

How the Drum Teaches us About our Identity

Learning Objectives

1. Understand how chemical messages are passed in the brain.
2. Learn how the culture and our brain influence who we are.
3. Learn about how neurons pass messages in the brain using neurotransmitters as chemical messengers

Introduction

In this activity, we will learn about how the brain sends chemical messages. The teachings of the drum will help us learn how our brain works.

The drumsticks represent our mother and father who come together to form our heartbeat on the drum (1). The songs that are sung to the beat of the drum may have a story or message that is passed between generations. Our traditional songs are sung in Mi'kmaq. Only those who can understand the language can explain the message and teach others. The messages, language, song, and drum are all important parts of our identity.

Special chemical messengers in our brain can influence how we think and feel. Everyone has these chemical messengers. When our mother and father come together to form our heartbeat, we inherit different pieces of who they are. This can include how the chemical messengers in our brains work.

Our brain passes these chemical messages just like the drum passes messages through songs. Each chemical in the brain has a specific message, just like each song on the drum has a message or story.

An example of a song that has a message is the Gathering Song. This is a song written by George Paul. This is the same person who wrote the Honour Song.

You can find the song at the following youtube link:

https://www.youtube.com/watch?v=UOpX3a_LH90

In order for Mi'kmaq people who speak English to understand this song and pass on the message, it needs to be translated or explained. The brain also needs the chemicals to be translated to be passed to other parts of the brain. Today we will learn how these chemicals are translated.

In order for the message of the drum song to continue being passed between generations, it needs to be sung and explained. Our brain also needs to continue

passing its chemical messages in order for us to think and feel. It can only pass the message if it gets translated.

The chemical messages sent in the brain and the cultural stories sung to the beat of the drum are both part of our identity.

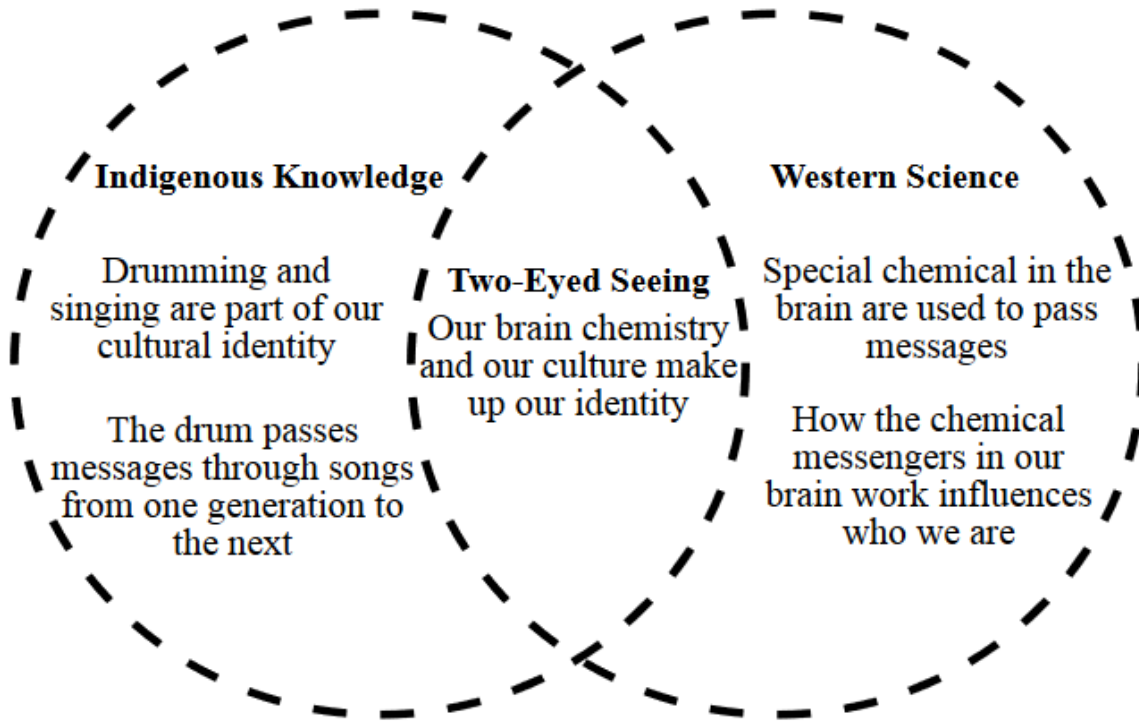


Figure 1. Two-Eyed Seeing Diagram

What is the message of the gathering song?

