BLUEWATER FAMILY SUPPORT SERVICES

BluesNews

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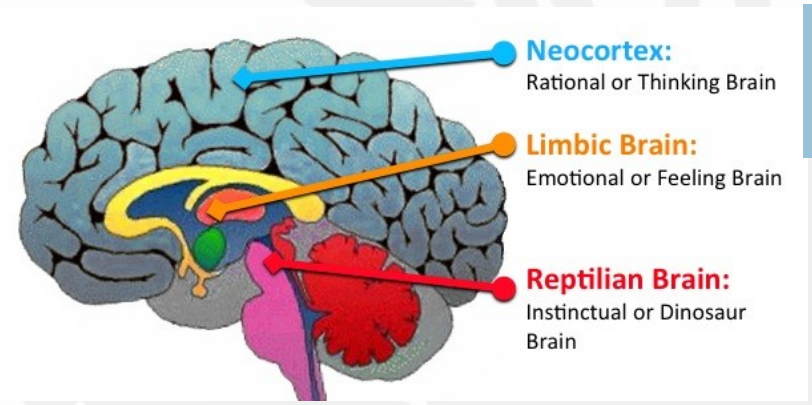

Triune Brain Concept

Prepared by Jay E. Gould

Looking at the overall anatomical relationships of the brain (see figure at left), notice how the most recently evolved neo-mammalian **neocortex** of the cerebral hemispheres surrounds the older paleo-mammalian limbic system, which in turn surrounds the ancient reptilian upper brainstem (basal ganglia, and diencephalon).

This division of the brain into three parts constitutes what MacLean calls the Triune Brain of mammals (meaning three brains in one). This conceptualization represents a hierarchical organization of the brain from an evolutionary perspective. Note, however, that although it is an interesting way of viewing general relationships between structure and function in the brain, this theory from the early 1960's--which is only summarized here--is a vast oversimplification, and **advances in neuroscience research have shown it not to be correct in all of its details.**

At the core of the human brain is the old proto-**reptilian** brain, or R-complex, which is responsible for innate, stereotyped, species-typical behavioral patterns necessary for survival of self and species. It is involved with reflexive and instinctive behaviors such as feeding, fighting, fleeing, and reproduction--the so-called Four F's. Behaviors included are aggression, territoriality, dominance, ritual displays and other nonverbal communication, as well as social conformity (examples: xenophobia, paranoia, war, military pageantry and goose stepping, graduation processionals, bowing to authority, and symbolism; e.g., phallic symbols, the cross, the hammer and sickle, and flags.) The proto-reptilian brain is made up primarily of the upper brain stem (referred to as the striatal complex); i.e., the base of the forebrain: diencephalon, basal ganglia, and part of the olfactory system. The hypothalamus of the

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diencephalons plays a particularly important role in the four F's, as well as regulation of the endocrine system and the autonomic nervous system. It is at the center of the body's survival and gene replication machinery.

2. Wrapped intimately around this core is the old paleo-mammalian brain. This consists of what is called the **limbic system**, i.e., the limbic cortex (or lobe) and connecting brainstem structures. The paleo-mammalian brain is responsible for enhanced emotion and motivation (and thus also visceral regulation), as well as enhanced learning and memory. It provides for greater flexibility of behavior and integrates messages from both inside and outside the body (which is required for a sense of personal identity). It is involved in emotional bonding between parent and child for prolonged care of young (which includes nursing, and audio-vocal communication for maintaining contact), and it is also involved in play behavior (which young mammals-- but not other species--use to learn adult behavior).

3. The third and outer portion of the brain is the neo-mammalian brain. It consists of the **neocortex**, which is greatly expanded in the higher mammals, as well as connected thalamic structures. It is concerned primarily with what is happening in the external world. It is responsible for complex stimulus analysis, precise and variable/learned aspects of motor control, further enhancement of learning and memory, and abstract, rational thought. In humans it is also responsible for language, planning, introspection, and self-awareness (consciousness). According to MacLean, it is the source (or site/locus) of foresight, hindsight, and insight. It reasons, plans, worries, and invents. The prefrontal cortex appears to be particularly involved in these functions (consider, e.g., the effects of prefrontal lobotomy).

