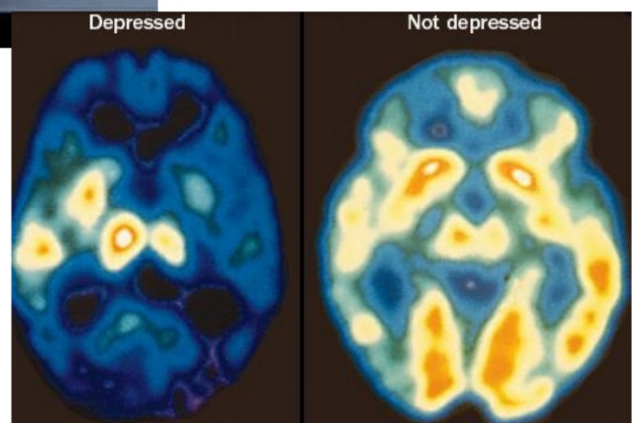


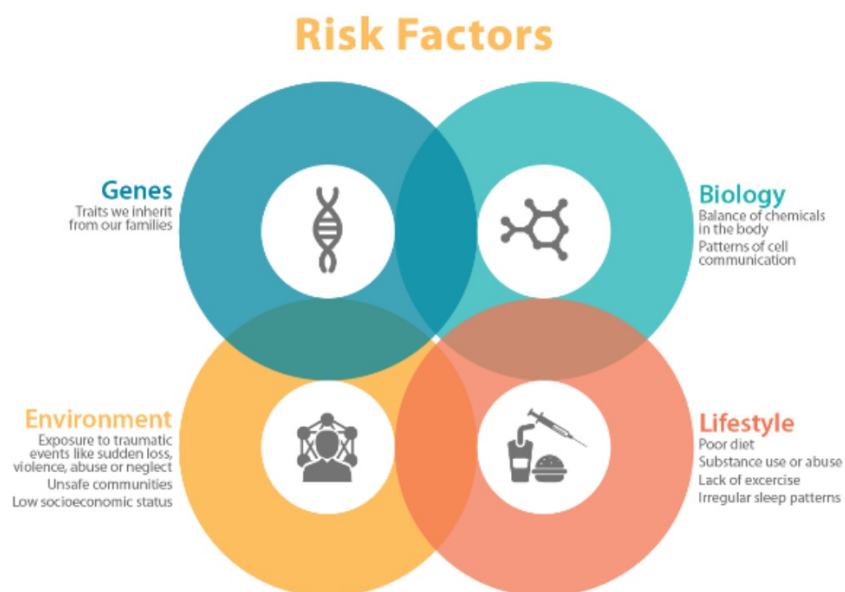
Mental illness and the Brain

- Mental illness happens when something in the brain isn't working properly
 - When the brain gets sick
- A number of things can be happening inside the brain
 - A specific part of the brain isn't working well
 - A specific part of the brain is working in the wrong way
 - A brain network could be disrupted
 - Neurochemical messengers aren't working properly



Multidimensional integrative approach – psychological disorders are the products of multiple interacting causal factors:

- **behavioural influences** (past experiences)
- **biological influences** (brain biology)
- **emotional influences** (fear, anxiety, etc)
- **social influences** (friends, families, support, relationships)
- **developmental influences** (age-related, maturity, etc)



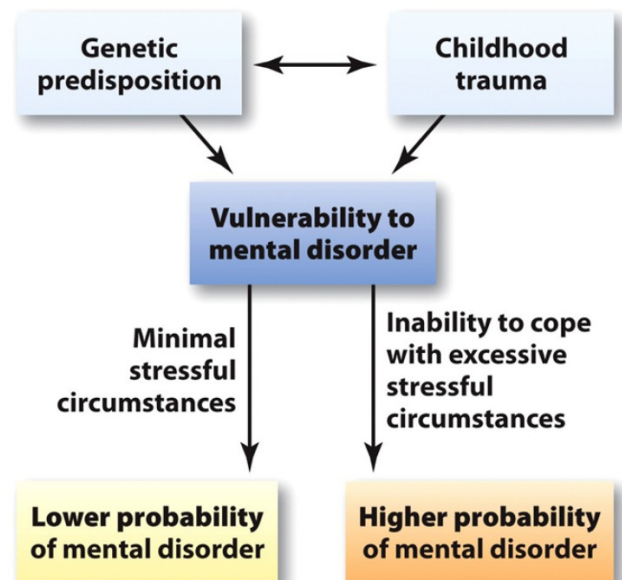
Interaction of genes and environment – 2 models:

Diathesis-Stress Model

- individuals inherit tendencies to express certain traits or behaviours which may then be activated under conditions of stress (ie they inherit a “vulnerability” or susceptibility which develops into an actual disorder when the certain env stressor comes along.
- diathesis = susceptibility which, when added to a stressor, develops into a disorder
- studies have been done on people with genetic ties to depression – ie certain genes affect the amount of serotonin produced – low serotonin = depression

Reciprocal Gene-Environmental Model

- certain genes might increase the probability that an individual will experience stressful life events – ie certain genes may cause a person to be more impulsive – thus leading to more risky behaviours
- * note: This should not be inferred as **blaming the patient** – they are not purposefully seeking out dangerous situations – there are simply genetic influences on personality that lead to certain types of life experiences.

