Introduction to Language

I. Nature of Human Language
II. Aspect of Linguistic Competence
III. Chomsky’s Transformational Grammar
IV. Multilingualism

I. Nature of Human Language
A. Linguistic Diversity

There are at least 7,102 living languages in the world.

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of Languages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>2,301</td>
</tr>
<tr>
<td>Africa</td>
<td>2,136</td>
</tr>
<tr>
<td>Pacific</td>
<td>1,313</td>
</tr>
<tr>
<td>Americas</td>
<td>1,064</td>
</tr>
<tr>
<td>Europe</td>
<td>286</td>
</tr>
</tbody>
</table>

Sources: Ethnologue: Languages of the World, Eighth edition; THE WASHINGTON POST

Many languages have multiple dialects
Chinese: 200
English: 60?
Half of the spoken languages may disappear by the end of the century.

At-risk languages
- Critically endangered
- Seriously endangered
- Endangered

Sources: Alliance for Linguistic Diversity, UNESCO
GENE THOGR AND KEVIN SCHULL, THE WASHINGTON POST

I. Nature of Human Language

Languages: not mutually intelligible
- Differences in vocabularies
- Differences in grammar
- Differences in phonemes

Dialects: mutually intelligible variations on a language
- Associated with regions, race, or social class
- Differences in grammar
- Differences in vocabulary
- Differences in pronunciations
- Common expressions within a dialect

Some Examples: (Delaney, 2010)

Linguists count between 3 (New England, Southern and Western/General America) and 24 English dialects in the U.S.
Pop/Soda/Coke

R-ful Southern

R sound after consonants:

Card
Fire
Fork
Turn

-Y offglide after a vowl:

My
High
Light
Nine

Dialect Example: The merger of /i/ and /e/ before nasals

Compare:

pin  pen
him  hem
I. Nature of Human Language

B. Linguistic Universals: Attributes shared by natural human languages that distinguish them from animal communication and artificial languages.

Greenberg (1963) described 45 For example “all languages have nouns and verbs . . .”

Hockett (1966) called these “design features” and identified 16 that appear in all human languages, only a subset of these appear in animal communication.

B. Linguistic Universals (cont):

Some examples (from Hockett):

1) Semanticity: words stand for something other then themselves. They represent something in its absence
   e.g. “chair”
   exception: supercalifragilisticexpialadocious

I. Nature of Human Language

B. Linguistic Universals (cont):

2) Arbitrariness: the relation between a linguistic element and its meaning is independent of physical resemblance
   Exception: onomatopoeia (e.g., “spill”)

Iconic languages at not arbitrary:
   e.g., computer icons
Often artificial languages are not arbitrary:
- American Sign Language (mostly iconic)

Animal communication through signs is not arbitrary
- "waggle dance" of the bees
- Washoe sign language.

I. Nature of Human Language

B. Linguistic Universals (cont):
3. Openness: New linguistic messages can be coined freely and easily.

Enables: new elements
expression of novel experiences
falsehoods or lies

Can chimpanzees learn an open language
Washoe's "water-bird" in reference to a swan

4. Discreteness: Language is made up of elements.
Meaning derives from combinations of elements not by variation of the elements.

Example: communication of continuous dimensions (distances or time) with the combination of discrete linguistic elements.
II. Aspects of Linguistic Competence

A. Linguistic Competence

The nature and scope of our knowledge of a language that makes us successful users of the language.

1) Meaning: Semantic System

An internal representation of meaning.

II. Aspects of Linguistic Competence (cont)

2) Grammar

Syntactic System: A system that specifies the organization among words, and determines the relation between sound and meaning.

A system of rules that enable us to judge:

- grammaticality
- ambiguity
- synonymity

"Colorless green ideas sleep furiously."
"The chicken is ready to eat."
"The girl was kissed by the boy." vs. "The boy kissed the girl."

III. Aspects of Linguistic Competence (cont)

3) Sound

Phonological System: A system of speech sounds, and rules for combining those sounds to produce and understand utterances.

phonetic features -> phonetic segments -> phonemes
II. Aspects of Linguistic Competence (cont)

B. How the systems work together: An example.

The dog chased the cat.
phonological
semantic
syntactic (grammatical)

III. Chomsky’s Transformational Grammar

A. What it is: A theory of how the components of linguistic competence work together

B. Why it is important:
   Demonstrated the inadequacies of the behaviorist attempt to explain human language.

Skinner (Verbal Behavior, 1957)
a behaviorist account of language

Chomsky (1957, 1965, 1975) developed the transformational theory as a theory of language.

III. Chomsky’s Transformational Grammar

Chomsky’s challenges to behaviorism:
1) linguistic universals
   languages developed independently, why are there linguistic universals?
   These universals were thought to derive from an innate mechanism that provided humans with the structures needed to acquire and use our languages.
   e.g. Language Acquisition device (LAD)
   critical period in language development
III. Chomsky’s Transformational Grammar

2) separation of the syntactic system and the semantic system.

