



## EMPOWERING: AN OT'S PERSPECTIVE

EMPOWERED  
TO CONNECT  
CONFERENCE

Marti Smith, OTR/L

SHOW  HOPE

## REGULATIONS OF THE SENSORY SYSTEM THROUGH RELATIONAL ACTIVITY

- Regulation is monitoring and adjusting with a goal of balancing
- We learn regulation through relationship





## REGULATIONS OF THE SENSORY SYSTEM THROUGH RELATIONAL ACTIVITY

- Neural pathways depend upon emotion, repetition, myelin, amygdala response, proprioception, relationship, and environment
- Our own personal past experiences and history will influence how we perceive a new experience





**EMPOWERED**  
TO CONNECT  
**CONFERENCE**

---

Our early responses to sensory stimuli are heavily dependent on caregiver social cueing





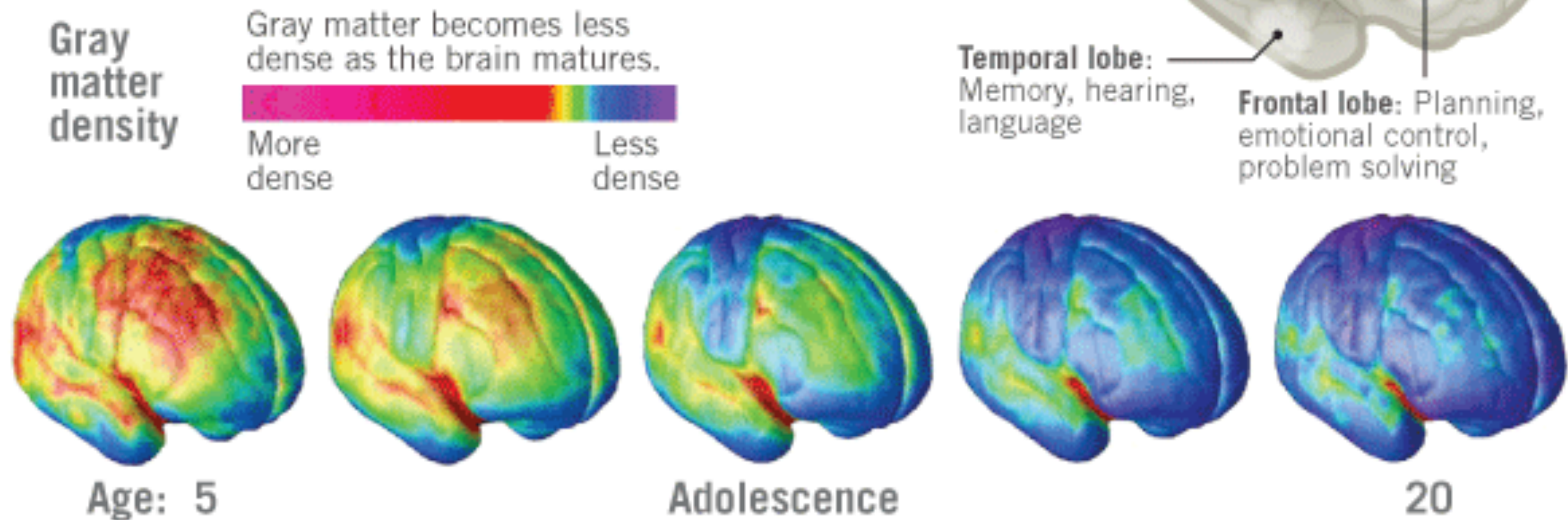
## REGULATIONS OF THE SENSORY SYSTEM THROUGH RELATIONAL ACTIVITY

---

- The brain develops in sequence and will heal in sequence
- A child cannot access a part of his/her brain that is not fully developed due to age or traumatic influence

