

BRAIN EXTRAVAGANZA! Brain Facts and Build Your Own Brain Questions

*Brain #1

Sponsor: IU Health Bloomington Hospital

Artist: Carol Hedin

Brain Facts

1. **Pregnancy Brain Power.** Pregnant women may develop greater brain power due to an increase in the number of dendrites and glial cells, resulting in intensified sensory perception.
2. **Brain Hemispheres.** In a fetus, more than 250,000 new brain cells grow every minute.
3. **Learning.** A newborn's brain triples in size in the first year due to dendritic growth and increased synaptic connections.
4. **Teen Brain.** The teenage brain is a work in process. What we do during our teen years establishes a lifelong circuitry for that activity. Whatever we want to be good at when we are older, we need to do during our teen years as our brain develops and makes connections.
5. **Aging.** As people age, they continue to produce new connections. Thanks to neuroplasticity, the brain is capable of making new connections throughout life, and this capability helps with recovery from neurological trauma.

Build Your Own Brain

Which "brain-stimulating" activity do you enjoy most?

- A. Working crossword puzzles
- B. Composing music
- C. Learning foreign languages
- D. Reading
- E. Playing sports
- F. Writing prose or poetry

*Brain #2

Sponsor: Centerstone of Indiana, Inc.

Artist: Amy Brier and Ivy Tech Students

Brain Facts

1. **Health.** What we eat, how much we sleep we get, and the thoughts we think can all profoundly influence our overall mental health.
2. **Illness.** The brain is just like any other organ in that it too can become ill. Brain illnesses include manic depression (bipolar disorder), schizophrenia, and anxiety disorder. Treatment helps.
3. **Treatment.** A combination of medication and talk therapy for psychiatric illnesses influence the chemistry in our brain by increasing or decreasing specific neuronal activity.

Build Your Own Brain

How do you learn best?

- A. Reading material to myself
- B. Hearing someone explain it
- C. Imagining myself doing it
- D. Watching someone else do it
- E. Teaching someone else to do it
- F. Repeating an activity over and over

4. **Neurons.** Neurons communicate with one another using chemical neurotransmitters. Different brain disorders reflect different groups of neurons with faulty communication.
5. **Addictions.** Smoking, drugs, and alcohol profoundly disturb the healthy internal environment of the brain, making it really difficult for neurons to do their jobs.

*Brain #3

Sponsor: Southern Indiana Radiological Associates (SIRA)

Artist: Gabriele Abowd Damico/Lara Lynn Weaver

Brain Facts

1. **Mapping.** Different parts of the brain perform different functions. Scientists are creating maps of the brain using different tools.
2. **Computer Axial Tomography (CAT).** A CAT scanner takes X-rays of the structures of the brain.
3. **Magnetic Resonance Imaging (MRI).** MRIs use the presence and motion of water in the brain to create images.
4. **Electroencephalography (EEG).** Electrodes are attached to the scalp to record electrical activity in the brain.
5. **Positron Emission Tomography (PET).** After administration of a radioactive marker, a PET scan traces it as it moves through the brain.

Build Your Own Brain

It is challenging for me to:

- A. Remember names
- B. Understand math
- C. Read
- D. Express myself artistically
- E. Get along with others
- F. Communicate my emotions

*Brain #4

Sponsor: Bloomingfoods

Artist: Bonnie Gordon Lucas

Brain Facts

1. **Food.** Different foods stimulate us in different ways. Milk and turkey contain tryptophan, which turns into serotonin and we relax.
2. **Antioxidants** are like garbage collectors. They help clean out the brain so neurons and glial cells can function better.
3. **Fish.** Coldwater fish – especially salmon and tuna – contain omega 3-fatty acids that protect brain cells and reduce the risk of heart disease and stroke.
4. **Balance.** A healthy brain needs the right balance of nutrients along with physical

Build Your Own Brain

What is your favorite “brain superfood?”

- A. Nuts
- B. Berries
- C. Salmon or tuna
- D. Oatmeal
- E. Avocados
- F. Dark chocolate

activity, mental challenge and social interaction.

5. **Fat.** Diets extremely low in fat can make you feel foggy in the brain because neurons need good fat to conduct their messages.

*Brain #5

Sponsor: Lotus World Music Festival (in memory of Dr. Kat Domingo)

Artist: Merridee LaMantia/Jill Bolte Taylor

Brain Facts

1. **Playing** music is a great way to challenge our minds and integrate information between our left and right hemispheres.
2. **Listening.** Our left brains' critical judgment circuitry determines whether or not we like a piece of music.
3. **Physical.** Most world cultures move their bodies when they perform or sing music.
4. **Cognitive.** People who have trauma to their left hemisphere language centers may not be able to speak but they can often sing.
5. **Performance Anxiety.** There are techniques we can learn to train ourselves to minimize stage fright.

