

# The Emergence of Thought and Language: COGNITIVE DEVELOPMENT IN INFANCY AND EARLY CHILDHOOD



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# Topic Outline



1. The Onset of Thinking: Piaget's Account
2. Information Processing During Infancy and Early Childhood
3. Mind and Culture: Vigotsky's Theory
4. Language

# The Onset of Thinking: Piaget's Account

## LEARNING OBJECTIVES:

- According to Piaget, how do schemes, assimilation, and accommodation provide the foundation for cognitive development throughout the life span?
- How does thinking become more advanced as infants progress through the sensorimotor stage?
- What are the distinguishing characteristics of thinking during the preoperational stage?
- What are the strengths and weaknesses of Piaget's theory?
- How have contemporary researchers extended Piaget's theory



# *Basic Principles of Cognitive Development*

**schemes** - mental structures that organize information and regulate behavior

**Assimilation** - occurs when new experiences are readily incorporated into existing schemes.

**Accommodation** - changing existing knowledge based on new knowledge



## Assimilation



Saw this four-legged animal for the first time.



*Existing Schema: His four-legged pet is a dog.*



Child will call this a dog.

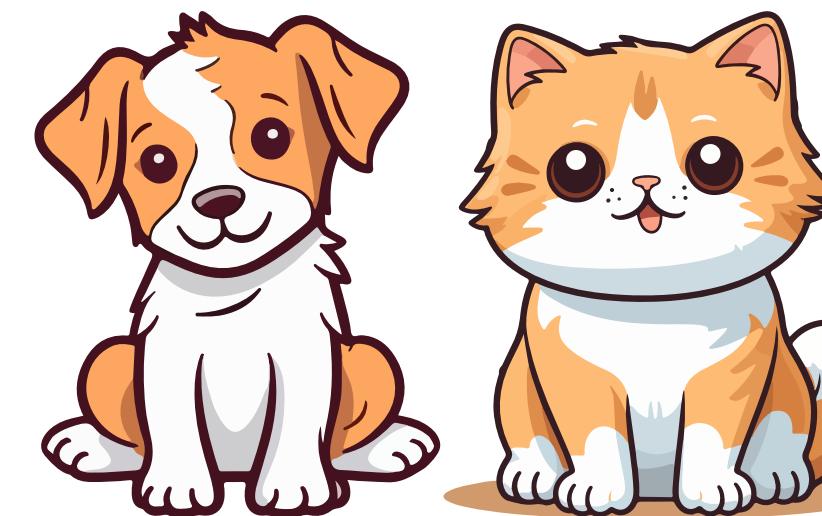
## Accommodation



*Existing Schema: His four-legged pet is a dog.*



Someone points out that this is a cat, though it has four legs.



Realizes that four-legged animals are not all dogs.

# Stages of Cognitive Development

PERIOD OF DEVELOPMENT	AGE RANGE
Sensorimotor period	Infancy (0–2 years)
Preoperational period	Preschool and early elementary school years (2–7 years)
Concrete operational period	Middle and late elementary school years (7–11 years)
Formal operational period	Adolescence and adulthood (11 years and up)

**Concrete Operational Period** - We finally discover logic and we develop concrete cognitive operations, such as sorting objects in a certain order.

**Formal Operational Period** - We now have the ability to “think more rationally about abstract concepts and hypothetical events”. Our advanced cognitive abilities allow us to understand abstract concepts.

# *Sensorimotor Thinking*

**Sensorimotor Period** - from birth to roughly 2 years of age, is the first of Piaget's four periods of cognitive development

## **Adapting to and Exploring the Environment**

- Newborn respond reflexively to many stimuli, but between 1-4 months, reflexes are first modified by experience.
- At about 8 months, infants reach a watershed: the onset of deliberate, intentional behavior.
- Beginning at about 12 months, infants become active experimenters

# Understanding Objects

**Object Permanence** - understanding, acquired in infancy, that objects exist independently of oneself

Piaget argued that not until approximately 18 months do infants have full understanding of object permanence.

## Using Symbols

- By 18 months, most infants have begun to talk and gesture, evidence of their emerging capacity to use symbols.
- At 20 months, children may move their hand back and forth in front of their mouth, pretending to brush their teeth.
- In just 2 years, the infant progresses from responding reflexively to actively exploring the world, understanding objects, and using symbols

# *Preoperational Thinking*

**Egocentrism** - difficulty in seeing the world from another's outlook

One of Piaget's famous experiments, the **three-mountains problem**, demonstrates preoperational children's egocentrism

