Developmental Assessment in Primary Care Practice

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Learning Objectives

- Develop a basic approach to assessing the child with developmental differences
- Know essential concepts of child development
- Be familiar with how to assess difference
- Know when to follow, and when to refer

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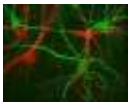
Neuroanatomic, neurophysiologic, and environmental considerations

- Pre-natal growth period

  Establishing the neural architecture for central and peripheral nervous system development

- Post-natal growth period…

  The shaping, pruning, nurturing, or injuring of the postnatally developing nervous system



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Pre-Natal Growth Period

- Neurulation (Conception to ~28 days)
  - Primary Neuropore
  - Neural tube closure
- Canalization (28 days to ~50 days)
  - Neuronal division and migration
- Cyto differentiation (50 days+)
  - Neuronal elaboration and dendritic arborization

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Critical Periods in Post-Natal Development

- Sensitive periods when certain important processes are developing most rapidly
- Disturbances during these periods can alter development of these processes in critical ways
- Evidence
  - Diminished sensory input (vision, auditory)
  - Environmental deprivation
  - Traumatic events during infancy
  - Electronic media, television violence, movies

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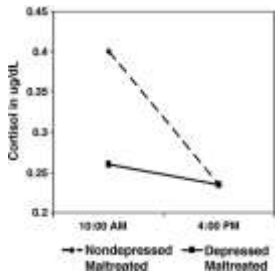

Fig. 3. Morning and afternoon salivary cortisol levels, in µg/dL, in depressed and non-depressed maltreated children. The depressed maltreated children have a significantly lower morning cortisol level than the non-depressed maltreated children and are less likely to show the expected decrease in cortisol levels across the day.

Hart et al., 1996; reprinted with permission of Cambridge University Press.

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Critical Periods—3 Take-Home Points

1. Once specific cells of the neurectoderm become capable of triggering (and inhibiting) specific cellular expression, they define individual specialized cell lines that comprise the mature central nervous system.
2. CNS development can be affected by variations in regulatory gene expression, mutation, teratogenic effects, perinatal and postnatal effects etc…
3. *Neurons to Neighborhoods*, Shonkoff et al, 2009

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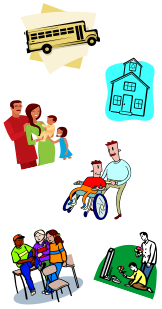
Clinical-Diagnostic Domains

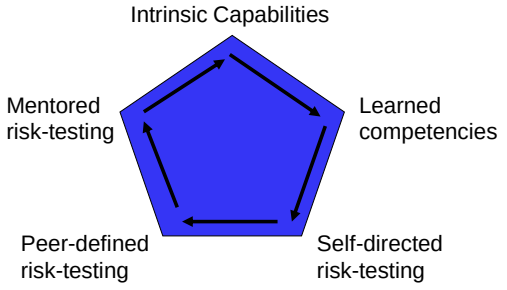
- **Personal-social** (Relating to others)
- **Fine motor-adaptive** (Small muscle use and coordination)
- **Language and Communication** (Speech and symbols To relate to others)
- **Gross motor** (Large muscle use)



Functional Domains

- **Physical**
- **Cognitive**
- **Emotional-Social**

A Developmental Model



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The developmentally competent (typical) child will integrate these functional domains in a manner that reflects both his/her biological potential and the influence of on his/her developing nervous system.

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Developmental Theories

Maturational	(Gesell)
Cognitive	(Piaget)
Social-emotional	(Erikson)
Psychodynamic	(Freud)
Attachment	(Mahler, Bowlby, Ainsworth)
Social learning	(Bandura)
Moral reasoning	(Kohlberg)

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Maturational Theory
Arnold Gesell

Children can do certain things by certain ages. The **rate of attainment** has relevance.

