WHAT IS LANGUAGE?

COMD570: Introduction to Language Development

Instructor

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  - Discovery 1, Room 202D
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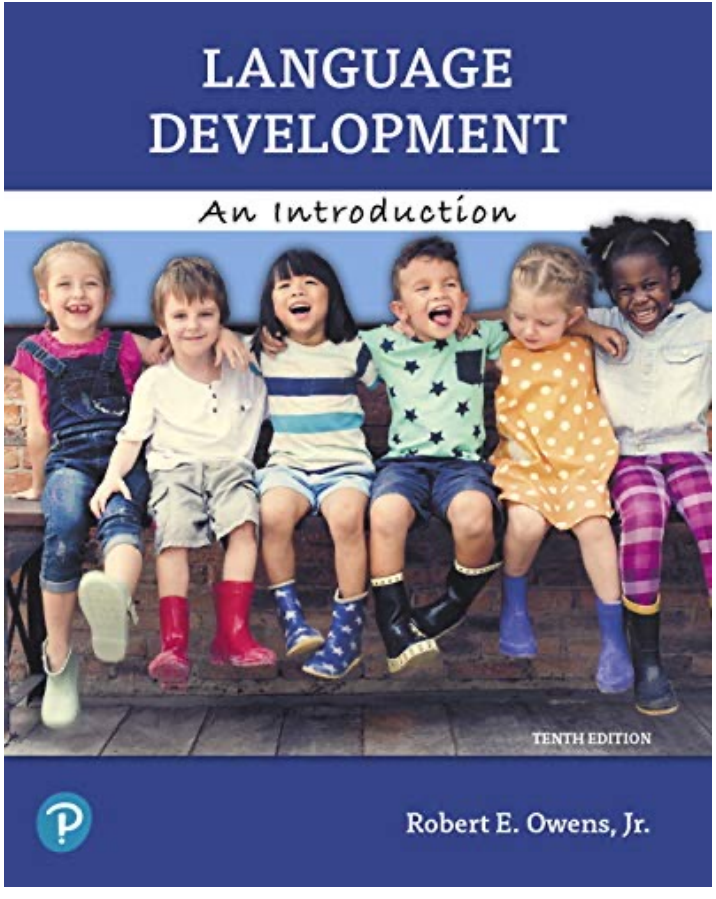
Textbook

- Language Development: An Introduction (Tenth Edition)
  - Richard Owens, Jr.
- Read the assigned readings *before* class



Course objectives

- Students will be able to:
  - Describe basic aspects of speech, language, and communication
  - Describe the major components and characteristics of the major theories of language acquisition
  - Describe the neurological bases of language
  - Describe the processes of healthy language development and major features characteristic of different stages
  - Describe how social and cultural favors impact language development
  - Analyze language samples at different stages of development

What is language?

- What we're doing now.

- Linguistics: what is that stuff?
- Language acquisition/development: how do we learn that stuff?

Communication & Language

- **Communication**: sending and receiving of information ideas, needs, desires

- **Language**: human-specific system of rules and mental objects (symbols or representations) that is used for communication

Speech, Writing, and Sign

- **Speech:**
  - Expressing language by executing precise and specific movements of the vocal tract
  - The complex sounds produced by these movements
- **Writing:**
  - Expressing language by executing precise and specific arm/hand movements with a tool
  - Speech encoded as visual line symbols
- **Sign (as in sign language):**
  - Expressing language by executing precise and specific movements of the face, arms, and torso
  - The complex signals produced by these movements

What is language?

- Language: a general thing that humans have/do
  - French, American Sign Language (ASL), English: specific instances/cases of that thing that all humans do
- Language vs. dialect
  - “A language is a dialect with an army and navy”
  - Similar problem of defining “species” in biology
  - Mutual intelligibility is one criterion

Properties of Language

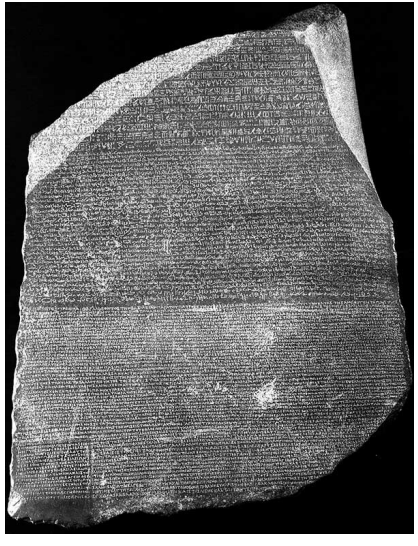
- Language is a social tool
- Language is a rule-governed system
- Language is generative
- Other properties:
  - Reflexive/metalinguistic
  - Displacement
  - Arbitrary

Language is a social tool

- Language is the backbone of human cultural development and richness
  - Allows us to convey ideas to each other and to pass on knowledge to our descendants

Acheulean hand axes
~1.8 million – 100 K years ago

Chauvet cave paintings (~35,000 years ago)



Rosetta stone
(196 BC)

Tattersal, 2017 Encyclopedia Brittanica

Language is a rule-governed system

- Language has **rules**
- These rules are **descriptive**: they describe how a language or languages in general work
- A comprehensive set of such rules: a **grammar**
- **Mental grammar**: linguistic rule system within an individual's mind/brain (i.e., the rule system describing their idiolect)

