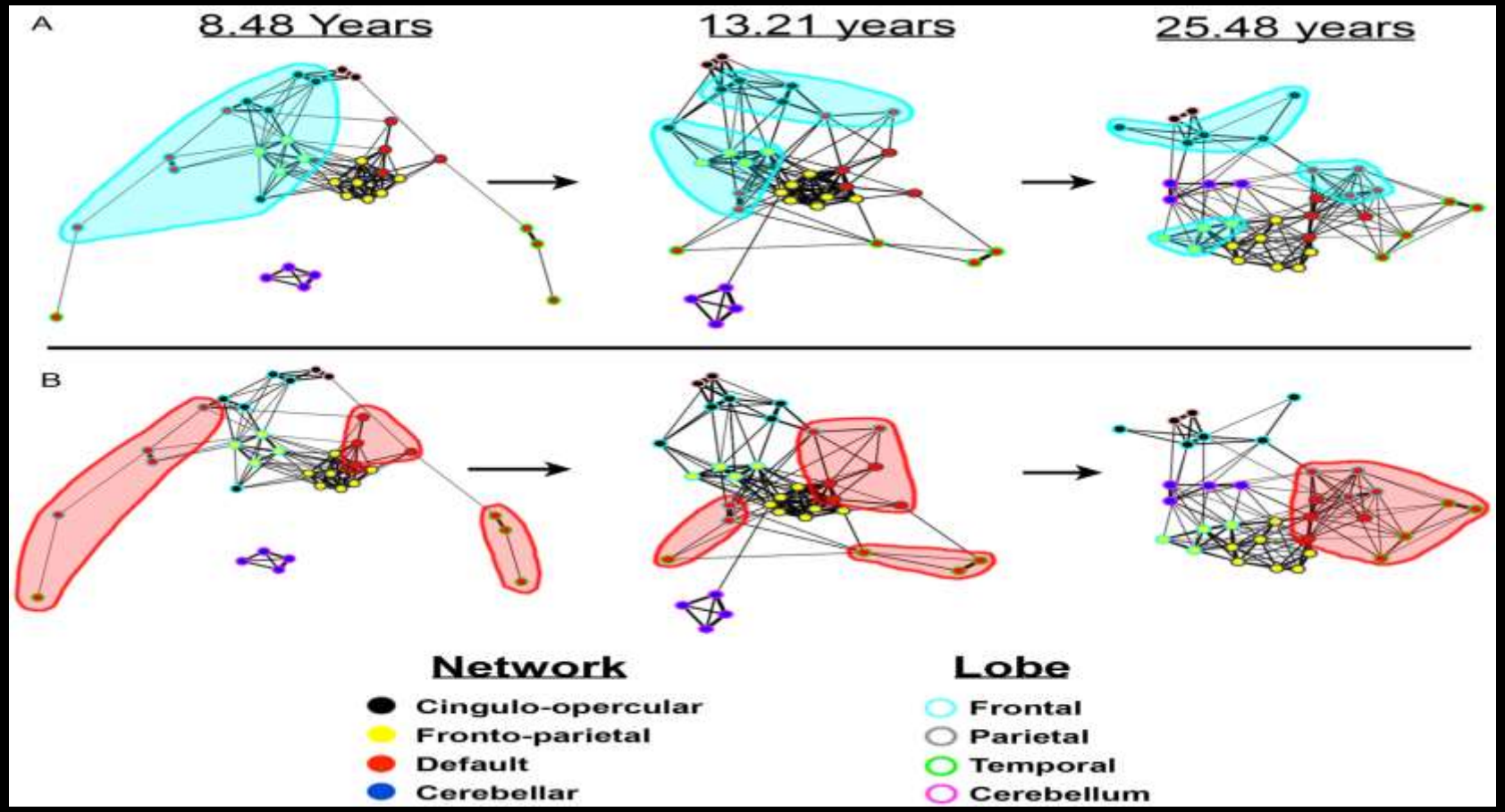
Language Networks Associated with Visual Objects



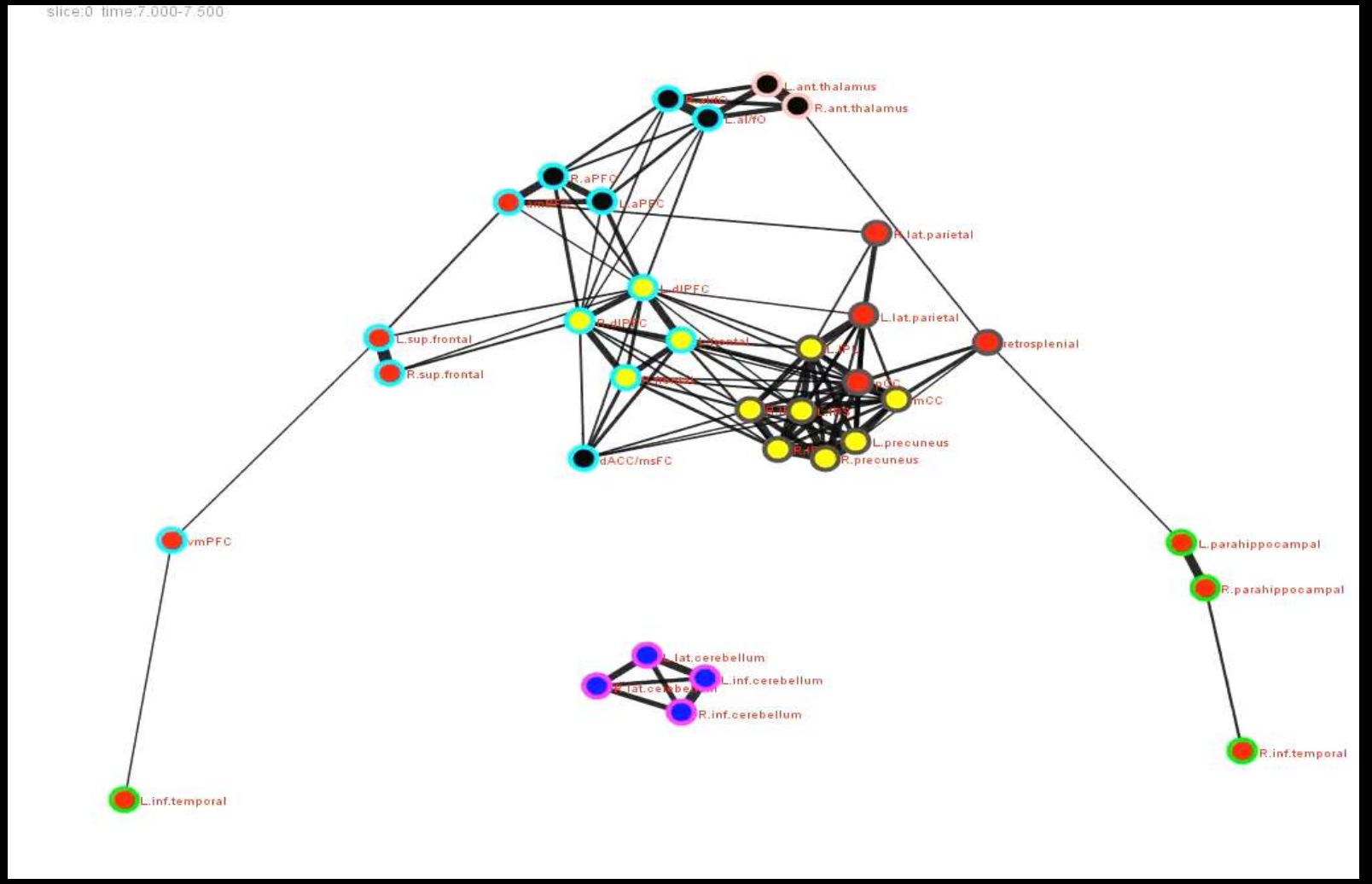
leg-related word arm-related word face-related word