Build Your Own Brain

What do you like to do most?

- A. Compose music
- B. Practice music alone
- C. Perform music for others
- D. Dance to music
- E. Teach music
- F. Listen to music

Brain #6

Sponsor: Home Instead Senior Care Bloomington (by Janet Barrows)

Artist: Gail Hale

Brain Facts

1. **Connections, Not Cells.** A really smart brain does not necessarily have more neurons, but rather has more synaptic connections between the neurons that are there.
2. **Strong Synapses.** Exercising the body increases blood flow to the brain and helps keep neuronal synapses strong.
3. **Sleep.** During sleep is a great time for brain cells to organize their information so we can be smart and alert when we are awake.
4. **Caregivers.** Supportive caregiving can have a profoundly positive impact on the health and well-being of the one being cared for.
5. **Better with Age.** Social interaction stimulates our neurons to make new connections with other neurons. It is really important that we stay connected to our social network as we age.

Build Your Own Brain

You are?

- A. A natural born leader
- B. A natural born musician
- C. A natural born caregiver
- D. A natural born athlete
- E. A natural born peacemaker
- F. A natural born problem solver

Brain #7

Sponsor: Cook Group, Inc.

Artists: Yara Clüver and Althea Crome

Brain Facts

1. **BMI.** Neuroscientists have developed Brain-Machine Interface (BMI) technology to help those with serious physical disabilities use their thoughts to send email and turn on TVs via electrodes implanted in their brains.
2. **Implants.** Neuroprosthetics are artificial devices implanted in the brain to repair damaged structures. The two most well-known devices are cochlear (hearing) and retinal (vision) implants.
3. **Electronic Tattoo.** Scientists are working on an electronic tattoo to monitor the heart, brain, and other bodily systems. This technology may be able to prevent epileptic seizures or warn of heart problems.
4. **Stroke Repair.** The sooner a stroke survivor gets to a hospital for help, the better the long-term outcomes for that person generally are.
5. **Neurogenesis.** The brain can create some new neurons (undergo neurogenesis), resulting in the ability of the brain to create new neural networks necessary for recovery from trauma.

Build Your Own Brain

What is most true about you?

- A. I wake up happy in the morning.
- B. I feel uncomfortable around happy people.
- C. I am sensitive to the feelings of others.
- D. I would rather be happy than right.
- E. I would rather be right than happy.
- F. I experience joy when others succeed.

Brain #8

Sponsor: WFHB (by Dr. Becky Allmon)

Artist: Melissa Johnson

Brain Facts

1. **Language and Music.** These activities share similar brain areas, including Broca's area, the motor cortex, basal ganglia, and the cerebellum.
2. **Hemispheric Differences.** While understanding the meaning of a word is a left hemisphere activity, processing melody is a right hemisphere function.
3. **The Chills.** When we "get the chills" listening to music, we are stimulating our reward, motivation, emotion, and arousal systems using our amygdala, orbitofrontal cortex, and midbrain regions.
4. **Musicians** often develop a larger corpus callosum than non-musicians, resulting in

Build Your Own Brain

What type of music do you enjoy the most?

- A. Rock and roll
- B. Classical
- C. Jazz
- D. Country
- E. Folk/bluegrass
- F. World

more rapid communication between the right and left hemispheres.

5. **Music.** When a song goes around and around in your mind, it is said to be “stuck in the superior tip of your temporal lobe.”

Brain #9

Sponsor: Baker Family Dentistry and Siwy Plastic Surgery

Artist: Amy Brier

Brain Facts

1. **Gums and Brain.** In aging people, gum disease can impair memory. Having our teeth cleaned twice a year supports good health in general.
2. **Decay.** Three or more glasses of soda pop daily can lead to tooth decay, the need for fillings, and tooth loss.
3. **Halitosis** is the technical word for bad breath, which is caused by an imbalance of bacteria in the mouth and throat.
4. **Plastic surgery** is the medical specialty that deals with the correction of physical form and function. Plastic surgery encompasses many areas of subspecialty: reconstructive, craniofacial, hand, wound, burn, micro-vascular, pediatric, and cosmetic.
5. **Reconstructive surgery** is intended to correct a physical abnormality caused by a birth defect, disease or tumor, physical trauma, or infection. The goal of reconstructive surgery may be to restore function or to achieve physical normality.