It has been suggested by some that a breakdown in communication among the parts of the triune brain is responsible sometimes for pathological behavior. An example would be the split between rational thought and emotion found in schizophrenia. More commonly, most of us have probably experienced, at one time or another, what might represent a relatively minor and temporary occurrence of a neuro-communication breakdown. Specifically, I am thinking of when we suddenly explode in an outburst of emotion while at the same time our rational mind is conscious of the event but incapable of bringing the behavior under control. Indeed, we may feel as if we are two individuals in one: that which is doing the acting, the paleomammalian and proto-reptilian brain, and that which is passively observing, the rational neo-mammalian brain. Perhaps the prefrontal link between the neocortex and limbic system (which is the major connection between these two divisions of the brain) gets temporarily blocked due to hyperactivity in the paleo-mammalian brain when we are unusually emotionally aroused. As a result, the rational brain cannot regulate our emotional, instinctive behaviors.

MacLean has proposed that rather than the rational, neo-mammalian brain, it is the paleo-mammalian brain, the seat of emotion, that is responsible for perceptions of what is true, i.e., what is reality. It is the paleo-mammalian brain, moreover, that is responsible for the feelings of oneness with the universe that are associated with ecstatic, mystic, religious, and drug states (as demonstrated by the aura of psychomotor/ temporal lobe-limbic system epilepsy). MacLean believes that the most fundamentally important philosophical implication of his work is that our so-called "rational" perceptions of truth are merely neocortical rationalizations for feelings welling up from the limbic system--the seat of emotion. How then are we to trust our beliefs and ideas about ourselves and the rest of the universe?

What is wrong about the Triune Brain model:

The layering proposed by MacLean has not stood the test of time. For example MacLean included the basal ganglia in the lowest "reptilian" layer whereas this would now be seen as a middle layer. A more modern model might have 4 layers: brainstem & hypothalamus (basic survival functions), limbic system (amygdala, etc., complex automatic behavior), basal ganglia (adaptive behavior sequence optimization), prefrontal cortex (goal-oriented learning, behavior, & reasoning); but these are subsystems within a larger systems and not true layers.

The brain did not evolve by adding layers, as MacLean's model implies. Rather, the core circuits of the whole brain have reorganized over time, with certain circuit elements and regions expanding and becoming more complex. Even reptiles have cortex-like structures, just smaller and less complex.

The "competing brain area" aspect of the Triune Brain model is simplistic and inaccurate. At a broad conceptual level, cognitive circuits do play a larger role in humans, whereas "limbic circuits" take over in moments of threat (fight-or-flight). However the brain is a whole system and all circuits are engaged and collaborating all the time. The prefrontal cortex requires the rest of the brain to function, and fight-or-flight responses engage circuits in the basal ganglia and cerebral cortex.

In general, the brain as a whole has proven to be highly complex and intricate, with deep interconnections and cross-connections. Circuit elements and brain regions are part of a complex dynamic system that does not easily separate into independent modules. For example the limbic regions do not really form a coherent system, and the limbic subregions, like the amygdala or hippocampus, are better understood in relation to the brain as a whole rather than to other limbic system elements.

How Can Vision Development Effect Behavior?

by Marti Smith, OTR/L

Vision is one of our primary input senses. It's how we scan a room for danger. It's how we decide if something/someone is attractive. If a picture is worth 1,000 words, that says a lot about how we process. Have you heard of picture schedules? (When children have difficulty with routines, these schedules relay information to them visually.) Have you been trained in EMDR? Do you reflexively smile when someone smiles at you? These are all examples of how we use the visual system to regulate. But what if there was a hitch in the development of the visual system?