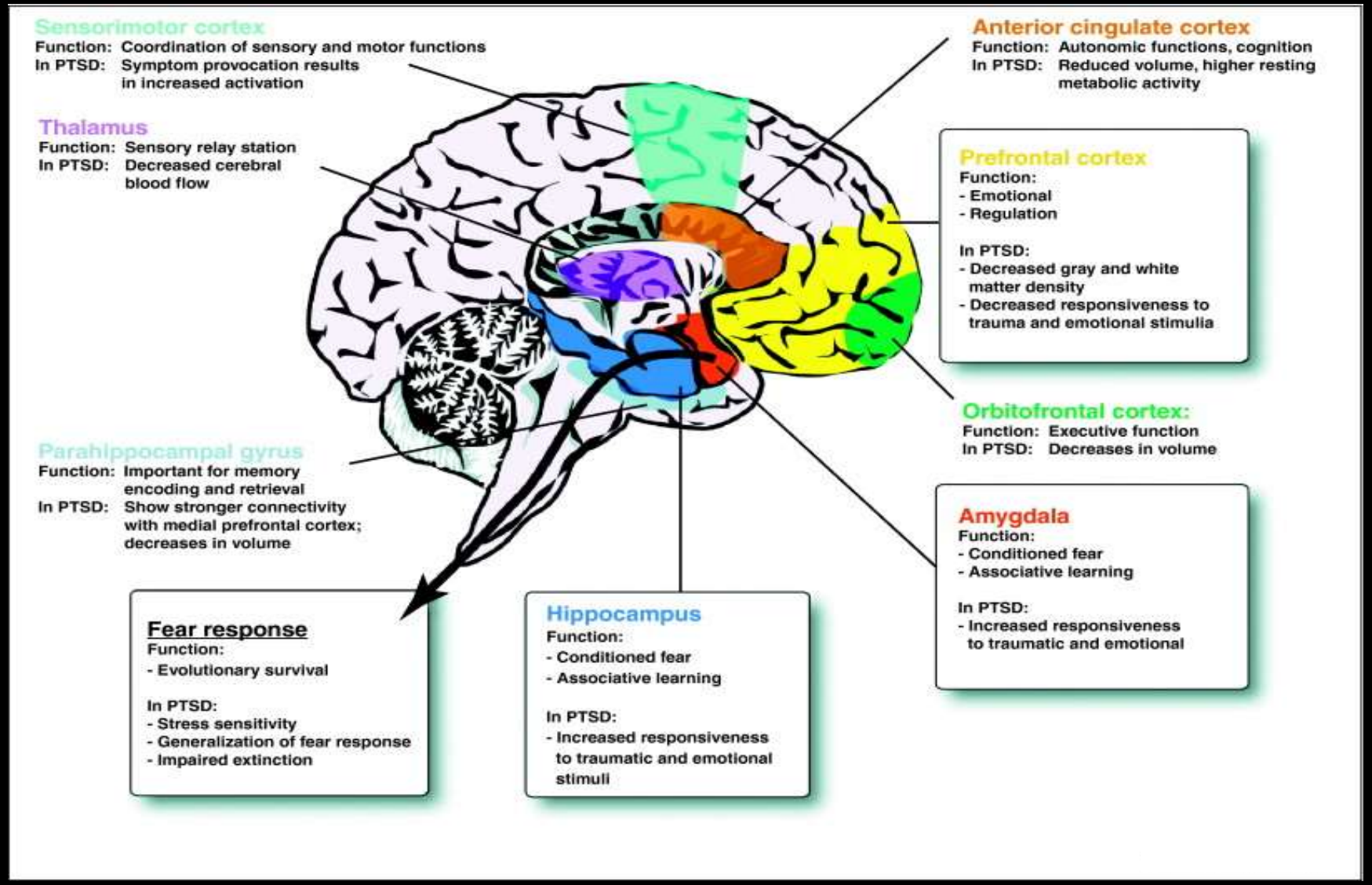


OVER AGE ARCHITECTURE MATURES FROM A "LOCAL" TO "DISTRIBUTED" ORGANIZATION

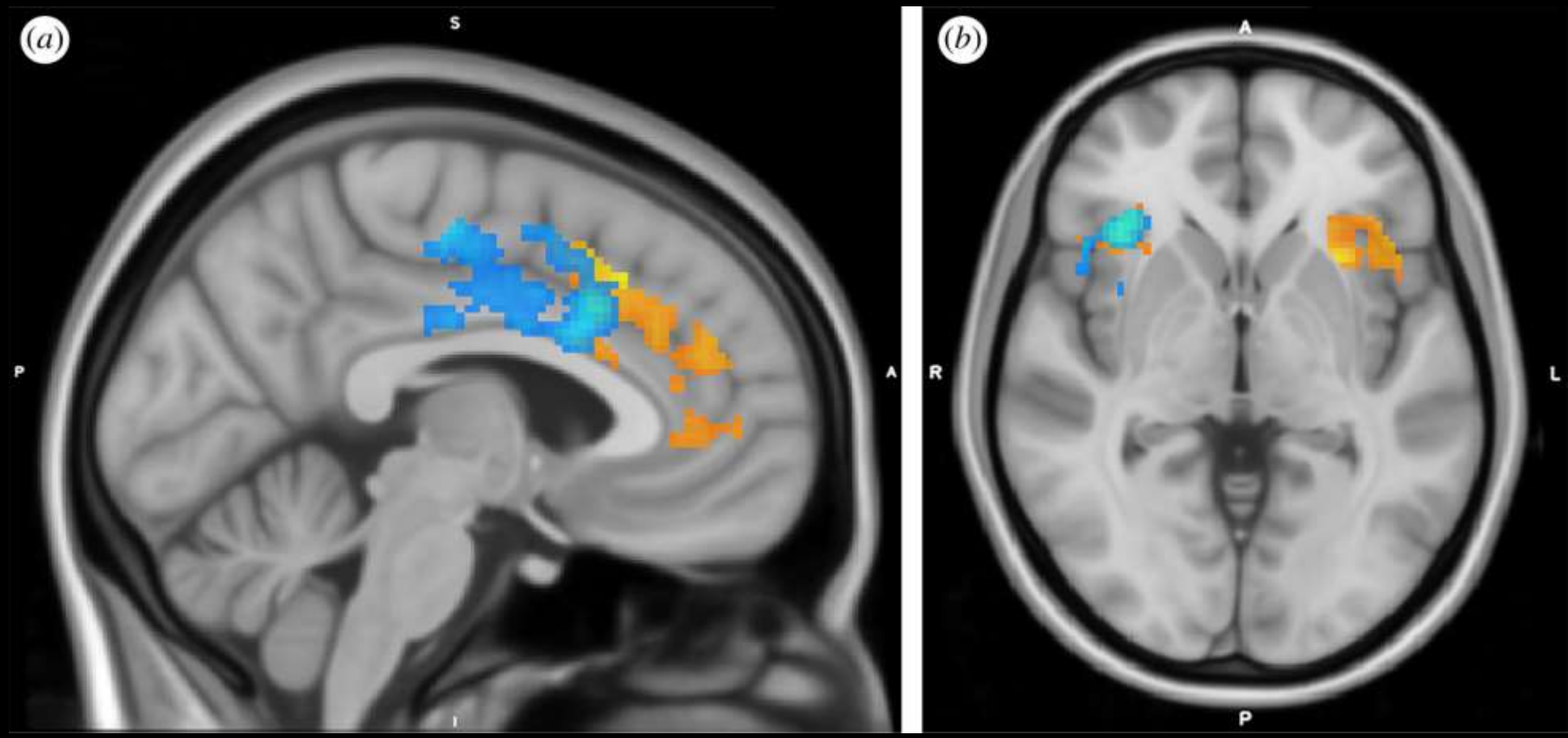


Development and interaction of ↑ correlations between default & cerebellar networks. Segregation of local, anatomically clustered regions functional network integration. A & B represent individual screen shots (at av. ages 8.48, 13.21, and 25.48 years) of transition in network architecture from child to adult.


slice:0 time:7.000-7.500
L.ant.thalamus
R.ant.thalamus
L.aPFC
R.lat.parietal
L.dlPFC
L.lat.parietal
L.sup.frontal
R.sup.frontal
mCC
L.precuneus
R.precuneus
dACC/msFC
vmPFC
L.parahippocampal
R.parahippocampal
L.lat.cerebellum
L.inf.cerebellum
R.inf.cerebellum
R.inf.temporal
L.inf.temporal

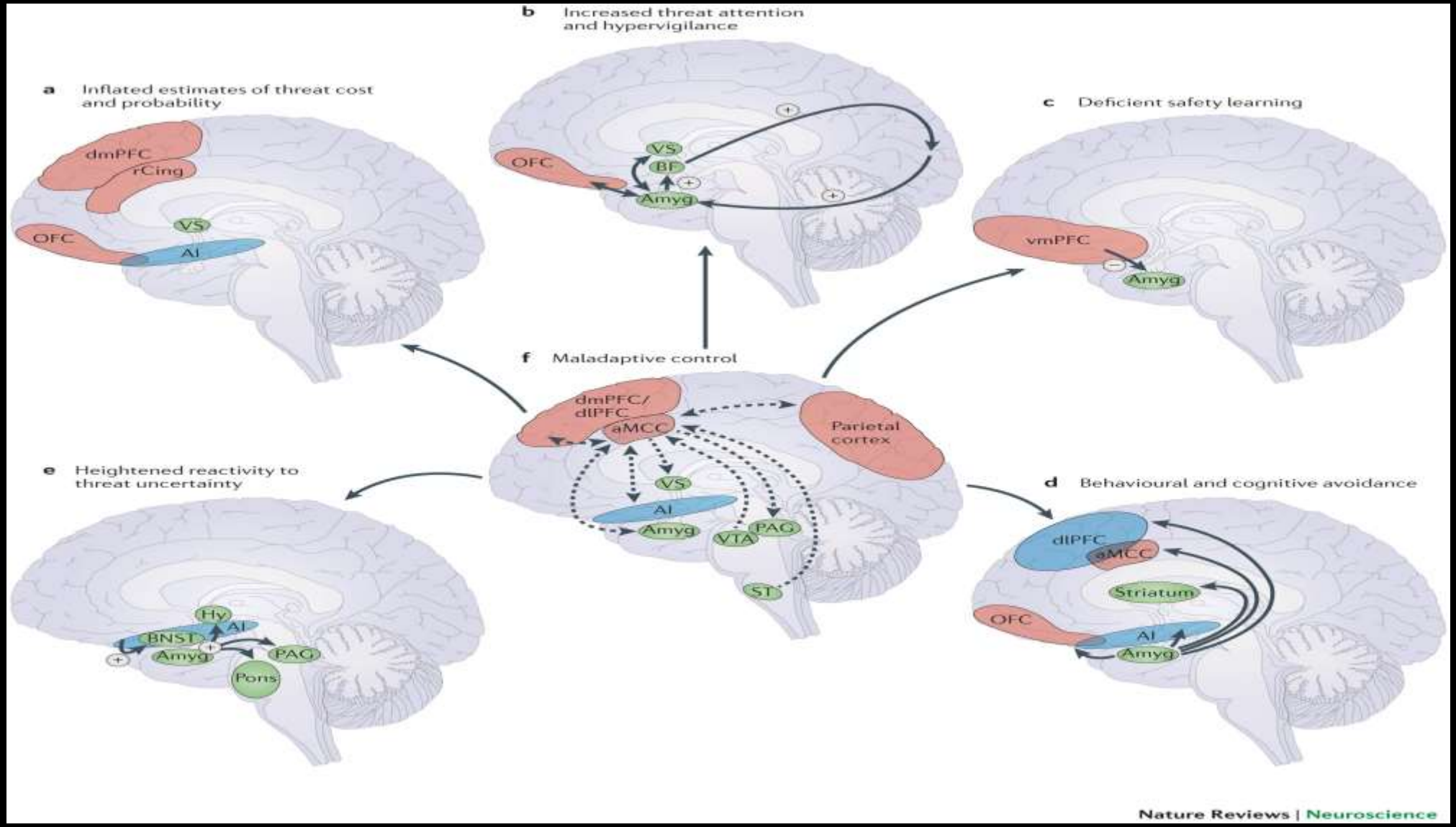

Sensorimotor cortex
Function: Coordination of sensory and motor functions
In PTSD: Symptom provocation results in increased activation
Thalamus
Function: Sensory relay station
In PTSD: Decreased cerebral blood flow
Parahippocampal gyrus
Function: Important for memory encoding and retrieval
In PTSD: Show stronger connectivity with medial prefrontal cortex; decreases in volume
Anterior cingulate cortex
Function: Autonomic functions, cognition
In PTSD: Reduced volume, higher resting metabolic activity
Prefrontal cortex
Function:
- Emotional
- Regulation
In PTSD:
- Decreased gray and white matter density
- Decreased responsiveness to trauma and emotional stimulia
Orbitofrontal cortex:
Function: Executive function
In PTSD: Decreases in volume
Amygdala
Function:
- Conditioned fear
- Associative learning
In PTSD:
- Increased responsiveness to traumatic and emotional
Fear response
Function:
- Evolutionary survival
In PTSD:
- Stress sensitivity
- Generalization of fear response
- Impaired extinction
Hippocampus
Function:
- Conditioned fear
- Associative learning
In PTSD:
- Increased responsiveness to traumatic and emotional stimuli

Political Uncertainty



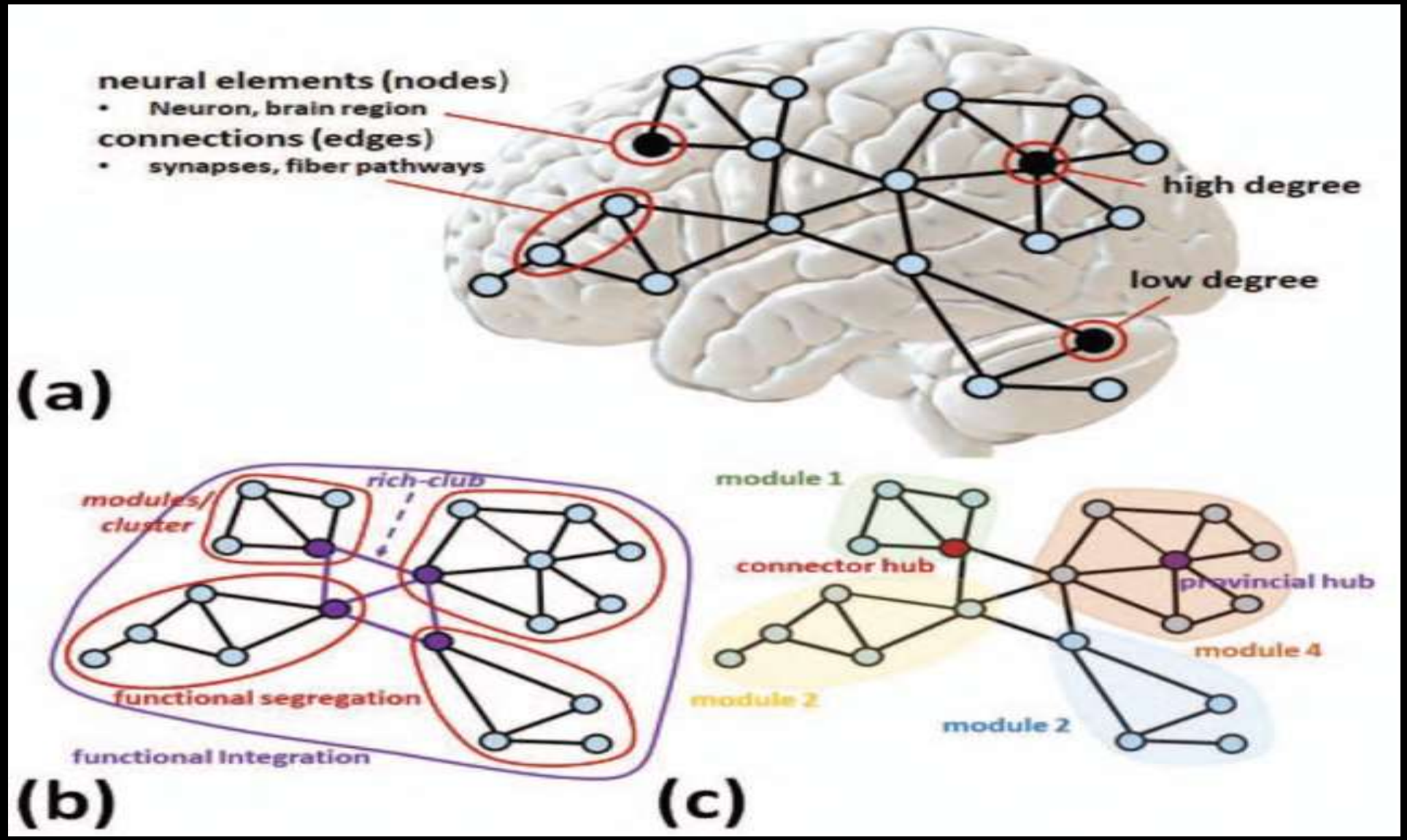
BOLD activation in (*a*) ACC and (*b*) bilateral insula in response to *certain* > *uncertain* trials (red–yellow) and *incongruent* > *congruent* trials (blue–light blue).