Mental and physical development across all ages is comparable by virtue of the fact that each stage follows a parallel and orderly process…

Stages vary between "rough" and "smooth" periods (i.e.: equilibrium and disequilibrium)

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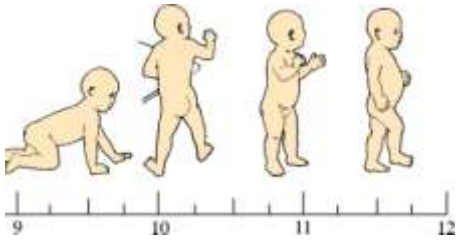
Chronologic progression of gross motor development

Cephalo-caudal myelination and accomodation



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Johnson, C. P. et al. Pediatrics in Review 1997;18:224-242

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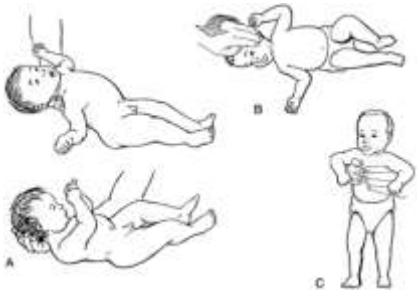
Clinically Useful Reflexes



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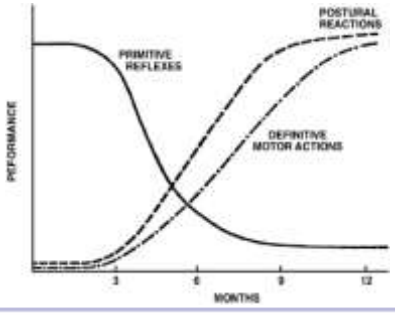
The Declining Intensity of Declining Reflexes



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Cognitive Theory
Jean Piaget (1896-1980)

Children are not simply immature humans. They think differently from adults.

Stages of cognitive development

Sensorimotor ***Infancy***
Child learns about his/her environment through the senses and motor abilities (repetition is key)

Preoperational ***Toddler & early childhood***
Acquisition of language; egocentrism giving way to the appreciation of others' perspectives.

Concrete operational ***Elementary & early adolescence***
Mental tasks can be performed as long as objects are visible to the child

Formal operational ***Adolescence and adulthood***
Mental tasks can be performed using abstract (non-concrete ideas)

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Two important Piaget cognitive concepts to apply in primary care setting

#1. Object permanence occurs during the sensorimotor stage by 8 months:

"That toy just disappeared. I'm hungry."

"That object disappeared—where did it go? I'm hungry"

"That object disappeared but it's still around here somewhere . . . where, let's see?

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Two important Piaget cognitive concepts to apply in primary care setting

#2: **Conservation of number, mass, and volume**
Occurs during concrete operational phase by 11 years. Children develop methods of thinking.

" You can rearrange those apples as much as you want, but I am 6 years old and I know they're the same number.

" You can't fool me…that's the same piece of clay, its just a different shape and I'm 9.

" You just poured my juice into a bigger cup, but it's the same amount of juice. You forgot, I am 11 now?

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Why Is it Important to Recall Gesell and Piaget in Practice?

- Cognitive disability (aka "mental retardation") presents in the non-clinical setting as difficulties with thinking and reasoning, often in the presence of other developmental delays—but not always.
- Parents may or may not recognize this difficulty in the child until he/she gets older.

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Social-Emotional Theory Erik Erikson

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Social-Emotional Theory Erik Erikson

- Social environment combined with biological maturation provides a set of "crises" that must be resolved
- A "sensitive period" in which to successfully resolve each crisis before a new crisis is presented.
- Results of resolution, whether successful or not, carried forward to next crisis and provide the foundation for its resolution.

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Erikson's Theory of Socio-emotional Development

Stage	Age	Expected Resolution
Trust vs. Mistrust	Infancy	Child develops a belief that the environment can be counted on to meet his or her basic physiological and social needs
Autonomy vs. Shame and Doubt	Toddlerhood	Child learns what he/she can control and develops a sense of free will and corresponding sense of regret and sorrow for inappropriate use of self-control.
Initiative vs. Guilt	Early Childhood	Child learns to begin action, to explore, to imagine as well as feeling remorse for actions
Accomplishment/Industry vs. Inferiority	Middle Childhood/ Elementary	Child learns to do things well or correctly in comparison to a standard or to others
Identity vs. Role Confusion	Adolescence	Develops a sense of self in relationship to others and to own internal thoughts and desires (Later work has shown two substages: a social identity focusing on which group a person will identify with and a personal identity focusing on abilities, goals, possibilities, etc.)
Initimacy vs. Isolation	Young Adult	Develops ability to give and receive love; begins to make long-term commitment to relationships
Generativity vs. Stagnation	Middle Adulthood	Develops interest in guiding the development of the next generation
Ego Integrity vs. Despair	Older Adulthood	Develops a sense of acceptance of life as it was lived and the importance of the people and relationships that individual developed over the lifespan.

