FOLLOWING PHINEAS GAGE

NAME:

Phineas Gage: From Tamping Iron to Tinseltown

The story of Phineas Gage is famous, and when people repeat famous stories they have a tendency to improve them. The famous story about Phineas says that after hanging around the Boston medical school for weeks, he grows bored and restless. Phineas takes back his tamping iron and hits the road, traveling from city to city through New England and ending up at P. T. Barnum's American Museum on Broadway in New York City. Barnum's museum has nothing to do with our modern idea of a museum. It is a freak show.

Barnum's Big Top: A Showman's Spectacle

In Barnum's time, people will pay to see "living giants," "bearded ladies," and calves born with two heads. People have always gawked at strange and unusual things. Barnum's special genius is "improving" the unusual. Hype and humbug make Barnum's museum a roaring success. He pulls in the crowds with half-fakes like the "Woolly Horse," a strange, long-haired horse that Barnum declares is a newly discovered species, being part deer, buffalo, elephant, camel, and sheep. At least the Woolly Horse is a real horse. Barnum's "mermaid" is a total fake, a counterfeit fossil pasted together from bones, withered skins, and who knows what else. Barnum shows his "mermaid" alongside real exotic animals like orangutans and grizzly bears. Barnum floods the exterior with the brightest lights in all of New York. Inside, the lighting is deliberately dim. The noise is deafening, with actors, jugglers, and glass blowers working the crowd.

In this wild scene, would anyone notice an ordinary-looking young man with a bad scar on his forehead holding an iron rod? It is said that Phineas exhibited himself and his tamping iron at Barnum's. The most colorful description of Phineas at Barnum's museum comes from Alton Blackington, a Boston radio and TV reporter who broadcasts his account a century after Phineas's death. Blackington says that Barnum's museum billed Phineas as "The Only Living Man With a Hole in His Head." According to Blackington, "The poster and one-sheets depicted a husky young man smiling broadly in spite of a huge iron bar which stuck out of his head. Actually, of course, the iron bar no longer protruded from Gage's head but he had it with him, and another skull, also perforated. During his sideshow performances, he would shove the long iron through the holes in his extra skull to demonstrate just how he was injured. All the details were to be found in a pamphlet he sold, and by paying ten cents extra, skeptics could part Gage's hair and see his brain, what there was left of it, pulsating beneath the new, thin covering."

Phineas Gage's mother said her son exhibited himself here at P. T. Barnum's American Museum on Broadway in New York City. Barnum was the gaudiest showman and greatest hoaxer of his age. Did Phineas Gage, The Man with a Hole in His Head, fit in with the other human oddities and strange wonders that Barnum promoted here with hype and hoopla? *Photograph circa 1850 from the Hulton Collection, Getty Images*

Blackington spins a great yarn. Unfortunately, we don't know if the details are true. Phineas's mother did tell Dr. Harlow that after leaving Boston, Phineas and his tamping iron visited "most of the larger New England towns and New York, remaining a while in the latter place at Barnum's with his iron." But that's as far as the details go, and Blackington's sources can't be found. In our time, Professor Malcolm Macmillan, an Australian psychologist who is the world's leading expert on Phineas Gage, makes a massive effort to track down the story. Professor Macmillan turns to experts on Barnum, old newspaper files, contemporary diaries, and circus museums. He can't find Phineas anywhere. As far as Professor Macmillan can determine, Dr. Harlow is the only reliable source. Dr. Harlow says that after Phineas leaves Boston in 1850 he gets information about his former patient only from Phineas's mother.

The Enigmatic Stagecoach Driver: Phineas in Chile

Her name is Hannah Trusell Swetland Gage. She says that Phineas returns from New York to the family's New Hampshire home early in 1851 to work for Mr. Jonathan Currier in his livery stable in the nearby town of Hanover. Whatever Phineas's problems with people, he gets on well with horses. He works in Currier's stable for a year and a half. His health is good, his mother remembers. He seems happiest with children and animals. Then, in 1852, he meets a stranger in Hanover who has big plans to set up a stagecoach line in South America between Valparaiso and Santiago, Chile. He could use a man who is experienced with horses. In August 1852, Phineas leaves New England forever, bound for Chile and a new life as a stagecoach driver.

Here the evidence fades out for a time. His mother recalls only that Phineas talked about driving six-horse teams for this coach line on the bottom of the world. She doesn't recall the stranger's name. But there is a small clue in the August 1852 order books of the Abbott-Downing Company of Concord, New Hampshire. In 1852, Abbott-Downing makes the finest and toughest stagecoach in the world. This Concord coach is the famous Wild West stage, hauling mail and passengers over the plains and across deserts. In 1852, the Abbott-Downing Company books show that a Mr. James McGill ordered a Concord stage for a new coach line that he was organizing in Valparaiso, Chile. Was James McGill the stranger who hired Phineas? Professor Macmillan is still looking for evidence in New Hampshire or Chile, but he says it's possible.

FOLLOWING PHINEAS GAGE

A Concord stagecoach is a monster on huge wooden wheels. With six horses, nine passengers, an armed guard, mail, and freight, a fully loaded Concord stage is over six tons in motion. The driver controls it all with reins, a whip, and a feeble wooden foot brake. It's not an easy job. The driver's fists are filled with reins, three pair in the left hand for the "near" side horses, three in the right for the "off" side. The whip is largely for making showy, whip-cracking arrivals in town. Mostly he drives with his hands and voice, using the matched pairs of horses to wheel, to slow down, or to pull clear.

Until Professor Macmillan turns up solid proof, we can't say for sure if Phineas drives a Concord stagecoach in Chile, but the driver's job would be much the same on any six-horse coach—hard, tiring, and sometimes exciting. According to his mother, Phineas drives for nearly seven years on a regular schedule over the primitive roads between Valparaiso and Santiago. There is so much we would like to know but probably never will about Phineas's time in Chile. Does he—can he—learn Spanish? Is he a loner? Does he stay with the same stage line or jump from job to job? Does he tell anyone in Chile his tragic story?

If we can't know any of this, we can catch a glimpse of Phineas in the driver's seat, his fists full of reins, his face full of dust, his hat pulled down over his eyes against the Chilean sun. Phineas is intent on his team, on the slope of the road, and on the big, rocking coach. His decisions are quick and instinctive, based on long habit. He knows his horses. He knows his reins.

Although it is being pulled by four horses instead of the usual six, this is a New Hampshire–built Concord stagecoach, somewhere in Chile at about the time that Phineas Gage arrived there. We have no way of knowing if it is Phineas at the reins. *New Hampshire Historical Society*

We know one other thing about Phineas in Chile. He has his tamping iron with him. Stowed under the seat or ready to hand, the tamping iron goes everywhere Phineas goes.

In 1859, Phineas washes up on his family's doorstep in San Francisco. His mother has moved to California from New Hampshire to be with her youngest daughter, Phebe, and her new husband, David Shattuck. In July, a very sick Phineas gets off a boat in San Francisco and somehow finds his way to the Shattuck house. Phineas is in "feeble condition," his mother says, much changed since she last saw him in New Hampshire. Phineas tells his mother that he is only suffering from the voyage. He had been terribly seasick on his first voyage from Boston to Chile in 1852, he tells her. He will get over this. It takes months, but he seems to fully recover.

Epilepsy and the Elusive Cure: San Francisco Seizures

In San Francisco, Phineas is not a good **invalid**. He hates resting. He has worked hard all his life, on the family farm, on the railroad, in the livery stable, and on the Chilean stagecoaches. As Phineas gradually feels better, he wants to go right out and get back to work. Finally Phineas takes a job plowing for a farmer near the little town of Santa Clara. Phineas tell his mother that he has no trouble with the farm work, but he soon **quarrels** with the farmer. He moves to another farm, then another. Phineas is "always finding something which did not suit him in every place he tried," says his mother. That February, he is back in San Francisco for a visit. At the dinner table, he suddenly falls into "a fit."

A fit is an epileptic seizure. Epilepsy is not a disease but a complex of symptoms. Basically, a seizure is an electrical storm in your brain's nerve cells. It can begin in one area of the brain and spread to other regions, sometimes sending your muscles into **involuntary convulsions**. Seizures are relatively common; about one person in 200 will experience a seizure, mild or **severe**, at some time in life. But an epileptic seizure is only a symptom; the cause can be anything from a tumor, to an **inherited genetic disposition** to seizures, to a blow to the head. In our time, we control most epileptic symptoms with powerful drugs called "anticonvulsants," because uncontrolled seizures can cause their own brain damage.

By the time a seasick Phineas Gage staggered ashore here in 1859, San Francisco was still a frontier town on the farthest edge of the continent. *Photograph from the San Francisco History Center, San Francisco Public Library*

In 1860, severe epileptic seizures are not controllable. All the doctors in San Francisco can offer Phineas are theories, useless drugs, and nursing instructions. After that first seizure at his sister's dinner table, he recovers almost immediately with no memory of the fit or any ill effect. Within hours, he has two more seizures. In the morning, he wakes up feeling like his old self and insists that he has to get back to work. Back in Santa Clara, he switches farm jobs again. In May, he comes into San Francisco to visit his mother. He seems fine. Two days later, at five o'clock in the morning, Phineas has a severe seizure. Then he has another and another. The **intervals** between seizures grow shorter and shorter.

FOLLOWING PHINEAS GAGE

Bleeding & Bizarre Treatments: Medical Missteps of the 1860s

The family physician comes and "bleeds" him. By 1860, the practice of bleeding a patient is the last gasp of a treatment that goes back to the "bodily humors" theory of the ancient Greeks. The doctor who treats Phineas decides he has too much blood and draws off the "extra." It's **outmoded** treatment, even for 1860. Back in Vermont in 1848, Dr. Harlow bled Phineas at the height of his fever. Without understanding why, Dr. Harlow may have helped Phineas at that moment of crisis. Drawing blood reduces blood pressure slightly, which may have taken some of the pressure off his swollen brain. But bleeding does nothing for epileptic seizures.

Phineas's seizures are probably caused by slow changes in brain tissue damaged in the original accident. Why the damage worsens as Phineas grows older is unknown. Possibly Phineas strikes his head again. Perhaps the constant **jarring** in the driver's seat of a **lumbering** stagecoach causes a concussion on the site of the old damage. Perhaps Phineas has a low-grade bacterial infection or perhaps a brain tumor. No one can say why, but now Phineas's seizures grow more violent and more frequent. One after another, the seizures leave him weaker and weaker.

The Chilling End: Hypothermia and the Final Curtain

They finally kill him on May 21, 1860, at his sister's house in San Francisco. The immediate cause of death is probably hypothermia—his body can't control its internal temperature. In our time, we read about hypothermia killing mountain climbers, or sailors who fall into cold water. An epileptic seizure creates the same effect as shivering in icy water. In cold water, you shiver—your muscles **spasm**—to heat up your body. While shivering violently in cold water, you don't realize you are also sweating as your muscles throw off heat. Eventually the muscles **expel** heat faster than it can be replaced. Your blood temperature starts to fall. Your internal organs, especially the brain and heart, need a constant core temperature to function. As the brain detects a fall in blood temperature, it automatically protects itself by shutting down the blood supply to the hands and feet. You lose feeling. If you keep losing heat, the brain shuts down blood circulation over a larger and larger area of your skin. Phineas's muscle seizures are causing the same effect. His brain shuts down circulation to his feet and hands, then his skin, and then organ by organ until his brain must choose between blood for itself and blood for the heart. His heart stops. This is how Phineas dies, twenty days short of his thirty-seventh birthday.

He is buried at Laurel Hill Cemetery in San Francisco. Phineas is a stranger in the city, and few outside his family circle know anything about his curious past. No California newspaper notes his death or burial. Family news travels slowly across the continent. Back east, the country is drifting toward Civil War, and when it breaks out the following April, doctors soon have more pressing concerns than Phineas Gage.

Timeline of Phineas' Life Events

1848	1851-1852	1852-1859	1859	1860
Phineas Gage suffers a traumatic brain injury when a tamping iron penetrates his skull during a work accident in Vermont.	Phineas ...	Phineas ...	Phineas ...	Phineas ...

Timeline Events

a. experiences severe epileptic seizures and passes away in May.
b. returns to his family in San Francisco, feeling ill after a voyage.
c. travels through New England to New York City, then departs for Chile.
d. works as a stagecoach driver in Chile.

Do Not Complete this timeline until During Reading

WORD UP!

BEFORE READING

1

Skim through the text for bold words or italicized words. These words are important and often have a definition provided. Bold and italicized words can also give readers a hint of what the article is about.

1. Look to see if bold words are defined in small text at the bottom of the page.
2. If they are not defined, choose **3 words** to define using an online dictionary.
3. In the margin space, record the definitions.

What hints does this give the reader of what the EXCERPT is about?

Check this box when you have completed this task

ANNOTATE

BEFORE READING

2

Annotate the <u>title</u>, <u>each sub-heading</u>, and <u>any visuals</u> by:

- <u>Underlining</u> in the <u>title</u>, <u>each subheading</u>, and <u>any visuals</u>
  - Important words and phrases
- <u>Writing</u> in the white space **1** of these **3**:
  a. Why do you underline those words?
  b. Why are they significant?
  c. What do they make you notice or wonder?

IMPORTANT WORDS ARE LANUGAGE THAT:

- command attention
- enhance recall
- convey a depth of meaning and emotion

Check this box when you have completed this task

PUPORSE

BEFORE READING

3

Identify two things before reading the text:

1. What is your purpose for reading this text?
2. Predict the author's purpose for writing the text.
   - Looking at the <u>title</u>, <u>subtitles</u>, <u>bold print</u>, and <u>any visuals</u>, is his/her purpose to inform, persuade, or entertain? About what?

Response Starters:

- The title and graphics suggest that the author aims to... I know this because ...
- From the subtitles and bold print, it appears that the author's purpose is ... I know this because ....
- The visuals and the title collectively suggest that the author's intent is... I know this because ...
- The title and subtitles indicate that the author's goal is to... I know this because ...

Check this box when you have completed this task

What is your purpose for reading this text?

Predict the author's purpose for writing the text

Use a response starter

CENTRAL IDEA

BEFORE READING

4

Do a close read of the <u>title</u> of the text, <u>each sub-headings</u>, and <u>any visuals</u>

- What does the <u>title</u>/<u>sub-headings</u>/<u>any visuals</u> suggest about the central idea?
  - Answer these questions in place of writing in your article

List in this box repeated <u>words</u> or <u>ideas</u> used within the <u>title</u>, <u>any sub-heading</u>, and <u>vocab</u> - 3 minimum; circle them in the text

List in this box repeated <u>words</u> or <u>ideas</u> used within the <u>captions of visuals</u> - 3 to 5 minimum; circle them in the text

Check this box when you have completed this task

Based on the sub-headings, and more specifically, the sub-heading called "_____."

I anticipate that the article will delve into...

Write something specific/related/meaningful in relation to the excerpt

Based on the <u>repeated words and ideas</u> found in the sub-headings, title, captions, and vocab what do you believe the text will primarily focus on? How is that different than previous excerpts?

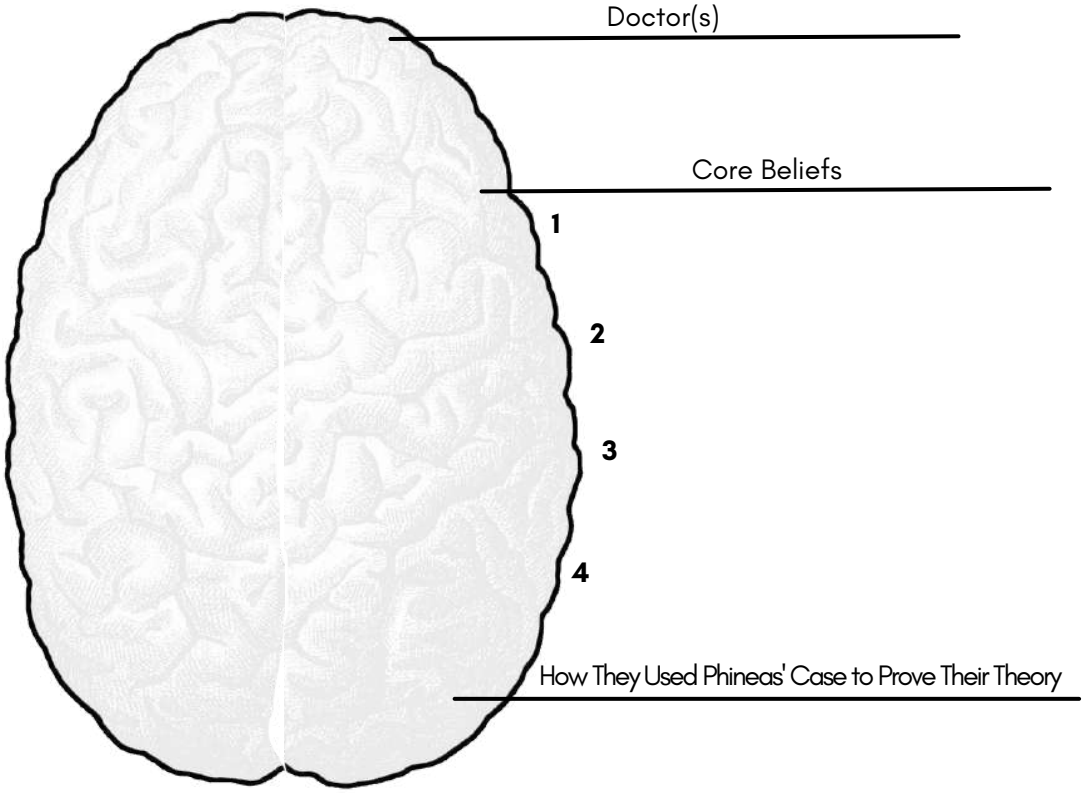
Using the repeated words and ideas as clues, I think this text is mostly about ...

This is a different focus from previous excerpts because ...

PHRENOLOGISTS, WHOLE BRAINERS, AND YOU

By incorporating your own character traits, along with some suggestions from your teacher, you can reinforce the "modern" brain theories that influenced scientists during the time of Phineas's accident.

