Our Brains on Conflict:

A Neuroscientific Explanation

Julie Sasscer-Burgos, Psy.D.
NSA

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Topics for Today

- Brain Structure
- Brain Function
- Brain Communication
- How the brain affects our behavior during conflict
- How we can affect our brains during conflict

What is Neuroscience?

- A branch of science that deals with the structure and function of the brain, particularly in relation to behavior

Why do we care about our brain when we are dealing with conflict?

- Our brain influences how we interact with our environment, and our environment influences how our brain works.
- We can put to use our knowledge of brain function to shape how we interact.

Basic Brain Functions

- Staying alive
- Perceiving
- Emoting
- Thinking
- Acting

Our Brain in Three Parts

- Concept Developed by Dr. Paul McLean, the director of the Laboratory of Brain Evolution and Behavior at NIH in the 1960's
- Based on evolutionary age and function of brain

Reptilian Brain -

- AKA : Reptilian System, R-complex, hind brain
- Involved in:
  - Regulation of unconscious body functions such as breathing, heart rate, digestion, circulation
  - Behaviors related to self-preservation, such as sex, eating, defending body, defending food source
  - Enacting fight/flight/freeze response

Mammalian Brain

- AKA: Paleocortex, paleomammalian brain, limbic system, midbrain
- Involved in:
  - Consciousness
  - Thought
  - Memory
  - Emotion
  - Triggering Fight/Flight/Freeze response
  - Social Connections

Neocortex

- AKA: Neomammalian brain, human brain, forebrain
- Involved in:
  - Sensory Perception
  - Motor Commands
  - Spatial Reasoning
  - Language
  - Conscious thought – including the conscious interpretation of an emotional state

Occipital Lobe

- Involved in:
  - Visual reception
  - Visio-spatial processing
  - Movement and color recognition

Parietal Lobe

- Involved in:
  - Sensory Integration
  - Spatial sense/navigation
  - Knowledge of numbers and their manipulation
  - Speech and language

Temporal Lobe

- Involved in:
  - Auditory Processing
  - Semantic Processing
  - Formation of Memory
  - Discrimination of Smells and Sounds

Frontal Lobes

- Involved in:
  - Abstract Thinking
  - Thought Analysis/ Metacognition
  - Regulation of Behavior
  - Mediation of Conflicting Thoughts
  - Making Choices Between Right and Wrong
  - Predicting Probability of Outcomes of Actions and Events
  - Social Control / Suppressing Emotional or Sexual Urges

Prefrontal Cortex

- The Last Area to Develop
- The Seat of the "Executive Function" of the Brain

In times of conflict, why don't we just use the prefrontal cortex?

- Because the older parts of the brain have been around for a long time and are very good a their jobs. They have had time to practice and perfect.
- The older parts of the brain have kept us alive and have allowed us to be part of groups.
- The older parts of the brain are preconscious so we can't avoid using them even if we want to.
- They provide important information that we should be taking into consideration
- The prefrontal cortex, for all of its sophistication, is not always right

The Prefrontal Cortex Loves Understanding

- It will consider input from many other areas of the brain and pull it into a coherent understanding
- However, if there is not sufficient information it will use what it has and drag in other material, and you will not always know what was dragged in
- Two different people's brains bring in different material, so their understandings may conflict, even as each is sure they have rationally arrived at the correct understanding

The Brain During Conflict

- Conflict was around long before the neocortex developed
  - Something wanted to eat you
  - You did not want to be eaten
  - This is conflict
- The brain had to work fast in order to survive and not be bogged down in careful analysis of a lot of novel information. The process had to be preconscious and fast, fast, fast

The Task of the Brain During Conflict

- A recognition of what things, animals, and actions are
  - This is a berry bush / That is a lion
- A judgment of whether this is good or bad
  - Berry bush good / Lion bad
- A reaction
  - Berry bush –approach to eat berries / Lion – RUN!

Judging Good vs. Bad

- Animals have evolved to judge more things as bad than good because the cost of judging something as good and being wrong is too high.
- It is better to erroneously run away from food and live to eat later than to misinterpret a lion as food and be eaten.