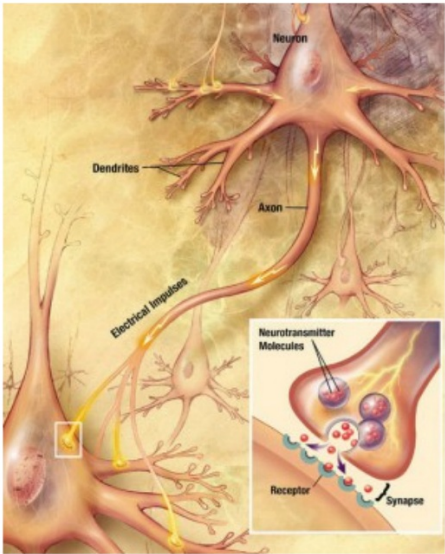


Psychological Science, 4/e Figure 14.7
© 2013 W. W. Norton & Company, Inc.

Nongenomic “inheritance” of behaviour

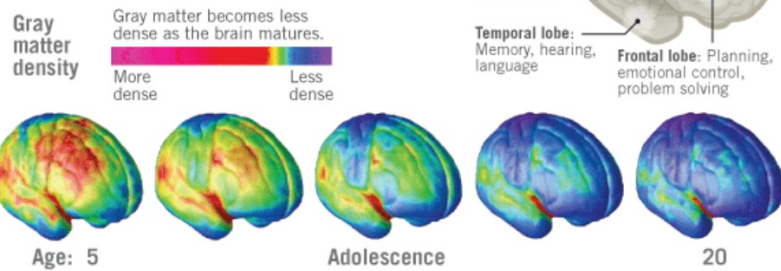
- studies with rats involving cross fostering – ie easily stressed mothers raised rats from calm mothers and vice versa
- it showed that the rats from the stressed mothers raised by the calm mothers grew up more calm – indicating a strong environmental influence and less so for genetics.
- in humans – babies of parents with schizophrenia adopted seemed only to develop mental illness if they were raised by dysfunctional parents – children adopted by high functioning parents did not develop these disorders
- this again shows that a genetic predisposition may never express itself unless certain env factors are present – especially early influences seem to affect how genes are expressed.
- emphasis on parenting in the early years – stable home situations



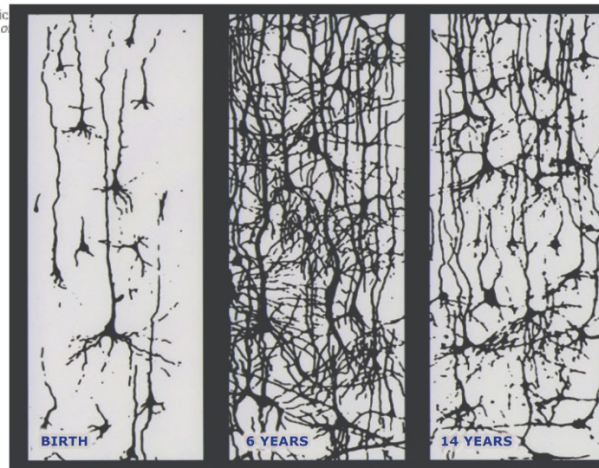


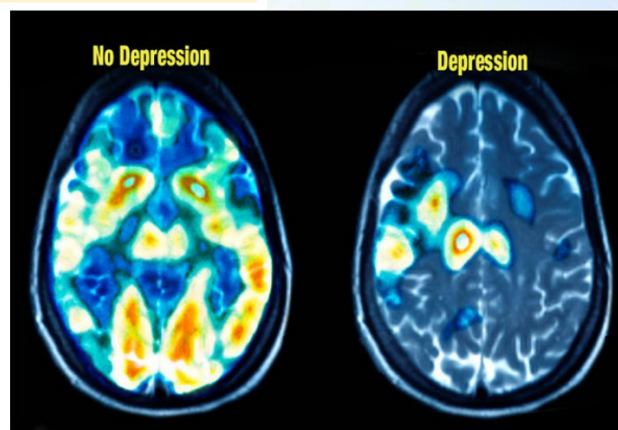
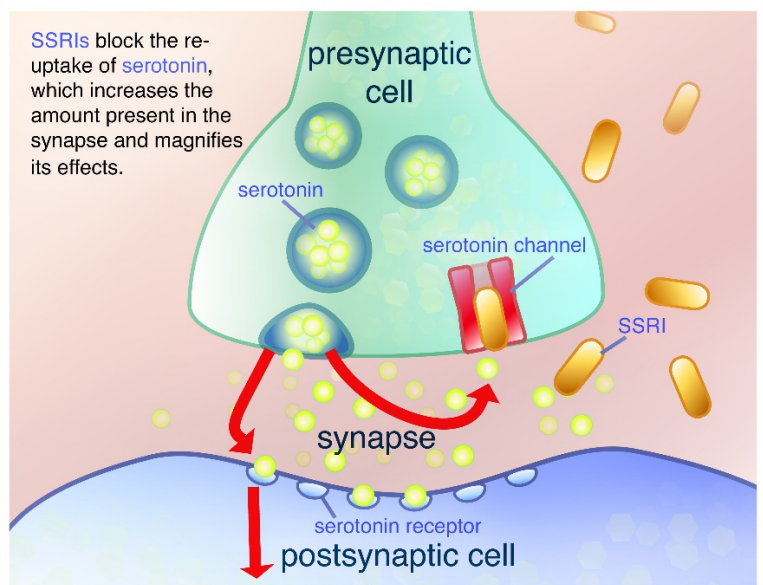
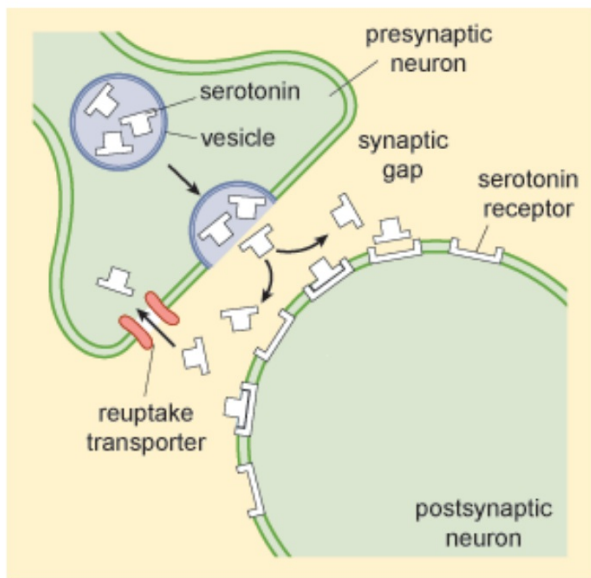
Growing a Grown-up Brain