**Animism** - phenomenon of crediting inanimate objects with life and lifelike properties such as feelings



# Centration

**Centration** - Piaget's term for this narrowly focused thought that characterizes preoperational youngsters.

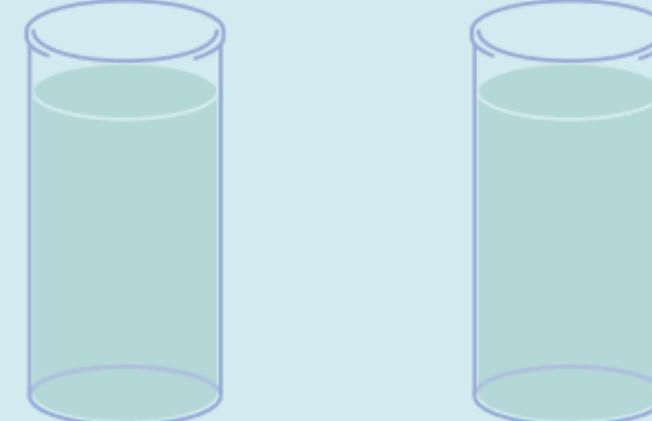
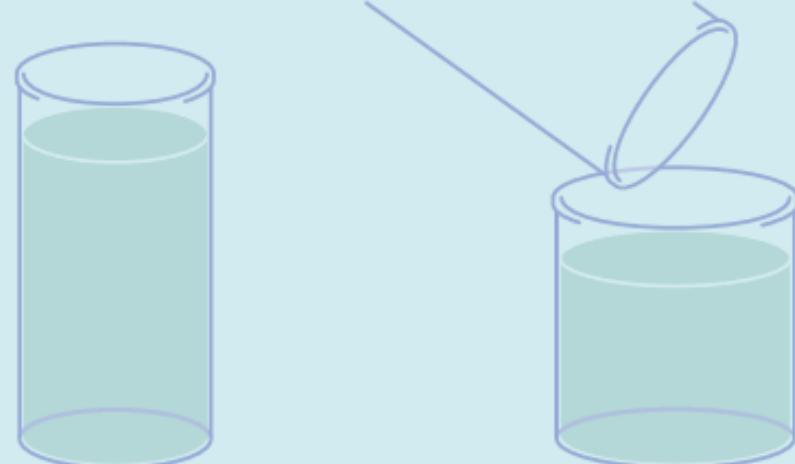
Piaget demonstrated centration in his experiments involving **conservation**.

In conservation problems, preschool children typically do not believe that the quantity of a liquid remains the same when it is poured into a taller, more slender beaker



# *Appearance as Reality*

Children in the preoperational stage of development typically have difficulty solving conservation problems, in which important features of an object stay the same despite changes in physical appearance. In **conservation problems**, preschool children typically do not believe that the quantity of a liquid remains the same when it is poured into a taller, more slender beaker

Type of conservation	Starting configuration	Transformation	Final configuration
Liquid quantity	 <p>Is there the same amount of water in each glass?</p>	<p>Pour water from one glass into a shorter, wider glass.</p>	 <p>Now is there the same amount of water in each glass, or does one glass have more?</p>

## Number



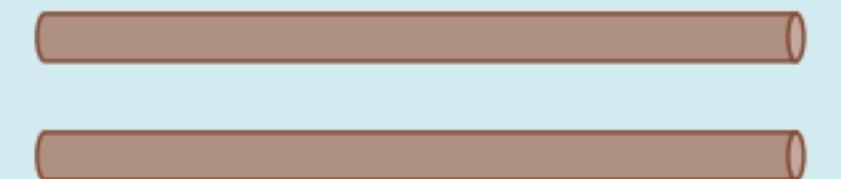
Are there the same number of pennies in each row?

Stretch out the top row of pennies, push together the bottom row.



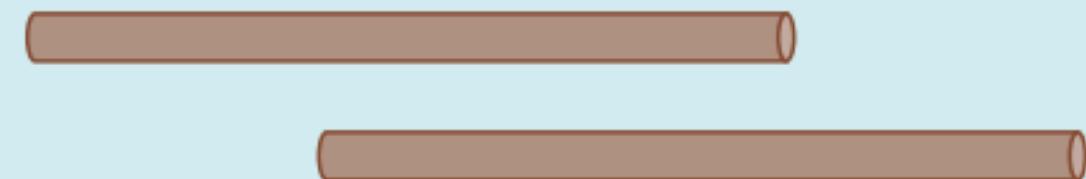
Now are there the same number of pennies in each row, or does one row have more?

## Length



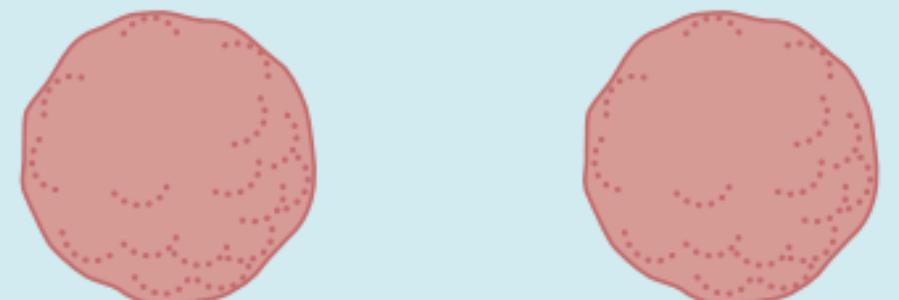
Are these sticks the same length?

Move one stick to the left and the other to the right.



Now are the sticks the same length, or is one longer?

## Mass



Does each ball have the same amount of clay?

Roll one ball so that it looks like a sausage.



Now does each piece have the same amount of clay, or does one have more?

