

Brain Morsels: Packet 5

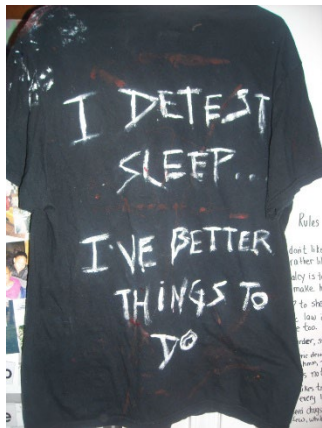


EACH BRAIN MATTERS
THE CENTER FOR NEUROSCIENCES FOUNDATION

Sleep deprivation!

And, Exploring your creativity, continued

Remember that there are 5 pillars of brain health: nutrition, exercise, sleep, social connections and intellectual challenge. So far, we have focused on sleep because among all the pillars it is the one typically most neglected, most maligned, and given the lowest priority. And yet, it is so critically important to our mental and physical health. Here's why it matters!



Ah yes. So much time given over to sleep in our lives. Roughly a third of our lives, or, for the average 75-year-old who sleeps 8 hours a night, 219,000 hours have been spent asleep. Almost a quarter million!

Yet, “Without enough sleep, we all become tall two-year-olds.” (Jojo Jensen, *Dirt Farmer Wisdom*, 2002). And remember, nearly all, if not all, animals sleep, so sleep *must* be important. In the last two packets, we talked about the normal patterns of sleep and indeed about how optimal sleep patterns can become disrupted as we age. We also described some of the most common “prescriptions” for improving sleep hygiene. Here we’ll tell you about some of **the consequences of inadequate sleep on the functioning of the brain and on its long-term health.**

In the Western world, most adults are sleep-deprived. Many think they can get along just fine on 4 or 5 hours of sleep, and in fact brag about it! Others are juggling many responsibilities and completing them often takes them into the wee hours of the morning. There are people who are genetically night owls and others who are genetically morning larks. Teenage brains usually shift to later sleep times and struggle to awaken for school. For the night owls with morning jobs or the teenagers with early school start times, sleep time is often compromised. Yet sleep has now robustly been shown *to be essential* to physical vigor, emotional control, cognitive competence, a strong immune system, mental health, and some protection against dementia in old age.

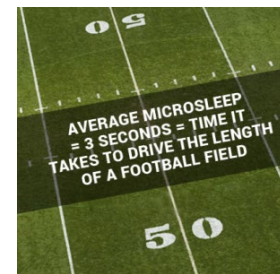
Diving in a little deeper, **acute sleep deprivation** is known to be associated with poor memory and false memories may occur. Don’t even think about gambling in a sleep-deprived state; poor emotional regulation and poor reasoning easily lead to unrealistic expectations of gains and to minimizing losses, in turn leading to risky gambling decisions. Inappropriate behavior or even aggressive behavior is not uncommon. Anxiety and irritability rise. There is a tendency to focus

on negative experiences and facial expressions may be mis-interpreted. Disruption of hormones regulating appetite may lead to eating binges.

Chronic sleep deprivation is associated with a reduction in the excitability of neurons, which of course impairs cognitive function. It is known to reduce creativity and problem-solving ability, reduce the ability to cope with stress, increase difficulty making decisions, and lead to poor attention and focus as well as impaired memory. Many feel unmotivated or lethargic and always tired; the incidence of depression is higher. Health problems associated with chronic sleep deprivation include type 2 diabetes, cardiovascular disease, and obesity. The risk of these diseases starts to kick in when people consistently get fewer than 6-7 hrs of sleep. Studies suggest that a chronic sleep deficit may put the body into a state of high alert, which increases the production of stress hormones, in turn driving up blood pressure. Also, sleep deprivation can increase inflammation in the body and the brain, further increasing the risk for disease.

And one other indication of the importance of sleep is the appearance of microsleeps when the brain is sleep deprived. These are very short episodes of sleep – a fraction of a second to 4-5 seconds, often not even noticed, that occur during waking hours.

