

Promoting Participation
For Children with Autism:
A Clinician's Guide for
Implementing Ayres Sensory
Integration®



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Jefferson.
HEALTH IS ALL WE DO

Objectives: Ayres Sensory Integration® and Autism Spectrum Disorders (ASD)

- Understand a systematic, evidence-based application of ASI for ASD.
- Increase appropriate use of ASI for children with ASD.
- Apply Data Driven Decision Making using ASI.
- Be introduced to a clinical guidebook for using ASI for children with ASD.

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Thank you

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Thank you

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Why a Manual?

- Next step in the development and testing of an intervention.
- Increase clarity
- Assure that ASI is used in a way that is keeping with the theory and principles
- Encourages fidelity in research and practice

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Why are we really here?



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Increasing focus and clarity

- To better understand our young patients
- To better communicate with parents and team members
- To better plan and implement targeted intervention
- To make lives better

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What can skills and knowledge do you have as an OT that can help to articulate about the child's strengths and challenges?

- What might be different about the “lens” through which we view the child?
- How can we communicate with others who may have very different frames of reference?

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Ayres Sensory Integration® (ASI):

- Includes the theory, framework for assessment and intervention principles identified by Ayres (1972, 1979, 1989).
- Posits that adequate sensory integration is an important foundation for adaptive behavior.
- Focuses on the sensory motor foundations
- Emphasizes active, dynamic interactions with the social and physical environment.

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Core Concepts of Ayres Sensory Integration® Intervention



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Core Concepts of Ayres Sensory Integration® Intervention

- *Sensory information provides an important foundation for learning and behavior.*
- *Sensory Integration is a developmental process.*
- *Successful integration of sensory information results in and is further developed by adaptive responses.*

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Core Concepts of Ayres Sensory Integration® Intervention

- *The “just right challenge” provides the milieu for sensory integration to occur*
- *Children have an innate drive to seek meaningful experiences from their environment.*

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Sensory Integration Promotes Neuroplasticity



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Core Concepts of Ayres Sensory Integration® Intervention

- ASI targets the sensory-motor factors that are hypothesized to be impacting participation daily life activities
- Includes core concepts described in ASI Fidelity measure
- Designed to improve the ability to process and integrate sensation as a basis for enhancing successful participation in daily occupations
(Parham & Mailloux, 2014; Smith Roley, 2001; Schaaf, et al., 2009, Smith Roley, et al., 2015)

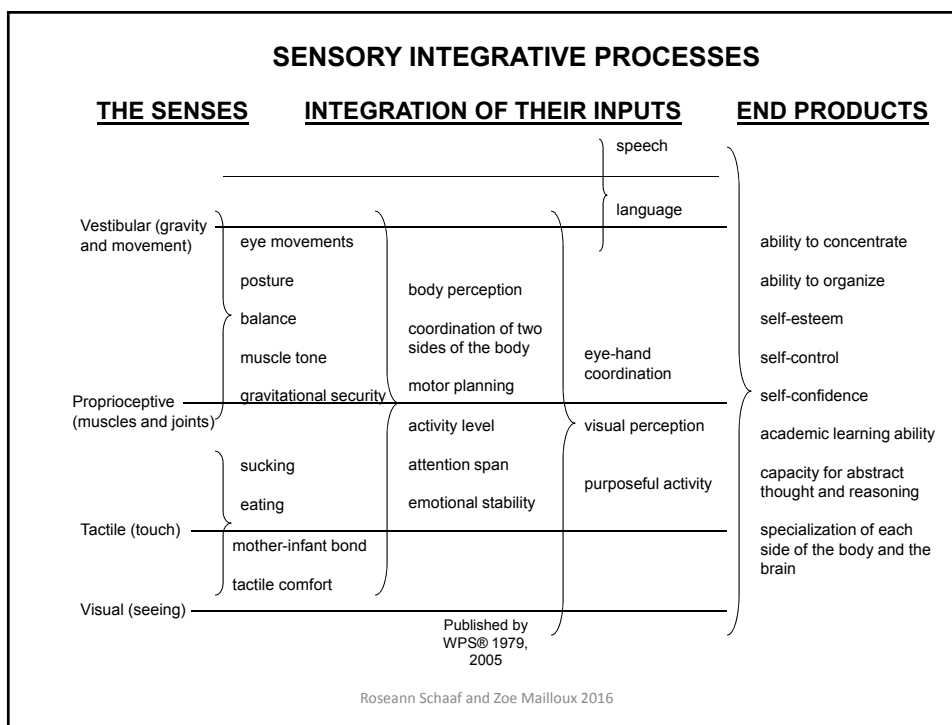
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Core Concepts of Ayres Sensory Integration® Intervention

The Adaptive Response

- The catalyst for change.
- “An appropriate action in which the individual responds successfully to some environmental [or situational] demand” (Ayres, 1972, p. 22) that results in increasingly complex skills or abilities.

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Problems in Vestibular Bilateral Integration				Problems in Sensory Responsiveness	
Problems in Somatosensory		Problems in Visualspatial		Problems in Sensory Reactivity	
Problems in Sensory Perception					
Vestibular Processing <ul style="list-style-type: none">Processing of rotary motion (e.g., SIPT Postural Nystagmus, SPM Balance and Motion; SP Body Position and Movement)Perception of head position and changes in center of gravity	Proprioception <ul style="list-style-type: none">Body position awareness (e.g., SIPT KIN, SPM Body Awareness; SP Body Position and Movement)Girdling of force	Tactile Perception <ul style="list-style-type: none">Touch perception scores (e.g., SIPT Manual Form Perception, Finger ID, Graphesthesia, Localization of Tactile Stimuli)Able to find or manipulate objects without vision	Visual Perception <ul style="list-style-type: none">Visual perception (e.g., SIPT Space Visualization, Figure-Ground Perception; MVPT-3, -D/TVP-3, TVP-3, SPM and SP visual items related to perception)	Hypersensitivity <ul style="list-style-type: none">Signs of overresponsiveness or heightened responses on SPM or SP items or observations related to:<ul style="list-style-type: none">Vestibular inputTactile inputVisual inputAuditory inputOther sensory input (e.g., temperature, pain, other sensations)	Hypo-sensitivity <ul style="list-style-type: none">Signs of underresponsiveness or varying responses on based on SPM or SP items or observations related to:<ul style="list-style-type: none">Vestibular inputTactile inputVisual inputAuditory inputOther sensory input (e.g., temperature, pain, other sensations)
Problems in Motor-Related Functions					
Postural/Ocular Mechanisms <ul style="list-style-type: none">Balance (e.g., SIPT Standing & Walking Balance, BOT-2 Balance)Ocular tracking or SIPT Motor AccuracyExtensor toneRighting or equilibrium reactions	Postural Mechanisms <ul style="list-style-type: none">Proximal joint stabilityBalance (e.g., SIPT Standing and Walking Balance, BOT-2 Balance, SP Endurance and Tone)Proximal joint stability, weight shifting, ability to move segmentally	Body-Centered Praxis <ul style="list-style-type: none">Ability to plan novel actions with face and body (e.g., SIPT Postural Praxis, Oral Praxis, Praxis on Verbal Command, Sequencing Praxis, Bilateral Motor Coordination; SPM Planning and Ideas)Ability to learn new skillsSeemingly coordinated or clumsy in actions	Visualspatial <ul style="list-style-type: none">Visual-motor or visual praxis ability (e.g., SIPT Motor Accuracy, Design Copying, Constructional Praxis, VMI, BOT-2 copying items)Able to plan and learn visual-motor tasks (e.g., writing, drawing, building)	Common Behavioral Signs <ul style="list-style-type: none">Appears to crave movement/lack signs of distressAppears to have good praxis skills in contrast to struggles with bilateral skillsAppears to seek heavy work, joint reaction or compression activitiesHas low awareness of body positionAppears to seek extra touch input or seeming not to use tactile feedback, or bothUses vision more than usual to guide actionsMisses seeing thingsShows confusion in differentiating objects and shapesAppears not to use vision as much as expectedHas high or disorganized activity levelAppears to have poor attention or distractibilityHas low or disorganized activity levelAppears to have language, apraxia, or poor attention	
Bilateral Integration <ul style="list-style-type: none">Items that measure ability to coordinate both sides of the body (e.g., SIPT Bilateral Motor Coordination, Sequencing Praxis, Oral Praxis, Graphesthesia, Manual Form Perception)Bilateral finger to nose, finger reachingJumping jacks and skipping					
Notes to Assist in Differentiating Problems and Patterns					
If low scores on tactile perception and praxis are present, then low scores in this area are more likely part of a broader somatosensory pattern vs. vestibular bilateral integration.	Signs of poor proprioception frequently accompany both vestibular bilateral integration problems and somatosensory.	Somatosensory may include problems in vestibular processing and bilateral integration and/or visual dyspraxia.	Signs of both somatosensory and visualspatial may be present; poor visualspatial scores without poor visual perception may be part of somatosensory pattern.	Problems with regulating sensory responses can occur in conjunction with problems in vestibular bilateral integration, somatosensory, or visualspatial.	Signs of overresponsiveness, underresponsiveness, and fluctuating responses may be seen together; poor sensory perception can be confused with sensory hypersensitivity.

History/evidence of patterns based on Ayres Sensory Integration

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Sensory Integration involves:

- Appropriate “filtering” of amplitude of sensation for protection and function (*sensory modulation*)
- Sensory *perception* from all sensory systems to discriminate and interpret information
- Processing of sensation for *motor planning, related motor functions such as postural & ocular control, balance and bilateral integration.*

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Patterns of Sensory Integration function and dysfunction

- Sensory Perception
- Vestibular Bilateral Integration
- Somatopraxis
- Visuopraxis
- Sensory Reactivity
- Other

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Factor Analyses (1965-2015) Sensory Integration Patterns

- Somatosensory (1965, 1966, 1969, 1972, 1977 & 1989, 1998, 2011)
- Somatopraxis - tactile + motor planning deficits (1965, 1966, 1969, 1972, 1977 & 1989, 1998, 2011)
- Visuopraxis (1965, 1966, 1969, 1972, 1977, 1989, 1998, 2011)
- Vestibular, bilateral integration & sequencing (1965, 1966, 1969, 1972, 1977, 1989, 1998, 2011, 2014)
- Sensory Reactivity - Tactile defensiveness & attention (1965, 1966, 1969, 1972, 2011)
- Praxis on Verbal Command (1969, 1972, 1977, 1989, 1998)

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A little about the senses, in general...