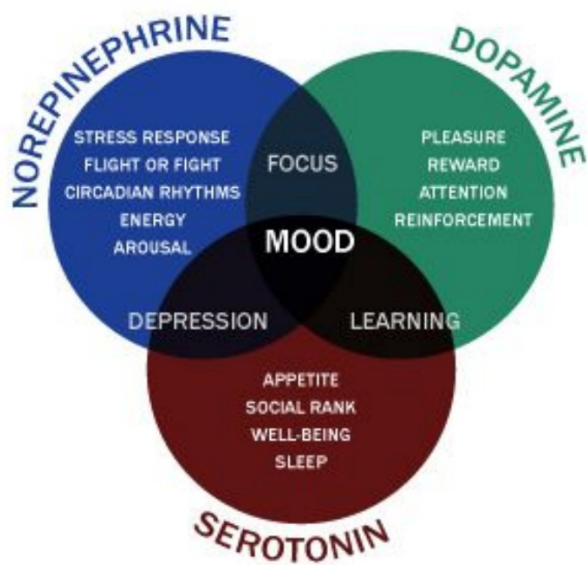
Scientists have long thought that the human brain was formed in early childhood. But by scanning children's brains with an MRI year after year, they discovered that the brain undergoes radical changes in adolescence. Excess gray matter is pruned out, making brain connections more specialized and efficient. The parts of the brain that control physical movement, vision, and the senses mature first, while the regions in the front that control higher thinking don't finish the pruning process until the early 20s.



Source: "Dynamic
al., *Proceedings of*







What we are told mental illness is:

@the.holistic.psychologist

Bad genetics



A faulty "chip" in brain



What mental illness really is:

Inflammation



Insulin resistance



Unhealthy gut-brain axis



Neurotransmitter issues



Chronic stress



Toxic subconscious programming



STRUCTURE KEY: ● Carbon atom ○ Hydrogen atom ○ Oxygen atom ○ Nitrogen atom ○ Rest of molecule

ADRENALINE



NORADRENALINE

The chemical structure of 2,4,6-trinitrophenol (TNP) is shown. It consists of a central benzene ring with three nitro groups (NO₂) attached at the 2, 4, and 6 positions, and a hydroxyl group (OH) attached at the 1 position.



DOPAMINE



SEROTONIN



GABA

CC(=O)OCCN

ACETYLCHOLINE



GLUTAMATE

NC(=O)C[C@H](N)C(=O)N

ENDORPHINS



Released during exercise, excitement, & sex, producing well-being & euphoria, reducing pain. Biologically active section shown.



CC BY NC ND

BY NC ND

GAMMA AMINOBUTYRIC ACID (GABA)

- reduces postsynaptic activity – which inhibits a variety of beh and emotions – ie reduces anxiety, hostility, anger, aggression, even anticipation and pleasure
- certain tranquilizers (benzodiazepines) – attach GABA molecules to the receptors of specialized neurons more easily – thus making the indiv calmer

Foods with natural GABA – can reduce anxiety – such as: oolong tea, cherry tomatoes, shrimp, sesame and sunflower seeds fermented foods (sauerkraut, yogurt, kimchi, kefir, miso)

Foods that Stimulate GABA Production in CNS:

Traditional fermented foods and beverages



sauerkraut



kimchi



tempeh



natto



kefir



kombucha



Soy sauce

Novel fermented foods and beverages



Beverages fermented by kefir and kombucha starters



Lactic fermented vegetable mixes

- Almonds
- Bananas
- Beef Liver
- Broccoli
- Brown Rice
- Green Tea
- Halibut
- Lentils
- Oats, whole grain
- Oranges, citrus fruits
- Rice bran
- Spinach
- Walnuts



SEROTONIN

- serotonin influences our behaviour, mood, thought processes
- low serotonin is associated with less inhibition, impulsivity, overreaction to situations, aggression, impulsive overeating, suicide
- drugs to aid are called SSRIs (selective serotonin reuptake inhibitors) – fluoxetine
- * tryptophan is needed to produce serotonin (and melatonin) – our bodies can't make tryptophan so we need to eat foods with tryptophan

Foods with tryptophan: dairy (yogurt, milk, eggs, cheese), turkey, bananas, nuts and



DOPAMINE

- general function is to activate other NTs and to aid in pleasure-seeking behaviours – serotonin is associated with restraint and inhibition – they balance each other
- class of drugs – L-dopa – a dopamine agonist (increases dopamine) – it turns on a pathway in the locomotor system which affects our movement and coordination – a deficiency in dopamine is associated with Parkinson's – L-dopa improves coordination and reduces tremors and rigidity of muscles

Foods that increase dopamine are foods rich in tyrosine – beans, chicken, duck, cheese, edamame, oatmeal, dark chocolate (yes, again!!), seaweed, wheat germ, apples, bananas, fish, eggs, watermelon, strawberries



NOREPINEPHRINE (NORADRENALINE)

contain **phenylalanine**

- associated with endocrine system
- stimulates 2 groups of receptors (alpha-adrenergic and beta-adrenergic)
- beta-blockers are given to reduce hypertension and control HR – they block beta-receptors so that norepinephrine is reduced which keeps BP down
- norepinephrine may have a link to panic and panic disorders – norepinephrine is used to influence body's emergency reactions – ie "fight or flight" response