Language is a rule-governed system

- The goal of language sciences is *description*, not **prescription**

- *Prescriptive rules*: biases about what is correct or socially valuable
  - Don’t split infinitives ("to go boldly ", not "to boldly go")
  - Don’t strand a preposition ("in what did you put it?," not "what did you put it in?")
  - Don’t use a double negative ("I cannot get satisfaction," not "I can't get no satisfaction")
  - Don’t start a sentence with "and" or "but”

Language is a rule-governed system

- Unlike prescriptive rules, **descriptive rules** are mostly unconscious
  - We are often not actually aware of what the rules are
  - They require linguistic analysis to figure out

Language is a rule-governed system

- You can create new words in English:
  - klume, plive, shroke, trute

- There are impossible words:
  - *knong, *psaa, *sroke, *tboung

* = an impossible expression

- Why?

Language is a rule-governed system

- There are rules of word formation in English that allow the combination of some sounds in certain contexts, but not others

- Some of these rules are specific to English – all the starred examples are real Cambodian words:
  - knong (inside)
  - psaa (market)
  - sroke (country)
  - tboung (south)

Language is generative

- Language is **generative**
  - Creative, in the sense that we build and understand new sentences
  - Not necessarily creative in the artistic sense, but that too ;)
  - Constantly generating new ideas through linguistic creativity
  - Language structure cannot simply be captured through a set of patterns, but rather pattern-*generating* mechanisms

Language is generative

- No “longest sentence” of English:
  - Bob loves linguistics
  - Susan knows that [Bob loves linguistics]
  - Harry realized that [Susan knows that [Bob loves linguistics]]
  - John said that [Harry realized that [Susan knows that [Bob loves linguistics]]] …

Language is Reflexive

- Language has **metalinguistic** properties
  - We can use language to reflect on language, its correctness and effectiveness, and its qualities
- Some aspects of **metalinguistics**:
  - Phonological awareness
    - Conscious recognition of phonological properties of language, e.g. that there are phonemes (*phonemic* awareness)
  - Early reading skills
  - Pig Latin
  - Rhyming/Word play
  - Puns

Language involves Displacement

- **Displacement:** the ability to discuss things not physically present in the immediate environment
  - We can use language to refer to things in front of us (e.g., the chairs and tables around us)
  - But we can also talk about things that are not present (e.g., a memory from childhood, the Death Star)

Language has Arbitrariness

- Language is arbitrary in two important ways:
  1. The form of a word is not determined by its meaning

English	Korean	Italian
dog	kee	cane

  2. Linguistic sense different from communicative sense:

- John: what's new, David?
- David: good!

- Girlfriend: how do I look in this new dress?
- Boyfriend: that color is really amazing!

Iconicity

- Non-*completely* arbitrary relations between form and meaning
  - Onomatopoeia: “whoosh”, “bzzzz”, “woof”
  - Even then they are still arbitrary (i.e., not completely determined by meaning, could easily have a different form):

English	Korean	Italian
woof	Meong meong	bau bau

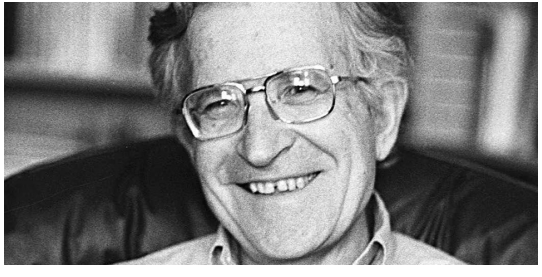
- Sign languages have more iconicity than spoken languages (will discuss more next week ☺)

Universality of language

- Natural languages exist wherever there are humans
- No society has ever been found that does not have a language
- When deaf children are allowed to interact with each other, new sign languages spontaneously develop (e.g., American Sign Language, Nicaraguan Sign Language)
- https://www.youtube.com/watch?v=pjtioIFuNf8 (start at 2:44)

Animal language? Project Nim

- In the 60s and 70s, much attention was given to the idea of teaching apes ASL
- Nim Chimpsky, a chimpanzee, was one of the most celebrated and successful of these apes



Noam Chomsky

Fig. 1. Nim signing the linear combination, *me hug cat* to his teacher (Susan Quinby). (Photographed in classroom by H. S. Terrace.)

Koko the Gorilla

- https://youtu.be/G4QQ8Mfjb_g

Apes – Project Nim

- Conclusions of lead researcher on project Nim:
  - “For the moment, our detailed investigation suggests that an ape's language learning is severely restricted. Apes can learn many isolated symbols - (as can dogs, horses, and other non-human species), but they show no unequivocal evidence of mastering the conversational, semantic, or syntactic organization of language” (Terrace, 1979)”

Apes – Project Nim

- “It’s an insult to chimpanzee intelligence to consider this their means of communication. It’s rather as if humans were taught to mimic some aspects of the waggle dance of bees and researchers were to say, ‘Wow, we’ve taught humans to communicate.’