Whole Brain



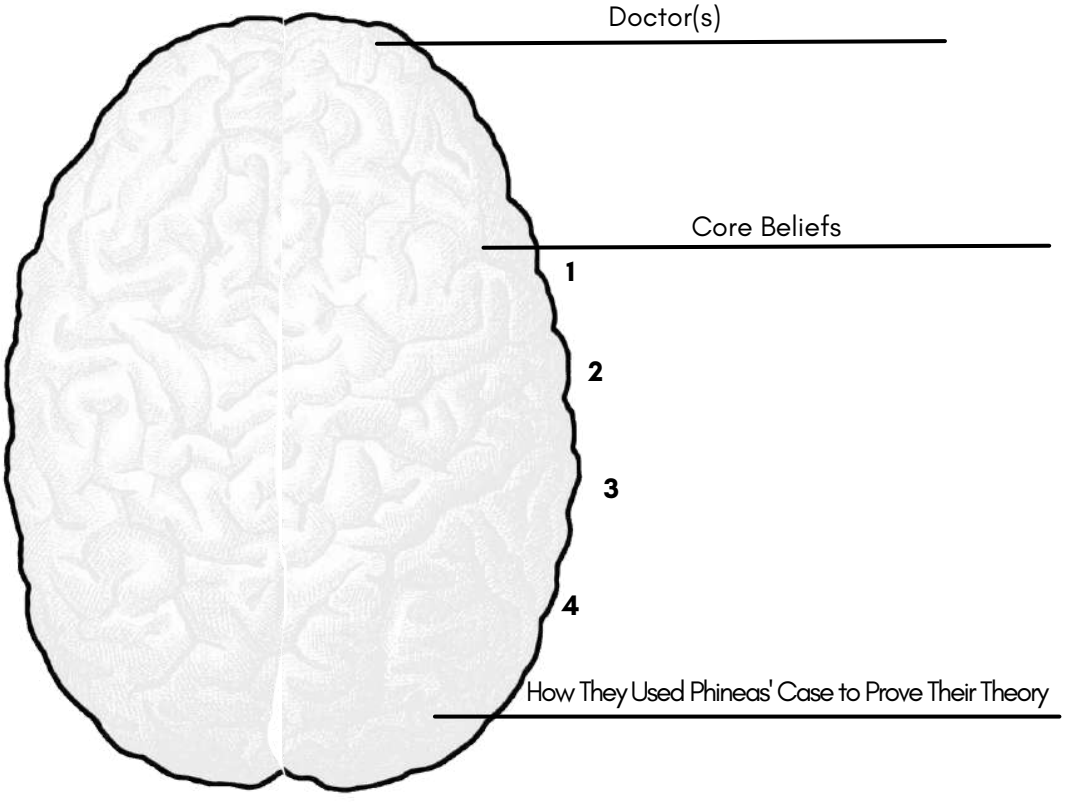
Use These to Review the Brain Theories

- Brain as a Localization of Specific Functions
- Dr. Bigelow
- Dr. Gall
- Dr. Harlow
- Dr. Sizer
- Evidence of damage to specific brain regions controlling traits or behaviors.
- Formless "Cloud" or "Jelly"
- Functionality Despite Injury
- Interpretation of Personality Traits Based on Skull Bumps
- Interconnected "Mind"
- Mapping of "Organs" in the Brain
- Organs Inside the Brain Control Specific Functions
- The Brain as a "Whole Intelligence"
- Showed the brain's capacity to redistribute functions, supporting their view of the brain's unity and interconnectedness.

Instructions:

- Circle 10 character traits from the list below that apply to you.
- Write them into the brain how a person with a Whole Brainer approach perceived brain function in the past.

Localizing/Phrenology



Circle 10 Traits That Apply to You

Distractible	Curious
Unmotivated	Energetic
Resistant to change	Independent
Overly dependent	Creative
Attention-seeking	Idealistic
Confrontational	Adventurous
Vindictive	Empathetic
Inattentive	Impulsive
Overly sensitive	Rebellious
Perfectionistic	Confident
Blaming	Sensitive
Defeatist	Ambitious
Narcissistic	Optimistic
Manipulative	Assertive
Lacks empathy	Passionate
Aggressive	Sociable
Insensitive	Compassionate
Self-destructive	Responsible
Secretive	Resilient
Closed-minded	Open-minded
Arrogant	Expressive
Judgmental	Persistent
Withdrawn	Charismatic
Disruptive	Analytical
Dismissive	Enthusiastic

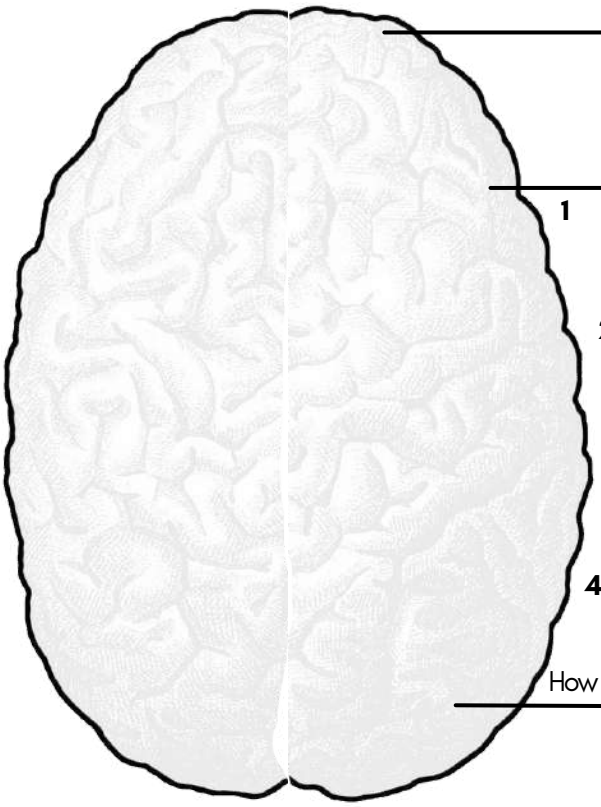
Instructions:

- Utilize the circled traits above.
- Write them into the brain how a person with a Localizer/Phrenologist approach viewed brain function in the past.

PHRENOLOGISTS, WHOLE BRAINERS, AND YOU

By incorporating your own character traits, along with some suggestions from Mrs. Baker and a bit of playdough, you can reinforce the "modern" brain theories that influenced scientists during the time of Phineas's accident.

Whole Brain



Doctor(s)

Core Beliefs

1

2

3

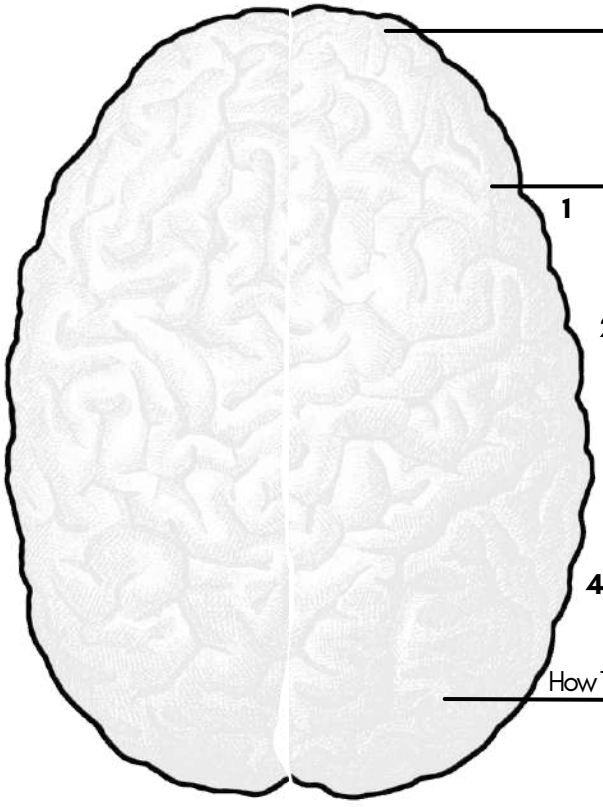
4

How They Used Phineas' Case to Prove Their Theory

Use These to Review the Brain Theories

- Brain as a Localization of Specific Functions
- Dr. Bigelow
- Dr. Gall
- Dr. Harlow
- Dr. Sizer
- Evidence of damage to specific brain regions controlling traits or behaviors.
- Formless "Cloud" or "Jelly"
- Functionality Despite Injury
- Interpretation of Personality Traits Based on Skull Bumps
- Interconnected "Mind"
- Mapping of "Organs" in the Brain
- “Organs” Inside the Brain Control Specific Functions
- The Brain as a "Whole Intelligence"
- Showed the brain's capacity to redistribute functions, supporting their view of the brain's unity and interconnectedness.

Localizing/Phrenology



Doctor(s)

Core Beliefs

1

2

3

4

How They Used Phineas' Case to Prove Their Theory

Whole Brain Instructions:

- Utilize the list of traits you brought to class today (your top 10).
- Write them into the brain how a person with a Whole Brainer approach perceived brain function in the past.
- Finally, use playdough to further visually represent the fundamental principles of this brain theory.

Localizing/Phrenology Instructions:

- Utilize the list of traits you brought to class today (your top 10).
- Write them into the brain how a person with a Localizer/Phrenologist approach perceived brain function in the past.
- Finally, use playdough to further visually represent the fundamental principles of this brain theory.

PHRENOLOGISTS, WHOLE BRAINERS, AND YOU

Upon finishing each brain theory session, please ensure to respond to two reflection questions here. Each question will prompt you to connect the concepts in your brain creation to your comprehension of the theory. For each question, incorporate 3-4 phrases from the given list. Remember to mark them off the list as you use them and underline them in your answers.

AFTER COMPLETING THE WHOLE BRAINER'S MODEL

Words/Phrases to Use:

- Approach to understanding
- Applying insights gained
- Complex phenomena
- Comprehensive view of brain activity
- Contemporary neuroscience and psychology
- Everyday life
- Historical theories
- Holistic perspectives
- Holistic understanding of brain function
- Incorporating diverse viewpoints
- Individual attributes
- Interconnectedness
- Personal traits
- Reflecting on personal traits
- Understanding of brain function
- Various aspects of brain function and behavior
- Whole Brainer approach

Use 3-4 words/phrases from the list and underline them.

Reflection Question:
What was the most challenging aspect of representing your character traits according to the Whole Brainer approach?

How can what you learned in this activity help you understand more about how the brain works? What new things did you learn that make it easier to understand how the brain affects how we think and behave?

AFTER COMPLETING THE LOCALIZER'S MODEL

Words/Phrases to Use:

- Brain function
- Critical thinking
- Deepening my understanding
- Different theories
- Evolved over time
- Factors
- Human behavior
- Incorporating my own traits
- Individual differences
- Neuroscience(s)
- Personal
- Principles of brain theories
- Real-life traits and behaviors
- Technology advancements
- The brain
- Theories
- Theories of brain function
- Understanding
- Understanding of the brain

Use 3-4 words/phrases from the list and underline them.

Reflection Question:
How did the exercise of incorporating your own traits into the model help you understand the principles of the Localizing/Phrenology brain theory better?

Reflect on the role of individual differences in shaping theories of brain function throughout history. How do you think our understanding of the brain has evolved over time, and what factors have contributed to these changes?

L6: WHOLE BRAINERS VS. LOCALIZERS EXIT TICKET

Identify correct ideas by Whole Brainers with WB and correct ideas by Localizers with L.

____ certain brain regions are indeed specialized for particular cognitive processes and behaviors

____ highlighted the complexity and integrated functioning of different brain regions

____ identified that specific areas of the brain are responsible for controlling distinct functions and behaviors

____ identified the interconnected nature of the brain's circuits within the cortex

Identify incorrect ideas by Whole Brainers with WB and incorrect ideas by Localizers with L.

____ overstated the extent to which different brain areas could compensate for damage or injury

____ sometimes overlooked the specific localization of certain brain functions

____ specific bumps and depressions on the skull could accurately indicate an individual's personality traits and mental faculties

____ specific brain regions could be precisely mapped to specific personality traits or behaviors

____ underestimated the degree to which certain functions and behaviors are tied to particular brain " regions

Circle 12 Common Personality Traits That Apply to You

Distractible	Curious	Stubborn	Self-aware
Unmotivated	Energetic	Impatient	Innovative
Resistant to change	Independent	Moody	Outgoing
Overly dependent	Creative	Argumentative	Competitive
Attention-seeking	Idealistic	Self-conscious	Trustworthy
Confrontational	Adventurous	Reckless	Humorous
Vindictive	Empathetic	Insecure	Reflective
Inattentive	Impulsive	Pessimistic	Intuitive
Overly sensitive	Rebellious	Withdrawn	Assertive
Perfectionistic	Confident	Defiant	Patient
Blaming	Sensitive	Indecisive	Caring
Defeatist	Ambitious	Manipulative	Altruistic
Narcissistic	Optimistic	Disorganized	Considerate
Manipulative	Assertive	Procrastinating	Resourceful
Lacks empathy	Passionate	Judgmental	Tenacious
Aggressive	Sociable	Defensive	Ambitious
Insensitive	Compassionate	Passive-aggressive	Self-disciplined
Self-destructive	Responsible	Overly critical	Adaptable
Secretive	Resilient	Irresponsible	Assertive
Closed-minded	Open-minded	Self-absorbed	Confident
Arrogant	Expressive	Disrespectful	Determined
Judgmental	Persistent	Entitled	Empathetic
Withdrawn	Charismatic	Lazy	Inquisitive
Disruptive	Analytical	Intolerant	Resilient
Dismissive	Enthusiastic	Impulsive	Assertive

Choose 10 and Rank Your Traits

1 being your most dominant personality trait

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

9 _____

10 _____

During Reading

1

WORD UP!

Keep a writing utensil in your hand as you read and ...

- **Circle** words you are unsure of
  - *Should not be words already defined for you*
- **Use** context clues to unlock the meaning of a word
- **Annotate** the definition in the margin of the text

Tip:
Do not distract from your reading by defining these words with an online dictionary. Only define words using context at this stage.

Mark off a checkbox for every sub-heading completed in this step.

1 2 3 4 5 6 7 8 9 10 11 12 13

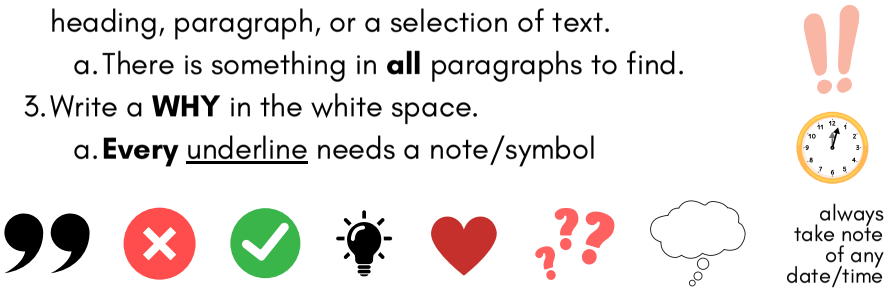
During Reading

2

ANNOTATE

For **every** paragraph

1. Consider the **sub-heading title**.
2. Based on the title, **underline** specific words and phrases that are significant to your understanding of the sub-heading, paragraph, or a selection of text.
   a. There is something in **all** paragraphs to find.
3. Write a **WHY** in the white space.
   a. **Every** underline needs a note/symbol



always take note of any date/time

Mark off a checkbox for every sub-heading completed in this step.

1 2 3 4 5 6 7 8 9 10 11 12 13

During Reading

3

PURPOSE

Analyze the author's method of organization.
Record it in the margin space of each sub-heading.

Which way did your author organize the text?

Cause/Effect: Reveals reasons and outcomes.

Problem/Solution: Identifies issues and proposes effective remedies.

Description: Details characteristics, creating a vivid picture.

Compare/Contrast: Examines similarities and differences.

Sequence: a specific order of events/steps of a process

Chronological: the order of things in terms of time

Mark off a checkbox for every sub-heading completed in this step.

1 2 3 4 5 6 7 8 9 10 11 12 13

During Reading

4

CENTRAL IDEA

STEP 1
List repeated words and ideas to identify patterns in the author's message.

Step 2
Repeat this step for every sub-heading

Mark off a checkbox for every sub-heading completed for Step 1.

1 2 3 4 5 6 7 8 9 10 11 12 13

Step 3
Identify repeated ideas/words between the sub-headings + answer

What does this repetition and/or pattern suggest about the central idea?

Use ones of these sentence starters:

- This repetition highlights...
- A central idea that emerges through repetition is...
- The repetition in the text conveys ...

Excerpt 6 Exit Ticket

Which of the following best summarizes the development of the central idea in the excerpt?

A) The excerpt explores the structure and function of neurons, the historical evolution of brain theories, and the pseudoscience of phrenology, leading to a nuanced understanding of brain localization and interconnectedness.

B) The excerpt presents a comparison between the beliefs of Whole Brainers and Localizers, illustrating their contrasting views on brain function and showcasing Phineas Gage's case as evidence for both perspectives.

C) The excerpt discusses the structure of neurons, the discovery of cells as the fundamental unit of life, and the competing theories of Whole Brainers and Localizers, ultimately leading to advancements in understanding brain activity and function.

D) The excerpt examines the development of phrenology, the theories of Whole Brainers and Localizers, and the impact of Phineas Gage's case on nineteenth-century medical understanding, culminating in modern insights into the complexities of brain organization.

Which of the following best summarizes the conflict between the "Whole Brainers" and the "Localizers" in the excerpt?

A) The Whole Brainers believe in specific brain regions controlling distinct functions, while the Localizers argue for a holistic view of brain function.

B) The Whole Brainers advocate for a localized model of brain function, whereas the Localizers propose a unified theory of brain intelligence.

C) The Whole Brainers argue for interconnected brain functions, while the Localizers support the idea of specific brain regions controlling individual actions.

D) The Whole Brainers emphasize the importance of evidence-based reasoning, while the Localizers rely on phrenological pseudoscience.

Excerpt 6 Exit Ticket

Which of the following best summarizes the development of the central idea in the excerpt?

A) The excerpt explores the structure and function of neurons, the historical evolution of brain theories, and the pseudoscience of phrenology, leading to a nuanced understanding of brain localization and interconnectedness.

B) The excerpt presents a comparison between the beliefs of Whole Brainers and Localizers, illustrating their contrasting views on brain function and showcasing Phineas Gage's case as evidence for both perspectives.

C) The excerpt discusses the structure of neurons, the discovery of cells as the fundamental unit of life, and the competing theories of Whole Brainers and Localizers, ultimately leading to advancements in understanding brain activity and function.

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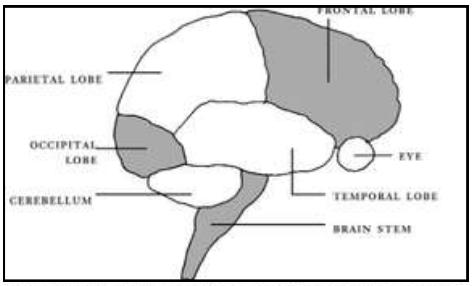
WHAT WE THOUGHT ABOUT HOW WE THOUGHT

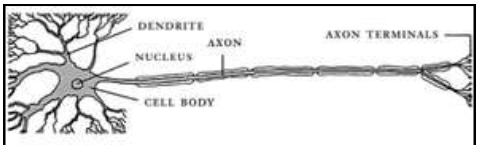
The Brain Revolution of the 19th Century

After this tour of the outside of the brain, what you and the Boston doctors in 1850 still lack is a map of the nerve cells. In 1850, the Boston doctors know very little about any kind of cell, even though the cell revolution is getting under way in Germany, thanks to Matthias Schleiden and Theodor Schwann. Working independently, they both revisit the work of Robert Hooke, the microscope observer who came up with the name cell in 1665. Hooke, they realize, was seeing empty cork cells because they were dead. Now, for the first time, Schleiden sees living cells in plants. Schwann sees them in animal tissue. Together, they realize that the cell is the fundamental unit of life. Everything alive, from slime molds to human beings, is composed of cells. It is the stuff inside the cell that controls every process of life, from digestion to reproduction.