Everything we experience comes
first through our senses

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two main functions of the senses

- **Interpretative function**-more “sophisticated;” gives us information to perceive, classify, organize and act upon-**OPTIMAL SUCCESS**
- **Protective function**-more “primitive;” let’s us know when we might be in danger; fight or flight reactions-**SURVIVAL**

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Sensory Perception

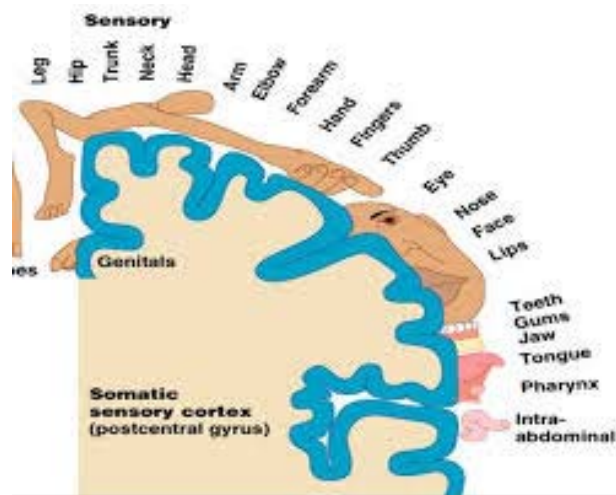
The ability to
take in and
interpret
sensation

WHAT is this?

WHERE is it?



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The interpretation of sensory information

Sensory perception

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Poor Sensory Perception-Problems in:

TACTILE PERCEPTION: discrimination of shape, size, texture, location, etc. of tactile stimuli

PROPRIOCEPTION: discrimination of body position/force

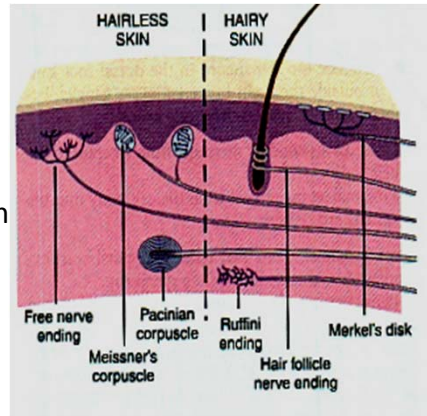
VESTIBULAR: discrimination of head position/direction/speed of movement and change in center of gravity

VISUAL: discrimination of shape, size, color, location, etc. of visual stimuli

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Tactile Perception

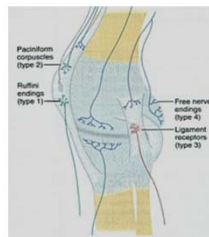
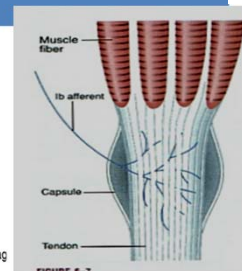
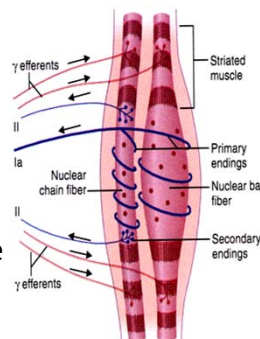
- Tactile receptors in skin
- Touch and touch-pressure stimulate tactile receptors
- Sends information to somatosensory cortex to further specify body map in the brain.



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Proprioception Perception

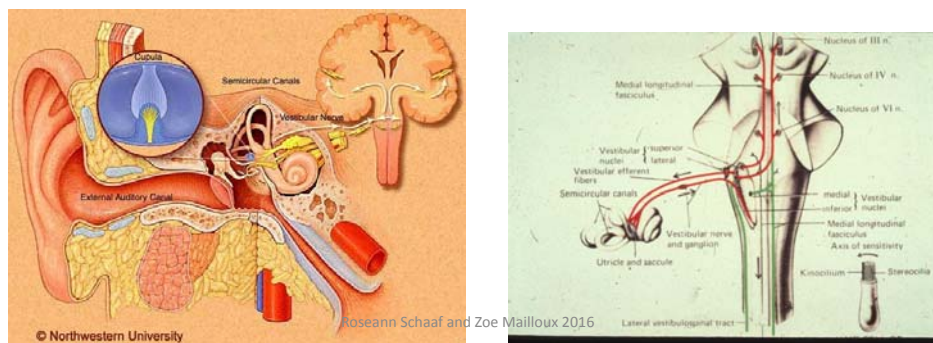
- Receptors are muscle spindle, GTO, joint receptors.
- Movement of muscle/joint, co-contraction, stretch, tension or load on muscle or tendon
- Triggers neuron firing to cerebellum and cortex



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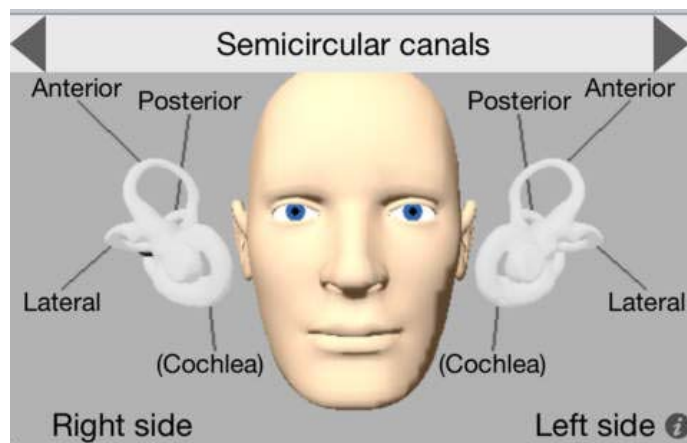
Vestibular Perception

The vestibular system is a sensory-motor system that contributes to antigravity tone, righting and balance reactions, and the coordination of eye and head movements.



Vestibular-ocular connections

Post rotary nystagmus is a normal vestibulo-ocular reflex



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PRAXIS: frontal and parietal cortex, basal ganglia, and white matter tracts containing projections between these areas

The left diagram illustrates the motor areas of the brain, showing a lateral view of the brain with various motor areas labeled: Motor cortex (precentral gyrus), Motor cortex, Hip, Trunk, Shoulder, Arm, Wrist, Hand, Fingers, Thumb, Neck, Brow, Eye, Face, Lips, Jaw, Tongue, and Swallowing. The right diagram illustrates the sensory and motor areas of the brain, showing a lateral view of the brain with various sensory and motor areas labeled: Central Sulcus, Primary Motor Cortex, Supplemental Motor Area, Premotor Cortex, Primary Sensory Cortex, Parietal Association Area, and Auditory.

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Somatodyspraxia

Difficulty with somatosensory perception associated with total body motor planning-

COMMON IN CHILDREN WITH ASD

Visuodyspraxia

Difficulty with visual perception and visual motor planning-LESS COMMON IN CHILDREN WITH ASD

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Postural Ocular Bilateral Functions

- Muscle tone
- Extensor tone
- Postural adjustments
- Weight bearing and weight shifting
- Balance and equilibrium reactions
- Ocular mechanisms
- Midline integration
- Laterality
- Bilaterality
- Level of alertness

Consider the interplay with vestibular and proprioceptive functions

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Problems in Vestibular Bilateral Integration

Inefficient vestibular processing associated with poor postural, ocular and bilateral function



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Sensory reactivity

RS 1

Level of behavioral response to sensation

- touch or textures
- sound
- movement or heights
- light or other visual stimulation
- taste or odors

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Slide 36

RS11

As per previous comments - summarize key points succinctly. I could make a chart showing data on reactivity to summarize this info

Roseann Schaaf, 6/30/2015

RS1

Difficulty with Sensory reactivity

Hyperreactivity

Excessive or exaggerated reactions to typical levels of sensation that interfere with participation in daily activities

Hyporeactivity

Absent or reduced reactions to typical levels of sensation that interfere with participation in daily activities

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The “protective” function Sensory Reactivity

- Meant for survival
- Helps us screen out what is not important and attend to what is important
- Gets us ready for fight or flight



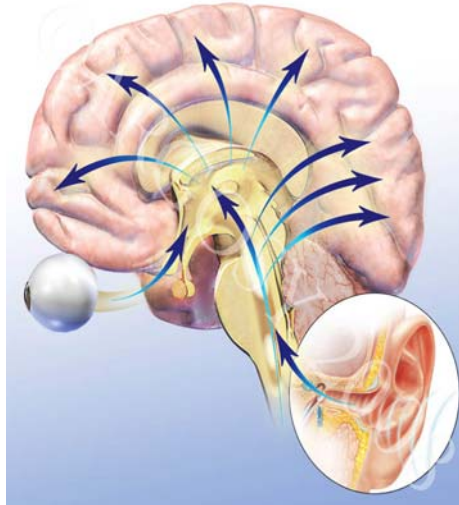
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Slide 37

RS11 As per previous comments - summarize key points succinctly. I could make a chart showing data on reactivity to summarize this info
Roseann Schaaf, 6/30/2015

Reticular System

- Alerting sensory activities/input may stimulate the reticular activating system
- Calming or inhibitory sensory activities/input may decrease reticular system activity and result in calming



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<http://www.memrise.com/mem/1354390/reticular-formation/>

Research to date suggests that children with autism:

- **Show signs of poor sensory reactivity; both hypersensitivity and low registration**
- **Show signs of poor sensory perception in tactile, proprioceptive and vestibular functions; visual perception more often a relative area of strength**
- **Show signs of poor ideation, imitation, planning, sequencing**

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Sensory Integration and Praxis Patterns in Children with Autism

Smith-Roley, et al., 2015

The purpose of this paper was to characterize sensory integration and praxis patterns of children with autism spectrum disorders (ASD), and discern whether these patterns relate to social participation.

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METHOD

- **The Sensory Integration and Praxis Tests (SIPT) and Sensory Processing Measure (SPM) scores were extracted from clinical records of 4 to 11-year old children with ASD (N = 89).**
- **SIPT and SPM standard scores were used to describe sensory integration and praxis patterns.**
- **Correlation coefficients were generated to discern relationships among sensory integration and praxis scores, and their associations with SPM Social Participation scores.**

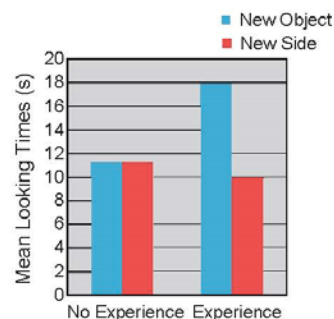
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RESULTS

- Children with ASD showed relative strengths in visual praxis.
- Marked difficulties were evident in imitation praxis, vestibular–bilateral integration, somatosensory perception, and sensory reactivity.
- Social participation scores were inversely associated with areas of deficit on SIPT measures.

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Woodward: Studies of infants-role of perception on anticipation



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Lloyd, MacDonald & Lord (2013)

Found evidence, from a large sample, that very young children with ASD have significant motor delays, including fine and gross motor skills and that the delays become more pronounced with age. They hypothesize that sensory issues may be a factor and also that there may be interplay between motor development and social language skills for children with autism.