# Growing a Grown-up Brain

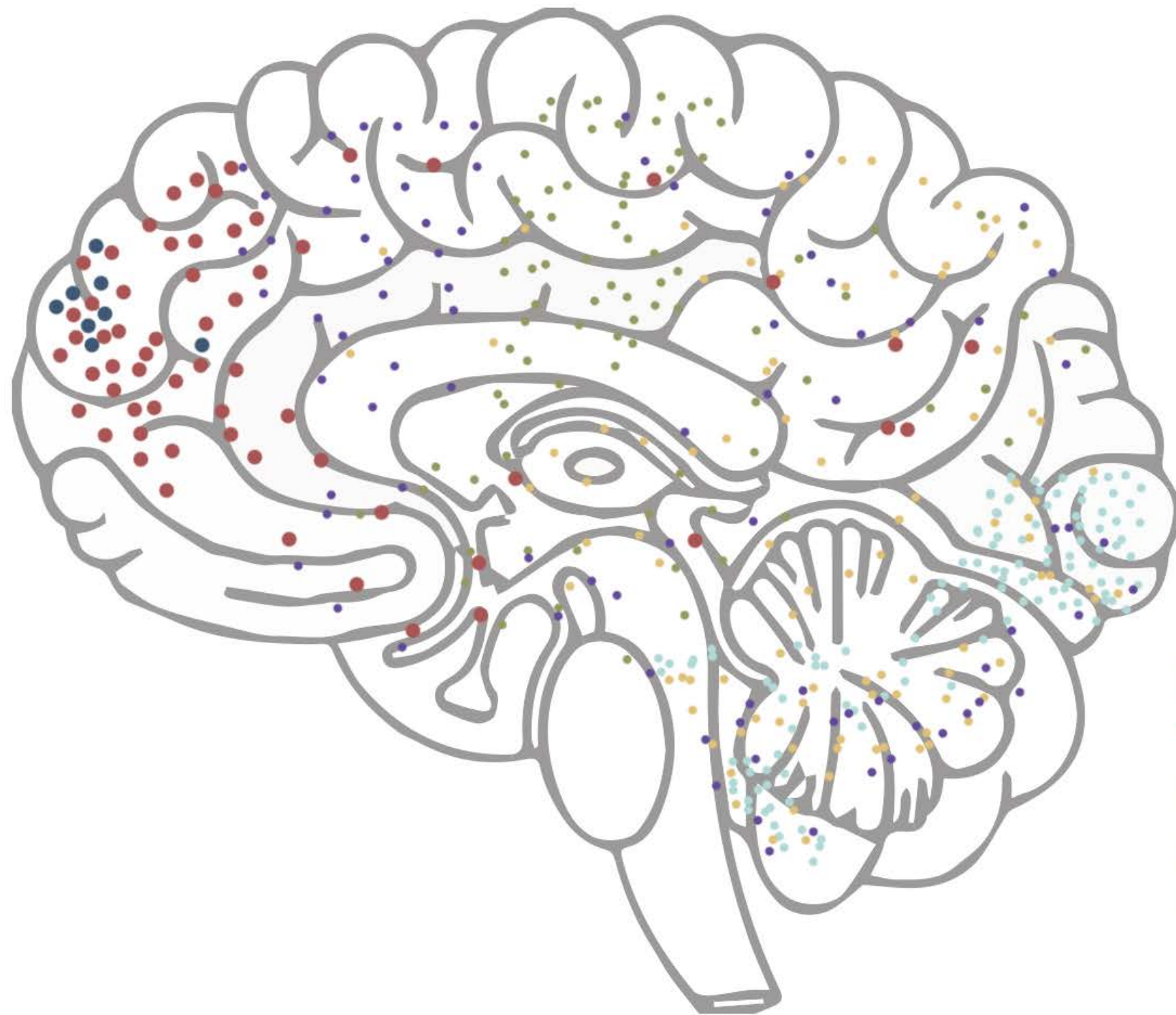
Scientists have long thought that the human brain was formed in early childhood. But by scanning children's brains with an MRI year after year, they discovered that the brain undergoes radical changes in adolescence. Excess gray matter is pruned out, making brain connections more specialized and efficient. The parts of the brain that control physical movement, vision, and the senses mature first, while the regions in the front that control higher thinking don't finish the pruning process until the early 20s.



Source: "Dynamic mapping of human cortical development during childhood through early adulthood," Nitin Gogtay et al., *Proceedings of the National Academy of Sciences*, May 25, 2004; California Institute of Technology



## REGULATIONS OF THE SENSORY SYSTEM THROUGH RELATIONAL ACTIVITY



There is an 8x synaptic density increase during the first 18 months while neurons seek their appropriate connections

NEWBORN / BABY (0-12 MO)

TODDLER (12-36 MO)

PRESCHOOL (3-6 YR)

CHILD (6-10 YR)

TEEN (10-17 YR)

ADULT (17+)



## BRAIN STEM

- Rythmic swinging and activities
- Relational interaction
- Repetitive, repetitive, repetitive
- Simple activities with limited arousal
- Vision exercises
- Lycra swaddles and play
- Puppets
- Gross motor game





