

Refining Clinical Reasoning in Pediatric Practice

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Objectives

Participants will be able to:

- Describe the importance of clinical reasoning in evaluation and treatment
- Articulate the steps of the Reasoning in Action Model (RAM)
- Systematically analyze video presentations
- Generate hypothesis based on data presented
- Plan interventions

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Systematizing Clinical Reasoning

General Principles of Systematic Clinical Reasoning

- ❑ Thinking process that informs our decision making in practice (evaluation and intervention)
- ❑ Our clinical reasoning is guided by the frames of references we know
- ❑ Our clinical reasoning is based on the data we gather about a client
- ❑ Clinical reasoning is informed by evidence
- ❑ Evidence includes: Clinical reasoning, best external evidence, client's choices

Sackett, D. L., Rosenberg, W. M., Gray, J. M., Haynes, R. B., & Richardson, W. S. (1996). Evidence based medicine. *BMJ: British Medical Journal*, 313(7050), 170.

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Why is Clinical Reasoning so important in Data Driven Practice and EBP?

Provides choices of what assessment tools to utilize

Helps us analyze them

Provides choices of the evidence to utilize in the intervention process

Helps us understand how to apply them

Helps us understand what and how to measure the outcomes of the intervention

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Data Driven Reasoning

- Process of reasoning
 - Reason for referral
 - Hypotheses
 - Testing the hypotheses
 - Conclusion
- A model that helps organize our reasoning: Reasoning in Action Model (RAM)

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Hypotheses generation based on the reason for referral

- **REASON FOR REFERRAL: Fidgety, does not attend, does not stay in seat**
 - ADHD – executive function difficulties?
 - Stressed ?
 - Seeks proprioception?
 - Sensory processing difficulties?
 - Under responsive to vestibular input?
 - Over responsive to visual, auditory, tactile?
 - Over responsive to tactile?
- **REASON FOR REFERRAL: Difficulty handwriting**
 - Tremor, neuromotor problem?
 - Motor planning issues – can't copy/imitate?
 - Visual perception?
 - Somatosensory processing?
 - Motor planning - Letter formation?
 - Somatosensory processing?
 - Lack of proper instruction?
 - Difficulties with attention?
 - Under responsive to vestibular input?
 - Executive function difficulty?

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Testing the Hypotheses: Methods of Data Collection

Observations

Standardized Testing

Parent Questionnaires

Participation Issues

Our stories and unconscious actions

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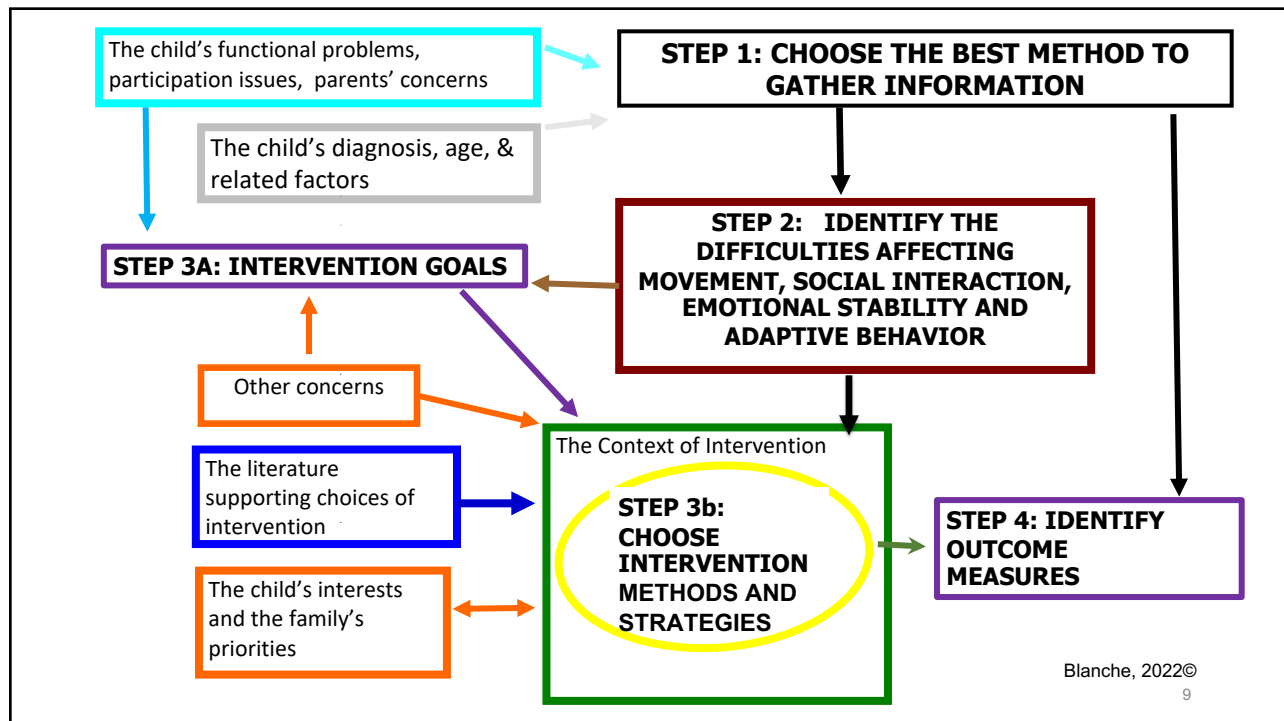
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Reasoning in Action Model (RAM)

