Recap

• PREScriptive vs. DESCRIPTIVE grammar
• Grammar
  – Phonology, morphology, syntax
• Glossed examples from different languages
  食べ物ありますか。
  Tabemono arimasu ka.
  Food exist INT
  “Do you have food?”
Language

• Sapir (1921)
  – Language is a purely human non-instinctive method of communication of an idea, emotions, and desires by means of voluntarily produced symbols.
Language

• Bloch and Trager (1942)
  – A language is a system of arbitrary vocal symbols by means of which a social group co-operates.
Language

• Hall (1968)
  – Language is the institution whereby humans communicate and interact with each other by means of habitually used oral-auditory symbols.
Language

• Robins (1979)
  – Languages are symbol systems almost wholly based on pure or arbitrary convention. Languages are infinitely extendable and modifiable according to the changing needs and conditions of the speakers.
Language

• Chomsky (1957)
  – From now on I will consider a language to be a set (finite or infinite) of sentences, each finite in length and constructed out of a finite set of elements.
Language

• Natural Languages
  – Turkish, English, French, German, Spanish, Japanese, Persian, Arabic, Azerbaijani, Italian, Russian, Ancient Greek, Latin, Ottoman, Zazaki, Crimean Tatar, Karaim, Chinese, Turkish Sign Language

• Constructed Languages
  – International Auxiliary Languages: Esperanto
  – Fictional Languages: Klingon, Sindarin and Quenya (Elvish), Dothraki, Na’vi

• Formal Languages
  – L(G)={a^n b^m a^n | n>0, m>0}, Programming languages, mathematical logic
Language

• Human Languages
  – Language is specific to human species

• Language have a physical aspect
  – Uniformity of language acquisition
  – Critical period (5-11 yrs)

• Innateness

• Modularity
Language

- Modular hypothesis
Syntax

• not its means this place nothing if in sentence syntax is

• Bag of words vs. acceptable string of meaningful words

• Glibs are frussing on the drubles and the brigger is not groucked about it.
Words

• Content words
  – food, cat, tree, sentence, syntax, place, book, vase, liberty, velocity, infinity, void, expression, talk, stop, think, cognize, glib, fruss, druble, brigger, grouck

• Function words
  – Are, of, in, the, and, not (Eng) mi, de, ve, ki (Tr) ha, ga, o, ka, ne (Jp) ne, pas, est (Fr)
Word order

• English -> generally inflexible
  – topicalization, heavy NP shift,
• Turkish -> more flexible
• Etmez bu anlam yerli cümle ifade olmadıkça sözdizimi hiç bir yerinde
• Not that flexible
Word order

• Ali duvarı maviye boyadı.

• Duvarı maviye Ali boyadı.

• Duvarı maviye boyadı Ali.

• Maviye boyadı duvarı Ali.
Syntactic Changes

• Promotion/demotion
• Duvar maviye boyandı.
• Duvar Ali tarafından maviye boyandı.
• Ahmet duvarı maviye boyattı.
• Ahmet Ali’ye duvarı boyattı.
Lingistic Structure

• Hierarchical
• Embedding -> recursion

• I wonder if [her sister [who is 28 years old] is a student [who is about to graduate]].
Linguistic Structure

• I know that you think that she assumes that I guess...

• Senin adamın kitabı okuduğunu bildiğini düşündüğümü sanıyorsun.

• There is no end to recursion
  – But human memory is limited!
Linguistic Structure

- I charged up the battery
- I charged up the street

- I charged the battery up
- * I charged the street up

- I [charged up] the battery
- I charged [up the street]

- CONSTITUENTS
Linguistic Structure

• I saw the woman next door’s children.
• What was that guy who retired last month’s name?
• The student I lent the book to’s room-mate said she’d left.

• [the woman]’s -> [the woman next door]’s
• [that guy who retired last month]’s
• [the student I lent the book to]’s
Linguistic Structure

• **CONCLUSION:**

  Linguistic rules are structure dependent.
Linguistic Structure

• Fiction of primitive languages
  – There are no primitive languages
  – Sometimes there are languages in making
  – Pidgins -> Creoles
How to make pretty graphs for 501

- www.graphviz.org
  - **dot** - "hierarchical" or layered drawings of directed graphs.
  - **neato** - "spring model" layouts.
  - **fdp** - "spring model" layouts.
  - **sfdp** - multiscale version of fdp.
  - **twopi** - radial layouts.
  - **circo** - circular layout.
Basic Tree

dot -Tjpg tree.gv -o tree.jpg
Sample Syntactic Tree

graph Sentence {
  rankdir = TB;
  node [shape="box" color="#f0f0f0"];  
  S -- NP1; S -- VP1;
  NP1 -- Det1; NP1 -- N1;
  Det1 -- L1;
  N1 -- L2;
  VP1 -- V1; VP1 -- NP2;
  V1 -- L3;
  NP2 -- Det2; NP2 -- N2;
  Det2 -- L4;
  N2 -- L5;
  NP1 [label="NP"]; NP2 [label="NP"];  
  VP1 [label="VP"]; V1 [label="V"];  
  Det1 [label="Det"]; Det2 [label="Det"];  
  N1 [label="N"]; N2 [label="N"];  
  L1 [label="The"]; L2 [label="cat"]; L3 [label="drank"]; L4 [label="the"]; L5 [label="milk"];  
}
digraph Automata {
rankdir = LR;
node [shape="circle"]; q0 -> q1 [label="a,b"]; q1 [shape = "doublecircle"]; }

Command: dot -Tjpg automata.gv -o automata.jpg
Sample FSM

digraph Machine {
    rankdir = LR;
    node [shape="circle"];
    // I define a dummy state and make it white
    // I make the edge invisible so that there is only an arrowhead before q0
    // the arrowhead marks q0 as the starting state
    q [color="white" label=" "];
    q -> q0 [style="invisible" arrowhead="open"]; q0 -> q1 [label="a"];
    q0 -> q3 [label="b"]; q1 -> q2 [label="a"]; q3 -> q2 [label="b"]; q2 [shape = "doublecircle"]; q1 -> qe [label="b" color="grey"]; q2 -> qe [label="a" color="grey"]; q2 -> qe [label="b" color="grey"]; q3 -> qe [label="a" color="grey"]; qe [color="grey"];
    q1 -> qe [label="b" color="grey"]; q2 -> qe [label="a" color="grey"]; q2 -> qe [label="b" color="grey"]; q3 -> qe [label="a" color="grey"]; qe [color="grey"];
}