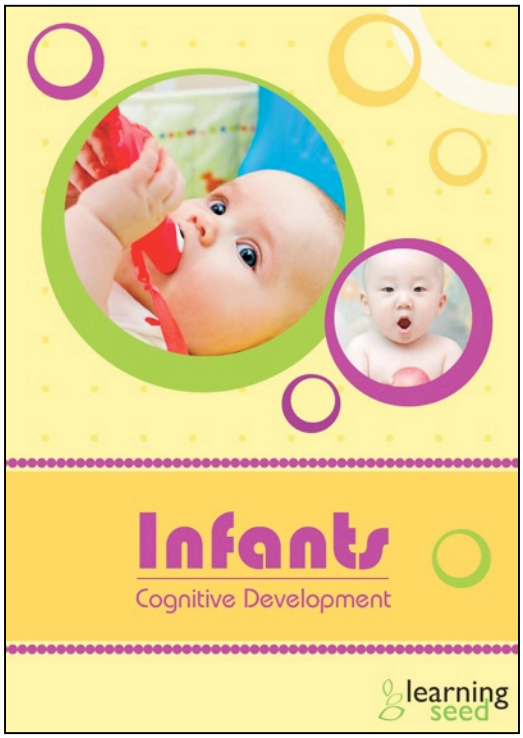
Infants:
Cognitive Development



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Legal Niceties

The Video

Teaching Guide

Credits

The Video

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Closed Captioning

This program is closed-captioned.

Summary

Infants' brains are actively developing with everything they experience. This program examines how newborns fit into the senosrimotor stage of development. It traces cognitive development from simple reflexes to the beginnings of thought. It explores infant intelligence, information processing and memory. Viewers will see the progression of infant communication from crying-- to giggling-- to euphoric babbling and their first words. The program provides tips that can be used by parents and caregivers to foster cognitive and language development.

Key Facts About The Infant Brain

Structure and Function

- Neurons are the basic nerve cells in our brains. These cells communicate with each other thanks to branch-like fibers called dendrites.
- Dendrites receive messages from other neurons through small gaps between them called synapses.
- As babies are exposed to objects, people, and events, their brain cells create more connections.
- It is possible for one cell to connect to as many as 15,000 other cells.
- Brain cell connections become permanent when the same thing happens repeatedly.
- When children hear the same words and phrases many times, they learn to understand speech and strengthen the language connections in the brain.

Key Facts About Stage Theory

The Sensorimotor Stage

- Much of our knowledge about cognitive development has been influenced by the work of developmental theorist Jean Piaget.

- Piaget's theory is based on stages, where each stage builds upon the last. Each stage has sub-stages.

- Infants are in the sensorimotor stage.

- Inborn reflexes include
    - rooting - turning their heads towards something that touches their cheek
    - sucking - the tendency to suck at things that touch their lips
    - stepping - the movement of legs when they are held with their feet touching the floor
- Object permanence is the understanding that objects and people exist even when they cannot be seen.
-

Piaget's Sensorimotor Stage (All ages are approximate)

Simple reflexes	First month of life	Inborn, simple reactions to their world
First habits and primary circular reactions	Month 1- 4	combine separate actions into one activity
Secondary circular reactions	Months 4 - 8	Interact with objects around them, and when that interaction results in a pleasing effect, they repeat it
Coordination of secondary circular reactions	Months 8 - 12	Engage in goal-directed behavior which involves the understanding of cause and effect relationships
Tertiary circular reactions,	Months 12-18	Deliberately change their behaviors in order to cause a desired outcome and conduct mini-experiments
Beginnings of thought	18 months – 2 years	Ability to think symbolically

Key Facts About Information Processing

Intelligence

- The exact definition of intelligence is not agreed upon by psychologists, educators or other experts.
- Most of these approaches deal with developmental scales based on peer comparisons.
- Some of the areas researchers examine include activities involving motor skills, language use, memory, problem solving, adaptive behavior, and personal-social behavior.
- If an infant varies significantly from the performance of her peers at a given age, it may be helpful to identify a child that may need special help and attention.

Information Processing and Memory

- Information processing approaches are all about the way that individuals take in, use and store information.
- Information processing has three steps: encoding, storage, and retrieval.
- Encoding is the process by which information is first stored in a form that is usable to memory.
- Babies pick and choose which bits of information to focus on and encode and her brain cells use the encoded information to connect with other brain cells.
- Retrieval is the process by which information in memory is located, brought into awareness, and used.
- A part of the brain called the hippocampus is what enables an infant's memory skills.
- Memory can be separated into implicit and explicit memories.
- Implicit memories are memories which we are not consciously aware of, but which affect our behavior.
- The first few times an infant sucks food from a bottle, grasps an object or crawls, they really have to think about it. But through repetition, these skills become increasingly subconscious or implicit.
- Explicit memories are memories that require conscious cognitive effort to retrieve.
- We know that repetition creates lasting memories and babies love repetition.

Key Facts About Language Development

Communication

- During the first month of life, infants communicate with their parents and caregivers by crying. Babies quickly learn that crying will bring them food, company, or comfort.
- Babies who are exposed to sign language hand gestures, babble with their hands.
- By 6 months, their babbling begins to reflect only the sounds of the languages they hear around them.
- Babbling allows babies to imitate the rhythm, syllables, sentence length, and inflection of the speech that they hear. This is the groundwork for learning and expressing language.
- They eventually learn that "Ma-ma" gets more of a response from their mother, and "Da-da" from their father. They begin to realize that specific sounds have specific meanings.