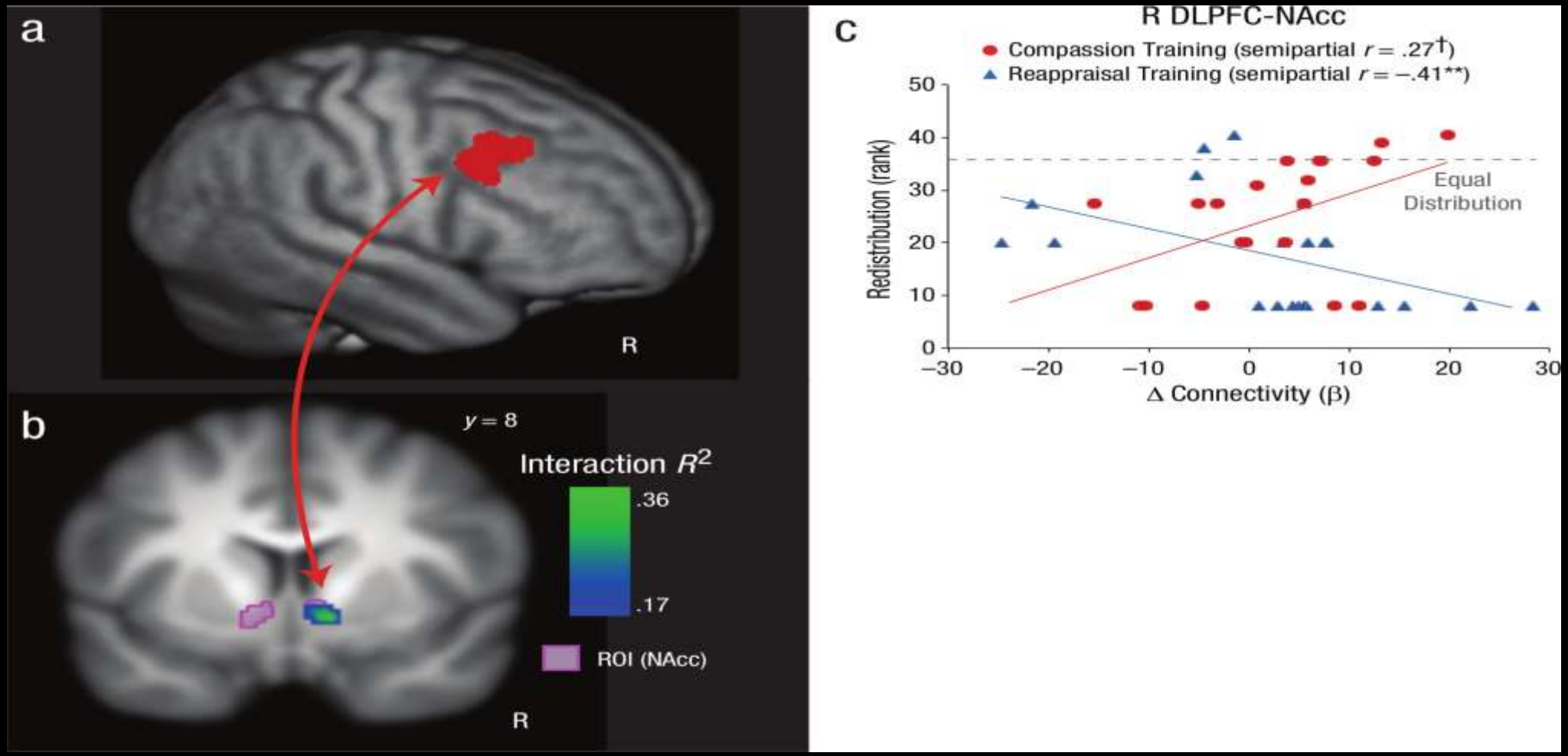
Ambiguity and Threat



The Wiring of our Brains is Not Fixed but Adaptable Across Our Lifetime

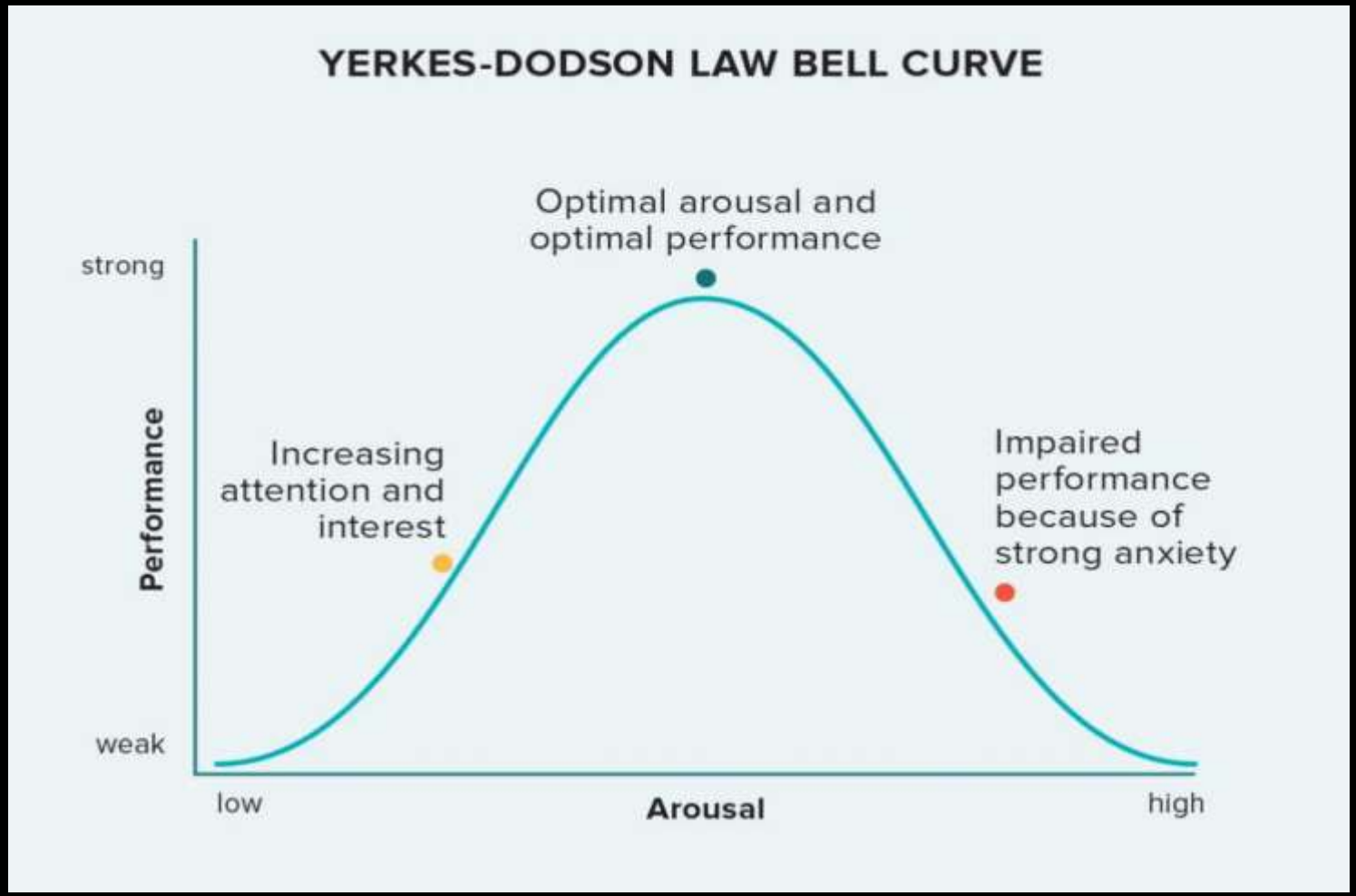
Small v. Large-World Networks



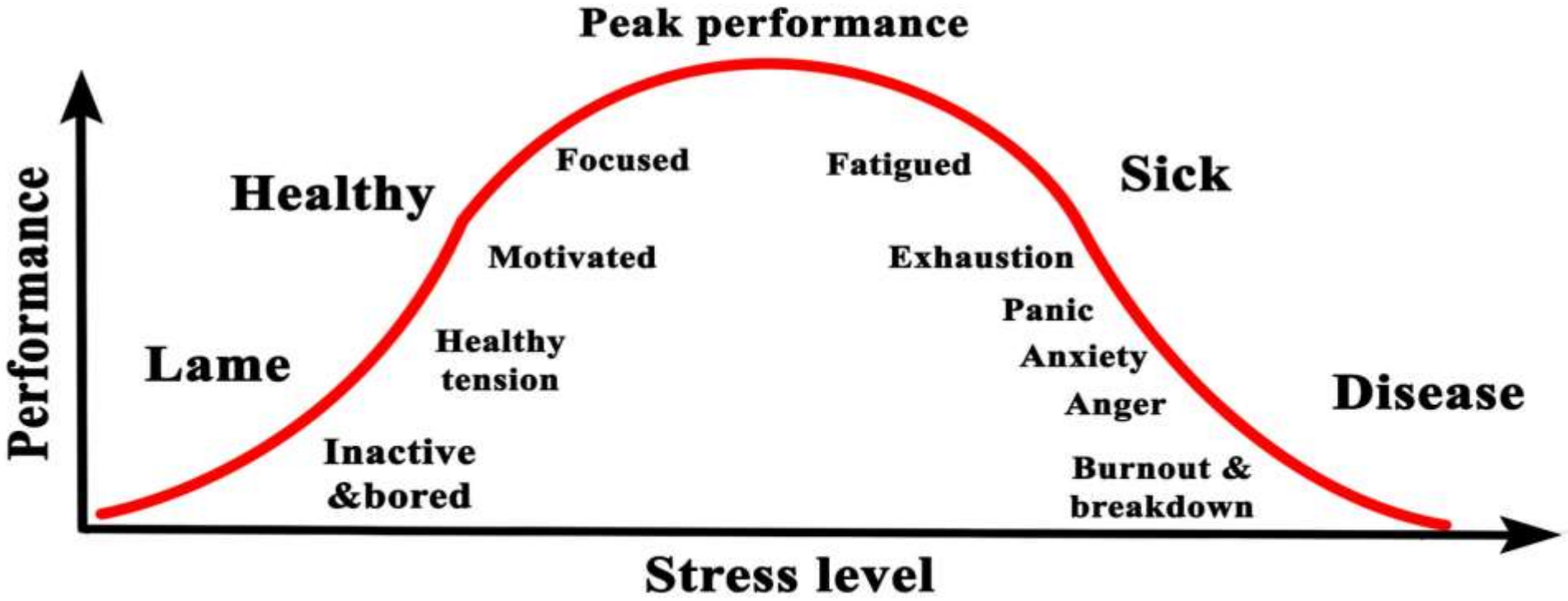


Emotion regulation involves the influence of PFC over amygdala, insula, and NAcc. Weng et al (2013), noted that Compassion trainees showing greater DLPFC-NAcc connectivity, redistributed more funds after training, whereas reappraisal trainees who showed greater DLPFC-NAcc connectivity redistributed less money after training

