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FOR SCHOOLS

SISSA

We are our brains!

A neuroscience game for high school

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European Children's Universities Network
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SEVENTH FRAMEWORK PROGRAMME

This project has been funded with support from the European Commission

Title: We are our brains
Area: Neuroscience
Type of Activity: Role playing game
Age: High school students
Duration: 30 minutes

Aims of the activity: Neuroscience is increasingly becoming more studied and relevant within the world of science. However, the brain is still relatively under-studied in school curriculums. This game gives students a taste of the complexity of the brain. It highlights how the diverse parts of the brain, each with its own function, work together to perceive the world around us. It also includes an introductory presentation on neuroscience.

Competences needed for teachers: No particular competences.

Materials needed

- heavy paper or tag board on which to print or glue the file 'Parts of the brain' for the number of students in your class. You could laminate the cards for multiple uses.
- string, to make the brain parts into either headbands or necklaces
- small pieces of paper and pens/pencils
- a projection system to show the included powerpoint presentation
- headphones to hear the included sounds from a computer
- optional: 3 blindfolds

For each sensory experience you will need some additional materials. You can choose your favorite experience or do them all. You can also create your own experiences.

Apple experience
- for touch: an apple
- for taste: bite sized pieces of an apple
- for smell: cut apple
- for sight: the included image “apple”
- for sound: the included sound files “apple bite” and “do you want a bite?”

Chewing gum experience:
- for touch: a piece of gum
- for taste: a piece of gum
- for smell: a piece of gum
- for sight: the included image “gum”
- for sound: the included sound files “chewing gum” and “do you want a piece?”

Potato chips experience:
- for touch: an open bag of chips
- for taste: potato chips
- for smell: potato chips
- for sight: the included image “chips”
- for sound: the included sound files “chewing gum” and “do you want one?”

Instructions

Before the activity

Arrange the tables or desks in a circle or rectangle. They will represent the skull. Since students will position themselves according to their brain areas and most of the brain areas are inside the skull, you should leave enough space inside the desks for almost all of the students. A few areas will be outside the skull, so leave some space outside the desks as well. Alternatively, you could create the skull using string, tape, or a rug on the floor.

It is possible for the game to be a stand-alone activity; however, we recommend that you use the included powerpoint/pdf presentation to introduce the game and the field of neuroscience to your students.

Below we provide an example script for the powerpoint presentation. We encourage you to adapt or expand upon this script to fit with your own knowledge, your students' knowledge, and the objective of your lesson.

1. Introduction to Neuroscience (slide 2 of the included presentation)

Slide 2: Start by asking your students a number of questions to see what they already know and think. What do you know about the brain? How is the brain studied? Who studies the brain? Add your own questions as well.

Slide 3: "What is Neuroscience? The word neuroscience is composed of two parts: Neuro and Science. Science is the study of something in a rational or logical way. Neuro is short for neurons, which are the type of cell that make up our brains."

Here each instructor can decide how detailed an explanation of neurons, in terms of structure and function, they would like to provide. A brief description is below:

"Neurons have two parts. They have a round body with lots of little branches and they have a very long tail that also has lots of little branches at the end. The branches on the tail connect to the branches of other neurons. Through these connections the neurons can send messages around the brain."

At this point you can ask your students what they think are the principle functions of the brain. The presentation continues with examples of brain functions. As each function appears you can discuss it with your students. Note that the list of functions in the presentation is not exhaustive.

"The brain is made up of many regions, each of which has its own particular function to perform. The regions work together to provide us with a complete understanding of the situation around us. The regions communicate with each other very quickly to keep us up to date.

Many of the actions that the brain, and more generally the nervous system, completes are under our control or at least we are aware of them. However, the autonomic nervous system controls actions below our level of consciousness. This includes regulating heartbeat, breathing, and digestion.

The brain is an extremely complex organ, more complex than the heart or the lungs. Because of this scientists still don't completely understand how it works. Neuroscientists work to figure out all of the mysteries of the brain."

Slide 4: The purpose of this slide is to demonstrate the breadth of the field of neuroscience, highlighting some of the largest subfields.

"Neuroscience is a broad field and there are many ways to study the brain. Here are a few of the main ways.

Neurobiology is the study of the nervous system at the cellular and molecular levels. It focuses largely on the structure and function of neurons, but considers other cell types as well. Neurobiologists study the structure of neurons, how neurons send messages to other neurons, how the various parts of neurons are made, and other things. (See the link below for more detailed information.)