A Systematic Way to Collect Data

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Step 1: Choosing the Best Method to Gather Information

Based on:

- The child's functional and participation issues and parent/teacher concerns or the reason for referral
- Child's age, diagnosis and other related factors

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Step 2: The Difficulties Affecting Movement, Social Interactions, Emotion Regulation and Adaptive Behaviors

- Appendix C – Hypotheses generation
 - What information do I have available to me?
 - Reason for referral
 - Parent surveys/child interview
 - Standardized assessments
 - Observations – Why are observations important during the evaluation and intervention process?
 - Clustering the data to form hypotheses
 - What patterns do you see to form a conclusion and start choosing intervention methods?

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Step 3: Intervention Goals and Intervention Methods

- Appendix C2 SI and other element (modified)
 - What participation problems will be targeted in the goals and during the intervention?
 - What physical environment do I have available to me?
 - What skills will I target during the intervention to address the issues related to participation?
 - What intervention methods do I need to use or blend with SIT, why, and how?
 - What are the child's and the family's interests and motivations?
 - How will I measure the outcomes?
 - What published research can I use to support my intervention?

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Using Multiple Approaches – What We Need to Know

- Basic sciences supporting the development of the intervention
- Discipline that housed/developed the approach
- Main principles (motivation, intensity, expectations, contexts of the intervention)
- Areas addressed
- Evidence

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Using Multiple Approaches – What We Need to Know: Sensory Integration Theory

- Basic sciences supporting the development of the intervention
 - Neurosciences
 - Social Sciences
 - Occupational Science
- Discipline that housed/developed the approach
 - Occupational Therapy
- Main principles
 - Sensory processing affects motor performance, emotion regulation, and adaptive behavior
 - Intervention is based on incorporating the sensory experience into the challenge presented to the individual
- Areas addressed
 - Praxis and motor planning
 - Arousal regulation
 - Organization
- Evidence
 - Schaaf, R. C., Dumont, R. L., Arbesman, M., & May-Benson, T. A. (2018). Efficacy of occupational therapy using Ayres Sensory Integration®: A systematic review. *American Journal of Occupational Therapy, 72*(1), 7201190010p1-7201190010p10
 - Weitlauf, A. S., Sathe, N., McPheeters, M. L., & Warren, Z. E. (2017). Interventions targeting sensory challenges in autism spectrum disorder: a systematic review. *Pediatrics, 139*(6), e20170347

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Examples of Clinical Research that Supports the Choices of Interventions

- Descriptive
 - Link between sensory processing and adaptive behaviors and attention in children with ASD (Dellapiazza et al., 2018)
 - SPD impacts school performance, play and leisure and ADL (Koenig & Rudney, 2010)
- Effectiveness (one to one and sensory strategies)
 - Sensory modulation disorders (Miller et al., 2007)
 - Autism spectrum disorder (Iwanaga et al., 2014; Pfeiffer et al., 2011; Roberts & Thomas, 2007; Schaaf et al., 2014)
 - Achieving goals in school (Clark et al., 2019)
 - Sensory strategies (Bagatell et al, 2010; Fedewa et al, 2011; Lin et al., 2014; Umeda & Deitz, 2011)
- Considered to be evidenced-based (Schoen et al., 2019; Steinbrenner, et al., 2020) and preferred by parents of children with ASD (Monez et al. 2019)

