NATIONAL MUSEUM OF HEALTH AND MEDICINE

BRAIN AWARENESS WEEK

TEACHER'S GUIDE GRADES 6-8

This guide will help you prepare for your visit to Brain Awareness Week at the National Museum of Health and Medicine. It outlines the major ideas that will be presented during the visit and suggests activities to help extend the BAW experience into your classroom. This program supports the Common Core and Next Generation Science standards. (pg.5)

TIME

2 hours

GROUP SIZE

minimum of 10 students
maximum of 65 students

AT THE CONCLUSION OF THIS WORKSHOP, STUDENTS SHOULD BE ABLE TO:

- Identify the parts and functions of the nervous system, particularly the brain
- Identify the role of synapses in transferring signals between neurons and other cells
- Identify ways that communication between neurons can be impacted through an individual's activities
- Explain and identify the differences between sensory and motor circuits
- Understand how the nervous system develops in humans
- Identify types of injuries or disease that can harm the nervous system and ways to treat them
- Explain the importance of neuroscience research

SUGGESTED PRE-VISIT CLASSROOM ACTIVITIES

- Discuss the pre-visit materials and the format of the program.
- Create brain hats (using the brain hat template) and discuss the functions of the brain.
- Discuss what can happen when someone has a traumatic brain injury.
- Create a word search, bingo game, or other activity to teach the parts of the nervous system using the vocabulary words listed in this guide.
- Learn a song about the brain and perform it for the class. http://faculty.washington.edu/chudler/songs.html.
- Have students write a report on a neurological disorder including the symptoms, causes, treatments and current research on the disease/disorder.

SUGGESTED POST-VISIT CLASSROOM ACTIVITIES

- Have students fill out the Program Evaluation for their museum visit. This evaluation revisits the information covered during the program.
- Visit http://www.brainline.org and read stories from the patient's point of view. Discuss the challenges, differences, and successes following a traumatic brain injury.
- Create a video for SFN's Brain Awareness Week Video Contest using the information learned from the program. http://www.brainfacts.org/Educators/Get-Involved/Articles-Folder/BAVC-Rules-and-Guidelines
- Start a Brain Bee at your school http://www.sfn.org/publicoutreach/educationprograms/brain-bee

VOCABULARY

AMYGDALA:
part of the limbic system, this group of nuclei are located within the temporal lobes of the brain and are shown to play a primary role in processing of memory, decision-making, and emotional reactions

AXON:
the long, fiberlike structure of a nerve cell that conducts impulses to or from the cell body; bundles of axons form nerves

BRAIN STEM:
the lower part of the brain; houses the centers that control vital functions, such as breathing and the heartbeat

CEREBELLUM:
the region of the brain located behind the brain stem. It is concerned with balance and the control of movement

CEREBRUM:
the largest part of the brain; made up of two cerebral hemispheres. It contains the nerve centers for thoughts, personality, the senses, and voluntary movement

CIRCUITS:
the neural pathways of the brain

CORPUS CALLOSUM:
the wide, curved band of about 20 million nerve fibers that connects the two hemispheres of the cerebrum

DENDRITE:
a short, branched extension of a nerve cell where impulses are received from other cells at synapses and are transmitted to the cell body

DURA MATER:
a tough membrane which covers the brain and the spinal cord. It lies over the arachnoid and pia mater and adheres closely to the inside of the skull

FRONTAL LOBE:
located at the front of the brain behind the forehead, this lobe is concerned with behavior, learning, personality, and voluntary movement

GLIAL TISSUE:
a nerve cell that provides support for neurons

HEMATOMA:
an accumulation of blood within any part of the body; caused by a torn blood vessel

HEMORRHAGE:
the escape of blood from a blood vessel, usually as a result of an injury

HIPPOCAMPUS:
a structure in the brain concerned with learning and long-term memory

MYELIN SHEATH:
the insulating covering that surrounds the axon, which increases the speed at which nerve impulses can travel along the axon