Piaget's stages of cognitive development

Sensorimotor	Infancy	Child learns about his/her environment through the senses and motor abilities (repetition is key)
Preoperational	Toddler and early childhood	Acquisition of language; egocentrism giving way to the appreciation of others' perspectives.
Concrete Operational	Elementary and early adolescence	Mental tasks can be performed as long as objects are visible to the child
Formal Operational	Adolescence and adulthood	Mental tasks can be performed using abstract (non-concrete ideas)

The Concept of Emotional "Safe Place"

Not a physical entity, but capacity of a child to use his/her own effective developmental strategies to handle—at least for the moment—an extrinsic challenge to his/her emotional well-being.

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Assessment

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Levels of Developmental Care

- Surveillance
  - Regular monitoring of child's development in the course of routine primary are
- Screening
  - Targeted evaluation of general departures from typical development, or diagnosis-specific queries
- Assessment
  - Formal and often extensive evaluation of documented delays in development

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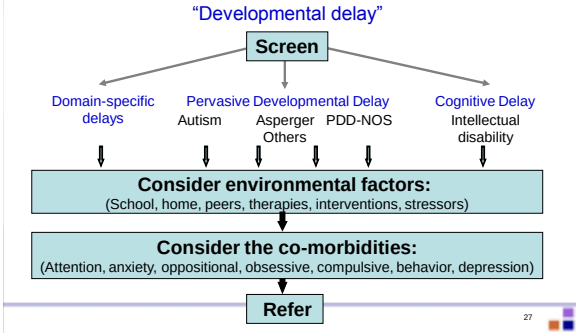
An Approach to Assessing the Child with Delayed Development



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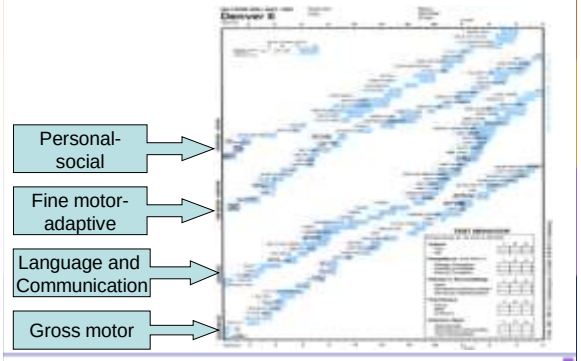
Developmental Domains



Examples:

Perinatal asphyxia

Down Syndrome

Congenital CMV

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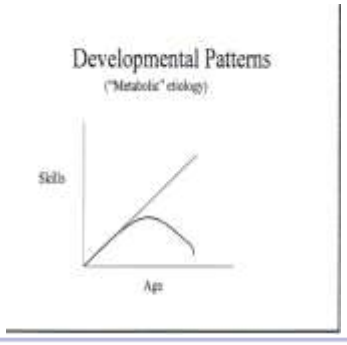

Examples:

Hurler Synd.

Metachromatic Leukodystrophy

Demyelination syndromes

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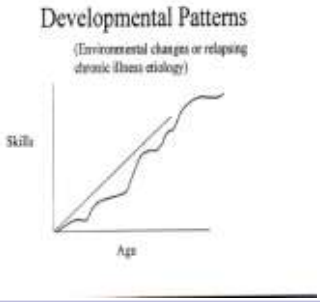
Dworkin, P



Examples:

Seizure disorder

Multiple foster care placements

JRA

Maternal depression

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Clinical Example 1

Josephina is an 18 month old former premature girl whom you have followed from the neonatal intensive care unit. Her NICU course was notable for a Grade III intraventricular hemorrhage, respiratory distress syndrome, intubation for 3 weeks, and mild residual bronchopulmonary dysplasia. She was receiving services from Early Intervention, but these were discontinued at her first birthday because she appeared to be "doing well."