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SI Theory is Occupation-Based Addresses: Body Functions, Activities and Participation

- Sensory Experiences
- Adaptive Responses
- Context of Play – child centered
- Therapeutic Alliance
- The Physical Environment?
 - Sensory rich
 - Relevant

Individualized Intervention in Sensory Integration

The uniqueness of intervention based on Sensory Integration

SI	=	Sensory Experience	+	Highest level of the Adaptive Response
Intervention				

Context of Play
The therapeutic relationship
In a specialized environment

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Using Multiple Approaches – What We Need to Know: **NDT**

- Basic sciences supporting the development of the intervention:
 - Movement sciences
 - Neurosciences
- Discipline that housed/developed the approach
 - Physical Therapy
 - Practiced by OT, SLP and PT
- Main principles
 - Sensory feedback affects motor performance
 - Changing the sensory experience through facilitation will change motor performance
- Areas addressed
 - Motor performance
- Evidence
 - Bar-Haim S, Harries N, Nammaourah I, et al. Effectiveness of motor learning coaching in children with cerebral palsy: A randomized controlled trial. *Clinical Rehabilitation*. 2010;24:1009-1020. PMID: 20576667 (this compares Motor learning and NDT)
 - Franki I, Desloovere K, De Cat J, et al. The evidence-base for conceptual approaches and additional therapies targeting lower limb function in children with cerebral palsy: A systematic review using the International Classification of Functioning, Disability and Health as a framework. *J Rehabil Med*. 2012; 44: 396-405. PMID: 22549647

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Using Multiple Approaches Targeting **Executive Functions**

- Basic sciences supporting the development of the intervention
 - Cognitive Neuroscience
 - Neuropsychology
- Disciplines that housed/developed the approach
 - Psychology
- Main principles
 - Prefrontal lobe functions affect behavior
 - Need for inhibitory control, working memory, cognitive flexibility
- Areas addressed
 - Attention
 - Behavior regulation
 - Goal oriented activities
- Evidence
 - Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science*, 333(6045), 959-964
 - Thorell, L. B., Lindqvist, S., Bergman Nutley, S., Bohlin, G., & Klingberg, T. (2009). Training and transfer effects of executive functions in preschool children. *Developmental science*, 12(1), 106-113

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Using Multiple Approaches – What We Need to Know: Developmental Individual Differences –Relationship Based Model (DIR/Floortime)

- Basic sciences supporting the development of the intervention
 - Functional Emotional Developmental Levels
 - Sensory Integration/regulation
- Discipline that housed/developed the approach
 - Psychology
- Main principles
 - Follow the child's lead
 - Create an environment of play
- Areas addressed
 - Communication and social interaction
 - ASD
- Evidence
 - Liao, S. T., Hwang, Y. S., Chen, Y. J., Lee, P., Chen, S. J., & Lin, L. Y. (2014). Home-based DIR/Floortime™ intervention program for preschool children with autism spectrum disorders: Preliminary findings. *Physical & occupational therapy in pediatrics, 34*(4), 356-367.
 - Pajareya, K., & Nopmaneejumrulers, K. (2011). A pilot randomized controlled trial of DIR/Floortime™ parent training intervention for pre-school children with autistic spectrum disorders. *Autism, 15*(5), 563-577

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Using Multiple Approaches – What We Need to Know: Cognitive Orientation to Daily Occupational Performance (or CO-OP Approach)

- Basic sciences supporting the development of the intervention
 - Movement Sciences
 - Behavioral
 - Cognitive
- Discipline that housed/developed the approach
 - Occupational Therapy
- Main principles
 - Performance based
 - Strategy based problem solving
- Areas addressed
 - Skill Acquisition (DCD, High functioning ASD, ADHD, etc.)
 - Ideation?
- Evidence
 - Banks, R., Rodger, S., & Polatajko, H. (2008) Mastering handwriting: How children with developmental coordination disorders succeed with CO-OP. *OTJR: Occupation, Participation and Health, 28*(3): 100-109.
 - Ghorbani, N., Rassafiani, M., Izadi-Najafabadi, S., Yazdani, F., Akbarfahimi, N., Havaei, N., & Gharebaghy, S. (2017). Effectiveness of cognitive orientation to (daily) occupational performance (CO-OP) on children with cerebral palsy: A mixed design. *Research in Developmental Disabilities, 71*, 24-34.