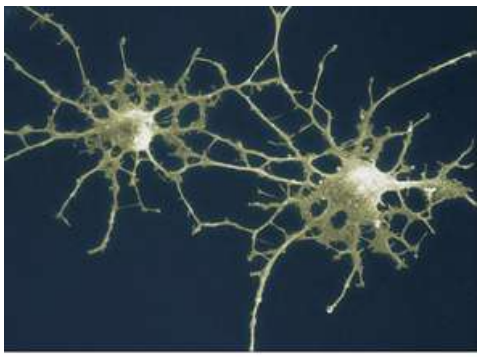


The brain cortex is like a city; every part has an address. Instead of a city's east or west side, the cortex has a left and right hemisphere. The folds and ridges in the hemispheres are like cross streets, and medical students must memorize every one. The cortex also has four lobes—the frontal (in front), the parietal (on top), the occipital (at the back), and the temporal (on the side). A brain "address" can specify left or right hemisphere, the lobe, the nearest ridge or fold, and whether the location is on top or bottom, inside or out, and front or back. Phineas was injured most seriously on the inside of the left frontal lobe, but scientists are still arguing about the exact address. *Illustration by David Macaulay*

As a living organism becomes more complex, its cells differentiate—that is, they specialize. A line of cells will differentiate and become muscle cells. Another will differentiate and become nerve cells. All complex animals have nerve cells, but no animal has as many nerve cells as humans do. Your brain and spinal cord have about 100 billion neurons.



The nerve cell, or neuron, is a living, one-way wire with switches at both ends. Messages arrive chemically in the dendrites, where they are converted to electrical impulses, which travel down the axon, the long body of the cell. At the terminal on the far end, signals are converted back into chemical messengers, called neurotransmitters, for the short voyage across the synapse to the dendrites of the next neuron. Amazingly, neurons can work as fast as thought. *Illustration by David Macaulay*



Here two human nerve cells show off their intricate network of axon terminals and dendrites. These connections are so fine that they cannot be seen through a conventional light microscope. A scanning electron microscope (SEM) was used here to capture the details. *SEM photograph by Andrew Leonard, Photo Researchers Inc.*

Neurons: The Brain's Wiring

A neuron is basically a wire with plugs at each end. Unlike most wires, most neurons have many, many plugs so they can both relay messages and switch them. A neuron is a long, skinny cell with a tangle of receivers at one end called dendrites, a long connector called an axon in between, and at the other end a smaller tangle of transmitters called axon terminals. Neurons never actually touch one another or splice together. There is always a tiny gap between the axon terminal of one neuron and the dendrite of the next. The gap is called a synapse. It is bridged by signaling chemicals called neurotransmitters. A message travels as an electrical impulse through the axon, down the body of the nerve cell, to the axon terminal. There the electrical impulse is converted into a chemical neurotransmitter to float across the synapse to the next neuron. Here's where the complications begin. In your brain, your neurons have lots of choices. Your brain has lots of synapses because the neurons are layered and clumped together so that the number of possible connections is huge. Each neuron can have anywhere from 1,000 to 6,000 synapses. That means the 10 billion neurons in your brain and spinal cord have a possible 10 trillion synaptic choices to make. Complexity is good. Making synaptic connections is how your brain actually thinks, learns, remembers, acts, and reacts.

The Battle of Brain Theories: Whole Brainers vs. Localizers

The Boston doctors watching Phineas in 1850 haven't a clue about neurons, which won't be discovered for another twenty years. Still, these doctors know that the brain sits atop the spinal cord, a thick, bundled cable of thousands of threads. Doctors do not know that each thread is a bundle of microscopic neurons. They do know that cutting the spinal cord results in paralysis. The higher the break in the spinal cord, the more complete the **paralysis**. They know that if the cord is cut at the base of the brain stem, the patient dies.

WHAT WE THOUGHT ABOUT HOW WE THOUGHT

The Battle of Brain Theories: Whole Brainers vs. Localizers Cont'd.

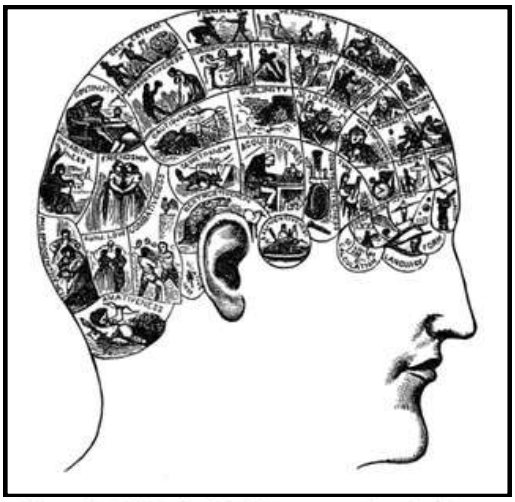
That's why Phineas interests the doctors. His injury is not at the back of his head in the cerebellum or at the bottom of the brain near the brain stem. He was struck through the forehead, and the iron must have pierced the frontal lobe of the cortex. If Phineas survived with a large piece of his cortex destroyed, then what does the cortex do? Across America and Europe, doctors are fiercely divided over this very question. These are the two rival schools. One group thinks the brain is a "whole intelligence," that is, that your brain is one interconnected "mind." Let's call them the "Whole Brainers." They think of the cortex as a **chamber** holding a formless cloud or jelly driven by a mysterious "vital force." Through this force, every part of the brain is connected to every other part. The Whole Brainers believe that thoughts and commands can **originate** anywhere in the brain jelly/cloud and flash into action. If one part of the brain is injured, then the functions or thoughts that came from there will flow to another part.

Unfortunately, the Whole Brainers have no hard evidence for their theory. Instead they must look for unusual cases that might back them up. Phineas seems to be such a case. Dr. Bigelow of Harvard thinks so. He is a Whole Brainer.

His opponents believe in "**localized** function"; that is, they believe that the brain is divided into **specific** areas that control specific things. Let's call them the "Localizers." They are followers of the Austrian Dr. Gall, who started the brain revolution by declaring that the brain was the seat of intelligence, emotions, and will. Dr. Gall called his brain science "phrenology" (a made-up Greek word). By any name, the Localizers, or Phrenologists, believe that "organs" inside the brain control specific functions. They draw up a model Phrenological Head to show the "organs" in their correct positions. The "Organ of Veneration [respect]" and the "Organ of Benevolence [kindness]," for example, are supposed to be just above the left eyebrow. (Remember where Phineas was hit by the iron? Stay tuned.) Unfortunately, the Phrenologists have no way of knowing which part of the brain controls what. "Benevolence" cannot be seen on the outside of the brain.

Phrenology: Bumps, Dips, and Dubious Diagnoses

Later in the nineteenth century, scientists will discover that a weak electrical current applied to the exposed brain of a laboratory animal will make certain muscles twitch involuntarily and certain senses sharpen or go dead. In the early twentieth century, scientists will invent more **sophisticated** and less dangerous ways to "see" brain activity. Eventually they will chart the brain's electrical signals by attaching **electrodes** to the scalp for an "electroencephalograph," or EEG. The EEG **plots** amazing patterns of electrical activity that match specific areas of the brain with specific functions. Toward the end of the twentieth century, scientists will invent brain scanners that can "image" the electrical and chemical activity inside a living brain.



A Phrenological Head is definitely an eye-catcher—bald as a billiard ball and each "organ" carefully outlined and labeled. By the middle of the nineteenth century, a popular parlor game is "reading" one's character by feeling the skull for bumps and dips and then matching them to a head chart such as this one. *Hulton Collection, Getty Images*

Back in 1850, the Localizers/Phrenologists haven't seen a single thought or brainwave. Still, that doesn't stop them from identifying thirty-seven "organs" of the brain. How do they do it? Bumps. That's right. Bumps on the head. The Phrenologists reason that if you have a strong organ, it will be big and project from your skull as a bump. If you have a weak organ, it will be small and you'll have a dip or depression in your skull. Run your hand over your own skull and you will find all sorts of knobs, bumps, dips, and so on. The Phrenologists decide that if you have a bump over your Organ of Amativeness, you are a person with a strong talent for physical love. If you have a dip or a depression over your Organ of Philoprogenitiveness (also known as parental love), you're not going to be fond of children.

WHAT WE THOUGHT ABOUT HOW WE THOUGHT

Phineas Gage: A Case Study in Brain Localization

Among Boston doctors, phrenology is considered serious stuff when Phineas walks into the middle of the debate of the Whole Brainers versus the Localizers. Both sides **seize** him as proof of their belief. Dr. Bigelow and his fellow Whole Brainers say that Phineas would surely have died if specific areas of the brain were vital to specific functions. After all, the tamping iron carried away pieces of Phineas's brain. If every part of the brain was vital, then he should be dead. Yet here is Phineas alive in Boston, walking, talking, and taking care of himself. Therefore, say the Whole Brainers, the whole brain must be able to perform any function of one part.

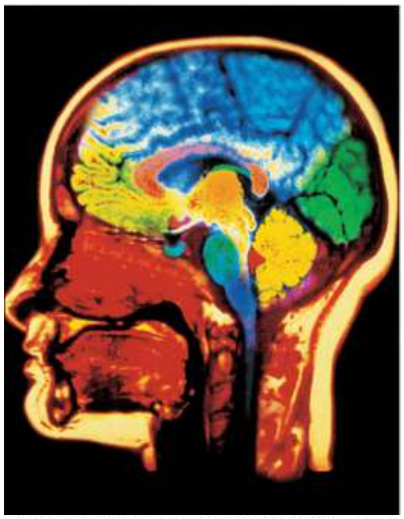
On the other side, Dr. Harlow is a Localizer, or at least he is a friend of some leading Localizers/Phrenologists. The Localizers say Phineas proves their theory. The tamping iron has not killed him because the damage is limited to specific organs that are not **critical** to life. Yet the Localizers/Phrenologists don't have all the facts. In 1850, when Phineas comes to Boston, Dr. Harlow feels he must keep the details of his patient's personality problems confidential, but he does tell some of the truth to Dr. Nelson Sizer. Dr. Sizer is a big man in phrenology and lectures on it all over New England. Dr. Harlow leaks the information to Dr. Sizer that the "completely recovered" Phineas is not the old Phineas. Dr. Sizer tries to disguise the source of his report to the American Phrenological Journal in 1851, writing, "We have been informed by the best authority that after the man recovered, and while recovering, he was **grossly profane**, **coarse**, and vulgar, to such a degree that his society was **intolerable** to decent people."

Unraveling the Brain: 19th Century vs. Modern Understanding

Dr. Sizer's report is wonderful news for the Localizers/Phrenologists. As Dr. Sizer explains, "If we remember correctly, the iron passed through the regions of the organs of BENEVOLENCE and VENERATION, which left these organs without influence in his character, **hence** his profanity, and **want** of respect and kindness."

In the long run, the Localizers will turn out to be somewhat right about localization but completely wrong about phrenological organs. The Whole Brainers will turn out to be right about the complex interconnections of the brain but wrong about the brain acting as a whole. The 10 billion neurons in your brain are not connected at random. They are organized into "local **circuits**" within the cortex; the local circuits form "subcortical nuclei," which together form "cortical regions," which form "systems," which form "systems of systems," which form you.

Specific areas of the brain do control specific functions and behaviors, but it's not always as "logical" as we would imagine. Skills that you think should be in the same brain patch are scattered about in different places in the cortex. Different areas of the cortex let you recognize letters in a book or faces in a crowd, or know whether you are standing upright. Yet many of these localized functions are also controlled by interactions with other parts of the brain. The human brain, it turns out, is both localized and interconnected. We know so much more about the brain today than the Phrenologists and the Whole Brainers did in 1850, yet we really understand only the rough outlines.



An MRI scan allows us to look inside a living person's head and see a slice of everything from the throat to the spinal cord. Inside the brain, you can see the different lobes of the cortex; the corpus callosum, which joins the two hemispheres; the cerebellum at the back of the head; and the brain stem. Compare this to the phrenological chart that appears earlier in this chapter. *MRI scan by Scott Canzine and Sue Trainor, Photo Researchers Inc.*

Back in 1850, Dr. Bigelow tells the Boston doctors, "Taking all the circumstances into consideration, it may be doubted whether the present is not the most remarkable history of injury to the brain which has been recorded." He also announces that Mr. Gage has graciously agreed to donate his famous tamping iron to the Harvard Medical College. Dr. Bigelow donates the plaster head of Phineas to go with it. The plaster head remains in Boston, but Phineas and his tamping iron soon slip out of town.

WORD UP!

BEFORE READING

1

Skim through the text for bold words or italicized words. These words are important and often have a definition provided. Bold and italicized words can also give readers a hint of what the article is about.

1. Look to see if bold words are defined in small text at the bottom of the page.
2. If they are not defined, choose **3 words** to define using an online dictionary.
3. In the margin space, record the definitions.

Write an answer this question:
What hints does this give the reader of what the article is about?

☐ Check this box when you have completed this task

ANNOTATE

BEFORE READING

2

Annotate the <u>title</u>, <u>each sub-heading</u>, and <u>any visuals</u> by:

- <u>Underlining</u>
  - Important words and phrases
- <u>Writing</u> in the White Space
  a. Why do you underline those words?
  b. Why are they significant?
  c. What do they make you notice or wonder?

IMPORTANT WORDS ARE LANUGAGE THAT:

- command attention
- enhance recall
- convey a depth of meaning and emotion

☐ Check this box when you have completed this task

PUPORSE

BEFORE READING

3

Identify two things before reading the text:

1. What is your purpose for reading this text?
2. Predict the author's purpose for writing the text.
   - Looking at the <u>title</u>, <u>subtitles</u>, <u>bold print</u>, and <u>any visuals</u>, is his/her purpose to inform, persuade, or entertain? About what?

Response Starters:

- The title and graphics suggest that the author aims to... I know this because ...
- From the subtitles and bold print, it appears that the author's purpose is ... I know this because ....
- The visuals and the title collectively suggest that the author's intent is... I know this because ...
- The title and subtitles indicate that the author's goal is to... I know this because ...

☐ Check this box when you have completed this task

What is your purpose for reading this text?

Predict the author's purpose for writing the text
Use a response starter

CENTRAL IDEA

BEFORE READING

4

Do a close read of the <u>title</u> of the text, <u>each sub-headings</u>, and <u>any visuals</u>

- What does the <u>title</u>/<u>sub-headings</u>/<u>any visuals</u> suggest about the central idea?
  - Answer these questions in place of writing in your article

List in this box repeated words or ideas used within the <u>title and any sub-heading</u> - 3 to 5 minimum; circle them in the text

List in this box repeated words or ideas used within the <u>captions of visuals</u> - 3 to 5 minimum; circle them in the text

☐ Check this box when you have completed this task

Based on the sub-headings, and more specifically, the sub-heading called "_____."

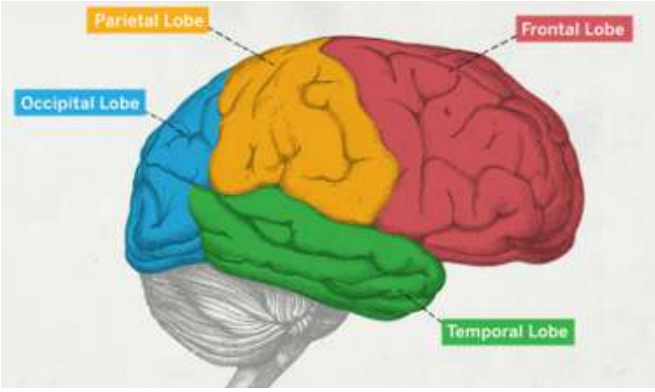
I anticipate that the article will delve into...
Write something specific/related/meaningful in relation to the excerpt

Based on the <u>repeated words and ideas</u> found in the sub-headings, title, and captions, what do you believe the text will primarily focus on? How is that different than previous excerpts?
Using the repeated words and ideas as clues, I think this text is mostly about ...

This is a different focus from previous excerpts because ...

L5: DIAGNOSING PHINEAS EXIT TICKET

Which part of Phineas's brain was injured?
Circle Your Answer



How does your choice explain his symptoms?
Choose all that apply.

A) Personality Changes
B) Loss of Vision
C) Difficulty with Social Interactions
D) Lacking Rational Reasoning Skills
E) Enhanced Problem-Solving Skills
F) Impaired Decision-Making
G) Loss of Taste and Smell
H) Increased Memory Capacity
I) Heightened Sensitivity
J) Reduced Appetite
K) Frequently Changes His Mind

Reflecting on Phineas's brain injury, how does understanding how the brain works help us learn about injuries and how they affect the way people think and act? Fill the whole space.

Use 4 of these phrases in your response

- Brain injuries
- How brains work
- Changes in behavior
- Learning from brain structure
- How thinking is affected
- Different actions we see
- What brain injuries mean
- Understanding how brains think
- Changing behavior patterns
- Learning about brain functions

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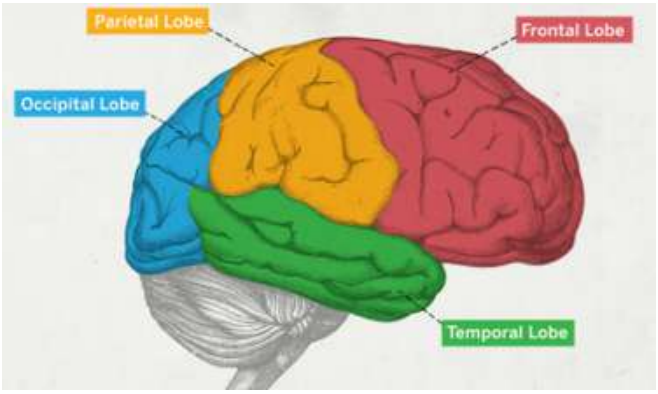

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NAME:

DIRECTIONS

As your During Reading task, read each chunk of text aloud. Once you're finished, use playdough to create a concrete object/idea/person that represents the central idea of each section. Then, write a brief explanation on why you chose to construct that particular object. Utilize the given sentence prompts to construct your connection. Ensure that there is a clear correlation between your chosen/created content and the main idea presented in this text segment.

Chunk 1: The Doctors of 1850: An Image and Its Realities **and** The Ether Dome: An Era of Change

Items From This Chunk

1. **Surgical tools** (scalpels, forceps, bone saws)
2. An **ether apparatus** for anesthesia
3. **Surgeons and doctors with distinguishing features** (satin waistcoats, black frockcoats, side-whiskers)
4. **Photographer** (Josiah Hawes)

Item: _____

Tip: *Just write the bolded word/or phrase to save you time and effort*

Connection to the Central Idea of this Chunk:

Go back into the excerpt. Underline the evidence you cited above and label it appropriately. This will serve as your annotation!

Response starters for your chunk 1 connection:

For any item: "The [item] I crafted represents a key aspect of the historical context described in the text. It symbolizes..."