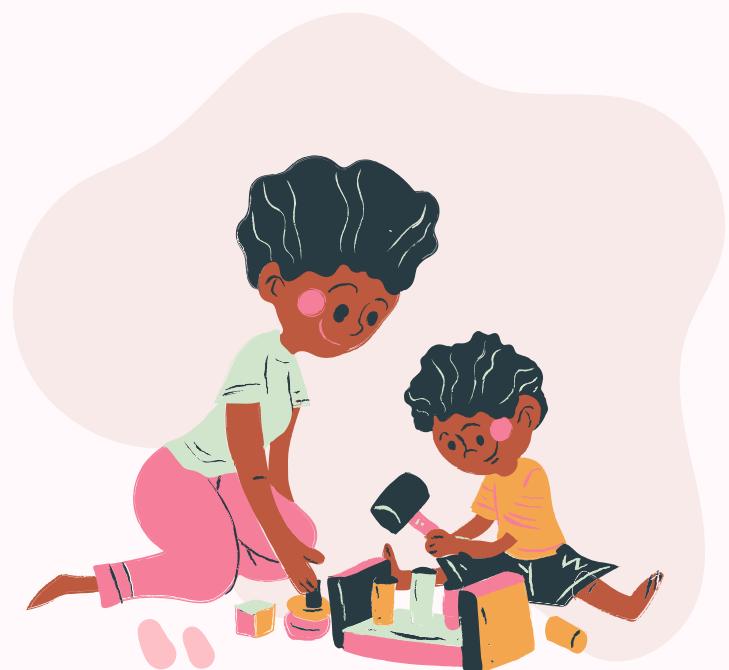
Confusion between appearance and reality is not limited to costumes and masks. It is a general characteristic of preoperational thinking.

## **Characteristics of Preoperational Thinking**

<b>CHARACTERISTIC</b>	<b>DEFINITION</b>
Egocentrism	Child believes that all people see the world as he or she does
Centration	Child focuses on one aspect of a problem or situation but ignores other relevant aspects
Appearance as reality	Child assumes that an object really is what it appears to be

# *Evaluating Piaget's Theory*

- Piaget's theory has inspired extensive research due to its comprehensive nature.
- Research supports Piaget's view that children actively seek to understand and organize their knowledge of the world.
- Cognitive development, according to Piaget, involves significant qualitative changes.
- Piaget's theory has provided valuable ideas for teachers and parents on fostering children's development.



# Guidelines for Fostering Cognitive Development

- Teachers should let children explore and discover how things work instead of just telling them.
- Kids learn best when they're given challenges that are just a little harder than what they already know.
- Children grow faster when they notice and fix their own mistakes.



# Criticisms of Piaget's Theory

- Piaget's theory underestimates cognitive competence in infants and young children and overestimates cognitive competence in adolescents.
- Piaget's theory is vague concerning processes and mechanisms of change.
- Piaget's stage model does not account for variability in children's performance.
- Piaget's theory undervalues the influence of the sociocultural environment on cognitive development



# *Extending Piaget's Account: Children's Naïve Theories*

Piaget believed that children, like scientists, formulate theories about how the world works. Children's theories are usually called "naïve theories" because, unlike real scientific theories, they are not created by specialists and are rarely evaluated by formal experimentation.

**core knowledge hypothesis** - infants are born with rudimentary knowledge of the world, which is elaborated based on experiences

Some of the theories young children first develop concern **physics**, **psychology**, and **biology**. That is, infants and toddlers rapidly develop theories that organize their knowledge about properties of objects, people, and living things

# Naive Physics

## Object Understanding in Infants:

- Adults understand that objects stay in place unless moved and follow physical laws like gravity.
- Piaget claimed understanding objects develops slowly, but **newer research** shows infants understand objects earlier.

## Baillargeon's Studies (1987, 1994):

- Experiment: Infants watched a screen rotate with a red box either realistically stopping the screen or unrealistically seeming to vanish.
- Findings: 4½-month-olds looked longer at the unrealistic event, indicating surprise and some understanding of object permanence.

## Infants' Knowledge Beyond Permanence:

- Infants know objects move continuously, are solid, and require contact to move.
- They distinguish between solids and liquids.

## Infants as Naive Physicists:

- Infants have a basic but not complete understanding of physical properties.
- They learn more complex properties, like gravity, later in childhood.
- Understanding ownership of objects develops in preschool years.

## Key Point:

- Infants rapidly develop a reasonably accurate theory of some basic properties of objects.

# Naive Biology

Motion is critical in early understanding of the difference between animate and inanimate objects.

By 12 to 15 months, infants and toddlers use motion to identify animate objects and they have determined that animate objects are self-propelled, can move in irregular paths, and act to achieve goals (*Biro & Leslie, 2007; Opfer & Gelman, 2011; Rakison & Hahn, 2004*).

Many 4-year-olds' theories of biology include the following elements:

- Movement
- Growth
- Internal Parts
- Inheritance
- Illness
- Healing

# Information Processing during Infancy and Early Childhood



## LEARNING OBJECTIVES:

- What is the basis of the information-processing approach?
- How well do young children pay attention?
- What kinds of learning take place during infancy?
- Do infants and preschool children remember?
- What do infants and preschoolers know about numbers?

# *General Principles of Information Processing*

**Mental Hardware** - refers to mental and neural structures that are built in and allow the mind to operate

**Mental Software** - refers to mental “programs” that are the basis for performing particular tasks

According to information-processing psychologists, it is the combination of mental hardware and mental software that allows children to accomplish a specific task.