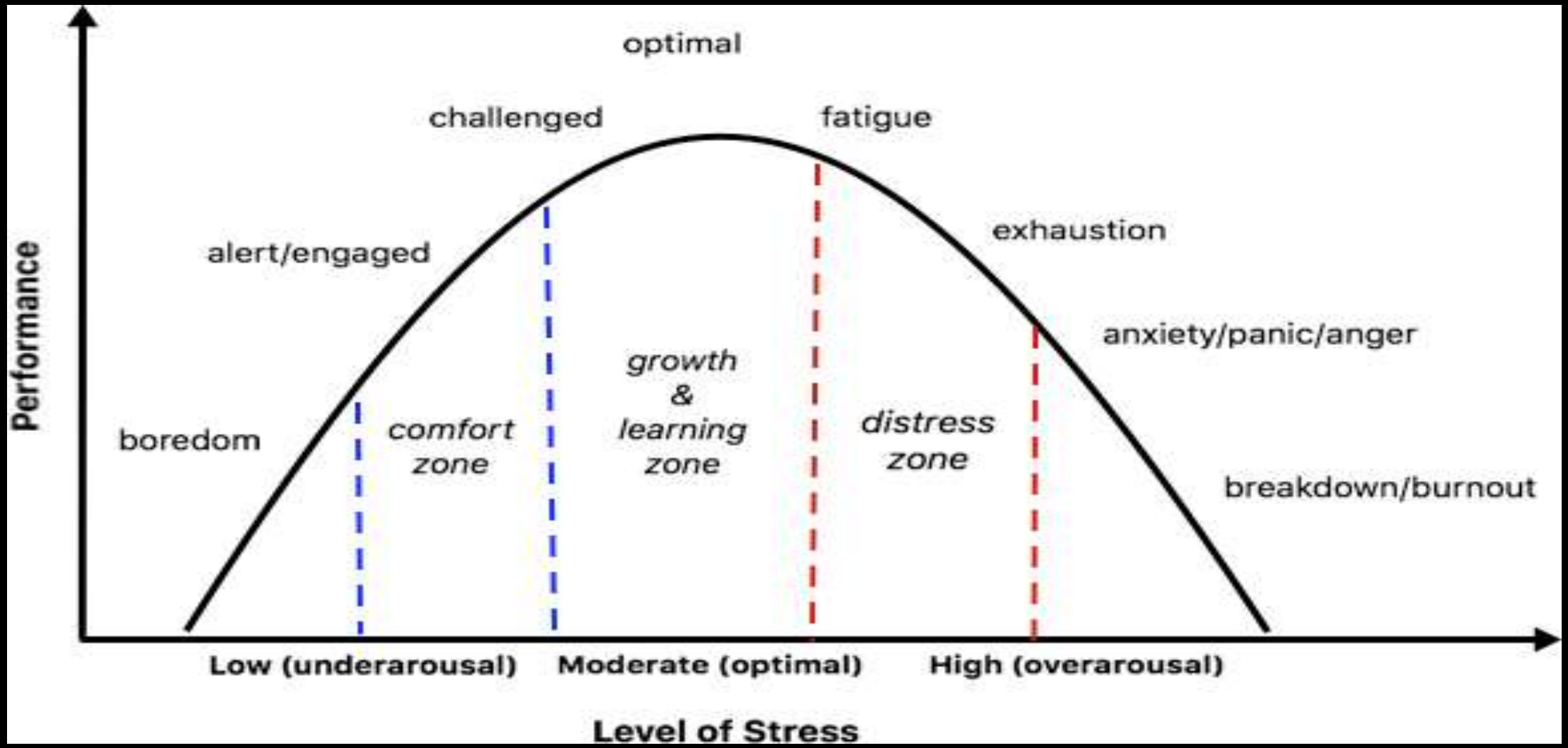
Yerkes-Dodson Law



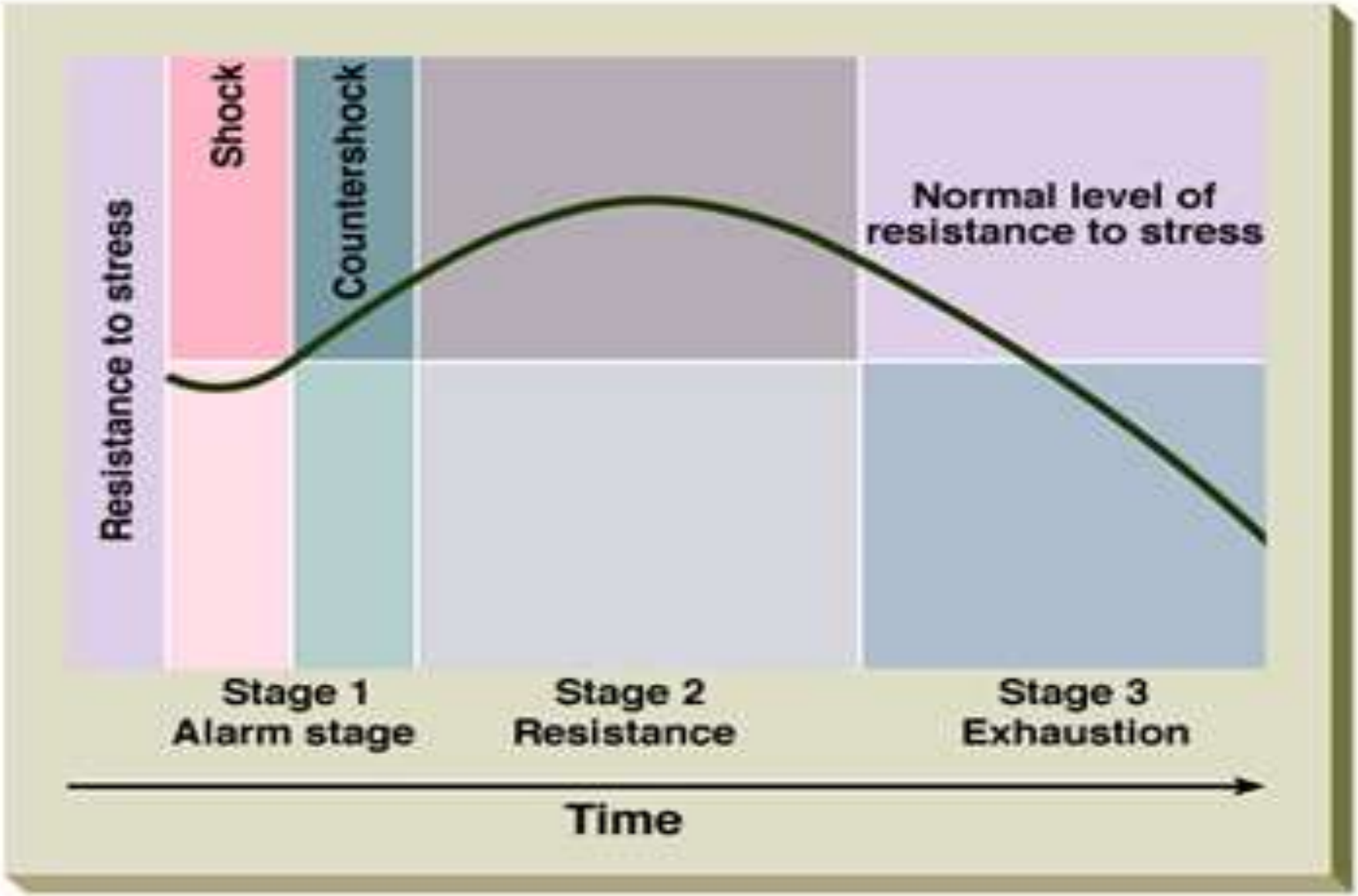
Yerkes Dodson Stress Performance Curve



Yerkes-Dodson in Application



Seyle's General Adaptation Syndrome



THE BIOLOGIC REACTION TO STRESS

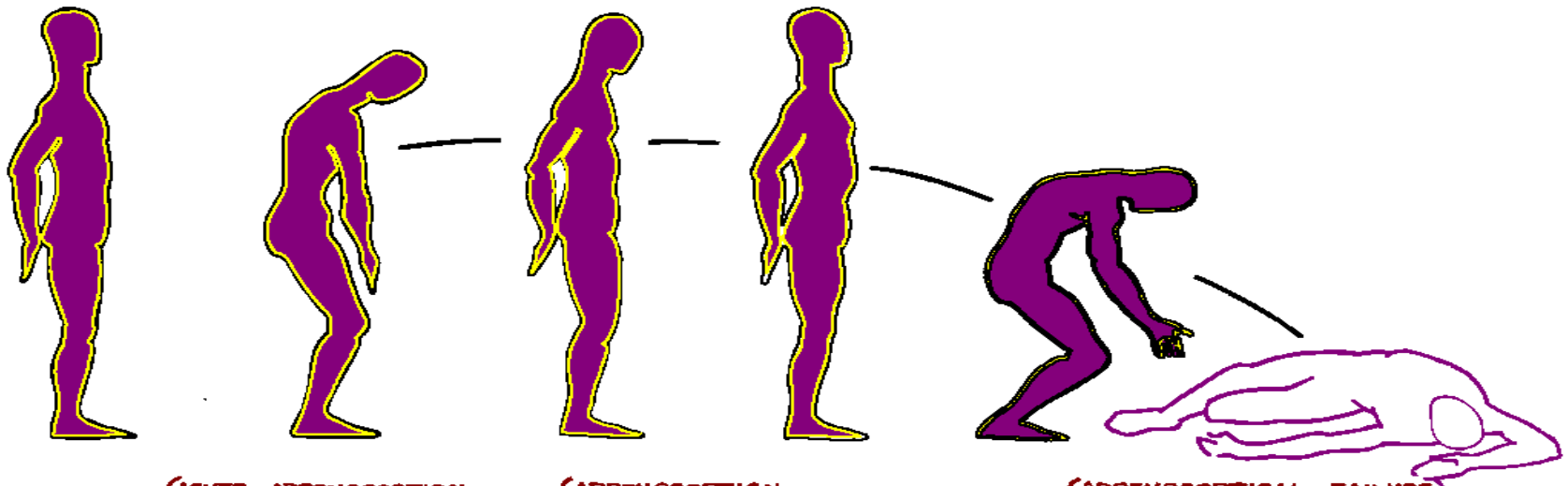
STRESSORS

ASI Correlation — **Number 1** — **Numbers 2,3,4,5 & 6** — **Number 7**

ALARM REACTION (SELYE)
(GENERAL AND NON-SPECIFIC)

SHOCK PHASE | COUNTERSHOCK PHASE | RESISTANCE PHASE | EXHAUSTION PHASE

- SURGERY
- INFECTIONS
- PHYSICAL TRAUMA (WOUNDS, BURNS, CRUSH INJURIES)
- IMMUNOLOGICAL AND ALLERGIC INSULTS
- SEVERE EXERTIONS
- STRONG EMOTIONS
- MAINUTRITION
- SEVERE EXPOSURES (HEAT, COLD, SUN)



(ACUTE ADRENOCORTICAL INSUFFICIENCY)

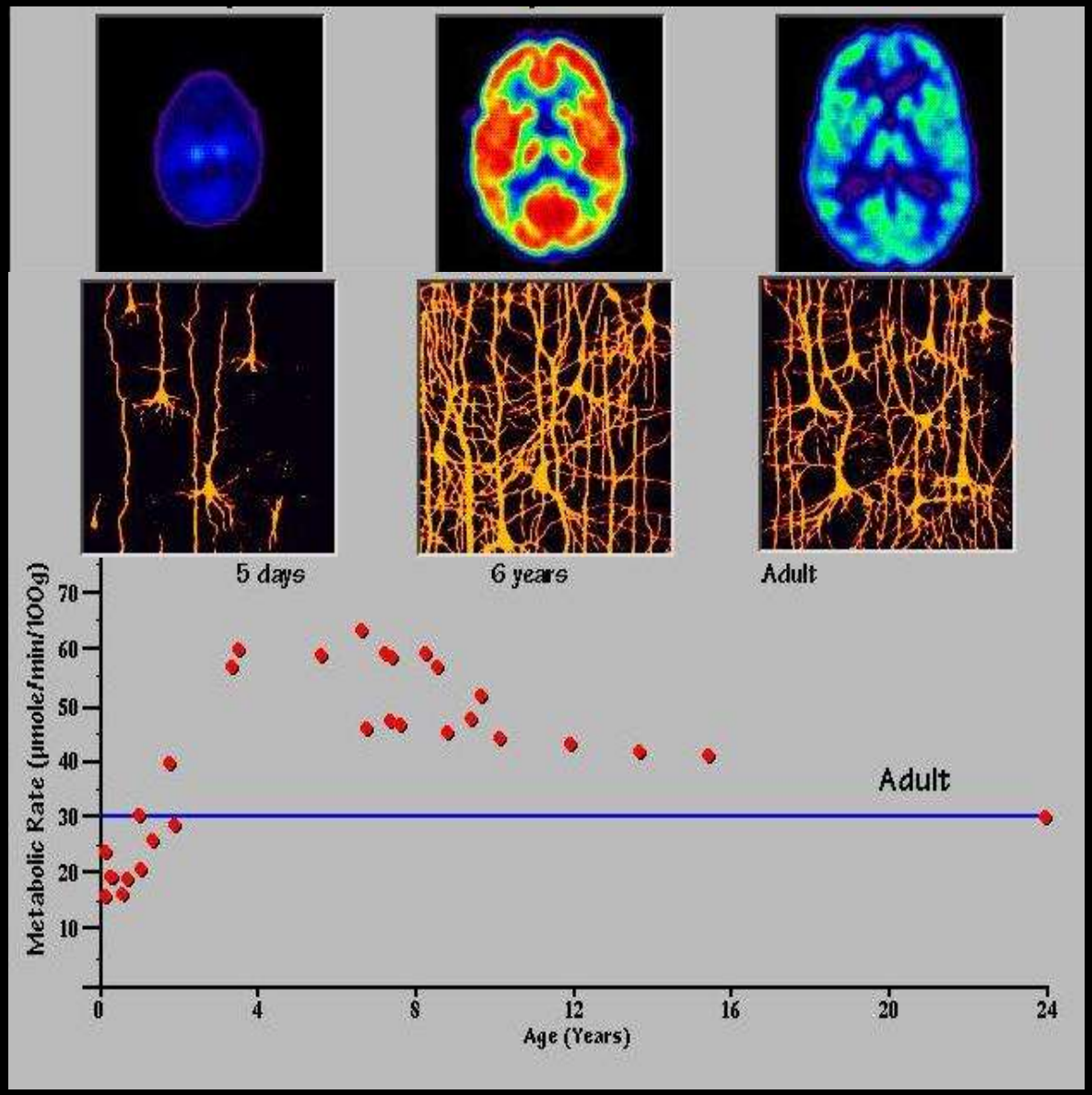
PALLOR AND COLD SWEAT
MUSCLE WEAKNESS
TACHYCARDIA
HYPOTENSION
HYPOVOLEMIA
HEMOCONCENTRATION
HYPOGLYCEMIA
HYPOCHLOREMIA
HYPERKALEMIA
LEUKODENIA
ANURIA
GASTROINTESTINAL ULCERATION

(ADRENOCORTICAL RESPONSE)