For surgical tools or ether apparatus: "My creation highlights the advancements in medical technology during the 1850s. It relates to the CI of this chunk because ..." *CI is an acronym for central idea*

For surgeons and doctors: "The figures I sculpted embody the appearance and roles of medical professionals in the 1850s. They relate to the CI because ..." *CI is an acronym for central idea*

For the photographer (Josiah Hawes): I crafted a miniature representation of Josiah Hawes because he ... This connects to the CI ... " *CI is an acronym for central idea*

Chunk 2: Phineas: A Case Study in Medical Skepticism **and** A Battle of Beliefs: Debunking Skepticism Through Evidence

Items From This Chunk

1. A mini version of the **tamping iron** that Phineas had in hand when he arrived in Boston
2. Mold figures representing Dr. Bigelow, Phineas, and the **skeptical doctors** in the audience
3. Shape representations of **documents**, such as accounts from Dr. Williams, Dr. Harlow, and eyewitnesses like Mr. Adams and Phineas's workmen

Item: _____

Tip: *Just write the bolded word/or phrase to save you time and effort*

Connection to the Central Idea of this Chunk:

Go back into the excerpt. Underline the evidence you cited above and label it appropriately. This will serve as your annotation!

Response starters for your chunk 2 connection:

Tamping Iron: "In this chunk of text, it discusses ... I (made/chose) the small iron in relation to the CI because ... " *CI is an acronym for central idea*

Dr. Bigelow and Audience Members: "In the text, it refers to ... I (selected/created/made) Dr. Bigelow and the doctors to represent that the CI of this chunk is ... " *CI is an acronym for central idea*

Eyewitness Accounts and Evidence: "In this chunk, I noticed that it repeated the idea of ... The items I (made/selected/chose) connects to the CI of the sub-heading because ..." *CI is an acronym for central idea*

DIRECTIONS

As your During Reading task, read each chunk of text. Once you're finished, use playdough to create a concrete object/idea/person that represents the central idea of each section. Then, write a brief explanation on why you chose to construct that particular object. Utilize the given sentence prompts to construct your connection. Ensure that there is a clear correlation between your chosen/created content and the main idea presented in this text segment.

Chunk 3: Shifting Paradigms: From Spleens to Neurons

Items From This Chunk

1. Sculpt a small representation of the **brain**
2. Mini figures of **influential doctors** and **scientists** like Franz Josef Gall or Aristotle
3. Craft symbolic representations, such as a **broken heart** or a **splenic anger**

Item: _____

Tip: *Just write the bolded word/or phrase to save you time and effort*

Connection to the Central Idea of this Chunk:

Go back into the excerpt. Underline the evidence you cited above and label it appropriately. This will serve as your annotation!

Response starters for your chunk 3 connection:

Miniature Brain Model: "I read about ... in this chunk of text. So, I (crafted/selected) a small brain model to represent the CI because ..." *CI is an acronym for central idea*

Historical Doctors/Scientists: "Because I read ... in this chunk, I (made/selected) a figure of (Franz Josef Gall or Aristotle). This relates to the CI of the sub-heading ..." *CI is an acronym for central idea*

Symbols of Changing Beliefs: "I chose symbols like (a broken heart or a splenic anger) to represent ... I did this because it relates to the CI. I say this because the CI of this chunk is ... " *CI is an acronym for central idea*

Chunk 4: Unraveling the Brain's Mysteries: The Anatomy of Thought

Items From This Chunk

1. Sculpt a mini **brain model to showcase its structure**, including the cerebral cortex, brain stem, and cerebellum
2. Mold the **left and right hemispheres of the brain**, connected by the corpus callosum
3. Sculpt different **sections of the cerebral cortex** to represent the frontal lobe, parietal lobe, occipital lobe, and temporal lobes

Item: _____

Tip: *Just write the bolded word/or phrase to save you time and effort*

Connection to the Central Idea of this Chunk:

Go back into the excerpt. Underline the evidence you cited above and label it appropriately. This will serve as your annotation!

Response starters for your chunk 4 connection:

Brain Model: "I crafted a miniature brain model to demonstrate its structure, including the cerebral cortex, brain stem, and cerebellum. This model helps illustrate the CI. I say this because ... " *CI is an acronym for central idea*

Hemispheres and Corpus Callosum: "I (made/sculpted/selected) the left and right brain hemispheres connected by the corpus callosum because I read ... This demonstrates item is important to the CI because..." *CI is an acronym for central idea*

Brain Lobes: "Using playdough, I (made/created/chose) different sections of the cerebral cortex. This is important to the CI of the sub-heading because ... " *CI is an acronym for central idea*

WHAT WE THOUGHT ABOUT HOW WE THOUGHT

The Doctors of 1850: An Image and Its Realities

In the winter of 1850, Phineas goes to Boston so the doctors there can see for themselves. What are doctors like in 1850? They look like gentlemen, or at least they do in the oil portraits that they have painted of themselves to boost their social status. If you lined up a gallery of these doctors' portraits, you'd see a long row of wise faces, satin **waistcoats**, gold watch chains, and side-whiskers. By 1850, there are photographs of doctors, showing wise faces, satin waistcoats, and whiskers. Photographs of doctors at work, though, are rare. Photographing anyone or anything moving is difficult because the light-sensitive plates are very slow, and a single **exposure** can take a full minute. Yet the year before Phineas's accident, a Boston photographer named Josiah Hawes sets up his camera in a surgical operating theater and takes a "daguerreotype" (a photograph on a metal plate) that he entitles, "Third Operation Using Ether Anesthesia at the Massachusetts General Hospital." The operating room is called the Ether Dome and still exists today.

The Ether Dome: An Era of Change

The picture that Hawes makes is probably the very first of doctors being doctors instead of doctors posing for portraits. In Hawes's photograph, the surgeons stand impatiently beside the operating table, ready to start work. This is truly a historic moment. Before the introduction of ether a few months before, surgeons had to employ powerful assistants to hold down patients or restrain them with leather-covered chains. Because of the discovery of ether anesthesia, the doctors in the Ether Dome can take their time operating.

Notice two things about Hawes's picture. First, it's all men. There are no female hospital nurses, let alone female doctors. The second thing you should notice is what the doctors are wearing—nothing special. They are in street clothes—black **frockcoats**, shiny satin vests, and linen shirts. No one is wearing **surgical scrubs**. No one is wearing surgical gloves, masks, or **booties**. These doctors may not wash their hands until after the operation. These men know nothing about bacteria—but they think they know all about the brain.

The patient is the one in the cotton gown and wool socks, lying unconscious on the table. Knocked out by inhaling ether fumes, the patient can feel no pain in this state of "twilight sleep." When word of the discovery of anesthesia reached England, a London newspaper rejoiced, announcing, "We Have Conquered Pain." *Massachusetts General Hospital, Archives and Special Collections; print courtesy of Harvard University Art Museums*

Phineas: A Case Study in Medical Skepticism

This is what an audience of doctors looks like when Phineas arrives in Boston in January 1850, tamping iron in hand. He is Dr. Bigelow's guest but also his prize **specimen**. Phineas is examined, measured, and discussed. He agrees to sit for a plaster "life" mask. Dr. Bigelow puts straws up Phineas's nose so he can breathe while the doctor pours liquid plaster over his face. Then the plaster is lifted off to make a mold. From it, Dr. Bigelow casts a three-dimensional version of Phineas's face. His eyes are shut, but the enormous scar on his forehead is clear.

Phineas appears in person at Dr. Bigelow's lectures to convince the **assembled** doctors that his case is neither an **exaggeration** nor a **fraud**. Dr. Bigelow tackles that question head-on: "The leading feature of this case is its improbability," Dr. Bigelow admits. "A physician who holds in his hand a crowbar, three and a half feet long, and more than thirteen pounds in weight, will not readily believe that it has been driven with a crash through the brain of a man who is still able to walk off, talking with **composure** and **equanimity** of the hole in his head. Yet there is every reason for supposing it in this case **literally** true."

The evidence is standing before them, "crowbar" in hand. Even **confronted** with that, there are still doctors in the audience who don't believe that the tamping iron went through Phineas's brain. Perhaps, they say, it just hit him a **glancing** blow on the head. Dr. Bigelow reads out accounts from Dr. Williams and Dr. Harlow. He adds other eyewitness statements from Cavendish people including Mr. Adams, the hotel owner, and some of Phineas's workmen. Dr. Bigelow unveils his plaster life mask of Phineas. The casting clearly shows scars where the iron went in and came out. Yet there are doctors who think that Phineas is a humbug, a fake from the back woods of Vermont.

A Battle of Beliefs: Debunking Skepticism Through Evidence

There are two other groups of doctors paying close attention to Dr. Bigelow's presentation. The two **rival** groups are eager to believe in Phineas's case. Their theories directly **contradict** each other, and yet both groups believe that Phineas's case supports their side. As it turns out, both groups are slightly right but mostly wrong. Yet their wrong **theories**—and Phineas himself—will steer our knowledge of the brain in the right direction.

WHAT WE THOUGHT ABOUT HOW WE THOUGHT

Excerpt 5

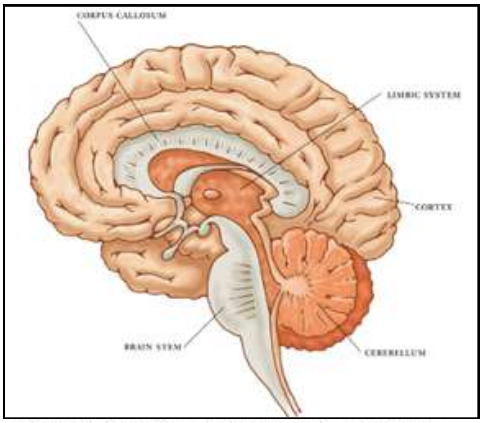
Shifting Paradigms: From Spleens to Neurons

Everybody knows that people use their brains to think. Right? And, of course, emotions, especially love, come from the heart. Wrong? Obviously, our ideas about how the body works have changed. Three hundred years ago, everybody "knew" that anger was controlled by the **spleen**. Twenty-three hundred years ago, the ancient Greeks "knew" that the heart was the center of emotion and thought. Aristotle, the greatest scientist of his time, "knew" that the primary **function** of the brain was to cool the blood. It isn't until 1800 that an Austrian doctor named Franz Josef Gall declares that the brain is the seat of the intelligence, the emotions, and the will. Still, it takes time for new ideas to sink in. Even today, we don't talk about a lover who's been dumped as feeling "broken-brained."

By Phineas's time, doctors know what a brain looks like, at least from the outside. They learn as students of gross (a term for "large-scale") **anatomy** by **dissecting** the **cadavers** of **paupers**, prisoners, and the unclaimed. By 1850, all doctors know the **gross** anatomy of the skeleton, internal organs, muscles, and, of course, the brain. They just don't know how the brain works.

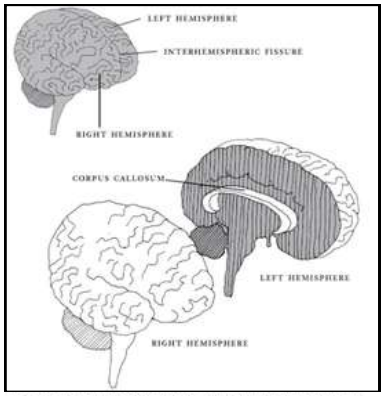
Unraveling the Brain's Mysteries: The Anatomy of Thought

You can have a look for yourself. Imagine you could click open the top of your head and lift your brain out. It weighs about three pounds. Some compare it to half of an enormous walnut, but if you can't visualize a three-pound walnut half, think of a bicycle helmet (bicycle helmets look the way they do so they can surround the brain). Think of your brain as a big cap **perched** on a stalk and protected by the neck flap. The big cap is your cerebral cortex. The stalk is your brain stem, which plugs into your spinal cord. The brain stem keeps many of your automatic functions going, like your breathing and heartbeat. The neck flap covers your cerebellum, which **coordinates** movement. Without your cerebellum, you couldn't walk upright, touch your finger to your nose, or turn this page. Without your brain stem, you couldn't breathe. Without your cerebral cortex, you wouldn't be human.



This is half a brain. On top and in front is the cortex. In the back and underneath are the cerebellum and the brain stem. On the bottom of the cortex is the limbic system, which coordinates memory, sensation, and emotion. In Phineas's case, the tamping iron passed through the frontal cortex, leaving the rest of his brain relatively unharmed. *Illustration by Jerry Malone*

The cortex is where you think, remember, learn, imagine, read, speak, listen, and dream. In the cortex, you feel your emotions and you make sense of what your senses are telling you. The cortex is where you actually see what your eyes **transmit**, smell what your nose senses, taste what your tongue samples, touch what your nerves report, and hear what your ears pick up. None of this **vital** activity is visible in gross anatomy. By just holding a brain in your hands you (and the doctors of Phineas's day) can't see the thing that makes this organ work, the brain's fundamental unit, which is the brain cell, or neuron. You'll need a microscope and a lot of skill to see a single neuron, but all of these structures—the cortex, cerebellum, brain stem, and spinal cord—are made up of neurons **specialized** to **relay** and transmit tiny **electrical impulses**. By layering and connecting billions of neurons, you get a brain.



Here you can see the division between the two hemispheres of the cortex. The crack between them is called the "interhemispheric fissure." The two hemispheres specialize in different mental skills, but brain functions are not as neatly divided as they appear. Phineas's tamping iron struck the left hemisphere first but also grazed the right hemisphere on the way out. He lost something from both hemispheres. *Illustration by David Macaulay*

But by looking at your brain in your hand, you'll notice that the cortex splits in half right down the middle. The left hemisphere and the right hemisphere are separated on top by a deep crack—the **interhemispheric fissure**—but joined in the middle of the brain by a thick mat of nerves—the corpus callosum. The corpus is the **switchboard** for signals back and forth between the two halves. In recent times, scientists have learned that the two hemispheres **specialize** in certain skills. Sometimes you'll hear brain researchers talk about a "right brain" or a "left brain" skill. They really mean right or left hemisphere. But you can't see any skills by looking at the outside of a brain.

Indeed, if you're looking at your brain from the outside, you might wonder if you're holding the cortex backwards. The front of the cortex seems to be hanging in space until you realize that your face fits the space underneath. The part of the cortex above your face is the frontal lobe. The frontal lobe is the part that concerns us most regarding Phineas, but you should know the other lobes—the parietal lobe on top and the occipital lobe at the back of your head, right above your cerebellum. Wrapping around your **temples** on the side of your head are the temporal lobes. Each hemisphere has its own frontal, parietal, occipital, and temporal lobes. All together, the cortex is a soft **mass** of folded nerve tissue. It looks as if your cortex was folded up quickly and stuffed in any old way, but the truth is that every human brain is folded in exactly the same way. How the neurons inside those folds and ridges connect is what makes every human being **singular**.

Teaching Script

Hello everyone, today I'll be introducing you to the [insert assigned part of brain]

_____

Function and Purpose

The [insert assigned part of brain] _____ serves an important function and purpose. It is responsible for [insert function and purpose here from your pink paper here]

_____

Appearance and Size

In terms of appearance and size, the [insert assigned part of brain] _____ is [insert brief description of appearance and size here from your pink paper here]

_____

_____

Playdough Insructions

Let me show you how I created the [insert assigned part of brain]. *Show them your brain*
Now it's your turn. Make the [insert assigned part of brain] now.

BRAINS IN CLAY:
NAME:
Exploring Neuroanatomy through Playdough Sculpting

Teaching Script

Hello everyone, today I'll be introducing you to the [insert assigned part of brain]

_____

Function and Purpose

The [insert assigned part of brain] _____ serves an important function and purpose. It is responsible for [insert function and purpose here from your pink paper here]

_____

Appearance and Size

In terms of appearance and size, the [insert assigned part of brain] _____ is [insert brief description of appearance and size here from your pink paper here]

_____

_____

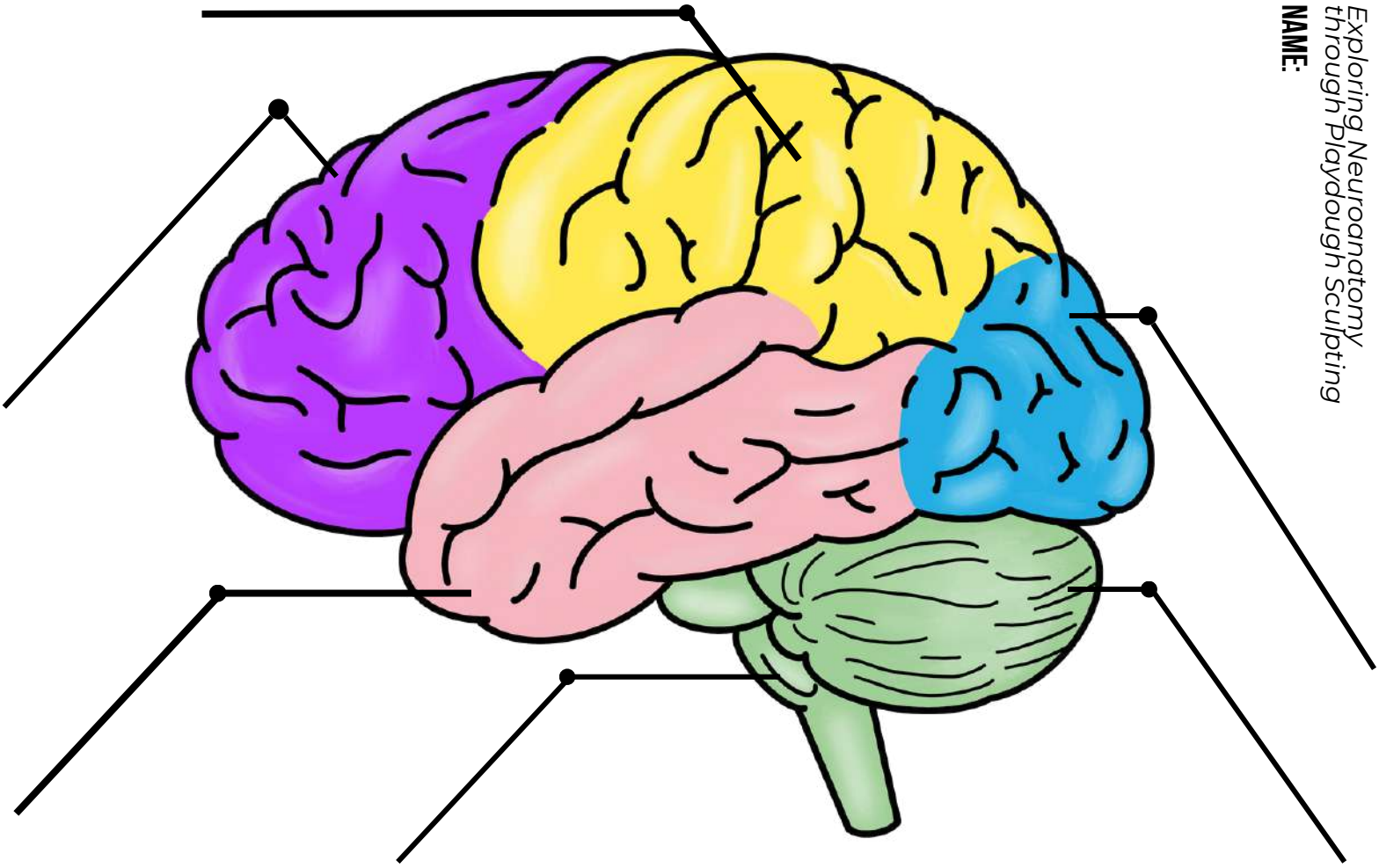
Playdough Insructions

Let me show you how I created the [insert assigned part of brain]. *Show them your brain*
Now it's your turn. Make the [insert assigned part of brain] now.