# **Attention**

**attention** - a process that determines which sensory information receives additional cognitive processing

**orienting response** - an individual views a strong or unfamiliar stimulus, and changes in heart rate and brain-wave activity occur

**habituation** - act of becoming unresponsive to a stimulus that is presented repeatedly

## **Importance for Infants:**

- Orienting helps infants notice important or dangerous events.
- Habituation prevents overreaction to non-threatening stimuli.

Infants (and older children) pay attention to loud stimuli at first but then ignore them if they aren't interesting or dangerous

## Improving Attention in Preschoolers:

- Preschoolers' attention improves gradually but remains less developed than in older children/adults.
- **Tools of the Mind Curriculum:** uses pretend play to enhance attentional processes by encouraging children to stay in character and think flexibly.

## Parental and Teacher Support:

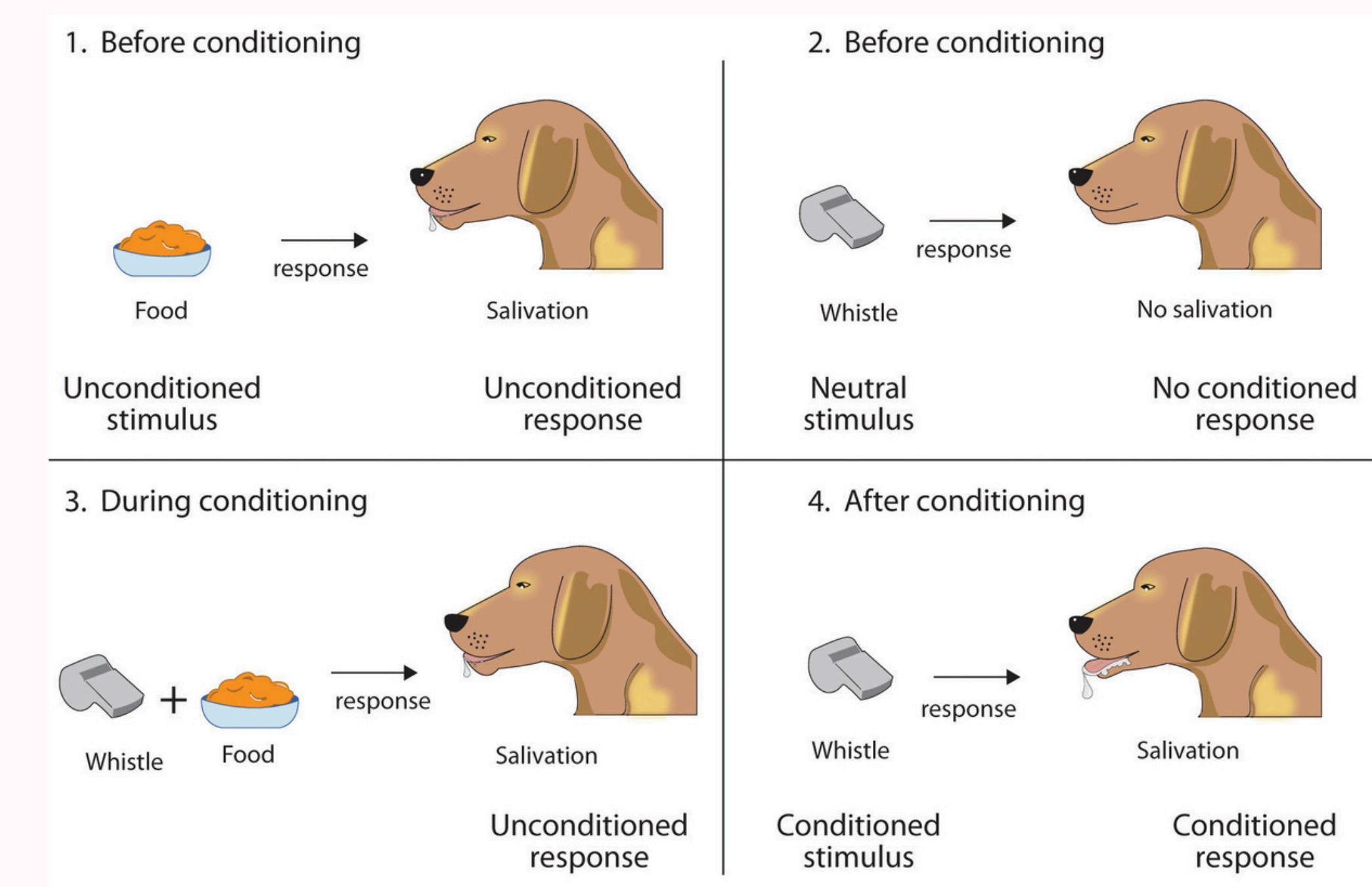
- Visual reminders, like drawings, to encourage attention.
- After-school programs teaching parents and children activities to boost attentional skills, leading to improved focus in children.