NEURON:
a single nerve cell, the function of which is to transmit electrical impulses

NERVOUS SYSTEM:
the network of nerve cells and fibers that transmits nerve impulses between parts of the body

OCCIPITAL LOBE:
the lobe in the rear of the brain that is concerned with vision

PARIETAL LOBE:
the pair of lobes located at the top of the head concerned with processing sensory information

PERIPHERAL NERVOUS SYSTEM:
all of the nerves with their coverings that fan out from the brain and spinal cord, linking them with the rest of the body. The system consists of cranial nerves and spinal nerves

SPINAL NERVES:
the 31 pairs of combined motor and sensory nerves that emerge from and enter the spinal cord

STIMULI:
a thing or event that evokes a specific functional reaction in an organ or tissue

STROKE:
damage to the brain by deprivation of its full blood supply or leakage of blood from a ruptured vessel; may impair movement, sensation, vision, speech, or intellect

SYNAPSE:
the junction between two nerve cells, or between a nerve cell and a muscle fiber or a gland. Chemical messengers are passed across a synapse to produce a response in a target cell

TEMPORAL LOBE:
each of the paired lobes of the brain lying beneath the temples concerned with the understanding of speech/language

TRAUMATIC BRAIN INJURY:
an injury to the brain as a result of an outside force, usually a blow to the head

RESOURCES

The appearance of hyperlinks does not constitute endorsement by the NMHM or any other agency of the U.S. Government of the destination web site or the information, products or services contained therein.

WEBSITES

- Society for Neuroscience: http://www.sfn.org
- Dana Alliance for Brain Initiatives: http://www.dana.org
- Brainline: http://www.brainline.org
- Brain Facts: http://www.brainfacts.org
- Neuroscience for Kids: http://faculty.washington.edu/chudler/neurok.html
- National Institute of Mental Health: http://www.nimh.nih.gov/health/educational-resources/index.shtml

PUBLICATIONS

Human Body by Kirsteen Rogers and Corinne Henderson. Usborne Publishing Ltd., 2001.

Understanding Your Brain by Rebecca Treays. Usborne Publishing Ltd., 2004.

Understanding Your Senses by Rebecca Treays. Usborne Publishing, 1997.

The Human Body Book by Steve Parker. DK Publishing. 2007

BIBLIOGRAPHY AND LINKS

National Governors Association Center for Best Practices, & Council of Chief State School Officers. (2010). *Common Core State Standards*. Retrieved from www.corestandards.org

National Research Council. (1996). *National Science Education Standards*. Washington, DC: The National Academies Press.

National Research Council. (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Washington, DC: The National Academies Press.

NGSS Lead States. (2013). *Next Generation Science Standards: For States, By States*. Retrieved from www.nextgenscience.org

Steve Parker. (2007). *The Human Body Book*. New York, NY: DK Publishing.

Society for Neuroscience. (2014). *Neuroscience Core Concepts: The Essential Principles of Neuroscience.* Retrieved from www.brainfacts.org/CoreConcepts

NATIONAL SCIENCE STANDARDS

- Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells (MS-LS1-1, Structure and Functions, LS1.A).
- Develop and use a model to describe the function of a cell as whole and ways parts of cells contribute to the function (MS-LS1-2, Structure and Function, LS1.A).
- Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories (MS-LS1-8, Information Processing, LS1.D).
- Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism (MS-LS3-1, Variation of Traits, LS3.B).

COMMON CORE

- Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks (RST.6-8.3).
- Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics (RST.6-8.4).

- Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 6-8 topics, texts, and issues, building on other's ideas and expressing their own clearly (SL.7.1).
- Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression (L.7. 6).