BRAINS IN CLAY:

Exploring Neuroanatomy through Playdough Sculpting

NAME:



Brain Stem

Function and Purpose

Appearance and Size

Cerebellum

Function and Purpose

Appearance and Size

Frontal Lobe

Function and Purpose

Appearance and Size

Parietal Lobe

Function and Purpose

Appearance and Size

Temporal Lobe

Function and Purpose

Appearance and Size

Occipital Lobe

Function and Purpose

Appearance and Size

BEFORE READING

1

WORD UP!

Skim through the text for bold words or italicized words. These words are important and often have a definition provided. Bold and italicized words can also give readers a hint of what the article is about.

1. Look to see if bold words are defined in small text at the bottom of the page.
2. If they are not defined, choose **3 words** to define using an online dictionary.
3. In the margin space, record the definitions.

Write an answer this question:
What hints does this give the reader of what the article is about?

☐ Check this box when you have completed this task

BEFORE READING

2

ANNOTATE

Annotate the title, each sub-heading, and any visuals by:

- Underlining
  - Important words and phrases
- Writing in the White Space
  - Why do you underline those words?
  - Why are they significant?
  - What do they make you notice or wonder?

IMPORTANT WORDS ARE LANUGAGE THAT:

- command attention
- enhance recall
- convey a depth of meaning and emotion

☐ Check this box when you have completed this task

BEFORE READING

3

PUPORSE

Identify two things before reading the text:

1. What is your purpose for reading this text?
2. Predict the author's purpose for writing the text.
   - Looking at the title, subtitles, bold print, and any visuals, is his/her purpose to inform, persuade, or entertain? About what?

Response Starters:

- The title and graphics suggest that the author aims to... I know this because ...
- From the subtitles and bold print, it appears that the author's purpose is ... I know this because ....
- The visuals and the title collectively suggest that the author's intent is... I know this because ...
- The title and subtitles indicate that the author's goal is to... I know this because ...

☐ Check this box when you have completed this task

BEFORE READING

4

CENTRAL IDEA

Do a close read of the title of the text, each sub-headings, and any visuals

- What does the title/sub-headings/any visuals suggest about the central idea?
  - Write your prediction in the margin near the title.

Prediction Starters:

- The title suggests that the article will focus on...
- Based on the sub-heading "__," I anticipate that the article will delve into...
- The title "__" implies that the article will likely explore...
- Upon seeing the sub-heading "__," I expect the article to address...
- The title leads me to believe that the article will center around...
- Considering the sub-heading "__," I predict that the article will examine...
- The title hints at a discussion of... and the sub-heading "__" reinforces this expectation.

☐ Check this box when you have completed this task

BRAINS IN CLAY: Exploring Neuroanatomy through Playdough Sculpting

Select the brain part that you've been designated to research further:

__ Brain Stem __ Cerebellum __ Corpus Callosum __ Cerebral Cortex

If delegated the cerebral cortex, be sure to mark the specific lobe you are responsible for:

__ Occipital Lobe __ Temporal Lobe __ Parietal Lobe __ Frontal Lobe

Becoming a Pseudo-Expert on a Specific Part of the Brain

- As part of your assignment, you will be required to answer some questions related to a specific part of the brain.
  - The questions will be based on the source material provided to you.
  - You will be expected to share your findings with your group members, so it's essential to have a good grasp of your chosen part of the brain.

Purpose and Function:

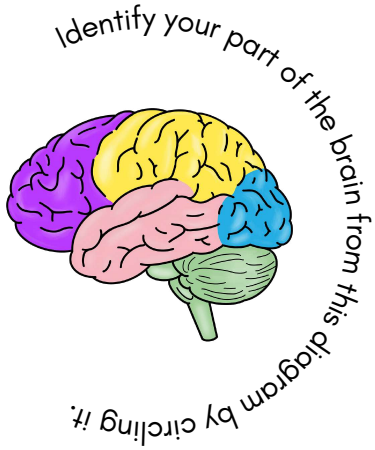
What does the [part of the brain you're studying] do? Circle one.

Auditory and memory hub *Decision-making and planning center* *Visual processing hub*

Coordination and balance manager *Sensory information processor* *Vital functions regulator*

How does it help our bodies and minds work?

What jobs or tasks is it responsible for?



Location and Structure:

Where exactly in the brain is the [part of the brain you're studying] found?

What does it look like? Texture? Approximate size in relation to other parts of the brain? *Circle one.*

Back, medium-sized, rough *Largest, front part, grooved* *Small, distinctive surface folds, velvety*

Compact, connects to brain/spinal cord *Medium-sized, side region, furrowed* *Top, medium-sized, bumpy*

What's around it in the brain?

Applications in Medicine:

What happens if something goes wrong with the [part of the brain you're studying]? Circle one.

Breathing problems, paralysis, coma *Impaired judgement, personality changes, difficulty focusing* *Visual disturbances, hallucinations, blindness*

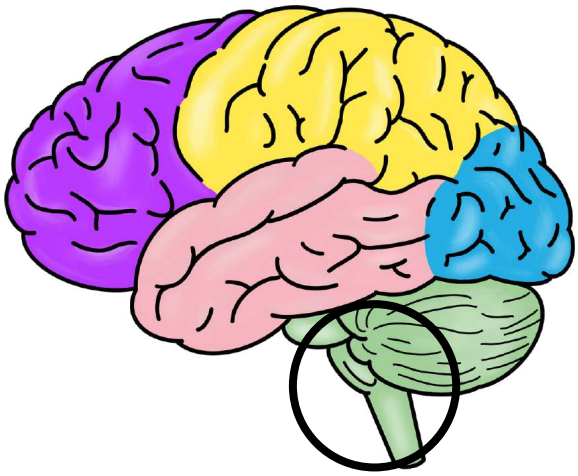
Coordination difficulties, tremors *Memory loss, seizures, language difficulties* *Sensory processing issues, difficulty with spatial awareness,*

Are there sicknesses or problems that can happen to it?

How do doctors help people with those problems?

UNVEILING THE BRAIN STEM: GUARDIAN OF VITAL FUNCTIONS

The brain stem is a **vital** structure located deep within the folds of the brain. Despite its small size, this sentinel governs numerous essential bodily functions that sustain life.



Journeying Through the Brain's Core

The brain stem acts as a vital connection between the brain and the spinal cord, responsible for **transmitting** information and **coordinating** their functions. It also plays a critical role in regulating fundamental processes such as breathing, heart rate, blood pressure, and consciousness. Moreover, it controls basic **reflexes** such as coughing, sneezing, and swallowing, making it an essential part of our body.

In the Heart of Complexity

The brain stem is located under the **cerebral** hemispheres and snugly tucked beneath the cerebrum. It comprises three primary components: the midbrain, pons, and **medulla oblongata**. Though relatively small compared to other brain regions, its significance cannot be overstated. Resembling a stalk, the brain stem extends down from the base of the brain.

Smooth in texture, the brain stem is composed of **densely** packed nerve fibers and nuclei. It occupies a relatively compact portion of the brain's lower region, with a notably smaller size compared to the cerebral cortex. The brain stem is surrounded by vital structures such as the cerebellum and cerebral cortex, forming an intricate network crucial for coordinated brain function.

Navigating Troubled Waters

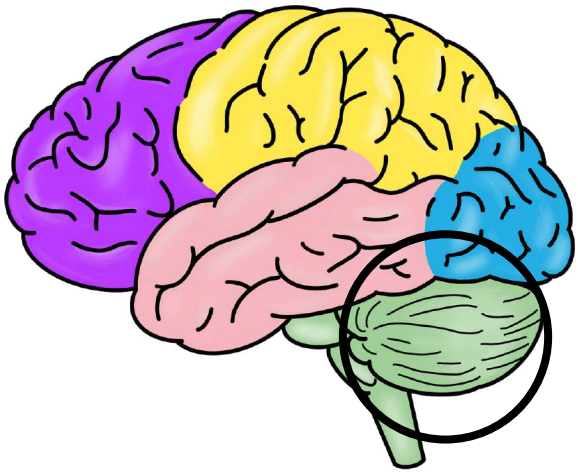
The brain stem is responsible for maintaining a **delicate** balance within the human body, regulating breathing, consciousness, and movement. However, when this balance is disrupted, severe consequences may follow. Strokes, tumors, or traumatic injuries can impair the brain stem's function, resulting in life-threatening complications such as **paralysis** or loss of consciousness. Timely medical intervention is essential in such cases, with treatments ranging from medication to surgical interventions aimed at reducing pressure or restoring function.

With advanced medical technologies and interventions, doctors strive to mitigate the impact of brain stem disorders. Rehabilitation programs, respiratory support, and medications tailored to address specific symptoms all play a crucial role in aiding patients on the road to recovery.

Ultimately, the brain stem serves as a steadfast guardian, **orchestrating** vital functions that are essential for human survival. Its complex mechanisms and unwavering dedication underscore its indispensable role in sustaining life and preserving the delicate balance within the human body.

HARMONY IN MOTION: EXPLORING THE ENIGMATIC CEREBELLUM

The cerebellum is a captivating structure **nestled** within the intricate landscape of the brain. It orchestrates the symphony of movement and coordination that defines human capability.



The Conductor of Coordination

As the **conductor** of coordination, the cerebellum is responsible for refining movements and maintaining balance. Its function is to **integrate** sensory information from the body and coordinate muscle activity, ensuring smooth and precise execution of motor tasks. Furthermore, the cerebellum plays a vital role in cognitive functions, such as language processing, attention, and **emotional regulation**.

A Jewel in the Crown

Located at the back of the brain, the cerebellum is a distinct structure nestled beneath the cerebral cortex. Despite its small size, it contains billions of neurons arranged in precise patterns, creating a finely convoluted surface. The cerebellum is incredibly complex, with unique layers and circuits dedicated to specialized functions. This efficient neural architecture is a testament to the cerebellum's **velvety** texture and compact size. It serves as a vital link in the neural network that governs movement and cognition, situated adjacent to the brain stem and beneath the cerebral hemispheres.

Navigating the Waves of Dysfunction

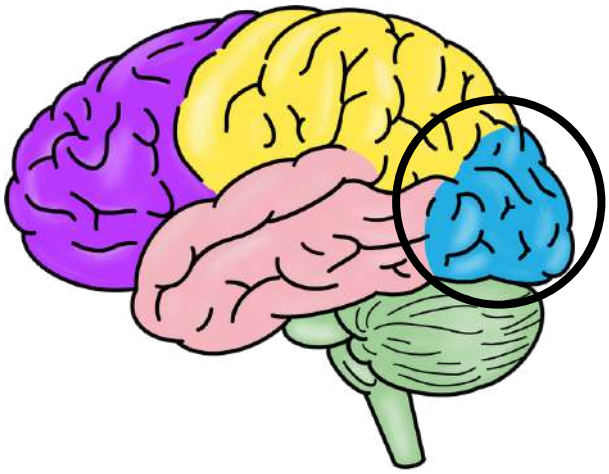
The cerebellum plays a critical role in ensuring smooth **motor coordination** and speech. Disruptions in this area can lead to various challenges, including cerebellar ataxia, tumors, and stroke. Individuals affected may experience tremors, difficulties with fine motor skills, and impaired balance.

Medical interventions, such as medication, physical therapy, and assistive devices, are essential for addressing **underlying** causes and managing symptoms. A tailored rehabilitation program based on individual needs empowers patients to regain independence and optimize their potential for recovery.

The cerebellum's complex architecture and **multifaceted** functions highlight its indispensable role in shaping human experience and facilitating the journey through the world. Ultimately, it remains a **beacon** of coordination and precision, illuminating the path towards fluid movement and **cognitive harmony**.

GATEWAY TO VISION: UNVEILING THE MAJESTY OF THE OCCIPITAL LOBE

Within the intricate landscape of the brain, the occipital lobe emerges as a captivating realm, where the wonders of sight are orchestrated and **interpreted**, painting the canvas of human perception.



The Seat of Vision

The occipital lobe, as the "seat of vision," plays a crucial part in processing visual information that our eyes receive. It helps interpret visual cues such as shapes, colors, motion, and depth perception. By utilizing complex **neural pathways**, the occipital lobe decodes the **visual** world, allowing us to interact with our environment and appreciate its beauty.

An Architectural Marvel

Positioned at the back of the brain, the occipital lobe plays a **crucial** role in interpreting and processing visual information. Its complex structure features specialized areas – such as association areas and the primary visual cortex – which are responsible for diverse aspects of visual perception. The intricate folds and unique morphology of the occipital lobe represent the elegance and intricacy of neural architecture, highlighting the sophistication of visual processing.

Navigating the Landscape of Vision

The occipital lobe is a key component of the brain's visual processing network, situated near neighboring brain regions such as the parietal and temporal lobes. Its location is **strategic**, as it seamlessly **integrates** visual information with other sensory modalities, leading to a richer perception and comprehension of the world around us.

Illuminating the Shadows

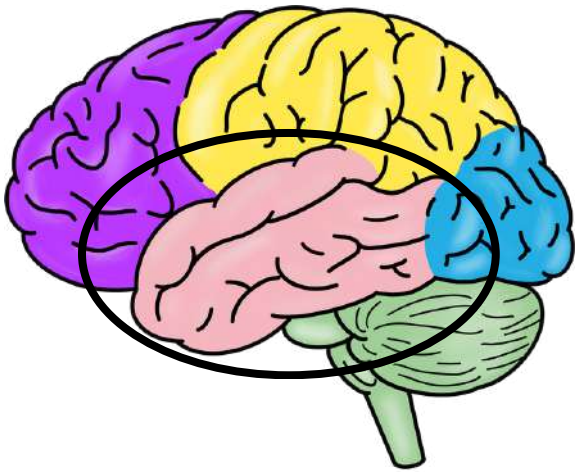
The occipital lobe is a critical component of the brain that plays a crucial role in visual processing and **perception**. However, when this delicate balance is disrupted, it can lead to a wide range of visual disturbances, including field defects, **hallucinations**, and seizures. Whether caused by a traumatic brain injury, tumor, or other condition, prompt diagnosis and targeted interventions are essential for mitigating the impact of these disorders.

A comprehensive, multidisciplinary approach incorporating neuroimaging, visual assessments, and therapeutic interventions is the cornerstone of effective treatment. By tailoring rehabilitation programs to individual needs, healthcare professionals can empower patients to adapt to visual changes and navigate the complexities of daily life with resilience and confidence.

Ultimately, the occipital lobe serves as a **beacon** of sight and perception, illuminating the path towards understanding and appreciating the visual world. Its intricate architecture and profound influence underscore its indispensable role in shaping human experience and enriching the tapestry of sensory perception.

ECHOES OF MEMORY: UNRAVELING THE ENIGMA OF THE TEMPORAL LOBE

Within the **labyrinthine** depths of the brain, the temporal lobe emerges as a **sanctuary** of memory, emotion, and **auditory sensation**, weaving the intricate threads of human experience.



The Nexus of Memory and Emotion

The temporal lobe is the center of memory and emotion, responsible for encoding, storing, and recalling memories with an emotional charge. It consists of **specialized** regions like the hippocampus and amygdala, critical in establishing long-term memories and regulating emotional reactions. Using complex **neural** connections, the temporal lobe connects past experiences with current emotions, influencing our outlook and behavior.

Anatomy of Reflection

The temporal lobe, situated within the **lateral** region of the brain, plays a crucial role in processing auditory and visual **stimuli**, as well as forming memories. Its convoluted surface, adorned with intricate sulci and gyri, contains a vast **network** of neural circuits and specialized regions that are essential for cognitive function. The temporal lobe's graceful curvature and diverse composition **epitomize** human cognition, beckoning us to explore the depths of our memories and emotions.

Harmony of Connections

Nestled between neighboring structures such as the parietal and occipital lobes, the temporal lobe plays a critical role in the brain's sensory and cognitive network. Its unique location allows it to combine auditory and visual information with memory processes, resulting in a more comprehensive understanding of the world and influencing our perceptions.

Echoes of Disruption

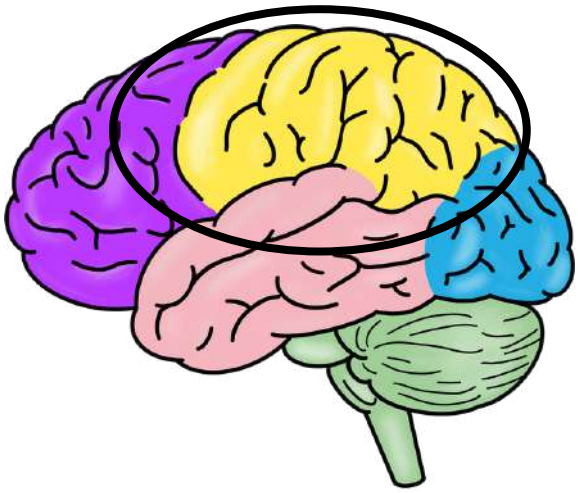
The temporal lobe is responsible for maintaining a delicate balance in the human brain. When this balance is disturbed due to conditions like temporal lobe epilepsy, traumatic brain injury, or neurodegenerative diseases, it can cause profound disturbances in memory, emotion, and perception. Timely diagnosis and targeted interventions are crucial to manage symptoms and optimize cognitive function.

Healthcare professionals use a holistic approach to alleviate the burden of temporal lobe disorders and enhance the quality of life for affected individuals. This includes **neuroimaging**, neuropsychological assessments, and **therapeutic** interventions. Rehabilitation programs, tailored to individual needs, empower patients to navigate the complexities of memory and emotion with resilience and grace.

In essence, the temporal lobe is a testament to the richness of human experience. Its intricate architecture and profound influence **underscore** its **indispensable** role in shaping **cognition**, emotion, and perception. By understanding the complexities of the human mind, we can better appreciate the remarkable nature of our memories and emotions.

THE PARAGON OF PERCEPTION: EXPLORING THE MARVELS OF THE PARIETAL LOBE

Within the intricate expanse of the brain, the parietal lobe emerges as a **bastion** of sensory perception, **spatial** awareness, and integration, sculpting the contours of human cognition and bodily sensation.



Embodiment of Sensory Synthesis

The parietal lobe plays a crucial role in sensory integration, **harmonizing** an array of sensory inputs to create a unified representation of our body and the surrounding environment. This part of the brain processes visual, **tactile**, and **proprioceptive** information, which enables us to recognize objects, navigate through space, and plan our movements. By weaving intricate **neural** connections, the parietal lobe shapes our perception of the world and guides our actions.