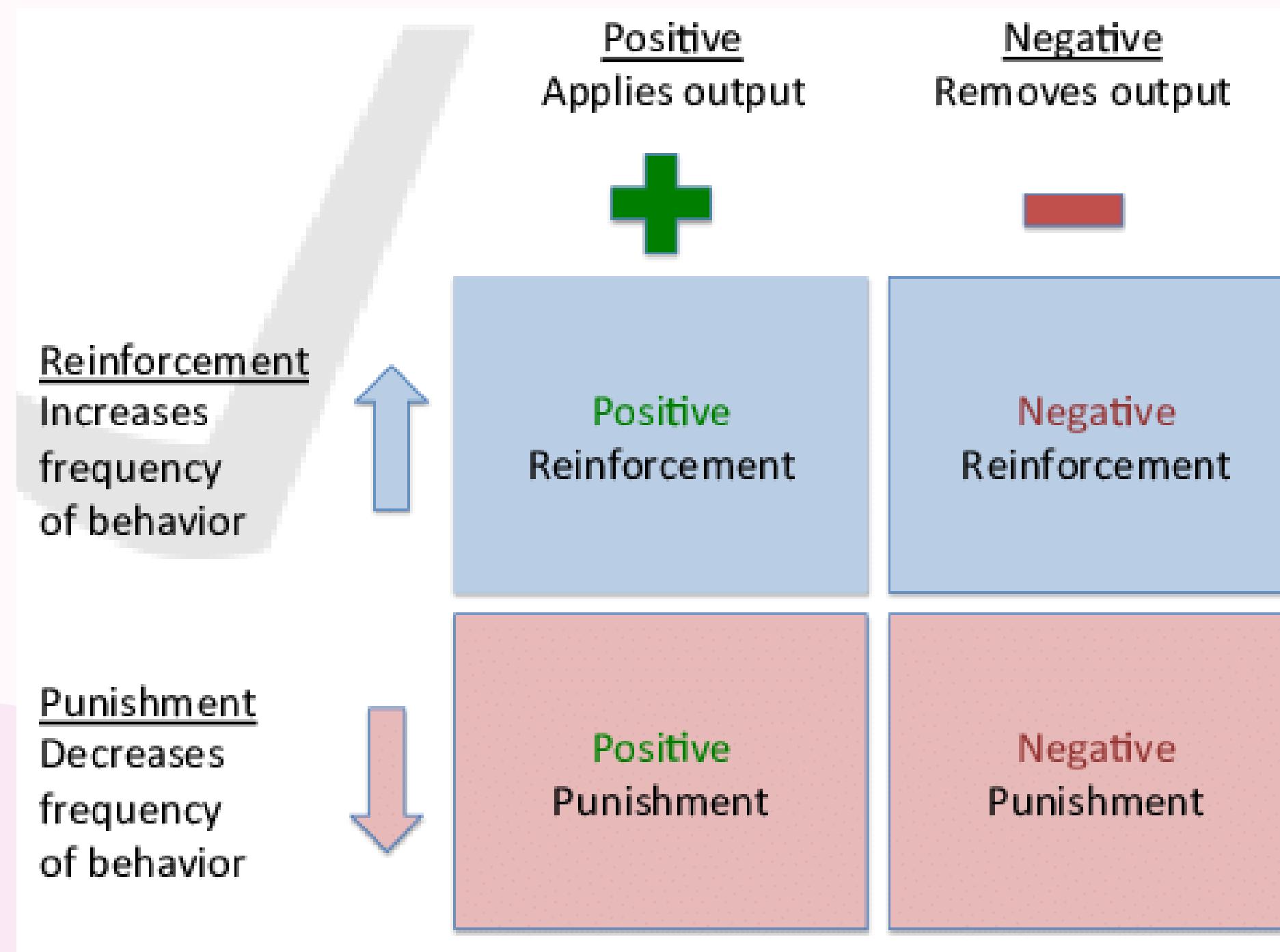
# Learning

**Classical Conditioning** - a form of learning that involves pairing a neutral stimulus and a response originally produced by another stimulus

Classical conditioning is important because it gives infants a sense of order in their environment. That is, through classical conditioning, infants learn that a stimulus is a signal for what will happen next



# Operant Conditioning - focuses on the relation between the consequences of behavior and the likelihood that the behavior will recur



When a child's behavior leads to pleasant consequences, the child will probably behave similarly in the future; when the child's behavior leads to unpleasant consequences, the child will probably not repeat the behavior.

# Imitation

## Learning Through Observation:

- Older children, adolescents, and young adults learn by observing others (e.g., sports moves, romantic behaviors, gaming).

## Infant Imitation:

- Infants as young as 10 months imitate actions like waving or knocking down blocks.