# BRAIN STEM





## LIMBIC SYSTEM

- First-then sequence reminders
- Organization help
- Parallel games
- High interest with a “just right” stress component
- Massage
- Sensory (tactile) bins
- Physical classroom supports





# LIMBIC SYSTEM





## DIENCEPHALON/CEREBELLUM

- Fine motor games
- Feeding intervention
- Sleep intervention
- Auditory therapies
- Therapressure program
- Individual sports







SHOW  HOPE

EMPOWERED  
TO CONNECT





SHOW  HOPE

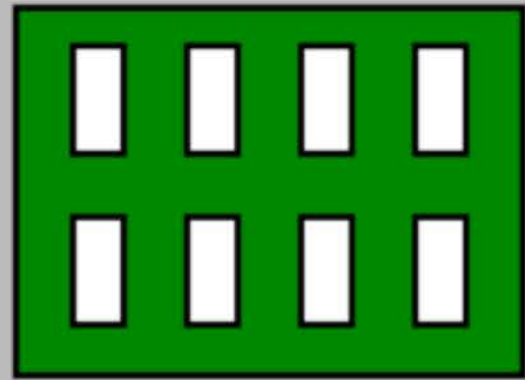
EMPOWERED  
TO CONNECT



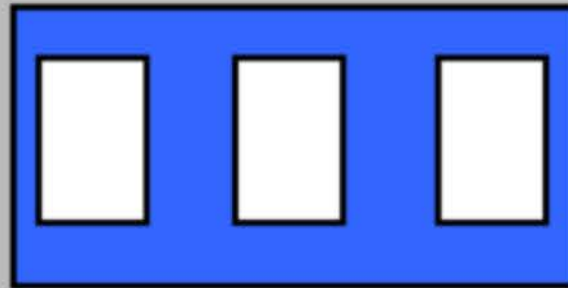
## CORTEX

- Auditory therapies
- Communication boards
- Visual schedules
- Social stories
- Visual timers

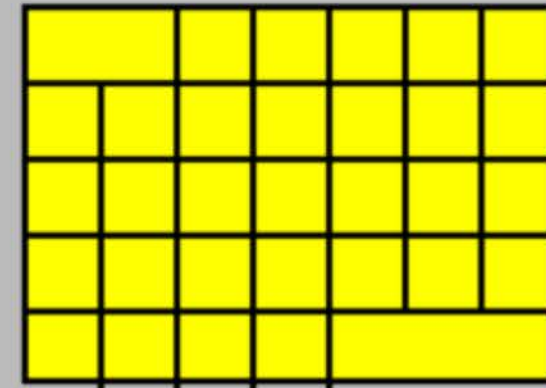




**Daily  
Schedules**



**Mini-  
Schedules**



**Calendars**



**Choice Boards  
and Menus**



**Communicating  
'No'**



**People  
Locators**



## FRONTAL CORTEX

- Timers
- Metronomes
- Crafts
- "How Does Your Engine Run" plate
- Early Mozart music (60-80 beats per minute)





## THE SENSORY RESPONSE

- Normal response
- Hyporesponse
- Hyperresponse
- Interpretation within relationship





# CHILDREN WILL REACT DIFFERENTLY TO THE SAME SENSORY STIMULI





## THE SIX R'S FROM DR. BRUCE PERRY

- Rhythmic
- Repetitive
- Relational
- Respectful
- Rewarding
- Relevant





## SENSORY DOMAINS

- Vestibular sense
- Proprioceptive sense
- Tactile sense
- Olfactory sense
- Visual sense
- Auditory sense
- Gustatory sense



# SENSORY REGULATION

Example: Cookbook

Not everyone likes the same meals and we will need to adjust for allergies, preferences, and portion sizes.

Sometimes we combine recipes or simplify them.