Implications when negotiating conflict

- If something is unfamiliar or amiss or even unclear, the natural inclination is to judge it as bad.
- For example, if a person is behaving in an unpredictable way, the unpredictable behavior will be judged to be dangerous (bad).
- It is not that change itself is bad, it is that until the change is known to be good, it is presumed to be bad. For example, once change is known to result in you getting a million dollars you are going to judge change as good.

Emotion

- A large part of the response to a stimulus is emotion
- Emotion has two main purposes
  - To produce reactions to specific situations.
    - Approach – allows sex/reproduction, food gathering, forming families and other social bonds for protection
    - Defense – fight, flight, or freeze
  - To physically prepare the organism to respond in the way most likely to result in survival.
    - Setting off the sympathetic nervous system
    - Forming relationships

Emotion

- Emotions begin in the paleomammalian brain
- The paleomammalian actions are preconscious
- We cannot initially control our emotions - they happen quickly, at least a half a second before we are aware of them
- There are more neural pathways from amygdala in the limbic system going to the neocortex than the other way, so it is easier for the limbic system to overwhelm the neocortex than the other way around

Emotion

- If humans had the ability to control emotion they would be able to choose to love someone, or choose not to love someone
- If humans had the ability to control emotion there would be no need for artificial stimulation such as roller coasters, sports, movies, recreational drugs. Humans like these things because they evoke the emotions they like to feel.

Are we totally out of control?

- While we cannot instantly control our emotions, we can (on a good day) control our behavioral reaction to emotions, because the monitoring of behavior is seated in the prefrontal cortex, which is conscious.
- Once we become aware of emotions we can use them to help us figure out what caused the reaction. Once we know the cause we can engage our prefrontal cortex and slowly influence the limbic system to reinterpret the data.

How do parts of the brain communicate?

- An adult human brain is made up of approximately 100,000,000,000 brain cells, or neurons.
- The neurons are connected to each other and send chemical and electrical signals to transmit information.

Neuron

- Chemical signal comes into a dendrite, sometimes into a cell body or axon
- Accumulation of signals “excites” neuron
- When enough excitation builds up, the neuron “fires,” sending an electric impulse down the axon
- Electrical impulse releases chemical from the end of the axon to the next cell
- The connection between two neurons is called a synapse
- Some signals inhibit cell action

Chemical Neural Communication

- Neurotransmitter – the chemical that comes out of one neuron, floats across the synapse, and fits into a receptor on another cell
  - If it builds excitement it is an “excitatory” neurotransmitter
  - If it diminishes excitement it is an “inhibitory” neurotransmitter
  - Most cells have many synapses, some receiving excitatory chemicals and some receiving inhibitory transmitters

Chemical Neural Communication

- The more a neuron fires, the more dendrites and axon terminals it grows
- Often we can increase the number of excitatory or inhibitory actions within the neocortex with conscious effort and practice
- The increased neural connections in the neocortex can make the desired paleomammalian neurons develop, with time

Chemical Neural Communication

- Neuromodulator – a chemical that modifies the efficacy of the synapse. It can affect how quickly or slowly a dendrite can respond to a chemical, or whether it will respond at all.
- Neuromodulators generally float around a diffuse area, such as in the cerebrospinal fluid, rather than strictly in the synapses.
- Most neuromodulators also function as neurotransmitters in other parts of the system.

Neurotransmitters

- Most common are:
  - Glutamate – usually excitatory
  - Gamma Amino-butyric Acid (GABA) – usually inhibitory

Neuromodulators (most relevant to conflict)

- Histamine – arousal
- Vasopressor – aggression
- Norepinephrine – sns activation
- Oxytocin – bonding with other humans
- Dopamine – pleasure
- Serotonin - relaxation

Neuromodulators important in calming, caring, sociability

- Not enough – individuals are irritable, aggressive, and bullying
- Enough – can develop a caring response, and calm down fear, anxiety, and anger reactions

How to increase the good stuff

- Oxytocin – bonding with other humans
  - Increase by touching, sharing resources, sex
  - Forming warm relationships with others
- Dopamine – pleasure
  - Pleasant views, favorite music, perfume, smell of chocolate chip cookies, comfortable clothes
  - Favorite activities
- Serotonin – relaxation
  - Not created by body, must come from food and drink. Foods containing tryptophan (e.g. turkey) and protein are best.
  - Medication - SSRIs

Recent relevant findings

- Old thinking: Aggression and dominance led to higher social status, and this status led to more opportunities to mate, reflecting higher evolutionary fitness.
- Recent genetic testing has shown that in most mammals (primates, wild horses, wolves) offspring do not necessarily belong to the most dominant, aggressive males – apparently the females are mating with non-dominant males at least as often.