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MacNeil & Mostofsky, 2012

Impaired formation of perceptual motor action needed for skilled gestures is specific to autism

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Flanagan, et al. (2012)

Found a significant relationship between head lag at 6 months of age and later ASD diagnosis

Head lag may indicate low tone, poor postural stability, impaired sensory processing and/or difficulty with anticipatory activity

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Ben-Sasson et al (2009)

- **Meta analysis on sensory modulation symptoms in individuals with ASD-**
- **Included 14 studies**
- **Found significant sensory differences including under, over and seeking responses**

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Chamak et al. (2008)

**Reported a qualitative study of
20 individuals with ASD that revealed
“...peculiar perceptions and difficulties in the
processing of sensory information with
occasional overload and problems in
processing information from more than 1
modality (sensory integrative dysfunction),
as well as hypo- and hypersensitivity and
sometimes the need for body pressure.”**

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Baranek, et al. 2006

**Prevalence of overall sensory symptoms
for the ASD group was 69% on the
Sensory Experiences Questionnaire**

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Lane, A.E. et al (2010)

**Cluster analysis using Sensory Profile
revealed 3 patterns of sensory processing in autism**

- Sensory-based inattentive seeking –
under-responsive (milder overall)
- Sensory modulation with movement sensitivity –
low energy/weak, poor endurance
- Sensory modulation with taste/smell sensitivity –
under and over-responsiveness with no movement issues
more communication difficulties and maladaptive behaviors

**Sensory subtypes predicted communication
competence and maladaptive behavior**

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Schaaf and Benevides (2006)

**87% of children with autism had
sensory dysfunction using the
Short Sensory Profile (SSP)**

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Sensory Reactivity vs Sensory Perception

**Literature has focused on
response to sensation
versus *perception* of sensation**

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Introduction to Data Driven Decision Making (DDDM)

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What is Data Driven Decision Making?

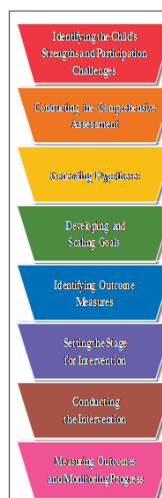
“DDDM provides a framework for reasoning through the occupational therapy process with a focus on utilization of data to guide and measure outcomes” (Schaaf, 2015)

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Using DDDM in ASI

A systematic approach for reasoning and decision making (Schaaf, 2015)

- Uses data to guide assessment and intervention
- Analysis and interpretation of assessment data to identify the sensory motor factors hypothesized to impact participation.
- Proximal (sensory motor) and distal (participation-based) outcomes identified and measured.



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DDDM Table-Blank Form p 35

Identifying the Child's Strengths and Participation Challenges	Conducting the Comprehensive Assessment	Generating Hypotheses	Developing and Scaling Goals	Identifying Outcome Measures	Setting the Stage for Intervention	Conducting the Intervention	Measuring Outcomes and Monitoring Progress

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Step by Step Guide Blank Form 1.3.1 p 35

Identifying the Child's Strengths and Participation Challenges	Conducting a Comprehensive Assessment	Generating Hypotheses	Developing and Scaling Goals	Identifying Outcome Measures	Setting the Stage for Intervention	Conducting the Intervention	Measuring Outcomes and Monitoring Progress
<p>Child loves bright colors and geometric shapes and is especially interested in Thomas the Tank Engine characters.</p> <p>Child is having difficulty with dressing, which is causing a great deal of concern for the family. He currently needs more than 5 physical, verbal, or visual prompts to put on or take off a T-shirt and wears only 100% cotton jersey fabric.</p>	<p>Results of the Sensory Integration and Praxis Tests (SIPT) demonstrated the presence of somatodyspraxia, with low scores on tests of tactile perception and praxis.</p> <p>Relative strengths were noted on visual perception tests of the SIPT.</p> <p>The Sensory Processing Measure (SPM; Parham, Ecker, Kuhaneck, Henry, & Glennon, 2006) revealed signs of tactile sensory hyperreactivity.</p>	<p>Poor somatosensory perception and praxis affect the child's ability to arrange and put on clothing independently.</p> <p>Tactile hyperreactivity also contributes to difficulty in dressing because the feel of many garments irritates the child.</p>	<p>Child will be able to perceive placement of clothes using tactile feedback and will plan actions needed to put on and take off a T-shirt.</p> <p>Child will wear clothing made from 3 different types of fabric 100% of the time.</p>	<p>Proximal outcome measures are scores on tactile perception and praxis tests of the SIPT (e.g., Finger Identification, Graphesthesia, Localization of Tactile Stimuli, Oral Praxis, Postural Praxis) and the SPM score related to tactile hyperreactivity.</p> <p>Distal outcome measures are the ability to reach the expected level on goal attainment scaling related to dressing and the ability to put on and take off a T-shirt and tolerate various fabrics (measured by observations documented on</p>	<p>The therapist assigned to implement the intervention has completed advanced training in sensory integration, including administration and interpretation of the SIPT and SPM. She has reviewed the assessment findings, the generated hypotheses, and established outcome measures to be ready to begin the intervention phase.</p> <p>Prior to the first intervention session, the therapist verified that safety procedures and necessary equipment were in place and ensured that the activities aimed at enhancing tactile perception and praxis, as well as those focused on reducing tactile hyperreactivity, were available. As a part of this preparation, a plan was developed for collaborating with the parents and nanny who had been identified as the key stakeholders. On the basis of all the previous steps</p>	<p>The initial areas of focus in the intervention will involve providing individually tailored sensory-motor experiences with a focus on tactile sensations, aimed at both reducing tactile hyperreactivity and improving tactile perception.</p> <p>Motor planning will also be a focus of treatment.</p> <p>Because the child has so much trouble imitating actions, the therapist may include activities involving imitation in a mirror or with other children nearby.</p>	<p>Proximal outcomes were assessed by re-testing on the SIPT. The child demonstrated significant improvement on the Oral Praxis and Postural Praxis tests (from below-average to average range) and improved scores on Graphesthesia and Finger Identification.</p> <p>Localization of Tactile Stimuli remained about the same.</p> <p>Tactile reactivity improved according to observations.</p> <p>Distal outcomes measured by goal attainment scaling showed that the child achieved expected performance (0) on the T-shirt goal and better than expected performance (+1) on the tolerance of various fabrics goal.</p> <p>The therapist may plan to</p>

Step 1: ID of Strengths and Challenges

- History & record review/Occupational Profile
(See Form 11.1.1, p. 49-59)
- Contextualize child's needs within participation challenges

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Common Areas of Participation & Performance for Children

- Academic Learning
- Play
- Social Interaction
- Self-Care

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Step 2: Conduct a Comprehensive Assessment

- Importance of Assessment
- Areas to Assess: Function and sensory perception, reactivity, praxis and postural, ocular and bilateral integration
- Assessment Tools
 - SIPT
 - SP
 - SPM
 - Structured Observations

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When a child is not participating successfully what are the possible (underlying) barriers?

- Cognitive level
- Language skills
- Social emotional factors (e.g. stress in the home)
- Medical conditions
- Cultural factors
- Experience
- Attention & Behavior
- **Sensory and motor functions**

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While it is important to consider and contribute input in all areas, sensory motor functions are a key area of OT expertise



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Therefore, choice of assessments is guided by:

- Likely areas of concern based on evidence
- OT domains
- Individual child and family considerations
- Contextual factors – child and family context

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Research suggests that children with ASD are likely to:

- Show signs of hyper or hypo reactivity
- Show signs of poor sensory perception in tactile, proprioceptive and vestibular functions; visual perception more often a relative area of strength
- Show signs of poor ideation, imitation, planning, sequencing

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What are other conditions that might also have a prevalence of sensory integration related concerns?

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If we agree that based on the literature that sensory and motor functions are likely areas of challenge what assessments can we and should we use?

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Assessment Tools That Allow for Comprehensive Identification of Sensory Motor Factors

Which tests and measures will provide insight into the main patterns of sensory integration dysfunction, i.e.:

- Problems in somatosensory perception & praxis
- Problems in vestibular processing, postural & ocular and bilateral integration
- Problems in sensory over and under reactivity

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



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Coming soon...

The Evaluation in Ayres Sensory Integration ®

CHILD'S RIGHT HAND/ARM	
1R  Accuracy 0 1 R:	2R  Accuracy 0 1 R:
5R  Accuracy 0 1 R:	6R  Accuracy 0 1 R:

CHILD'S RIGHT FOREARM OR HAND			
1R forearm  Acc 0 1 S _ L _ R _	2R forearm  Acc 0 1 S _ L _ R _		
5R forearm  Acc 0 1 S _ L _ R _	6R forearm  Acc 0 1 S _ L _ R _		
9R forearm	10R hand		

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A man with dark hair, wearing a grey polo shirt, is sitting at a light-colored wooden table. He is smiling and looking towards the camera. In front of him is a white tray containing several black 3D printed shapes of various geometric forms, including circles, squares, and a star. There are also a few small blue and green objects on the table.

Materials planned to made available through 3-D printing

A collage of four images showing various 3D printed objects. The top left shows a grid of red square tiles with different textures. The top right shows a red, translucent, dome-shaped object. The bottom left shows a hand holding a red, translucent, dome-shaped object over a bottle. The bottom right shows four white, dome-shaped objects with small white caps, arranged in a row on a red surface.

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**Review the tools for assessing and
interpreting sensory integration data**
See pages 65-69