In computational neuroscience the goal is to understand how networks of neurons are organized. Computational neuroscientists model the networks used for particular behaviors using a computer; they basically create an artificial neural network. Because the brain is so complex, it has to be simplified when creating an artificial network. This is done by including only a few regions of the brain and representing the strength of the connection between neurons with numbers. After an artificial network is created, computational neuroscientists compare it to the real brain. If the artificial network gives the same response as the real network, then the artificial network can be trusted and used to better understand the structure and mechanisms at work in our actual brains.

Cognitive neuroscience is the study of the various functions of the brain. For example, some cognitive neuroscientists study memory. They try to understand if we have just one type of memory or multiple types (sensory memory, short-term memory, long-term memory, episodic memory, procedural memory, etc.), what factors affect memory, how long it takes to store a memory, and where in the brain we store memories. Other cognitive neuroscientists ask similar questions about other cognitive functions."

Slide 5: The purpose of this slide is to discuss entities that are directly measureable and those that are not, such as cognitive functioning. You can point out that we have tools to measure some entities, such as temperature, height, and heartbeat. But for other entities we have to measure them in a less direct way, and often need to develop tools to do so.

Slide 6: When exploring a question in the field of cognitive neuroscience it's necessary to follow the series of steps listed on this slide. Discuss each step with your students. To involve them more you could have them think about how to proceed at each step with a particular cognitive function in mind. If they have trouble coming up with a function here are a few possibilities: how many ordered digits can a person remember, how long does it take to respond to the appearance of a stimulus, does response time change when listening to music compared to silence.

2. Role playing game 'We are our brains'

"Now we'll try being all the parts of the brain and see if we can do it!"

Assign each student (or pair of students) a part of the brain. To easily identify during the game what role each student is playing, the string can be used to put the ID card either around each student's forehead or hanging around their neck.

The sensory brain areas are identified by a picture of an eye in their descriptions. These are the areas that will receive the sensory stimulations listed above (touch, taste, smell, sight, sound).

Additional sensory brain areas are identified by a picture of a little person in their descriptions. These students will report the sensations they feel in their own bodies relevant to their assigned brain area (temperature or internal sensations).

Roles that require students to write something down are identified by a notepad icon. These students will need paper and a pen or pencil.

When all the roles have been assigned and the students are ready, you can proceed with slide 3 of the presentation. (Be sure to use the correct presentation for the number of roles you assigned.)

“We are now going to find out what everyone’s role is and place ourselves in the correct place. It’s important to understand your own role, but it’s also important to listen to everyone else’s role.”

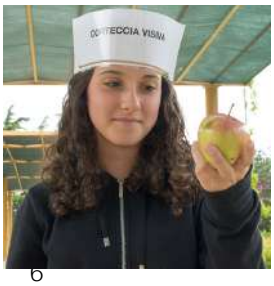
Now you can start revealing brain areas on the powerpoint presentation. As each area appears, have the student(s) with that role place themselves in the correct place relative to your “skull.” Then ask them to read the description of their brain area. For example: *“I am the visual cortex. The visual cortex is at the back of the brain. It combines the information that comes from the two parts of the retinas in the eyes. What should you do: Think about the information you received from the part of the RETINA that processes IMAGES and the part of the RETINA that processes COLORS. Try to figure out what object the eyes saw. Write it down and pass it to the THALAMUS.”*

When all the brain areas are revealed and the students are in position, give the sensory stimuli to the students with the eye icons according to the following:

- The two parts of the retina – the sight stimuli
- The tongue – the taste stimuli, ask them to hold their nose and close their eyes (or blindfold them) so that they experience only the taste of the item
- The olfactory system – the smell stimuli, ask them to close their eyes (or blindfold them) so that they experience only the smell of the item
- The two ears – the sound stimuli
- Touch – the touch stimuli, ask them to close their eyes (or blindfold them) so that they experience only the feel of the item

IMPORTANT: The other students shouldn’t know what stimuli these 5 systems received. The idea of the game is for them to work together as the separate areas of the brain would to figure out what each item is.

When all the sensory stimuli have been experienced the game is ready to begin. Each student follows the instructions in their description to contribute to the overall understanding of the item. The game finishes when all of the information has reached the Frontal Lobe. This student will then use the information to say what the item was. You can then reveal the initial stimuli and compare the final result with these inputs. You can also point out that the students took much longer to understand the item than the brain does. The brain can understand much more complicated situations in very little time; it is an extremely fast and efficient organ.