## Development of Imitation:

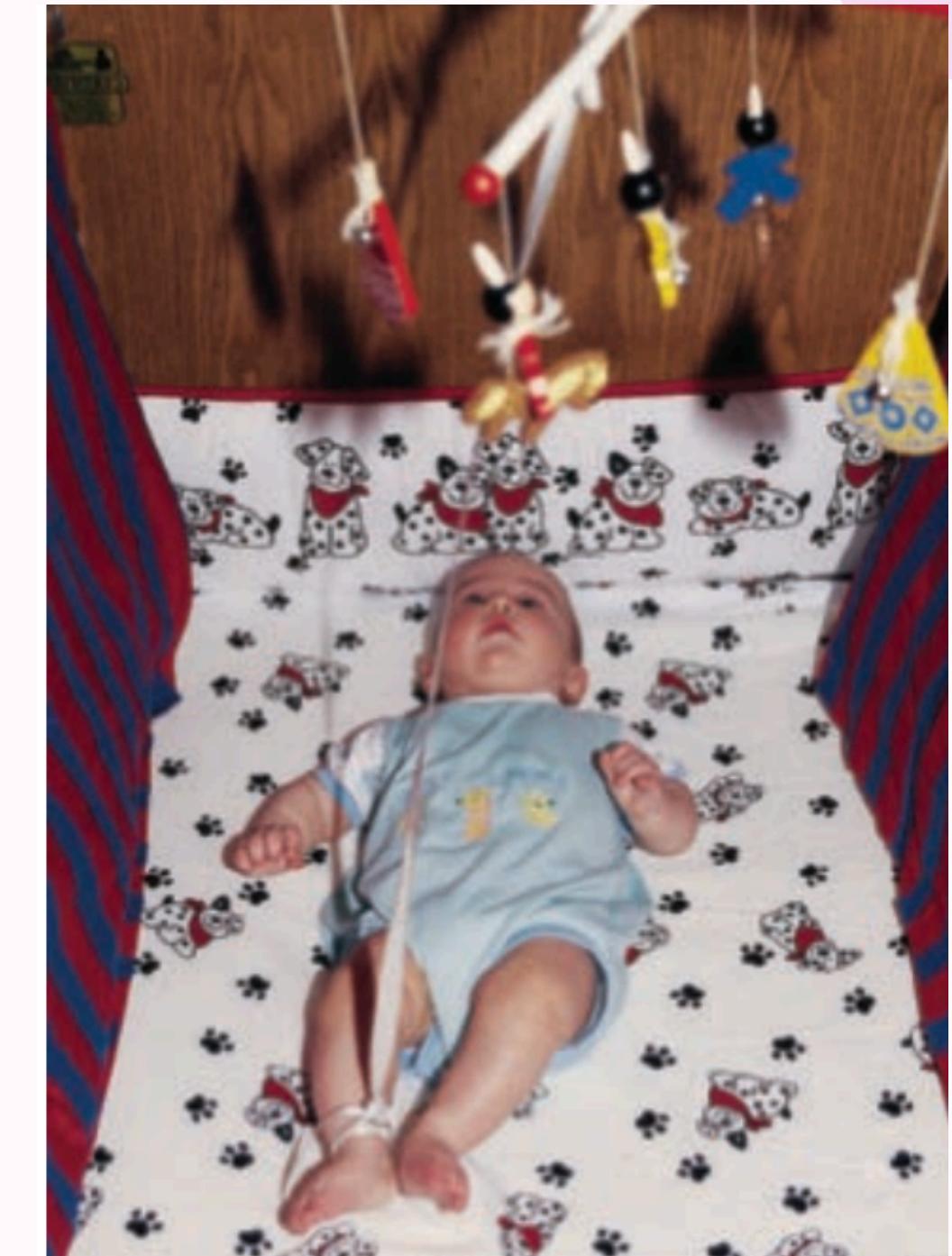
- Imitation skills in infants expand rapidly over the first year of life, suggesting an early, limited form of imitation that evolves with age.

# Memory

Young babies (2-3 months) can remember events for days or weeks.

## Rovee-Collier's Method:

- Babies learn to kick to move a mobile by attaching a ribbon from the mobile to their leg.
- After several days/weeks, they still remember to kick when the mobile is reintroduced.
- If memory fades after weeks, a reminder (moving the mobile) helps them recall the action.



## **Key Features of Early Memory (2-3 months):**

1. Remembering past events.
2. Gradual forgetting over time.
3. Cues can trigger forgotten memories.

## **Memory Improvement in Older Infants and Toddlers:**

- Older infants and toddlers remember more and retain memories longer.
- Toddlers can recall and imitate complex sequences of actions better than infants (e.g., making a rattle).

**Autobiographical Memory** - memories of the significant events and experiences of one's own life



# Mind and Culture: Vygotsky's Theory

# *Introduction*

**Human development** is often seen as a journey with various paths. According to Piaget and information-processing psychologists, children navigate this journey mostly on their own, influenced by others and culture but essentially exploring independently.

In contrast, **Lev Vygotsky**, a Russian psychologist, offered a different perspective. He believed that **development is like an apprenticeship** where children make progress through collaboration with more skilled individuals. Vygotsky argued that children advance more effectively when working alongside someone knowledgeable, rather than on their own.

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# ***Zone of Proximal Development (ZPD)***

- refers to the gap between what a child can do alone and what they can achieve with help from others.

This difference between his independent abilities and his potential with support defines his ZPD. Teachers and caregivers can use this concept by providing guidance and structure to help children accomplish tasks they cannot yet handle on their own. Just as training wheels help kids learn to ride a bike, supportive interactions with more skilled individuals help children improve their skills and gradually gain independence.

**According to Vygotsky**, cognitive development starts in social contexts and only later becomes controlled independently by the child.

# Scaffolding

A teaching approach where educators adjust the level of help they provide based on the learner's needs. At first, they give detailed instructions to help children learn a new task. As the children become more skilled, the support shifts to reminders and less direct guidance. This method ensures that learners get the right amount of assistance to progress effectively.