Learning Language

- Receptive speech refers to language that they can understand but not articulate.
- Productive speech refers to when infants know what they want to say and vocalize sounds to try to express themselves.
- During the first year of life, the number of words that infants understand grows by 22 new words a month. Words that they learn to speak increase by 9 words a month.
- Infant-directed speech is characterized by short simple sentences, a high pitch, and intonation that has a singsong quality- what is commonly known as "baby-talk".
- Speech and language difficulties can be caused by Down syndrome, general language delay, and hearing impairment.
- Early diagnosis from a doctor can help identify a problem and begin the needed treatment that helps an infant attain the best language proficiency possible.

Progression of Infant Communication (All ages are approximate)

6 weeks	Social smile
Months 1 – 4	Communicates with giggles and protests Draw out vowels sounds like “ooooh” and “ahhhhh”
Months 4 - 7	Babble strings of consonants. Their cries become deliberate. (They test to see the responses they get)
Months 8 - 12	Imitate words they hear Use pointing and gesturing Understand receptive speech
1 Year	Speak first words

Suggested Activities

- Research Jean Piaget's theory of cognitive development and contrast this with current research.
- Name three activities in which infants and their caregivers are engaged together on a daily basis. Brainstorm ways that caregivers can foster cognitive and language development during each of these activities.
- Using the activities from the above activity (or think of new ones), describe how infants are learning during each one. Describe each in terms of the information-processing model. (encoding, storage, and retrieval).

Infants: Cognitive Development

Matching Quiz

Match the words in the first column to the best available answer in the second column.

_____	Stage which involves infants' behavior with their own body that they repeat over and over- for the sake of fun and novelty.	1) primary circular reactions
_____	The placement of information into memory.	2) secondary circular reactions
_____	Memories which we are not consciously aware, but which affect our behavior.	3) hippocampus
_____	Kind of speech that refers to infants understanding what others are saying and to which they can respond accordingly.	4) encoding
_____	Short simple sentences, a high pitch, and intonation that has a sing-song quality- what is commonly known as "baby-talk"	5) storage
_____	Stage which involves repeated pleasurable behaviors, which involve infants' interactions with objects or people in their environment.	6) retrieval
____	The process by which information in memory is located, brought into awareness, and used.	7) implicit
_____	Memories that require conscious cognitive effort to retrieve	8) explicit
_____	Part of the brain that enables an infant's memory skills.	9) receptive
_____	The process by which information is first stored in a form that is usable to memory.	10) infant directed speech

Infants: Cognitive Development

Matching Quiz *Answer Key*

__1__	Stage which involves infants' behavior with their own body that they repeat over and over- for the sake of fun and novelty.	1) primary circular reactions
__5__	The placement of information into memory.	2) secondary circular reactions
__7__	Memories which we are not consciously aware, but which affect our behavior.	3) hippocampus
__9__	Kind of speech that refers to infants understanding what others are saying and to which they can respond accordingly.	4) encoding
_10__	Short simple sentences, a high pitch, and intonation that has a sing-song quality- what is commonly known as "baby-talk"	5) storage
__2__	Stage which involves repeated pleasurable behaviors, which involve infants' interactions with objects or people in their environment.	6) retrieval
__6__	The process by which information in memory is located, brought into awareness, and used.	7) implicit
__8__	Memories that require conscious cognitive effort to retrieve	8) explicit
__3__	Part of the brain that enables an infant's memory skills.	9) receptive
__4__	The process by which information is first stored in a form that is usable to memory.	10) infant directed speech

Infants: Cognitive Development

Fill-In-The-Blank

Select the correct term from the list below and write it in the blank space. Some terms may be used more than once, while others not at all.

1. Piaget's theory of cognitive development is divided into _____.

2. _____ are the basic nerve cells in our brains.

3. The parts of brain cells that receive messages are called _____.

4. The removal of unused brain cell connections in order to strengthen others is called _____ pruning.

5. Infants fall into the _____ stage of development.

6. When newborns exhibit behaviors like rooting, sucking, and stepping; these are _____ or unlearned, involuntary responses to outside stimuli.

7. The word _____ in sensorimotor stages refers to the fact that infants like to repeat experiences over and over again.

8. The understanding that objects and people exist even when they cannot be seen is called object _____.

9. _____ speech is when infants know what they want to say and vocalize sounds to try to express themselves.

10. Often, infants use pointing and _____, as well as facial expressions as nonverbal ways to make their feelings known.

productive	neurons	permanence
gesturing	dendrites	circular
sensorimotor	synaptic	stages
reflexes	sections	predictive

Infants: Cognitive Development

Fill-in-the-Blank Exercise *Answer Key*

1. Piaget's theory of cognitive development is divided into stages.
2. Neurons are the basic nerve cells in our brains.
3. The parts of brain cells that receive messages are called dendrites.
4. The removal of unused brain cell connections in order to strengthen others is called synaptic pruning.
5. Infants fall into the sensorimotor stage of development.
6. When newborns exhibit behaviors like rooting, sucking, and stepping; these are reflexes or unlearned, involuntary responses to outside stimuli.
7. The word circular in sensorimotor stages refers to the fact that infants like to repeat experiences over and over again.
8. The understanding that objects and people exist even when they cannot be seen is called object permanence.
9. Productive speech is when infants know what they want to say and vocalize sounds to try to express themselves.
10. Often, infants use pointing and gesturing, as well as facial expressions as nonverbal ways to make their feelings known

productive	neurons	permanence
gesturing	dendrites	circular
sensorimotor	synaptic	stages
reflexes	sections	predictive

Additional Resources

Jean Piaget

http://www.piaget.org/

Cognitive development

http://www.edpsycinteractive.org/topics/cogsys/piaget.html

Speech and language milestones

http://www.nidcd.nih.gov/health/voice/speechandlanguage.asp

Information processing

http://www.edpsycinteractive.org/topics/cogsys/infoproc.html