Making Neuroscience Fun

A Brain Awareness Program for All Ages

Brain Health: It's SPECtacular

Science Behind the Story (SBS)
My Brain Keeps Me Alive (A Brain Facts Story)
(2nd Grade- 7-8 yrs)

This story talks about all the things that your brain does that helps you to stay alive.

- There are lots of behaviors that you have to automatically do to stay alive. (breathing, pumping blood to your body, regulation of body temperature, digestion).

  There are lots of behaviors that animals do to stay alive – survival behaviors. Most of these behaviors are automatic; meaning you don't have to do anything to make them work. Your brain takes care of everything.

  > Your cardiovascular system pumps blood in your arteries and back from your veins. Your respiratory system gives you oxygen. Your gastrointestinal system digests your food to give you energy. Your thermoregulation system maintains your constant body temperature.

  The Autonomic Nervous System or Visceral Nervous System consists of central and peripheral neurons that control the functions of the visceral organs (heart, lungs, gastrointestinal system) (Janig, 2013; Furness, 2006). This is a non-voluntary, "automatic" system (San-Galli, 2015).

- Your brain gets information about what you need to stay alive and then it tells your body what to do. (eating, drinking, sleeping, going to the bathroom - you learn when and where to do these behaviors)

  There are lots of behaviors that you need to do to stay alive, which the brain cannot do automatically for you. But, our brain motivates us to do these behaviors (Lang, 2006; Berridge, 2004). These behaviors include…

  - eating – so our body has energy
  - drinking – so our body has fluids
  - sleeping – so our bodies can repair and rejuvenate
  - going to the bathroom – so our body gets rid of waste
  - thermoregulation – keeping cool when it is hot and keeping warm when it is cold

  A part of our brain, known as the hypothalamus, is the control center essential to vital visceral, endocrine and metabolic activities including temperature, thirst and appetite regulation, sleep and wakefulness, alerting and emotional states (Sternson, 2013).

  The hypothalamus receives information from other parts of our body to let the brain know when there is a need for something that will keep the body alive (Sternson, 2013). The hypothalamus then acts to produce both visceromotor responses (adjusting the balance in the ANS) and somatic motor responses (movements to alleviate the need) (Sternson, 2013).

- These behaviors are so important that your brain rewards you for getting the things it needs – by making you feel happy.

  In order to survive, as an individual and as a species, there are a number of things that our bodies need; these are known as primary reinforcers (McNaughton, 2019). We have 2 kinds of needs – survival needs and propagational needs (Schultz, 2015). Primary reinforcers are things like food, water, sleep, maintaining body temperature – keeping warm and cool - tied to shelter – sex and nurturing behaviors – so our offspring survive to pass on our DNA (Schultz, 2015). Our bodies "need" primary reinforcers in order to survive and to propagate. Both survival needs and propagational are regulated by the hypothalamus and both involve the limbic system (Tsigos, 2002).

  Primary reinforcers activate the reward system, the dopaminergic mesolimbic system which is part of the limbic system (Spanagel, 1999). Behaviors that are important for the survival of the species are behaviors that we want to occur – such as eating, drinking, sleeping, sex - activate the reward pathway – also known as our pleasure center (Salamone, 2002). These behaviors – make us happy – and so we tend to do them when the need arises.

National Standards:

Next Generation Science Standards

- Crosscutting Concepts:
  - **Cause & Effect:** Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.
    - Events have causes that generate observable patterns.
  - **Structure & Function:** The way an object is shaped or structured determines many of its properties and functions.
    - The shape and stability of structures of natural and designed objects are related to their function(s).
  - **Patterns:** Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.
    - Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.
- Related Grade Level Content
  - Ecosystems & Biodiversity

National Health Education Standards (Shape America) & CDC (Centers for Disease Control and Prevention)

- **Standard 1:** Students will comprehend concepts related to health promotion and disease prevention to enhance health.
  - 1.2.1: Identify that healthy behaviors impact personal health. **(CDC)**
- **Standard 5:** Students will demonstrate the ability to use decision-making skills to enhance health.

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