Wejkwita'jik nkikma'q wula tet nike' a

(Wej-gwee-dah-jik nin-gig-ah-mah woo-lah ded nee-gay ah)

Our Family is coming, to this place right now

Ma'wiomi weskowa'sit, weltasualtultiek (ah way)

(Mah-wee-oh-mee wis-goh-wah-seet, well-dah-swole-doo-deeg ah way)

We are having a gathering and we are happy (about it)

Wejkwita'jik niskamijk wula tet nike' a

(Wej-gwee-dah-jik niss-gah-mij woo-lah ded nee-gay ah)

Our grandfathers are coming, to this place right now

Nenmitij na telta'jik, petaqte'ji'jk wtowtiwow.

(Nen-ah-mee-deej na dell-dah-jig, beh-dok-day-jeejk oo-dow-dee-who)

They know where they are going, their road is straight

Wejkwita'jik no'kmaq wula tet nike' a

(Wej-gwee-dah-jik noh-gah-mah woo-lah ded nee-gay ah)

All of our relations are coming, to this place right now

Pepkwijete' ma'tijik newtitpa'q Way ha ya yo way.

(Beb-kwi-jeh-day-mah-dih-jeeg nayoh-dee-bah Way ha ya yo way)

We will drum all night

Questions and answers about the brain

What is a Neuron?

The neuron is a cell in the brain that receives and translates messages. It helps to pass the message through the brain. There are millions of neurons in our brain that help pass messages. The largest part of the neuron is called the "soma". This is where messages are received (2). There are branches on the soma called "dendrites". The dendrites catch messages to be brought to the soma (2). The soma translates the chemical into an electrical message and sends it down a long tail. This tail is called the "axon" and is connected to the end of the neuron (2). At the end of the axon is the "axon terminal". The axon terminal has chemical messengers stored, ready to be released so the message can continue being passed on (2). When the electrical signal reaches the axon terminal, it releases the message to be sent to another nearby neuron.