These probably don't matter much if you are sitting at your computer or engaged in simple tasks, but they do matter if you are on the interstate driving along at 60 mph or more. At that speed, in slightly less than 3 seconds, you would drive 90 yards, almost the length of a football field with no conscious control over your car. The National Highway Traffic Safety Administration estimates that 2.5% of fatal crashes and 2% of injury crashes involve drowsy driving.



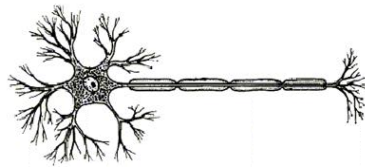
Special note on Sleep Apnea

In packet 4, we mentioned that if your own efforts to improve your sleep prove inadequate, i.e., you are still waking tired and experience drowsiness or lethargy during the day, seeking help would be a wise move. Sleep apnea turns out to be very common in seniors, men and women alike.

We hear people talk about sleep apnea all the time, but what is it and why does it happen? Sleep apnea involves multiple breathing stops throughout the night, whether because of airway collapse or obstruction and/or a problem with the brain's signal to breathe. This disrupts the sleep cycle as well as causing deficient oxygenation of the oxygen-hungry brain. While many of us think of sleep apnea in association with snoring, obesity and/or males, it is quite common in post-menopausal women and is increasingly likely in men and women beyond 60 years of age. The American Medical Association estimates that only 1 in 5 of the 30 million people in the US who have sleep apnea have been diagnosed.

Smoking, drinking alcohol, obesity, hypothyroidism, and a thick neck or small lower jaw make sleep apnea more likely, but the important thing as we age is to consider whether we have it, not only in someone who snores and easily falls asleep during the day, but in someone who often awakens with headaches unrelated to alcohol, or episodically stops breathing or gasps for air during the night, or has symptoms easily dismissed as “old age”: having more trouble concentrating, organizing and remembering things, and being tired, cranky or depressed much of the time. These symptoms parallel those of chronic sleep deficit, as do the microsleeps and health problems associated with untreated sleep apnea, including persisting problems controlling high blood pressure. The diagnosis of sleep apnea can begin with the health care provider prescribing a recording of oxygen levels throughout the night, but usually involves a night in a sleep lab to clarify optimal intervention. Treatment is effective and worthwhile, with substantial improvement in physical and emotional well-being and cognitive function as well as decreased risk of developing dementia. For more information see the AARP article: *Why You Should Take Sleep Apnea Seriously* by Hallie Levine, Published January 25, 2019 / Updated September 06, 2023.

Whatever the cause of sleep deprivation, the short story here is that with each missing hour of sleep, essential body and brain maintenance tasks go undone and the restorative function of sleep is diminished.



Exploring your creativity, continued

In the last packet, we asked you to define creativity and the characteristics of people you consider to be creative. We also asked that you think about the way you best express, or enjoy expressing, your own creativity. Here we ask you to continue that exploration, now examining the ways you personally generate ideas and act creatively.

Activities

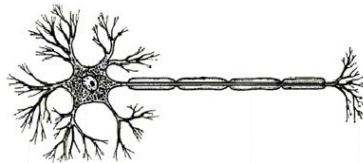
1. From your experience, what affects creativity? Think about a really creative time for you. What were the conditions?
 - a. Are you more creative alone or with others (essentially a creative community)
 - b. How does the environment affect your level of creativity? Conditions known from research to affect creativity include color, activity level, function of the environment, environmental noise level, urban environment, and nature.
 - c. Do your ideas come from an internal source or an external one? Or a combination?
 - d. Do you think there is a genetic component?

- e. How about your state of health? Your stress level?
- f. Does what you eat matter? How about how much quality sleep you have had?
- g. Is time of day or season of the year a factor for you?
- h. If a new or advanced skill set is required for you to embark on a project, does that deter you or delight you?
- i. Do you have access to the tools and supplies you need?
- j. What about personality? Are you an introvert or an extrovert? Or does your mood on a given day or time period matter? Do those affect your creativity?
- k. Does curiosity play a role?
- l. Are there experiences that you think have enhanced or limited your creativity? What mental stories do you tell about yourself and who you are that might affect whether you believe you are creative?
- m. Do you think age matters?