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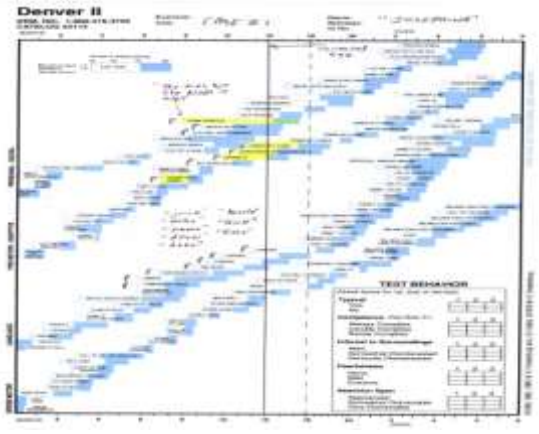

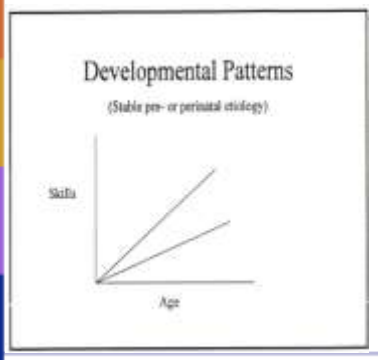

Example:

Perinatal asphyxia

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Dworkin, P

Clinical Example 2

Jimmy is a 12-month old boy who is new to your practice. His clinic record indicates that he has not been seen for a well child visit since he was 6 months old. The last immunizations he received were his "4 month shots." His mother reports that his 10 year old brother provides much of Jimmy's care. During the physical examination, your observe that he has not been washed recently. During the DENVER II, his mother reports, "I never give him a cup—he loves the bottle." When asked if Jimmy imitates, she asks, "What do you mean?" Jimmy looks confused when you try to play ball with him, although he does reach up to be held.

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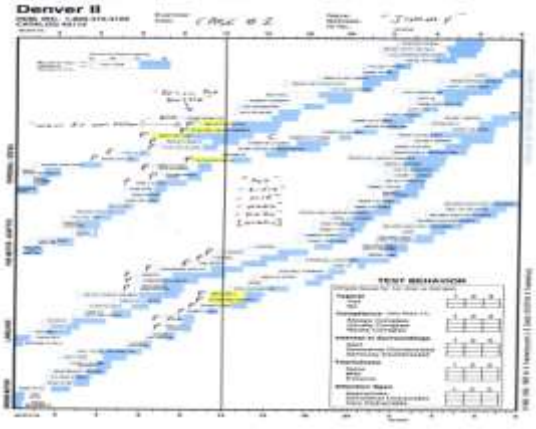

Clinical Example 2 (continued)

- When DENVER II and other tests do not suggest developmental delay, consider child's environment
- Consider the following as clues to an inadequate or stressful environment:
  - Missing several primary care visits
  - Considerable amounts of care provided by young siblings
  - Poor personal hygiene
  - Teacher reports
  - The child's affect
  - Lack of family supports
  - History or physical evidence of abuse or neglect

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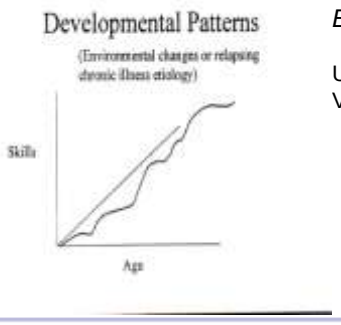

Example:

Understimulation
Variable care

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Clinical Example 3

Daniel is a 2-year old boy who has been in your office at least 5 times this winter for otitis media. Otherwise he has been quite well. His mother reports that he is a "delightful, friendly child who gets along great with his brother and sistersShe notes, "Daniel is my quiet one, he talks less than the others but of course they always talk for him." You ask Daniel some questions and he smiles at you but his speech is very difficult to understand. You rely on his mother to translate for him.

