Cognitive Development
During the First Three Years

Chapter 7
Guideposts to Study

1. What Are Six Approaches To The Study of Cognitive Development?

2. How Do Infants Learn, and How Long Can They Remember?

3. Can Infants’ and Toddlers’ Intelligence Be Measured, and How Can It Be Improved?
Guideposts to Study

4. How Did Piaget Explain Early Cognitive Development, and How Have His Claims Stood Up?

5. How Can We Measure Infants’ Ability To Process Information, and When Do Babies Begin to Think About Characteristics of The Physical World?
Guideposts to Study

6. What Can Brain Research Reveal About The Development of Cognitive Skills?

7. How Does Social Interaction With Adults Advance Cognitive Competence?

8. How Do Babies Develop Language, and What Influences Linguistic Progress?
Studying Cognitive Development: Six Approaches

- Behavioral
- Psychometric
- Piagetian
- Information-Processing
- Cognitive Neuroscience
- Social-Contextual
Behaviorist Approach: Basic Mechanics of Learning

- Classical Conditioning
- Operant Conditioning
- Infant Memory
  - Theories explaining why people don’t remember things earlier than age 2.
Psychometric Approach: Developmental and Intelligence Testing

- Measures Quantitative Differences Using Tests
  - Intelligent Behavior
  - Intelligent Quotient (IQ) tests
    - Testing infants and toddlers
    - Bayley Scales of Infant and Toddler Development
Psychometric Approach: Developmental and Intelligence Testing

- Assessing The Impact Of The Home Environment
  - Home Observation for Measurement of the Environment (HOME)
    - Parental responsiveness
      - Praise
    - Number of books in home
    - Passive-genotype-environment correlation
<table>
<thead>
<tr>
<th>Name of Subscale</th>
<th>Description</th>
<th>Example Item</th>
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<tbody>
<tr>
<td>Emotional and verbal responsivity of the primary caregiver</td>
<td>The communicative and affective interactions between the caregiver and the child</td>
<td>Mother spontaneously vocalizes to the child at least twice during visit</td>
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<tr>
<td>(items 1–11)</td>
<td></td>
<td>Mother caresses or kisses child at least once during visit</td>
</tr>
<tr>
<td>Avoidance of restriction and punishment</td>
<td>How the adult disciplines the child</td>
<td>Primary caregiver (PC) does not shout at child during visit</td>
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<td>(items 12–19)</td>
<td></td>
<td>PC does not express overt annoyance with or hostility toward the child</td>
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<tr>
<td>Organization of the physical and temporal environment</td>
<td>How the child’s time is organized outside the family house. What the child’s personal space looks like</td>
<td>When PC is away, care is provided by one of three regular substitutes</td>
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<tr>
<td>(items 20–25)</td>
<td></td>
<td>The child’s play environment appears safe and free of hazards</td>
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<tr>
<td>Provision of appropriate play materials</td>
<td>Presence of several types of toys available to the child and appropriate for his/her age</td>
<td>Child has one or more large muscle activity toys or pieces of equipment</td>
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<tr>
<td>(items 26–34)</td>
<td></td>
<td>Provides equipment appropriate to age, such as infant seat, infant rocker, playpen</td>
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<tr>
<td>Parental involvement with the child</td>
<td>How the adult interacts physically with the child</td>
<td>PC tends to keep child within visual range and look at him/her often</td>
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<tr>
<td>(items 35–40)</td>
<td></td>
<td>PC talks to child while doing her work</td>
</tr>
<tr>
<td>Opportunities for variety in daily stimulation</td>
<td>The way the child’s daily routine is designed to incorporate social meetings with people other than the mother</td>
<td>Father provides some caregiving every day</td>
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<tr>
<td>(items 40–45)</td>
<td></td>
<td>Family visits or receives visits from relatives approximately once a month</td>
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Findings from studies using the HOME scales, and from neurological studies and other research suggest the following guidelines for fostering infants’ and toddlers’ cognitive development:

- In the early months, provide sensory stimulation but avoid overstimulation and distracting noises.
- As babies grow older, create an environment that fosters learning—one that includes books, interesting objects (which do not have to be expensive toys), and a place to play.
- Respond to babies’ signals. This establishes a sense of trust that the world is a friendly place and gives babies a sense of control over their lives.
- Give babies the power to effect changes, through toys that can be shaken, molded, or moved. Help a baby discover that turning a doorknob opens a door, flicking a light switch turns on a light, and opening a faucet produces running water for a bath.
- Give babies freedom to explore. Do not confine them regularly during the day in a crib, jump seat, or small room and only for short periods in a playpen. Baby-proof the environment and let them go!
- Talk to babies. They will not pick up language from listening to the radio or television; they need interaction with adults.
- In talking to or playing with babies, enter into whatever they are interested in at the moment instead of trying to redirect their attention to something else.
- Arrange opportunities to learn basic skills, such as labeling, comparing, and sorting objects (say, by size or color), putting items in sequence, and observing the consequences of actions.
- Applaud new skills and help babies practice and expand them. Stay nearby but do not hover.
- Read to babies in a warm, caring atmosphere from an early age. Reading aloud and talking about the stories develop preliteracy skills.
- Use punishment sparingly. Do not punish or ridicule results of normal trial-and-error exploration.

