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Ling/psych532: introduction

- If the eye is the window to the soul
 - Language
 - Is a window onto the mind....
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- It is a territory in which an “abstract” structure
 - Meets physics and neurology
 - Raises a set of classic problems....

The Structure of the course

- Section 1: TgB lectures (5)
- Section 2: Topical seminars with faculty
- Section 3: Student reports
- Evaluation:
- weekly comments (subject: “ling532”)
- In-class participation:
- One presentation – discuss by Feb. 16
- Email subject heading: “ling532...”

Classic questions and answers

- **Nativism vs Empiricism**
- **Rationalism vs Behaviorism**
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- **Rules vs habits**
- **Form vs meaning**
- **Innate vs learned**
- **Modular vs connectionist behaviors**
- **Localist vs global neurology**
- **Universals vs. Frequent Patterns**
- **Review lecture topics**

History of psychology of language

The psychological science of language from 1880 to 1950: From eclectic mentalism (Wundt) to behaviorism (Watson) to S/R associationism (Skinner). The primary focus is on historical attempts to capture linguistic behavior with a principled minimal architecture – stimulus-response association: the first “psycholinguistics” (Osgood et al).

Jan 20) The rediscovery of the sentence: The dominant S/R behaviorist models foundered on logical grounds and on Miller’s experimental demonstrations of the psychological role of the sentence – a representational level beyond the power of associative models. Syntactic Structures Syntax and associated “psychological reality” studies.

History of Grammatical Architecture

- **Jan 27) (LATE START – magic show) Linguistic science of language from 1880 to the 1950s: Early descriptive models Wundt (including transformations) (Bloomfield 1 - 1915), Sapir. Operationalist structuralism (Bloomfield 2 - 1936), Harris.**
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- **Feb 3) The generative-rationalist revolution. The last fifty years of generative syntax reflects a gradual shift from multiple rule-based to minimal principle-based syntactic architectures (this time the principles are hierarchical composition and recursion). There is a consistent notion of inner and outer forms for sentences, and the notion of a computational derivational relation between them.**

Linguistic models and case studies

- **Feb10) Interrelating statistical and structural processes.**
Psycholinguistic models historically attempted to unify learning and linguistic structure via associative learning theory, alas an inadequate theory. Linguistic models have emphasized pure structural learning and assignment, also inadequate to the importance of statistical facts in learning and behavior. Analysis by Synthesis as a constructive comprehension model which integrates statistical and structural properties of language.
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- **Feb 10: Acquisition, parameter setting vs. problem solving models. Piatelli-palmarini, Bever, (McKee) Ohala, Gerken (Gomez)**
- **Feb 17: Aphasia and language in the brain: Beeson, Christensen, Patterson, Wilson (Dede), (Plante) (Rapschak)**
- **Feb 24: More Neurolinguistics**

More case studies

- **March 3: Psychoacoustics, phonetics and related phenomena – Hammond, Lotto, Warner, Archangeli,**
- **March 10: Structure and representation of the lexicon: Harley, (Forster), (Badecker), Ussishkin**
- **March 17:, Spring Break**
- **March 24: Speech Production and acquisition: Garrett, Mckee, Harley**
- **March 31: Models and language evolution. Wedel, Piatelli-palmarini, Medeiros, Barss**
- **April 7) Computational models and language behavior. Cohen, Fong, Faisel, Hammond**
- **April 14) Bilingualism, brain and second language acquisition. Adamson, (Nicol), (Dallas), (Alt) Troike**
- **April 21-22) Universals of Language (Keynote address, of WCCFL) Bever**
- **April 28) More on universals . Everyone.**

Setting the Scene:

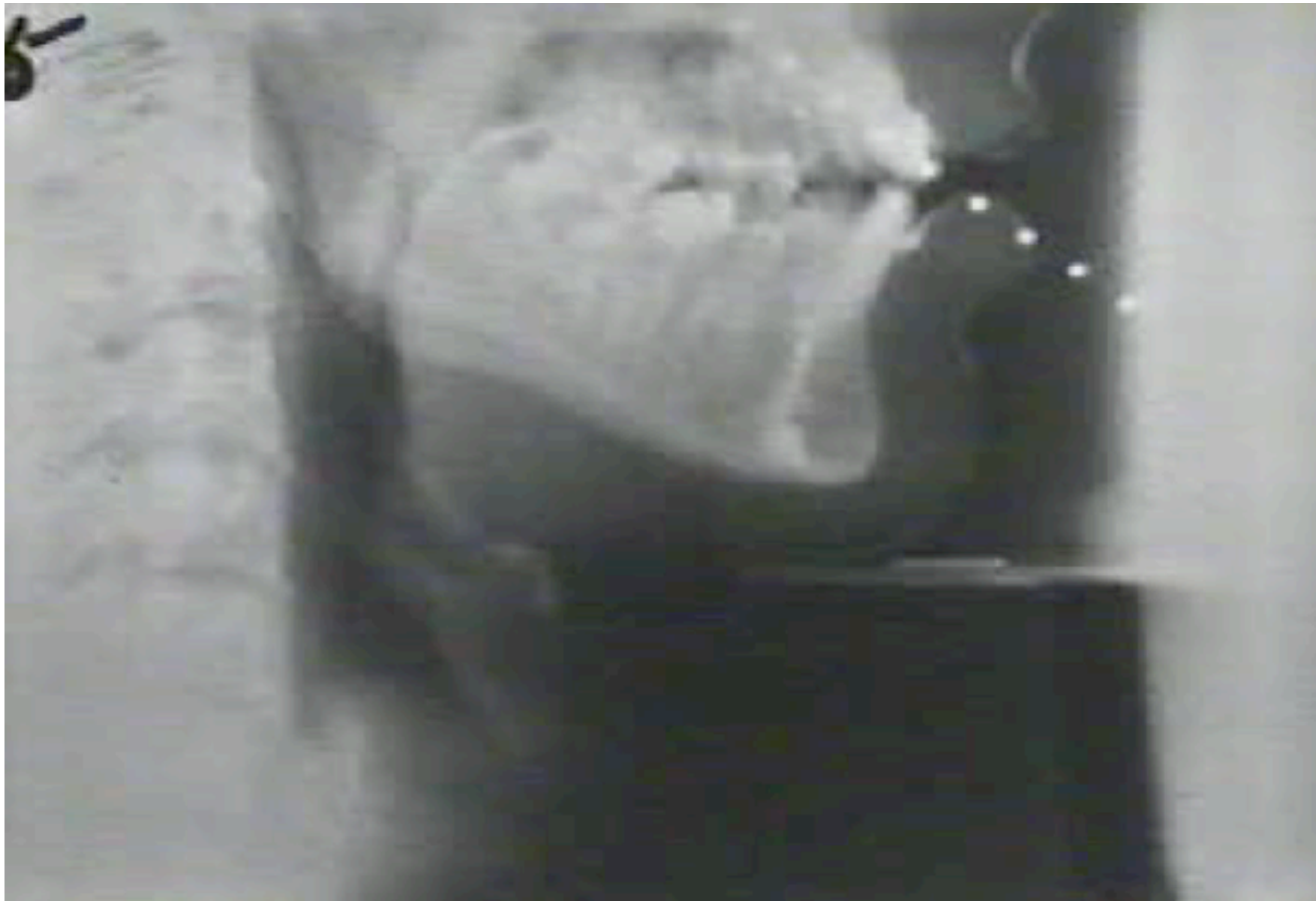
The reconstructive nature of language

- Language behavior involves multiple layers of reconstructing how it was produced
- Sentences are the ‘highest’ natural level of representation that is reconstructed
- At each level there is some form of analysis by synthesis, reconstructing a “derivation”

Example of what we hear: Sound alone



Then look at waveform.....as it is heard



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Enduring issues in Psycholinguistics

The scientific history of the sentence

- Two related threads of approaches to language
- Psychology - Wundt -> behaviorism -> WW2 (Miller) -> rationalism
- Linguistics - (Wundt)Bloomfield1/Sapir -> Bloomfield2 -> Harris -> Chomsky ->
- Evolution of architectures: syntactic structures -> aspects -> gen.semantics -> interpretive semantics -> GB -> minimalism 1 -> minimalism 2
- Syntax as: social system -> habits -> knowledge -> perfect interface