PARTICIPATING ORGANIZATIONS MAY INCLUDE:

National Museum of Health and Medicine (NMHM)

Howard University

Rutgers University

Uniformed Services University of the Health Sciences (USUHS)

Walter Reed Institute of Research (WRAIR)

Defense and Veterans Brain Injury Center (DVBIC)

DoD Congressionally Directed Medical Research Program (CDMRP)

Society for Neuroscience (SFN)

National Institutes of Health (NIH)

National Institute on Alcohol Abuse and Alcoholism (NIAAA)

National Institute on Drug Abuse (NIDA)

National Institute on Aging (NIA)

National Institute of Mental Health (NIMH)

National Institute of Child Health and Human Development (NICHD)

National Eye Institute (NEI)

National Institute of Neurological Disorders and Stroke (NINDS)

Warrior Canine Connection

Walter Reed National Military Medical Center (WRNMMC): Speech Pathology and Audiology clinics

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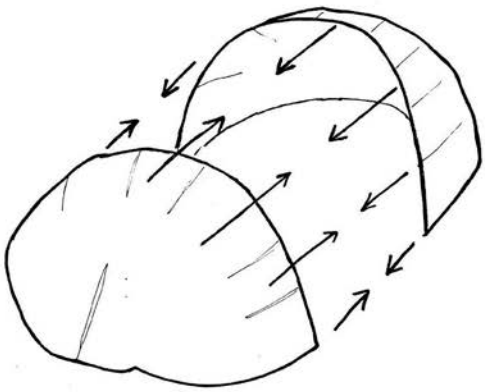
Make a "hemisphere hat" (it could also be a life-size model, instead of a hat)

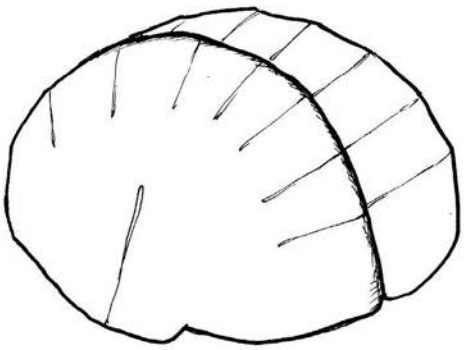
You will need copies of the following pattern pages printed onto heavyweight paper (card stock), plus either clear tape or white glue. If you use glue, we recommend using clothespins or paper clips to hold the joints while they dry.