Acetylcholine - needed for muscle activation, aids in alertness, learning and memory

contain **choline**



Acetylcholine

building block is choline (main source FAT)

Almonds	Celery	Oranges
Beef	Chicken	Peanuts
Blueberries	Coffee	Peanut butter
Broccoli	Eggs	Soybeans
Asparagus	Fava beans	Tofu
Cabbages	Fish	Wheat germ
Cauliflower	Grape juice	Lettuce
Caviar	Hazelnuts	



C[N+](C)(C)CO

CHOLINE

RICH FOODS

PASTURED POULTRY LIVER

PASTURE-RAISED EGGS

GRASS-FED MEATS

GRASS-FED BEEF LIVER

BROCCOLI/CAULIFLOWER

WILD-CAUGHT SALMON

ROSEMARY

DRJOCKERS.COM
OPTIMIZE YOUR HEALTH

Glutamate - involved in assimilation of vision, hearing, other sensory input to acquire new information and develop new pathways for learning and memory



What is Monosodium Glutamate (MSG)

- Flavor enhancer/food additive largely used in the food industry
 - Responsible for umami/savory taste
 - When detected by taste buds, it signals the protein presence in the diet
 - Thought to mainly be in Asian cuisine
 - Hidden in many processed foods
 - Used in place of sodium