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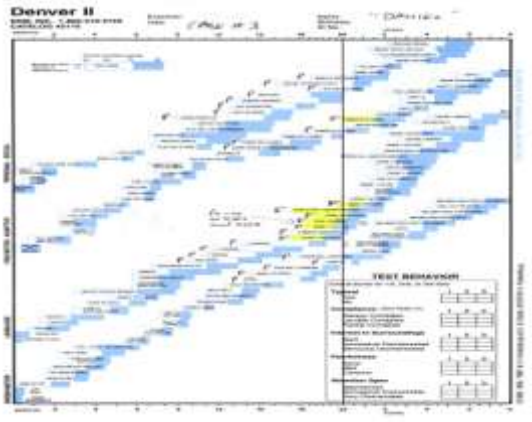

Clinical Example 3 (continued)

- Language delay is most common form of developmental delay in children (5-10% of preschoolers)
- By age 2 years, child should:
  - have 200+ word vocabulary
  - use 2 or 3 word combinations
  - point to several body parts
  - use "no"
  - and ask questions with rising intonation
- Children with ***hearing problems*** often use "body language" to help themselves communicate and thus "mask" hearing loss

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Clinical Example 3 (continued)

- All children with suspected language delay should have formal hearing testing
- Language development is a better predictor of cognitive development than motor development
- "Speech delay" is most common presentation for global developmental disorders including:
  - cognitive disability
  - autism/pervasive developmental disorder
  - environmental neglect or abuse

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"Language"

- System of symbolic representation used by human beings to communicate information. Examples:
  - finger spelling
  - sign language
  - "other" body language

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"Speech"

- The planned execution of the oral movements necessary to articulate language. Examples:
  - Dysarthria
  - Dyspraxia
  - Apraxia
  - Clear vs. "fluent"

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"Communication"

- The acquisition of skills drawn from multiple developmental domains which enables one to interact, and to make his/her thoughts and needs known

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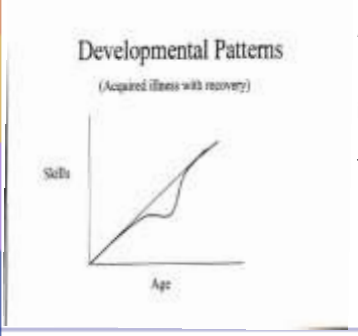

Example:

Hearing impairment
Deafness with treatment

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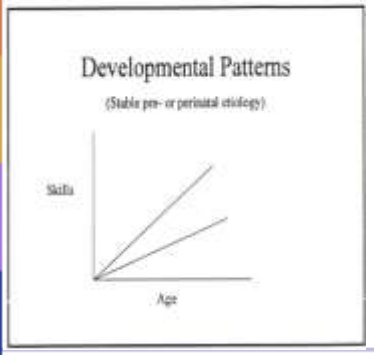

Example:

Congenital Rubella

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Dworkin, P

Clinical Example 4

Eleanor is a 3-year-old girl who is new to your clinic. Her mother reports that she is healthy but that "She is still not interested in potty training." Eleanor has been in a playgroup but seems to prefer playing by herself. She is unable to name a friend other than "Mommy," does not point to pictures, but smiles and repeats "meow" when you ask her "which one says meow?" Despite multiple demonstrations, Eleanor cannot stand on one foot. After completing a tower of 5 blocks, she looks at both you and her mother, claps, and laughs.

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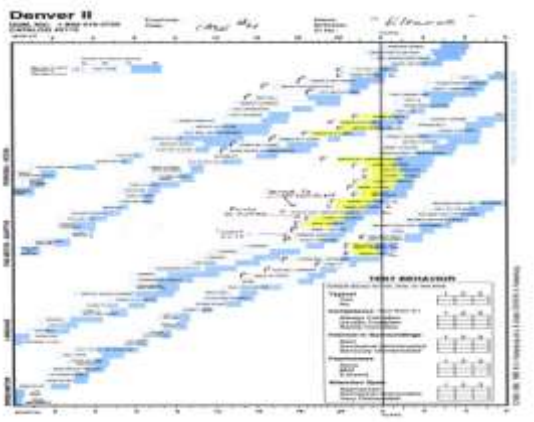

Clinical Example 4 (continued)

- DENVER II profile is concerning due to delays in fine motor adaptive and language skills, and cautions in all domains
- No loss of milestones, sociable and interactive
- Profile more consistent with pattern of global developmental delay—less so with Autism or Pervasive Developmental Disorder
- Eleanor should be referred for school-based evaluation to include speech/language, cognitive, and occupational therapy assessments

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Clinical Example 4 (continued)