Chomsky, 2008

Apes – Project Nim

- “But if, say, Nim had succeeded, we would still have learned nothing about language acquisition... if apes have this fantastic capacity, surely a major component of humans extraordinary biological success (in the technical sense), then how come they haven’t used it? It’s as if humans can really fly, but won’t know it until some trainer comes along to teach them.”

Chomsky, 2008

Human language and animal "language"

- Animal communication systems have fascinating and varied properties, some of which may be related to human language
- Fundamental differences remain
  - Limited creativity, particularly with respect to creativity of meaning
  - Modality-fixed (as far as we know)

Other Aspects of Communication

Communication: Extralinguistic Elements

- Paralinguistic
- Nonlinguistic
- (Metalinguistic) – already discussed

Paralinguistic elements

- Language: what you're saying

- Paralinguistic elements: how you say it

Paralinguistic elements

- Paralinguistic elements: superimposed on speech to signal attitude or emotion
  - Intonation
  - Stress
  - Speaking rate
  - Pauses
- “Suprasegmental devices”: change the form and meaning of speech by acting across segments of a sentence

Nonlinguistic Elements

- Gestures
- Facial expression
- Body posture
- Eye contact
- Proxemics
- Context

Gestures & Facial Expressions

Body Posture

Proxemics

- Proxemics – the ”personal space” that separates you from others

- American customs:

1. Public Zone (12+ feet)
2. Social Zone (4 -12 feet)
3. Personal Zone (2 - 4 feet)
4. Intimate Zone (0 - 2 feet)

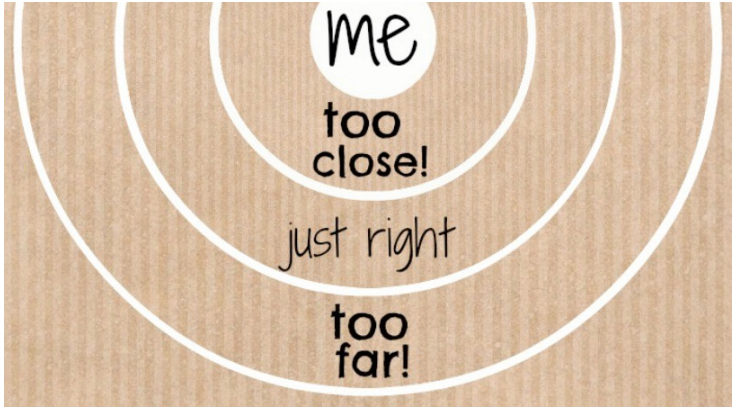


TABLE 1.1 Nonlinguistic Cues

Gesture	Other Interpretations	Countries in Which Unacceptable
Thumbs-up		Australia, Nigeria, Islamic countries, such as Bangladesh
A-OK	Japan: *money* France: *zero, worthless*	Latin American countries
Victory or peace sign		England (if palm toward body)
Hailing a waiter (one finger raised)	Germany: *two*	Japan
Beckoning curled finger		Yugoslavia, Malaysia, Indonesia, Australia
Tapping forehead to signify "smart"	Netherlands: *crazy*	
Stop		Greece, West Africa
Hands in the pockets		Belgium, Indonesia, France, Finland, Japan, Sweden
Strong handshake	Middle East: *aggression*	
Good-bye	Europe and Latin America: *no*	
Crossing legs and exposing sole of the foot		Southeast Asia
Nodding head for agreement	Greece, Yugoslavia, Turkey, Iran, Bengal: *No*	

Source: Information from Axtell (1991).

Nonlinguistic cues vary widely by culture!

Linguistic Theory

Linguistic Theory

- Theories developed specifically to capture what the nature of language is, and how it is acquired by children

Nature vs. Nurture

- "Competing" theoretical frameworks:
  1. Generative/nativist approach
  2. Interactionalist approach
     - Emergentism
     - Constructionism
- These are not *really* competing theories but rather different ways of looking at language
  - The generative/nativist approach: properties of the individual
  - Interactionalist approach: properties of the data and social context

Nature vs. Nurture

- On the one hand, languages are variable and language acquisition depends on the cultural environment

- On the other hand, language is universal and language acquisition occurs automatically within a biological critical period

Generative Grammar

- Scientific framework that attempts to resolve this tension

1. **Universal grammar (UG)**
   - Some instinctive basis for human language acquisition
   - A “language template” innately specified in the genes
   - Types of *possible* rules of language
2. **Environmental language data**
   - Critical period in which these details can be filled in by data in the environment
   - Specific rules learned by combining innate templates with language data

Poverty of the stimulus

- Knowledge of language under-determined from environment
  - Additional impetus for a theory of universal grammar
  - E.g. possible interpretations of sentences
  - Not provided directly by language data in the environment

Language acquisition device (LAD)

- Another term for universal grammar (UG), when applied to the question of language acquisition