A Tapestry of Sensation

The parietal lobe, situated in the upper region of the brain, is an essential component responsible for unifying sensory and **motor functions**. It's a complex region with a **convoluted** surface, marked with intricate **sulci** and **gyri**, housing numerous specialized areas crucial for cognitive processing. The parietal lobe's complicated structure and diverse composition make it a hub for sensory perception, offering a unique opportunity for in-depth research on spatial cognition and bodily awareness.

Integration and Interpretation

The parietal lobe is a critical component of the brain's sensory and motor network. It is located between the frontal and occipital lobes, and its strategic placement enables the **seamless** integration of sensory inputs with motor commands. This allows us to interact with the world around us in a more meaningful way, enriching our understanding of the environment.

Perceptions of Disruption

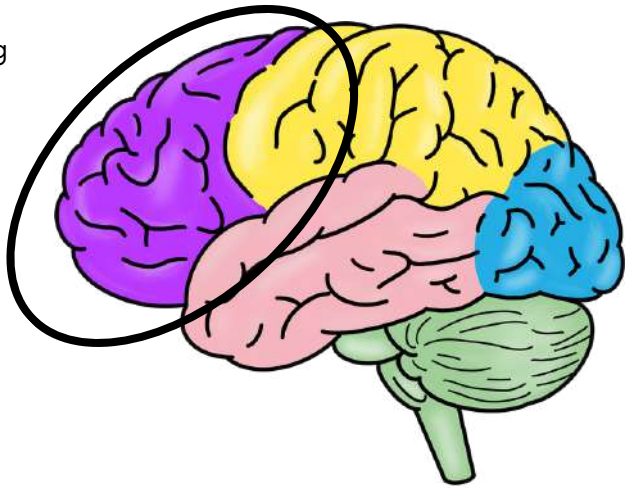
The parietal lobe plays a crucial role in sensory perception, spatial cognition, and motor function. Disruptions to this delicate balance can lead to significant disturbances, causing conditions such as parietal lobe lesions, strokes, or neurodegenerative diseases. Symptoms may include impaired spatial awareness, tactile perception, and body image. Early diagnosis and targeted interventions are necessary to optimize cognitive function and manage symptoms.

To alleviate the burden of parietal lobe disorders, healthcare professionals use a multidisciplinary approach, incorporating neuroimaging, neuropsychological assessments, and rehabilitative interventions. Personalized rehabilitation programs empower patients to navigate sensory perception and spatial cognition complexities with resilience and grace.

The parietal lobe shapes human perception, guiding our understanding of self and space, and illuminating the path towards understanding the complexities of the human mind. Its intricate architecture and profound influence underscore its **indispensable** role in shaping cognition, perception, and action.

THE FRONTIER OF COGNITION: UNRAVELING THE MYSTERIES OF THE FRONTAL LOBE

Within the vast expanse of the brain, the frontal lobe emerges as the **vanguard** of cognitive prowess, orchestrating **executive functions**, personality traits, and higher-order decision-making processes that define human behavior and intellect.



The Architect of Executive Function

The frontal lobe is responsible for a wide range of **cognitive processes** that are crucial to goal-oriented behavior, emotional regulation, and **inhibition**. With specialized regions like the prefrontal cortex, the frontal lobe plays a crucial role in planning, social behavior, and problem-solving. Through complex **neural** networks, this lobe shapes our capacity to reason, adapt to new situations, and anticipate consequences, guiding our behavior and ambitions.

A Citadel of Complexity

The frontal lobe, located at the front of the brain, is a complex structure responsible for cognitive processing and motor control. Its unique shape, with its convoluted surface adorned with **sulci** and **gyri**, conceals a **labyrinth** of neural circuits essential for higher-order cognition and behavior. As the embodiment of human intellect, the dynamic architecture and varied composition of the frontal lobe invite investigation into the depths of human personality and decision-making.

Integration and Initiative

Situated amidst neighboring structures such as the parietal and temporal lobes, the frontal lobe plays a fundamental part in the brain's cognitive and motor network. Its **strategic** placement allows for the seamless integration of sensory inputs with cognitive processes, resulting in a deeper understanding of the world around us and influencing our interactions.

Perspectives of Disruption

When the delicate balance within the frontal lobe is disrupted, it can result in a wide range of profound disturbances that impact an individual's cognition, personality, and behavior. Traumatic brain injuries, **neurodegenerative** diseases, and frontal lobe **lesions** are all conditions that can cause impairments in decision-making, emotional regulation, and social behavior. Early diagnosis and targeted interventions are critical for managing symptoms and optimizing cognitive function.

Healthcare professionals take a **multidisciplinary** approach that encompasses neuroimaging, neuropsychological assessments, and therapeutic interventions to alleviate the burden of frontal lobe disorders and improve the quality of life for affected individuals. Rehabilitation programs that are tailored to meet individual needs empower patients to navigate the complexities of cognition and behavior with resilience and grace.

Ultimately, the frontal lobe is a **beacon** of cognitive **prowess** that shapes our aspirations and guides us on our journey through the complexities of human existence. Its intricate architecture and profound influence underscore its indispensable role in shaping cognition, personality, and behavior, illuminating the path towards a better understanding of the complexities of the human mind.

BEFORE READING

1

WORD UP!

Skim through the text for bold words or italicized words. These words are important and often have a definition provided. Bold and italicized words can also give readers a hint of what the article is about.

1. Look to see if bold words are defined in small text at the bottom of the page.
2. If they are not defined, choose **3 words** to define using an online dictionary.
3. In the margin space, record the definitions.

Write an answer this question:
What hints does this give the reader of what the article is about?

☐ Check this box when you have completed this task

BEFORE READING

2

ANNOTATE

Annotate the title, each sub-heading, and any visuals by:

- Underlining
  - Important words and phrases
- Writing in the White Space
  - Why do you underline those words?
  - Why are they significant?
  - What do they make you notice or wonder?

IMPORTANT WORDS ARE LANUGAGE THAT:

- command attention
- enhance recall
- convey a depth of meaning and emotion

☐ Check this box when you have completed this task

BEFORE READING

3

PUPORSE

Identify two things before reading the text:

1. What is your purpose for reading this text?
2. Predict the author's purpose for writing the text.
   - Looking at the title, subtitles, bold print, and any visuals, is his/her purpose to inform, persuade, or entertain? About what?

Response Starters:

- The title and graphics suggest that the author aims to... I know this because ...
- From the subtitles and bold print, it appears that the author's purpose is ... I know this because ....
- The visuals and the title collectively suggest that the author's intent is... I know this because ...
- The title and subtitles indicate that the author's goal is to... I know this because ...

☐ Check this box when you have completed this task

BEFORE READING

4

CENTRAL IDEA

Do a close read of the title of the text, each sub-headings, and any visuals

- What does the title/sub-headings/any visuals suggest about the central idea?
  - Write your prediction in the margin near the title.

Prediction Starters:

- The title suggests that the article will focus on...
- Based on the sub-heading "__," I anticipate that the article will delve into...
- The title "__" implies that the article will likely explore...
- Upon seeing the sub-heading "__," I expect the article to address...
- The title leads me to believe that the article will center around...
- Considering the sub-heading "__," I predict that the article will examine...
- The title hints at a discussion of... and the sub-heading "__" reinforces this expectation.

☐ Check this box when you have completed this task

L4: Something Odd About Phineas Exit Ticket

Which portion of text from excerpt 4 can best be used to argue against the claim that Phineas is "fully recovered from his wounds" (29)?

(a) “In the spring, Phineas is back in Cavendish, carrying his tamping iron. He never goes anywhere without it these days.”
(b) “Phineas has come for a final examination by Dr. Harlow and to reclaim his old job on the railroad. His left eye looks intact, but the vision has gradually faded away.”
(c) “Phineas has a huge scar on his forehead and a small scar under his cheekbone, but otherwise he is physically healed.”
(d) “Yet Dr. Harlow has private doubts about Phineas’s mental state. Phineas is just not his old self.”

How does this portion of text change your understanding of what Dr. Harlow means when he says that Phineas is recovered?

(a) It underscores the long-lasting impact of Phineas's injury, revealing potential ongoing challenges.
(b) It accentuates the physical scars and persistent vision difficulties Phineas experiences post-recovery.
(c) It highlights Dr. Harlow's reservations about Phineas's psychological state despite his physical recuperation.
(d) It implies Phineas's bodily recovery while acknowledging the enduring effects of brain trauma on his personality.

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Excerpt 4 Central Idea

What is the central idea of the text?

A. Phineas's transformation and the resulting loss of support from friends and employers.

B. The collaboration between Dr. Harlow and Dr. Bigelow on a medical case, leading to an invitation to present in Boston.

C. Phineas's ever-changing plans, reminiscent of a child's whims, causing concern among associates.

D. The exploration of consequences following Phineas's injury on his personality and professional life, observed by Dr. Harlow and former employers.

Choose the TWO best pieces of evidence from the excerpt to support your answer.

A. "He is fitful, irreverent, indulging at times in the grossest profanity, manifesting but little deference for his fellows..."

B. "Phineas comes up with all sorts of new plans, the doctor writes, but they are no sooner announced than he drops them."

C. "His contractors, who regarded him as the most efficient and capable foreman in their employ previous to his injury, considered the change in his mind so marked that they could not give him his place again."

D. "Would Mr. Gage consider coming to Boston at Dr. Bigelow's expense so his case could be presented at the medical school and before the Boston Society of Medical Improvement?"

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D. "Would Mr. Gage consider coming to Boston at Dr. Bigelow's expense so his case could be presented at the medical school and before the Boston Society of Medical Improvement?"

During Reading

1

WORD UP!

Keep a writing utensil in your hand as you read and ...

- **Circle** words you are unsure of
  - *Should not be words already defined for you*
- **Use** context clues to unlock the meaning of a word
- **Annotate** the definition in the margin of the text

Tip:
Do not distract from your reading by defining these words with an online dictionary. Only define words using context at this stage.

Mark off a checkbox for every sub-heading completed in this step.

1 2 3 4 5 6 7 8 9 10 11 12 13

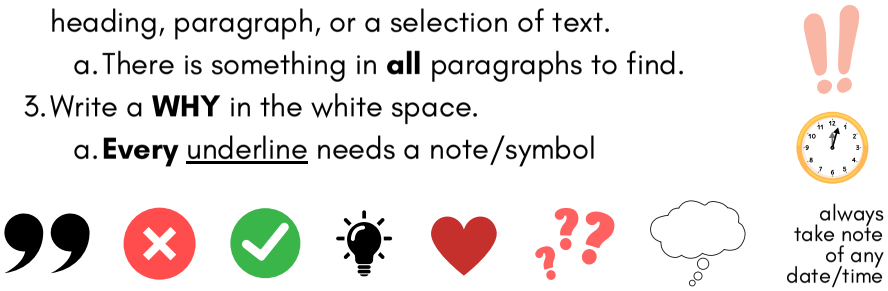
During Reading

2

ANNOTATE

For **every** paragraph

1. Consider the **sub-heading title**.
2. Based on the title, **underline** specific words and phrases that are significant to your understanding of the sub-heading, paragraph, or a selection of text.
   a. There is something in **all** paragraphs to find.
3. Write a **WHY** in the white space.
   a. **Every** underline needs a note/symbol



always take note of any date/time

Mark off a checkbox for every sub-heading completed in this step.

1 2 3 4 5 6 7 8 9 10 11 12 13

During Reading

3

PURPOSE

Analyze the author's method of organization.
Record it in the margin space of each sub-heading.

Which way did your author organize the text?

Cause/Effect: Reveals reasons and outcomes.

Problem/Solution: Identifies issues and proposes effective remedies.

Description: Details characteristics, creating a vivid picture.

Compare/Contrast: Examines similarities and differences.

Sequence: a specific order of events/steps of a process

Chronological: the order of things in terms of time

Mark off a checkbox for every sub-heading completed in this step.

1 2 3 4 5 6 7 8 9 10 11 12 13

During Reading

4

CENTRAL IDEA

STEP 1
List repeated words and ideas to identify patterns in the author's message.

Step 2
Repeat this step for every sub-heading

Mark off a checkbox for every sub-heading completed for Step 1.

1 2 3 4 5 6 7 8 9 10 11 12 13

Step 3
Identify repeated ideas/words between the sub-headings + answer

What does this repetition and/or pattern suggest about the central idea?

Use ones of these sentence starters:

- This repetition highlights...
- A central idea that emerges through repetition is...
- The repetition in the text conveys ...

L3: Microscopic Invaders Exit Ticket

Sequence the events by date. Put the oldest first.

1st, 2nd, 3rd, 4th, 5th

The discovery of “animalcules” (bacteria)	____
The use of glass lenses to build a simple microscope	____
The theory that bacteria can cause illness and death	____
The discovery of microscopic "cells"	____
Techniques to sterilize or clean objects to kill harmful bacteria	____

Based on the information in the text, what is the most likely reason for the delayed connection between bacteria and illnesses in the 19th century?

A) Limited technological advancements, such as the absence of powerful microscopes.
B) Insufficient interest among scientists in exploring the microscopic world.
C) Overreliance on traditional medical theories, like the humoral theory.
D) Lack of available funding for scientific research during that period.

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“HORRIBLE ACCIDENT” IN VERMONT

Gaither, Excerpt 4

Phineas: The Great Recovery Show

None of this progress to come will do Phineas a bit of good back in 1848. Instead, Phineas is saved by good luck and good care. Dr. Harlow follows the best medical advice of his time—keep the wound clean but covered and watch for **inflammation**. A sign of infection is a fluid called “pus” (it’s actually dead white blood cells, a sign that the body’s immune system is attacking bacterial invaders) that collects in pockets to form abscesses. Fourteen days after the accident, Phineas develops a huge **abscess** under the skin just above his eyes. Phineas is feverish, losing his appetite, and sinking fast. Dr. Harlow lances (punctures) the abscess. He drains the pus and dresses Phineas’s forehead again. The fever **abates**. His scalp begins to heal. Phineas is saved by his youth, his **iron constitution,** and Dr. Harlow’s good nursing. Dr. Harlow will always be **modest** about his role in saving Phineas. “I dressed him,” Dr. Harlow will say. “God healed him.”

Post-Recovery Party

The patient gains strength. Too much strength, in his doctor’s opinion. Dr. Harlow is called out of town for a few days, and when he comes back he finds Phineas out of his sickbed. His head still heavily bandaged, Phineas is roaming about Cavendish in the rain with no coat and thin shoes. He is eating unwisely, refusing nursing advice, and ignoring doctor’s orders. Phineas says he wants to go home to his mother’s house in Lebanon, New Hampshire, twenty miles away. He intends to walk. According to the best medical theories of his day, Dr. Harlow diagnoses an imbalance of bodily “humors.” This theory, which goes back to the ancient Greeks, declares that health is maintained by a balance of four liquids, or humors, in the body—blood, phlegm, yellow bile, and black bile. To bring them into balance, Dr. Harlow prescribes two powerful drugs—an “emetic” to make Phineas throw up and a “purgative,” a powerful laxative, to evacuate his bowels. Phineas is knocked flat by the medicines and spends the next two weeks in bed, where Dr. Harlow keeps him on a “low,” or bland, diet. His humors may or may not be in balance, but Phineas is resting quietly at last.

Dr. Harlow’s Rockstar Report

Ten weeks after the accident, Dr. Harlow declares Phineas fully recovered from his wounds. He puts Phineas in a closed carriage and sends him home to his mother in New Hampshire. Phineas is very weak, but he can walk short distances. He can count, feed and dress himself, and sing. He can speak clearly and make sense of what he hears. Yet there is something odd about the “recovered” Phineas. Just before he leaves Cavendish, Dr. Harlow gives Phineas a little test. The doctor offers Phineas $1,000 for the pocketful of pebbles that Phineas has collected walking along the Black River near town. Dr. Harlow knows that Phineas can add and subtract, yet Phineas angrily refuses the deal. Dr. Harlow tells himself that a man who was so badly hurt is going to need time to regain his full powers.

As soon as Phineas leaves for home, Dr. Harlow writes a short report for the Boston Medical & Surgical Journal. Most doctors ignore Dr. Harlow’s article. The few who read it don’t believe it. How could a man survive such an injury, let alone make a “complete recovery”? But one Boston doctor is intrigued. He writes to Harlow for information and urges the Vermont doctor to back up his case by collecting formal statements from eyewitnesses in Cavendish. The letter is from Henry J. Bigelow, professor of surgery at the Harvard Medical College.

Not Phineas’s Old Self

In the spring, Phineas is back in Cavendish, carrying his tamping iron. He never goes anywhere without it these days. Phineas has come for a final examination by Dr. Harlow and to **reclaim** his old job on the railroad. His left eye looks **intact**, but the vision has **gradually** faded away. Phineas has a huge scar on his forehead and a small scar under his cheekbone, but otherwise he is physically healed. Yet Dr. Harlow has private doubts about Phineas’s mental state. Phineas is just not his old self.

“HORRIBLE ACCIDENT” IN VERMONT

Gaither, Excerpt 4

A Quirky Unraveling: Friends, Employers, and the Railway Drama

His old employers on the railroad quickly come to the same conclusion. The new Phineas is unreliable and, at times, downright nasty. He insults old workmates and friends. He **spouts vulgar** language in the presence of women. He changes his mind and his orders from minute to minute. The railroad **contractors** let him go. Dr. Harlow, who is keeping **confidential** notes on Phineas, sadly writes, “His contractors, who **regarded** him as the most **efficient** and capable foreman in their employ previous to his injury, considered the change in his mind so **marked** that they could not give him his place again.”

When he was an old man, Dr. Henry J. Bigelow wore a long beard and sober clothes, befitting one of Boston's senior surgeons. But when he was a young man studying medicine in Paris, Bigelow was a snappy dresser. *From a daguerreotype by Leon Foucault, Paris, 1841; courtesy of Countway Library of Medicine, Harvard Medical School*

Someone Not Like Himself

Phineas's old friends also wash their hands of him. Dr. Harlow writes: "He is **fitful**, **irreverent**, **indulging** at times in the grossest **profanity** (which was not previously his **custom**), **manifesting** but little **deference** for his fellows, impatient of **restraint** or advice when it conflicts with his desires." Phineas comes up with all sorts of new plans, the doctor writes, but they are no sooner announced than he drops them. Phineas is like a small child who says he is running away from home after lunch and then comes up with a new idea over his sandwich. Dr. Harlow writes, “A child in his **intellectual capacities** and **manifestations**, he has the animal passions of a strong man.” A doctor is bound by his oath not to reveal the details of a patient’s condition without permission, so Dr. Harlow will keep his observations to himself for twenty years.

A Proposal from Dr. Bigelow in the Land of Boston

Meantime, Dr. Harlow has another letter from Dr. Bigelow at Harvard, who thanks him for collecting the eyewitness statements about the accident. Would Mr. Gage consider coming to Boston at Dr. Bigelow’s expense so his case could be presented at the medical school and before the Boston Society of Medical Improvement? Dr. Harlow and Dr. Bigelow make arrangements.