**For example**, mothers from different countries, like Turkey and the United States, often use verbal instructions, while others, like those in India and Guatemala, also use physical cues or gestures. Despite the varying methods, the goal is the same: to simplify tasks and support learning without overwhelming the child.



# *Private Speech*

- It refers to the way children talk to themselves to help manage their actions and thoughts.

For instance, 4-year-old Victoria, who talks to herself while coloring, is using private speech to guide her task. Vygotsky saw this as a key step towards self-regulation.

Initially, children rely on external guidance from others, but as they grow, they begin to use private speech to guide themselves. Over time, this private speech evolves into inner speech, or thought.





## Zone of Proximal Development

- the difference between the level of performance that youngsters can achieve with assistance and the level they can achieve alone.



## Scaffolding

- refers to a style in which teachers adjust their assistance to match a child's needs.



## Private Speech

- an intermediate step between speech from others and inner speech

Research supports that children use private speech more during challenging tasks and after making mistakes, as they need more guidance in these situations. Vygotsky's work highlights that **cognitive development is not just a personal journey but involves collaboration and the use of language to help control behavior and thinking.**



# Language



# *Introduction*

Nabina is just a few weeks away from her first birthday. For the past month, she has seemed to understand much of her mother's speech. If her mom asks, "Where's Garfield?" (the family cat), Nabina scans the room and points toward Garfield. Yet Nabina's own speech is still gibberish: She "talks" constantly, but her mom can't understand a word of it. If Nabina apparently understands others' speech, why can't she speak herself?

- After their first birthday, most children achieve a major milestone: they start speaking their first words, which quickly leads to a larger vocabulary. This development signifies the start of their ability to communicate verbally with others, sharing their ideas, beliefs, and feelings. These first words are the result of a year of language development. To understand this process and why Nabina's speech is not yet clear, we need to examine the stages of language growth that occur before a child starts speaking their first words.

# *The Road to Speech*

When a baby cries, it's using one of its few communication methods to express discomfort, while the mother uses both words and actions to comfort the baby. This scenario raises two key questions: Do babies understand any of the speech directed at them even before they can speak? And how do they transition from crying to speaking? To address these questions, we first need to explore whether infants can comprehend speech before they begin to talk.



# *Perceiving Speech*

Newborns have a strong ability to hear and prefer speech over other complex sounds. They can distinguish between different speech sounds, known as **phonemes**, such as consonants and vowels, even as early as one month old.

Researchers use techniques like measuring how infants respond to different sounds to test this ability. For example, when babies hear a sound repeatedly, they start to respond less, a phenomenon known as **habituation**. However, if a new sound is played, they react more, showing they can tell the difference. As they grow, infants become better at recognizing words despite variations in pronunciation.

# *Impact of Language Exposure*

Infants initially recognize many phonemes but, with increased exposure to their native language, become more sensitive to important sounds and less so to others.



# *Identifying Words*

Infants face challenges in learning to speak but start by recognizing phonemes and speech patterns. By 7-8 months, they focus on repeated words, using stress patterns and syllable frequency to segment speech.

**Infant-directed speech**, characterized by its slow pace and exaggerated pitch, helps them focus on and segment these sounds more effectively, aiding their language development.



# *Steps to Speech*

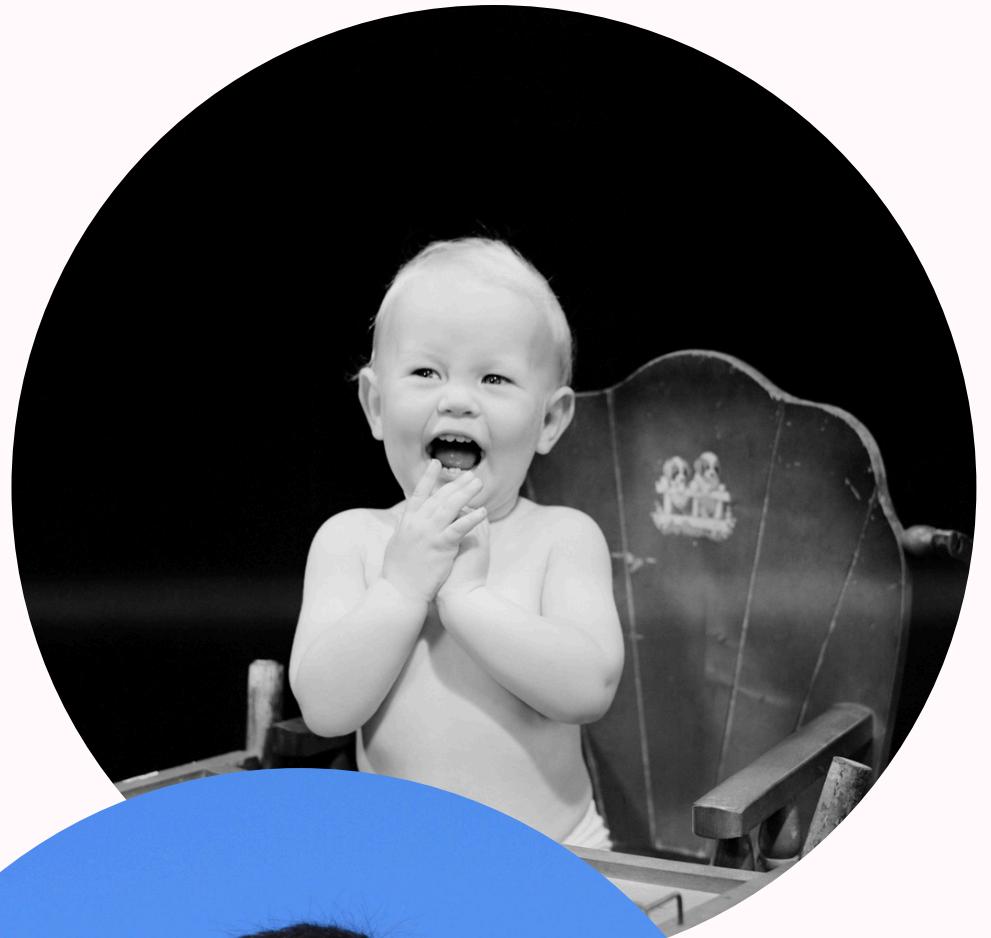
- **Cooing (Around 2 Months):** Infants start making vowel-like sounds such as “oooo” and “ahhh,” showing enjoyment in experimenting with sounds.
- **Babbling (Around 6 Months):** Babies begin producing repetitive, speech-like sounds like “dah” or “bah,” combining consonants and vowels. This phase includes repeating sounds and experimenting with more complex sound combinations.