Considerations for educators and facilitators:

1. There are versions of the game available for 10, 15, or 20 participants. You can select the size that works best for your class or group, of course there's always the option of students working in pairs. This sizing is true of both the roles as well as the powerpoint presentation, so please be sure to select the files for both.

2. We provide the images and sound files for the 3 listed experiences, but you are welcome to create your own experiences. Multiple experiences may give students the opportunity to try multiple roles.

3. The students are usually quite confused when the game starts. To help alleviate this confusion make sure that each student understands what they are supposed to do before the game starts. Again, including multiple experiences may lead to smoother later games.

Useful links

Neurons structure and function: http://en.wikipedia.org/wiki/Neuron

Neurons structure and function: https://faculty.washington.edu/chudler/cells.html

Brain structure for children: http://kidshealth.org/kid/htbw/brain.html#

Brain structure for children: http://www.cyh.com/HealthTopics/HealthTopicDetailsKids.aspx?p=335&np=152&id=1528

Summary of included files

ATTACHMENT 1: Parts of the brain for 10 roles

ATTACHMENT 1: Parts of the brain for 15 roles

ATTACHMENT 1: Parts of the brain for 20 roles

Presentation_WeAreOurBrain_x10

Presentation_WeAreOurBrain_x15

Presentation_WeAreOurBrain_x20

Sound_Apple

Sound_WouldYouLikeABite?

Sound_Chewing_chips

Sound_Chewing_chewing-gum

Soun_WouldYouLikeOne?

Picture_Apple

Picture_Chewing-gum

Picture_Chips

ATTACHMENT 1: Parts of Brain for 10 roles

RETINA

The retina is a part of the brain that is inside the eye. It transforms the things we see into information that the brain can understand.

What should you do: What do you see? Try to make sense of the images you see. Tell it to the THALAMUS.

EARS

Each of our ears has a special membrane or surface. When sounds hit our ears they make this special membrane vibrate. Our brains understand what sound we heard based on these vibrations. The membrane acts to transform sounds into information that the brain can understand.

What should you do: Think about what you hear and tell it to the THALAMUS.

TOUCH

Your touch system is not inside your brain, it's all over your body in your skin. Its purpose is to feel things that are touching your skin.

What should you do: Think about what you are touching. Is it wet, dry, soft, hard, smooth, bumpy, painful, itchy, something else? Decide how the object feels and then tell the SPINAL CORD.

INTERNAL SENSATIONS SYSTEM

Your internal sensations system is not inside your brain, but it's in every other part of your body. Its purpose is to feel the sensations that come from your internal organs, like your stomach, heart, and lungs.

What should you do: Think about what your internal organs are telling you. Are you hungry or full? Do you need to use the bathroom? Do some of your muscles hurt? Tell the SPINAL CORD what you are feeling.

SPINAL CORD

The spinal cord is like a bunch of strings. It goes from your brain to your tailbone inside your spine. It's used to pass messages from your brain to the rest of your body and from the rest of your body to your brain.

What should you do: Think about the information you received from TOUCH and the INTERNAL SENSATIONS SYSTEM. Try to understand what they are feeling. Write it down and pass it to the THALAMUS.

OLFACTORY SYSTEM

The olfactory system is inside the nose. It transforms smells into information that the brain can understand.

What should you do: What do you smell? Write down what you smell and pass it to the THALAMUS.

TONGUE

Everyone knows where the tongue is. Your tongue tastes things and transforms the tastes into information that your brain can understand.
What should you do: What do you taste? Taste is affected by smell so ask the OLFACTORY SYSTEM what it smells. Think about what you taste. Write it down and pass it to the THALAMUS.

THALAMUS

The thalamus is the part of the brain that receives information from all the senses. It then sends the information to different parts of the brain that each has its own function. The thalamus is similar to a post office; it sorts messages and sends them to the correct place. Since the thalamus needs to be in contact with all the other systems, it's in the middle of the brain.
What should you do: Collect and read all the messages that the other systems have sent you. Send them all to both the FRONTAL LOBE and MEMORY.

MEMORY

Memory is used to store all the important information we collect so that we can remember it when we need it. Memory doesn't have a precise spot in the brain, though surely some memory is found on the outer part of the brain.
What should you do: Think about all the things that the THALAMUS told you. Is there something that you remember it told you more than once? Write it down and pass it to the FRONTAL LOBE.