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Problems in Vestibular Bilateral Integration			Problems in Sensory Responsiveness		
Problems in Somatosensory Perception			Problems in Sensory Reactivity		
Vestibular Processing <ul style="list-style-type: none"> Processing of rotary motion (e.g., SIPT Postural Nystagmus, SPM Balance and Motion; SP Body Position and Movement) Perception of head position and changes in center of gravity 	Proprioception <ul style="list-style-type: none"> Body position awareness (e.g., SIPT KIN, SPM Body Awareness; SP Body Position and Movement) Grasping of force 	Tactile Perception <ul style="list-style-type: none"> Touch perception scores (e.g., SIPT Manual Form Perception, Finger ID, Graphesthesia, Localization of Tactile Stimuli) Able to find or manipulate objects without vision 	Visual Perception <ul style="list-style-type: none"> Visual perception scores (e.g., SIPT Space Visualization, Figure-Ground Perception, MVPT-3, -DTVP-3, TVP-3, SPM and SP visual items related to perception) 	Hypersensitivity <ul style="list-style-type: none"> Signs of overresponsiveness or heightened responses on SPM or SP items or observations related to: <ul style="list-style-type: none"> Vestibular input Tactile input Auditory input Other sensory input (e.g., temperature, pain, other sensations) 	Hypo-sensitivity <ul style="list-style-type: none"> Signs of underresponsiveness or varying responses on based on SPM or SP items or observations related to: <ul style="list-style-type: none"> Vestibular input Tactile input Auditory input Other sensory input (e.g., temperature, pain, other sensations)
Problems in Motor-Related Functions			Common Behavioral Signs		
Postural/Ocular Mechanisms <ul style="list-style-type: none"> Balance (e.g., SIPT Standing & Walking Balance, BOT-2 Balance) Ocular tracking or SIPT Motor Accuracy Extremity tone Righting or equilibrium reactions 	Postural Mechanisms <ul style="list-style-type: none"> Proximal joint stability Balance (e.g., SIPT Standing and Walking Balance, BOT-2 Balance, SP Endurance and Tone) Proximal joint stability, weight shifting, ability to move segmentally 	Body-Centered Praxis <ul style="list-style-type: none"> Ability to plan novel actions with face and body (e.g., SIPT Postural Praxis, Oral Praxis, Praxis on Verbal Commands, Sequencing Praxis, Bilateral Motor Coordination; SPM Planning and Ideas) Ability to learn new skills Seemingly coordinated or clumsy in actions 	Visual-praxis <ul style="list-style-type: none"> Visual-motor or visual praxis ability (e.g., SIPT Motor Accuracy, Design Copying, Constructional Praxis, VMI, BOT-2 copying items) Able to plan and learn visual-motor tasks (e.g., writing, drawing, building) 	Hyperactivity <ul style="list-style-type: none"> Has high or disorganized activity level Appears to have poor attention or distractibility 	Hypoactivity <ul style="list-style-type: none"> Has low or disorganized activity level Appears to have lethargy, apathy, or poor attention
Notes to Assist in Differentiating Problems and Patterns					
If low scores on tactile perception and praxis are present, then low scores in this area are more likely part of a broader somatosensory pattern vs. vestibular bilateral integration.	Signs of poor proprioception frequently accompany both vestibular bilateral integration problems and somatosensory praxis.	Somatosensory praxis may include problems in vestibular processing and bilateral integration and/or visual dyspraxis.	Signs of both somatosensory and visual-praxis may be present; poor visual-praxis scores without poor visual perception may be part of somatosensory pattern.	Problems with regulating sensory responses may occur in conjunction with problems in vestibular bilateral integration, somatosensory praxis, or visual-praxis.	Signs of overresponsiveness, underresponsiveness, and fluctuating responses may be seen together; poor sensory perception can be confused with sensory hypersensitivity.

Generating Hypotheses

- Understanding Hypotheses: predictive statements linking sensory motor factors to participation challenges.
- Based on interpretation of assessment data.
- A data-based clinical “hunch”
- Hypotheses testing: data from outcome measurement used to “test” the hypotheses

Example

- Poor somatosensory perception and praxis affect the child's ability to arrange and put on clothing independently.

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Hypothesis Generation Activity

Participation Challenge	Assessment Data	Hypothesis
Unable to sit still for participation in classroom activities	Decrease vestibular functioning (decreased PRN) Decreased balance (BOT-2)	

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Developing and Scaling Goals

- Identification of Goals
- Goal Attainment Scaling
 - Parent Interview
 - Setting goal, current level and expected outcome
 - Scaling Goals
- Considerations
 - Equidistance
 - One change variable
 - Technical check

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For example, in an approach such as sensory integration, participation gains are not always easy to see in the course of therapy sessions...



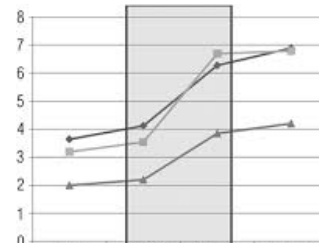
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What is GAS?

How do we
measure this...



...and make it look like
this?



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Goal Attainment Scaling:

- method of writing goals
- careful prediction of expected gains
- requires training for consistency
- allows the possibility of comparing gains on individual, yet diverse areas of change

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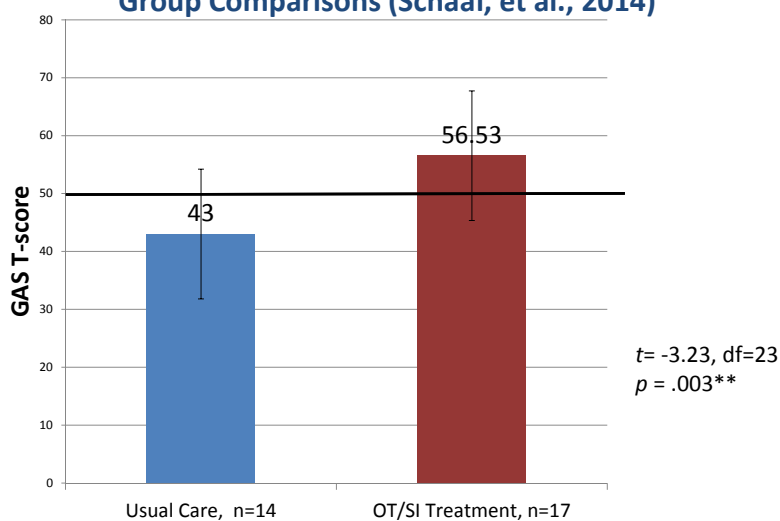
GAS has been applied in occupational therapy effectiveness research in:

- **rehabilitation**
(Joyce, Rockwood, & Mate-Kole 1994; Lannin, 2003; Mitchell & Cusick, 1998)
- **school systems**
(Dreiling & Bundy, 2003; King et al., 1999)
- **mental health programs**
(Lloyd, 1986; Scott & Haggarty, 1984)
- **sensory integration studies**
(Pfeifer, et al., 2011; Miller, Coll, & Schoen, 2007; Schaaf et al., 2014)

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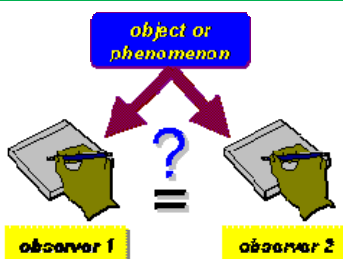
Primary Outcome

Parent-Rated Goal Attainment Scale Group Comparisons (Schaaf, et al., 2014)



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Goal Attainment Scaling - Reliability



**Good inter-rater reliability (0.90 and above)
has been reported using GAS**

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How does the GAS process begin?

- Initial identification of participation challenges and strengths
- Provision of a comprehensive assessment
- Generation of hypothesis to relate assessment findings to participation strengths and challenges

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How are goals determined?

- **Patient is included when possible**
- **With children, parents may be key partner in determining goals**
- **Goal areas are usually identified through interview, questionnaires and other means of including the patient and family in defining what will be considered important and relevant progress**

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How are goals determined?

- **Hypotheses are shared with the patient/family**
- **Specific daily life implications are identified**
- **Development of goal areas occurs**

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How are goals determined?

Remember-

- Goals are different from interventions.
- Interventions are the treatment approaches in which the client and therapist will participate to improve function.
- Goals reflect a change in quality of life.

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How are goals scaled?

- Identify 3-5 areas in which to write a goal
- Include only one problem or variable for each goal scale.
- All scales should be weighted.
- The client's behavior at intake (current level) may be equivalent to any of the five levels or not on the scale at all.

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How are goals scaled?

- Avoid variables which are too general or vague to be accurately scored at a follow-up interview.
- The levels on a scale should not overlap each other.
- If the information needed for a scale's follow-up scoring is to be obtained from a source other than the client (and the source of information should be listed).

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How are goals scaled?

To measure, consider:

- How much (quantity)
- How long (duration-consider time needed to achieve target)
- How often (frequency)

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How are goals scaled?

Goals are Scaled goals as follows:

-2 = **much less** than expected

-1 = **less** than expected

0 = expected improvements

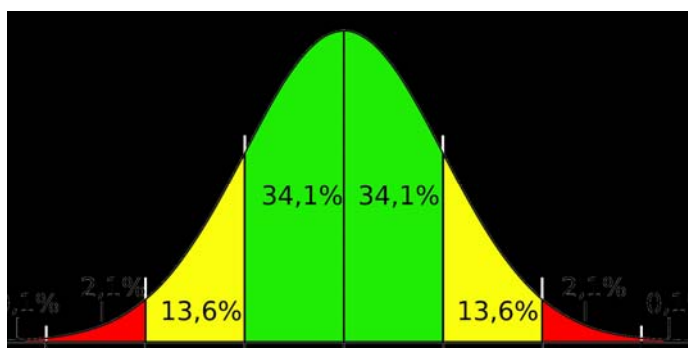
+1 = **much more** than expected

+2 = **more** than expected

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Describe current level	Score
Very Minimal progress (much less than expected)	-2.0
Minimal progress (less than expected)	-1.0
Expected level of attainment (where THIS child with THIS intervention is expected to be)	0.0 (like “average” on a probability curve)
Greater than expected attainment (more than expected)	+1.0
Much greater than expected attainment (much more than expected)	+2.0

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Goals are scaled using probability estimates that follow the 'bell curve'

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GAS Probability Estimates

The expected level (0) is individually set

- **For specific patient (age, previous tx, etc)**
- **With specific assessment findings**
- **For specific type of intervention planned**
- **For specific time frame**

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GAS Probability Estimates


- The “chance” (probability) of child obtaining -1 should equal the probability of the child obtaining +1
- The “chance” (probability) of child obtaining -2 should equal the probability of the child obtaining +2

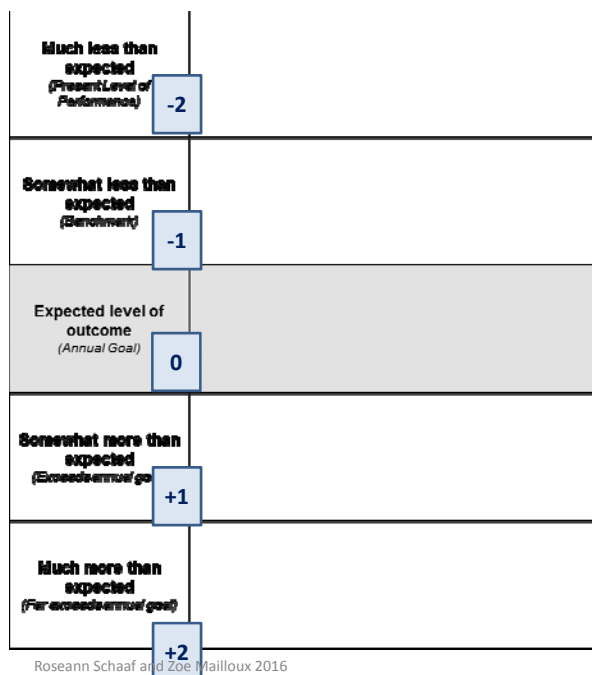
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GAS Probability Estimates

- Kiresuk, Smith, & Cardillo, 1994 provide a formula to determine if a therapist or center is tending to set goals too high or too low
- In a research study-the person scaling goals and checking on progress toward goals is “blind” to the intervention
- In practice, other safeguards can assist in objectivity

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- An article by Ruble, et al (2012)  prompted use of GAS in schools
- Since goals at school are usually set for one year, the Ruble paper suggests setting -2 at the current level:



GAS Tools

- Parent Interview for Setting Goals p 82
- Parent Response Form for GAS p. 85
- GAS Checklist for Technical Quality of Goals p.86