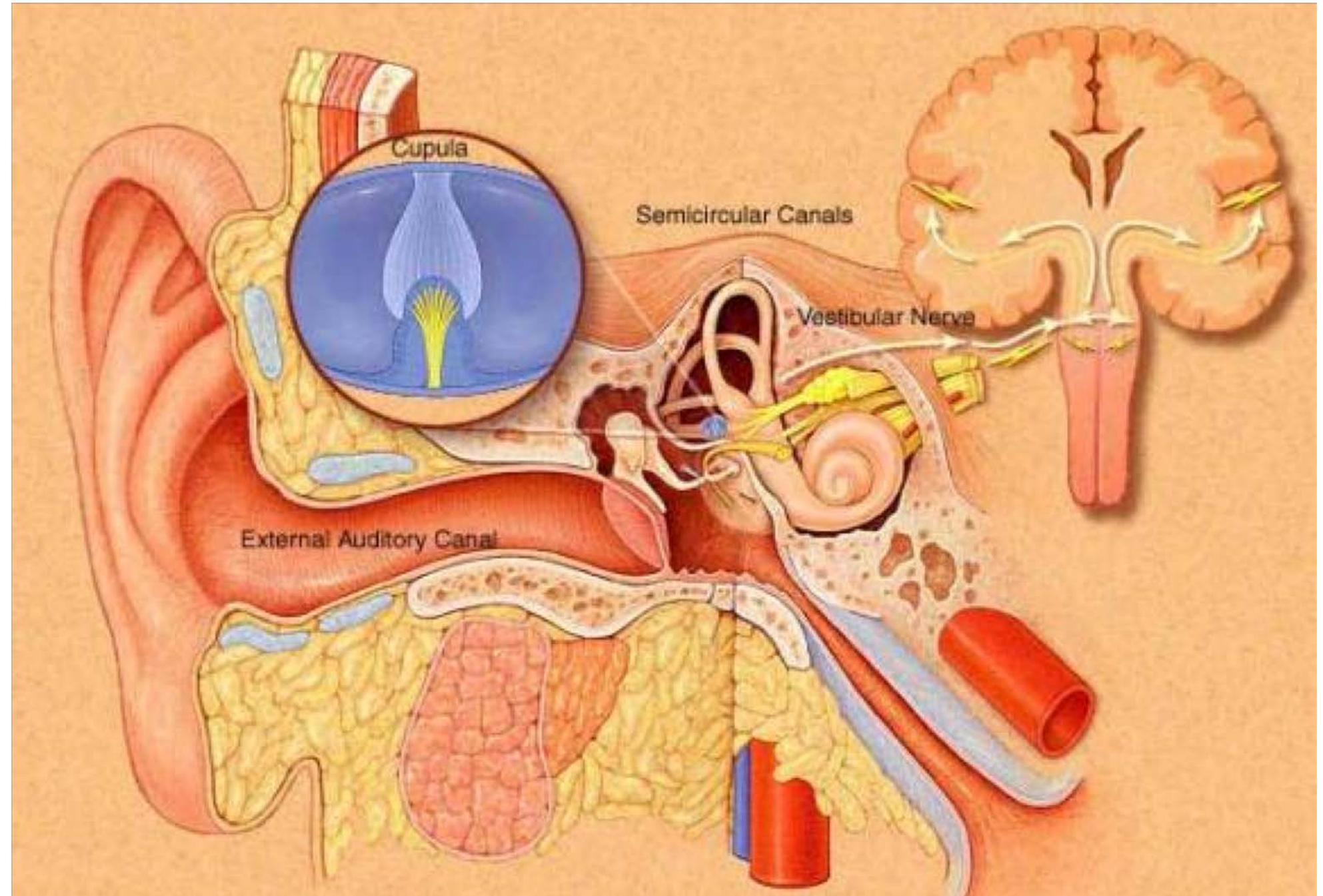
Therapeutic activities are like recipes. Some are complex and require years of study and practice. Others are very simple and easy to make.





