


# **PODAR JUMBO KIDS**

## **BRAIN RESEARCH AND ITS IMPLICATIONS ON EARLY CHILDHOOD EDUCATION**




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We live in a new world,  
one where education,  
neuroscience, and  
classroom instruction are  
joined

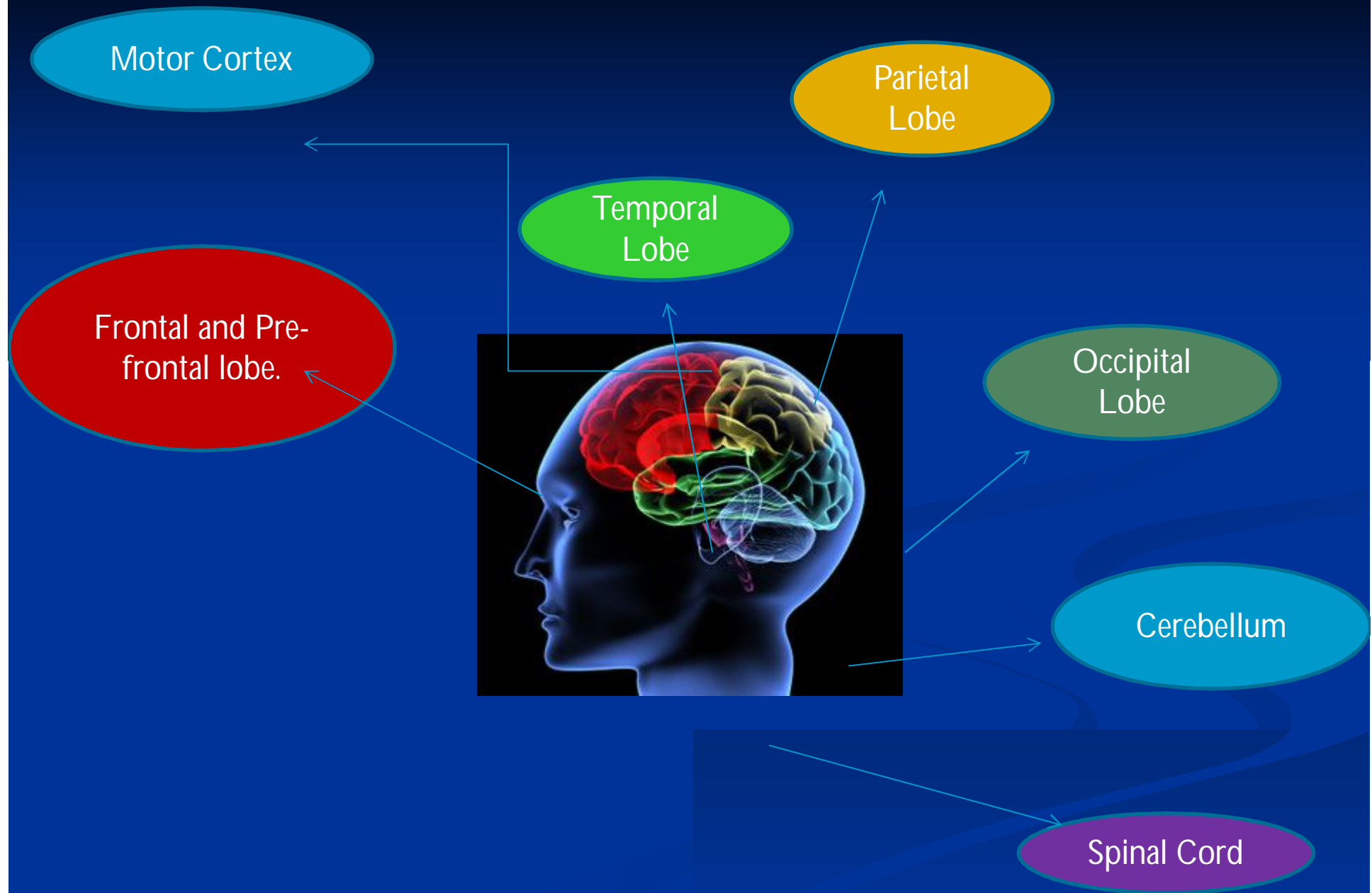


*The brain is without doubt our most fascinating organ. Parents, educators, and society as a whole have a tremendous power to shape the wrinkly universe inside each child's head, and, with it, the kind of person he or she will turn out to be. We owe it to our children to help them grow the best brains possible.*