Glutamate Content of Common Foods per 100 g

Plant



Tomatoes
0.5 g



Almonds
6.8 g



Soy Sauce
1.6 g



mushrooms
8.4 g



Soy Protein Isolate
17.5 g

Animal



Parmesan Cheese
8.2 g



Beef Loin
6 g



Whey Protein Isolate
14 g

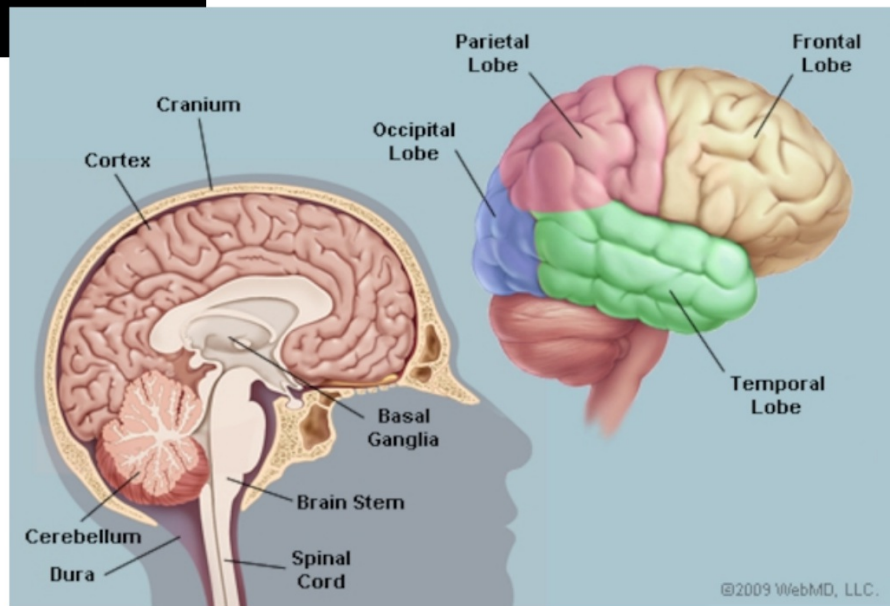


Bacon
5.6 g

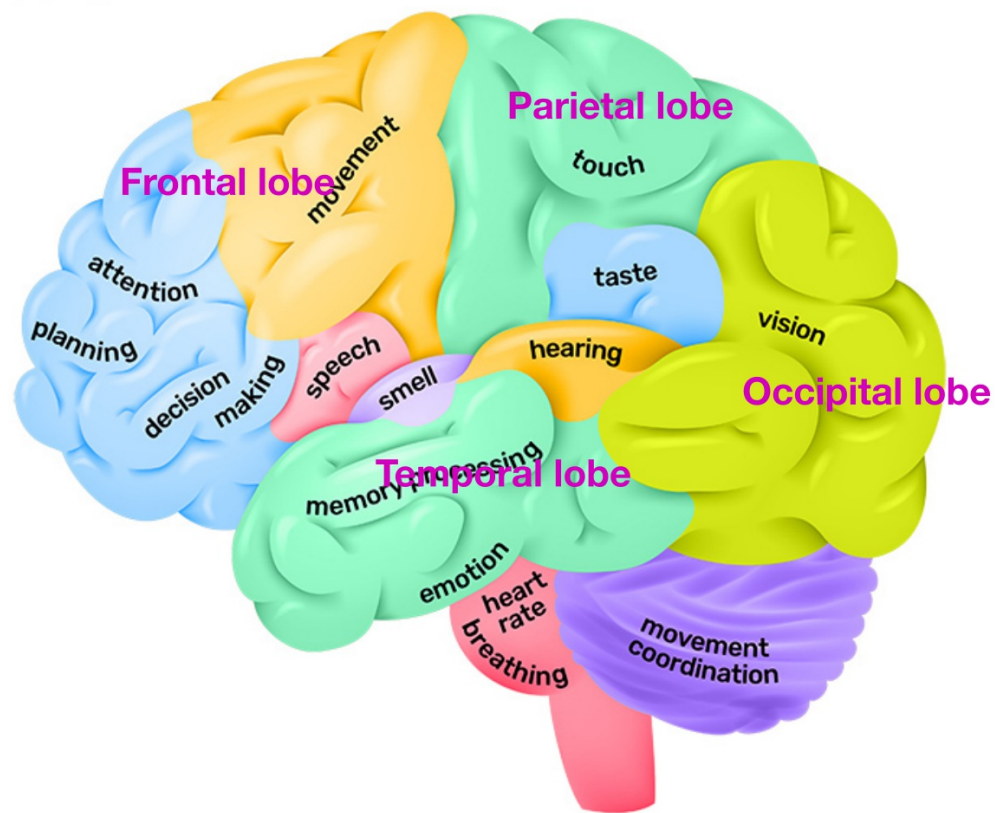




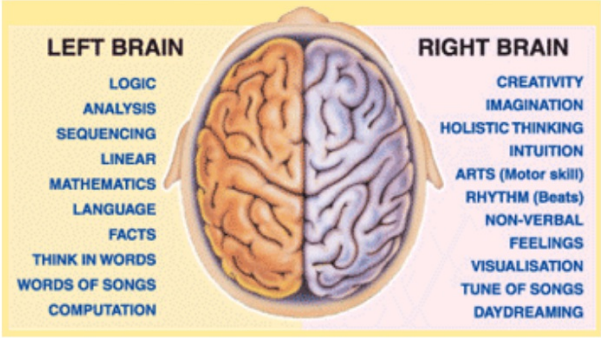
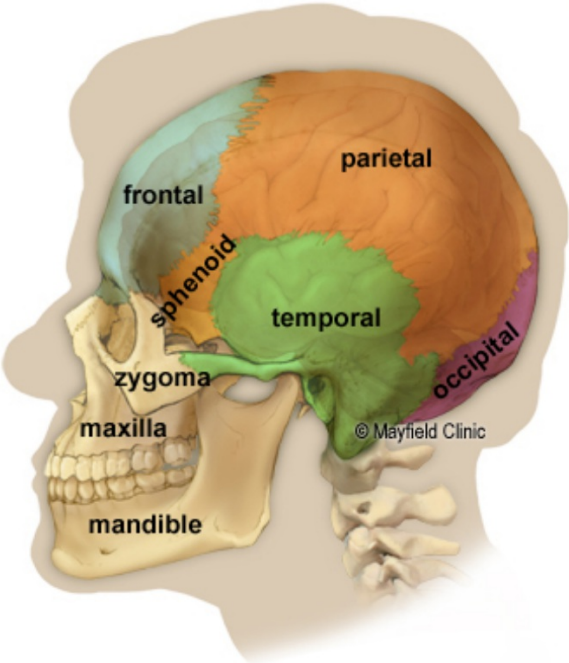
The Brain