## VESTIBULAR SENSE

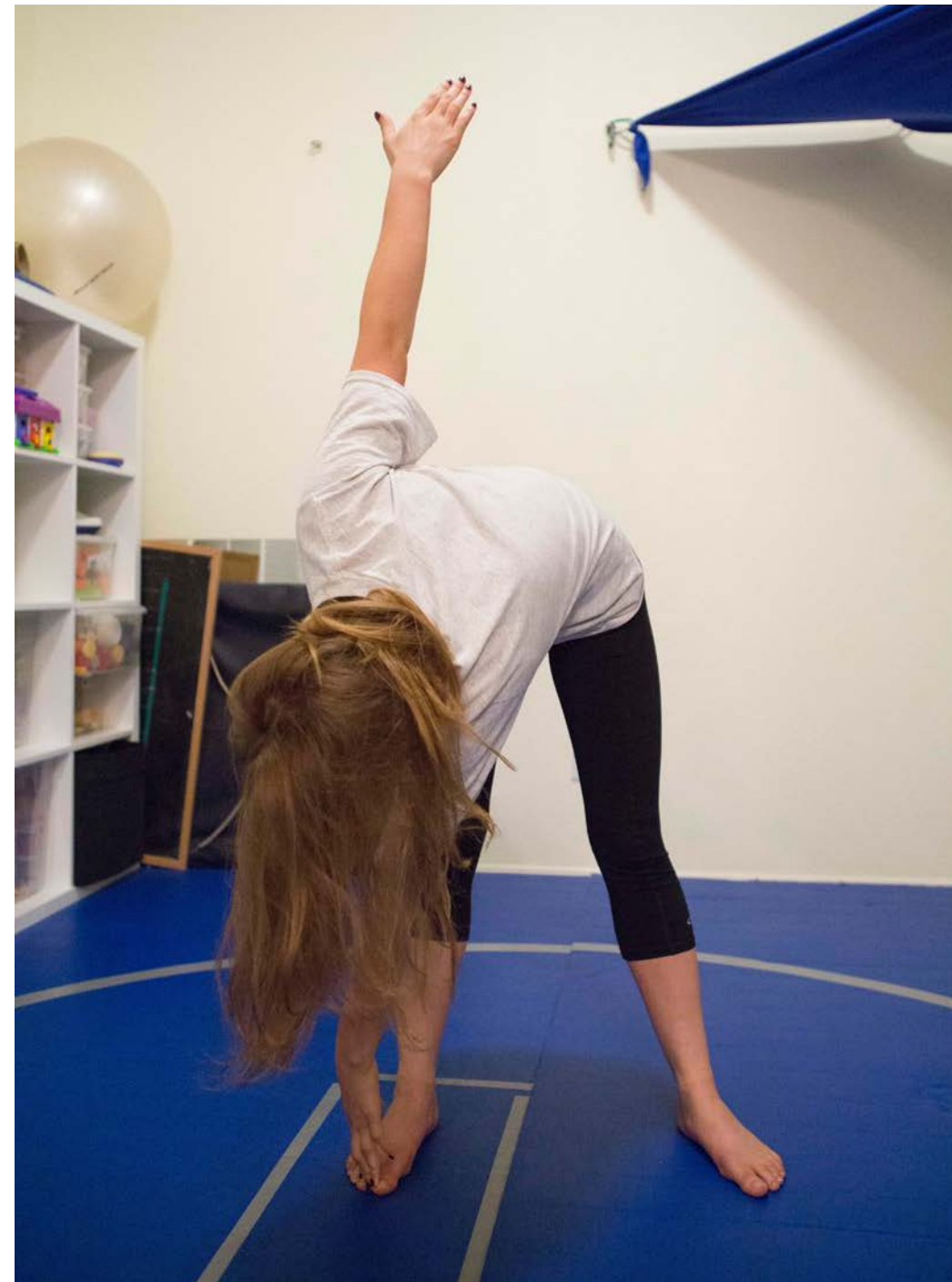
- Centrally located
- Protects
- Input varies on position
- Lasts 4-6 hours
- Connected to other senses





## VESTIBULAR SENSE

- Head to foot
- Front to back
- Side to side
- Elliptical
- Tight spin





## PROPRIOCEPTIVE SENSE

- Calming input
- Overrides pain response
- Connected sense
- Lasts 3-4 hours
- Receptors in joints for body's position in space





# PROPRIOCEPTIVE SENSE





# PROPRIOCEPTION

Nothing happens in isolation.

Proprioception is often combined with other sensory input for a "just right" sensation.







SHOW  HOPE

EMPOWERED  
TO CONNECT





SHOW  HOPE

EMPOWERED  
TO CONNECT



## TACTILE SENSE

- Skin is the largest receptive organ
- Easy to access
- Perception changes with type of deep or light input
- Lasts 2 hours





## OLFACTORY SENSE

- Very primitive
- Connected to familial history
- Associated with taste
- Goes straight to amygdala - fight or flight
- Synthetic scents have extra binding molecules
- Can alert or calm





## OLFACTORY SENSE





## VISUAL SENSE

- Developed early
- Mirror neurons and social reciprocity
- Focal vs. peripheral
- Dysfunction affects vestibular sense
- Compensates for other senses





## VISUAL SENSE





## AUDITORY SENSE

- Located near vestibular
- Connected to proprioception
- Effects heart rate
- 40-60 bpm calming
- 100-120 bpm alerting
- Social relational





## AUDITORY SENSE





## GUSTATORY SENSE

- "Hot beverage?"
- Social connector
- Caregiver guilt
- Extreme emotional associations
- Associated with smell and touch
- Poor oral motor skills with trauma





## GUSTATORY SENSE