*~L Eliot (1999)*







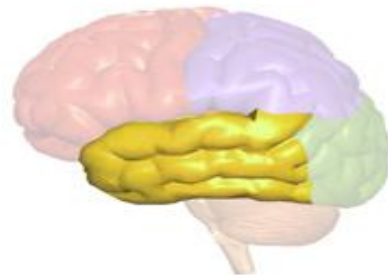
## OCCIPITAL LOBE (Visual Cortex)

- Responsible for processing visual stimuli.
- Millions of cells determine motion, depth, distance, color, lines, different shades and general scanning.
- When looking at the same object we all see it just a little differently.



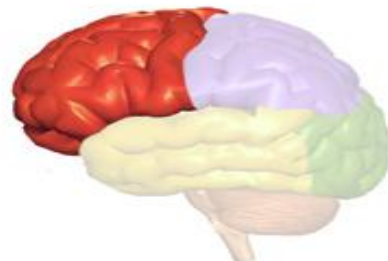
## PARIETAL LOBE

- Connected with the processing of nerve impulses related to the senses, such as touch, pain, taste, pressure, and temperature.
- Related to memory, language functions and spatial attention.



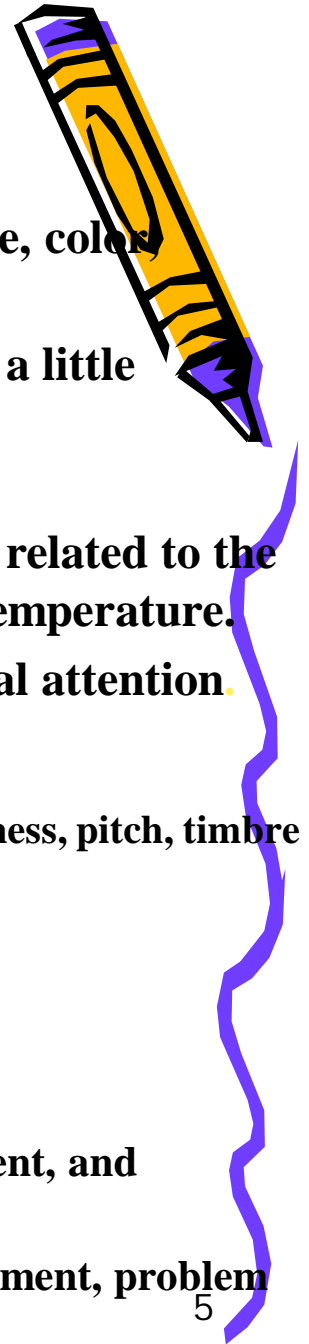
## TEMPORAL LOBE

- Main function is to process auditory stimuli – sound's loudness, pitch, timbre
- Wernicke's Area – (LH) comprehend and interpret speech.
- Plays a role in auditory memory.



## PREFRONTAL LOBE

- Concerned with emotions, reasoning, planning, movement, and parts of speech.
- Also involved in purposeful acts such as creativity, judgment, problem solving, and planning.
- Perhaps the most important part of our brains as it is what defines who we are.



Our ability to think about the past

Last part of the brain to develop.

Orbitofrontal cortex regulates emotional responses from the lower parts of the brain

Separates us from other species

Our ability to love, hate and experience emotional pain.

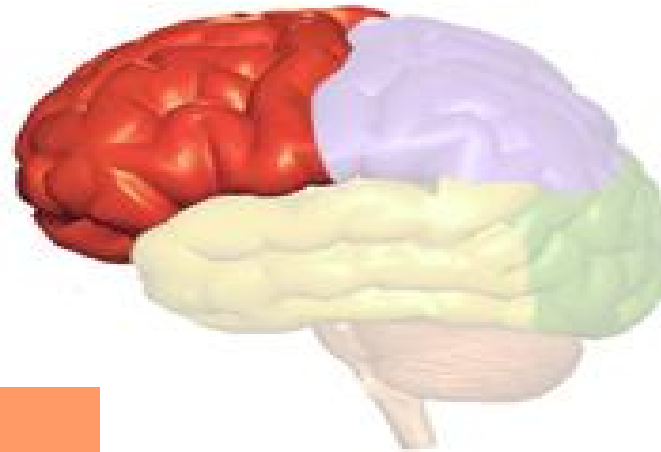
Controls for higher order thinking skills

Broca's area - allows for speech

Knowing who we are and our ability to reflect on our lives.