FRONTAL LOBE

The frontal lobe is just behind your forehead, at the front of your brain, that's why it's called the frontal lobe! It does lots of things and is one of the most mysterious parts of the brain. It combines messages that it receives from all the other parts of the brain. It allows us to think, count, make decisions, dream, and that's just part of the list!
What should you do: Collect all the messages that the other parts and systems have sent you. Put everything together and tell everyone else the combined message.

ATTACHMENT 2: Parts of Brain for 15 roles

THE PART OF THE RETINA THAT PROCESSES IMAGES

The retina is a part of the brain that is inside the eye. It transforms the things we see into information that the brain can understand.

What should you do: What do you see? Try to make sense of the images you see. Tell the VISUAL CORTEX what objects you see.

Be careful! You can't see colors!

THE PART OF THE RETINA THAT PROCESSES COLORS

The retina is a part of the brain that is inside the eye. It transforms the things we see into information that the brain can understand.

What should you do: What colors do you see? Think about what colors are in the images. Tell the VISUAL CORTEX what colors you see.

VISUAL CORTEX

The visual cortex is at the back of the brain. It combines the information that comes from the two parts of the retinas in the eyes.

What should you do: Think about the information you received from the part of the RETINA that processes IMAGES and the part of the RETINA that processes COLORS. Try to figure out what object the eye saw. Write it down and pass it to the THALAMUS.

EARS

Each of our ears has a special membrane or surface. When sounds hit our ears they make this special membrane vibrate. Our brains understand what sound we heard based on these vibrations. The membrane acts to transform sounds into information that the brain can understand.

What should you do: Think about what you hear and tell it to the AUDITORY SYSTEM.

AUDITORY SYSTEM

The auditory system combines the information that comes from the ears.

What should you do: Think about the information you received from the two EARS. Try to figure out what sounds they heard. Write them down and pass them to the THALAMUS.

If the sounds they heard were words, pass them to the LANGUAGE SYSTEM instead.

Be careful! You can hear human voices and know who is talking, but you can't understand what they said. Understanding what the words mean is the job of the LANGUAGE SYSTEM.

TOUCH

Your touch system is not inside your brain, it's all over your body in your skin. Its purpose is to feel things that are touching your skin.
What should you do: Think about what you are touching. Is it wet, dry, soft, hard, smooth, bumpy, painful, itchy, something else? Decide how the object feels and then tell the SPINAL CORD.

TEMPERATURE DETECTION SYSTEM

Your temperature detection system is not inside your brain, it's all over your body in your skin. Its purpose is to feel the temperature of things that are touching your skin. And don't forget, the air is touching your skin.
What should you do: Think about the temperature your body feels. Is it hot, cold, room temperature? Pass on what temperature you feel to the SPINAL CORD.

INTERNAL SENSATIONS SYSTEM

Your internal sensations system is not inside your brain, but it's in every other part of your body. Its purpose is to feel the sensations that come from your internal organs, like your stomach, heart, and lungs.
What should you do: Think about what your internal organs are telling you. Are you hungry or full? Do you need to use the bathroom? Do some of your muscles hurt? Tell the SPINAL CORD what you are feeling.

SPINAL CORD

The spinal cord is like a bunch of strings. It goes from your brain to your tailbone inside your spine. It's used to pass messages from your brain to the rest of your body and from the rest of your body to your brain.
What should you do: Think about the information you received from TOUCH, the TEMPERATURE DETECTION SYSTEM, and the INTERNAL SENSATIONS SYSTEM. Try to understand what they are feeling. Write it down and pass it to the THALAMUS.

OLFACTORY SYSTEM

The olfactory system is inside the nose. It transforms smells into information that the brain can understand.
What should you do: What do you smell? Write down what you smell and pass it to the THALAMUS.

TONGUE

Everyone knows where the tongue is. Your tongue tastes things and transforms the tastes into information that your brain can understand.
What should you do: What do you taste? Taste is affected by smell so ask the OLFACTORY SYSTEM what it smells. Think about what you taste. Write it down and pass it to the THALAMUS.

THALAMUS

The thalamus is the part of the brain that receives information from all the senses. It then sends the information to different parts of the brain that each has its own function. The thalamus is similar to a post office; it sorts messages and sends them to the correct place. Since the thalamus needs to be in contact with all the other systems, it's in the middle of the brain.
What should you do: Collect and read all the messages that the other systems have sent you. Send them all to both the FRONTAL LOBE and MEMORY.

MEMORY

Memory is used to store all the important information we collect so that we can remember it when we need it. Memory doesn't have a precise spot in the brain, though surely some memory is found on the outer part of the brain.
What should you do: Think about all the things that the THALAMUS told you. Is there something that you remember it told you more than once? Write it down and pass it to the FRONTAL LOBE.