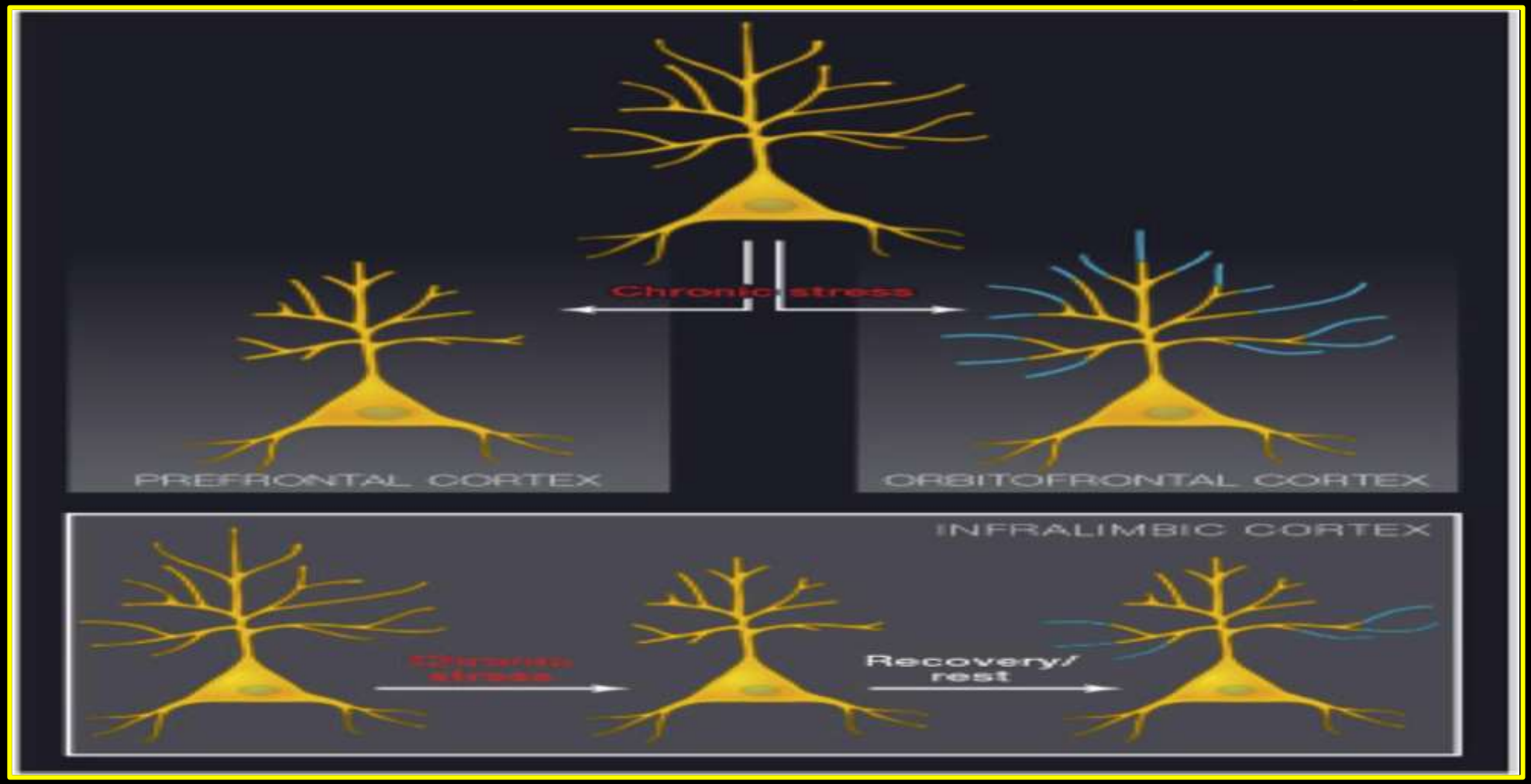
RESTORATION OF BLOOD PRESSURE
RESTORATION OF BLOOD VOLUME
FALL IN HEMATOCRIT
RISE IN BLOOD SUGAR
RISE IN NITROGEN EXCRETION
INCREASE IN LEUKOCYTES
FALL IN LYMPHOCYTES
FALL IN EOSINOPHILES
DECREASE IN SIZE OF THYMUS AND LYMPH NODES
HYPERTROPHY OF ADRENAL CORTEX WITH DISCHARGE OF LIPID GRANULES

(ADRENOCORTICAL FAILURE)

COLLAPSE
DEATH


5 days
6 years
Adult
Metabolic Rate (µmole/min/100g)
70
60
50
40
30
20
10
Adult
0
4
8
12
16
20
24
Age (Years)

Chronic Stress Leads to Dendritic Shrinkage



Top: Stress causes dendritic expansion in the corresponding neurons within orbitofrontal cortex.

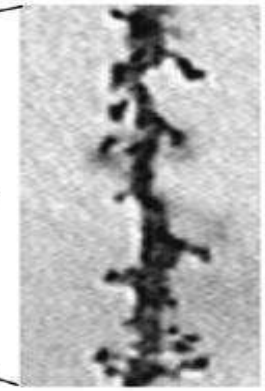
Bottom: Neurons in infralimbic cortex lose distal dendritic branches with stress.

Center on the Developing Child
HARVARD UNIVERSITY

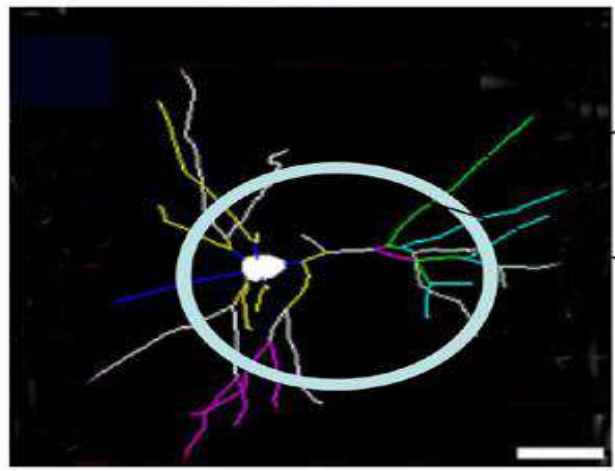
Persistent Stress Changes Brain Architecture

Normal

Typical neuron—
many connections



Toxic
stress



Damaged neuron—
fewer connections

Prefrontal Cortex and
Hippocampus

Sources: Radley et al. (2004)
Bock et al. (2005)

Motor Planning

Resilience

- Resilience means to most people “achieving a positive outcome in the face of adversity”. This can involve “bending and not breaking,” that is, recovering from a bad experience.
- Or it can involve an “active resistance” to adversity through coping mechanisms that operate at the time of trauma. But this adaptation does not, by itself, indicate flexibility in successful adaptation to new challenges over the life course. The individual traits that allow the more flexible outcomes depend upon a foundational capacity of that individual built upon experiences in the life course, particularly early in life, that promote the development of healthy brain architecture supporting cognitive flexibility allowing the brain to continue to change with ongoing experiences.
- A healthy brain architecture provides the basis for good self-esteem, and a locus of control for effective self-regulation, not only of behavior but also of the physiological responses to stressors that are regulated by the central and peripheral nervous systems.

What Is Resilience?

The ability to cope with the setbacks , adversity and trauma

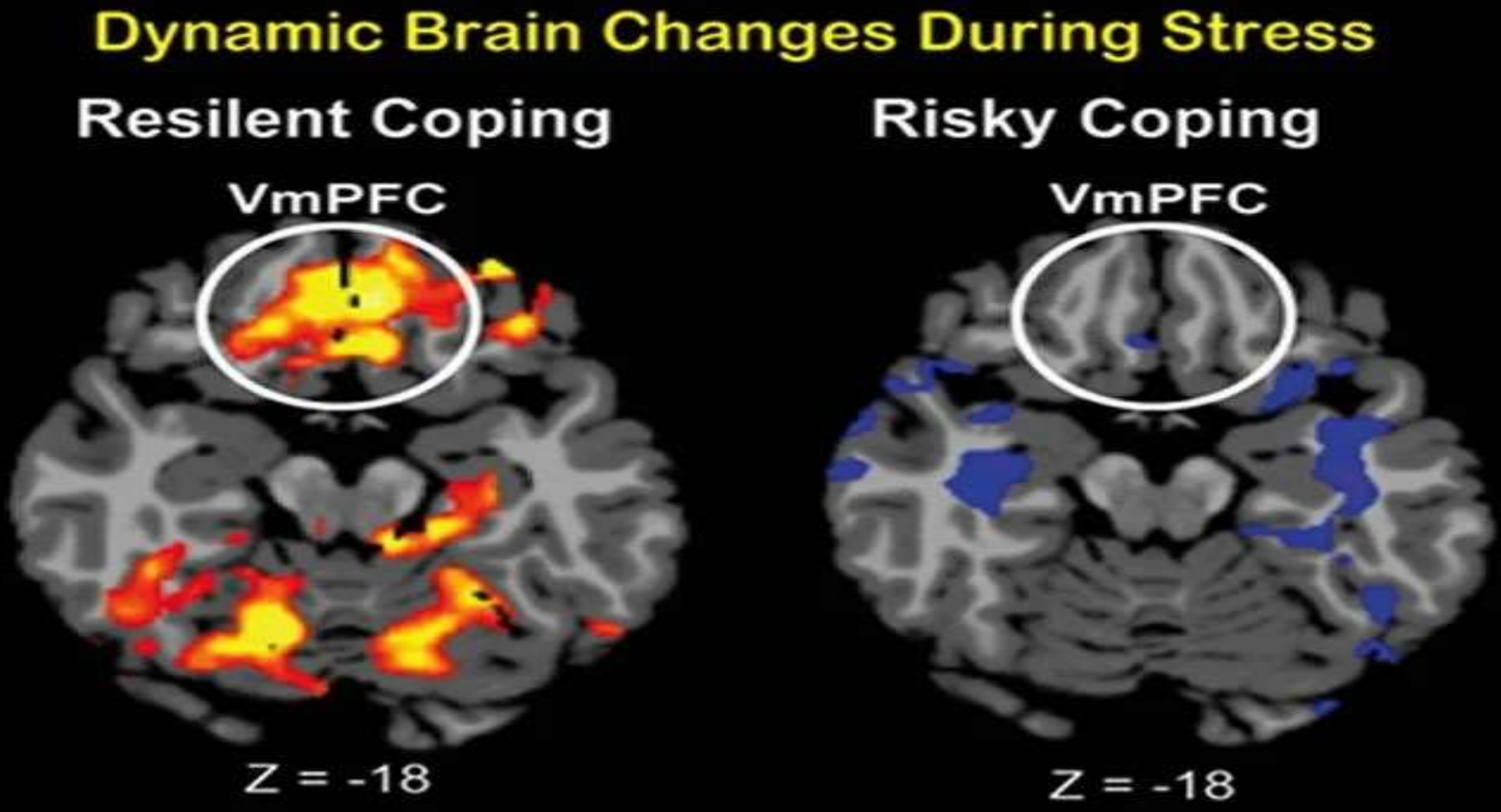
Being resilient is a necessity for workplace wellbeing.

One misconception about resilience is that it is definitely not that you won’t experience any difficulties……..

rather,

Resilience refers to how one manages it skillfully and successfully. Resilience helps one’s personal growth and gives a better and newer perspective on life.

Physiological Measurement of Resilience



Tenets of resilience

Plasticity

ALL LIVING MATTER

Resilience implicates flexible adaptation to changing conditions, the emergence of new forms from sub-components, and the ability to re-calibrate.

Sociality

ACROSS ANIMAL EVOLUTION

Coordinated action among organisms enhances survival of the group. In mammals, bonding confers resilience by supporting maturation of stress-management systems, providing protection, and ushering social collaboration.

Meaning

HUMAN SPECIFIC

Meaning-making systems sustain resilience by giving significance to human suffering, inspiring strength in the face of trauma, and transcending death through acts of kindness.

Components of the neurobiology of affiliation supporting resilience

BIOBEHAVIORAL SYNCHRONY

Flexible interplay of order and variability, continuous oscillations of mismatch and reparation, and bottom-up coordination of biology and behavior.

Marks the infant's first encounter with the social world and expands across development. Individually stable across time and relationships.

Provides the foundation for empathy, symbolic abilities, sharing, and compassion.

OXYTOCIN

Implicates plasticity at cellular, molecular, neuronal populations, and network assembly levels.

Underpins sociality, parenting, pair-bonding, and group sharing across mammalian species.

Sustains spirituality, moral elevation, and sense of transcendence.

AFFILIATIVE BRAIN

Parental brain coheres during the period of greatest plasticity in the adult brain and shapes the infant's social brain during sensitive periods of plasticity.

Sustains the capacity to form parental, pair, and filial bonds across mammalian species.

Extends to love beyond concrete attachments to humankind, biosphere, and abstract commitments that transcend the individual's life.

Resilience and Neuroplasticity

Historically , when there was limited awareness about mental health, it was thought that all human behaviours were innate, and there were no ways to control them. So if a person was not resilient, there was no way to develop it.

Now we know that through neuroplasticity, resilience can be achieved. Neuroplasticity is how your brain gets trained to change its neural networks by growth and reorganization. These synaptic connections can be re-synched by learning and rigorous training.