Chomsky, 1955

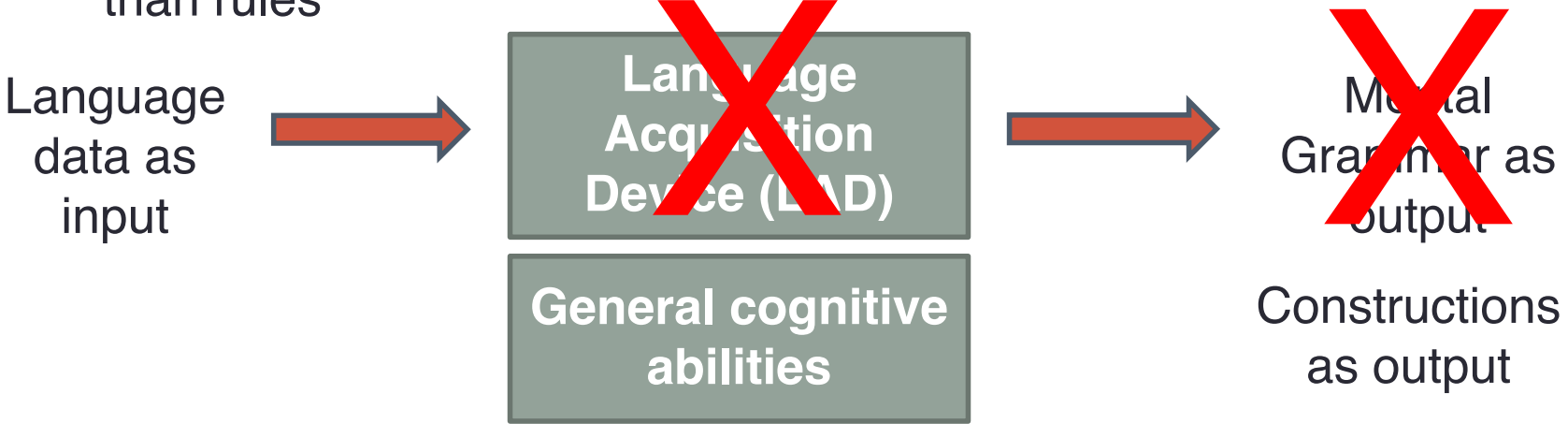
Grammars & Universal Grammar

- We will discuss both general rules/properties of language (**universal grammar**) and specific rules /properties of specific languages (**grammar**)

- Huge challenge to simply identify the rules /properties of a given language, let alone fully specify how exactly language data are combined with UG to create those rules /properties

Interactionalist Approach

- Central differences with the Generative Approach:
  - Emphasis placed on “general” cognitive abilities and the quality of the language data
  - Think of language acquisition as acquiring “constructions” rather than rules



Constructionism and Development

- Constructions or sentence frames are paramount:
  - General templates in which different elements can be slotted
    - Mommy's go-ing
    - Daddy's cook-ing
    - Katie's play-ing
    - Harry's sing-ing
    - = NOUN's VERB-ing construction

- Generative grammar:
  - Sentence → NOUN + *'s* + VERB + *ing*
  - You can build a sentence by combining a noun, 's', a verb, and '-ing

Competence & performance

- **Competence**: what you know about language
- **Performance**: how you use language

Competence & performance

- Analogy: dancing
  - Competence: certain beat, rhythm, particular steps, moves, etc. that are possible
  - Performance: *actual* dancing, involving wrong moves, falling over, spilling glasses of wine, poking people in the eye
- Analogy: chess
  - Competence: where you can place a piece when, when somebody wins/loses, etc.
  - Performance: actual chess playing (which may involve going to the bathroom, mistakes, particular strategies, etc.)

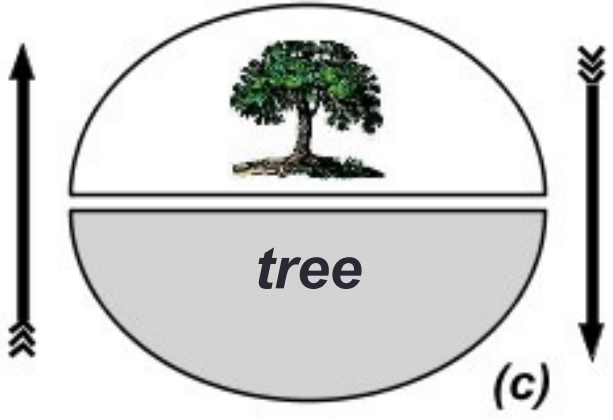
Competence & performance

- The goal of linguistic theory is to capture *competence*
  - Performance is a much more complicated matter, involving many many different factors, one of which is knowledge of language
- Assessing language abilities requires figuring out a person's competence, and how it may be affected by performance
  - Not always straightforward!

Components of language

- Conceptual necessity: need to describe two systems

- Sensory-motor:
  - Phonetics
  - Phonology
- Meaning:
  - Semantics
  - Pragmatics



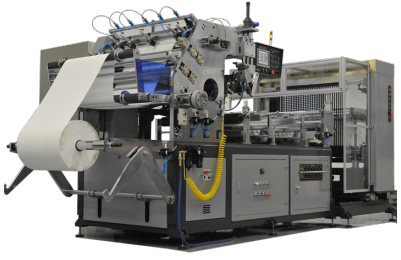
Components of language

- Arbitrary and creative nature of language suggest a third part of the grammar:
  - Combinatorial system: morphology and syntax

- Rules that create new sentences by combining words together
- Sentences are both pronounced and have meaning

