



Making Sense of Sensory Processing

November 14th, 2013

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Outline

- Sensory Preferences
- Sensory Processing Overview
- Components of Sensory Processing
- Power Sensations
- Brain Science
- The “New” Brain
- Sensory Diets
- Final Considerations



Sensory Diets

-What we do throughout the day to stay in that just right place for the activity?

-Natural routines that help us to stay “in the zone”

- **Move: Vestibular/Proprioceptive**
 - Rock in chair or standing
 - Exercise (aerobics, weight lifting, yoga)
 - Clean
 - Stretching, shifting positions
 - Cross legs, bounce legs, tap toes
 - Bike ride, walk, hike, dance
- **Touch: Tactile**
 - Twirl hair, play with keys
 - Shower/bath
 - Massage
 - Pet animals
 - Fidget (straw, paper clips, jewelry, nails)
- **Taste/Chew: Oral**
 - Thick drinks, hard candy, gum, crunchy, chewy
 - Smoke
 - Cold drinks, warm drinks
 - Chew buttons, shirt, nails, bite cheeks/lip
- **Look: Visual**
 - Watch fireplace, sunset/sunrise, camp fire, fish tank
 - Lighting/Colors
 - Cluttered vs. organized

Sensory Processing

- ALL information comes into the brain as sensory information
- 5 Senses???
- Ability to organize and make sense of incoming information
 - Inhibition & Filtering
 - Cortical processing
- Influenced by:
 - Immune system
 - Nutrition
 - Toxins
 - Activity Level
 - Muscle Tone
 - Arousal Level (Stress Chemistry)

Components of Sensory Processing

- Protective Responses
 - Defensiveness
- Modulation/Regulation
 - Arousal level matches activity
- Registration of Stimuli
 - Details
- Integration of Information
 - Icing on the cake!



Defensiveness

- Hyper sensitive response to “non-noxious” stimuli (Mimics PTSD)
- Can be in any sensory system
- Fight or Flight remains in “ON” position
- All about stress chemistry



Modulation/Regulation

- Regulated by chemistry (neurotransmitters) released from brainstem
- “just right” for the task
- Awake, Asleep, Alert, Attentive
- Inhibition to manage overwhelming amount of incoming sensory information
- Filtering mechanism to focus on salient stimuli

Indications of Modulation Problems

- Trouble with transitions
- Sleep/wake difficulty
- Distractibility
- Perseverations
- Impulsivity
- Lack of emotional regulation
- Self-stimming behaviors
- Some self-injurious behaviors

Registration of Stimuli

(Specific to vestibular & proprioception)

- Poor core strength
- “Losing the fight” with gravity/low tone
- Difficulty staying in chair
- Shuffles rather than walk
- Tends to lean, prop and collapse into furniture
- Flat hands (HUGE impact on handwriting)

Sensory Integration

- S.I. Theory vs. sensory integration
 - Theory developed by Jean Ayres, OT
 - Specific protocol for diagnosis & treatment
- Sensory Processing Disorder (SPD)
 - DSM V: 2012?
- Sensory processing/Sensory diets
 - Embedded into natural routine
 - Necessary for all students (and adults, too!)

3 Power Sensations

- Tactile System
 - Body boundaries (me vs. not me)
 - Proprioceptive System
 - Body contents
 - Vestibular System
 - Relationship to gravity
- Key Information for body scheme, body awareness and ultimately self-esteem
- Audition/Visual Systems
 - provide environmental cues & spatial concepts

Tactile System

- Touch receptors located just under the skin
- Defines body boundaries
- Includes space just beyond us
 - Why space definition impacts attitudes
- Pressure touch vs. light touch
- Protective vs. discriminatory
 - Protection vs. localized, precise sensation which allows us to discriminate shapes, textures, and sizes of hand held objects



Proprioceptive System

- Receptors in muscles, tendons and joints
- Unconscious awareness of joint & muscle movement
- Defines our body contents
- Motor maps, automated functioning
- Personal sense of self
- Together with tactile system are the basis for self concept/self image

Vestibular System



- Receptors in inner ear, attached to cochlea
- Unconscious awareness of movement and position in space
- Relationship to gravity
- Direct effect on muscle tone, postural control and movement
- Vestibular input is like “turning the lights on” in the brain
- Integral role in language and auditory processing

Research related to Vestibular Processing

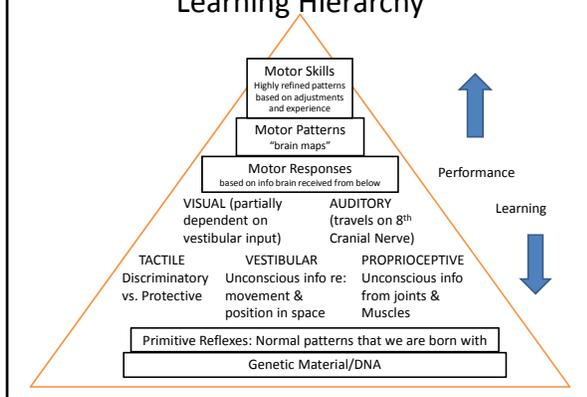
- Healthy babies given 16 sessions of vestibular activation had significantly more advanced reflexes & motor skills than control group (Clark, D.L. et al)
- Premature infants gained weight faster, were less irritable, and spent more time in a quiet alert state when given vestibular input (Anderson, J.)
- Puppies & kittens showed an increase in brain cell development over control group when given vestibular stimulation (Kosmarskaya, E.N.)