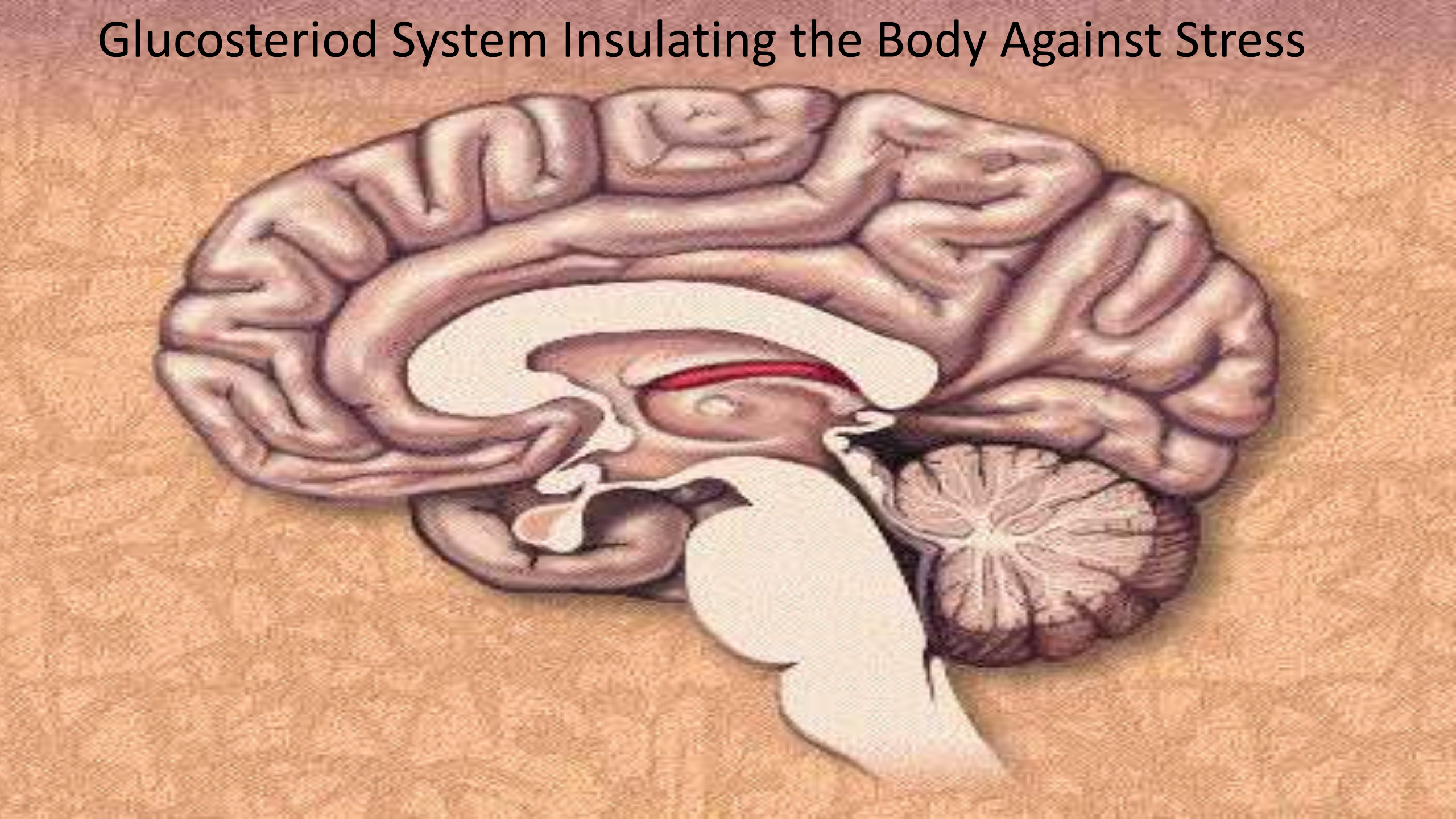
Brain Structures Involved In Resilience

Resilience comes through practice, helping to shape synaptic connections.

Amygdala

The Amygdala is the part of the brain most responsive to emotional behavior. Any kind of emotional behavior is triggered by the amygdala. The neurons which extend from the amygdala are triggered due to fear and stress.

Glucosteriod System Insulating the Body Against Stress



Resilience implicates plasticity

- At the outset, resilience involves mechanisms that promote flexible adaptation to changing conditions, resourceful use of contextual provisions in the service of personal growth, and the capacity to persist toward long-term goals tempered by the ability to modify and recalibrate. That is, resilience implies plasticity.
- Plasticity relies on neurobiological systems that underpin social fittedness, physical stamina and endurance as they flexibly adapt to diverse conditions. Bonding is likely the process exuding the greatest plasticity in mammals. Great neural plasticity has led to the evolution of viviparity (internal gestation) and to physiological reorganization in mother and young that enabled the maturation of the fetus within the maternal body. Immense neural plasticity is also required to make that newborn the most salient object to its mother to the exclusion of all other focus.
- As noted, the oxytocin system plays a key role in neural plasticity, which is critical to the formation of attachments, and the period after childbirth marks the time of greatest plasticity in the adult brain.
- The “plasticity” component of resilience comprises two features:
  - a) resilience is integrative and regulatory;
  - b) resilience is time-based.

Resilience is Integrative and Regulatory

- Regulation promotes flexible integration of system components into a functional whole, shaping self, individuality, agency and wellbeing through the formation of new, person-specific, dyad-specific and culture-specific configurations. Developmental research has examined the construct of “regulation”, with suggestions that this is the single most important concept in understanding developmental disruptions.
- Regulation adopts a system perspective. It describes how components coalesce into a functional whole; how higher and lower elements hierarchically organize over time; and how within system components integrate with those in the immediate environment. Regulatory processes mature on top of each other from biological to emotional to attentional to self-regulatory, and parent-child co-regulation (synchrony) supports maturation of higher-order regulatory skills, such as attention modulation and self-control.

- Resilience is time-based
- Resilience is time-bound and process-based, and develops from simple to complex and from biological to mental. The “timeness” component of resilience is critical across evolution (phylogenesis) and from infancy to adulthood (ontogenesis), but also at the level of concrete social experiences.

- Social moments always unfold in time when two or more participants create a novel “dance” of matched and mismatched moments that coordinate behavior, physiology and mental states. The timeness of these encounters enables the formation of new forms from existing units. Time, therefore, is an indispensable component of resilience (the ability to recalibrate) and this is captured by “synchrony”, a time-based construct.

Resilience is Social

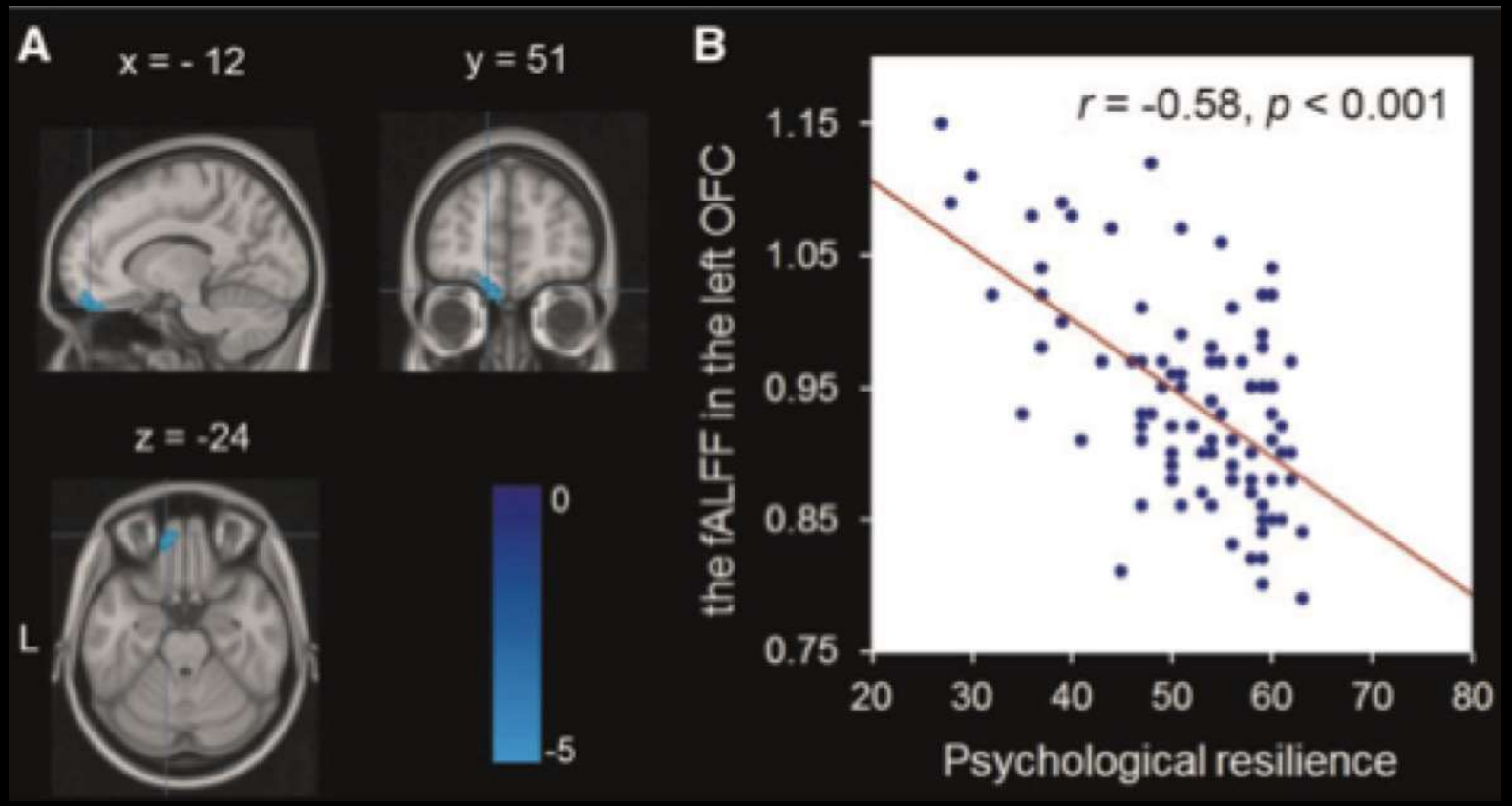
- Sociality underpins survival and adaptation, and species that can better utilize social mechanisms of coordinated action have a significant survival advantage. This is elegantly described by the entomologist E. Wilson in The *Social Conquest of Earth,* arguing that humans achieved supremacy among vertebrates and ants among invertebrates, in terms of population size, spread across Earth, and durability, due to their eusociality (hyper-sociality), which involves the capacity for collaborated action among group members and social organization across generations.
- Mechanisms of synchrony are found in ants, fish and birds, and are underpinned by the coordination of biology and behavior through *vasotocin*, the parent molecule of the mammalian *oxytocin* and *vasopressin*. Humans' biobehavioral synchrony, relies on a long history of social mechanisms that promoted resilience via action coordination. Consistent with the behavior-based principle of affiliative neuroscience, these mechanisms were selected with a focus on behavior: social behavior in the group in non-mammalian species and affiliative bonds in mammals. Notably, however, while loneliness is hazardous to the well-being of any living organism, the "social" component of resilience is variable, and is observed across the animal kingdom, paralleled by variability in the density and localization of *oxytocin* receptors

Resilience Involves Meaning

- While resilience builds on species-general foundations and adds a human dimension, the meaning-making element is exclusively human. We must integrate the species-general foundations of endurance, diversity, adaptation and stress-management with the human ability to give meaning to hardship, adversity and trauma.
- Humans' ability to give meaning to trauma often utilizes collective cultural or religious myths and, at other times, builds on forming personal meaning through actions(i.e., those involving strengthening affiliative bonds or acts of altruism extending beyond the individual.
- Much research has underscored the role of spirituality in the capacity to bounce back from trouble or in the ability to use trauma for growth.

