Cognitive Development

- Cognition – thinking
- Perception, learning, memory, reasoning

- *Theories of Cognitive Development*
  - *Piaget*
  - *Vygotsky*
- *Language Development*
- *The Brain and Language*

Piaget

- Piaget taught in The Grange aux Belles school for boys in Paris

- Noticed similar errors in the same age group

- Distinct age related ways of thinking and understanding the world

- Child’s mind develops through a series of stages
- Schemas – mental moulds
- Assimilate new experiences
- Accommodate our schemas to incorporate new experiences

- **Sensorimotor: 0-2yrs** experiencing the world through senses and actions.

  Object permanence and Stranger Anxiety

- **Preoperational: 2-6/7** representing things with words and images, intuitive thinking

  Pretend play, Egocentrism

- **Concrete Operational: 7-11** thinking logically about concrete events, arithmetic

  Conservation, Mathematical Transformations

- **Formal Operational: 12 – adulthood**

  abstract reasoning, logic, mature moral reasoning

Sensorimotor

- born with reflexes – sucking, grasping
- motor development – moving, sitting, crawling, standing, walking
- Seeks stimulation, captivated by interesting spectacles, explores
- Awareness of agency (I can make something happen)
- Intentionality
- Imaginative play
- Beginning of language

Preoperational

- Ability to represent objects using symbols
- Animistic Thinking
- Egocentrism
- Intuitive – may use mental operations such as classifying, quantifying - but may not be aware of it.
- Irreversibility
- Focus on ends rather than means

Concrete Operational

More flexible in their thinking

- Conservation
- Organize (classes, sub classes)
- A is taller than B, B is taller than C

(working memory)

Formal Operations

- Abstract Thought
- Hypothetical Thinking
- Logical

Can go beyond unrealistic content to focus on the logic

- Increased Complexity

- Children are active constructors of knowledge
- Development follows a sequence
- Errors are informative and give us clues about children’s thinking as they struggle to understand reality
- Cognitive Development in the early years is perceptual motor not language based

- Culture and the historical era - influence development
- Stage wise Development ?
- May have underestimated abilities

Vygotsky

- Born in Russia
- Law Degree
- 1917 – Russian Revolution

- Marx

Human capacity for tool use and production

What people think depends on their material life

- Engels

 - tool use

 - communication

Technology created a new orientation to the environment

- Planning

- Psychological Tools – master behavior - Signs

- Signs – mediators that account for shifts in development

  speech, numbers, algebraic symbols, art enable better cognitive representation of the world and problem solving

- Human behavior is understood in the context of the *signs of the culture*

- *Speech* - words free our thoughts and attention from the present situation.

“speech enables us to reflect upon the past and plan for the future”
Vygotsky, 1930

- Children cannot develop purely abstract modes of thought without instruction in abstract sign system.

- Seen in technologically advanced societies

- 1931 – soviet govt phasing in adult education in remote regions
- Luria - central Asia

- In the Far North, where there is snow, all bears are white. Novaya is in the Far North. What colour are the bears there?

Luria, 1976

- **Zone of Proximal Development** – With adult guidance the range of potential development exceeds what can be achieved alone

- The Role of Culture
- Apprenticeship – weaving, pottery
- Social Interaction plays a fundamental role in cognitive development

- *‘Thought and Language’*

  external speech – social context

  inner speech - gradually internalized

  tool for self regulation

  Speech – turning thought into words and inner speech is the conversion of speech into inward thought.

- Play - transitional stage

  pretend play – relationship with everyday objects changes – becomes more abstract

  Role play - rules – self regulation

  “Tools of the mind”

  executive function - to stay focused

- As the tools of thinking in a culture change the mind takes on a new character

Vygotsky

Language Development

- Babbling – 3mnths -1yr
  speechlike meaningless sounds
- Language Comprehension

- Telegraphic Speech
- Overgeneralization – apply rules everywhere

- **The Learning Theory Approach** – language acquisition occurs thru principles of reinforcement and conditioning
- What about learning rules?

- **Chomsky** - innate linguistic ability that emerges as a function of maturation

  Language Acquisition Device – permits understanding the structure of language and unique characteristics of the language

Language

Language – tool of communication

Linguistic Competence – universal human species typical ability

- Language elements
- Syntax
- Semantics
- Pragmatics

Language Elements

- Phones - speech sounds (produced)

- Phonemes – mental representations phones that are categorized
- Syllables - smallest unit of speech perception

- Words, clauses, sentences

Syntax -Grammar

- Theory of Transformational Grammar
  (Chomsky, 1957, 1965)
  phrase structure rules
  deep phrase structure
  surface structure

Semantics Meanings of words

- Concepts –

  “family resemblance structures” (Wittgenstein, 1953)

  Prototypes

- denotational vs connotative meaning

Pragmatics

- Context and Situation
- Status
- Conversation Rules

- Critical Period

  7-9

  Deaf children who got cochlear implants by age 2 develop better oral speech than those who received implants after age 4.

  Signing –same effect

- Finer aspects of grammar – mastery was related to age at which language had been learned (7-8 years seemed to be the cut off) (Johnson & Newport, 1989)

"Yesterday the hunter shoots a deer"

The Brain and Language

- Broca's Area: speech production
  left frontal lobe

- Wernicke's Area: language comprehension
  left temporal lobe

- Angular Gyrus – transforms visual representation into auditory code

- Nerve fibres connect these brain areas

Language Influences Thinking?

- **Linguistic Relativity Hypothesis** (Whorf, 1956) language shapes and determines how people of a particular culture perceive or understand the world
- Color Perception

  Perceived differences grow when we assign different color names

- Abstract ideas -conceptualized through language

- Thinking in Images

  mental practice

Gestures

- Chimps –natural gestures (tool users)
- Pave the way for children’s language
- Signed language readily develops among deaf
- Gesture on the phone
- Congenitally blind people gesture
- Lightens cognitive load

Bottlenose Dolphin wearing a sea sponge


gettyimages
Ingo Arndt
80360025

- Animal Learning

- Project Washoe – American Sign Language – 176 signs

  string words into a sentence

  “You me go out, please”

  Water bird when she saw a **swan**

- Loulis – Washoe’s adopted baby picked up 66 signs through observation
- Sign amongst each other – come, tickle, hug ..
- Early exposure to language seems to be critical