Psychometric Approach: Developmental and Intelligence Testing

- **Early Intervention**
  - Reduces the gap for children who have had limited learning opportunities and low parental expectations
    - Individuals with Disabilities Education Act
    - Project CARE
Piagetian Approach: The Sensorimotor Stage

- **Six Substages**
  - **1st substage**
    - Birth to 1 month
    - Exercise some control over reflexes
  - **2nd substage**
    - 1 to 4 months
    - Primary circular reaction
Piagetian Approach: The Sensorimotor Stage

- **Six Substages**
  - **3\textsuperscript{rd} stage**
    - 4 to 8 months:
      - Secondary circular reaction
  - **4\textsuperscript{th} stage**
    - 8 to 12 months
      - Coordination of secondary schemes
Piagetian Approach: The Sensorimotor Stage

- Six Substages
  - 5\textsuperscript{th} substage
    - 12 to 18 months
    - Tertiary circular behavior
  - 6\textsuperscript{th} substage
    - 18 months to 2 years
    - Mental combinations
    - Representational ability
<table>
<thead>
<tr>
<th>Substages</th>
<th>Ages</th>
<th>Description</th>
<th>Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use of reflexes</td>
<td>Birth to 1 month</td>
<td>Infants exercise their inborn reflexes and gain some control over them. They do not coordinate information from their senses. They do not grasp an object they are looking at.</td>
<td>Dorri begins sucking when her mother’s breast is in her mouth.</td>
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<tr>
<td>2. Primary circular reactions</td>
<td>1 to 4 months</td>
<td>Infants repeat pleasurable behaviors that first occur by chance (such as thumb sucking). Activities focus on the infant’s body rather than the effects of the behavior on the environment. Infants make first acquired adaptations; that is, they suck different objects differently. They begin to coordinate sensory information and grasp objects.</td>
<td>When given a bottle, Dylan, who is usually breast-fed, is able to adjust his sucking to the rubber nipple.</td>
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<td>3. Secondary circular reactions</td>
<td>4 to 8 months</td>
<td>Infants become more interested in the environment; they repeat actions that bring interesting results (such as shaking a rattle) and prolong interesting experiences. Actions are intentional but not initially goal directed.</td>
<td>Alejandro pushes pieces of dry cereal over the edge of his high chair tray one at a time and watches each piece as it falls to the floor.</td>
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<tr>
<td>4. Coordination of secondary schemes</td>
<td>8 to 12 months</td>
<td>Behavior is more deliberate and purposeful (intentional) as infants coordinate previously learned schemes (such as looking at and grasping a rattle) and use previously learned behaviors to attain their goals (such as crawling across the room to get a desired toy). They can anticipate events.</td>
<td>Anica pushes the button on her musical nursery rhyme book, and “Twinkle, Twinkle, Little Star” plays. She pushes this button over and over again, choosing it instead of the buttons for the other songs.</td>
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<tr>
<td>5. Tertiary circular reactions</td>
<td>12 to 18 months</td>
<td>Toddlers show curiosity and experimentation; they purposefully vary their actions to see results (for example, by shaking different rattles to hear their sounds). They actively explore their world to determine what is novel about an object, event, or situation. They try out new activities and use trial and error in solving problems.</td>
<td>When Bjorn’s big sister holds his favorite board book up to his crib bars, he reaches for it. His first efforts to bring the book into his crib fail because the book is too wide. Soon, Bjorn turns the book sideways and hugs it, delighted with his success.</td>
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<tr>
<td>6. Mental combinations</td>
<td>18 to 24 months</td>
<td>Because toddlers can mentally represent events, they are no longer confined to trial and error to solve problems. Symbolic thought enables toddlers to begin to think about events and anticipate their consequences without always resorting to action. Toddlers begin to demonstrate insight. They can use symbols, such as gestures and words, and can pretend.</td>
<td>Jenny plays with her shape box, searching carefully for the right hole for each shape before trying—and succeeding.</td>
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*Infants show enormous cognitive growth during Piaget’s sensorimotor stage, as they learn about the world through their senses and their motor activities. Note their progress in problem solving and the coordination of sensory information. All ages are approximate.*
Piagetian Approach: The Sensorimotor Stage

