

## **Executive Dysfunction or the Conductor That's Gone Awry**

In today's abbreviated world of attention and learning disorders such as; ADD, ADHD, OCD, ODD, NLD, LD, AS, PDD, PDD-NOS, DCD, and ELP (sorry, they were my favorite group), we often here a common theme that's usually bound to the hip to all of them, and that is executive dysfunction (ED).

This mysterious term is bandied about as if most individuals have a complete understanding as to what it means, and where in the brain executive function takes place. After all, executive functions are what separate us, humans, from all other animals.

In her book, Different Minds, Deirdre Lovecky<sup>1</sup> describes executive function (EF) this way; ".....that part of the brain that attends to, organizes, processes, and outputs information." Although this is fundamentally correct the definition still does not give this important attribute justice.

Let us first discuss where the seat of EF is found in our brain. Our brain is divided into two halves called the right and left hemispheres such that if you were to cut a cantaloupe in half you would be holding the left hemisphere in your left hand the right hemisphere in your right hand. In addition, our brains are also divided into lobes so that if you put that cantaloupe back together, the back part would be the occipital lobe, the sides would be the temporal lobes, and top part would be the parietal lobe, and the front part would be the frontal lobes. At the very front of the frontal lobe is another division called the prefrontal cortex and it is this area that is responsible for our EF, and separates us from all other forms of animal life because as humans, our frontal lobes are more developed.

According to Korbinian Brodmann,<sup>2</sup> the prefrontal cortex or its analogues account for 29% of the total cortex in humans, 17% in the chimpanzee, 11.5% in the gibbon, 7% in the dog and 3% in the cat.

Elkhonon Goldberg in his book, The Executive Brain,<sup>3</sup> presents the analogy of the prefrontal cortex as being the conductor, CEO, or stage director and the rest of our brain being the players in the orchestra, subordinates in a corporation, or actors on stage. He describes it this way; "The CEO does not manufacture the company's product, just as the conductor does not make music, and the director does not act. Yet they direct the actions of those who manufacture the product, play the music, or perform on stage. Without them there would be no product, no concert, and no show."

So we see that executive functions are functions that make us uniquely human. The ability to plan actions based upon goals or objectives (planning), organize our thoughts to achieve those goals and objectives most efficiently (organization) and carry out the steps necessary to accomplish what we set out to do (sequencing).

I wish it were as simple as that. Planning actions based upon goals requires us to remember the goal. This requires us to be able to hold the goal in mind. This also takes place in the prefrontal cortex and is referred to as working memory.

Working memory is the ability to hold pieces of information in reference to the task at hand, in our mind and refer to back to them quickly while we are in the process of carrying out the steps necessary to complete a task. Not only do we have to keep the goal in mind but we have to keep the necessary steps in mind and in the correct order (sequencing), just like a windows program allows us to move from window to window while everything is readily available on the screen. We must also be flexible enough to change the plan in midstream if during our execution of the task it is not going as we planned (mental flexibility). Lastly, we must also sustain enough desire and mental arousal to be able to keep on task to finish what we have set out to do (attention, vigilance). The acronym ISIS is commonly used; I- Initiate the task, S- Sustain attention while completing the task, I- Inhibit other distracting stimuli to stay on task, S- Be able to Shift our thought patterns should we need to correct or change our approach.

As you can see, a tremendous amount of brain power is required to be able to accomplish the above. So what happens if this part of the brain is weak or not fully aroused or not neurologically active enough?

As quoted from Different Minds by Deirdre Lovecky,<sup>4</sup> Executive dysfunction results in impairments in abilities that have academic, emotional, and interpersonal consequences. These impairments involve selective, focused and sustained attention, efficient memorization and problem solving, inhibition of verbal and nonverbal responses, organization, planning, self-monitoring, and self-instruction, sequencing of complex behaviors and management of space and time.

It is the current thought that ADD/ADHD is more of an executive dysfunction than that of a specific lack of attention.

I believe that there are three core brain functions; timing, synchronicity, and rhythm.

- **TIMING-** How long to get from A to B?  
Deficits in timing include; Inattention, delays in processing, information retrieval, short and long term memory, fine and gross motor control.
- **SYNCHRONICITY-** Ability to carry out steps in a process. Deficits in synchronicity include problems with sequencing/planning, organization, executive function.
- **RHYTHM-** Multi-tasking, smooth transition from one thought to the next.  
Deficits with brain rhythm include problems with; Mental flexibility/agility, working memory.

What is important to understand is that most children and adults that have been labeled with any of the abbreviations listed in the first paragraph will have some form of executive dysfunction, and therefore most if not all of these conditions are co-morbid meaning that they occur together to varying degrees in most people. We can also look at all of these syndromes actually as one syndrome along a spectrum with mild presentations at one end and more severe presentations at the other end.

The current research reveals that there are common causes for most of these challenges and that they stem from under activated or weak brain regions, inability of one hemisphere to communicate efficiently with the other hemisphere, and inability of the bodies sensory system to properly integrate at the higher levels of the brain.

So we see the need to focus on strengthening the neurons in the brain and restore faulty timing, synchronization and rhythm.

Luckily, through the brains amazing ability to change based upon proper stimulation, a process called plasticity, genetics need not be the only dictate as to how our brains will function and medication need not be the only choice we have. We no longer have to listen to the words; “there’s nothing that can be done, you just have to live with it”

- 1- Lovecky, DV, Different Minds, Pg 44
- 2-Goldberg, E, the Executive Brain, Pg. 33
- 3- Goldberg, E, the Executive Brain, Pg. 21-22
- 4- Lovecky, DV, Different Minds, Pg 62

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