Psychology of Language, briefer history

- This course is about what we know (*language*) and what we do with what we know (*language behavior*)
- The initial problem is: **where does our knowledge come from?**
- Two classic answers:
 - from “the world” (*empiricism*)
 - from “inside” (*nativism*)

Empiricism: *the truth is Out There*

- The infant's mind is an “**empty blackboard**”
- The world “writes” on it, and “fills it up” with knowledge.
- The child's mind is essentially a memory bank that stores everything it “experiences”
- Something like language is the way it is because it historically happened to be that way.

Nativism: *the truth lies In Us*

- The child's mind is highly channeled/structured
- The child imposes structure to *create* “experience”
- Prestructured experiences accumulate in memory:
the role of experience is like water to a flower seed.
- Language is the way it is, because it is *innate*.

Both views are right and wrong

- Perceiving the world involves forming *mental representations* -
Empiricism is wrong
- The world is repeatable, not *an illusion* -
Nativism is wrong

Simple Evidence for Representations: The case of Vision

- Vision works by snapshots, continuity is created
- What we “see” is actually scattered light, not “real” objects or scenes
- No real object is as perfect as it seems mentally

“Continuous” vision starts with snapshots

- Rabbit parts -> whole rabbit filled in
- Reading text by jerky fixations (blind during movement)
- You don’t “see” the eye in motion because of feed-forward from motor areas
- (but try wiggling your eyeball externally - then the world wiggles too)

What we “see” is scattered light

- A “seen” object is actually orderly reorderings of light, reflected onto the retina
- Consider a pingpong ball “gun” as a kind of “flashlight”
- It bounces the balls off of a face in an orderly way, and it is that order that creates an imposed retinal image
- The mind has to then put it back into a “percept”

We “see” more perfectly than reality

- The “whole” rabbit, including a representation of its “other side” is never completely presented
- There are no perfect real circles, except in our mind
- Hence, the mind creates visual....
 - - Continuity
 - - Representations
 - - Idealizations

The case of language: the mind *creates* “sentences”

- Arguments from Wilhelm Wundt, “father of experimental psychology”
- “Words” can be defined as “memorized sound sequences linked to ‘meanings’.
- But language occurs in groupings of words which have transcendental meaning - **sentences**.
- The boy likes the dog/ the dog likes the boy
- *likes the boy the dog / *the dog the boy likes

The sentence as “*mental representation*”

- Attempts to define the sentence “objectively” fail
- Not **word sequences** - single word sentences exist, “help”, “sit”, “wait”
- Not **meaningful** groups or sequences - “Monday, Tuesday....”: “puddle pond, lake, ocean”
- There are **nonsense sentences**: “Colorless green ideas sleep furiously” (Chomsky)
- Restricted in word orders which speakers know:
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- “*green sleep ideas colorless furiously”

Sentences are independent of meaning

- Some “sentences have NO meaning!
- *Colorless green ideas sleep furiously*
- Some non-sentences have meaning
- *Monday, Tuesday...: puddle/pond/lake/ocean*

Sentences have internal structures

- “Inner vs Outer form”.... (Wundt again)
- *Caesar crossed the Rubicon. The Rubicon was crossed by Caesar. Caesar succeeded in crossing the Rubicon. Cross the Rubicon is what Caesar did...What happened to the Rubicon is Caesar crossed it....etc.*
- *Caesar* = “agent”
- *Cross* = “action”
- *Rubicon* = “patient”

Wundt concludes: Sentences are **“mental representations”**

- They are “real” but reside in the **“intuitions”** of speakers.
- This makes them part of a speaker’s **“knowledge”**
- For Wundt, this relegated the study of language to “social psychology”, not “experimental” study
- But language structure can be studied.
- **Why did Wundt’s sensible ideas die?**

Behaviorism: a big misunderstanding

- Positivism in 19th/20th century physics
- Measurement techniques were interfering with what is measured
- Suppose the “light gun” was shooting tennisballs it would actually move or flatten you and give a distorted image
- Positivism required a theory of the observing tool itself and the interaction with the observed: a perfectly sensible idea

“Physics Envy” in psychology

- Positivism requires explicit theories of the relation between observer and observed
- In psychology, this became transmogrified:
thou shalt not posit any mental structure without a method to observe it
- This is the **behaviorist doctrine**.
- Consequence for the study of language:
the sentence does not
“exist” (except for philosophers)
- How do we define what is **observable**?