Aggression, Serotonin, and Survival

- Dr. S.J. Suomi of the Laboratory of Comparative Ethology, National Institute of Child Health & Human Development, NIH published research in 2005 on rhesus monkeys, aggression, and serotonin levels
- Monkeys who were more aggressive risk takers were found to have lower levels of serotonin
- More of them died before reproducing
- Monkeys with higher levels of serotonin had the most pro-social behavior, the most grooming and bonding with females
- More of them lived to reproduce

Aggression, Serotonin, and Survival

- Reproductive success was not correlated with larger canine teeth or body size, and was negatively correlated with aggressive behavior
- Less aggressive males who had formed good relationships with females were able to lead troupes after death of aggressive males, with the support of females.

Aggression, Serotonin, and Survival

- High serotonin may be important in forming bonds (familial and sexual), keeping calm, fostering relaxation
- However, low serotonin may be evolutionarily helpful for the species, if not for the individual
- Low serotonin individuals are more likely to take risks, to search out new territory, to try new foods, to detect new hazards. This can get them killed. However, it can also provide important information to the group, helping the group survive.

Lessons for us

- When serotonin is low, we have trouble inhibiting aggressive responses to perceived verbal or physical threats
- To increase harmony, we want to increase serotonin, and avoid situations that decrease serotonin

A Quick Review

- Parts of the brain evolved at different times.
- The older parts are more solid and cannot be instantly overridden by conscious thought.
- Emotions and reactions have been around for a long time, and are durable and strong.
- New stimuli are more likely to be judged as bad than good
- Neuromodulators can help influence how cells react
- We want to maximize relaxation, bonding, and pleasure neuromodulators

All of this information, what do we do with it?

- When there is conflict, keep in mind that all parts of people's brains are at work.
- We can have some influence on brain function, and we can have understanding and acceptance of what we cannot influence.
- In general, we want to recognize the functioning of the paleomammalian brain, and maximize the influence of the neocortex
- We want to increase calming, caring neuromodulators

Tips:

- Set up the environment to be as non-threatening as possible, paying attention to sight, sound, smell, touch, and taste.
- Play soft music in the reception area, until the discussion starts. Pleasurable sounds increase dopamine.
- Serve food and drinks. Turkey sandwiches are ideal because they contain tryptophan, which is a metabolic precursor to serotonin. Protein helps, especially if it contains a little bit of fat and is accompanied by a little bit of carbohydrates. Don't overdo the carbs and sugar because people will crash. However, any offering of food will help as a sign of affiliation.

Tips:

- Shake hands. Even slight touch (as long as it is culturally and socially appropriate) increases oxytocin , the neuromodulator related to forming bonds.
- Start with a ritual. In many business settings the most common ritual is for everyone to go around the room and introduce themselves. Familiar rituals increase serotonin and allow people to relax. Our reptilian brains like predictability.
- Remember that information that is ambiguous or unfamiliar will most likely be interpreted negatively. Present information as clearly as possible, with direct explanations of how it will not hurt the participants, or how they will gain from it. This may need to be repeated or rephrased several times.

Tips:

- Even when the information is clear, if it appears to lead to a loss for the individual there will likely be negative emotion attached. Sometimes there is no way around this. You must be prepared for negative emotion and accepting of it. (Caveat – You do not have to be accepting of aggressive behavior)
- Acknowledge the negative emotions to send the message that they are being heard, avoiding the need for escalation. This will also help the participant use conscious thought to modulate them.
- When there is negative emotion appeal to the greater good. Sometimes this will lead to an activation of the paleomammalian cortex that seeks affiliation.

Tips:

- Remember that while calming and caring is helpful, it may take some time to make a difference. Go slow.

Questions?