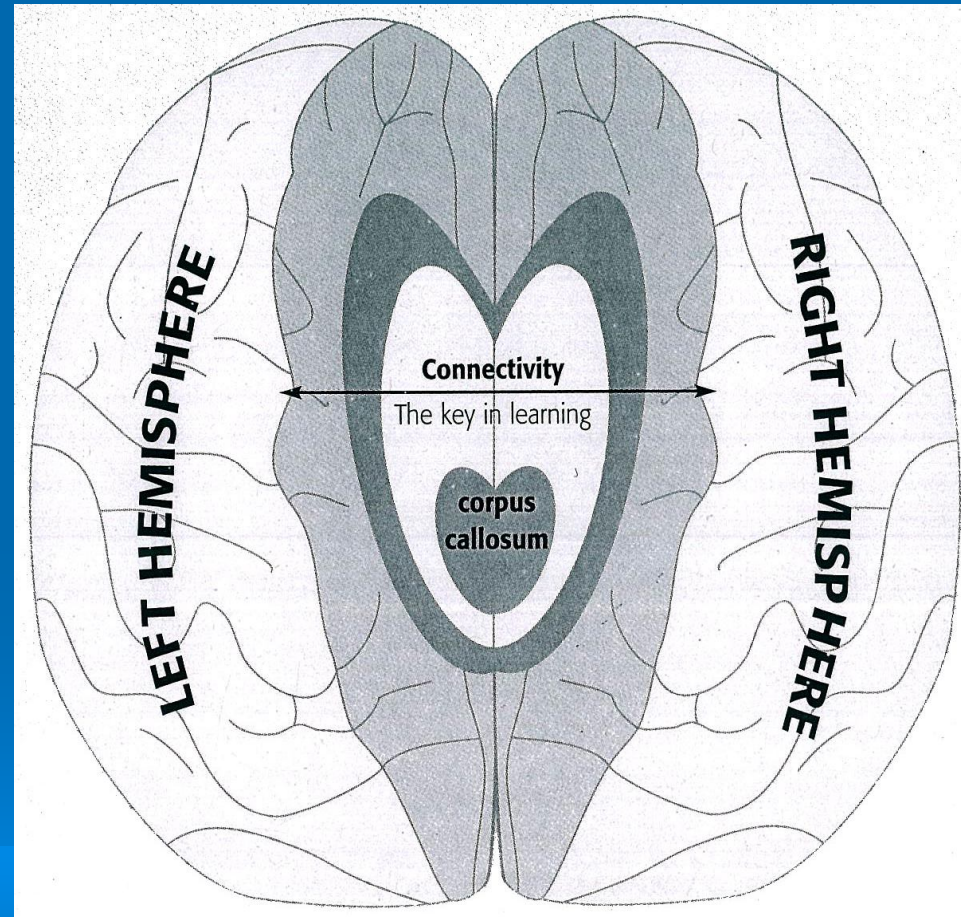
Our ability to make decisions and solve problems

Ability to plan our future



# Left and right brain

- Left and right brain make me bright,
- Left brain works better when it works with the right!
- Music and rhyme help them work together,
- With this brain training I can learn better!



# Left and right brain

- **Left side of brain**

- By giving structure and meaning to language, the left side of the brain enables us to understand the words that we read and hear.



- **Right side of brain**

- Responsive to tonality, sound, rhythm and music, when the right side of the brain hears a word or sentence, it starts processing the message behind the words. Is the speaker trying to tell us something happy, sad or funny? It's not what you say; it's how you say it.

The production and release of the following neurotransmitters will cause change in the brain

- **Acetylcholine.** Helps with frontal lobe functions and in formation of long-term memories.
- **Dopamine.** Assists in focus, attention, and goal setting.
- **Norepinephrine.** Responds to novelty and aids in memory formation.
- **Serotonin.** Helps control impulsivity, calms the brain, aids in reflective behaviors.