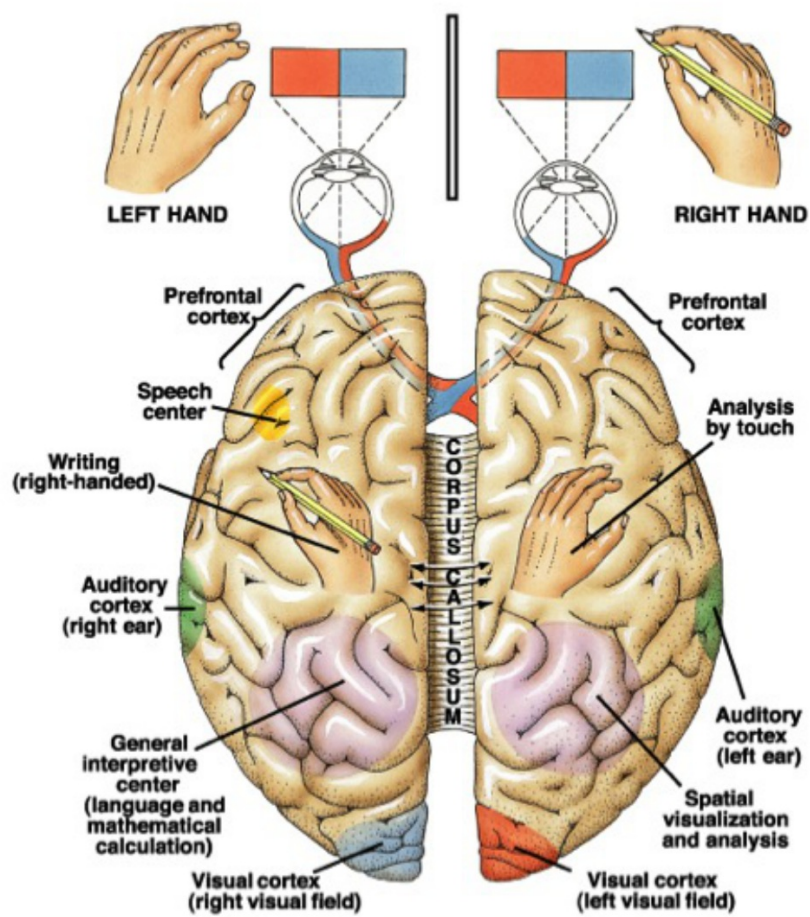


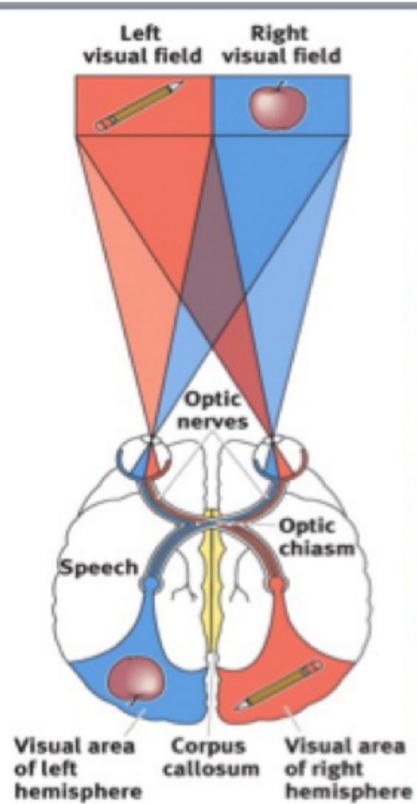
The cerebral cortex



Cerebral lobes







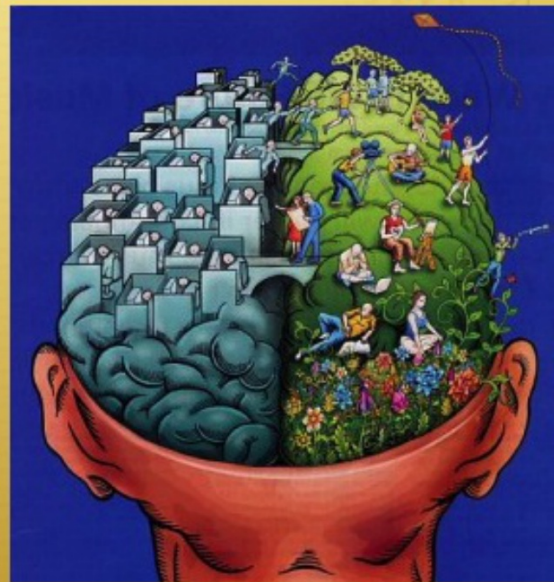
- Right hemisphere controls left side of body and visual field
- Left hemisphere controls right side of body and visual field

The Stroop Effect

The Stroop Effect is a test to determine which side of the brain is dominant. It also shows that an individual may have a right-brain/left-brain conflict, leaving the person struggling to complete the test.

In this test, the right-brain tries to recognize the colour, while the left-brain tries to read to word. If you are trying to recognize the colour, but you are left-brain dominant (most right-handed people), you will be confused and find the task difficult. Likewise, if you are trying to read to word, but are right-brain dominant, you will also struggle to complete the task.

Try the Stroop Test on the next slide!



The Stroop Test

Orange Blue Green Pink Orange Purple Pink
Purple Yellow Green Blue Green Blue Purple
Yellow Orange Gray Red White Red Pink
Blue Gray Red Blue Orange Red Blue
Purple Red Purple Orange Gray Red Green
Blue Purple Pink Yellow Pink Green Yellow
Orange Yellow Red Yellow Pink Orange Green
Purple Gray Red Orange Green Blue Green
Pink Gray Red Yellow Purple Blue White
Pink Blue Green Purple Yellow Gray Yellow

Try it in French!

BLEU	JAUNE	BLEU	ROUGE	BLEU
VERT	JAUNE	ROUGE	VERT	JAUNE
VERT	ROUGE	VERT	JAUNE	JAUNE
JAUNE	ROUGE	JAUNE	VERT	BLEU
BLEU	ROUGE	JAUNE	JAUNE	VERT
ROUGE	BLEU	VERT	JAUNE	VERT
ROUGE	JAUNE	BLEU	ROUGE	VERT
BLEU	VERT	BLEU	JAUNE	JAUNE
BLEU	ROUGE	ROUGE	JAUNE	ROUGE
VERT	BLEU	ROUGE	VERT	BLEU

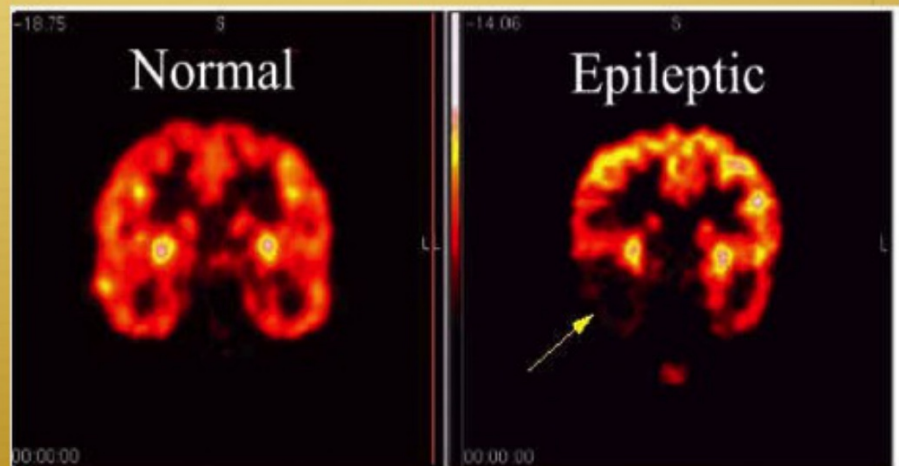
Epilepsy & the corpus callosum

✦ <http://www.youtube.com/watch?v=lfGwsAdS9Dc>

(a man receives surgery to alleviate epileptic seizures)

✦ http://www.youtube.com/watch?v=sfOWssDEW_U&feature=related

(temporal lobectomy epilepsy surgery)