Make a set of cards:

Card 1 through x: to be optimally creative, I think I need.... Give each card one condition.

Then, on each card, list some ways you could test those conditions. Change one at a time. Any surprises?



Is one of the stories you tell yourself “I am not creative”?

We all have mental stories about ourselves. Here’s what can happen when the brain creates those stories and then we live with them.

"I Can't Draw" and Other Stories We Tell Ourselves

Once upon a time, when your brain was very young and trying to figure out the world, your brain took in lots of information from that world and tried, haltingly, to use that information to learn how to operate in that world. Some things worked; others didn’t. Eventually, the brain began to see patterns. Some things seemed to go together. Like a flat surface with legs becomes a table, and a table is used for eating, for gathering people together and so forth. Later we discover that there are categories for things, like furniture. These patterns help us simplify the world, because the brain comes to understand with little thought what an object is and to what category it belongs. No need to rediscover with each encounter.

Our young brains also are learning how to do things: to walk, to ride a bike, to use various tools. This is complicated, of course, because we are simultaneously developing our motor skills, learning to use sensory input that we need to fine tune movement, and the cognitive skills to go with both. In the end, our brains learn to coordinate specific muscle groups to enable walking, or the muscles controlling our hands to enable fine motor skills, like drawing. Our brains use networks in the frontal lobe to compare what behavior or motor output it had planned with what actually happened, with the idea of detecting errors and correcting them.

For example, here's what usually happens when a child is learning to ride a bike. Some kids get a tiny bike with no pedals, one in which they can learn balance, but their feet are easily on the ground; they use the stepping pattern they already know to push the bike forward. They might also have a low-to-the-ground bike with a wide seat *and* with pedals. They eventually graduate to a standard bike, and in most cases, a parent or sibling runs alongside steadying the bike, while the child's brain learns how to balance, pedal, and steer all at the same time. In other words, they are being actively taught and they are engaging their brain in building more and more complex patterns. That complexity requires building more complex motor circuits.

Same story with music. Suppose you want a child to learn an instrument. In most cases, the child is actively taught. The process of active learning is greatly enhanced by active teaching.

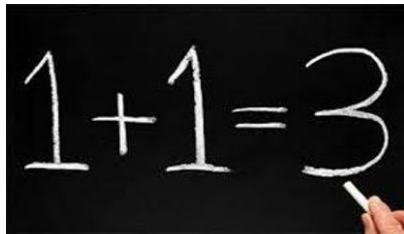


Curiously though, developing the skill of drawing often is different. Suppose a child has been asked to draw her family. At the beginning, she would draw stick figures, with details like clothing coming later, often needing a teacher to say people wear clothes so put clothes on your stick figure, and here's how. In some schools, the early art curriculum teaches children to deconstruct a shape into simple line segments, or to draw objects in the foreground before those in the background, or to creatively change the

drawing into something else if a mistake is made rather than abandoning it. But many children must figure out on their own how to draw; they are not being given the active support they need to develop this skill. Their drawing skills may never get significantly better, and they are often disappointed at their efforts. The child's brain, registering the repeated evidence of lack of skill, concludes that this is a pattern: "I cannot draw." Thereafter, the brain will continue to collect supporting evidence for this lack, and yet will disregard evidence to the contrary.



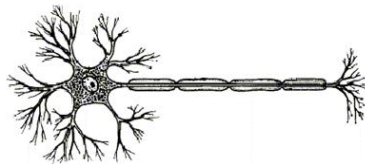
Perhaps “I can’t draw” is not a terrible limitation in the grand scheme, but there is another very common story that *does* come with limitations: the “I can’t do math” story. Now math is indeed taught in schools, and many schools now have math resource teachers or tutors to work with children who are struggling. Some children learn their facts easily, love multiplication and division, geometry or algebra, and maybe are inclined to pursue math as an indispensable component of their career path. Their brain’s story, supported by parents and teachers, is that they are good at math. But other students struggle.