What if a child never crawled due to neglect?

Our eye muscles are linked to the muscles in the back of our neck. Our body wants to keep our neck upright so our head doesn't hit the floor. Our eyes help with this. The development of our eye muscles that move up and down begin to strengthen about the same time as we begin learning to crawl. When in the all fours position, your neck can only extend so far due to bone structure. So it is during this time that the child learns to use the muscles to move the eyes up and down (side to side happens a little earlier). In short, if a child doesn't crawl, the up/down eye muscles may be underdeveloped. Why does this matter? Consider where your eyes go if you are upset. They move up as a regulatory trigger. If your eye muscles don't move up, you lose this healthy dissociative movement. Further, if a child with low muscle development wants to look up but the muscles are weak, they will compensate by moving the neck. When the neck extends backward, the vestibular (and visual) systems signal the brain that the body is falling backwards. This triggers a fight or flight response. In short, if the up and down eye muscles don't develop properly, the very mechanism that is supposed to help calm a child will actually spin her into alertness and dysregulation.

What if the vision system over-develops?

Another thing to consider is if a child's side to side muscles get too much "practice". This can happen when there is a constant threat and the child is relying on the visual system to scan for danger. There are two types of vision: focal and peripheral. Focal vision is for things at midline. It is the calming vision. If you want to concentrate, you bring things to the midline. It's difficult to read a book being held to your side. Peripheral vision is off to the side and is designed to be alerting. When something rushes past you, you turn your attention to it. Horses will use blinders to keep the animal using only the focal vision. But what about the child who overdeveloped those scanning, side-to-side muscles? He is constantly over-reaching his visual field and bringing in too much peripheral vision. This will keep him in the high alert state even when he is trying to remain calm.

How can we help?

A good developmental optometrist or vision therapist can be a great resource. A few easy exercises and modifications can also include the app "Eye Exerciser - Eye Training", practicing tracking objects visually while the head is stationary, looking at stationary objects while moving the neck, wearing a ball cap or hoodie to decrease the field of peripheral vision, minimizing clutter and visual stimuli, and crawling through visually stimulating obstacle courses.

Summary

Sometimes behavior can be linked to vision. If a child has difficulty calming down, see if he can simply track your finger while keeping his head still. It might even be effecting his reading and ability to copy from the board. It's easy to test and fairly simple to help.

Marti Smith, OTR/L is an Occupational Therapist in Austin, TX who specializes in treating dysregulation. She is a ChildTrauma Academy Fellow and has many additional certifications that assist with her creative approach to treating children. Her passion is for training other professionals to help better understand children's needs and behaviors. See creativetherapies.com for more information about her work.

Rhythm of Breathing Affects Memory and Fear*

NEUROSCIENCE NEWS DECEMBER 7, 2016

BREATHING IS NOT JUST FOR OXYGEN; IT'S NOW LINKED TO BRAIN FUNCTION AND BEHAVIOR.

Northwestern Medicine scientists have discovered for the first time that the rhythm of breathing creates electrical activity in the human brain that enhances emotional judgments and memory recall.

These effects on behavior depend critically on whether you inhale or exhale and whether you breathe through the nose or mouth.

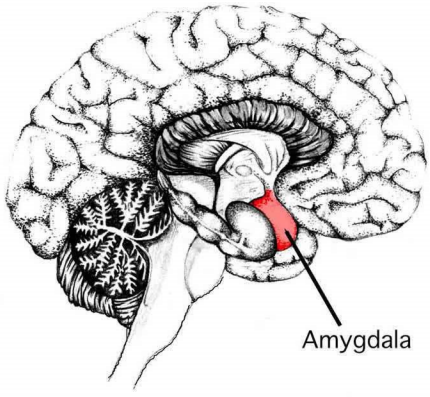
In the study, individuals were able to identify a fearful face more quickly if they encountered the face when breathing in compared to breathing out. Individuals also were more likely to remember an object if they encountered it on the inhaled breath than the exhaled one. The effect disappeared if breathing was through the mouth.