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Example

PARTICIPATION STRENGTHS & CHALLENGES



- Miguel's parents report that he has trouble getting dressed for school in the morning
- Although he is a strong boy, he is often tired and sluggish
- Miguel's inability to tie his shoes and adjust his clothing after using the bathroom is causing social difficulties

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EXAMPLE

Assessment findings:



- Results on the SIPT show poor tactile perception and poor praxis
- Results on the SPM show some problems in tactile defensiveness, planning & ideas and socialization
- Results on other motor tests show good physical strength and motor skills
- Miguel is very musical and can sing well; he wants to play the guitar and piano

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EXAMPLE



Hypotheses

- **Poor tactile perception and poor praxis interfere with dressing skills and these problems also affect his social skills**
- **Tactile defensiveness also makes some aspects of dressing challenging**
- **Miguel's good physical strength and motor skills will help him to execute tasks once he has improved tactile perception and praxis and reduced tactile defensiveness**
- **Miguel's interest in music can be used to motivate and assist him in developing his abilities**

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Case example:

Miguel will put on a t-shirt independently

Current level: Miguel pulls a t-shirt over his head but it is often backwards or inside out. He is not able to figure out how to place his arms in the shirt

-2.0 Much Less than Expected Level	-1-0 Somewhat Less than Expected Level	0 Expected Level	+1.0 Somewhat More than Expected Level	+2.0 Much More than Expected Level
With set up Miguel will Pull shirt overhead and place 1 arm in shirt correctly on 4/5 days.	With set up, Miguel will pull shirt overhead and place both arms in shirt correctly on 4/5 days.	With set up, Miguel will pull shirt overhead and place both arms in shirt correctly and pull shirt down over his trunk on 4/5 days.	Miguel will set up his shirt, pull shirt overhead and place both arms in shirt correctly and pull shirt down over his trunk on 4/5 days.	Miguel will remove shirt from drawer, pull shirt overhead and place both arms in shirt correctly and pull shirt down over his trunk on 4/5 days.

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Identifying Outcomes

- Proximal vs Distal Outcomes
- *Proximal outcomes*: based on the specific sensory motor factors hypothesized to be affecting participation/goal attainment identified in the assessment process.
- *Distal outcomes* are the participation challenges
 - closely aligned with goals

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Identifying Outcomes: Example

Paul is a 5-year-old child with high-functioning autism. His family reveals that his participation in mealtime is of primary concern; therefore, mealtime participation becomes a primary goal for intervention. Assessment data show that Paul's challenges in this area are related to two major factors:

- (1) a limited food repertoire secondary to oral sensory sensitivity and
- (2) difficulty sitting in the chair secondary to decreased vestibular processing resulting in poor balance and postural skills **needed for sitting.**

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Identifying Outcomes: Example

- Proximal outcomes: decreased oral sensitivity, improved vestibular processing, balance and postural control.
- Distal outcome: the ability to sit at the table during dinner for 10 minutes.

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Planning and Implementing ASI Intervention

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Feasibility

- Schaaf, Benevides, Kelly, Mailloux, 2013
- Examined feasibility, safety, and acceptability of a manualized protocol
- The intervention is safe and feasible to implement, acceptable to parents and therapist, and therapists were able to implement protocol with adequate fidelity.

Evidence for ASI

- Pfieffer, et al., 2011 (Comparative Effectiveness)
- Schaaf, et al., 2014 (RCT)
- Iwanaga, et al., 2013 (Comparative Effectiveness)
- Abdel & Mohamed, 2015 (Pre-Post)

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Evidence for ASI

Effectiveness of SI for children with ASD Pfeiffer, et al., 2011

Comparative Effectiveness Study-OT ASI vs Fine Motor

37 children with ASD aged 6-12; randomized

18 tx sessions over 6 weeks

Used ASI Fidelity Measure

RESULTS: Children with ASD had greater gains on GAS and a significant decrease in autistic mannerisms in comparison with the fine motor intervention

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Evidence for ASI

Effectiveness of SI for children with ASD Schaaf, et al., (2014)

RCT

32 children with autism aged 4-8yrs

OT-SI for 10 weeks, 3 X per week compared to customary care; Used ASI Fidelity Measure

RESULTS OT-SI group showed statistically significant improvements in primary outcome measure of GAS, as well as secondary outcome measure (PEDI) showing improvements in decreased caregiver assistance for self-care and social activities.

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Effectiveness of SI for children with ASD

Schaaf, et al., (2013)

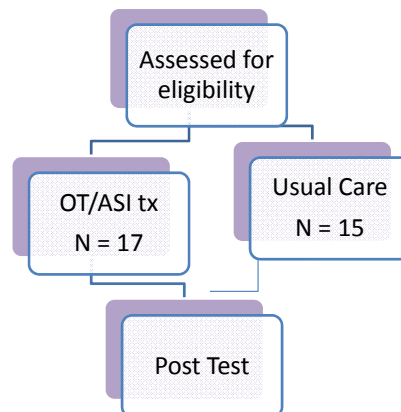
RCT N=32 ASD

AGE 4yr-6mo to 8 yr6mo

DOSAGE:10 weeks, 3 X wk

RESULTS: statistically significant improvements in primary measure of GAS ($p=.003^{**}$) ES=1.2 and PEDI caregiver assistance in self care and social activities

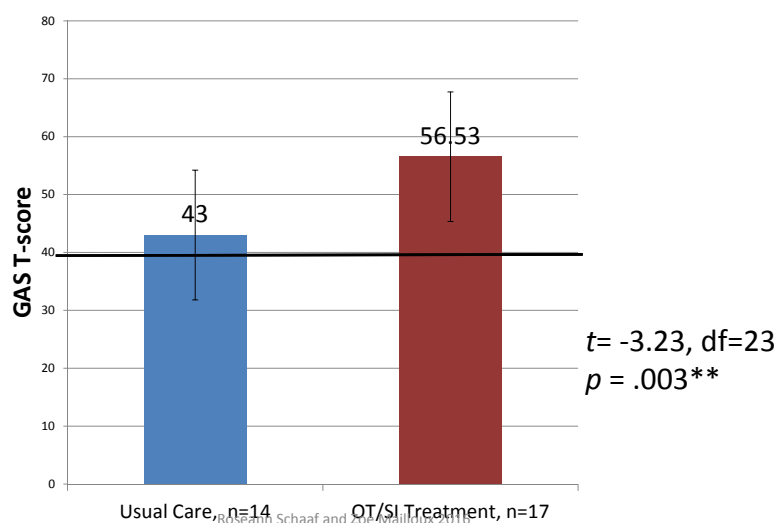
Study Design



111

Effectiveness of SI for children with ASD

Schaaf, et al., (2013)



Pediatric Evaluation of Disability Inventory (PEDI)

	Control	Treatment	p value
	Median Change (Scaled Score)	Median Change (Scaled Score)	
Functional Skills			
Self Care	1.7	3.7	ns
Mobility	0	0	ns
Social Function	1.1	4	ns
Caregiver Assistance			
Self Care	1.3	12.2	0.0076**
Mobility	0	0	ns
Social Function	0	13.5	0.0394*

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Evidence for ASI

Pilot Study: Efficacy of Sensory Integration Therapy for Japanese Children with High-Functioning Autism Spectrum Disorder Iwanaga, et al. 2012

Children with ASD 8 in individual SIT sessions; 12 participated in group therapy (GT) that included social skill training, communication training, kinetic activities, and child–parent play for 8–10 months; did not use ASI Fidelity Measure, but identified ASI principles

RESULTS SIT GROUP: MAP (Japanese version) Total scores and all Index scores (except for Verbal Index) increased significantly suggesting a more positive effect on motor coordination abilities, non-verbal cognitive abilities, and combined abilities of sensory motor and cognition in children ASD compared to GT.

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Evidence for ASI

Effectiveness of sensory integration program
in motor skills in children with autism
Abdel & Mohamed (2015)

Pre Post One Group Design

34 children with autism aged 40-65 months

SI for 6 months, 3 X per week; did not use ASI Fidelity Measure, but identified ASI principles

RESULTS Children with ASD showed statistically significant improvements in gross and fine motor skills on the PDMS-2.

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Setting the Stage for Intervention

- Therapist's training
- Safe environment
- Appropriate equipment
- Plans for collaboration with key stakeholders, (including adapting activities and modifying routines and activities in the home or school)
- Dosage (duration/frequency) and location of intervention is considered

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Setting the Stage for Intervention

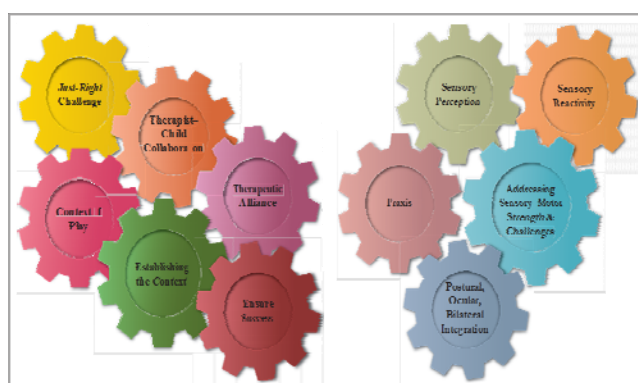
Evaluating and
modifying the
sensory
environment ~



~with special attention to tactile, proprioceptive
and vestibular sensory experiences

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Conducting the Intervention



Establishing
the Context

Addressing the Child's
Sensory-Motor Strengths
and Challenges

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Conducting the Intervention: Establishing the Context



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Conducting the Intervention: Establishing the Context

Just right
challenge



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Slide 119

- RS2** We could talk about each one generally (No slides??)
Roseann Schaaf, 3/22/2015
- RS12** Pick a video clip to exemplify some of these concepts
Roseann Schaaf, 6/30/2015

Conducting the Intervention: Establishing the Context



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The child is an
active collaborator



Conducting the Intervention: Establishing the Context



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The therapists
ensures
success



Conducting the Intervention: Establishing the Context

Emphasis on the
context of play



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Conducting the Intervention: Establishing the Context



Fostering a
therapeutic
alliance
with the
child



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#1



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Conducting the Intervention: Addressing the Child's Sensory– Motor Strengths and Challenges



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Conducting the Intervention: Addressing the Child's Sensory– Motor Strengths and Challenges

Enhancing Sensory Perception

- Tactile
- Proprioception
- Vestibular



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Enhancing Sensory Perception

Enhancing Sensory Perception	Description	Rationale	Examples
Individually-tailored sensory-motor opportunities with varying intensities, qualities, speed, and duration to address the child's areas of need	<p>Emphasis on tactile, proprioceptive and vestibular sensation.</p> <p>Variety of sensory –motor activities with a focus on enhancing perception and processing of these sensations.</p> <p>Based on the identified areas of need as shown from assessment data.</p>	<p>Touch (tactile), position (proprioception) and movement and gravity (vestibular) are critical as foundations for the development of motor, language and other skills</p> <p>Also have impact on self esteem</p>	<p>Swing on trapeze and land into a large pillow</p> <p>Roll in carpet</p> <p>Jump into a bin of small balls from platform or swing</p>

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Reflective Questions and Tips

Reflective Questions	Tips
How did I provide sensory opportunities (tactile, vestibular and proprioception)?	Choose activities that are rich in total body sensory experiences as described above in examples section.
In what ways did I provide opportunities tailored to the child's needs with varying intensities, qualities, speed and duration?	Be sure to gauge the child's response so that they are pleasant and therapeutic activities.
How did the child respond to the sensory-motor activities?	Be sure to focus on tactile, vestibular and proprioceptive sensory experiences and tailor these to the child's needs based on their assessment data.
What can I do differently next session to assure that I provide sensory experiences that are matched to the child's needs?	