# Experience Dependent and Experience Expectant

- Both neuroscientists and child development experts agree that there are two types of learning that occur (Berk, 2006; Bruer, 2001; Greenough, Black, & Wallace, 1987).



# Experience dependent

- *Experience*-dependent learning occurs when the brain is exposed to certain types of experiences from the uniqueness of its environment.
- It is experience-dependent learning that is provided by the home, school, and other environments.



# Two critical areas of research in the neurosciences are influencing how we educate our young children

- The first significant subject of research is referred to as **plasticity**.
- Mental and physical activity stimulates physiological and structural changes in the brain.
- The experiences we provide all children will affect their very brain structure.



# Mirror neurons

- The second area of research is the startling discovery of "*mirror neurons*."
- These are networks in the premotor area of the brain that fire when we watch someone else do something.
- This implies that when a child watches an adult do something, a network begins firing in the brain.
- Empathy, language, and social behavior may center on what a child sees.

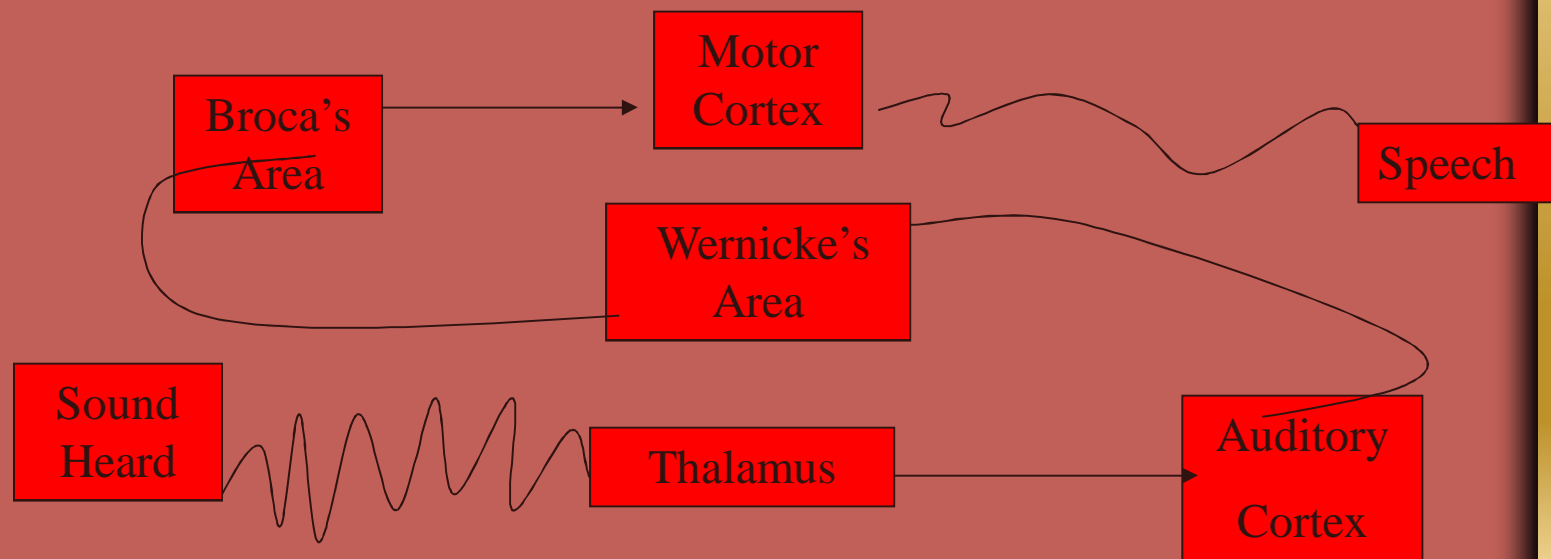


# Big Blocks and How the Brain Works

- Each experience a young child has involves one or more of their senses.
- As the child interacts with his environment.
- Various stimuli enter the body via the five senses.
- All outside experiences are converted to electrical/ chemical impulses that travel via the nervous system to the thalamus, an almond-shaped organ in the center of the child's brain.
- This important organ assigns the incoming stimuli to one of four lobes(occipital, temporal, parietal, and frontal) or the motor cortex part of the brain to be further processed.