"One of the major findings in this study is that there is a dramatic difference in brain activity in the amygdala and hippocampus during inhalation compared with exhalation," said lead author Christina Zelano, assistant professor of neurology at Northwestern University Feinberg School of Medicine. "When you breathe in, we discovered you are stimulating neurons in the olfactory cortex, amygdala and hippocampus, all across the limbic system."Northwestern scientists first discovered these differences in brain activity while studying seven patients with epilepsy who were scheduled for brain surgery. A week prior to surgery, a surgeon implanted electrodes into the patients' brains in order to identify the origin of their seizures. This allowed scientists to acquire electro-physiological data directly from their brains. The recorded electrical signals showed brain activity fluctuated with breathing. The activity occurs in brain areas where emotions, memory and smells are processed.

This discovery led scientists to ask whether cognitive functions typically associated with these brain areas — in particular fear processing and memory — could also be affected by breathing.

The amygdala is strongly linked to emotional processing, in particular fear-related emotions. So scientists asked about 60 subjects to make rapid decisions on emotional expressions in the lab environment while recording their breathing. Presented with pictures of faces showing expressions of either fear or surprise, the subjects had to indicate, as quickly as they could, which emotion each face was expressing.

When faces were encountered during inhalation, subjects recognized them as fearful more quickly than when faces were encountered during exhalation. This was not true for faces expressing surprise. These effects diminished when subjects performed the same task while breathing through their mouths. Thus the effect was specific to fearful stimuli during nasal breathing only.



In an experiment aimed at assessing memory function — tied to the hippocampus — the same subjects were shown pictures of objects on a computer screen and told to remember them. Later, they were asked to recall those objects. Researchers found that recall was better if the images were encountered during inhalation.

The findings imply that rapid breathing may confer an advantage when someone is in a dangerous situation, Zelano said. "If you are in a panic state, your breathing rhythm becomes faster," Zelano said. "As a result you'll spend proportionally more time inhaling than when in a calm state. Thus, our body's innate response to fear with faster breathing could have a positive impact on brain function and result in faster response times

to dangerous stimuli in the environment."

Another potential insight of the research is on the basic mechanisms of meditation or focused breathing. "When you inhale, you are in a sense synchronizing brain oscillations across the limbic network," Zelano noted.

Abstract

Nasal Respiration Entrains Human Limbic Oscillations and Modulates Cognitive Function

The need to breathe links the mammalian olfactory system inextricably to the respiratory rhythms that draw air through the nose. In rodents and other small animals, slow oscillations of local field potential activity are driven at the rate of breathing (2–12 Hz) in olfactory bulb and cortex, and faster oscillatory bursts are coupled to specific phases of the respiratory cycle. These dynamic rhythms are thought to regulate cortical excitability and coordinate network interactions, helping to shape olfactory coding, memory, and behavior. However, while respiratory oscillations are a ubiquitous hallmark of olfactory system function in animals, direct evidence for such patterns is lacking in humans. In this study, we acquired intracranial EEG data from rare patients (Ps) with medically refractory epilepsy, enabling us to test the hypothesis that cortical oscillatory activity would be entrained to the human respiratory cycle, albeit at the much slower rhythm of 0.16–0.33 Hz. Our results reveal that natural breathing synchronizes electrical activity in human piriform (olfactory) cortex, as well as in limbic-related brain areas, including amygdala and hippocampus. Notably, oscillatory power peaked during inspiration and dissipated when breathing was diverted from nose to mouth. Parallel behavioral experiments showed that breathing phase enhances fear discrimination and memory retrieval. Our findings provide a unique framework for understanding the pivotal role of nasal breathing in coordinating neuronal oscillations to support stimulus processing and behavior.