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Appendix B: Approaches Table

After the therapist has identified problem areas, sensory integration may be combined with multiple approaches as part of the intervention process.

Approach	Informed By	Key Concepts and Goals of Intervention
Biomechanical (Colangelo & Shea, 2018)	Kinesiology, Physiology, Anatomy	Promotes independent participation through external supports or development of functional strength, joint alignment, range of motion to enhance function.
Behavioral (Howe et al., 2018; Martin & Pear, 2015)	Psychology	Behavior can be observed, measured and shaped through skill training, chaining, modeling, reinforcement, and practice.
Cognitive Orientation to Daily Occupational Performance (Missiuna et al., 2001; Polatajko et al., 2001a; Polatajko et al., 2001b)	Psychology, Education	Utilizes a cognitive approach to problem-solve occupational performance challenges through a child-centered, solution-oriented approach. Foster skill acquisition and carry over for occupational performance in variety of contexts and environments.
Developmental, Individual Difference, Relationship-Based (DIR)/Floortime (Greenspan & Wieder, 2008)	Human Development, Psychology	Use of play as intervention to facilitate parent responsiveness to increase the child's cognitive, emotional and communication functions. Create foundations for social, emotional, and intellectual capacities.

Blanche, E. I., Giuffrida, C., Hallway, M., Edwards, B., & Test, L. A. (Eds.). (2021). *An Evidence-based Guide to Combining Interventions with Sensory Integration in Pediatric Practice*. Routledge.

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Approach	Informed By	Key Concepts and Goals of Intervention
Sensory Integration (Ayres, 1972, 1979, 1985, 1989; Bundy & Lane, 2020)	Neurosciences, Behavioral Sciences, Occupational Science	Use of child-directed sensory activity to increase sensory processing, self-regulation, and adaptive skills. Basic elements of Sensory Integration Treatment are sensory experiences, challenge and adaptive responses, in the context of play, therapeutic alliance and an enriched environment.
Neurodevelopmental Treatment (Bierman et al., 2016; Bobath, 1948; Kalisperis et al., 2019)	Neurosciences, Motor Control, Motor Learning	Use of therapeutic handling based on movement analysis to address optimal sensorimotor processing, task performance and acquisition of functional motor skills. Improve functional movement performance by addressing impairments impacting posture and movement using therapeutic handling to guide active, goal-directed movement; redirect ineffective movement and assist in learning more efficient movements to increase activities and participation.
Task Training (Shumway-Cook & Woollacott, 2017)	Neurosciences, Motor Learning, Psychology	Acquisition of skills through practice and experience that are task specific, and contextually-based. Practicing parts of the task can be done but should be practiced within the context of the whole task and variability of the task, in many contexts and environments, so that it can be generalized into new situations.

Blanche, E. I., Giuffrida, C., Hallway, M., Edwards, B., & Test, L. A. (Eds.). (2021). *An Evidence-based Guide to Combining Interventions with Sensory Integration in Pediatric Practice*. Routledge.

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Approach	Informed By	Key Concepts and Goals of Intervention
Healing Centered Engagement (Ginwright, 2018)	Psychology	Addressed cultural, spiritual and civic elements to support the collective healing process.
Modified Interactional Guidance (Benoit 2001; Madigan et al., 2006; Tooten et al., 2012)		Guides parents to increase the sensitivity of their attunement skills in a play context through videotape analysis and modeling. Improve dyadic co-regulation and safety to facilitate the child's social/emotional development and self-regulatory skills.
Caregiver Coaching (Graham et al., 2009; Graham 2020; Kraversky, 2019; Rush & Sheldon 2011)	Social Sciences	Guides parents to identify and implement social and physical environmental changes that support successful occupational performance, Process may include identifying barriers and challenges, discussing potential solutions, and following up.

Blanche, E. I., Giuffrida, C., Hallway, M., Edwards, B., & Test, L. A. (Eds.). (2021). *An Evidence-based Guide to Combining Interventions with Sensory Integration in Pediatric Practice*. Routledge.

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After the therapist has identified problem areas, sensory integration may be combined with multiple approaches as part of the intervention process.

