

Neuromatrix Lesson

Amygdala: Perception of Emotions

Introduction:

In the Go into the Director's Brain Movie, students learn that the amygdala is part of the limbic region, the most ancient part of the brain. This brain structure is essential for decoding emotions, and in particular, stimuli that are threatening to the organism. The amygdala is like a central intelligence station that evaluates the nature of all new incoming stimuli from the environment to determine whether these stimuli are friendly or hostile. The amygdala scans the memory patterns of the brain and decides whether a stranger is friend or foe. It is responsible for setting off a defensive alarm to the limbic region, which is part of the emotional circuitry of the brain. It triggers the six primary emotions of surprise, joy, anger, fear, disgust, and sadness.

Students sometimes have difficulty distinguishing between emotions, often confusing one emotion with another. This lesson will focus on distinguishing between the six primary emotions and how students may perceive each emotion differently or the same. Students identify each emotion and write about a time in their lives when they experienced each one.

Objectives:

Students will:

Discover that the amygdala plays a key role in the system of emotions.

Distinguish between the six primary emotions.

Learn how one's perception of the six primary emotions might change.

Standards:

1. National Science Education Life Science Standards Levels 5-8: Structures and functions in living systems.
2. NSE Standards: Science as Inquiry: Abilities necessary to do scientific inquiry and understandings about scientific inquiry.

California State Language Arts Standards: Grade 6

2.0 Reading Comprehension (Focus on Informational Materials)

Students read and understand grade-level-appropriate material. They describe and connect the essential ideas, arguments, and perspectives of the text by using their knowledge of text structure, organization, and purpose.

Structural Features of Informational Materials

2.1 Identify the structural features of popular media (e.g., newspapers, magazines, online information) and use the features to obtain information.

Comprehension and Analysis of Grade-Level-Appropriate Text

2.3 Connect and clarify main ideas by identifying their relationships to other sources and related topics.

1.0 Writing Strategies

Students write clear, coherent, and focused essays. The writing exhibits students' awareness of the audience and purpose. Essays contain formal introductions, supporting evidence, and conclusions. Students progress through the stages of the writing process as needed.

Research and Technology

1.4 Use organizational features of electronic text (e.g., bulletin boards, databases, keyword searches, e-mail addresses) to locate information.

1.5 Compose documents with appropriate formatting by using word-processing skills and principles of design (e.g., margins, tabs, spacing, columns, page orientation).

Set:

The amygdala is an almond-shaped brain structure that is involved in producing and responding to nonverbal signs of anger, avoidance, defensiveness, and fear. This structure is a small mass of gray matter that gives aversive cues, such as the freeze reaction, sweaty palms, and the tense-mouth display. The amygdala is also a primeval arousal center, originating in early fishes.

Many gestures express emotional turmoil. In an anxious meeting, for example, we may unconsciously flex our arms, lean away, or angle away from colleagues who upset us. Lip, neck, and shoulder muscles may tense as the amygdala activates brainstem circuits designed to produce protective facial expressions, such as a tense mouth, and protective postures, such as bow and crouch. The amygdala also prompts releases of epinephrine and other hormones into the blood stream, thus stepping-up avoidance response and disrupting the brain's ability to control rational thought.

The amygdala is considered part of the limbic region. In humans and other animals, this subcortical brain structure is linked to both fear responses and pleasure.

In addition to its other duties, the amygdala's gray matter evolved to mediate the chemical nervous system via the bloodstream. The amygdala sends signals to the hypothalamus, which then releases hormones into the bloodstream. After surgical removal of the amygdala, growls, screams, angry voices, and other negative signs may lose their meaning. When this happens, outside stimuli no longer activate the afferent cues, which in turn activate the nerves carrying impulses from the outer body toward the brain or spinal cord.

The Hippocampus and The Amygdala

Remember learning about the hippocampus? Here is how the amygdala and hippocampus work together! The amygdala receives numerous connections from the hippocampus. Since the hippocampus is involved in storing and retrieving explicit memories, its connections to the amygdala may be the origin of strong emotions triggered by particular memories.

The hippocampus also specializes in processing sets of stimuli (as opposed to individual stimuli.) – in other words, the context of a situation. Hence it is because the hippocampus has close connections with the amygdala that the entire context associated with a traumatic event can provoke anxiety.