"HORRIBLE ACCIDENT" IN VERMONT

You have already read and annotated these paragraphs in Excerpt 3

Excerpt 4

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Which way did the author organize this text?
Purpose Task

List repeated words + ideas to identify patterns in the author's message.
Central Idea Task

Use your annotations from Excerpt 3

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Phineas Gage with his tamping iron (c. 1860)

“HORRIBLE ACCIDENT” IN VERMONT

Excerpt 4

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Excerpt 3 Central Idea

What is the central idea of the text?

A) The development of advanced surgical techniques in the 19th century.

B) The discovery of life-saving vaccines during the mid-19th century.

C) The limited understanding of infections and bacteria in the 19th century.

D) The role of herbal medicine in treating common ailments in the 19th century.

Choose the TWO best pieces of evidence from the excerpt to support your answer.

A) "In 1848, science is still twenty years away from figuring out that infections are the work of living—that is, 'biotic'—things."

B) "Phineas is saved by good luck and good care. Dr. Harlow follows the best medical advice of his time—keep the wound clean but covered and watch for inflammation."

C) "Louis Pasteur's 'germ theory' will lead to a revolution in medicine. It will inspire an English surgeon named Joseph Lister to try performing surgery in sterile conditions."

D) "Doctors in 1848 don't realize that gangrene is the end result of bacterial infection. They don't realize that floating in the air on dust particles, lurking on fingertips, or growing on the shiny steel blades of their unwashed surgical scalpels are single-celled bacteria and other microscopic life forms."

E) "While Hooke was showing off his 'cells,' a sharp-eyed Dutch merchant named Anton van Leeuwenhoek was making more powerful microscopes."

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Name:

"HORRIBLE ACCIDENT" IN VERMONT

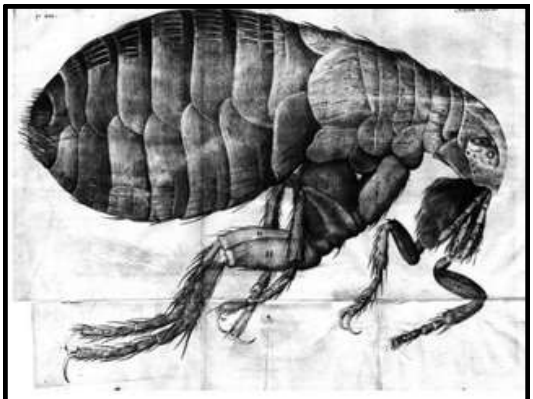
Excerpt 3

Our Brains: Locked Up Like Fort Knox

More than any other organ, the brain is sealed off from the outside world and from the rest of the body. There are many layers of tissue, bone, and skin to keep it protected from the outside, but there's also a "blood-brain barrier" that keeps out many **substances circulating** in the blood. Oxygen and **nutrients** can cross the blood-brain barrier, but many dangerous substances like **bacteria** cannot. With his skull **fractured**, Phineas's exposed brain is wide open, making him an **ideal candidate** for a **fatal** infection. No one in Cavendish in 1848, no scientist in America or Europe, has the slightest notion that bacteria cause infection.

Tiny Worlds Unleashed

Medical science in 1848 knows very little about bacteria, even though they were first seen through microscopes nearly two hundred years before. Today we are used to seeing the microscopic world, but when the microscope was invented in the middle of the seventeenth century, it caused a **sensation**. The microscope became a new kind of "high-tech" entertainment for **cultured** gentlemen, and in 1665 an Englishman named Robert Hooke came up with a microscopic "hit." He showed off a **slide** he'd made of an extremely thin slice of cork. Under the microscope lens, Hooke saw that the tissue inside a cork tree was made up of rows of tiny, boxlike structures. They reminded him of the bare rooms used by monks in a **monastery**. Hooke called them "cells." His cork cells, though, were empty because they were dead and dried out. It would take two **centuries** to figure out that it's the living stuff inside cells that makes them the **fundamental** unit of life.



In 1665, the English scientist Robert Hooke published this detailed drawing of a flea as seen through the newly invented microscope. London society clamored to see more microscope images of things too fine for the human eye. *From Hooke's* Micrographica*; courtesy of Dr. Joseph Gall, the Carnegie Institute of Washington, Baltimore, Md.*

While Hooke was showing off his "cells," a sharp-eyed Dutch merchant named Anton van Leeuwenhoek was making more powerful microscopes. Leeuwenhoek took a single drop of water from a rain barrel and turned his microscope on it. In that drop of water, Leeuwenhoek found a whole new planet of very, very small life forms. "Animalcules," he called them. Leeuwenhoek was the first to see single-celled microorganisms, tiny plants and tiny animals, including bacteria. Yet Leeuwenhoek never had the **faintest suspicion** that some of his "animalcules" caused humans to sicken and to die.

1848: Bacteria's Stealth Mode

That's more or less the state of knowledge in 1848. Few doctors have ever used a microscope, because it is not considered a medical instrument. These microscopic animals might be **marvels** of nature, but no doctor suspects that they have anything to do with disease, let alone infections. Doctors in 1848 don't use the word infection, but they know its **symptoms** well. They call it "sepsis," and they know from bitter experience how quickly a "septic" wound can go from slight redness to gross swelling to a fatal **condition** called gangrene.

“HORRIBLE ACCIDENT” IN VERMONT

Excerpt 3

The doctors of 1848 don’t realize that gangrene is the end result of bacterial infection. They don’t realize that floating in the air on dust particles, **lurking** on fingertips, or growing on the shiny steel blades of their unwashed surgical **scalpels** are single-celled bacteria and other microscopic life forms. On the smallest surface, there are hundreds of millions of them. They represent thousands of different species; there are tiny plants, tiny **fungi**, tiny viruses, and tiny animals. Among the microanimals are two particularly dangerous families of bacteria—streptococci and staphylococci (“strep” and “staph,” for short). What doctors don’t know in 1848, strep and staph do: that the broken head of Phineas is an ideal location to land.

1848 Medical Roulette

A wound is an open door. A cut or break in the skin lets staph and strep bacteria **colonize** the warm, wet, nutrient-rich cells inside. Once these bacteria get **established** in the body, they **reproduce** wildly. The body’s **immune** system tries to kill the invading bacteria with an **array** of special immune cells, while the bacteria try to protect themselves against immune cells by cranking out **toxic** chemicals. That’s an infection. The site of this **biological** battle between the immune system and bacteria swells up and turns red.

In 1848, science is still twenty years away from figuring out that infections are the work of living—that is, “**biotic**”—things. It will take nearly a century for science to develop the first “antibiotic,” penicillin, to **counter** infections. In 1848, a young Frenchman named Louis Pasteur is still studying chemistry in Paris. Eventually, Pasteur will unravel the three great biological mysteries of his time—**fermentation**, **decay**, and infection. All three processes are the work of living microorganisms; Pasteur will call them “germs.” Pasteur’s “germ theory” will lead to a **revolution** in medicine. It will inspire an English surgeon named Joseph Lister to try performing surgery in **sterile** conditions that exclude or kill all microorganisms. Lister will scrub his hands almost raw before operating, he will boil surgical clothing and instruments, and he will set up a machine to spray carbolic acid in the operating room to kill germs in midair. Lister’s first sterile operations in 1868 will cut the number of deaths from infection after surgery by 90 percent. For the first time in history, doctors will help more patients with surgery than they harm with **postsurgical** infections.

Phineas: The Great Recovery Show

None of this progress to come will do Phineas a bit of good back in 1848. Instead, Phineas is saved by good luck and good care. Dr. Harlow follows the best medical advice of his time—keep the wound clean but covered and watch for **inflammation**. A sign of infection is a fluid called “pus” (it’s actually dead white blood cells, a sign that the body’s immune system is attacking bacterial invaders) that collects in pockets to form abscesses. Fourteen days after the accident, Phineas develops a huge **abscess** under the skin just above his eyes. Phineas is feverish, losing his appetite, and sinking fast. Dr. Harlow lances (punctures) the abscess. He drains the pus and dresses Phineas’s forehead again. The fever **abates**. His scalp begins to heal. Phineas is saved by his youth, his **iron constitution,** and Dr. Harlow’s good nursing. Dr. Harlow will always be **modest** about his role in saving Phineas. “I dressed him,” Dr. Harlow will say. “God healed him.”

“HORRIBLE ACCIDENT” IN VERMONT

Excerpt 3

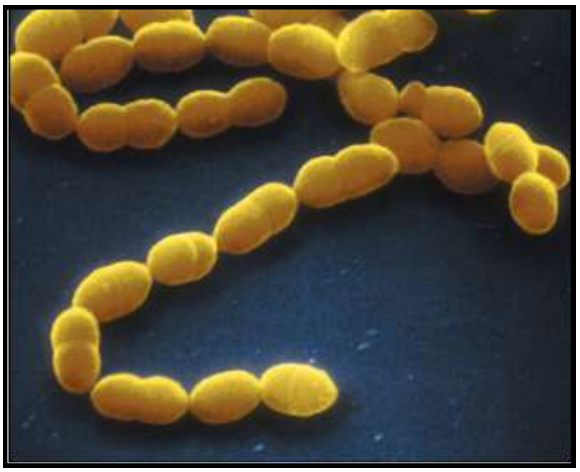
Post-Recovery Party

The patient gains strength. Too much strength, in his doctor’s opinion. Dr. Harlow is called out of town for a few days, and when he comes back he finds Phineas out of his sickbed. His head still heavily bandaged, Phineas is roaming about Cavendish in the rain with no coat and thin shoes. He is eating unwisely, refusing nursing advice, and ignoring doctor’s orders. Phineas says he wants to go home to his mother’s house in Lebanon, New Hampshire, twenty miles away. He **intends** to walk. According to the best medical **theories** of his day, Dr. Harlow diagnoses an imbalance of bodily “humors.” This theory, which goes back to the ancient Greeks, declares that health is maintained by a balance of four liquids, or humors, in the body—blood, **phlegm**, yellow bile, and black bile. To bring them into balance, Dr. Harlow prescribes two powerful drugs—an “emetic” to make Phineas throw up and a “purgative,” a powerful laxative, to **evacuate his bowels**. Phineas is knocked flat by the medicines and spends the next two weeks in bed, where Dr. Harlow keeps him on a “low,” or **bland**, diet. His humors may or may not be in balance, but Phineas is resting quietly at last.

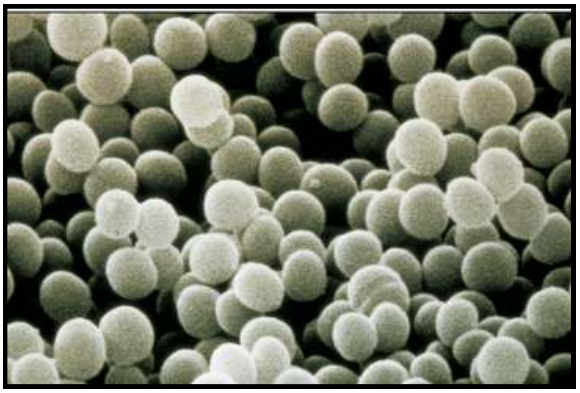
Dr. Harlow’s Rockstar Report

Ten weeks after the accident, Dr. Harlow declares Phineas fully recovered from his wounds. He puts Phineas in a closed carriage and sends him home to his mother in New Hampshire. Phineas is very weak, but he can walk short distances. He can count, feed and dress himself, and sing. He can speak clearly and make sense of what he hears. Yet there is something odd about the “recovered” Phineas. Just before he leaves Cavendish, Dr. Harlow gives Phineas a little test. The doctor offers Phineas $1,000 for the pocketful of pebbles that Phineas has collected walking along the Black River near town. Dr. Harlow knows that Phineas can add and subtract, yet Phineas angrily refuses the deal. Dr. Harlow tells himself that a man who was so badly hurt is going to need time to regain his full powers.

As soon as Phineas leaves for home, Dr. Harlow writes a short report for the Boston Medical & Surgical Journal. Most doctors ignore Dr. Harlow’s article. The few who read it don’t believe it. How could a man survive such an injury, let alone make a “complete recovery”? But one Boston doctor is **intrigued**. He writes to Harlow for information and urges the Vermont doctor to back up his case by collecting **formal** statements from eyewitnesses in Cavendish. The letter is from Henry J. Bigelow, professor of surgery at the Harvard Medical College.



Under the microscope, streptococci bacteria have a distinctive beads-on-a-string appearance. “Strep” bacteria live on nearly everything people touch but are only dangerous if they can penetrate the body’s defense and overpower the immune system.



Staphylococci bacteria are the other half of the deadly duo of opportunistic bacteria. Infections by “staph” and “strep” were a leading cause of death before the discovery of antibiotic medicines. Somehow, Phineas’s immune system beat off their attack.

WORD UP!

During Reading

1

Do this during your first read.

Look for and ...

- Circle words you are unsure of
  - Should not be words already defined for you
- Use context clues to try to unlock the meaning of a word
- Annotate the definition in the margin of the text

Hint:
Do not distract from your reading by defining these words with an online dictionary. Only define words using context at this stage.

ANNOTATE

During Reading

2

Underline ideas that are significant to your understanding of the topic/paragraph/selection of text.

For everything you underline, write the **WHY** in the margin. This could be as simple as a symbol or a complete sentence explaining **WHY** the idea is important to you.

Symbol Suggestions:

Quotation Marks

to highlight a favorite quote or passage

Checkmarks/X

to agree or disagree

Other Symbols

*always take note of any date provided within a text

CENTRAL IDEA

During Reading

3

Identify repeated words and ideas. Identify patterns in the author's message.

What does this repetition and/or pattern suggest about the central idea?

Annotate the repetition with your answer.

PURPOSE

During Reading

4

Analyze the author's method of organization. Record it in the margin space.

Which way did your author organize the text?

- Cause and Effect
- Problem/Solution
- Description
- Compare/Contrast
- Sequence (a specific order of events/steps of a process)
- Chronological (the order of things in terms of time)

Hint:
Read through the **WHOLE** text and use the process of elimination to narrow down the method or organization.

During Reading

1

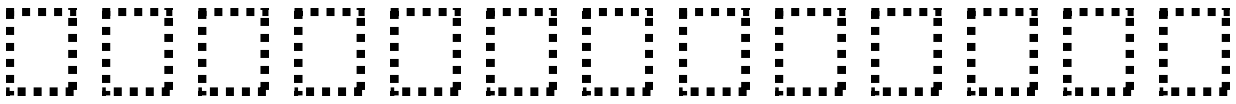
WORD UP!

Keep a writing utensil in your hand as you read and ...

- **Circle** words you are unsure of
  - *Should not be words already defined for you*
- **Use** context clues to try to unlock the meaning of a word
- **Annotate** the definition in the margin of the text

Tip:
Do not distract from your reading by defining these words with an online dictionary. Only define words using context at this stage.

Mark off a checkbox for every sub-heading completed in this step.



ANNOTATE

During Reading

2

For **every** paragraph

1. Consider the **sub-heading title**.
2. Based on the title, **underline** specific words and phrases that are significant to your understanding of the sub-heading, paragraph, or a selection of text.
    a. There is something in **all** paragraphs to find.
3. Write a **WHY** in the white space.
    a. **Every** underline needs a note/symbol

always take note of any date/time

Mark off a checkbox for every sub-heading completed in this step.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐

CENTRAL IDEA

During Reading

3

STEP 1

List repeated words and ideas to identify patterns in the author's message.

Step 2

Repeat this step for every sub-heading

Mark off a checkbox for every sub-heading completed for Step 2.

Step 3

Answer this question at the end of the article

What does this repetition and/or pattern suggest about the central idea?

Use ones of these sentence starters:

- This repetition highlights...
- A central idea that emerges through repetition is...
- In summary, the repetition and/or pattern in the text convey...

During Reading

4

PURPOSE

Analyze the author's method of organization.
Record it in the margin space of each sub-heading.

Which way did your author organize the text?

Cause/Effect: Reveals reasons and outcomes.

Problem/Solution: Identifies issues and proposes effective remedies.

Description: Details characteristics, creating a vivid picture.

Compare/Contrast: Examines similarities and differences.

Sequence: a specific order of events/steps of a process

Chronological: the order of things in terms of time

Mark off a checkbox for every sub-heading completed in this step.

☐☐☐☐☐☐☐☐☐☐☐☐

L2: ‘Phineas Should be Dead’ Exit Ticket

How do the different parts of this passage relate to each other?
Match the option to the correct paragraph number.

Paragraph 10: Amazingly, Phineas is still alive. The iron throws him flat on his back, but as his men come running through the gunpowder smoke, he sits up. A minute later, he speaks. Blood is pouring down his face from his forehead, but Phineas is talking about the explosion. His men insist on carrying him to an ox cart for the short ride into town. They gently lift him into the back of the cart so he can sit up with his legs out before him on the floor. An Irish workman grabs a horse and races ahead for the doctor while the ox cart ambulance rumbles slowly down the half-mile to Cavendish. Phineas’s excited men crowd alongside, walking next to their injured boss. Still acting as a foreman, Phineas calls out for his time book and makes an entry as he rolls toward town.

Choose one for this paragraph
Underline 3 clues to support your answer
a. Explains the science of brain injuries
b. Applies the science to Phineas' case
c. Tells part of Phineas' story

Paragraph 18: That’s a “closed brain” injury (sometimes called a concussion). The possibility of a closed brain injury is why doctors fuss if you bang your head falling off a bicycle or crashing a car or getting hit hard in the head with anything. (To prevent closed brain injuries, you should wear a helmet when bicycling, driving a race car, fighting in the infantry, playing tackle football, parachuting, exploring a cave, working on a construction site, or doing just about anything where you could strike your head hard. In Phineas’s case, however, a helmet would not have helped.)

Choose one for this paragraph
Underline 3 clues to support your answer
a. Explains the science of brain injuries
b. Applies the science to Phineas' case
c. Tells part of Phineas' story

Paragraph 19: Here Phineas has a stroke of luck. His is an “open brain” injury. The hole on top of his head gives his battered brain swelling room. The bad news is that his brain is open to infection. At first, though, he does remarkably well. The bleeding from his forehead slows and then stops within twenty-four hours. He remains cheerful and tells Dr. Harlow that he “does not care to see his friends, as he shall be at work in a few days.” The morning after the accident, however, he is glad to see his mother and uncle when they arrive from New Hampshire. Two days after the accident, he takes a turn for the worse. He develops a fever and begins to have delirious spells. His wound is leaking a foul-smelling liquid, a sure sign of infection. His death seems just a matter of time now.

Choose one for this paragraph
Underline 3 clues to support your answer
a. Explains the science of brain injuries
b. Applies the science to Phineas' case
c. Tells part of Phineas' story

Based on the information in the text, what conclusion can you draw about the doctors' treatment of Phineas?
a. The doctors only wanted to experiment on Phineas and didn't care about the outcome.
b. The doctors intentionally withheld treatment from Phineas that could have improved his condition.
c. The doctors treated Phineas according to the best medical knowledge of that time.
d. Phineas would have suffered no side-effects from the injury if he had been treated with the medical knowledge we have today.

L2: ‘Phineas Should be Dead’ Exit Ticket

How do the different parts of this passage relate to each other?
Match the option to the correct paragraph number.