- Carefully consider indications for neurodevelopmental and genetic evaluation
- Cognitive disability cannot be reliably diagnosed before age 3 years
- Although cognitive testing in pre-school children can be helpful, testing in school age children (5-7 yrs) more predictive of long term functioning
- To be diagnosed with cognitive disability, child must have impairment in adaptive or functional skills in addition to impairment in cognitive skills *(Vineland Adaptive Behavioral Scales can quantify adaptive skills)*

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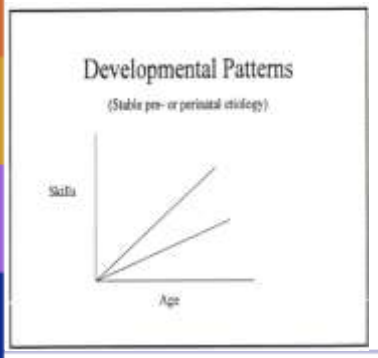

Example:

Cerebral dysgenesis

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Clinical Example 5

Shenika is a 4 year old girl seen for her preschool screening visit. She willingly enters the exam room, sits down on a chair and asks, “are you my doctor? Are you going to check my heart?” Her mother laughs and states that Shenika is “always talking,” and says that she loves to fix her own breakfast, dresses herself and enjoys playing “Chutes and Ladders” with her older sister. She stacks blocks, recites her “ABCs,” tells you her favorite color is green, and correctly identifies colors throughout the room. You attempt to perform the DENVER II but Shenika refuses saying with a smile, “I’m just not going to tell you!”

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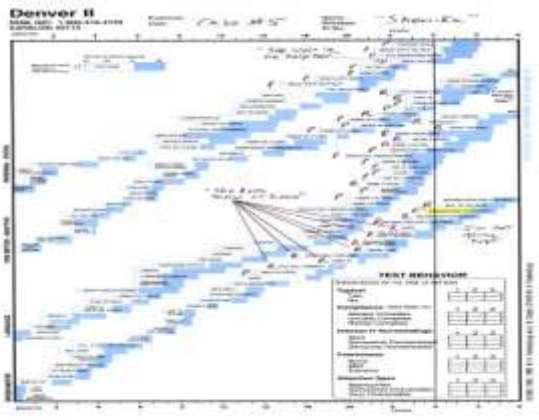

Clinical Example 5 (continued)

- DENVER II manual indicates this child should be retested in 1-2 weeks
- Some indicators this may be unnecessary:
  - She passes all items in the personal-social domain
  - She can do an advanced item in fine motor domain
  - She can do advanced drawing even though she refused to wiggle her thumb
  - Although she refused several language items, she could name one color before beginning DENVER II
  - She refused many gross motor items, but her mother is sure she does these all the time at home

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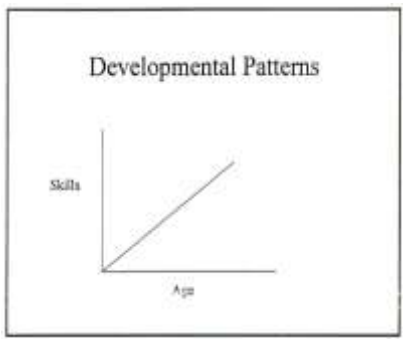

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Clinical Example 6

Jacob comes for his 2-year visit. His mother's biggest concern is that "Jacob has terrible temper tantrums and doesn't talk as mush as his sister did at his age." Jacob's grandparents tell mother not to worry because temper tantrums are part of the "terrible two's," and "because you spoil him!" Jacob makes screeching noises but does not use any words in the office. His mother says he struggles when she brushes his hair or tries to dress him. He does not throw the ball you offer, however he does nearly hit you on the head when he throws a toy overhand. He jumps up and down and flaps his hands.