Build Your Own Brain

My most important mouth hygiene activity is:

- A. I brush my teeth at least twice daily.
- B. I floss my teeth at least once a day.
- C. I brush my tongue daily.
- D. I use mouthwash to rinse my mouth.
- E. I avoid soda pop and other sugary foods.
- F. I whiten my teeth periodically.

*Brain #10

Sponsor: Trinity Episcopal Church (by Rev. Dr. Hal Taylor)

Artist: Michele Gingras

Brain Facts

1. **New Scientists.** Researchers who study the brain science of spiritual experiences are called “Neurotheologians.”
2. **Major Religions.** We use our left hemisphere to understand the story or dogma of each religion, e.g., the story of Christ or the Buddha.
3. **Meditation and Prayer.** Meditation and prayer have been shown to decrease activity in our left-brain language centers, ultimately decreasing our brain chatter.

Build Your Own Brain

What experience helps you feel most fulfilled?

- A. Being with my family
- B. Volunteering
- C. Having meaningful work
- D. Participating in my church community
- E. Having downtime with no schedule
- F. Having a sense of purpose in my life

4. **Spiritual Experiences.** Our right and left hemispheres process information in very different ways. Feeling connected to something that is greater than ourselves can occur when the left-brain language centers are damaged.
5. **The Healing Brain.** The Dalai Lama participated in studies on the effects of meditation on the brain. Practice of meditation was shown to help focus attention; manage anxiety, depression, fear, and anger; and improve the ability of the body to heal itself.

Brain #11

Sponsor: Mectra Labs

Artist: Jill Bolte Taylor

Brain Facts

1. **Gyri and Sulci.** The bumps (gyri) and grooves (sulci) of the cerebral cortex each have a specific name and contain neurons with specific functions.
2. **Frontal Lobe.** This structure houses our personality, appropriateness of behavior, and self-motivation.
3. **Temporal Lobe.** The temporal lobe houses our auditory (hearing) cortex, amygdala (center of fear and rage), and hippocampus (site of learning and memory).
4. **Eye Movement.** Cranial nerves III (oculomotor), IV (trochlear) and VI (abducens) are involved with eye movement.
5. **Face.** Cranial nerve V (trigeminal) “feels and chews” for the face. Cranial nerve VII (facial) moves the muscles of facial expression.

Build Your Own Brain

What is most true about you?

- A. My hearing is really sensitive.
- B. My eyes are really good.
- C. My intuition is really strong.
- D. My motor skills are agile.
- E. My sense of smell is amazing.
- F. I am a super taster.

Brain #12

Sponsor: IU Health Proton Therapy Center

Artist: Robin Ripley

Brain Facts

1. **Branches.** Neurons receive information from other neurons through their dendrites or cell bodies. Neurons carry information to their target tissue via their single axon.
2. **Blood-Brain Barrier (BBB).** Not everything circulating in the blood gets into the brain, due to the BBB.

Build Your Own Brain

Which is most true about you?

- A. I like to be organized and set goals.
- B. I tend to do things at the last minute.
- C. I’m an early starter on long-term projects.
- D. I thrive when I am being creative.
- E. I work best in small groups.
- F. I work best when I work alone.

3. **Fluid.** Blood is toxic to neurons. The “blood” of the nervous system is the clear, colorless cerebrospinal fluid (CSF). CSF helps cushion the brain and protect against injury.
4. **Proton Radiation Therapy** delivers a very precise, pinpoint beam of radiation that can target various types of brain and other tumors while sparing healthy tissue.
5. **Cerebrum.** Our brain is divided into the right and left cerebral hemispheres, which are connected by over 300 million axonal fibers, making up the corpus callosum.

*Brain #13

Sponsor: IU Department of Psychological and Brain Sciences

Artist: Barb Bonchek and Harmony School Students

Brain Facts

1. **Learning.** Information goes into our short-term memory first and then into long-term memory.
2. **Dreams.** About 12% of us dream in black and white, but most of us dream in color.
3. **Thoughts.** The human brain is estimated to produce on average 70,000 thoughts per day.
4. **Truth.** We use seven areas of our brain to tell the truth but fourteen areas when we fake it.
5. **Baby's Brain.** We are born with approximately twice as many brain cells than what we will use throughout our lives. During the first three years, half of these cells will die.