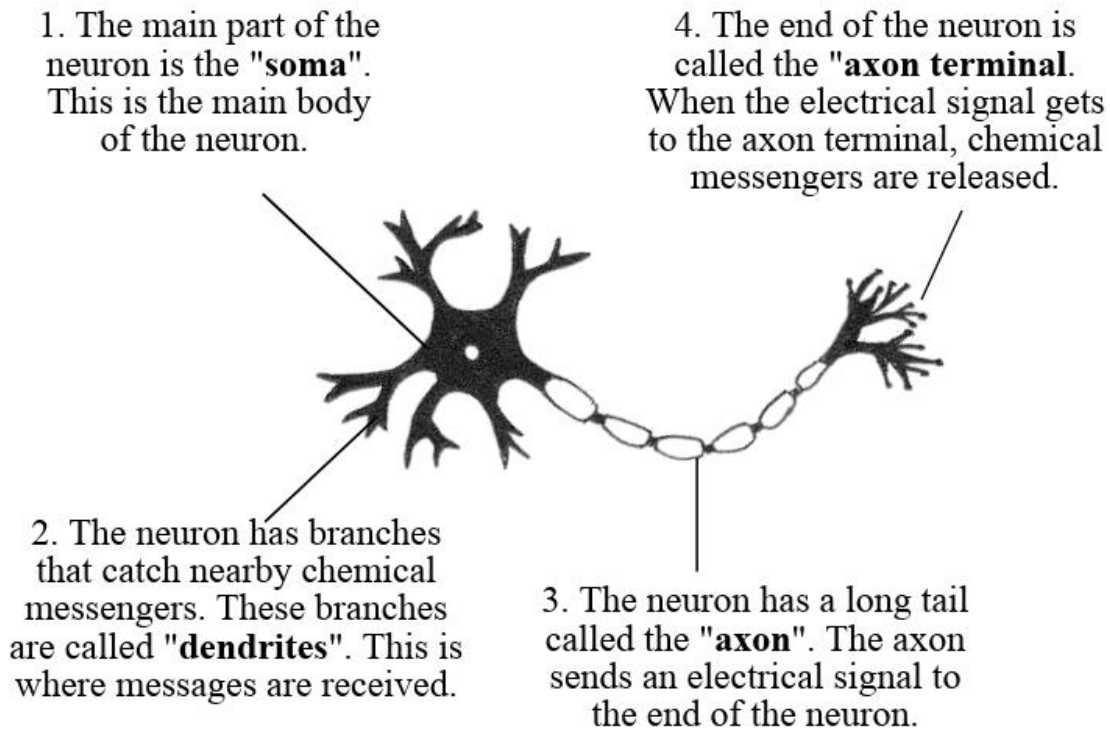


Figure 2. Parts of the Neuron

What are Neurotransmitters?

The chemical messengers that are used by neurons are called neurotransmitters. There are many neurotransmitters in the body with many messages. These neurotransmitters can only be translated if they reach the correct “receptors”. The receptors pass the message to the soma and it is translated into the electrical signal (2). The electrical signal is passed to the end of the neuron. At the end of the neuron at the axon terminal, the electrical signal causes more neurotransmitters to be released. The message is then released into the “synapse”. This is the space between two neurons (2). Figure 2 shows how the neurotransmitters are used by the neuron.