SIGNIFICANCE STATEMENT Animal studies have long shown that olfactory oscillatory activity emerges in line with the natural rhythm of breathing, even in the absence of an odor stimulus. Whether the breathing cycle induces cortical oscillations in the human brain is poorly understood. In this study, we collected intracranial EEG data from rare patients with medically intractable epilepsy, and found evidence for respiratory entrainment of local field potential activity in human piriform cortex, amygdala, and hippocampus. These effects diminished when breathing was diverted to the mouth, highlighting the importance of nasal airflow for generating respiratory oscillations. Finally, behavioral data in healthy subjects suggest that breathing phase systematically influences cognitive tasks related to amygdala and hippocampal functions.

"Nasal Respiration Entrains Human Limbic Oscillations and Modulates Cognitive Function" by Christina Zelano, Heidi Jiang, Guangyu Zhou, Nikita Arora, Stephan Schuele, Joshua Rosenow and Jay A. Gottfried in *Journal of Neuroscience*. Published online December 7 2016 doi:10.1523/JNEUROSCI.2586-16.2016

Building Self Confidence

Self-confidence is one piece of the happiness pie and is essential in a healthy personality. Low self-confidence is a major contributor to depression because it influences how you view yourself and your ability to accomplish goals and interact with others. Here are a few small changes to your daily routine that can help boost confidence.

Volunteer

There is a lot of research suggesting that volunteering helps people feel better about themselves. If you like animals, consider walking dogs. If you are passionate about children or education, volunteer in a local school or offer tutoring services. Or if you lack time to volunteer, consider making a donation. Meaningful giving will help you feel connected to others while making you feel like a better person.

Smile

Okay, it may sound obvious, but recent studies show that smiling during stressful situations can help lower heart rate levels and lead to more positive emotions. The physical act of smiling actually triggers your brain to feel more secure and relaxed. So even if you feel like you're faking it, you will feel benefits.

Do a good deed

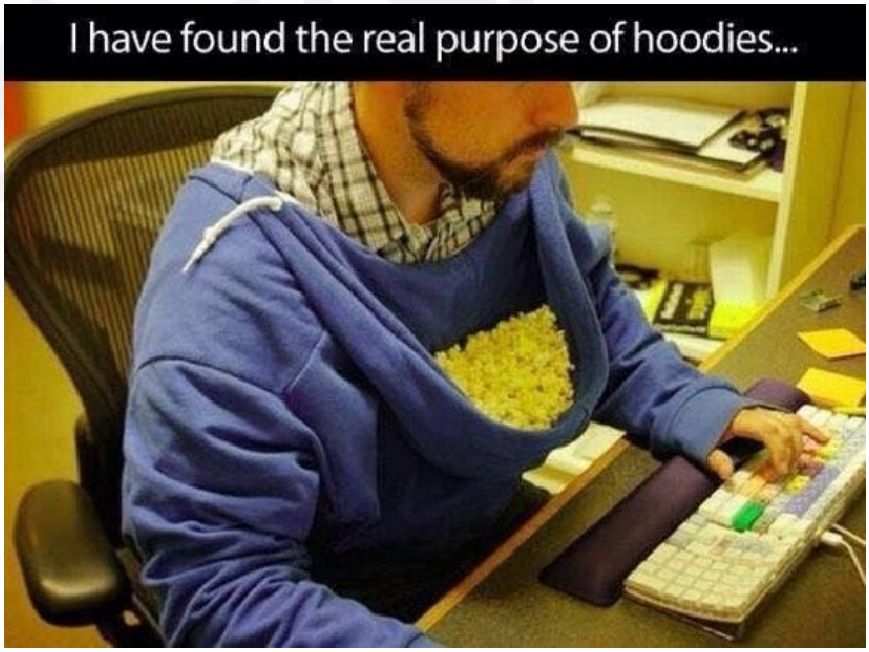
You've heard it before. Random acts of kindness make the world a better place. Performing good deeds can make you feel better about yourself while you brighten somebody else's day. Send a thank you card, bake some brownies for your co-workers, or compliment someone you usually don't talk to. Even small good deeds can have a big impact on your mood.