Sometimes that means that the child as a pre-schooler has not had the experience of exploring through play basic math concepts like number sense (which number is bigger, etc.), measurement (longer, shorter), or even the language of math (before and after, greater than or less than.) These are fundamental to developing math skills in elementary school.

Later, learning flexible strategies for solving math problems becomes important, as is a growth mindset: I learn from my mistakes, I learn by practicing, I can get this. When children with weak math foundations meet more difficult math challenges, and perhaps hear from adults around them that they can’t do math either, the brain again will take these experiences and understand them as “I can’t do math.” The brain remains on the look-out for corroborating evidence and, that one decent math test? Just a fluke. The can’t-do-math story can be significantly limiting – difficulty handling even routine finances or planning budgets and limiting career options.

Some of these stories our brains develop and tell us are deeply held stories, almost part of our personal profile of ourselves. Do you tell yourself that you are not creative? These stories are challenging to root out, but it is possible to do so later in life through considerable effort, a positive growth mindset, and the astonishing capacity of our brain to learn and adapt.



Puzzles

Except where noted otherwise, the puzzles that follow come from the website www.brainzilla.com

Puzzle 1

I am the beginning of everything, the end of time and space, the beginning of every end, and the end of every place. What am I?

Puzzle 2

A murderer is condemned to death. He must choose between three rooms. The first is full of raging fires, the second is full of assassins with loaded guns, and the third is full of lions that haven't eaten in 3 years. Which room is safest for him?

Puzzle 3

I am a fruit, but also a shape. If you had two of me, I would sound just the same. If you rearrange my letters, it could be a crime. Add me to a montage and I can become a different fruit. Remove my head and you can still listen; take away the end and I can still be eaten. Without a piece of the center, I am still a word; take away all of the middle and I am just an acronym. What am I?

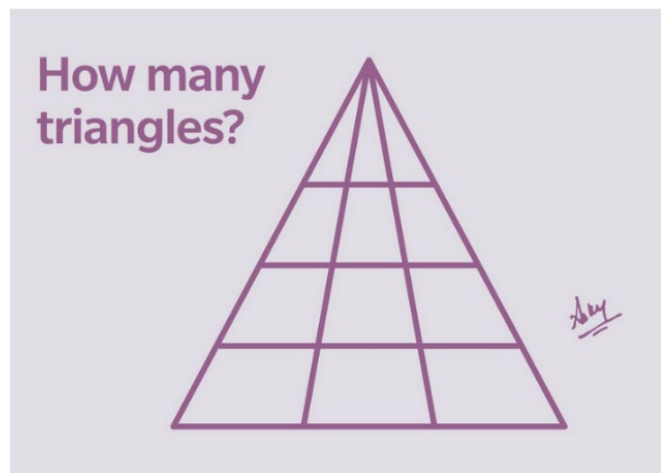
Puzzle 4

T S S C I E S N I E I R C A P	WHALES	
H H Y R D N A R W H A L W H R	BELUGA	KILLER
R I H U M P B A C K T L O L O	BLUE	NARWHAL
S B Y C L O S E U P U L N S T	HUMPBACK	SPERM
L T H E S P D I B E L U G A O	TYPES OF PHOTOGRAPH	
T E O O E L N E L E C T R O N	CLOSEUP	NATURE
I L T R T O S N C L A N S E A	FORENSIC	SELFIE
L T M M B L U E E Y A U T T P	MACRO	TILTSHIFT
T S I A A H K U S T K D A C T	PARTS OF AN ATOM	
S O I A E C S T U V E Q H N N	ELECTRON	PROTON
H D E I O A R R T E E U E O P	NEUTRON	QUARK
I P O D D K E O N S S A T H E	NUCLEUS	
F N A F O R E N S I C R A H I		
T R U S Y K I L L E R K S I R		
S I F Y D T I S E L F I E M A		

Puzzle 5

How many triangles (not counting the one in the artist's signature)?

From Reader's Digest, by Kumar Ankit.



Answers

Puzzle 1

The letter “e”.

Puzzle 2

The room with the lions. If they haven't eaten in 3 years, they are all dead.

Puzzle 3

A pear.

Puzzle 5

There are 24 triangles.