Components of language

Morphology & Syntax

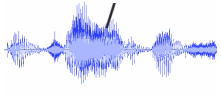


Abstract combinatorics

Form

Phonetics & Phonology

/ətʃɑɪldits səmtʃɑkələt/



Meaning

Semantics & Pragmatics

Chomsky, 1980; 1995

Learning Theories

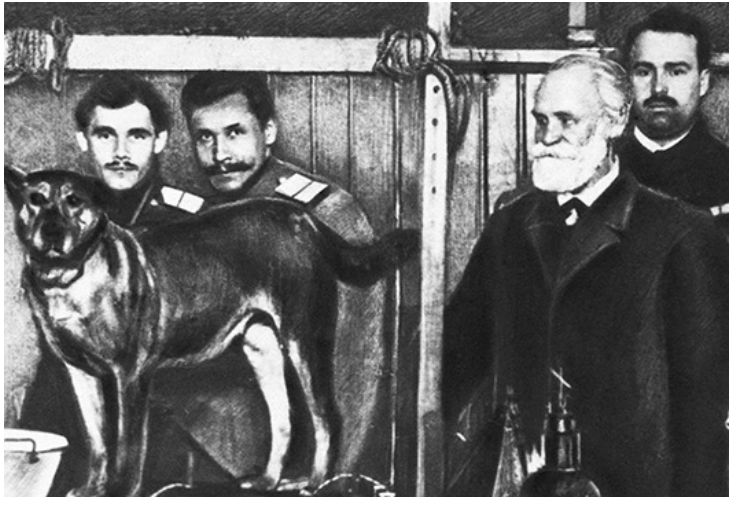
Learning Theories

- These are general psychological theories, which have been applied to the question of language development
  - Behaviorism
  - Piagetian cognitivism
  - Social constructivism

Behaviorism

- Theory of animal (incl. human) behavior, originating in latter half of 1800s and dominating Psychology in first half of 1900s

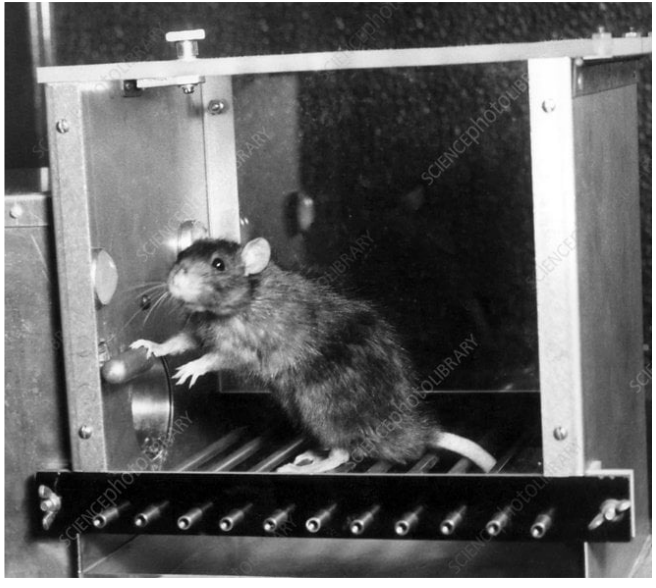
Pavlov and one of his dogs



- Early behaviorism: classical conditioning and stimulus-response associationism
  - Pavlov's dog: salivation a reflex associated with perception of food, but could elicit the reflex with a conditioned, neutral stimulus such as a bell

Operant conditioning

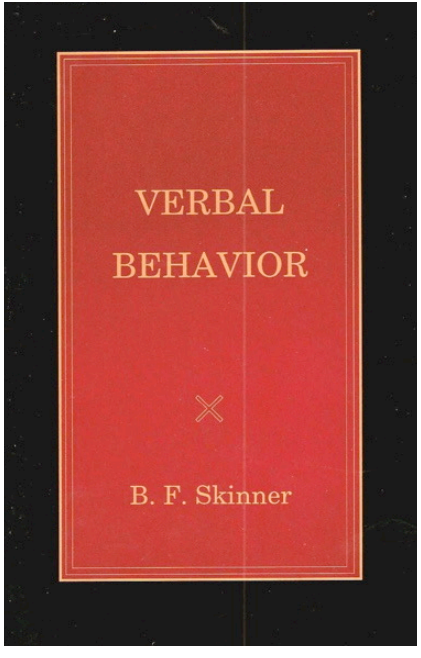
- Most behaviors of interest are not simple reflexes, but rather more complex behaviors
- Operant conditioning was the proposed mechanism by which complex behaviors are learned and caused
- A behavior emitted, and then the resulting environmental effects either increase or decrease the probability that the behavior is emitted again
  - I.e. punishment and reinforcement



A “Skinner box”

Skinner's Verbal Behavior

- Attempt to explain human language within the scientific framework of behaviorism
- Patterns of language behavior seen as complex behaviors learned after a long series of punishments and reinforcements
- E.g., baby somehow manages to utter something resembling "doggie" in response to seeing a dog
  - This is positively reinforced, and so the baby's verbal response "doggie" is more tightly connected to the presence of a dog



Skinner, 1957

Chomsky's (1959) critique

- Behaviorist principles, which might be relevant to identifying why *in some cases* people say or do certain things more often than other things, fail completely to provide an explanation for the basic facts of language structure or language development