LANGUAGE SYSTEM

The language system is found in the part of the brain that is above your ears, on both sides of your head. Its purpose is to understand which of the sounds we hear are words and then to figure out what these words mean.
What should you do: If the EARS heard any words, the AUDITORY SYSTEM will pass them to you. Think about what they mean and write it down for the FRONTAL LOBE.

FRONTAL LOBE

The frontal lobe is just behind your forehead, at the front of your brain, that's why it's called the frontal lobe! It does lots of things and is one of the most mysterious parts of the brain. It combines messages that it receives from all the other parts of the brain. It allows us to think, count, make decisions, dream, and that's just part of the list!
What should you do: Collect all the messages that the other parts and systems have sent you. Put everything together and tell everyone else the combined message.

ATTACHMENT 3: Parts of Brain for 20 roles

THE PART OF THE RETINA THAT PROCESSES IMAGES

The retina is a part of the brain that is inside the eye. It transforms the things we see into information that the brain can understand.
What should you do: What do you see? Try to make sense of the images you see. Tell the VISUAL CORTEX what objects you see.
Be careful! You can't see colors!

THE PART OF THE RETINA THAT PROCESSES COLORS

The retina is a part of the brain that is inside the eye. It transforms the things we see into information that the brain can understand.
What should you do: What colors do you see? Think about what colors are in the images. Tell the VISUAL CORTEX what colors you see.

VISUAL CORTEX

The visual cortex is at the back of the brain. It combines the information that comes from the two parts of the retinas in the eyes.
What should you do: Think about the information you received from the part of the RETINA that processes IMAGES and the part of the RETINA that processes COLORS. Try to figure out what object the eye saw. Write it down and pass it to the THALAMUS.

RIGHT EAR

Each of our ears has a special membrane or surface. When sounds hit our ears they make this special membrane vibrate. Our brains understand what sound we heard based on these vibrations. The membrane acts to transform sounds into information that the brain can understand.
What should you do: Together with the LEFT EAR, think about what you hear. Tell the AUDITORY SYSTEM what you hear.

LEFT EAR

Each of our ears has a special membrane or surface. When sounds hit our ears they make this special membrane vibrate. Our brains understand what sound we heard based on these vibrations. The membrane acts to transform sounds into information that the brain can understand.
What should you do: Together with the RIGHT EAR, think about what you hear. Tell the AUDITORY SYSTEM what you hear.

AUDITORY SYSTEM

The auditory system combines the information that comes from the ears.
What should you do: Think about the information you received from the two EARS. Try to figure out what sounds they heard. Write them down and pass them to the THALAMUS.
If the sounds they heard were words, pass them to the LANGUAGE SYSTEM instead.
Be careful! You can hear human voices and know who is talking, but you can't understand what they said. Understanding what the words mean is the job of the LANGUAGE SYSTEM.

BALANCE SYSTEM

Everyone knows that we use our ears to hear, but did you know that they also help us with balance? The balance system is located in the inner part of the ear, the part you can't reach with your finger or a Q-tip. It's made up of three canals filled with liquid that help our brain know how our bodies are positioned and if we're moving.
What should you do: Think about how your body is positioned: lying down, sitting, standing up, something else? Write down your body position and pass it to the THALAMUS. If you think your body is out of balance tell the MOTOR CORTEX right away.

TOUCH

Your touch system is not inside your brain, it's all over your body in your skin. Its purpose is to feel things that are touching your skin.
What should you do: Think about what you are touching. Is it wet, dry, soft, hard, smooth, bumpy, painful, itchy, something else? Decide how the object feels and then tell the SPINAL CORD.

TEMPERATURE DETECTION SYSTEM

Your temperature detection system is not inside your brain, it's all over your body in your skin. Its purpose is to feel the temperature of things that are touching your skin. And don't forget, the air is touching your skin.
What should you do: Think about the temperature your body feels. Is it hot, cold, room temperature? Pass on what temperature you feel to the SPINAL CORD.

INTERNAL SENSATIONS SYSTEM

Your internal sensations system is not inside your brain, but it's in every other part of your body. Its purpose is to feel the sensations that come from your internal organs, like your stomach, heart, and lungs.
What should you do: Think about what your internal organs are telling you. Are you hungry or full? Do you need to use the bathroom? Do some of your muscles hurt? Tell the SPINAL CORD what you are feeling.