	Problem Areas		Intervention Approaches
If the child...	...has impaired movement characteristics impacting postural control and functional movement...	...consider combining principles of sensory integration with...	...a neurodevelopmental treatment approach
	...has difficulty performing functional tasks...		...a motor task training approach
	...has physical limitations, such as range of motion, strength, endurance, edema affecting function...		...a biomechanical approach
	...has disruptive or avoidant behaviors that impact participation or performance of activities...		...a behavioral approach based on behaviorism
	...has motor coordination and motor planning problems...		...the Cognitive Orientation to daily Occupational Performance approach
	...has difficulties with social-emotional engagement and communication...		...a Developmental, Individual Difference, Relationship-Based (DIR)/Floortime approach
	...has difficulty with child-caregiver attachment and/or has experienced life trauma...		...a healing centered engagement or modified interactional guidance approach
	...and caregiver can benefit from directed support for sustained functional progress...		... a caregiver coaching approach

Blanche, E. I., Giuffrida, C., Hallway, M., Edwards, B., & Test, L. A. (Eds.). (2021). *An Evidence-based Guide to Combining Interventions with Sensory Integration in Pediatric Practice*. Routledge.

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Reproducible Working Document 1

First Phase: Data (Issues in participation, observations, other available information)	Second Phase: Hypotheses Generation/ Interpretations	Third Phase: Counting Data points and Conclusion.
Reason for referral:		
Sensory questionnaire and interview		
Observations in the classroom or community	△	
Observation in the specialized setting		
Structured observations in specialized setting:		
Standardized testing:		

Blanche, E. I., Giuffrida, C., Hallway, M., Edwards, B., & Test, L. A. (Eds.). (2021). *An Evidence-based Guide to Combining Interventions with Sensory Integration in Pediatric Practice*. Routledge.

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Reproducible Working Document 2

SI PRINCIPLES	USED IN MY SIT INTERVENTION	OTHER COMPREMENTARY INTERVENTIONS
SENSORY SYSTEMS		
ADAPTIVE RESPONSE/CHALLENGE		
CONTEXT OF PLAY/CHILD CENTERED		
THERAPEUTIC ALLIANCE		
ENRICHED PHYSICAL ENVIRONMENT		

Blanche, E. I., Giuffrida, C., Hallway, M., Edwards, B., & Test, L. A. (Eds.). (2021). *An Evidence-based Guide to Combining Interventions with Sensory Integration in Pediatric Practice*. Routledge.

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Complementing Principles of SI Theory

SI PRINCIPLES	USED IN TRADITIONAL SI INTERVENTION	WHAT ELSE IS NEEDED?
THE SENSORY SYSTEMS	Tactile Vestibular Proprioceptive	
ADAPTIVE RESPONSE/CHALLENGE	Adaptive responses utilize sensory experiences Focus on motor and behavior	
CONTEXT OF PLAY/CHILD CENTERED	Intrinsic motivation Enjoyable Spontaneous	
THERAPEUTIC ALLIANCE	A partnership Child directed, therapist modified	
ENRICHED PHYSICAL ENVIRONMENT	Sensory rich gym type environments	

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Complementing SI Principles: WHAT ELSE?

SI PRINCIPLES	USED IN TRADITIONAL SI INTERVENTION	WHAT ELSE IS NEEDED?
THE SENSORY SYSTEMS	Tactile Vestibular Proprioceptive	Visual Auditory Olfactory Interoceptive
ADAPTIVE RESPONSE/CHALLENGE	Adaptive responses utilize sensory experiences Focus on motor and behavior	Motor: what about cognition and posture? Behavior: what about ideation? Organization?
CONTEXT OF PLAY/CHILD CENTERED	Intrinsic motivation Enjoyable Spontaneous	Understanding child centered interventions
THERAPEUTIC ALLIANCE	A partnership Child directed, therapist modified	
ENRICHED PHYSICAL ENVIRONMENT	Sensory rich gym type environments	IS that enough? What about the community?

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Cases

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Assessment Considerations for Diverse Populations

Child may present with atypical sensory responses secondary to a number of possible factors:

- Sensory behavior may be part of the sequela of the diagnosis, or reflective of child's adapted level (e.g. sensory motor level)
- Poverty of movement
- Impairments in one or more sensory systems
- Effect of medications or medical conditions (e.g. seizure disorder, regulatory disorders related to sleep, eating)

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Data Driven Meaningful Intervention

What participation challenges you are addressing?

Analyze and cluster the data; form your hypothesis.

What theories will address the underlying skills and guide your intervention?

Use data to measure progress and guide ongoing intervention.

Ensure carry over to educational environment.

Promote self-determination.

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