Stimulus and response

- "A typical example of *stimulus control* for Skinner would be the response to a piece of music with the utterance *Mozart* or to a painting with the response *Dutch*…
- "Suppose instead of saying *Dutch* we had said *Clashes with the wallpaper, I thought you liked abstract work, Never saw it before, Tilted, Hanging too low, Beautiful, Hideous, Remember our camping trip last summer?*, or whatever else might come into our minds... Skinner could only say that each of these responses is under the control of some other stimulus property of the physical object… ***we [as scientists] identify the stimulus when we hear the response***"

Chomsky, 1959

Response strength

- An absurd example to illustrate the difficulty of applying behaviorist principles to language:
  - "response strength is defined as 'probability of emission' "
  - "It does not appear totally obvious that in this case the way to impress the owner [of a painting] is to shriek *Beautiful* in a loud, high-pitched voice, repeatedly, and with no delay (high response strength). It may be equally effective to look at the picture silently (long delay) and then to murmur *Beautiful* in a soft, low-pitched voice (by definition, very low response strength)."

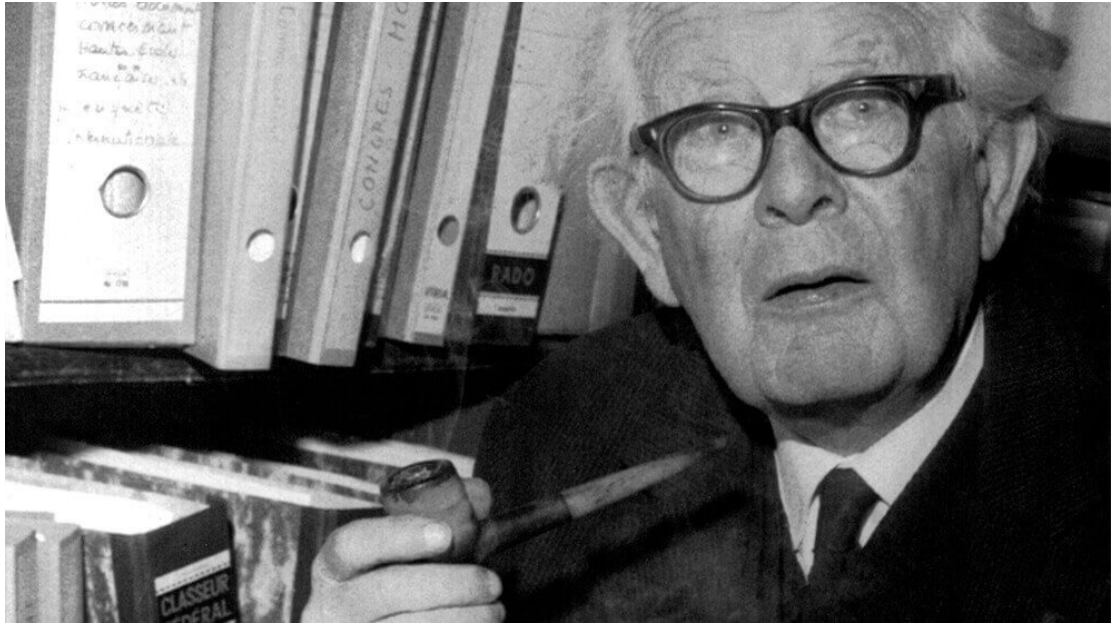
Chomsky, 1959

Behaviorism: conclusions

- Principles of reinforcement are probably relevant at some level to language development
  - Certainly, they can and have been applied usefully to language disorders

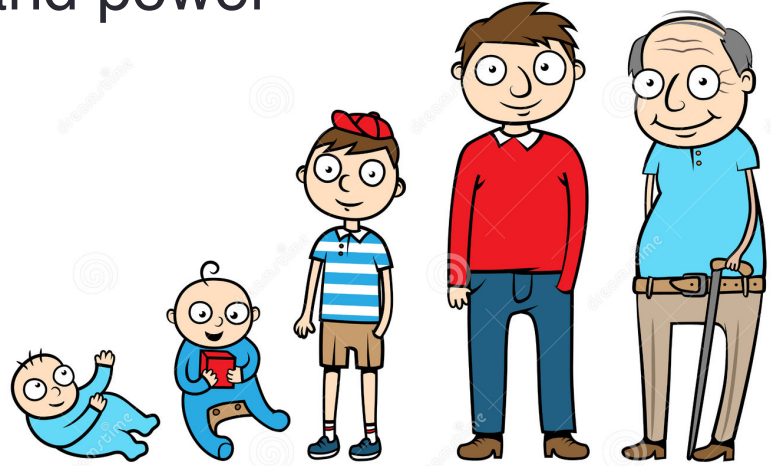
- But, do not really provide deep insight into what language is or how it is acquired