SPINAL CORD

The spinal cord is like a bunch of strings. It goes from your brain to your tailbone inside your spine. It's used to pass messages from your brain to the rest of your body and from the rest of your body to your brain.

What should you do: Think about the information you received from TOUCH, the TEMPERATURE DETECTION SYSTEM, and the INTERNAL SENSATIONS SYSTEM. Try to understand what they are feeling. Write it down and pass it to the THALAMUS. If there is some feeling that needs a motor response right away, tell the MOTOR CORTEX. As a response the MOTOR CORTEX may ask you to pass some commands to the MUSCULAR SYSTEM.

OLFACTORY SYSTEM

The olfactory system is inside the nose. It transforms smells into information that the brain can understand.

What should you do: What do you smell? Write down what you smell and pass it to the THALAMUS.

TONGUE

Everyone knows where the tongue is. Your tongue tastes things and transforms the tastes into information that your brain can understand.

What should you do: What do you taste? Taste is affected by smell so ask the OLFACTORY SYSTEM what it smells. Think about what you taste. Write it down and pass it to the THALAMUS.

THALAMUS

The thalamus is the part of the brain that receives information from all the senses. It then sends the information to different parts of the brain that each has its own function. The thalamus is similar to a post office; it sorts messages and sends them to the correct place. Since the thalamus needs to be in contact with all the other systems, it's in the middle of the brain.

What should you do: Collect and read all the messages that the other systems have sent you. Send them all to both the FRONTAL LOBE and MEMORY.

FRONTAL LOBE

The frontal lobe is just behind your forehead, at the front of your brain, that's why it's called the frontal lobe! It does lots of things and is one of the most mysterious parts of the brain. It combines messages that it receives from all the other parts of the brain. It allows us to think, count, make decisions, dream, and that's just part of the list!

What should you do: Collect all the messages that the other parts and systems have sent you. Put everything together and tell everyone else the combined message. If you think there is some action that needs to be done tell the MOTOR CORTEX. The MOTOR CORTEX will then tell the SPINAL CORD who will tell the MUSCULAR SYSTEM who will do the action.

AMYGDALA

The amygdala is a small part of the brain that is the shape of an almond. It's in the inner part of the brain. Its purpose is to think about our emotions.

What should you do: Listen to what MEMORY tells you. Does it make you feel any emotions? Which ones? Anger, happiness, surprise, sadness, fear, something else? Write down what you feel and pass it to the FRONTAL LOBE.

MOTOR CORTEX

The motor cortex is a part of the brain; it's located at the very top of your head. Its purpose is to tell your body how to move. The motor cortex receives urgent information from the SPINAL CORD when a response is needed right away, like when you are about to fall. When you have more time to think about and plan your movements the information comes to motor cortex from the FRONTAL LOBE.

What should you do: Collect the urgent information from the SPINAL CORD and BALANCE SYSTEM. You may need to respond quickly to this information, write down what the SPINAL CORD should do and pass it back. The FRONTAL LOBE will also pass you information about the actions it wants to do. Think about how to accomplish these actions. What parts of your body need to move? How should they move? Write down instructions for the actions and pass them to the SPINAL CORD. The SPINAL CORD will then pass them to the MUSCULAR SYSTEM.

MEMORY

Memory is used to store all the important information we collect so that we can remember it when we need it. Memory doesn't have a precise spot in the brain, though surely some memory is found on the outer part of the brain.

What should you do: Think about all the things that the THALAMUS told you. Is there something that you remember it told you more than once? If so tell it to the AMYGDALA and write it down and pass it to the FRONTAL LOBE.

LANGUAGE SYSTEM

The language system is found in the part of the brain that is above your ears, on both sides of your head. Its purpose is to understand which of the sounds we hear are words and then to figure out what these words mean.

What should you do: If the EARS heard any words, the AUDITORY SYSTEM will pass them to you. Think about what they mean and write it down for the FRONTAL LOBE.

MUSCULAR SYSTEM

The muscular system is not part of the brain, but the brain controls it. As you probably know, muscles are all over our body and are attached to each other, to our bones, and to our joints. Some muscles are voluntary, which means that we decide when and how to move them. Luckily we also have many involuntary muscles, like the heart and the digestive system. These muscles move on their own, without us consciously telling them to. Can you imagine if we had to constantly remember to make our heart beat or to contract our stomach to digest our food? It would be a nightmare!

What should you do: Collect all the messages that the MOTOR CORTEX sent you through the SPINAL CORD. Think about what parts of your body need to move to do the action.