- **Linguistic Babbling (8 to 11 Months):** Babbling starts to resemble real speech with varied intonation and stress patterns similar to those in adult speech. For example, English-speaking babies babble with rising and falling pitch patterns, reflecting the intonation of the language they hear.



- **Linking Perception and Production:** As babies hear and mimic the speech around them, their babbling gradually incorporates elements of real speech. This phase helps infants refine their ability to produce sounds and approximate real words.



# First Words and Many More

By 10 to 14 months, infants understand spoken words and start speaking their first words. By age 2, they know hundreds of words, expanding to over 10,000 by age 6. Early vocabularies mainly consist of nouns, though this varies by language and culture

## The Grand Insight: Words as Symbols

Infants learn that words symbolize objects and actions, starting around 18 months. They begin linking sounds to concepts and use gestures to aid language development.



# Fast Mapping of Words

After recognizing that words symbolize objects or actions, children's vocabularies grow slowly at first. By 18 months, many experience a "naming explosion," learning new words rapidly, especially for objects, through fast mapping.

**Fast mapping** - a child's connections between words and referents that are made so quickly that he or she cannot consider all possible meanings of the word.



- Joint Attention
- Constraints on Word Names
- Sentence Cues.
- Cognitive Factors
- Developmental Change in Word Learning
- Naming Errors

**Underextension** - when children define words more narrowly than adults do

**Overextension** - when children define words more broadly than adults do



# Individual Differences in Word Learning

Vocabulary growth varies widely among children. Key factors include phonological memory and exposure to rich language environments. Better memory and more diverse speech lead to larger vocabularies.

**Phonological Memory** - ability to remember speech sounds briefly; an important skill in acquiring vocabulary

- **Bilingualism**
- **Word Learning Styles**

**referential style** - language-learning style of children whose vocabularies are dominated by names of objects, persons, or actions.

**expressive style** - language-learning style of children whose vocabularies include many social phrases that are used like one word

# Encouraging Language Growth

Parents can enhance language growth by frequently speaking to their children and naming objects they are focused on.

Reading books together also helps; describing pictures while reading boosts vocabulary.



## ***Speaking in Sentences: Grammatical Development***

Within months after children say their first words, they begin to form simple two-word sentences. In their two-word speech, children follow rules to express different meanings

# From Two Words to Complex Sentences

**Telegraphic speech** - speech used by young children that contains only the words necessary to convey a message.

**Grammatical morphemes** - words or endings of words that make a sentence grammatical

**Overregularization** - grammatical usage that results from applying rules to words that are exceptions to the rule.



# How Do Children Acquire Grammar?

- **The Behaviorist Answer** - Skinner's theory that language is learned through imitation and reinforcement is criticized because children produce novel sentences and grammatical errors that can't be explained by simple imitation.
- **The Linguistic Answer** - Many scientists believe children are born with neural circuits that help them infer grammatical rules from the language they hear.
- **The Cognitive Answer** - Some theorists argue that children learn grammar by detecting patterns in speech, like identifying that "-s" indicates plurals, rather than through an inborn grammar device.
- **The Social-Interaction Answer** - This approach blends behaviorism, linguistics, and cognitive theory, emphasizing that language learning thrives in interactions where children and adults work together to improve communication.

# Communicating with Others

Effective communication involves taking turns speaking and listening, ensuring clarity, and providing feedback. While full mastery takes time, children learn these basics early in life.

- **Taking Turns**
- **Speaking Effectively**
- **Listening Well**



1. According to Piaget, how do schemes, assimilation, and accommodation provide the foundation for cognitive development throughout the life span?
2. How do children's naive theories influence their information processing, attention, and learning during early childhood
3. How does a child's exposure to different languages impact their word learning?



**THANK YOU!**