

# Cognitive Development



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# Agenda

- Guest Speaker:
  - Kristin Wright- Parent of a child with a disability & Chair of the California Advisory Commission on Special Education
- Cognitive Development
  - The range of cognitive skills
  - Piaget's Theory of Cognitive Development
  - Behavioral Theories of Cognitive Development
  - Cognitive Development and children with special needs



# Cognitive Development

- Describes mental activity and other behaviors that allow us to understand and participate in events around us.
  - Fundamental skill is being able to store increasing complex and abstract information, and manipulating the information in various ways.
    - Intimately related to the development of language, social competence and purposeful motor skills.
    - Children who show low intelligence scores show delays in these other areas as well.

# The Range of Cognitive Skills

- We receive information through our five senses: vision, hearing, taste, smell and touch
- Perception is the relating of information from senses to what we have in prior knowledge. It is sensation with meaning.
- Logical thought is the ability to use meaningful information to make decisions and for problem solving.
- Infants show that the foundations of cognitive skills by **fixing, tracking, turning from or towards odors, auditory discrimination to sounds, sucking responses.**

# The Range of Cognitive Skills

- As children get older, perceptual skills are refined and integrated into higher level thought processes. Examples of normal perceptual skills:
  - Visual: **fixing, tracking, discrimination, depth perception, visual memory, and figure ground**
  - Auditory: **localization, auditory memory, discrimination**
  - Tactile: **discrimination, temperature, texture, pressure**
  - Olfactory: **localization, discrimination**
  - Gustatory: **discrimination**

# Piaget's Theory of Cognitive Development (Developmental Approach)

- Development is an unfolding of ever-more complex skills as children modify their mental structures to deal with new experiences
- Development is a continuous process that **may vary in rate, but always progresses in the same sequence**, even for disabled children.
- Piaget's Stages of Cognitive Development
  - Sensorimotor period- birth to about 2 years
  - Preoperational period- 2 years to about 7 years
  - Concrete operations period- 7 years to about 12 years
  - Formal operations period- 12 years to adult

# Piaget's Theory of Cognitive Development

- What is schemata?
  - the ability to pull together new experiences, generalize to a new situation
- What are some examples of schemata?:
  - **all animals are horses**
- What is accommodation?
  - schemata modified to include new information- expanding the store of information
- What are some examples of assimilation and accommodation?
  - Assimilation: all flying things are birds
  - Accommodation: flying things can include kites and planes
- What is the principle of equilibrium?
  - Mechanism that facilitates change as child seeks balance in interaction with the environment

# Piaget's Stages of Development

## Sensorimotor Period

- Mental operations go through a transition from being exclusively overt and motoric to being partially internalized
- Object permanence is an important milestone in the sensorimotor period because it represents when the child has internalized symbolic representation

## ■ Reflexive Stage

- Cognitive development begins as a group of invariable reflex behaviors
  - Sucking, rooting, grasping, startle

## ■ Primary Circular Reactions

- Characterized by attempts to repeat an action that happened by reflex or chance
  - 1) Primary actions with the child's own body, 2) circular actions are repeated

## ■ Secondary Circular Reactions

- Characterized by simple exploration of with objects
  - Focus attention on objects rather than own body
  - Beginning of a primitive classification system

# Sensorimotor Period

- **Coordination of Secondary Schemata**
  - **Marked by 3 important characteristics**
    - **Intention:** Deliberate focused to attain a goal: hitting a barrier, moving a parents hand
    - **Imitation:** Trying to imitate a sound, or movement seen or heard: waving bye bye
    - **Anticipation:** Anticipatory behavior, crying when child sees parent put on coat
- **Tertiary Circular Reactions**
  - Child approaches objects with curiosity
    - Repeat the same behavior and then try a new variation with that object
- **Invention of New Means Through Mental Combinations**
  - Child can think through solutions to simple problems without the need for acting them out.
    - They can hold a thought in symbolic form
    - They enjoy picture books at this state since pictures represent objects

# Preoperational Period

The development of symbolic function marks the transition into this period: Changes occur on the **level of representational thought**

- Egocentrism: Unable to view things from another perspective
  - Three forms of egocentric speech:
    - Monologue: **Continuous talk, practicing language and thought**
    - Collective monologue: **Child speaks with no apparent connection to what others are saying**
    - Repetition: **Repeats what another said, as their own unique contribution**
- Centration: Unable to consider multiple attributes simultaneously
  - Focus on one attribute at a time
  - Cannot focus on the multiple attributes of the whole and its parts

# Preoperational Period

- Irreversibility and Focus on Successive States: Unable to see that all logical operations are reversible
  - The conservation problem: **Can't focus on transformations from state to state in mass, length, number, volume or area**
- Transductive Reasoning: Unable to utilize inductive or deductive thinking
  - Inductive: **generalizing from specific cases**
  - Deductive: **applying to specific cases**
- The Beginning of Concept Formation
  - The emergence of logical thought manifested in problem-solving and decision making abilities
  - **Sorting, grouping into classes, patterning**

# Theories of Development

## ■ Behavioral Theories

- Cognitive development is the result of the method and amount of learning children gain from their surroundings

## ■ Developmental Theories

- Cognition evolves through developmental changes in the organization of mental structures-these changes are reflected in children's behavior in learning situations.