Build Your Own Brain

When talking with someone, do you:

- A. Look them in the eye
- B. Put your hands on your hips
- C. Fold your arms across your body
- D. Touch them occasionally
- E. Look down and sway your body
- F. Stand a few feet away

Brain # 14

Sponsor: Dr. Terri Brown

Artist: Kurt Larsen

Brain Facts

1. **Trust.** From birth to 18 months, an infant learns about trust and mistrust, depending on whether his/her basic needs are met. The hormone **oxytocin** may influence our willingness to trust others.
2. **Right and Wrong.** Children of preschool age begin to assert their independence, take more initiative, and feel guilt.
3. **Differentiation.** Different groups of neurons (nuclei) are involved with different activities, and different neurons with different functions have different shapes and sizes.

Build Your Own Brain

What subject is (or was) easiest for you to learn?

- A. Math
- B. Languages
- C. Biological sciences
- D. Physical sciences
- E. Writing
- F. The arts

4. **Numbers in Color.** A small number of people have “synesthesia,” in which more than one sensory area in the brain is stimulated at the same time. Some people, for example, “see” numbers as having a color.
5. **Movement.** The cerebellum, located in the back of the brain, helps us move our body parts in a coordinated way.

Brain #15

Sponsor: Stone Age Institute

Artist: Jon Hecker and Patricia Hecker

Brain Facts

1. **Heart vs. Brain.** Ancient Egyptians considered the heart to be the source of intelligence, not the brain. They removed the brain during the process of mummification.
2. **Brain vs. Heart.** The 4th century B.C. philosopher, Aristotle, described the brain as being a “cooling agent” for the heart and a space where the spirit circulated.
3. **Thinking Brain.** In the 2nd century A.D., the physician Galen determined that mental activity took place in the brain.
4. **Anatomy.** Sixteenth-century Renaissance artist Leonardo da Vinci conducted many dissections of the brain and body looking for the seat of the “soul.”
5. **Evolution** is any change across successive generations in the heritable characteristics of biological populations.

Build Your Own Brain

I like learning about:

- A. Invertebrates
- B. Vertebrates in general
- C. Genetics
- D. Basic biology
- E. Human anatomy
- F. Neurosciences

Brain #16

Sponsor: Stone Belt (by WTIU)

Artist: Joe LaMantia and Stone Belt Artists

Brain Facts

1. **Reading Aloud.** Reading aloud and talking to a child promotes brain development.
2. **Language and the Brain.** Neurolinguistics is the study of how humans understand and produce language.
3. **Second Language.** Children between the ages of 6 and 13 have the greatest potential to learn a second language.

Build Your Own Brain

I like to work with other people who are:

- A. Knowledgeable
- B. Friendly
- C. Practical
- D. Goal oriented
- E. Visionary
- F. Spontaneous

4. **Primitive Nervous Systems.** Jellyfish do not have a brain but rather a “nerve net” made up of interconnected neurons that move together in a wave formation.
5. **Whales and Humans.** The blue whale has the largest brain of all animals. It weighs a little over 13 pounds. The human brain weighs a little under 3 pounds.

Brain #17

Sponsor: Indiana University Departments of Kinesiology and Speech and Hearing

Artist: Joe LaMantia and Jake Glasgow

Brain Facts

1. **Speech.** Broca’s area is a group of neurons in the inferior frontal gyrus of the brain, and it is involved with speech production.
2. **Hearing Brain.** Sound comes into our ears and then is transduced into a neural code that travels along cranial nerve VIII (vestibulo-cochlear) to our auditory cortex.
3. **Aphasia.** Damage to the language centers in our left hemisphere may result in a problem with creating or understanding speech (aphasia).
4. **Movement.** Kinesiology is the study of human movement, which involves the sciences of biomechanics, anatomy, physiology, psychology, and neuroscience.
5. **Motor Imagery.** When we imagine performing an activity, our neurons do not know that they did not really perform that action. This is why using imagery to learn is effective.

Build Your Own Brain

My favorite form of exercise is:

- A. Cycling
- B. Yoga
- C. Running or hiking
- D. Working out at the gym
- E. Team sports
- F. Water sports

Brain #18

Sponsor: Dr. David E. Lawler

Artist: David Ebbinghouse

Brain Facts

1. **Hormones** that regulate appetite are secreted in deep sleep. Sleep deprivation can result in people eating as much as a Big Mac a day in extra calories.
2. **Snoring** happens when the tongue encroaches on the upper airway during sleep. This can make breathing as difficult as trying to breathe through a straw.
3. **Sleep Apnea.** People with sleep apnea stop breathing, from several seconds at a time to over a minute, multiple times an hour. The brain's desperate attempts to get the tongue

Build Your Own Brain

On average, I get ____ hours of sleep at night:

- A. Fewer than 4
- B. 4-6
- C. 6-8
- D. 8-10
- E. 10-12
- F. More than 12

out of the way and breathing started again ultimately causes other serious health problems, such as cardiovascular disease and stroke.