Accept compliments

A major sign of low self-confidence is shrugging off praise or downplaying compliments. If someone compliments you, accept it with grace. Think about the compliment and allow yourself to feel genuinely good about it. Start building a mental list of what others like about you and retrieve that list the next time you are feeling down about yourself.

Dress for success

This may seem shallow at a glance, but clothing can actually have an impact on self-confidence. Researchers have found that people who dress for success actually think of themselves as more successful. Think about what your outfit says about you and how you feel in it. Even if you sit at a computer all day and don't interact with many people, consider wearing a nicely pressed shirt instead of a hoodie.



Learn something new

Personal achievement and valuable skills perpetuate self-confidence, so learning something new will help nurture positive feelings about yourself. Take a class, learn a new language, or learn to cook something difficult.

Ignore your inner critic

You will always be your worst critic. Often we lose self-confidence because the little voice in the back of our minds is telling us that we aren't good enough or that failure is imminent. Learn to ignore this voice and give yourself some credit. Prove that inner voice wrong and exceed your personal expectations.

Exercise

Getting exercise improves your mood, releases stress, and eventually will help you feel better about how you look. And it isn't necessary to be wildly ambitious. Just 30 minutes of exercise three times a week is enough to have a positive impact on your mood and your health. Setting fitness goals for yourself and meeting those challenges will also help boost self-confidence as you see your discipline diminish your lazier tendencies.

Stand up straight

Slouching comes across as sheepish and unhealthy, whereas good posture displays a sense of confidence, regardless if you are feeling it. Stand tall and relax your shoulders. Think about elongating the spine and holding your head straight so your eyes gaze forward. Also maintain good posture while sitting. Good posture brings a host of mental and physical benefits including a stronger core, better breathing, and less stress.

Eat right

Food has a strong impact on how we feel. You probably already know that eating healthy foods such as vegetables, fruit, nuts, and fish are good for your appearance, but eating these foods also affects your mood. Picture your diet as a chain of events, consuming healthier foods will lead to a smaller waistline and a happier mood, which in turn leads to more energy and self-confidence. Small changes bring results.

Assume people like you

A major symptom of low self-confidence is worrying too much about what others think and assuming that people focus on your flaws. This negative thinking can only lead to bad emotions and set you up for failure. Flip that attitude around and assume that people like you. Start by recognizing the situations when this happens and make a conscious choice to think positively about yourself.

Get organized

Set small weekly organization goals, such as cleaning out your purse or rearranging your bookshelves. Managing just one small piece of your life can have a big impact on how in control you feel.

Meditate

Meditation has shown to be effective in promoting stress reduction, relaxation, and productivity. Likewise, it has been shown to help with managing depression, blood pressure, and the risk of heart disease. According to researchers at UCLA, the brain gets stronger as meditation is practiced over time. Brain strength is measured in the amount of gyrification, or folding of brain tissue, which allows the brain to process information more efficiently.

Talk to strangers

Engaging in conversations with new people breaks habits of insecurity and makes you feel more outgoing and personable, leading to a more confident self. This doesn't mean you have to be the life of the party; just start by talking to the barista at the coffee shop or someone on your commute to work.

Ditch the gender stereotypes

Too often people assume limitations based on gender stereotypes–for instance that men are better at math and science, or that women are better communicators. Don't let these stereotypes get in your way. So what if the class you want to take is predominately male or female? Accept the challenge and believe in your own abilities.

Avoid the mirror

Studies have shown that focusing on our physical appearance makes us more anxious and less happy. Try avoiding the mirror or significantly limiting the time spent looking in the mirror and analyzing physical imperfections. Start by noting how often you look in the mirror, as well the length of time. Then begin to eliminate the unnecessary mirror-gazing. Remember: You are you own worst critic, so limit those opportunities to bully yourself.