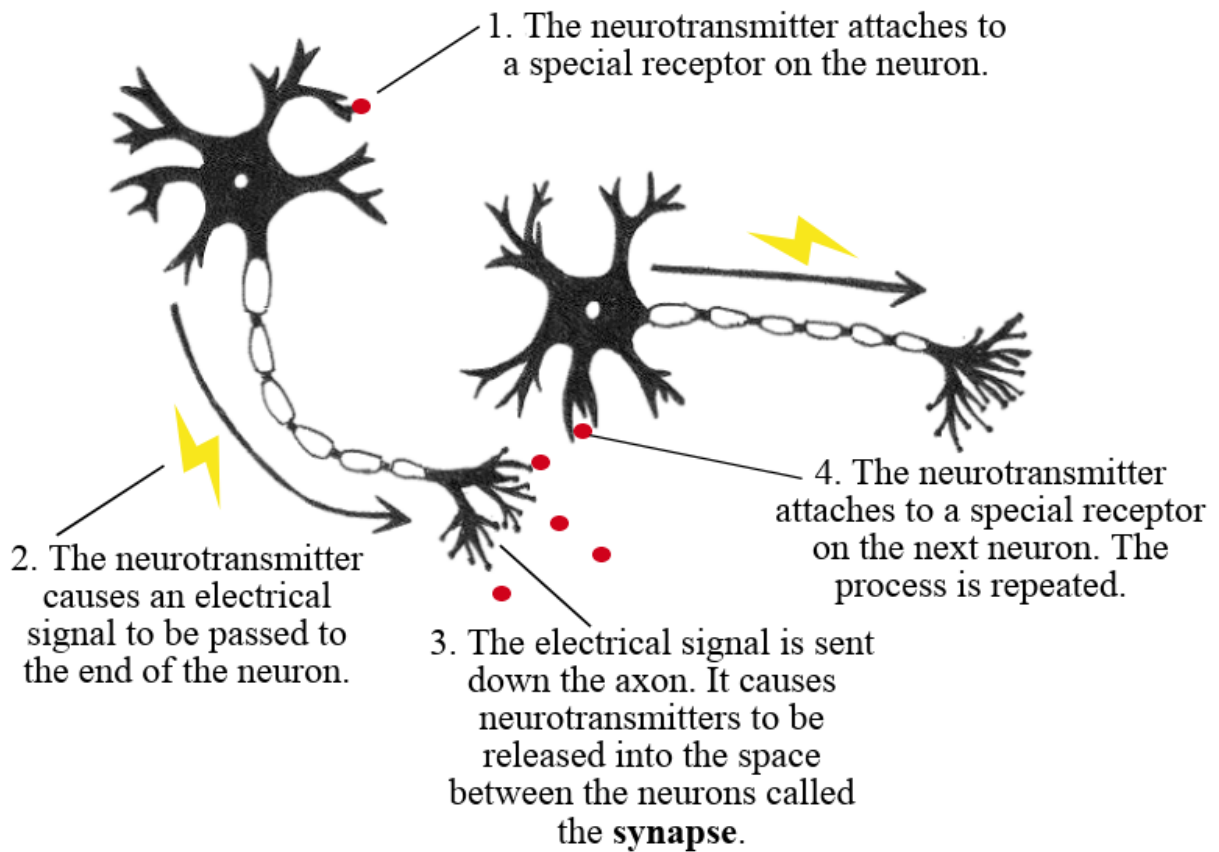


Figure 3. How neurotransmitters are passed in the brain

What are examples of neurotransmitters?

In our activity today we will learn about three of the neurotransmitters. They are called dopamine, acetylcholine, and epinephrine. Dopamine is a neurotransmitter that passes a message of feeling good. It is sent when we feel good or motivated (2). Acetylcholine is a neurotransmitter that passes a message telling us to move. The message is sent when we want to move muscles in our body (2). Epinephrine is a neurotransmitter that passes a message of feeling stressed or afraid. The message is sent when we are in danger or in stressful situations (2). Table 1 shows each of these neurotransmitters.

Table 1: Neurotransmitters and their Messages

| Neurotransmitter | Message |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dopamine | The message carried by this neurotransmitter is related to pleasure, reward, and motivation. It is released to send a message in response to something good (2). |
| Acetylcholine | The message carried by this neurotransmitter is related to movement of muscles in the body. It is released to tell muscles to move (2). |
| Epinephrine (also known as adrenaline) | The message carried in this neurotransmitter is related to stress or being afraid. It is released in the body to help you in stressful situations (2). |

Activity 1: Neuroscience Relay Race

What we need for our activity:

- 7 boxes
- 6 red balls
- 6 purple balls
- 6 green balls
- 9 yellow balls
- Hand drums

What we will do, step by step:

Step 1: Set up

Split into two teams. Use the figure on the next page and the directions below to set up each team and the materials.

- a) In a large space, such as a gym, have two camp counselors or drummers stand in the middle. Each drummer represents a “soma” of a neuron.
- b) Each team should stand in a line in front of the drummer or counselor on their team. The line of campers represents the “axon” (tail) of the neuron.
- c) Set up three boxes about five to ten meters from the camper furthest from the drummers. Label the boxes with the names of the neurotransmitters and what they do. The boxes represent the receptors for each neurotransmitter.
- d) Have one camper stand between the person between the end of the axon and the boxes. This person represents the synapse (the space between two neurons)
- e) Place half of the red, purple, and green balls in a box at the “axon terminal” of team one, and the other half in a box at the “axon terminal” of team two.
- f) Place half of the yellow balls in one box and half in another. Put the boxes at the beginning of each axon, closest to the drummers. These yellow balls represent the electrical signal.