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Reflective Questions and Tips

Reflective Questions	Tips
How did I include a variety of tactile experiences within the session?	Consider ways that a variety of tactile sensations can be added to activities. eg: a child hanging from a trapeze might like to "ice skate" with his feet on shaving cream sprayed on a mat
In what ways did I provide tactile opportunities tailored to the child's needs?	With the assessment results in mind, think about specific aspects of tactile perception to support, eg, children with somatodyspraxia may benefit from increased tactile input to their total body provided by moving through tunnels or spaces lined with various textures.
In what way did I facilitate tactile discrimination of size, shapes and textures?	
What would I do differently in next session?	

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Some children with ASD have poor tactile perception



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You can support the development of touch perception by-



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- Incorporating textures into play and everyday experiences
- Playing games that involve touch without using vision
- “Warming-up” hands and face for fine motor actions to bring in tactile information
- Incorporating a variety of tactile discrimination activities into therapy

Some children with ASD...

- Have poor position sense which creates social difficulties
- May cause “trouble” with “pressure” and force (pressing too hard or too soft)
- Need “extra” proprioceptive sensory input to feel calm and organized

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Help children by...

- Adding gentle resistance to activities
- Incorporating activities that give “push” and pull to the tendons and joints, e.g. jumping, hanging
- Incorporating deep touch pressure that also gives input to joints, such as massage, rolling, wrapping self up, etc.



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Some children with ASD...

- Have vestibular sensory systems that lead them to “crave” movement while others may be sensitive to movement
- May also have trouble with balance and postural responses
- Have low muscle tone may related to the vestibular sense

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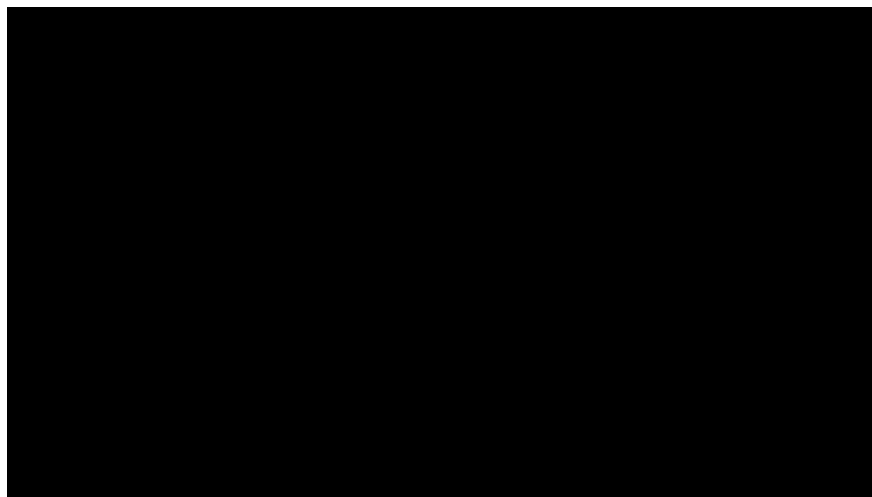
Help children by...

- Incorporating motion-swinging both back and forth and in a rotary motion (to the child's interest and tolerance)
- Playing activities that involve putting the head in different positions
- Having the child do some activities lying on the stomach with head up against gravity



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#3



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Conducting the Intervention: Supporting postural, ocular, oral and/or bilateral motor control



To enhance postural
control, ocular control,
and bilateral
development needed
for participation in
everyday activities



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Some children with ASD...

- Have postural, ocular and bilateral issues that are hard to see.
- Have trouble crossing body midline
- Seem weak due to low tone

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Help children by...

- Incorporating activities that use both sides of the body
- Playing activities that involve vestibular input
- Having the child do some activities lying on the stomach with head up against gravity and crossing their midline



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Facilitating Postural and Ocular Control and Bilateral Integration

Objective	Description	Rationale	Examples
Enhance postural control, ocular control, and bilateral development needed for participation in everyday activities	Activities incorporate vestibular and proprioceptive sensation while facilitating the development of postural, ocular, balance and bilateral motor development.	Inefficient vestibular and proprioceptive processing are associated with poor postural control, bilateral integration and ocular motor control (Ayres, 1989; Mailloux, et al., 2011).	Prone in a sling swing and bat at a hanging target. Use hands and eyes together to cross midline to reach for a target. Pumping, pulling or pushing with both arms in a rhythmical sequence. Whistles or bubble wands at midline.

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Reflective Questions and Tips

Reflective Questions	Tips
Which activities in this session most clearly targeted the proprioceptive and vestibular systems to facilitate postural skills?	"Break down" aspects of the challenges so the child does not have to manage too many things at the same
Did the tactile, proprioceptive and or vestibular activities challenge the child to build strength, dexterity, speed and agility in static and dynamic positions and fine and gross motor skills as appropriate?	Find ways to change the play scheme to challenge the child's ability level
In what ways did the child respond to indicate the sensory-motor activities were effective?	Provide additional sensory cues and supports to assist the child with this area of function

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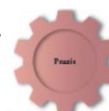
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Conducting the Intervention: Addressing problems in motor planning or praxis



Sensory-rich movement activities to increase the child's awareness of his or her body and simultaneously challenge and enhance ability to conceptualize, plan, and complete novel motor tasks.

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Problems in motor planning or praxis

- Difficulty forming an idea or plan of what to do
- Difficulty learning new motor skills and/or clumsiness in motor actions
- Trouble getting started
- Difficulty with timing and/or sequencing of movements
- Hesitancy to join in-may become bossy

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Many children with ASD...

- Have poor “ideation”-knowing what things are possible to do or play
- May have trouble with getting started-initiating action
- Encounter difficulty with timing and sequencing as part of planning

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Addressing problems in motor planning or praxis

- Encourage ideation
- Anticipate need for help in learning new skills
- Incorporate imitation
- Break down steps and motor through them
- Avoid verbal directions when child is trying to perform a motor skill
- Allow extra time
- Add sensory feedback, e.g. resistance
- Support children to do things for themselves

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Facilitating Praxis

Objective	Description	Rationale	Examples
To utilize active, individually-tailored activities rich in tactile, vestibular and/or proprioception which challenge the child's ability to plan and execute purposeful movements.	Sensory-rich movement activities to increase the child's body awareness and enhance the child's ability to plan and complete novel motor tasks. Help child to organize behavior. Activities utilized are dependent upon the child's needs.	Body sensations provide an important foundation for praxis (Ayres, 1989). Knowledge about the body forms a basis for the ability to create ideas for purposeful movement.	Encouraging the child to build a bridge or house out of blocks large Helping the child to build an obstacle course that involves novel ways of moving his body through space Asking the child if there are different ways of using or riding on equipment Asking the child to imitate facial, hand or body actions during a game

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#2



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Conducting the Intervention: Regulating Sensory Reactivity

developing and supporting the child's ability to regulate their responses to sensation as a basis for participation in daily activities



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Many children with have
problems in sensory reactivity

- Hypersensitivity or Defensiveness
- Hyposensitivity or Under-Responsiveness
- Fluctuating sensation



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The child with sensory hyper-reactivity may...

- React negatively and emotionally to specific sensations, exhibiting anxiety, hostility, or aggression. May withdraw from light touch, or rub the place that has been touched.
- Show negative or emotional reaction when approached from the rear, or when touched out of his field of vision; to specific smells, sounds, etc.
- Rebuff friendly or affectionate pats and caresses
- Overreact to physically painful experiences, making a big deal over a minor scrape or splinter
- Fuss about new clothing, such as stiffness, rough textures, shirt collars, belts, elasticized waists, hats and scarves, or seams in socks
- Not notice sensations that most people would

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Help children by...

- Understanding the sensitivity is “real”
- Being a detective to find out what things are bothering the child-sometimes hard to find
- Using sensory preparation and gradual desensitization
- Developing cognitive supports



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Examples of Calming Activities

- Wall push ups (hands, shoulders, back, bottom)
- Slow rocking, slow swaying, slow linear swinging
- Cuddling, back rubbing
- Big pillow hugs
- Firm touch pressure on shoulders
- Sucking thick liquids through a straw



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Organizing Activities



- Hanging from a chin-up or monkey bar
- Pushing, pulling, or carrying heavy loads, wagon
- Getting into an upside-down position
- Tug-of-war
- Wearing a weighted vest or backpack
- Manipulating theraputty, power putty, silly putty
- Chewing chewy foods (licorice, dried fruit, gum, beef/turkey jerky, bagels, taffy)

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Regulating Sensory Reactivity

Regulating Sensory Reactivity	Description	Rationale	Examples
Utilize active, individually-tailored sensory based activities aimed at developing and supporting the child's ability to regulate their responses to sensation	Regulation of sensory reactivity is the ability to respond to the sensations of daily life in a way that allows for awareness and appropriate response to the sensations of daily life. Emphasis is on helping the child regulate sensory hyper-reactivity. Currently both hyper and hypo-reactivity to sensation are described in the DSM5 as one of the features of the Restricted and Repetitive Behaviors core feature.	Appropriate regulation of reactivity to sensory experiences contributes to the capability to sustain engagement and attention in activities regardless of variability in the intensity, quality and duration of sensations from the body or the environment. Adequate sensory reactivity contributes to behavioral self-regulation & emotional stability	Observing the child's immediate and delayed responses to sensory experiences and modifying them as needed Facilitating the child's participation in sensory motor activities that challenge and support the child ability to attain and maintain regulated behavior, arousal and alertness. Providing slow, rhythmic activities, and sustained levels of sensation for calming or faster, more irregular sensation for alerting and activating the child. Changing the intensity, duration, frequency, or rhythm of the sensory activities

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Flow of a Session

*Keep the goals in your head,
Activities in your pocket,
And fun in your heart.*

Beginning of Session

Middle of Session

End of Session

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Choosing Intervention Activities

- Child (age, strengths) + Child's area of need + child's interest + context = activities. Then expand and challenge as able.
- Child with somatodyspraxia who needs total body tactile perception activities combined with praxis challenges to develop independence at school in ADL's. Loves superheroes.
- Don superhero cape with buttons, climb up rock wall and jump into ball pit to "save" the animals. Add challenge -climb out using suspended rope