Make eye contact

Confident people generally have good eye contact when they are speaking and listening. Like standing up straight, this confident mannerism will help hide your insecurities and leave you feeling more confident.

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Treat yourself

People who are caregivers are consistently focusing their attention on others tend to have lower self-confidence since they spend very little time working on personal achievements or their own physical and mental well-being. If you had a big meeting at work, reward yourself with some time to unwind with some wine and a bubble bath that night. Or if you get that raise you've been working for, treat yourself to those shoes you've been eyeing.

Allow 'me time'

Spending some time on your self is also important. Consider changing your hair color, put on some self-tanner, or try an at-home facial. Studies have shown that women who have a tan actually feel happier, healthier, more rested, and confident. A facial and a change of hair color will help you feel and look fresher, helping to amp up confidence.

HUMOR: GROWING OLD

QUESTION: HOW MANY DAYS IN A WEEK?
ANSWER: 6 SATURDAYS, 1 SUNDAY

QUESTION: WHEN IS A RETIREE'S BEDTIME?
ANSWER: TWO HOURS AFTER HE FALLS ASLEEP ON THE COUCH.

QUESTION: HOW MANY RETIREES TO CHANGE A LIGHT BULB?
ANSWER: ONLY ONE, BUT IT MIGHT TAKE ALL DAY.

QUESTION: WHAT'S THE BIGGEST GRIPE OF RETIREES?
ANSWER: THERE IS NOT ENOUGH TIME TO GET EVERYTHING DONE.

QUESTION: WHY DON'T RETIREES MIND BEING CALLED SENIORS?
ANSWER: THE TERM COMES WITH A 10% DISCOUNT.

QUESTION: AMONG RETIREES, WHAT IS CONSIDERED FORMAL ATTIRE?
ANSWER: TIED SHOES.

QUESTION: WHY ARE RETIREES SO SLOW TO CLEAN OUT THE BASEMENT, ATTIC OR GARAGE?
ANSWER: THEY KNOW THAT AS SOON AS THEY DO, ONE OF THEIR ADULT KIDS WILL WANT TO STORE STUFF THERE.

And, my very favorite....
QUESTION: WHAT DO YOU DO ALL WEEK?
ANSWER: MONDAY THROUGH FRIDAY , NOTHING. SATURDAY & SUNDAY, I REST.

Just before the funeral services, the undertaker
came up to the very elderly widow and asked,
'How old was your husband?' '98,' she replied...
'Two years older than me'
'So you're 96,' the undertaker commented..
She responded, 'Hardly worth going home, is it?

I feel like my body has gotten totally out of
shape, so I got my doctor's permission to
join a fitness club and start exercising.
I decided to take an aerobics class for seniors.
I bent, twisted, gyrated, jumped up and
down, and perspired for an hour, but,
by the time I got my leotards on,
the class was over.

It's scary when you start making the same noises as your coffee maker.

These days about half the stuff in my shopping cart says, "FOR FAST RELIEF."

THE SENILITY PRAYER :
Grant me the senility to forget the people
I never liked anyway, the good fortune
to run into the ones I do, and the
eyesight to tell the difference.

Professional Development / InService	
Leamington 1st and 3rd Wednesday	Parkhill 2nd and 4th Wednesday
Sept 20	Sept 27
Oct 4	Oct 11
Oct 18	Oct 25
Nov 1	Nov 8
Nov 15	Nov 22
Dec 8 (Christmas Luncheon)	Dec 13 (Christmas Luncheon)

2018	
Jan 17	Jan 10
Feb 7	Jan 24
Feb 21	Feb 14
March 7	Feb 28
March 21	March 14 (March Break)
April 4	March 28
April 18	April 11
May 2	April 25
May 16	May 9
June 6	May 23
June 20	June 13