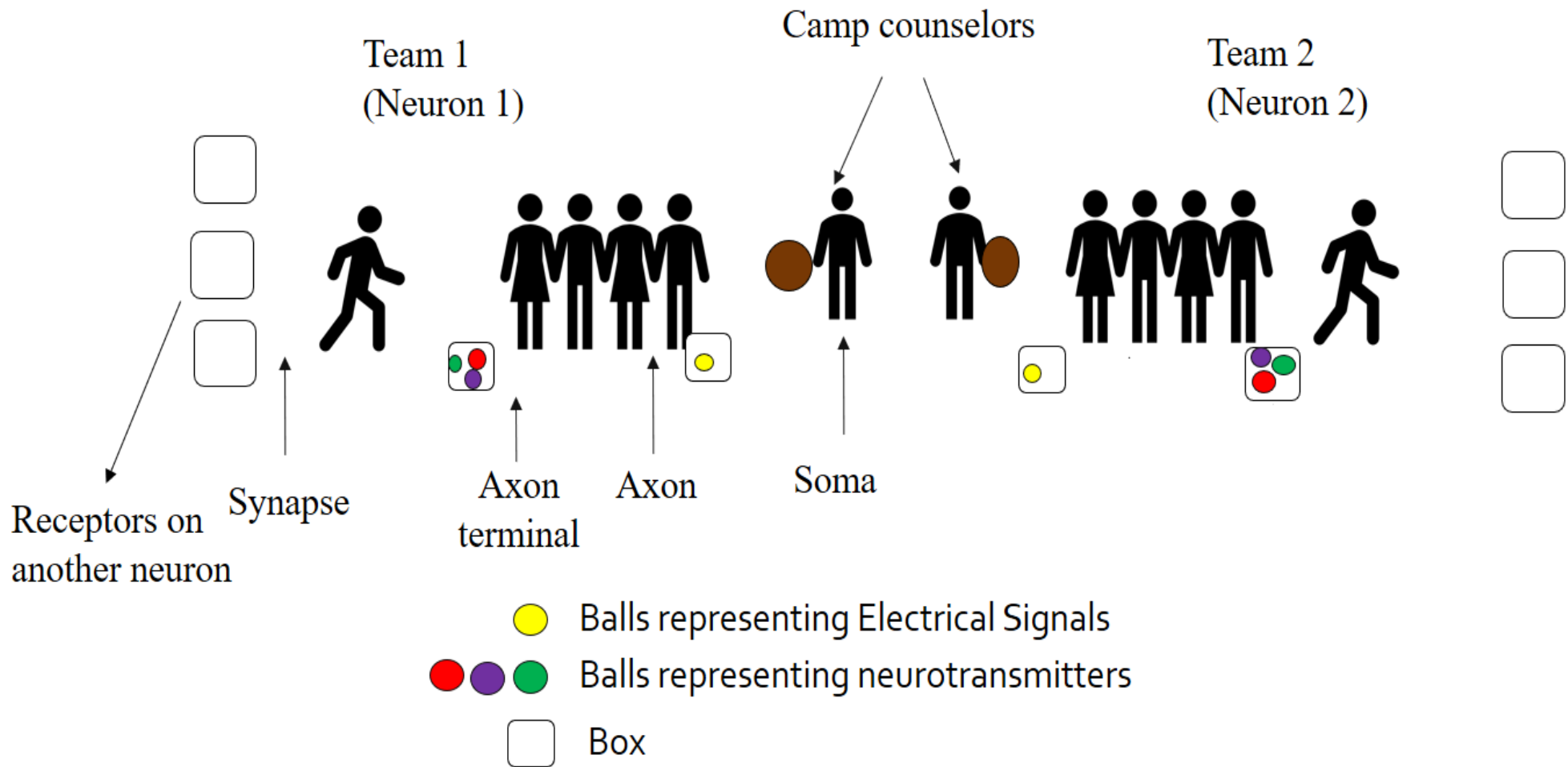


Figure 4. Set up for Neuroscience Relay Race

Step 2: Review the neurotransmitters used in the game

Listen to the camp counselor explain the game.

Review what each ball represents.

The red balls in the activity represents epinephrine. The purple balls in the activity represents dopamine. The green ball in the activity represents acetylcholine. The yellow balls used in the activity represent an electrical signal. Each neurotransmitter has a receptor represented by the labeled boxes for each team. See table 1 above for the role of each neurotransmitter.

Step 3: Begin the relay race

Listen carefully to the counselors play the drums to a song. They will beat the drum with soft and hard beats. When the camp counselors beat the drum hard, it means an electrical signal needs to be sent. When this happens, each team should do the following:

- a) The team member closest to the counselor should pick up a yellow signal ball. Pass the ball down the axon until it reaches the team member at the axon terminal
- b) The team member at the axon terminal should pick up one of the neurotransmitter balls. Pass the neurotransmitter ball to the team member in the synapse.
- c) The team member in the synapse should take the neurotransmitter ball to the correct receptor. The first team to get their neurotransmitter in the correct box wins the round. A counselor will record who gets the neurotransmitter ball in first each round.

Step 4: Debrief

The drum and the songs sung with the drum are part of our cultural identity. How our brain uses neurotransmitters is also part of our cultural identity. Everyone's brains are different.

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