Stimulus Response Psychology: defines “observables”

- Pavlov showed that single reflexes can be trained: dog salivates to a bell paired with food that is, a “stimulus” becomes “associated” with a “response” - reflexes as basic units
- Skinner developed this notion and generalized it to account for all kinds of behaviors, not just reflexes
- The study of language became the study of “words” and responses to them

The relation between Behaviorism and Empiricism

- If language is all words, **nativism is not needed:**
(unlike sentences words are “out there”
in the world)
- So, if Behaviorism is a correct kind of theory,
empiricism may be true
- If the child can learn only what is observable,
then **empiricism must be true**
- Mutual alliance between behaviorism/empiricism
against nativism/”rationalism”

Empiricism and Behaviorism excluded the sentence from science

- The only entities allowed in a theory **must be observable** (You cannot ‘see’ someone’s intuitions about sentences)
- The only kind of relation that can form between entities is **association**
- The dominant theory that emerged was **“stimulus-response” associationism**

Associationism

- Pavlov's dog and reflexology:
 - Meat -> salivation
 - Meat + tone -> salivation
 - Tone -> salivation
-
- Skinner removed “biology” from the paradigm, so **any** behavior could be trained to stimuli, not just reflexes.

Operant associationism

- Animal emits “behavior” given a stimulus, which is “reinforced”, leading to an automatic association.
- **Stimulus -> Response /Reinforcement**
- (Recall the pigeon, reinforced every time it started a turn, until it “learned” to make complete turns)
- Study of “General laws” of learning: spacing, timing, frequency, etc....
- All independent questions of what is learned, or what organism does the learning

Associations

- Are virtuous for Empiricism/Behaviorism because what is observed externally is identical with what is posited ‘internally’.
- If “x is associated with y” ‘internally’ it means that we can observe a “y” when there is an “x”.
- This fits with behaviorism, and empiricism (all knowledge derives from the world)....
- But does it fit with obvious facts....?

Limitations of Associations

- Definitions vs. Frequencies (professional B-ball players are tall and/or fast)
- Children know the distinction between:
- a) **true in my experience** (Typical dog = collie/germanshepherd'etc.)
- b) **true by definition** (dogs (dachsunds, wolfhounds, chiuaua vs. cats)

Associations vs internal relations

- We “learn” about B-ball explicitly, and dogs implicitly.
- So, maybe Associationism is inadequate for categories that humans learn – I.e., associations are good for everything else....
- Nope: simple demonstrations of innate perceptual constraints that transcend associations:
 - a) Causal sequences (billiard balls)
 - b) Gestalten

Gestalten are like sentences.....
in a way

- Square as four dots.... **O** **O**

 O **O**
- **Internal organization creates
“ideal” objects**

Idealization of percepts

- Square as four dots.... **O** **O**

 O **O**
- **Internal organization creates “ideal” objects**
- **Are sentence organizations of words, like gestalten?**

Thus, “psychology” became the study
of learning:

if it can't be learned, it can't be real

Effect on study of language

- At first, ca 1900, Wundt's/continental views were accepted in psychology....but then....
- **Behaviorism interdicted**
- All focused on words, words, words, as associatable elements. Sentence structures, inner/outer form, even simple superficial phrasing was ignored, because it could not be **operationally defined**
- **All linguistic knowledge derived from what can be learned, according to behaviorist restrictions**
Gestalt psychologists ignored language because it was “obviously learned”. (inner form is like a gestalt, not definable, hence, “not learnable”)

Never mind about the WHY of a crime.....

*Just figure out the HOW, and the why
will take care of itself....*

Lord Peter Wimsey