

Brain Week Brain Teasers

Science and creativity are two things Rhode Island is really good at, and **Brain Week RI (Mar 10 - 18)** aims to showcase both in a week full of fun and educational events designed to promote research into mental illness. We spoke with co-founders **Hakon Heimer** and **Victoria Heimer-McGinn** about the upcoming events. "This year I'm really looking forward to the Providence Brain Art Fair at the Museum of Science and Art on the opening Sunday of Brain Week RI," said Heimer of the event that will serve as the opening reception for Brain Week. As a former teacher, Heimer-McGinn knows how important events like these are in inspiring future scientists. "My favorite part of Brain Week is the school visits. I love motivating kids to care about their brains and inspiring them to consider research as a career." She is intrigued by brains on the other side of the age spectrum as well. "I am excited about the events addressing aging and Alzheimer's disease, especially the free screening of *Still Alice* followed by an expert panel discussion. It's never too soon to start thinking about our aging brains!" How meta! For a full list of Brain Week events, go to brainweekri.org/schedule-2018



1. Am I left-brained or right-brained?

You may have heard that creative people are more "right-brained" while people who are more logical are "left-brained." You might have even taken a quiz or seen an infographic on Facebook trying to help you figure out which best describes you. But as it turns out, everybody uses both sides of their brain in almost all situations. The two hemispheres of your brain are mirror images of each other, meaning you have two copies of each structure. While some computations rely on one side more than the other (scientists call this lateralization), overall behaviors, like understanding language, require both hemispheres working together. The ability to recognize words, for example, occurs more heavily on the left, while understanding words within sentences relies more on the right, but both sides are needed to understand the emotion the sentence conveys. The same goes for music; computing the tempo or pitch of a musical chord relies heavily on the left, while processing its place in a song relies on the right and appreciating the overall mood it conveys requires both sides. So the more creative and complex a piece of music is, the more of your logical left side it requires!



WHICH PICTURE REPRESENTS THE AMOUNT OF YOUR BRAIN YOU DON'T USE?



2. The 10% Myth

You may have heard that we only use 10% of our brains and if we accessed 100%, we could develop superpowers. This popular myth has many proposed origins, all dating back to the late 19th and early 20th centuries, before the dawn of brain imaging techniques. The reality is much more exciting – our brains are so active that throughout a single day we utilize every part of it. In fact, every task we perform activates unique neural circuits. On your commute to work alone you have remembered where your keys are, navigated a route, coordinated the movement of your hands and feet to steer, recognized objects around you such as stop signs, understood their meaning, made a decision to follow them or not, paid attention to the unexpected pedestrian and reacted appropriately. What a workout for your brain! If you had been in an MRI machine during that time, doctors would likely have seen every part of your brain light up!

ANSWER: NONE, THE IMAGE ON THE RIGHT

WHICH HELPS YOU REMEMBER THINGS BEST?



3. Emotionally charged memories

Have you ever noticed that it's easier to remember events when emotions are involved, both good and bad? Scientists are still trying to map out exactly how, but research tells us that the key is in how brain areas connect, ie, the neural circuitry involved in forming memories. It turns out that areas of the brain that process emotion, like the amygdala, are integral players in the memory pathways that allow us to store and later remember events. Stress hormones, for instance, activate the amygdala, which can moderate activity in the hippocampus, an area involved in storing memories. Even more surprising, the degree to which emotions modulate memory may be gender- and age-specific. This may be why older adults tend to be better at forgetting negative memories formed later in life. In any case, this explains why it's easier to remember something that made you happy or angry compared to a neutral memory that incited no emotion.

ANSWER: ONLY ONE, BUT THAT'S STILL PRETTY COOL. TAKING THE HEART AS A METAPHOR FOR EMOTION OVER LOGIC, THAT'S THE RIGHT ANSWER (TAKEN AS A SYMBOL OF CARDIAC ACTIVITY, LESS SO).

WHICH PICTURE REPRESENTS THE PROCESSING POWER OF YOUR BRAIN, AND WHICH THAT OF THE INTERNET?



4. Our own personal supercomputer

Our brains are composed of specialized cells called neurons that are responsible for the production of thoughts, emotions and actions. There are about 85 billion neurons, each making connections with about 10,000 other neurons. Compare that to the entire world wide web, with about 8 billion devices connected to probably less than 10,000 others. That's one amazing supercomputer in your head! To add complexity, there are about 10,000 types of neurons, each with a unique role. It's no wonder scientists in the robotics field have their work cut out for them. Even behaviors that our own brains can perform with ease, like gently picking up a fragile glass, are difficult to model in robots.

ANSWER: THE BLUE ONE IS YOUR BRAIN

CIRCLE THE AGE AT WHICH YOUR BRAIN REACHES MATURITY:



5. Fully mature at 21?

While we may be allowed to drive at the age of 16, vote at the age of 18, and drink alcohol at the age of 21, it is only when we are able to rent a car at the age of 25 that our brain has fully matured. Up until then, the brain undergoes extensive changes, such as synaptic pruning in adolescence (eliminating connections between neurons to optimize and refine the important ones) and cortical rewiring (strengthening communication between brain areas). As a result, stressors such as drugs, alcohol and concussions, which affect the immature brain more adversely than the adult brain, continue to be particularly dangerous well into early adulthood. Interestingly, while a hangover might be worse in your 30s-40s, binge drinking in your 20s will have more long-term impacts on your cognitive abilities as your neuronal circuits are still being shaped.

ANSWER: IF YOU CIRCLED 25, GOOD THINKING!

HOW MANY OF THESE COULD YOUR BRAIN'S ELECTRICAL OUTPUT POWER (CIRCLE THEM)?



6. The brain uses 20% of the total blood and oxygen produced in our body.

Despite being only 2% of our body's total weight, our brain requires a lot of blood and oxygen to keep our 100 billion neurons happy! Our brain usually generates about 12 watts, but during mentally intensive tasks, our brain could produce up to 23 watts.

ANSWER: ONLY ONE, BUT THAT'S STILL PRETTY COOL.

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