# Language Pathway in the Brain



# Language




The child's brain needs a rich language culture in order to develop normally:

Children who are spoken to a lot have:

- 33 more vocabulary words at 16 months.
- 131 more vocabulary words at 14 months.
- 295 more vocabulary words at 20 months.

Speaking to children not only increases vocabulary, it develops background knowledge and increases dendrite growth.

# Brain Briefing

 According to Jim Trelease, author of the best-selling; *The Read Handbook*. (2001), there are three books that contain all of the phonemes blends, and diphthongs a child needs to hear. They are *Goodnight Moon*, *Make Way for Ducklings*, and *Charlotte's Web*.



# Be Emotionally Intelligent



- Identify and label feelings
- Reading others' moods and feelings
- Managing your own moods and feelings
- Controlling impulses, delaying gratification
- Expressing feelings appropriately and productively
- Feeling compassion and empathy for others.

# Temperature



- There should be optimal temperature in the learning environment.
- Choice may be the most important variable when it comes to classroom temperature.
- According to Ornstein (1991) "a rise of only 1 or 2 degrees C in brain temperature above normal is enough to disturb brain functions."

acoustics - aromas - color - light - music - temperature - thinking process - curriculum

# Acoustics

- The brain processes about 20,000 bits of auditory stimuli every second. What does this mean for the classroom?
- Nearly every sound in the range of 20 to 15,000 cycles per second is fair game for processing.
- Hearing what we want students to hear in the classroom is one of the most significant variables in predicting reading performance, in fact, it's an even greater predictor than being identified as gifted.
- The Hescong Mahone Group(2007) found the loud ballast hum of poor lighting to have a -19% influence, compared to a +16% effect of being gifted.



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# Aromas



- The olfactory glands are directly linked to the nervous system.
- Smell is an important sense that is underutilized in the learning environment.
- An awareness of aromas can give you a very powerful edge in reaching learners and optimize learning states.
- Smells in the environment can influence mood, anxiety, fear, hunger, depression, and learning.
- Smells that are most effective depend on the students you have. Something as simple as dunking the blocks in bleach for cleaning can shut down some student's engagement.

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# Color:

- Neuroscientists theorize this because:

- The brain is biased for high contrast and novelty;
- 90% of the brain's sensory input is from visual sources;
- The brain has an immediate and primitive response to symbols, icons, and other simple images.

- Consider factors that influence your learning environment:

- Real life imagery
- Posters
- Room color
- Concrete visuals
- Bulleting boards
- Add interesting collections, photos, objects
- Encourage the use of bold colors in projects

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# Music

- Increases muscular energy
- Increases molecular energy
- Influences heartbeat
- Alters metabolism
- Reduces pain and stress
- Speeds healing and recovery
- Relieves fatigue
- Aids in the release of emotions
- Stimulates creativity, sensitivity, and thinking
- Assists with memory recall



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# Using a trampoline to tone the brain and body

- This is for one adult or child at a time. The object of this activity is to challenge yourself to land in alternating positions -sitting down and standing up - and keep landing on the 'X'. You must already be comfortable and practised at landing sitting down or standing up, this is not a physical agility test. Rather, it is to work a mental activity into an already great physical activity to tone the brain. Keep going for 5-10 minutes, taking breaks as feels appropriate.
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- Whenever the brain is challenged to learn new facts, it tries to make a connection between what it already knows and the new information it is trying to learn and remember. In this way, it starts to build up an extensive neural network.



# RAD LEARNING

 RETICULAR ACTIVATING SYSTEM

 + AMYGDALA'S FILTER

 + DOPAMINE



# Reticular activating system- RAS

- Use changes in the environment
- Mindful focus activities
- Teachable moments
- Multi sensory lessons to get the brain's attention
- RAS alerts the brain to change and gets it primed to interact with new information



# Amygdala

- Games and activities that reduce stress and increase pleasurable associations help keep this second brain filter from blocking information
- Stress, boredom, frustration or confusion block flow of information through amygdala to the thinking brain



# Dopamine

- With pleasurable experiences comes this neurotransmitters release
- Increase focus, attention and executive functions in the frontol lobe.



For questions on brain  
research you can log on to  
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Dr. Stephen Rushton