- Do Imitative Abilities Develop Earlier Than Piaget Thought?
  - Invisible imitation
  - Visible imitation
  - Deferred imitation
  - Elicited imitation
Piagetian Approach: The Sensorimotor Stage

- Development of Knowledge About Objects and Space
  - Object concept
  - Object permanence
  - A, not-B error
Piagetian Approach: The Sensorimotor Stage

- Development of Knowledge About Objects and Space
  - Symbolic Development, Pictorial Competence, and Understanding of Scale
    - Scale errors
    - Dual representation hypothesis
Information-Processing Approach: Perceptions and Representations

- **Habituation**
  - Type of learning based on repeated exposure to a stimulus reduces attention to a stimulus

- **Dishabituation**
  - Increased response to a new stimulus
Information-Processing Approach: Perceptions and Representations

- Visual and Auditory Processing Abilities
  - Visual preference
  - Visual Recognition memory
Information-Processing Approach: Perceptions and Representations

- Current Research and Goals
  - Cross-Modal Transfer
  - Joint Attention
Information-Processing Approach: Perceptions and Representations

- Information Processing As A Predictor of Intelligence – *Evaluating Piaget*
  - Visual expectation paradigm
    - Visual reaction time
    - Visual anticipation
Information-Processing Approach: Perceptions and Representations

- Information Processing and the Development of Piagetian Abilities
  - Causality
  - Object permanence
    - Violation-of-expectations
  - Violation-of-Expectations
Cognitive Neuroscience Approach: The Brain’s Cognitive Structures

- **Long-Term Memory Systems**
  - **Implicit**
    - Remembers without effort or conscious awareness
    - Habits and skills
  - **Explicit or Declarative memory**
    - Conscious or intentional recollection
  - Working memory
Social-Contextual Approach: Learning From Interactions With Caregivers

- **Guided Participation**
  - Inspired by Vygotsky’s sociocultural theory
  - Mutual interactions with adults that help structure children’s activities
  - Cultural differences affect the type of guided participation
Language Development

- Sequence of Early Language Development
  - Prelinguistic speech
    - Utterance of sounds that are not words
  - Early Vocalization
    - Crying
    - Cooing
    - Babbling
    - Imitation of language sounds
Language Development

- Sequence of Early Language Development
  - Perceiving language sounds and structure
    - Neural commitment
    - Phonemes
      - Basic sounds of native language
    - Native versus nonnative language
    - Deaf children and recognition of signs
Language Development

- Sequence of Early Language Development
  - Gestures
    - Conventional social gestures
    - Representative gestures
    - Symbolic gestures
Language Development

- **Sequence of Early Language Development**
  - **First words**
    - Linguistic speech
    - Holophrase
    - Passive and expressive vocabulary
  - **First sentences**
    - Telegraphic speech
    - Syntax
Language Development

- **Characteristics of Early Speech**
  - Children simplify language
  - Children understand grammatical relationships they cannot yet express
  - Children underextend and overextend word meanings
  - Children overregularize rules
Language Development

- Classic Theories of Language Acquisition: The Nature-Nurture Debate

  - Skinner (1957) maintained that language learning is based on experience: children learn language through operant conditioning

  - Observation, imitation, and reinforcement contribute to language
Language Development

Classic Theories of Language Acquisition: The Nature-Nurture Debate

- Chomsky suggested an inborn language acquisition device (LAD) that programs children's brains to analyze the language heard and figure out its rules: **nativism**

- Most developmentalists today believe language acquisition depends on an intertwining of nature and nurture
Inventing Sign Language

- Aspects of learning theory and nativism have been used to explain how deaf babies learn signed languages.
- Similarities and differences
- Deaf children of hearing parents vs. Deaf children of Deaf parents
Language Development

- **Influences on Language Development**
  - Genetic and Neurological factors underlie speech development; brain lateralization may be genetic but environmentally influenced.
  - Between ages 13 and 20 months, a period of marked vocabulary growth, infants show increasing lateralization and localization of comprehension.
Language Development

- **Influences on Language Development**
  - Social Interaction: The Role of Parents and Caregivers
  - Prelinguistic period
  - Vocabulary development
    - Code mixing and code switching
  - Child-Directed Speech (CDS)
Vocabulary Development

- Influences on Language Development
  - Vocabulary Development
    - Households speaking more than one language
    - Babies achieve similar milestones
    - May have smaller vocabularies in each language
  - Code Switching
  - Code Mixing
Preparing for Literacy

- Three Styles of Reading to Children
  - The Describer
  - The Comprehender
  - The Performance-Oriented Style