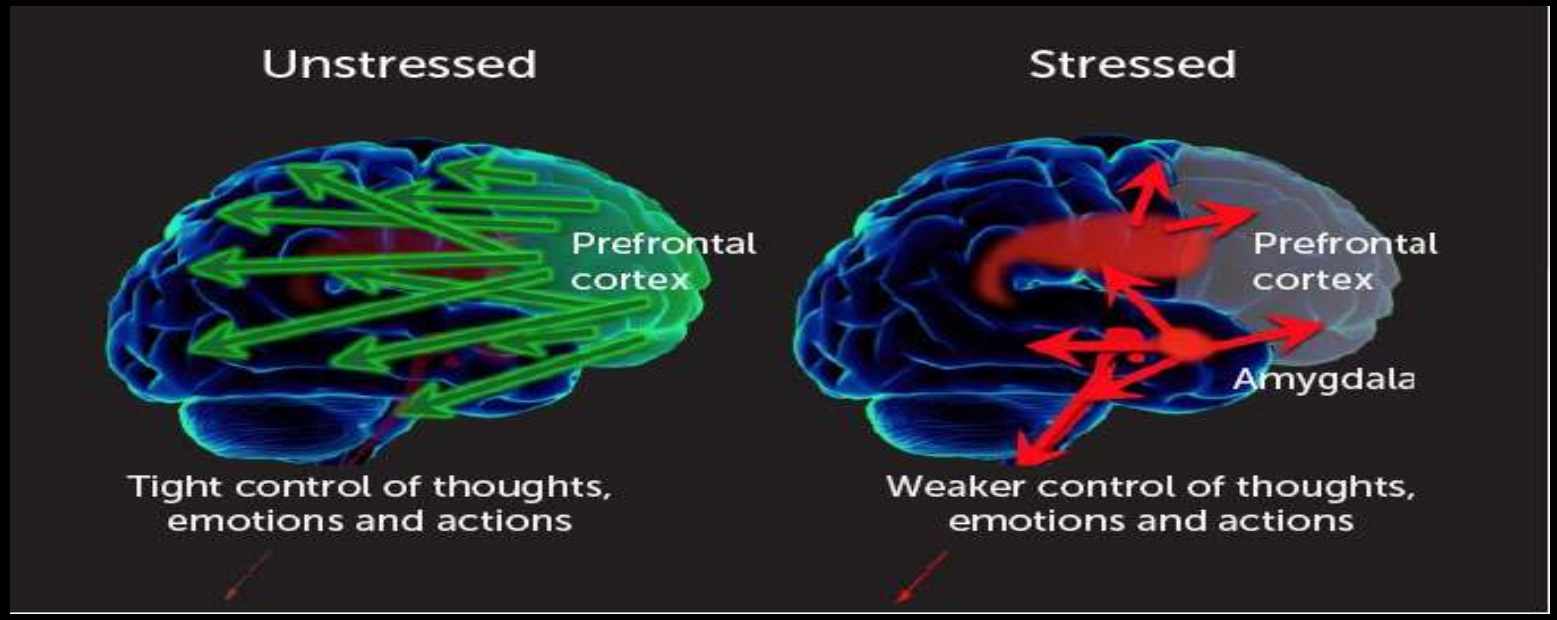
- The attribution of meaning that transcends an individual's life and relies on two systems of the neurobiology of affiliation. The ***oxytocin*** system provides the neurobiological substrate for spirituality, via its role in sustaining love, caring, empathy, and moral elevation. Neural structures that cohere into the "affiliative brain" are formed during early sensitive periods enabling humans to extend love to unfamiliar strangers, social groups, and abstract ideas, bestowing generosity beyond the individual's immediate bonds.
- However, intense cross-generational cultural myths, meaning systems, and religious beliefs run the risk of overlooking the first tenet of resilience - ***flexibility*** - by tightening habits, obligations, and submissive attitudes and increasing surveillance and rigidity. Such close-knit groups often function through tight in-group cohesion, achieved by tightening the neural and behavioral synchrony among in-group members to a hyper-social level in the face of real or perceived danger. For instance, throughout human history, soldiers receive intense training for coordinated action, and this motor synchrony enables the removal of cognitive empathy during battle in order to fight and destroy out-group members. The social component of resilience becomes significantly tighter for the in-group and is abolished for the out-group.
- Both ***oxytocin*** and ***neural synchrony*** participate in such in-group/out-group division, built on mechanisms that immediately distinguish friend from foe to protect loved ones. For instance, we studied the neural response of Israeli and Palestinian youth using MEG while viewing in-group and out-group protagonists in pain. For the first 500 ms, representing the brain's automatic response to vicarious pain, youth responded to the pain of both in-group and out-group members. However, after this half-second of grace, top-down processes blocked the brain's natural empathic response to the out-group, displaying only response to the pain of in-group.

Brain regions that are correlated with psychological resilience. (A) The fALFF in the left orbitofrontal cortex (OFC) was negatively associated with psychological resilience. The coordinate is shown in the MNI stereotactic space. (B) Scatter plots depicting correlations between the fALFF in the left OFC and psychological resilience



STRESS REDUCTION
Fomenting Resilience

In the healthy brain, structural remodeling occurs after both acute and chronic stress. The discovery of receptors for glucocorticoids in the hippocampus has led to many investigations in animal models and translation to the human brain using modern imaging methods. The most striking findings from animal models have identified structural plasticity in the hippocampus, consisting of ongoing neurogenesis in the dentate gyrus and remodeling of dendrites and synapses in the major neurons of Ammon's horn.



Resilience is decreased and vulnerability is increased by adverse childhood experiences that lead to “biological embedding” of trajectories of the response to stressful life events throughout the life course, which contribute disproportionately to allostatic overload in the form of physical and mental health disorders over the life span.

Classifying “Stress” Helps Reduce Ambiguity

- The ambiguity of the word “stress” can be reduced by using the following classifications of types of stress: good stress, tolerable stress, and toxic stress. Good stress is the experience of rising to a challenge, taking a risk, and feeling rewarded by an often positive outcome.
- Healthy self-esteem and good impulse control and decision-making capability, all functions of a healthy brain architecture, are important.
- Tolerable stress refers to situations where negative events occur, but the individual with healthy brain architecture is able to cope, often with the aid of family, friends, and other individuals who provide support. Here, “distress” refers to the uncomfortable feeling related to the nature of the stressor and the degree to which the individual feels a lack of ability to influence or control the stressor.
- Toxic stress refers to how negative events are experienced by an individual with limited support and may also have brain architecture reflecting the effects of adverse early life events that have been impaired. With toxic stress, the inability to cope is likely to have adverse effects on behavior and physiology, resulting in a higher degree of allostatic overload.

Brain development and healthy/unhealthy neural function determines whether response to “stressors” is efficient or dysregulated. Self-esteem, LOC, and good self-regulatory behaviors are key in determining whether a challenge, will result in “positive stress”, with a satisfying outcome, or have negative consequences.

With tolerable stress, we experience stressful events with successful coping and with minimal allostatic load and good internal resources and external support.

Toxic stress involves unsuccessful coping due to lack of adequate internal capacities as well as poor external support with an inadequate neural architecture to handle the stressors, and “allostatic overload” applies to those toxic stress situations where physiological dysregulation is likely to accelerate development of disease.

Definition of Allostasis and Allostatic Load, and Overload

- “Stress” is ambiguous and is less useful in understanding how the body handles daily life.
- Understanding balance between adaptation & maladaptation, we introduce a biologically oriented alternative allowing interventions both medical and psychological.
- On the one hand, the body responds to almost any event or challenge by releasing chemical mediators (e.g., ***catecholamines*** that increase HR and BP and;
- On the other hand, elevation of HR & BP produces chronic wear & tear on the cardiovascular system that can result, over time, in disorders such as strokes and heart attacks.
- For this reason, the term ***allostasis*** was introduced by Sterling and Eyer in 1981 to refer to the active process by which the body responds to daily events and maintains homeostasis (note that allostasis literally means achieving stability through change). Because sustained or inadequate allostasis can lead to disease, we introduce the term “***allostatic load*** or ***overload***”

How the Brain Becomes “Stuck”

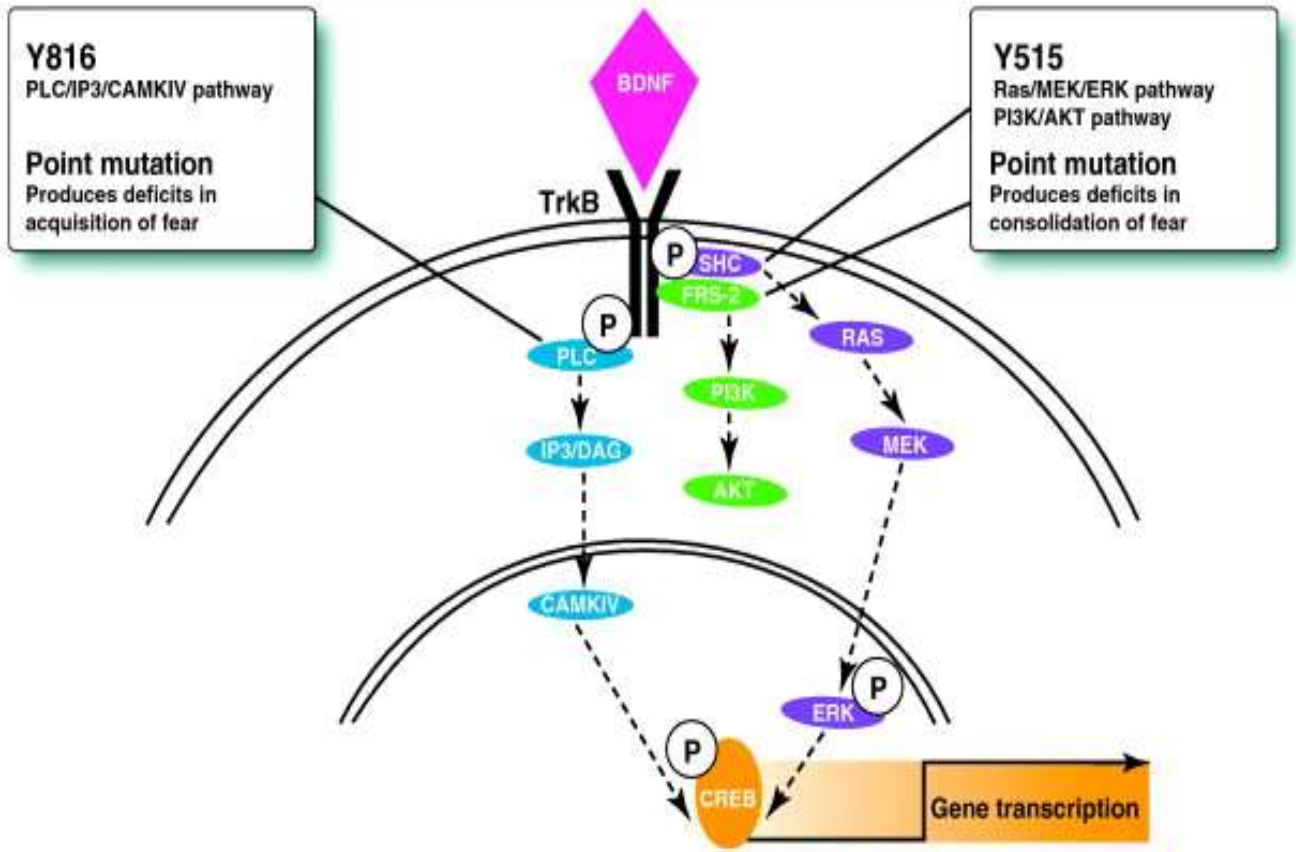
- Depression and anxiety disorders illustrate a loss of resilience, meaning that changes in brain circuitry & function, caused by stressors become locked in a particular state and need external intervention. Indeed, prolonged depression is associated with shrinkage of hippocampus & PFC.
- As far as reversal of these changes, there are a few studies that indicate that pharmacological treatment reverses decreased hippocampal volume in unipolar and bipolar depression, but the possible role of any concurrent cognitive behavioral therapy in these studies is unclear.
- Aging is also an example of a loss of resilience to the effects of chronic stress, based on studies of the rodent PFC. What is not clear yet is whether this loss of resilience can be reversed or prevented;
- Although not directly addressing recovery of resilience, studies on effects of physical activity on the aging or stressed brain are revealing the retention, with age, of the capacity for structural plasticity.

Psychological Strategies That Boost Resilience

Neuroplasticity is not achieved in a day. It requires a lot of resilience training and consistency. Here are some of the common practices and strategies for wellbeing training.

Interventions that Change the Brain and Improve Health

- Can the effects of stress and adverse early life experiences on the brain be treated even though there are no magic bullets for stress-related disorders?
- Depression and anxiety disorders, including PTSD, need to be treated with targeted behavioral therapies, where pharmaceutical agents are used to open up windows of plasticity and facilitate the efficacy of the behavioral interventions.
- Intervention goals for stress-related disorders are to mobilize internal and external coping resources leading to growth, adaptation.
- Brain-derived neurotrophic factor (BDNF) is a mediator of plasticity and can facilitate beneficial plasticity. BDNF works with glucocorticoids & excitatory amino acids to regulate plasticity. Overexpression of BDNF creates a ceiling that prevents further stress-induced change. Underexpression of BDNF creates a state of rigidity. glucocorticoid actions both facilitate BDNF actions and are facilitated by BDNF in a feed-forward loop that facilitates plasticity.



BDNF

Role in fear conditioning and extinction

Fear conditioning:

Amygdala: Inhibiting BDNF signaling in the amygdala impairs both the acquisition and consolidation fear conditioning [63,71]

Hippocampus: BDNF+/- mice showed impaired contextual fear conditioning [66]

Prefrontal cortex: Prelimbic BDNF required for acquisition of fear [68]

Extinction:

Amygdala: Required for consolidation but not encoding of extinction [64]

Hippocampus: Deletion of BDNF impairs extinction BDNF secreting neurons project to the infralimbic cortex [67]

Prefrontal cortex: Infralimbic BDNF required for extinction of fear [69]

Treatments

- Potential of fluoxetine, caloric restriction, and cortisol as regulators of neuroplasticity
- The concept of opening a window of plasticity is consistent with studies in animal models that show that ocular dominance imbalance from early monocular deprivation can be reversed by patterned light exposure in adulthood, which can be facilitated by fluoxetine, on the one hand, and caloric restriction, on the other.
- Investigations of underlying mechanisms for the reestablishment of a new window of plasticity are focusing on the balance between excitatory and inhibitory transmission and removing molecules that put the brakes on such plasticity.
- The caloric restriction study also showed that ingestion of cortisol in drinking water instead of caloric restriction was able to open a window of plasticity and enable binocular visual stimulation to correct amblyopia.

Treatments

Poor organization is one of the most common causes of stress. Structured approaches offer security against ‘out of the blue’ problems. Prioritising objectives, duties and activities makes them manageable and achievable. Don’t overload your mind. Organisation will help avoid personal chaos.

Perception-Based Therapy

- A new therapeutic approach is based on training older adults in visual perceptual discrimination, using Gabor patches that had built-in animation for directed motion.