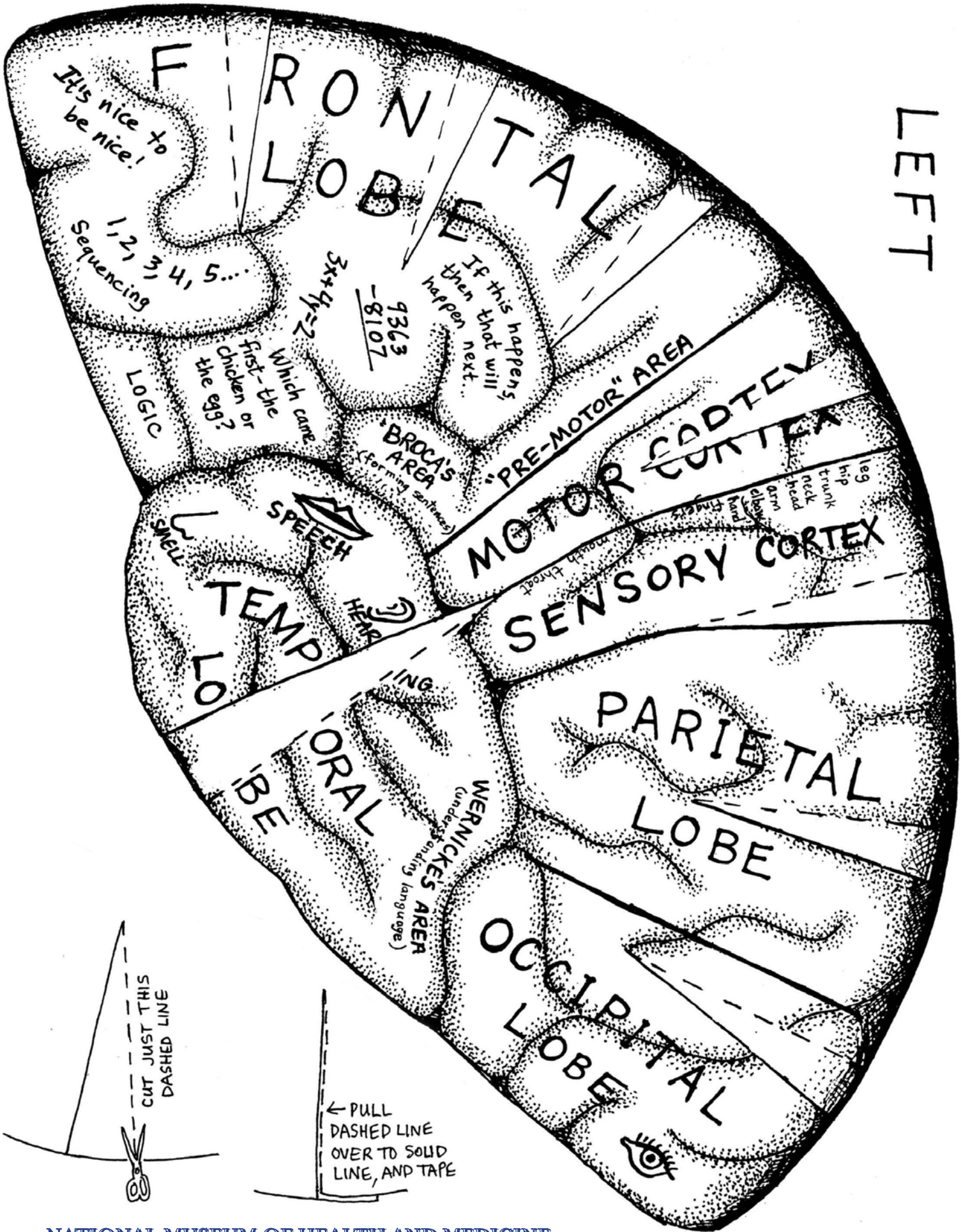
We have provided both labeled and unlabeled patterns so that you can choose to have your students do their own labeling, if you wish. With the labeled patterns, you may still want your students to color code the lobes, or trace over the words with markers or crayons. Do any coloring before you assemble the hats.

These hats are designed to be one-size-fits-all. (It's amazing how similar head sizes are, in comparison to shoe or shirt sizes.) The size of the hat can be made a little smaller by overlapping the hemispheres a little more before taping them together. If necessary, the folds can also be overlapped slightly more, as well. Another way you could shrink the size would be to use the reduction button on the copier and copy at 95%.

To assemble, first cut out both hemispheres, around the outside edge. Then snip in on the dashed lines. Don't cut the triangle out, just snip the dashed lines. Pull each (now snipped) dashed line over until it touches the other line, and secure with tape or glue. It should then take on a half-round shape. To put these two halves together, simply choose one side to overlap just slightly onto the other (1/8" or less is enough, but use more if you are trying to shrink the size of the hat) and secure with tape.