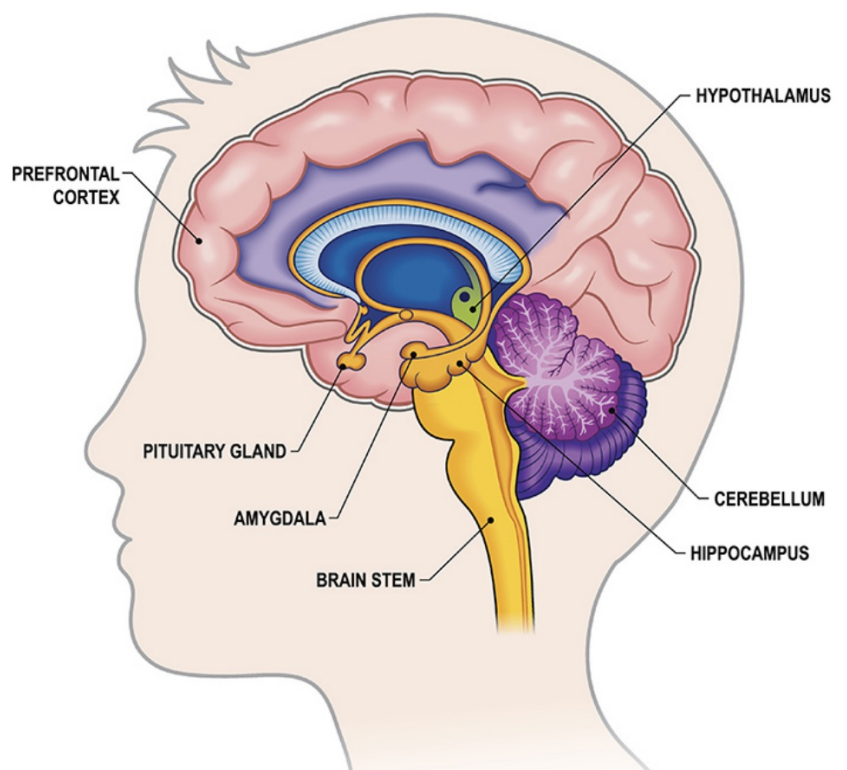
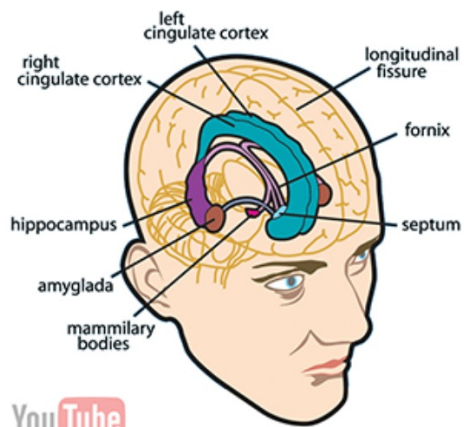
SCIENTIFIC
AMERICAN

FRONTIERS

Introductory Psychology
Video Collection

Severed Corpus Callosum

The Limbic system - arousal, learning, memory



Limbic system - basic parts

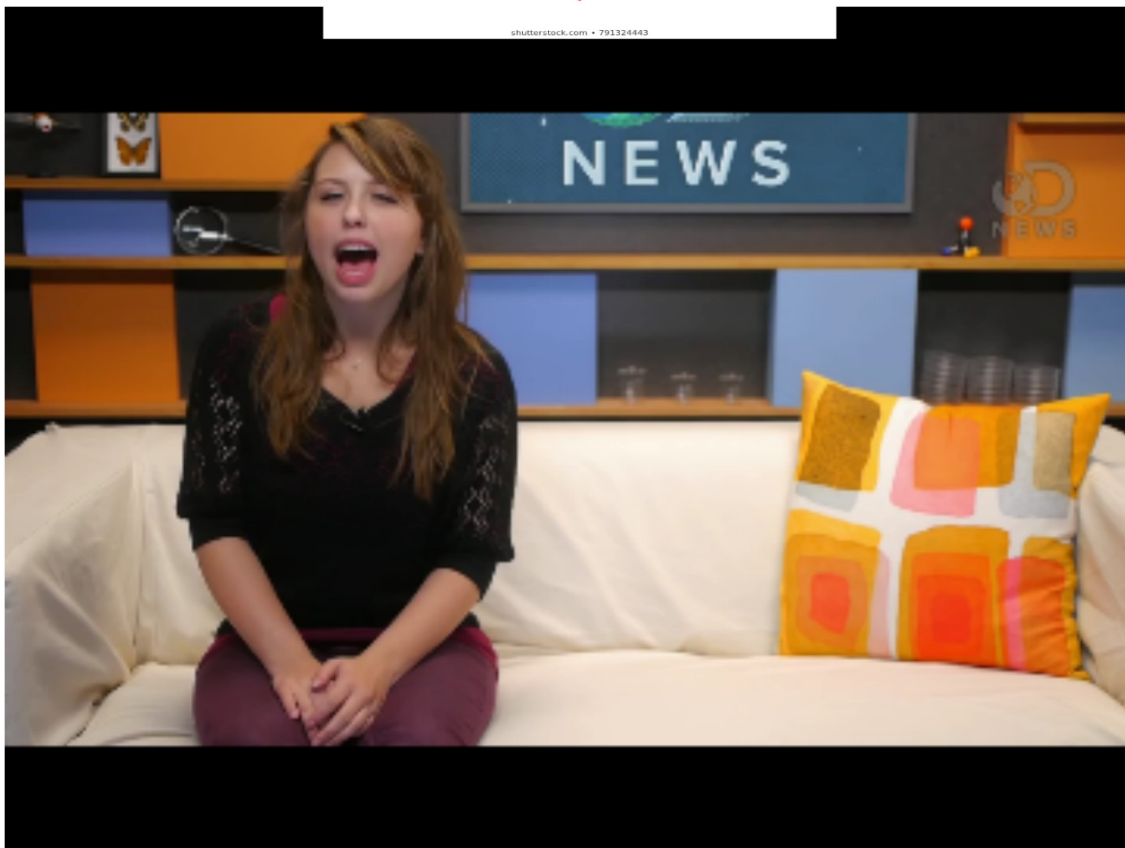
- Amygdala - **emotions** (reward, fear, social functions)
- Hippocampus – **cognition** (long-term memories, map navigation, spatial memory)

- Cingulate gyrus - **autonomic functions** (heart rate, blood pressure) and **cognition** (attentional processing)