Ten hours of training were found to improve on-task perception, and the training also benefitted working memory for a delayed-recognition motion direction task.

More- over, electroencephalography showed that training produced more efficient sensory encoding of the stimuli, which correlated with gains in working memory performance.

This finding fits with other evidence that perceptual training improves the ability to detect signal over noise and thus produces some generalized cognitive benefits. The authors suggested that there are two fundamental design elements that drive neuroplasticity in this type of intervention, because they personalize training to the capacity of each person and allow abilities to improve over time. To do so, the training incorpo- rates continuous performance feedback to provide repeated cycles of reward to the subject. Moreover, training is designed to adapt to the trainee's on- going performance using psychophysical staircase functions that enhance the challenge in response to accurate performance and reduce it for inaccurate performance.

Re-Framing

Re-framing is a technique to change the way you look at things in order to feel better about them. There are many ways to interpret the same situation so pick the one you like. Re-framing does not change the external reality, but helps you view things in a different light and less stress.

Reminder About Schachter & Singer

Other Top-Down Therapies that Change the Brain

Social integration and support, and finding meaning and purpose in life, are protective against *allostatic load* and programs such as the Experience Corps that promote these, along with increased physical activity, have been shown to slow the decline of physical and mental health and to improve PFC blood flow in a similar manner to regular physical activity.

Many of the interventions intended to promote plasticity and even slow age-related decline, such as physical activity and positive social interactions that give meaning and purpose, are also useful for promoting positive health and wellness independently of any notable disorder.

Mindfulness and Meditation

- Therapies addressing functional links between brain and body may be particularly effective in treat- ing the range of symptoms associated with many chronic diseases.71 Successful cognitive behavioral therapies, which are tailored to individual needs, can produce volumetric changes in both the PFC in the case of chronic fatigue72 and in the amygdala in the case of chronic anxiety23 (Table 1), and in brain- stem areas associated with well-being.73 MBSR has been shown to increase regional brain gray mat- ter density in the hippocampus, cerebellum, and PFC, which are involved in learning and memory processes, emotion regulation, self-referential pro- cessing, and perspective taking.74 Indeed, enhanc- ing self-regulation of mood and emotion appears to be an important outcome.25 More studies showing brain changes after MBSR have been reviewed very recently.75
- In relation to MBSR effects on amygdala volume that accompany anxiety reduction in generalized anxiety disorder (GAD),23 a follow-up study of symptom improvements followed GAD patients who were randomized to an 8-week MBSR or a stress management education (SME) active control program. In GAD patients, amygdala activation in response to neutral faces decreased following both interventions, whereas blood oxygen level–dependent responses in ventrolateral prefrontal regions showed greater increases in MBSR than in SME participants. Furthermore, functional connectivity between the amygdala and PFC increased significantly pre- to post- intervention within the MBSR subjects, but not in the SME group, at least not to a level that has clinical relevance, based on changes in Beck Anxiety Inventory scores. Amygdala–prefrontal connectivity turned from negative coupling, as typically seen in downregulation of emotions, to positive coupling, suggesting a unique mechanism of mindfulness involving other components of the complex PFC. These findings suggest that, in GAD, MBSR training leads to changes in frontolimbic areas crucial for the regulation of emotion and may do so in ways unique to MBSR.76
- Meditation has been reported to enlarge hip- pocampal volume and to do so differently in menand women, suggesting to the authors that med- itation practices and, most likely, MBSR, operate differently in males and females.77 This suggestion is reminiscent of very recent work showing sex dif- ferences in rats that showed differing fear responses. During fear conditioning and extinction, this work revealed that, despite no overall sex differences in freezing behavior, the neural processes underlying successful or failed extinction maintenance were sex specific.78 Given other work showing sex differences in stress-induced structural plasticity in PFC pro- jections to the amygdala and other cortical areas,79 these findings are relevant not only to sex differ- ences in fear conditioning and extinction but “also to exposure-based clinical therapies, which are sim- ilar in their premises to those of fear extinction and which are primarily used to treat disorders that are more common in women than in men.”78
- Another domain where MBSR and meditation practices are reported to have positive effects on brain function is in age-related cognitive decline.24 Fluid intelligence has been shown to decline slower in aging yoga practitioners and in aging MBSR prac- titioners than in controls.25 Resting-state functional networks of yoga practitioners and meditators were more integrated and more resilient to simulated damage than those of controls. Furthermore, the practice of meditation was found to be positively correlated with fluid intelligence, resilience, and global network efficiency.25 Moreover, gray matter volume is reported to be preserved in meditators compared to age-matched controls.80
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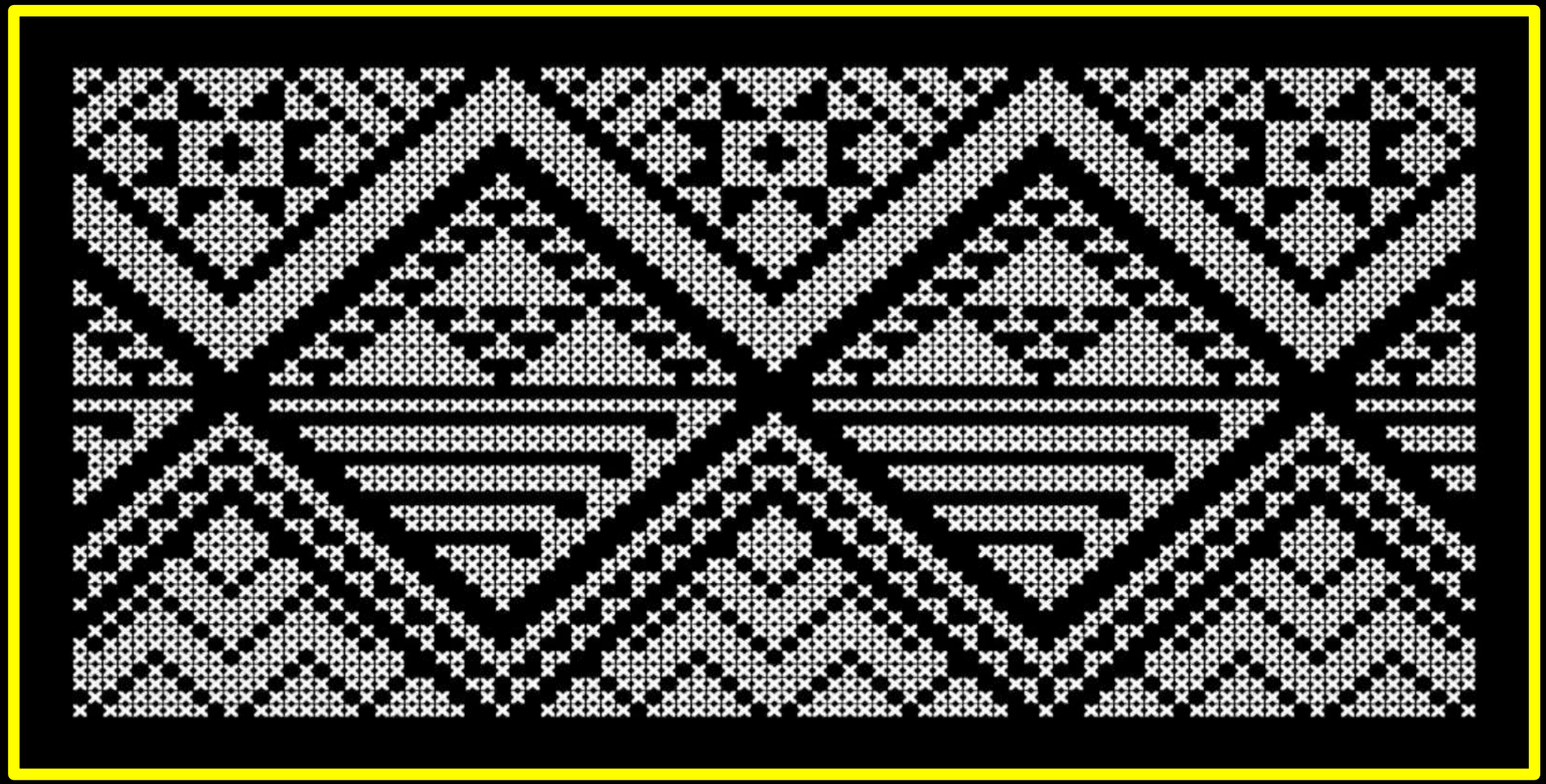
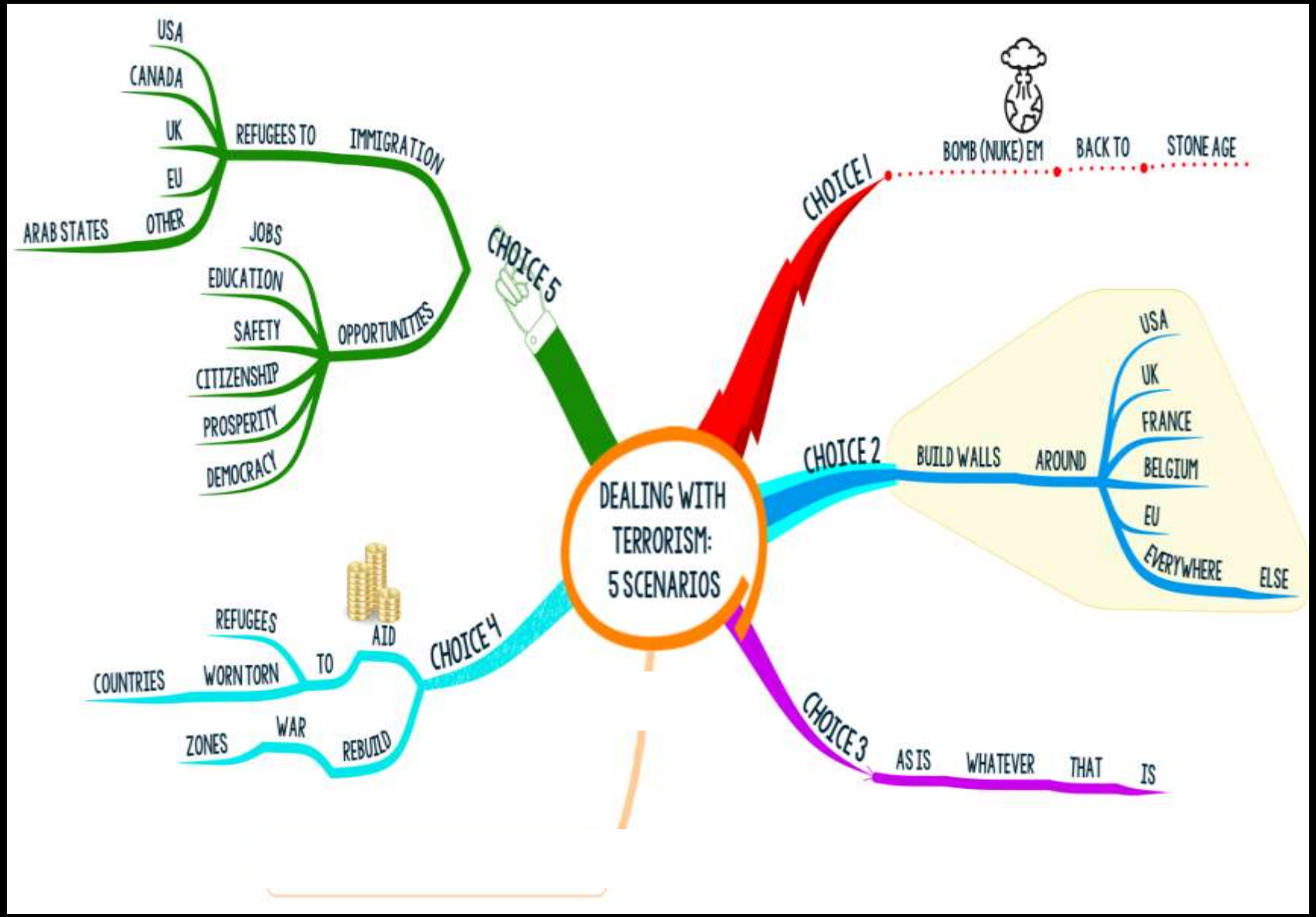
A Personal Experience on Resilience Training




DEALING WITH TERRORISM: 5 SCENARIOS
CHOICE 1
BOMB (NUKE) EM
BACK TO
STONE AGE
CHOICE 2
BUILD WALLS
AROUND
USA
UK
FRANCE
BELGIUM
EU
EVERYWHERE
ELSE
CHOICE 3
AS IS
WHATEVER
THAT
IS
CHOICE 4
AID
REFUGEES
TO
COUNTRIES
WORN TORN
WAR
ZONES
REBUILD
CHOICE 5
IMMIGRATION
REFUGEES TO
USA
CANADA
UK
EU
OTHER
ARAB STATES
OPPORTUNITIES
JOBS
EDUCATION
SAFETY
CITIZENSHIP
PROSPERITY
DEMOCRACY


RESILIENCE
Thank You Very Much
תודה רבה
Muchas Gracias
شكرا جزيلا