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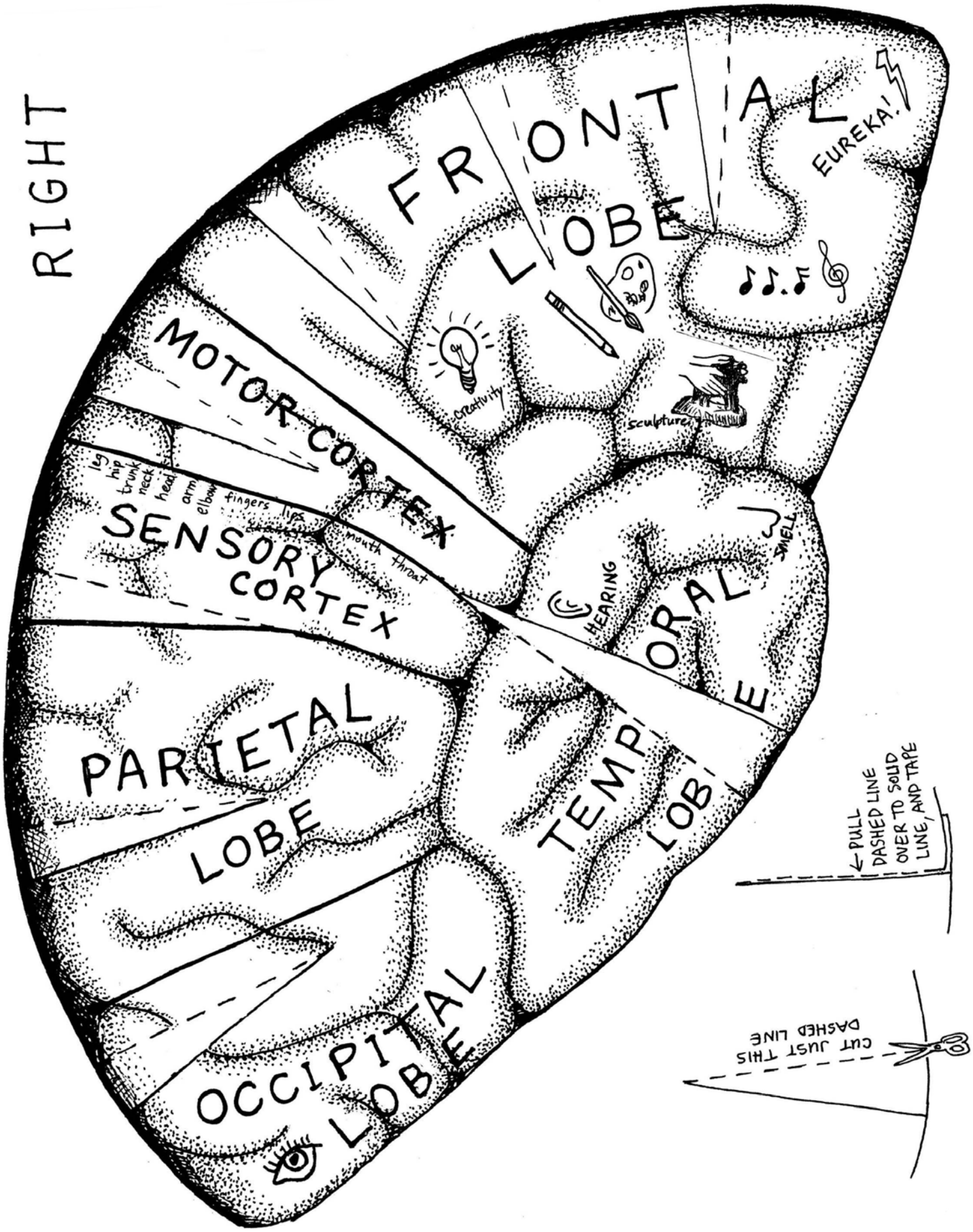
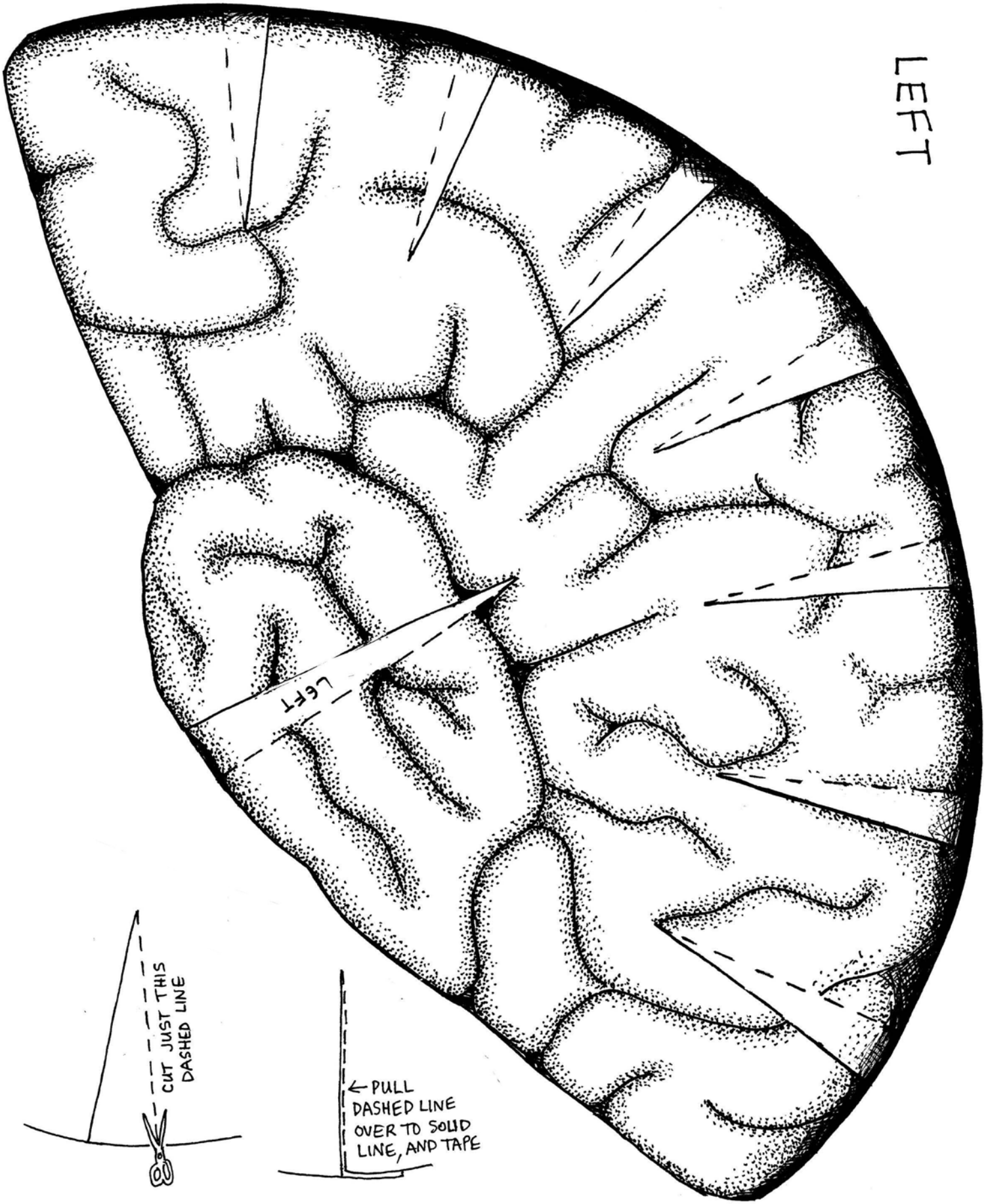