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Measuring Outcomes and Monitoring Progress

- Psychometric properties of outcome measures
- Frequency of Outcome measurement
- Who will collect the outcome data
- Where will it be collected?
- Strategies for outcome measurement
 - GAS as an outcome measures
 - Measuring observations of behavior
 - Parent/Child satisfaction

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Case Example: Raul

- 5 years of age
- Diagnosis of ASD (ADOS and ADI-R)
- Happy, easygoing infant who achieved all developmental milestones within age expectations except language.
- At 18 months concerns about low receptive language, poor eye contact, limited interests, repetitive behaviors, lack of interest in peers.
- Attended a preschool program at local public school-now in K

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Meet Raul

- Bright, enjoys puzzles and building structures from blocks and toys.
- Difficulty using crayons, scissors, opening lunch box
- Does not sustain play interactions
- Engages in unsafe play

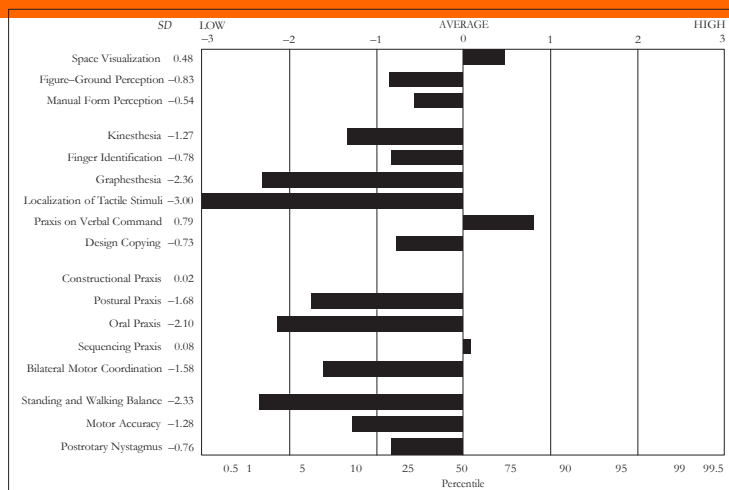
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Raul – Assessment and Findings

- Based on observation and record review therapist hunched that poor processing and integration of sensation may be a factor.
- SIPT, SPM-Home and Main Classroom
- Observation of play skills, social interactions
- Observation and recording of motor functions
 - Posture, strength, muscle tone, oculomotor

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Raul's SIPT



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Raul's SPM

SPM-Home			SPM-School		
Subscale	Raw Score	Interpretation	Functional Area	Raw Score	Interpretation
Social Participation	33	Definite dysfunction	Social Participation	27	Some problems
Vision	21	Typical	Vision	13	Typical
Hearing	17	Typical	Hearing	8	Typical
Touch	22	Typical	Touch	13	Typical
Body Awareness	27	Definite dysfunction	Body Awareness	16	Definite dysfunction
Balance and Motion	22	Some problems	Balance and Motion	22	Some problems
Planning and Ideas	36	Definite dysfunction	Planning and Ideas	23	Definite dysfunction

Note. SPM = Sensory Processing Measure.

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Raul's Assessment Data

Problems in Vestibular Bilateral Integration		Problems in Somatopraxis		Problems in Visuopraxis		Problems in Sensory Reactivity	
Problems in Sensory Perception		Problems in Sensory Perception		Problems in Sensory Perception		Problems in Sensory Reactivity	
Vestibular Processing <ul style="list-style-type: none">Processing of rotary motion (e.g., SIPT Postrotary Nystagmus; SPM Balance and Motion; SP Body Position and Movement)Perception of head position and changes in center of gravity	Proprioception <ul style="list-style-type: none">Body position awareness (e.g., SIPT KIN; SPM Body Awareness; SP Body Position and Movement)Grading of force	Tactile Perception <ul style="list-style-type: none">Touch perception scores (e.g., SIPT Manual Form Perception, Finger Identification, Graphesthesia, Localization of Tactile Stimuli)Ability to find or manipulate objects without vision	Visual Perception <ul style="list-style-type: none">Visual perception scores (e.g., SIPT Space Visualization, Finger-Ground Perception, MVPT-3, DTVP-3, TVPS-3, SPM, and SP visual items related to perception)	Hyperreactivity <ul style="list-style-type: none">Signs of overresponsiveness or heightened responses based on SPM or SP items or observations related to<ul style="list-style-type: none">Vestibular inputTactile inputVisual inputAuditory inputOther sensory input (e.g., temperature, pain, other sensations)	Hyporeactivity <ul style="list-style-type: none">Signs of underresponsiveness or varying responses based on SPM or SP items or observations related to<ul style="list-style-type: none">Vestibular inputTactile inputVisual inputAuditory inputOther sensory input (e.g., temperature, pain, other sensations)		
Problems in Motor-Related Functions		Problems in Motor-Related Functions		Problems in Motor-Related Functions		Problems in Motor-Related Functions	
Postural/Ocular Mechanisms <ul style="list-style-type: none">Balance (e.g., SIPT Standing and Walking Balance, BOT-2 Balance)Ocular tracking or SIPT Motor AccuracyExtensor toneRighting or equilibrium reactions	Postural Mechanisms <ul style="list-style-type: none">Proximal joint stabilityBalance (e.g., SIPT Standing and Walking Balance, BOT-2 Balance, SP Endurance and Tone)Proximal joint stability, weight shifting, ability to move segmentally	Body-Centered Praxis <ul style="list-style-type: none">Ability to plan novel actions with face and body (e.g., SIPT Postural Praxis, Oral Praxis, Praxis on Verbal Command, Sequencing Praxis, Bilateral Motor Coordination, SPM Planning and Ideas)Ability to learn new skillsSeemingly coordinated or clumsy in actions	Visuopraxis <ul style="list-style-type: none">Visual-motor or visual praxis ability (e.g., SIPT Motor Accuracy, Design Copying, Constructional Praxis, MFL, BOT-2 copying items)Ability to plan and learn visual-motor tasks (e.g., writing, drawing, building)				
Bilateral Integration <ul style="list-style-type: none">Items that measure ability to coordinate both sides of the body (e.g., SIPT Bilateral Motor Coordination, Sequencing Praxis, Oral Praxis, Graphesthesia, Manual Form Perception)Bilateral finger tone, finger touchingJumping jacks and skipping							
Common Behavioral Signs							
<ul style="list-style-type: none">Appears to crave movement/lack signs of dizzinessAppears to have good praxis skills in contrast to struggles with manual skills		<ul style="list-style-type: none">Appears to seek heavy work, joint traction or compression activitiesHas low awareness of body position		<ul style="list-style-type: none">Appears to seek extra touch input or seems not to use tactile feedback, or bothUses vision more than usual to guide actions		<ul style="list-style-type: none">Misses seeing thingsShows confusion in differentiating objects and shapesAppears not to use vision as much as expected	
<ul style="list-style-type: none">Has high or disorganized activity levelAppears to have poor attention or distractibility		<ul style="list-style-type: none">Has low or disorganized activity levelAppears to have lethargy, apathy, or poor attention					
Notes to Assist in Differentiating Problems and Patterns							
<ul style="list-style-type: none">If low scores on tactile perception and praxis are present, then low scores in this area are more likely part of a broader somatodyspraxia pattern vs. vestibular bilateral integration.		<ul style="list-style-type: none">Signs of sensory integration frequently accompany both vestibular bilateral integration problems and somatodyspraxia.		<ul style="list-style-type: none">Somatodyspraxia frequently accompanies both vestibular processing and bilateral integration and/or visual dyspraxia.		<ul style="list-style-type: none">Signs of both somatodyspraxia and visuospatial dyspraxia may be present; poor visual perception may be part of somatodyspraxia pattern.	
<ul style="list-style-type: none">Problems with regulating sensory responses can occur in conjunction with problems in vestibular bilateral integration, somatodyspraxia, or visuospatial dyspraxia.		<ul style="list-style-type: none">Signs of overresponsiveness, underresponsiveness, and fluctuating responses may be seen together; poor sensory perception can be confused with sensory hyporeactivity.					

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Raul: DDDM Steps 1 & 2

Identifying the Child's Strengths and Participation Challenges	Conducting the Comprehensive Assessment	Generating Hypotheses	Developing and Scaling Goals	Identifying Outcome Measures	Setting the Stage for Intervention	Conducting the Intervention	Measuring Outcomes and Monitoring Progress
Raul is a bright boy who has limited receptive-language and poor motor skills. He is very good at puzzles and building and likes to take things apart and put them back together. Participation challenges include difficulty holding and using utensils at school, such as crayons and scissors, and managing his lunch containers. Raul's play skills are limited, and he does not sustain interaction with peers at school. In addition, his parents and teacher have concerns about Raul's safety.	Raul has relative strengths in visual perception as evidenced by Sensory Integration and Praxis Tests (SIPT) scores of visual perception and visual praxis and in motor planning based on receptive-language scores. His strength and execution of familiar motor skills are adequate. Raul has difficulties in somatodyspraxia, characterized by poor tactile perception, proprioception, and praxis, which are shown by SIPT and Sensory Processing Measure (SPM) scores and observations. Raul has difficulties in social participation, which is shown by SPM scores and observations.						

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Hypotheses: Linking Raul's Assessment Data to Participation Strengths and Challenges

- Raul's difficulty with holding and using utensils is related to poor tactile and proprioceptive perception and somatodyspraxia.
- Raul's safety concerns at school are a result of poor tactile and proprioception perception and somatodyspraxia.
- Poor somatosensory (tactile and proprioceptive) perception is impacting Raul's ability to initiate and sustain play interactions with peers.

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Hypotheses: Linking Raul's Assessment Data to Participation Strengths and Challenges

- Strengths in visual perception and visual praxis can be used to support play, participation in school activities, and safety on playground
- Raul's strength in execution of familiar motor actions can support his participation in play and safety on playground

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GAS examples for Raul

1. Raul will independently (i.e., complete the task without direction or physical assistance) appropriately grasp utensils at school, such as crayons and scissors, and maintain the grasp for at least 10 minutes during a classroom task.

Current level: Raul uses an effective grasp on a crayon or pair of scissors but frequently uses too little pressure or drops the utensil.

-2 Much Less Than Expected Outcome	-1 Somewhat Less Than Expected Outcome	0 Expected Outcome	+1 Somewhat More Than Expected Outcome	+2 Much More Than Expected Outcome
Once positioned, Raul will appropriately grasp a crayon or pair of scissors and maintain the grasp for 5 minutes.	Raul will independently and appropriately grasp a crayon or pair of scissors and maintain the grasp for 5 minutes.	Raul will independently and appropriately grasp a crayon or pair of scissors and maintain the grasp for 10 minutes.	Raul will independently and appropriately grasp a crayon or pair of scissors and maintain the grasp for 15 minutes.	Raul will independently and appropriately grasp a crayon or pair of scissors and maintain the grasp for 20 minutes.