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A Stroke of Luck

In a small town's annual pie-eating contest, Bob, an ordinary guy with a reputation for bad luck, unwittingly becomes the unsuspecting star of the event when a local prankster swaps his oversized clown shoes with roller skates. As Bob takes his first bite, the roller skates unexpectedly propel him forward, transforming the clumsy participant into a comically graceful glider. Maneuvering through the chaos with a mix of panic and inadvertent skill, Bob not only avoids collisions but finishes the pie in record time. The crowd, initially shocked, erupts into laughter and cheers, turning Bob's stroke of luck—courtesy of a prank gone right—into an absurd and hilarious triumph that cements his status as the town's unexpected hero.

Define the phrase "stroke of luck" based on the scenario with Bob in the pie-eating contest. In what ways did Bob's stroke of luck defy his reputation for bad luck in the town?

Use three words from the list to the right to support your answer.

Words To Use

Stroke of Luck
Unexpected
Triumphant
Transformation
Favorable
Positive
Comical/Comedy
Reputation
Adaptability
Elevated
Defied/Defies
Symbol of Misfortune
Symbol of Fortune
Challenging

A “stroke of luck” is when ... Bob's luck changed when a problem turned into ... Despite his usual bad luck, ... This not only made people see Bob differently but also ...

Once you have completed the task, make sure to put it in Excerpt 2 and be prepared to present it aloud in class tomorrow.

A Stroke of Luck

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Define the phrase "stroke of luck" based on the scenario with Bob in the pie-eating contest. How did the unexpected swapping of Bob's clown shoes with roller skates contribute to his "stroke of luck" in the pie-eating contest?

Use three words from the list to the right to support your answer.

Words To Use

Stroke of Luck
Unexpected
Triumphant
Transformation
Favorable
Positive
Comical/Comedy
Reputation
Adaptability
Elevated
Defied/Defies
Symbol of Misfortune
Symbol of Fortune
Challenging

A “stroke of luck” is when ... Bob's luck changed when ... This unexpected twist contributed to this “sol” (stroke of luck) because ...

Once you have completed the task, make sure to put it in Excerpt 2 and be prepared to present it aloud in class tomorrow.

Name:

“HORRIBLE ACCIDENT” IN VERMONT

Phineas' Unbelievable Survival

Excerpt 2

Amazingly, Phineas is still alive. The iron throws him flat on his back, but as his men come running through the gunpowder smoke, he sits up. A minute later, he speaks. Blood is pouring down his face from his forehead, but Phineas is talking about the explosion. His men insist on carrying him to an ox cart for the short ride into town. They gently lift him into the back of the cart so he can sit up with his legs out before him on the floor. An Irish workman grabs a horse and races ahead for the doctor while the ox cart ambulance **rumbles** slowly down the half-mile to Cavendish. Phineas’s excited men crowd alongside, walking next to their injured boss. Still acting as a foreman, Phineas calls out for his time book and makes an entry as he rolls toward town.

Something terrible has happened, yet Phineas gets down from the cart without help. He climbs the steps of the Cavendish hotel, where he has been living, and takes a seat on the porch beside his landlord, Joseph Adams. A few minutes earlier, Adams had seen the Irishman ride past shouting for Dr. Harlow, the town physician. Dr. Harlow was not to be found, so the rider was sent on to the next village to fetch Dr. Williams. Now Phineas takes a neighborly seat on the porch and tells his landlord what happened to him.

Medical Examination and Initial Treatment

That’s how Dr. Edward Williams finds Phineas nearly thirty minutes after the accident. Dr. Williams pulls up in his **buggy** at the hotel porch, and there is Phineas, talking away. Friends, workmates, and the curious crowd around as Dr. Williams climbs down from his carriage. “Well, here’s work enough for you, Doctor,” Phineas says to him quite cheerfully.

Dr. Williams examines Phineas’s head. He can’t believe that this man is still alive. His skull is cracked open, as if something has popped out from the inside. Accident victims are often too shaken to know what happened, so Dr. Williams turns to Phineas’s workmen for the story, but Phineas insists on speaking for himself. He tells Dr. Williams that the iron went right through his head.

Dr. Williams does not believe him. “I thought he was deceived,” Dr. Williams writes in his notes. “I asked him where the bar entered, and he pointed to the wound on his cheek, which I had not before discovered. This was a slit running from the angle of the jaw forward about one and a half inch. It was very much stretched laterally, and was discolored by powder and iron rust, at least appeared so. Mr. Gage persisted in saying that the bar went through his head. An Irishman standing by said, ‘Sure it was so, sir, for the bar is lying in the road below, all blood and brains.’”

Dr. Edward Williams graduated from Vermont Medical College and worked for a time as a physician. While living in Cavendish, Vermont he was the first physician to treat brain-injury survivor Phineas Gage after Gage's accident.

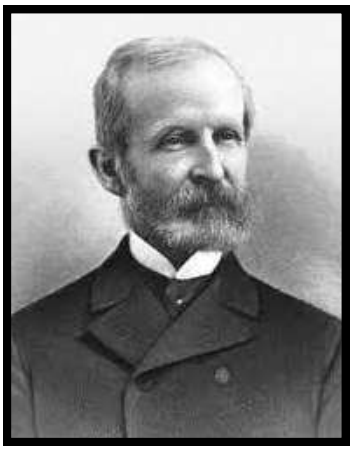
Dr. Harlow Steps In

It’s now an hour after the accident. The town’s regular physician, Dr. John Martyn Harlow, finally arrives at the hotel. The two doctors **confer**, but Dr. Harlow takes over the case. Phineas is a gruesome sight. Bleeding freely from his forehead and inside his mouth, Phineas looks to Dr. Harlow like a wounded man just carried in from a battlefield. Yet Phineas is alert, uncomplaining, and still telling anyone who’ll listen about the accident. Dr. Harlow wants Phineas to come in off the porch so he can treat his wound. Phineas gets up and, leaning only lightly on Dr. Harlow’s arm, climbs up a long flight of stairs to his room. He lies down on his own bed so Dr. Harlow can shave his head and examine the wound more closely. What the doctor sees is terrible. Something has erupted through the top of Phineas’s head, shattering the skull in its path and opening the brain to plain sight.

“HORRIBLE ACCIDENT” IN VERMONT

Excerpt 2

Dr. Harlow Steps In Contd.



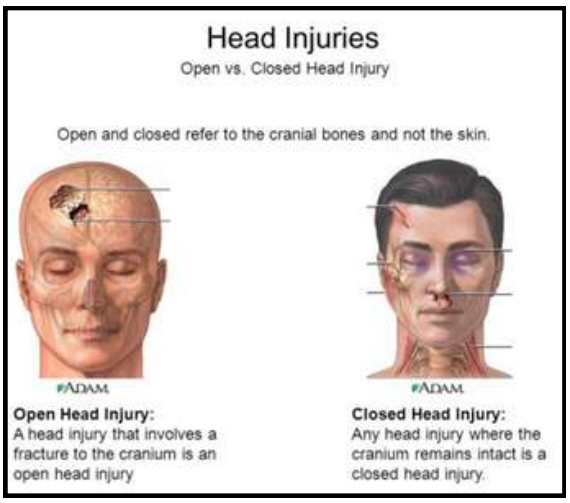
John Martyn Harlow (November 25, 1819 – May 13, 1907) was an American physician primarily remembered for his attendance on brain-injury survivor Phineas Gage, and for his published reports on Gage's accident and subsequent history.

Dr. Harlow does what he can. He cleans the skin around the hole, **extracts** the small **fragments** of bone, and gently presses the larger pieces of skull back in place. He looks inside Phineas’s mouth. He can see the hole where the iron passed upward through the roof of his mouth. Dr. Harlow decides to leave the hole open so the wound can drain. Then Dr. Harlow “dresses” the wound, pulling the loose skin back into position and taping it in place with **adhesive** strips. He puts a compress bandage directly over the wound and pulls Phineas’s nightcap down tightly over it. Finally he winds a roller bandage around his forehead to hold all the bandages securely. Only then does he notice Phineas’s hands and forearms, which are black with powder burns. Dr. Harlow dresses the burnt skin and has Phineas put to bed with his head **elevated**. He gives strict orders that his patient is to remain in that position.

The Dance Between "Closed" + "Open" Injuries

Phineas should have been dead long before this. A thirteen-pound iron rod through the head should kill a person instantly. Surviving that, he should have died of shock soon after reaching Cavendish. He’s lost a lot of blood, yet he remains awake and talkative. Even surviving the loss of blood, Phineas should have died of brain swelling. Any hard blow to the body causes injured tissue to **swell**. The brain is soft, and the skull is hard. A hard blow to the head can rattle the brain around inside like a BB in a tin can. The **rattling** bruises the brain, and bruised tissue swells. The brain swells, but the skull stays the same size; a swollen brain can jam itself so tightly it will cut off its own blood supply. This swelling can choke off oxygen to parts of the brain long enough to cause permanent damage. It can also cause death.

That’s a “closed brain” injury (sometimes called a concussion). The possibility of a closed brain injury is why doctors fuss if you bang your head falling off a bicycle or crashing a car or getting hit hard in the head with anything. (To prevent closed brain injuries, you should wear a helmet when bicycling, driving a race car, fighting in the infantry, playing tackle football, parachuting, exploring a cave, working on a construction site, or doing just about anything where you could strike your head hard. In Phineas’s case, however, a helmet would not have helped.)



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Name:

“HORRIBLE ACCIDENT” IN VERMONT

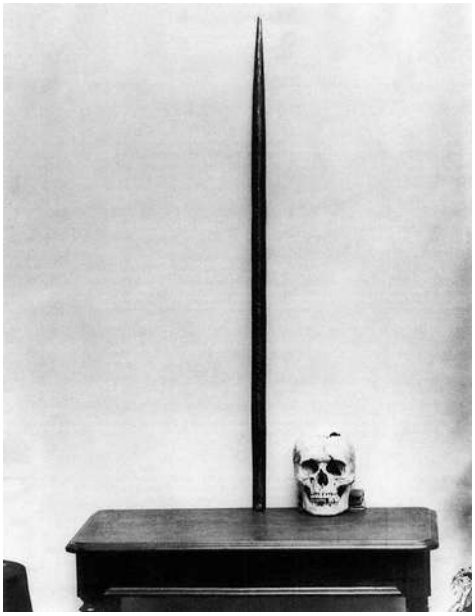
The Life-Altering Moment of Phineas Gage **Excerpt 1**

The most unlucky/lucky moment in the life of Phineas Gage is only a minute or two away. It’s almost four-thirty in the afternoon on September 13, 1848. Phineas is the **foreman** of a track construction gang that is in the process of blasting a railroad right-of-way through granite **bedrock** near the small town of Cavendish, Vermont. Phineas is twenty-six years old, unmarried, and five feet, six inches tall, short for our time but about average for his. He is good with his hands and good with his men, “possessing an **iron will** as well as an iron frame,” according to his doctor. In a moment, Phineas will have a horrible accident.

It will kill him, but it will take another eleven years, six months, and nineteen days to do so. In the short run, Phineas will make a full recovery, or so it will seem to those who didn’t know him before. Old friends and family will know the truth. Phineas will never be his old self again. His “**character**” will change. The ways in which he deals with others, **conducts himself**, and makes plans will all change. Long after the accident, his doctor will sum up his case for a medical journal. “Gage,” his doctor will write, “was no longer Gage.” Phineas Gage’s accident will make him world famous, but fame will do him little good. Yet for many others—psychologists, medical researchers, doctors, and especially those who suffer brain injuries—Phineas Gage will become someone worth knowing.

The Blasting Trade and Phineas's Tamping Iron

That’s why we know so much about Phineas. It’s been 150 years since his accident, yet we are still learning more about him. There’s also a lot about Phineas we don’t know and probably never will. The biggest question is the simplest one and the hardest to answer: Was Phineas lucky or unlucky? Once you hear his story, you can decide for yourself. But right now, Phineas is working on the railroad and his time has nearly come.



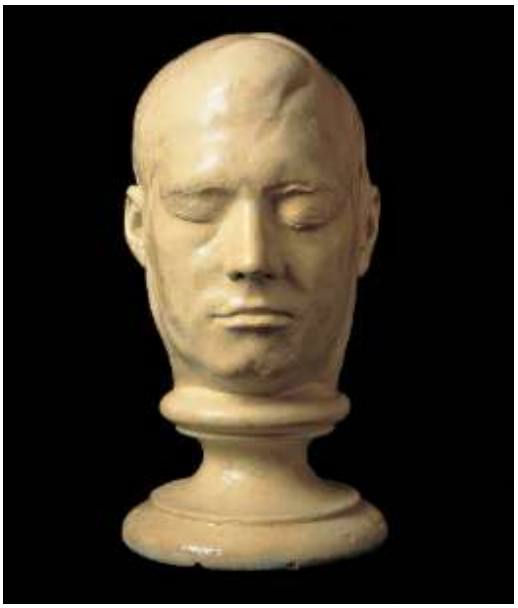
Building a railroad in 1848 is muscle work. There are no bulldozers or power shovels to open a way through Vermont’s Green Mountains for the Rutland & Burlington Railroad. Phineas’s men work with picks, shovels, and rock drills. Phineas’s special skill is blasting. With well-placed **charges** of black gunpowder, he **shatters** rock.

To set those charges, he carries the special tool of the blasting trade, his “**tamping iron**.” Some people confuse a tamping iron with a crowbar, but they are different tools for different jobs. A crowbar is for lifting up or prying apart something heavy. A tamping iron is for the delicate job of setting explosives. Phineas had his tamping iron made to order by a neighborhood blacksmith. It’s a tapering iron rod that is three feet, seven inches long and weighs thirteen and a half pounds. It looks like an iron spear. At the base, it’s fat and round, an inch and three quarters in diameter. The fat end is for tamping—packing down—**loose powder**. The other end comes to a sharp, narrow point and is for poking holes through the gunpowder to set the fuse. Phineas’s tamping iron is very smooth to the touch, smooth from the blacksmith’s forge as well as from constant use.

“HORRIBLE ACCIDENT” IN VERMONT **Excerpt 1**

His task is to blast the solid rock into pieces small enough for his crew to dig loose with hand tools and haul away in ox carts. The first step is to drill a hole in the bedrock at exactly the right angle and depth, or the explosion will be wasted. All day, Phineas must keep an eye on his drillers to make sure they stay ahead. All day, Phineas must keep an eye on his diggers to make sure they keep up. All the time between, Phineas and his assistant are working with touchy explosives.

They follow a strict routine. His assistant “charges” each new hole by filling the bottom with **coarse-grained** gunpowder. Phineas uses the narrow end of his iron to carefully press the ropelike fuse down into the powder. The assistant then fills up the rest of the hole with loose sand to act as a plug. Phineas will **tamp** the sand tight to bottle up the explosion, channeling the blast downward into the rock to shatter it. While his assistant is pouring the sand, Phineas flips his tamping iron around from the pointy end to the round end for tamping. Black powder is ticklish stuff. When it’s damp, nothing will set it off. When it’s too dry or mixed in the wrong formula, almost anything can set it off, without warning. But Phineas and his assistant have done this a thousand times—pour the powder, set the fuse, pour the sand, tamp the sand plug, shout a warning, light the fuse, and run like mad.



The Fateful Moment at the Blast Hole

But something goes wrong this time. The sand is never poured down the hole; the black powder and fuse sit **exposed** at the bottom. Does his assistant forget, or does Phineas forget to look? Witnesses disagree. A few yards behind Phineas, a group of his men are using a hand-cranked derrick crane to **hoist** a large piece of rock. Some of the men remember seeing Phineas standing over the blast hole, leaning lightly on the tamping iron. Others say Phineas was sitting on a rock ledge above the hole, holding the iron loosely between his knees.

There is no argument about what happens next. Something or someone distracts Phineas. Does he hear his name called? Does he spot someone goofing off? Whatever the reason, Phineas turns his head to glance over his right shoulder. The fat end of his tamping iron slips down into the hole and strikes the granite. A spark flies onto the exposed blasting powder. Blam! The drill hole acts as a gun barrel. Instead of a bullet, it fires Phineas’s rod straight upward. The iron shrieks through the air and comes down with a loud clang about thirty feet away.

This is what happens. Imagine you are inside Phineas’s head, watching in extreme slow motion: See the pointy end of the rod enter under his left cheekbone, pass behind his left eye, through the front of his brain, and out the middle of his forehead just above the hairline. It takes a fraction of a fraction of a second for the iron rod to pass from cheekbone to forehead, through and through.

After Reading

Identify repeated words/phrases and patterns in the author's message. What does the repetition and/or pattern suggest about the central idea of this excerpt?

I noticed a few repeated words/phrases within this excerpt. Most notably, between sub-headings "..." and "..." A pattern I noticed between these two sections of text was the repeated (insert an idea/word/phrase repeated between these 2 sections of text). I also noticed it being repeated ... This leads me to believe that the author's message is related/surrounds/connects to ...

When you are done, place this post-it onto the "'Horrible Accident" in Vermont" text and be prepared to share aloud.

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A Question About Luck

Alex finds a winning lottery ticket on the street. Ecstatic about their apparent stroke of luck, he decides to claim the prize. As Alex celebrates and starts making plans for the future, his friends and family treat him differently, and managing the wealth becomes overwhelming. Amid the chaos of managing the lottery winnings, Alex accidentally orders 100 bananas online instead of the intended 10 for a simple breakfast. The delivery turns into a surreal moment as a troop of escaped gorillas from the local zoo, lured by the scent, ends up converging on Alex's doorstep. While the bizarre incident adds a touch of humor to the situation, it further complicates Alex's life, creating an unexpected challenge to navigate alongside the more serious consequences of newfound wealth.

Do you think Alex can be considered truly lucky, given the unexpected challenges that came with winning the lottery? How do you define 'luck,' and how does this scenario with Alex apply to your definition?

Use three words from the list to the right to support your answer.

Words To Use

Unforeseen
Mixed
Fortunate
Cursed
Challenging
Complex
Unanticipated
Life-Altering
Reevaluate
Accident

Alex's situation does/doesn't seem lucky when you consider ... For example, ... Luck, to me, means ... It is generally a (positive/negative) thing. Alex's scenario would/would not apply because ...

When you are done, keep the post-it note here and be prepared to share aloud tomorrow in class.

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Reflection

Phineas Gage
Brain injury
Tamping iron
Neuroscience
Medical history
19th century medicine
Frontal lobe damage
Personality changes
Medical case study
Historical medical illustrations
Brain trauma
Medical advancements
Impact on psychology
Cognitive functions
Medical equipment and tools

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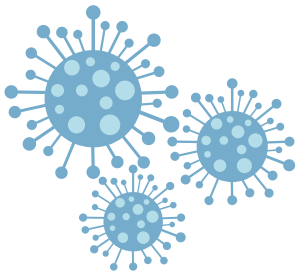
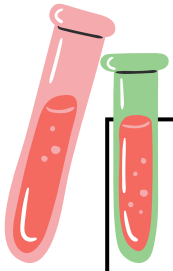


BRAIN SCIENCE PARTNER SIGNUP



Phineas Partner	
Tamping Iron Partner	
Gangrene Partner	
Medical Oddity Partner