Web sites with additional information about the amygdala.
<http://members.aol.com/nonverbal2/amygdala.htm> (America Online)
<http://web.sfn.org/content/Publications/BrainBriefings/fear.html> (Society for Neuroscience)
<http://en.wikipedia.org/wiki/Amygdala> (Wikipedia, the online encyclopedia)
http://www.thebrain.mcgill.ca/flash/i/i_04/i_04_cr/i_04_cr_peu/i_04_cr_peu.htm (Douglas Hospital, Quebec, Canada)
<http://www.sci.uidaho.edu/med532/amygdala.htm> (Medical Science 532 Nervous System Course. WWAMI Medical Education Program provides high-quality medical education for the states of Washington, Wyoming, Alaska, Montana and Idaho through the University of Washington School of Medicine.)

http://www.wisegeek.com/what-is-the-amygdala.htm?referrer=adwords_campaign=amygdala_ad=029431&_search_kw=amygdala (WiseGeek)
<http://www.psycheducation.org/emotion/amygdala.htm>
(Psycheducation: Extensive Mental Health Information on Specific Topics, by Jim Phelps, M.D., Corvallis, Oregon)
<http://biology.about.com/library/organs/brain/blamygdala.htm>
(About instructional site sponsored by the New York Times)
<http://www.brainexplorer.org/glossary/amygdala.shtml> (Brain Explorer site with simple explanations for the amygdala and how it interacts with other limbic system areas.)

Background Activation

Begin the lesson with the Emotions Chart (see blackline master). This chart will help students determine what they already know about the six primary emotions, what they want to learn about it, and what they have learned as a result of participating in the lesson.

This activity will activate prior knowledge and get students to think about the six primary emotions. Students can answer the following questions on the chart:

- What do you know about this emotion?
- Think of a time when you experienced this emotion.
- What factors can contribute to causing this emotion?
- What makes this emotion different from other emotions?

Activities:

After completing the first three columns in the chart, students can participate in the amygdala activity on the computer. Ask students to record how many portraits they correctly matched.

In the game, there are six galleries; each has a different feeling and color scheme. The primary object you are drawn to in each gallery is a portrait of the Director of the research facility in black and white. The Director's facial expression shows one of the six primary emotions. Six plaques are available next to the portrait. Each plaque is a text label with the name of one of the six emotions. The task is to click the plaque whose label corresponds to the emotion expressed on the Director's face in the portrait.

Group practice activity:

1) Once students have filled in the first two columns of the chart and played the game, they can participate in a

group activity. Use the blackline master with the six emotion cards.

2) There are small groups of six students. Each student is given a card labeled with a different emotion.

3) In groups, they will play a game of charades. Each student presents his/her emotion (limit to 2 minutes each) to the small group by acting out the emotion labeled on the card. They have to act it out or simply make a facial expression so the other students in the group will think about how they perceive those emotions. The other students in the group guess the emotion. This continues until all of the students have played the charades game.

4) After the game and in small groups they discuss the first two columns of the Emotions Chart.

5) After participating in the small group activity and filling in the Emotions Chart, students can play the Neuromatrix: Amygdala game again and record the number of correct matches.

6) Finally, students can go back to the Emotions Chart and complete the last column where they describe how they perceive (recognize) each emotion differently after playing the game and participating in the classroom activities.

Follow-up Activities:

Students can do an artistic interpretation of the six emotions with the following activities:

Draw pictures of an emotional event and give an explanation of the picture that relates to the amygdala.

Write a story about an emotion or an emotional event and how it relates to the amygdala.

Write a song about an emotion or emotional event.

Write a poem about an emotion or emotional event.

Write an entry into a personal journal about an emotion or emotional event and how it relates to the amygdala.

Assessment:

The last column of the Emotions Chart can be used as an assessment of students' understanding that the amygdala plays a key role in the emotions system; how they can distinguish between the six primary emotions; and how one's perception of the six primary emotions might change.

Emotions Chart

Name _____

	What do you already know about this emotion?	Think of a time when you experienced this emotion.	What factors can contribute to causing this emotion? What factors can contribute to feeling this emotion?	What makes this emotion different from the others?
surprise				
anger				
joy				
fear				
disgust				
sadness				

Emotions Cards

Surprise	Joy
Anger	Fear
Disgust	Sadness