2. Raul will navigate the playground safely.

Current level: Raul frequently walks into unsafe situations (e.g., in front of children on swings) and bumps into objects and people during the school day.

-2 Much Less Than Expected Outcome	-1 Somewhat Less Than Expected Outcome	0 Expected Outcome	+1 Somewhat More Than Expected Outcome	+2 Much More Than Expected Outcome
Raul will be able to navigate the playground during recess without walking into unsafe situations and bumping into objects and people, with no more than four physical cues to reposition him or change his course.	Raul will be able to navigate the playground during recess without walking into unsafe situations and bumping into objects and people, with no more than three physical cues to reposition him or change his course.	Raul will be able to navigate the playground during recess without walking into unsafe situations and bumping into objects and people, with no more than two physical cues to reposition him or change his course.	Raul will be able to navigate the playground during recess without walking into unsafe situations and bumping into objects and people, with no more than one physical cues to reposition him or change his course.	Raul will be able to navigate the playground during recess without walking into unsafe situations and bumping into objects and people, with no physical cues to reposition him or change his course.

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Raul's Proximal and Distal Outcomes

- Proximal
 - Change in Tactile Perception (GRA; LTS)
 - Change in Proprioceptive Perception (SWB, PPr)
 - Change in Praxis (PPr)
- Distal (all measured via GAS)
 - Improved use of utensils
 - Improved safety during play
 - Improved participation in social play

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Setting the Stage for Intervention-Raul

- Review Hypotheses within context of educational relevance
 - Difficulty using tools and objects affects school and play participation
 - Difficulty with praxis impact initiation of learning tasks and play activities
- Dosage and setting
 - Raul's needs point to individual + classroom-based
 - Active, individually tailored sensory motor activities rich in tactile and proprioceptive play.
 - Tactile bins to active tactile perception prior to tasks; classroom breaks with active, resistive move
 - Playground – Just right challenges for motor planning

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Conducting the Intervention: Addressing Raul's Sensory–Motor Strengths & Challenges

Raul's difficulty with holding and using utensils at school, such as crayons and scissors, as well as his safety concerns at school, noted in his walking into unsafe situations and bumping into objects and people are likely due to poor tactile perception & proprioception, which interfere with awareness of positioning and using these tools, and poor praxis, which limits Raul's ability to imitate and plan actions



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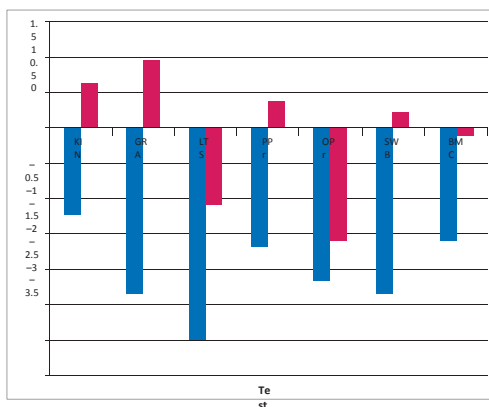
Choosing Intervention Activities

- Child (age, strengths) + Child's area of need + child's interest + context = activities. Then expand and challenge as able.

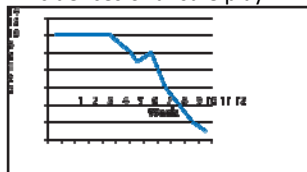
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Raul – Measuring and Displaying Outcomes

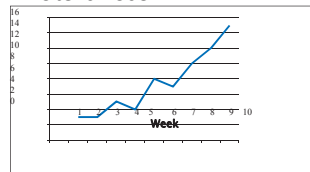
- SIPT Pre (Blue) Post (red)



Incidences of unsafe play



Utensil Use



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Putting it All Together -Raul

Identifying the Child's Strengths and Participation Challenges	Conducting the Comprehensive Assessment	Generating Hypotheses	Developing and Scaling Goals	Identifying Outcome Measures	Setting the Stage for Intervention	Conducting the Intervention	Measuring Outcomes and Monitoring Progress
Raul is a bright boy who has limited receptive-language and poor motor skills. He is very good at puzzles and building and likes to take things apart and put them back together. Participation challenges include difficulty holding and using utensils at school, such as crayons and scissors, and managing his lunch containers. Raul's play skills are limited, and he does not sustain interaction with peers at school. In addition, his parents and teacher have concerns about Raul's safety.	Raul has relative strengths in visual perception as evidenced by Sensory Integration and Praxis Tests (SIPT) scores of visual perception and visual praxis and in motor planning based on receptive-language scores. His strength and execution of familiar motor skills are adequate. Raul has difficulties in somatosensory perception, characterized by poor tactile perception, proprioception, and praxis, which are shown by SIPT and Sensory Processing Measure (SPM) scores and observations. Raul has difficulties in social participation, which is shown by SPM scores and observations.	Raul's difficulties at school, including his poor ability to hold and use utensils, such as crayons and scissors; his problems managing lunch containers; and safety concerns, noted in his walking into unsafe situations and bumping into objects and people, are likely because of poor sensory perception in the areas of touch (tactile) and position (proprioception) sense and poor motor planning, or somatodyspraxia. Poor somatosensory perception in the tactile and proprioceptive systems and difficulties underlying Raul's problems in initiating and sustaining play with peers. Raul's relative strengths in visual perception and visual praxis support his ability to read and excel at building tasks, and his adequate strength and ability to execute familiar motor actions allow him to participate in very basic play activities at school.	Raul will independently and appropriately grasp utensils at school, such as crayons and scissors, and maintain the grasp for at least 10 min during a classroom task. Raul will be able to navigate the playground during recess without walking into unsafe situations and bumping into objects and people, with no more than 2 physical cues to reposition him or change his course. Raul will be able to manage the containers by sequencing the actions needed to open lunch-related items (e.g., milk carton, a zipper-locked bag holding crackers or sandwich, packages of cookies or dried fruit) with no more than 2 physical or verbal prompts, 4 of 5 times observed.	Proximal measures are as follows: • SIPT tactile perception tests • SIPT proprioceptive tests • SIPT praxis, balance, and bilateral integration tests. Distal measures are as follows: • Goal attainment scaling • Data sheets recording the frequency and duration of the targeted behaviors. These may be taken by the teacher, a one-to-one behavioral aide, a parent (if observation is made at home), or the therapist.	Raul's therapist has 7 years of experience, including advanced training in the SIPT. She plans Raul's intervention around his identified sensory-motor factors, including his relative strengths in visual perception and visual-motor skills and typical sensory reactivity, as well as his difficulties in tactile and proprioceptive perception and praxis. Before initiating his school-based occupational therapy program, an individual education plan (IEP) meeting was held to determine Raul's eligibility and service recommendations for 60 min/week of occupational therapy in a setting with specialized therapy equipment (referred to as clinic in the IEP) and 30 min/week of one-on-one classroom-based occupational therapy until his next annual IEP meeting. Activities, equipment, and supplies that incorporate Raul's strengths and address his areas of difficulty are obtained, planned, and arranged. A formal communication plan was developed to ensure that collaboration with key stakeholders (i.e., teacher, behavioral aide, parents, speech-language pathologist) continues through the school year.	For Raul, individually tailored activities that support development of tactile perception, proprioceptive awareness, and praxis are emphasized, along with activities aimed at using his strength in visual perception. Careful considerations of how Raul's strengths and challenges affect his performance at school are also emphasized in his intervention program.	School aides chart Raul's grasp, safety on the playground, and ability to manage lunch containers. The therapist compares Raul's SIPT scores at pre-intervention and at end of the fall semester. The teacher or an independent evaluator reports Raul's goal attainment scaling scores.

CASE A 5 years 2 months boy

Case Information

Challenges-

Trouble with learning to swim; tying shoes; going on monkey bars; playing with peers; getting hair and nails cut; staying seated at school and engaging in arts and crafts

Enjoys movies, playing with trains; affectionate; good motor skills

LOW Vestibular Bilateral-p 20-21

POOR Sensory Reactivity-touch and sound-p 25

To-Do in Small Groups

Try Assessment Tool p 63

Complete DDDM Table

Pick 1-2 participation challenges

Use assessment data to form hypotheses

Write and scale one goal (GAS)

Identify 1-2 proximal and 1-2 distal outcomes

Discuss some appropriate therapy activities

How would you chart your outcomes?

Take Home Messages

- ASI is a theory-based intervention that follows principles and has evidence.
- DDDM is a systematic process to guide ASI that uses data to tailor intervention and measure outcomes
- Assess thoroughly and analyze assessment data!
- ASI addresses participation challenges by focusing on the sensory motor factors

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Thank You!

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References in book



Extra slides-ASD Dx



History of Autism

- 1943 Leo Kanner published "Autistic Disturbance of Affective Contact" describing 11 socially isolated children who share an obsessive desire for sameness.
- 1950s-1960s Autism widely regarded as a form of "childhood schizophrenia." Psychoanalysts blame emotionally cold mothering.
- 1970s Autism understood as a biological disorder of brain development.



DSM III (1980)

Autism as a disorder first described in the DSM 1980, as "Infantile Autism."

- A. Onset before 30 months of age
- B. Pervasive lack of responsiveness to other people (autism)
- C. Gross deficits in language development
- D. If speech is present, peculiar speech patterns such as immediate and delayed echolalia, metaphorical language, pronominal reversal.
- E. Bizarre responses to various aspects of the environment, e.g., resistance to change, peculiar interest in or attachments to animate or inanimate objects.
- F. Absence of delusions, hallucinations, loosening of associations, and incoherence as in Schizophrenia.



DSM III did not include Asperger Syndrome. The term "autistic disorder" appeared in the DSM III-R, in 1987, with a long list of very specific criteria. Even then, though, there was no "autism spectrum," nor were there high or low functioning designations. DSM III R 1987 added PDD-NOS



DSM-IV (1994)

- Included concept of “spectrum”
- Asperger, Rhett and Childhood Disintegrative Disorders added
- Diagnoses increased dramatically during this time



DSM-5 (2013)

- Symptoms of autistic disorder, Asperger syndrome, and PDD-NOS now grouped under the umbrella diagnosis of Autism Spectrum Disorder (ASD)
- To distinguish among the range of autism option of adding a functional level and specific descriptive language
- Some controversy and concern about lack of including Asperger as a specific condition



What is new in the criteria? (from Autism Speaks)

Two domains

- 1) persistent social communication and social interaction
- 2) restricted and repetitive patterns of behavior.

More specifically

- Deficits in social-emotional reciprocity
- Deficits in nonverbal communicative behaviors used for social interaction, and deficits in developing maintaining and understanding relationships.
- PLUS! least two types of repetitive patterns of behavior including stereotyped or repetitive motor movements, insistence on sameness or inflexible adherence to routines, highly restricted, fixated interests or **hyper or hyper reactivity to sensory input or unusual interest in sensory aspects of the environment.**