Understanding the Strengths and Skills of the Limbic System in Daily Life

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Our central nervous system (CNS) is composed of many parts. One basic way to sort it out is to divide it into three major functional parts: our primitive brain, the limbic system, and the neocortex. The primitive brain takes care of basic pain/pleasure reactions and maintains rhythms that support life. The limbic system is responsible for more complex survival functions as well as reactions and responses for living effectively in the world. It helps build pathways and patterns that help us stay alive and interact with the world in which we find ourselves. Throughout our lifetime, our primitive brain and limbic system will always have a very active role in what we do and how we do it. The neocortex is responsible for thinking things through for both the short-term and long-term based on values, risks, and rewards.

Our limbic system partners with our neo-cortex (thinking brain) to help us safely make our way through a busy intersection while carrying our shopping bags and using our key fob to open the trunk of our car parked in the third slot from the crosswalk. Stepping down and up at curbs, manipulating a familiar device, noticing the color and location of our car, keeping track of the crosswalk light and timer, and balancing our take-out coffee while carrying two shopping bags are all tasks that are impacted and run more by the limbic system than our thinking brain.

The limbic system serves as a processing area and a connector between the basic survival brain structures and the thinking, or cortical, brain structures. It is a primary player in controlling attention and interactions with visual, auditory, and tactile experiences, as well as, wake-sleep, hunger-thirst, elimination, temperature regulation, infection control and immune reactions, and other complex and interwoven life supporting systems. Its overall goal is to maintain a healthy balance called homeostasis with some reserve for emergencies. It includes:

- Amygdalae (active as a threat perceiver, needs meeter, and pleasure seeker)
- Hippocampal areas (key in learning and remembering, wayfinding, and time passage awareness)
- Thalamic connections (active in sensory messaging related to emotions and distress or excitement)
- Hypothalamus (critical in temperature regulation, blood sugar regulation, wake-sleep cycling and circadian rhythm, fluid balance and sodium regulation, and endocrine-hormone firing)
- Pineal glands (melatonin producers and more)
• Mamillary bodies (have a role in memory formation and interest in the world or data)
• Septum (influences anger, fear, sadness)
• Selected tracts of the olfactory (smell), optic (vision) and trochlear (hearing and balance) cranial nerves
• Pathways to control eye movement and head orientation and positioning
• The corpus collosum (the wiring between the left and right sides of the brain)

Our neocortex is the thinking and active-aware processing part of our CNS. In some ways it is the most developed and most valued part of our brain as adults, and yet it is the last part to form in humans. In reality, we must first develop and figure out how to use our primitive and limbic brain sections. Once we have those in working order, then we can safely spend time on learning to make use of the higher order system. It is a luxury item, and not essential to survival in a minute-to-minute situation. Our ability to effectively use our neocortex, however, does depend on the integration and well-being of the other two brain components. Our neocortex is designed to help us recognize the value and limitations of those two systems. A healthy neocortex learns how to pay attention to the signals that are coming from these two players, and yet not be overwhelmed or immobilized by their messaging.

When a neocortex is not well wired into the primitive brain and limbic system, or sections are not functioning in a healthy way, problems happen: errors in reactions, errors in metabolism, errors in sleep patterns, apathy, or errors in eating and drinking. Without a well-integrated and actively engaged three-way partnership, the human being that is housing all three of these brain systems will find that life is distressing, survival is risky, and that which should be helpful seems dangerous or unnecessary.

There are times and situations where it can be difficult to maintain our own brain trio. Finding ways to activate our own and another person’s limbic system in a positive and effective manner can significantly change how life is lived for both of us. Small shifts and changes in smells, visual cues and environments, auditory signals, pace of delivery, or expectations can alter which hormones get sent, which cells get fired, and which action will be taken or not taken.

Parents who recognize that their child’s meltdown in the middle of the grocery store may well be due to the need for a nap or the need to have a bowel movement, are much more likely to make future plans that take these unmet needs into account when responding to the distress of the moment and planning an outing in the future. When the parent is able to help the child notice their state of distress by making an accurate statement about what emotion is being felt, and then by providing simple options regarding possible causation, there is a much greater possibility that the child can begin to build wiring from the primitive system to the limbic system to the lobes of the neocortex. Becoming more self-aware and more able to recognize the signals of fatigue or bowel discomfort in advance of acute distress gradually allows for self-regulation and advance planning on the part of the developing mind.
What does all of this have to do with the world of dementia? Overall, brains fail in the opposite way in which they develop. We can be more and more tuned in to the probability that many of the messages we think we are sending to our partner may not be received and interpreted the way we had hoped. It is even possible that our efforts to help are perceived by the Person Living with Dementia’s limbic system as a threat, something dangerous, or something to be avoided at all costs.

In our effort to try to use our neocortex to help another neocortex that is malfunctioning, we may make a huge mistake and use some non-helpful, old patterns of parenting or discipline that worked with the developing brain of a child or teenager. If we pause, we may realize that the reason it worked in the past might have been due to our patterned interactions with the other person. Someone had the position of authority and the other was aware that continued well-being or survival depended on the authority-figure’s willingness to provide care and support. In other words, the old limbic system connections we had wired in are signaling us to use that strategy to get compliance. The problem is that we are trying to switch roles with the person who was that authority figure in that old scenario. There is a significant risk that they will not be okay with that role change. Instead, we might want to consider an alternative pathway or brain connection to minimize the negative affect or reactions and intensify the enabling relationship chemistry as brain wiring and structures are malfunctioning and dying.

We might be more helpful if we make some changes to the environment, the schedule, or our behaviors rather than asking what is not possible of the person living with dementia. Would you prefer honey or vinegar to help catch that fly? Actually, opting for pleasure and play, humor, and lightening a load through empathy and supportive cueing may be a more brain-smart intervention than trying to get wiring to form or re-fire in a dying brain. Using empathy and assessing for the possibility of unmet needs could go further in helping all parties live with less distress and improved limbic and primitive brain fitness for longer.

There is one more system that has a potential role in our ability to support and help ourselves and others in the world of dementia. It is called the reticular activating system (RAS). It has portions of its structure that lie in primitive brain, some that lie in the limbic system, and some wiring into the neocortex. All of our senses, except smell, have connections to this little finger shaped set of structures in the brain. The RAS is a filtering system. It helps you ignore data and details that are not helpful or important, and pay attention to information that is. It turns out that there are a few items that almost always get through the filter, no matter what else is going on. One is your preferred name. Another is a sense that you or someone you care deeply about is in danger. Both alert you and divert you from almost anything else when they occur. An interesting finding, is that you can provide direction to your RAS. You can tell it what you are interested in finding and it will keep looking for, listening for, or feeling for selected stimuli that match what you are seeking. The good news is that you can self-direct and self-talk yourself into better places, spaces, belief sets, and moods. The bad news is that you can also spiral yourself into dark places or repeated unpleasant situations and interactions by seeing them as such, even when they were not objectively that extreme.

Knowing that the limbic system and the primitive brain are critical to our survival, but also to our ability to develop and use our thinking brain, may help us let go of the idea that we
can get someone to manage their behavior once their brain begins to die. Perhaps it is our ability to use our complex three brain system that can be used to make this process less challenging and more understandable and livable, for the people we care about and love. To that, however, we must remember to get the right stuff for ourselves.