Piaget & Cognitivism

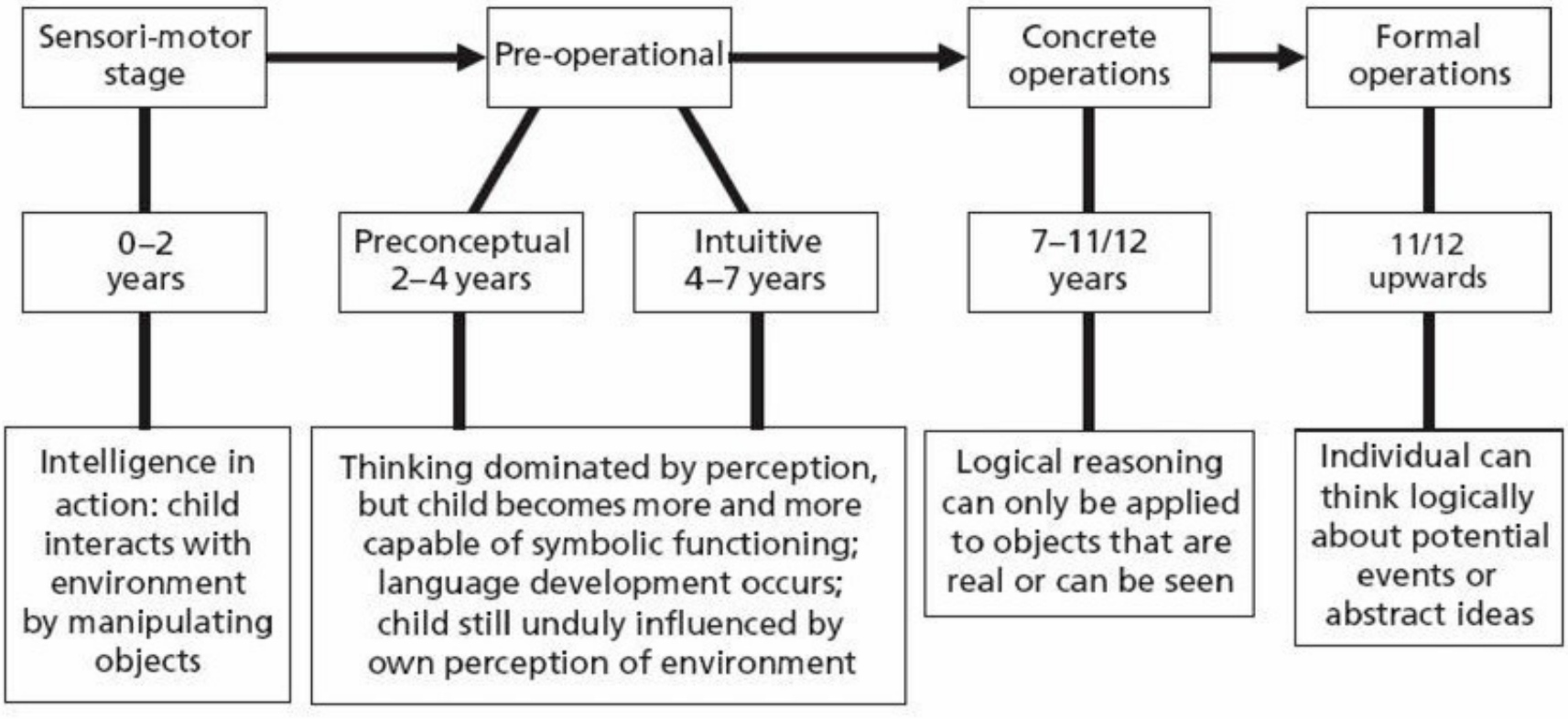


Stages of development

- Piaget's central notion was that cognition progressed through several stages of development, with subsequent stages based on previous stages, yet surpassing them in complexity and power



Piaget's stages of cognitive development



Sensorimotor substages

1. **Reflexes (0-1 months)**
   - Behavior reflects only innate reflexes
2. **Primary Circular Reactions (1-4 months)**
   - Behavior focused exclusively on own bodies and is repeated over and over (e.g., open and close hand, put hand in mouth)
3. **Secondary Circular Reactions (4-8 months)**
   - More aware of and more responsive to the outside world; begin to notice that their behavior can have interesting effects on the objects/people around them (i.e., contingency learning)

Sensorimotor substages

4. **Coordination of Secondary Circular Reactions (8-12 months):**
   - Goal-directed behavior emerges; **object permanence** develops
5. **Tertiary Circular Reactions (12-18 months):**
   - Increasing flexibility and creativity in behavior; experimentation with objects often leads to new unexpected outcomes
6. **Mental Representation (18-24 months):**
   - Symbolic thought emerges (ability to represent and think about objects in terms of internal mental concepts)

Object permanence

- The understanding that objects continue to exist even when they cannot be physically observed
- According to Piaget, once a child gained object permanence for one kind of object, they would expand their cognitive repertoire and obtain object permanence for all objects
- Marks the end of the sensorimotor stage and entry into the preoperational stage

Object permanence

- Sensorimotor stage (no object permanence): https://youtu.be/rVqJacvywAQ

- Incomplete object permanence (A-not-B error): https://youtu.be/4jW668F7HdA
  - **Perseverative** (persisting, unchanging) search error
  - Also could reflect limited executive function abilities in conjunction with intact object permanence

Conservation

- The ability to determine if quantity/volume remains the same despite changes to the container
- Marks transition from preoperational stage to concrete operational stage