RIGHT
FRONTAL LOBE
EUREKA!
creativity
sculpture
MOTOR CORTEX
leg
hip
trunk
neck
head
arm
elbow
fingers
lips
mouth
throat
SENSORY CORTEX
HEARING
SMELL
ORAL
PARIETAL LOBE
TEMPORAL LOBE
OCCIPITAL LOBE
PULL DASHED LINE OVER TO SOLID LINE, AND TAPE
CUT JUST THIS DASHED LINE



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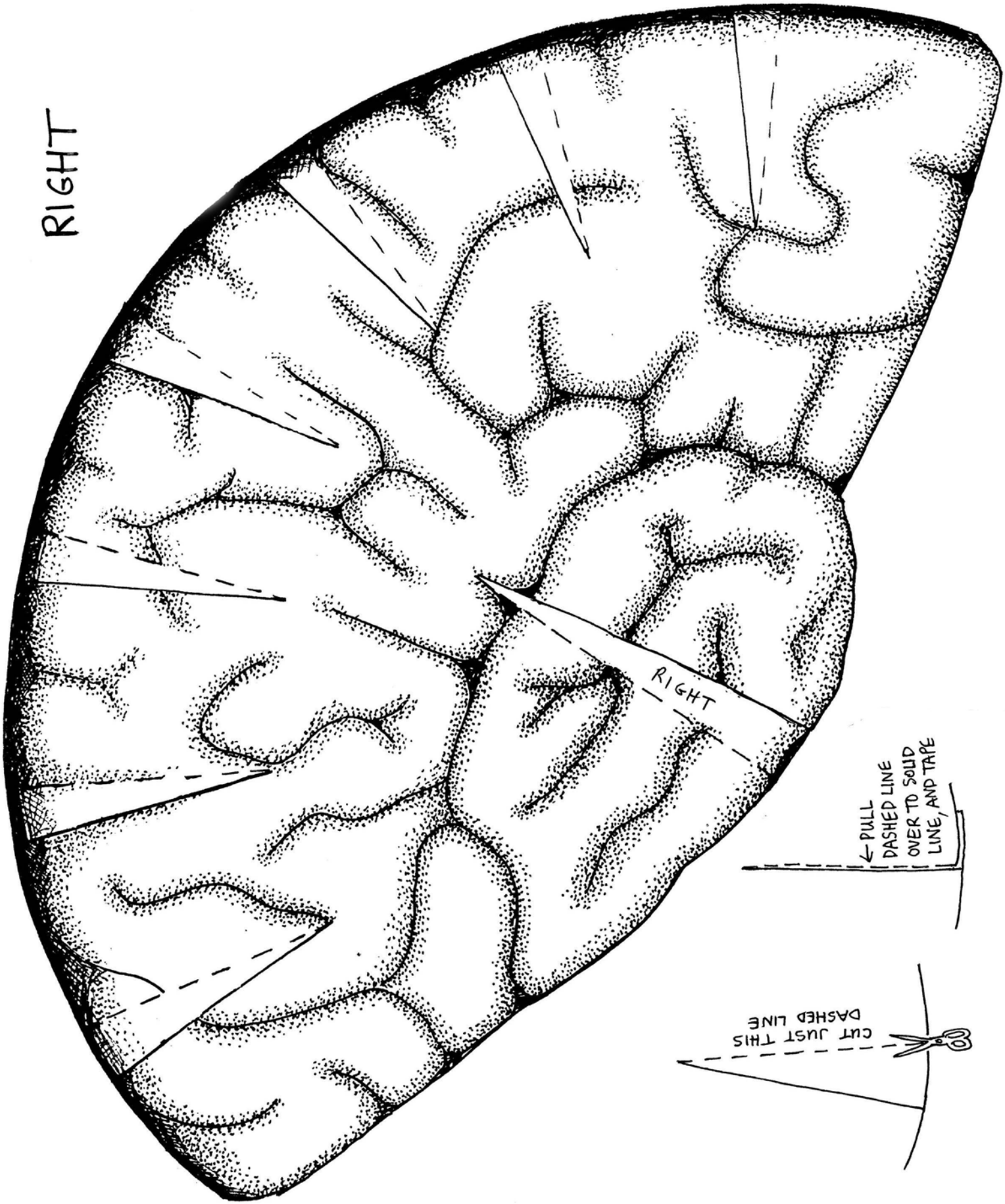
RIGHT
RIGHT
← PULL DASHED LINE OVER TO SOLID LINE, AND TAPE
CUT JUST THIS DASHED LINE