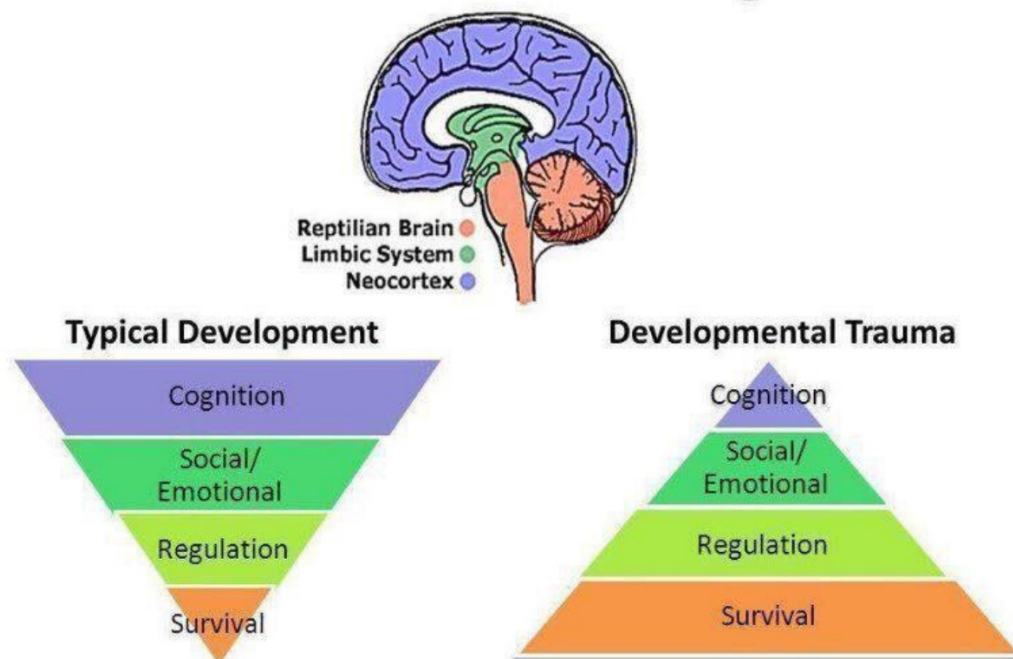
- Hypothalamus - **autonomic functions** (hormones, blood pressure, heart rate, hunger, thirst, sexual arousal, sleep/wake cycle)
- Thalamus - The "**relay station**" to the cerebral cortex

H A P P Y
Valentine's Day

shutterstock.com • 791326443

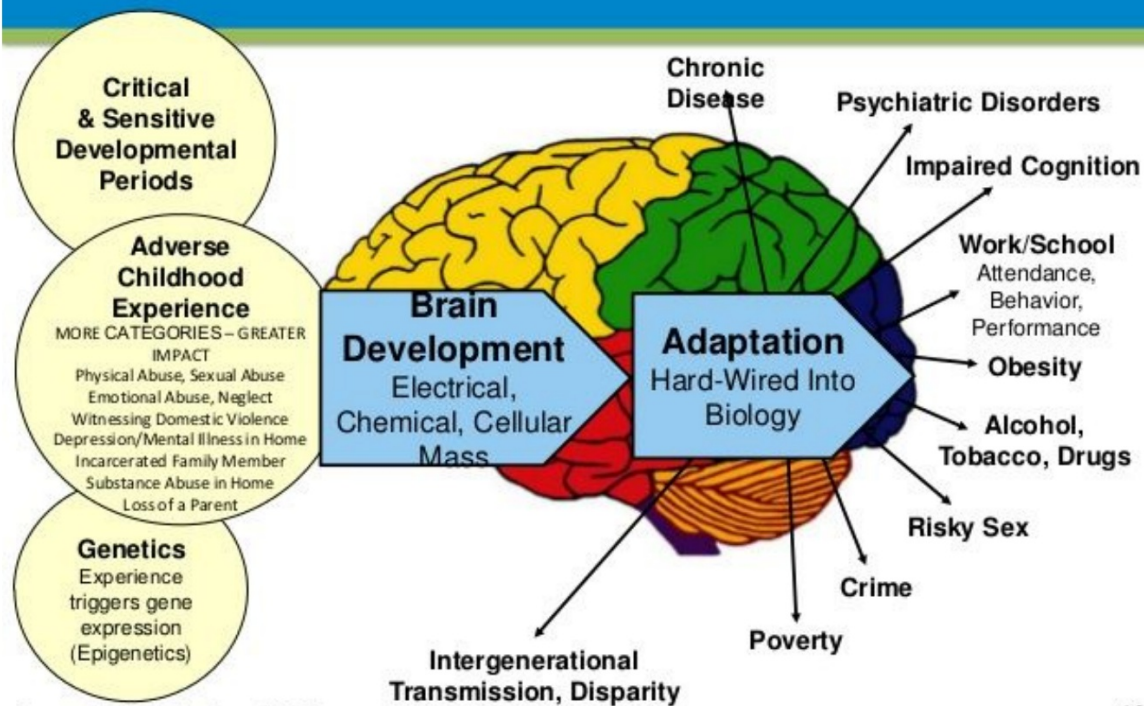


Trauma & Brain Development



Adapted from Holt & Jordan, Ohio Dept. of Education

Lifespan Impacts of ACEs



Source: Family Policy Council, 2012

ABUSE



Physical



Emotional



Sexual

NEGLECT



Physical



Emotional

HOUSEHOLD DYSFUNCTION



Mental Illness



Incarcerated Relative



Mother treated violently



Substance Abuse



Divorce

Brains: Journey to Resilience

<https://vimeo.com/245310333>

**THE BRAIN
ARCHITECTURE
GAME**