- https://youtu.be/gnArvcWaH6I

Cognitive development in stages

- “Horizontal” stages of cognition that apply broadly across many domains
  - Each stage has a set of principles that apply across all domains
  - E.g., principle of **conservation** applies regardless of the material or abstract notion being discussed (e.g. conservation for candy vs. water vs. number of students in a classroom)
- **Schemes** are the basic units of cognition that change under the influence of **organization** and **adaptation**

Piagetian Constructivism

- At a given stage, a set of certain cognitive “tools” (schemata) are available (e.g., “circular” reactions)
- Through experience and interaction with the environment, these tools are eventually transformed into a new set with greater capacity (e.g. secondary circular reactions)
- This new set of tools allows for new experiences/interactions with the environment, which eventually lead to another transformation into a new set of tools
- In this way, sensory-motor capacities eventually lead to complicated cognitive and linguistic abilities

Piagetian Constructivism

- During development, there are differences between the child's mental reality and the world
  - E.g., the child is used to interacting with toys and encounters something that is not a toy
- Through interaction, the child realizes that the object is not a toy
  - The child can make the object a toy **(assimilation)**
  - OR, the child can expand its cognitive repertoire in order to interact with the object in a different way **(accommodation)**
- Both assimilation and accommodation are forms of **equilibrium**: maintaining balance between the mind and the environment

Objections to Piagetian constructivism

- Lack of “horizontal” stages
  - E.g., Object permanence and conservation can occur at different ages for different domains/object types
  - Careful phrasing/explanation reveals that children may actually have object permanence earlier than thought

Objections to Piagetian constructivism

- Language acquisition (at least certain aspects of it) can occur independently of intelligence or intellectual ability
- Quadriplegics and the blind acquire language essentially normally (at least certain core aspects), although they have radically different sensory-motor experiences
- Deaf children show same developmental trajectory as hearing children, including babbling stages
  - Nothing inherent about the sensory-motor schemata of vocal organization that drives language development

Objections to Piagetian constructivism

- Situations of language development that are extremely counterintuitive from a constructivist viewpoint
  - Pronouns in ASL: children often make errors such as pointing at themselves when trying to communicate “you”
  - Exactly the opposite as predicted from constructivism, where pointing as a pronoun emerges from a gesture referring to the self

Piaget: Conclusions

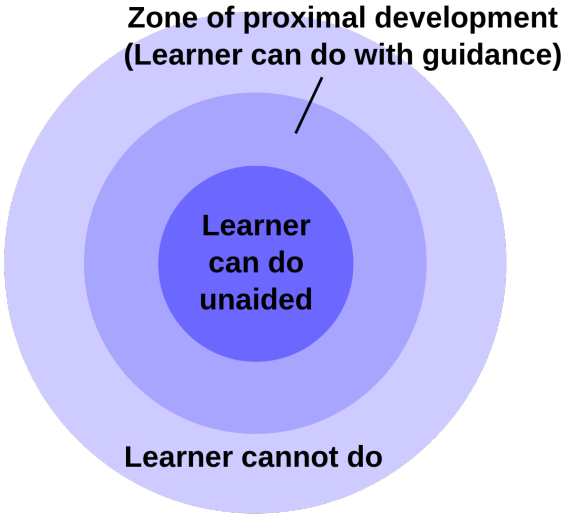
- Piaget at least provided a large body of experimental data regarding children's cognitive capacities
- Piaget's stages of development are *rough* descriptions of children's cognitive capacities at different ages
- **Alternative conclusion:** each cognitive ability may have an independent developmental trajectory from other cognitive abilities

Social Constructivism

- Emphasis on social aspect of knowledge
- “Reality does not exist until constructed by human interaction”
  - Knowledge doesn’t exist in your head, it exists within communities of people

Zone of Proximal Development

- Zone of Proximal Development: the ideal zone for cognitive development
  - Things that a learner is *capable* of doing, but are challenging, may require assistance/guidance
  - Things that can be done trivially are not longer useful for stimulating development
  - Things that are completely out of research cannot or only minimally help development
  - A goldilocks-style “just right” zone (not too hard, not too easy)



Lev Vygotsky

- Social learning precedes development
- I.e., children have complex social knowledge *before* they even interact with the world
  - In contrast to Piaget, who would say they acquire social knowledge because they construct it out of more primitive, physical interactions with the world
  - They interact with the world because they are motivated by social functions

Social constructivism: conclusions

- Social motivations probably do play a major role in driving children to acquire language
- You even see this process playing out in adults: the phenomenon of “accent drift”
  - You start to mimic the accent of those around you
- Modern sociolinguistic research has uncovered how identity and language are intertwined
  - Those who identify positively as from Appalachia tend to retain their accent, whereas those who don’t tend to lose or modulate their accent (Reed, 2016)

Recap

- Language vs. speech vs. communication
  - Language is a social tool
  - Language is a rule-governed system
  - Language is generative
  - Other properties:
    - Reflexive/metalinguistic
    - Displacement
    - Arbitrary
- Linguistic & cognitive learning theories
  - Generative/nativist vs. Interactionalist linguistic theories
  - Behaviorism vs. Piagetian Cognitivism vs. Social Constructivism