# Behavioral Theories

## Attention

- Child exposed to large amount of stimuli
  - Child's ability to concentrate on stimuli with greatest functional value
  - Less apt to be distracted by irrelevant and incidental attributes
  - The ability to focus on meaningful stimuli plays a significant role in the development of cognition

## Perception

- Children differ in how they interpret sensory information
  - May perceive the same situation in different ways depending on their dominant sensory mode
  - The sensory preferences of infants change from tactile to visual

# Behavioral Theories

## Memory

- **Characterized by the quantity of information stored in the brain's data bank and the extent to which a child can take new information and made associations with past knowledge**
  - **Short term: Small amount, about 7 numbers, not a significant difference between 3 year old and an adult**
  - **Long term: Greater storage capacity, greater difference between age**
- **Strategies used to memorize new information?:**
  - **Verbal labels: rehearsing verbally**
  - **Imagery: visualizing**
  - **Chunking: organization into meaningful clusters**

# Relationships Between Developmental and Cognitive Processing Models

- Differences among the theories are not great
  - **The developmental approach**
    - Focused on the gradual and organized
    - Cognition is a means to adapt to environmental demands by assimilating new information and modifying thoughts and structures
  - **The behavioral approach**
    - Focused on operations involved in receiving, storing and recalling information
    - Controlled stimuli provides motivation to modify behavior

# Factors That Affect Cognitive Development

- Many factors can interfere with normal cognitive development
  - Infection and intoxication
  - Trauma and physical agents
  - Metabolic or nutritional disorders
  - Gross brain disease
  - Unknown prenatal influences
  - Chromosomal abnormalities
  - Psychiatric disorders
  - Gestational disorders
  - Environment

These may have a direct influence on developing brain, interfere with transmission of information or impair ability to receive or respond to information

# Cognitive Development: The Child with Special Needs

**A child with an impairment that limits his ability to receive, process or responds to sensory information is likely to demonstrate delays or gaps in cognitive development**

- **Intellectual Impairment results in problems in memory and attention**
  - **Smaller than normal capacity**
  - **Inability to retrieve information**
  - **Limitations in storage and retrieval ability**
  - **Absence of rehearsal skills to get into long term memory**

# Cognitive Development: The Child with Special Needs

- Visual Impairments: hierarchy of deficits in children blind from birth
  - Fail to reach for objects, fail basic sensorimotor schemata
  - Parallel development with seeing children occurs at 3-4 years, because logical thought replaces visual perception as a major learning process

# Cognitive Development: The Child with Special Needs

- Hearing Impairments
  - Identified by failure to exhibit appropriate language skills
    - Often labeled as intellectually impaired because IQ test are often language based
    - Gestural imitation develop more quickly than hearing children
    - Children develop thought processes without language since they do not need linguistic system to think
    - If the environment is responsive to the child development occurs normally

# Cognitive Development: The Child with Special Needs

## Physical Impairments

- First years a child formulates perception of the universe through action
  - Disabled children perceive their universe in a different way due to their physical limitations
    - Display lower levels of problem solving
    - Often perceived to have lower IQ's due to the absence of language and movement
    - Infants with visual perceptual problem have the inability to manipulate objects and gain different perspectives
- Autism
  - Exhibit an interesting puzzle of perceptual and conceptual skills
  - Language delays may look like cognitive delays
    - **Children with autism have decreased attention, but have extreme skills in certain areas**

# Facilitating Cognitive Development

- Learning cannot be left to chance
  - Intentional planning to focus on learning rather than the product of the activity
- Focusing on the Process
  - Focus should be on how children process information and grow from the activity rather than accomplishing the activity
- Skills of the Interventionist
  - Use of materials and activities that catch and sustain a child's interest
    - Attention is a prerequisite of learning

# Skills of the Interventionist

- Select Activities with intrinsic termination points
  - Tasks must be meaningful, have a purpose and have a point of successful termination.
- Use of language as a cognitive tool
  - There is a close link between language and thoughts
    - It is important to give a child labels for objects, people and feelings to close the link between language and thought
    - Ways to contribute to the language competence of the child in the classroom is to name objects, describe feelings and actions- **USE LANGUAGE WHENEVER WHEREVER POSSIBLE**
- Expand the child's problem solving strategies through discussion
  - Tell me about I. How did you get that? Explain your thinking.

# Skills of the Interventionist

- Allow for learning through discovery
  - A classroom that encourages discovery learning has accessible materials for exploration, secure environment, discover how to use and enjoy materials, know where things are located
- Identify and utilize each child's primary mode
  - All learners show differential preference for receiving and processing information: Auditory, visual, or kinesthetic
    - At times the preferential input mode is the locus of impairment
      - **Nurture and stimulate the secondary input channel, and keep all lessons multi-modal**
- Structure the curriculum
  - Programs must be organized to include aspects that are most beneficial to children's intellectual growth.
    - **Programs should help the child progress moving from concrete to symbolic**



# Summary

- Children first learn about their worlds by their looks, smells, sounds, tastes, and feel.
- They see how different people and objects in their environment interact in order to formulate basic constructs of their worlds based on the simple relationships that they perceive.
- A disability may interfere with this process in four ways
  - **Ability to attend to a stimulus:** as a neurological or sensory impairment
  - **Reception to valuable stimuli:** visual or hearing impairment
  - **Disrupt the storage and process of information:** brain damage and intellectual impairments
  - **Ability to express cognitive abilities:** speech disorders, language disorders or orthopedic impairments
- We can interpret a child's cognitive development despite these extreme differences and provide intentional instructional support that will promote cognitive development