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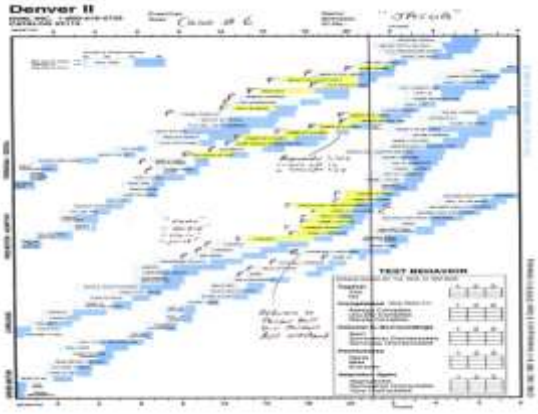

Clinical Example 6 (continued)

- Jacob manifests multi-domain delays
- A significant pattern of delay is evident
- Has difficulty with socially-oriented skills (eg dressing)
- Doesn't follow commands and has stereotypic and atypical behaviors
- This profile suggests a possible diagnosis of Pervasive Developmental Disorder or Autism
- Always consider in the differential
  - Fragile-X syndrome
  - Landau-Kleffner syndrome (acquired epileptic aphasia)
  - Metabolic disease

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Example:

Autistic Disorder

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Dworkin, P

Autism Spectrum Disorder

A neuropsychiatric syndrome characterized by the onset prior to three years of age, of severe abnormalities of reciprocal social relatedness: abnormalities of communication (including deficits in language): and restricted, stereotyped patterns of interests and behaviors.

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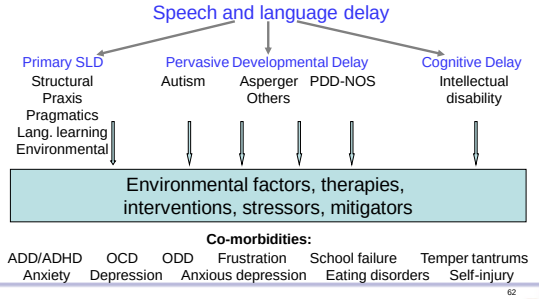
Behaviors often reflect possible discrepancy between capacity and environment and its stressors



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Clinical Example 7

Heather is 18-months old. Her mother brings her to clinic very worried that Heather is no longer doing the things she could do previously. The pregnancy, labor, and delivery were uncomplicated. Reviewing her chart, you note that Heather's DENVER II screening tests were interpreted as normal during her first year. At her one-year visit, Heather was just beginning to walk independently, able to put a block in a cup, and said, "baba" and "doggie," in addition to "mama" and "papa."

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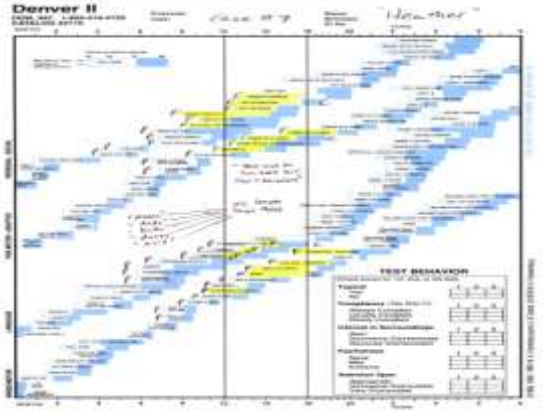

Clinical Example 7 (continued)

- 8 delays, at least 5 cautions, in setting of clear loss of developmental milestones—be very concerned
- Losing milestones is never a variant of normal
- Need to differentiate between:
  - Developmental regression
    (e.g. significant medical illness, prolonged hospitalization)
  - Degenerative development
    (e.g. metabolic disorders, childhood disintegrative disorders, Rett syndrome, Autism, and neuromuscular disorders)
- Irregardless of etiology, refer to Birth to 3, proceed with medical evaluation

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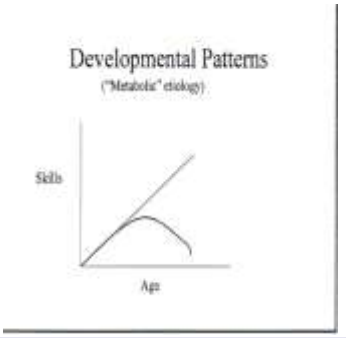

Examples:

Hurler Synd.

Metachromatic Leukodystrophy

Demyelination syndromes

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Ask a Question

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- Click on the chat icon above
- Question emailed to Training Team
- Questions answered by expert on topic
- Response within 2-3 weeks

Viewing at a live training?

- Organizer shares questions with Training Team

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Acknowledgements

- Wisconsin MCH LEND
- Department of Pediatrics, UW-Madison
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- Wisconsin CYSHCN Program
- Waisman Center

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