4. **Bruxism**, or tooth grinding during sleep, is common in people with sleep apnea, as the body tries to open the upper airway by moving the tongue out of the way.
5. **Chronic headaches** and migraines and tightness in the neck and shoulders, as well as shallow breathing, commonly result from the extra muscle contraction necessary in the throat to keep the tongue out of the upper airway, even while awake.

Brain #19

Sponsor: Pinnacle School

Artist: Roger Meridith and Pinnacle School Students

Brain Facts

1. **Dyslexia** is considered a learning disability, not an intellectual disability. People with dyslexia have difficulty reading and frequently reverse the order of letters or numbers.
2. **Dysgraphia** is the impaired ability to write and is often found in people with dyslexia.
3. **Brain-based Learning.** Our left hemisphere learns linearly, using language, and our right hemisphere learns spatially, using pictures.
4. **Vision.** Visual information from our eyes is processed in the occipital lobe at the back of the brain.
5. **Left Brain/Right Brain.** Our left hemisphere helps us define the boundaries of our body, while our right hemisphere helps us place our body where we want it to be.

Build Your Own Brain

I am particularly good at:

- A. Listening
- B. Being articulate
- C. Telling a good story
- D. Being funny
- E. Telling the truth
- F. Expressing my opinion

*Brain #20

Sponsor: NAMI National Alliance on Mental Illness (by Jill Bolte Taylor)

Artist: Martina Celerin

Brain Facts

1. **Bipolar Disorder.** Over 10 million Americans have bipolar disorder, and more than half of all cases begin between the ages of 15 and 25. Bipolar disorder (manic depression) is often treated with lithium.

Build Your Own Brain

I am close to someone who has been diagnosed with:

- A. Schizophrenia
- B. Chronic depression
- C. Manic depression
- D. Anxiety

2. **Delusions.** People with schizophrenia (or during the manic phase of bipolar) experience delusions, whereby they have a belief system that is not shared by the normal population.
 3. **Ups and Downs.** People who have bipolar disorder experience intense “ups and downs” far beyond those seen in people who are not affected by this disorder.
 4. **Depression.** Depression is a treatable illness in which an individual always feels sad, lacks energy, has trouble concentrating, and has little interest in doing anything.
 5. **Hallucinations.** People with schizophrenia (or during the manic phase of bipolar disorder) may hear, see, or smell things that the rest of us do not experience.
- E. Obsessive compulsion
 - F. None of the above

*Brain #21

Sponsor: Bloomington Chiropractic Center (by Norm Houze)

Artist: Peter Gray

Brain Facts

1. **Genetics.** Your body is genetically programmed to be healthy. When overwhelmed by stress, toxins, and poor diet, the human body begins to fail.
2. **Brain/Body.** Structure governs function. The brain controls all functions of the body and is highly dependent on its surrounding structure: the spine and skull.
3. **Blood.** The brain needs blood. Any interference of blood supply adversely affects the brain and nerves. Exercise and proper diet can restore blood to the brain.
4. **Chiropractic:** The science and art of chiropractic medicine is centered on releasing interferences of the brain and nervous system, particularly in the cranium and spinal column.
5. **Speed.** The brain and nervous system function like the Internet. Is your brain on high speed or dial-up speed?

Build Your Own Brain

Where do you hold the most tension in your body?

- A. Head and neck
- B. Jaw
- C. Shoulders
- D. Lower back
- E. Hips
- F. I’m Zen and don’t hold tension.

Brain #22

Sponsor: Middle Way House (by Carol Nicholas)

Artist: Merridee LaMantia

Brain Facts

Build Your Own Brain

1. **Physical abuse.** All behavior is the product of neural circuitry. This is why what we grow up with is what we learn. Patterns of aggressive behavior can be changed with therapy.
2. **Therapy.** Medication and cognitive behavioral therapy are used to treat people who have problems with various forms of abuse.
3. **Abuse.** Abused children often suffer with anxiety and depression later in life or have problems with substance abuse.
4. **Meditation.** Compassionate behavior can be learned through meditation.
5. **Power.** Abuse may arise from the need to have power and control over another person. Abuse can be physical, verbal, psychological, or even financial.

When you get scared, or have your fear circuitry triggered, what do you do?

- A. Fight, go on the attack
- B. Flee
- C. Play dead
- D. Go numb
- E. Talk rapidly
- F. Become calm and insightful