Vestibular-Auditory-Visual Triad

A strong vestibular foundation is needed to activate the core muscles of the body and provide a central axis (TRIAD)

- Auditory Input
 - The orienting response, locate and process sound source in a precise and efficient way
 - Vestibular/Cochlear system creates an internal image of space, a tangible concept of time
 - Rhythmic components of sound guide our timing and sequencing of body movements
 - Relates to difficulties with balance, coordination, eye muscle control and visual perception

Learning Hierarchy



Vestibular-Auditory-Visual Triad

- Visual
 - Strong core provides solid base for using eyes similar to the way a tripod stabilizes a camera
 - Ability to keep eyes steady on a target even when head or body is moving
 - If vestibular system is not working properly to guide postural control, the eyes cannot participate efficiently (i.e. copying from a distance, reading, writing, tying shoes, catching or kicking a ball)
 - Also contributes to our ability to use landmarks as a guide and move through environments
 - Ability to mentally visualize objects and events affects life skills such as making transitions, solving problems and preparing for future events

Brain Science

- Neurons
 - Electrical and Chemical communication
 - Nerve Growth Factor
 - Myelination (Omega/Fish oils)
 - Neurotransmitters
 - Serotonin, Dopamine, Histamine, Endorphines, etc.



Brain Chemistry Defines Us...

Serotonin

- Master modulator
- Affects all other NT's
- All is well with world, promotes calm
- Responsible for working memory
- Huge impact on arousal
- Stress depletes supply
- *Prop, activity, sleep, sunlight

Dopamine

- Pleasure chemical
- Initiation/Activator
 - Gives us will/motivator
- Promotes focus/concentration
- Chemical of emotional brain center (need it to smile!)
- Involved in addictions
- *Pressure touch, protein, music with strong rhythm

Brain Chemistry Defines Us...

Norepinephrine

- Chemical for selective attention (holds attn vs. dopamine which grabs attn)
- Contributes to fight or flight response
- Enhanced when serotonin is enhanced
- Also activated with new/novel experience

Histamine

- Conductor of the NT orchestra
- Found in brainstem & body
- Helps with state (modulation)
- Gives us our nuances of behavior
- Allergies & medications have huge impact!

The "New" Brain

Factors contributing to the increasing number of children experiencing difficulty with sensory processing:

- "Back to sleep" program
- Container generations
- Liability & Safety
- Technology
- Overall decreased movement
- Toxins
- Nutritional Factors

A "SANE" Approach

- Sleep
 - REM vs. Non-Rem
 - Bedtime Routine
- Activities
 - Proactive, not reactive
- Nutrition
 - Toxins, Chemicals, Preservatives, etc.
 - Fish Oil, Multi-vitamin, Protein
- Environment
 - Routines, Rhythm, Visual Schedule

Sensory Diets

- Use latency to your advantage
- Find natural opportunities in daily routine
- Have fun & be creative
- NO SUBSTITUTE for one point suspension swing
- Therapy complements sensory diets
- Consistency is the key!!

Latency Effect

In a typically developing system

- Vestibular: 8 hours
 - Powerful impact on what follows
- Tactile & Proprioceptive: 2 hours
 - No such thing as too much

Vestibular Activities

- Swings
- Rocking toys and chairs
- Riding toys
- Scooter boards
- Seesaws and merry go rounds
- Therapy balls

Heavy Work Activities

- Whole body actions involving pushing, pulling, lifting, climbing, hanging, crawling
- Resistive Activities
- Oral activities such as chewing, sucking and blowing

Generally organizing. Can improve attention, arousal level, body awareness, and muscle tone. May decrease defensiveness.

Heavy Work Ideas

- Jungle gyms, rock walls, zipline
- Trampoline, jump rope, hoppity balls
- Tug of war games, Push of war
- Mop, sweep, vacuum, rake
- Roller blades, bikes, scooters
- Animal walks, wheelbarrow walk

More Heavy Work Ideas

- Swimming
- Weighted items: blankets, clothes, wrist or ankle weights, weighted pals
- Pushing/pulling objects
 - Laundry basket, wagon, putty, towel or blanket on tile floor, Theraband
- Carrying objects
 - Groceries, backpacks, watering can

Sandwich/Squishing activities

- Sandwich between floor pillows or cushions
- Hot dog game
- Bear hugs
- Firm towel dry after bath, wrap tightly
- Roll ball over back in prone position
- Massage, lotion or deep pressure rubs
- Arm/Hand hugs

Oral Motor activities

- Chewy Foods: dried fruit, beef jerky, gum, granola bars, soft pretzels
- Resistive sucking: crazy straws, sports bottles, thick liquids/foods through straws
- Blowing activities: wind instruments, bubbles, whistles, bloopers, kazoo, cotton ball game

Fine Motor/Upper Extremity Activities

- Tools/toys
 - Clothespins, spray bottles, play doh, rolling pins, paper punches, rubbing plates
 - Silly putty, fidget toys, stress balls, squishies, sand
 - Sidewalk chalk, sandpaper, brush dog!
 - Cooking activities (stirring, pressing, kneading)
- Vertical surfaces (Easels, wipeboards)
 - Washing windows, shower, tables
 - Paint with water on side of house

A Note Regarding Behavior

- Think sensory first
- All behavior is communication
- Consistency
- Proactive sensory diets
- Honor all communication
- Eliminate emotional response

Final Considerations

- Sleep
- Nutrition
- Vitamins/Fish oil
- Water
- Movement
- Behavioral Strategies

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Mission Statement: Sensory Solutions is dedicated to broadening the traditional therapy model to include wellness for children of all abilities, parent education, and classes that promote growth and learning.