Broca’s aphasia: loss of grammar
Sarah Scott: Expressive Aphasia

Wernicke’s aphasia: loss of meaning
http://www.youtube.com/watch?v=dKTdMV6cOZw

3) sentence ambiguity

Behaviorist Account

\[ S \rightarrow S_1 \quad S_2 \]

Chomsky’s account (4 kinds of ambiguity)
phonological ambiguity
lexical ambiguity
syntactic ambiguity (2 kinds)

C. The structure of a transformational grammar

Phrase-Structure Rules
Deep Structure
Transformational Rules
Surface Structure
Phonological Rules
Sounds
Semantic System
Semantic Interpretation
III. Chomsky’s Transformational Grammar (cont)

D. Phrase Structure Grammar

1) Phrase structure rules
   (R1) S → NP + VP
   (R2) NP → Art + (Adj) + N
   (R3) VP → V + NP

2) Lexical Insertion Rules
   Art → the, a
   Adj → happy, sad, tall
   N → boy, girl, man, toy
   V → kissed, hugged

D. Phrase Structure Grammar (cont)

3) Phrase Structure

```
          S
         /\  
   NP  VP
   /    
Art     V
/          
The  boy  kissed  the  girl.
```

D) Extension of Phrase Structure Grammar (Transformational Grammar)
   a) provides for openness
   b) enables sentences with embedded clauses

EXAMPLE: This is the house that Jack built.
This is (the dog that lives in) the house that Jack built.

c) shows how sentences with different structures can share a meaning.
   "The girl was kissed by the boy." vs. "The boy kissed the girl."
E. Transformational Grammar

E. Extension of Phrase Structure Grammar
(Transformational Grammar)
1) Change the phrase structure rules by adding recursive processes.

(R1) $S \rightarrow NP + VP$
(R2') $NP \rightarrow Art + (Adj) + N + (S)$
(R3) $VP \rightarrow V + NP$

Deep Structure (represents the meaning)

The boy kissed the girl who hugged the man.
(but it is not a grammatical sentence)

2) add Transformational rules (e.g., equi NP deletion)

Surface Structure (what we speak and hear)

The boy kissed the girl who hugged the man.
E. Transformational Grammar

Definitions:

**Deep Structure**: The structure of the sentence resulting from the application of the phrase structure rules. Conveys the meaning of the sentence, but may be ungrammatical.

**Surface Structure**: The final description of the sentence after application of the transformational rules to the deep structure.

F. Implications of Transformational grammar

1. Shared meaning implies shared deep structures

```
The boy kisses the girl. (deep structure)
↓
past tense transformation
↓
The boy kissed the girl.
↓
passive voice transformation
↓
The girl was kissed by the boy.
```

2. Meaning and surface structure are only indirectly connected.

Extended Example: multiple types of ambiguity

- **Phonological ambiguity**
  - “I heard there is a black hole near Uranus.”

- **Lexical ambiguity**
  - Horses are introduced to America.
surface structure ambiguity: two surface structures and two deep structures.

They are frying chickens. They are frying chickens.
IV. Multiple Languages

Issues:
A. Impact of raising children in bilingual households.
B. How are multiple languages represented in semantic memory?
C. Struggle in the school systems: How can we cope with the range of languages in the public schools?
A. Raising children bilingually

Hakuta, Ferdman, & Diaz (1987)
Compared bilinguals with a matched control group
Bilinguals - higher analytical reasoning
higher concept formation
greater cognitive flexibility

Galambos & Goldin-Meadow (1990)
Looked at the meta-linguistic skills of bilinguals
- were more conscious of language structure
- were more aware that words were arbitrary symbols

B. How are multiple languages represented?

Single system hypothesis:
languages share an underlying representational system

Dual (multiple) system hypothesis:
each language has a separate representational system with the semantic network

Single system hypothesis:

<table>
<thead>
<tr>
<th>Language A</th>
<th>Representation of meaning</th>
<th>Language B</th>
</tr>
</thead>
<tbody>
<tr>
<td>chair</td>
<td>silla</td>
<td>rich</td>
</tr>
<tr>
<td>bread</td>
<td>pan</td>
<td></td>
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Dual (multiple) system hypothesis:

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Single vs. Dual System

Brain damage
- Sometimes first language recovers first after brain damage, sometimes the second language recovers first (Albert & Obler, 1978; Paradis, 1977) (supports some duality)

Electrical stimulation of the brain
- (Ojemann & Witacker, 1978)
- Electrical stimulation of some areas inhibits retrieval of both languages equally (support single system)
- But, other areas show impairment of only one language.

Semantic Priming Studies
- Does activation of a word in one language lead to automatic activation of a word in the second language?

Example:

<table>
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<th>Prime</th>
<th>Target</th>
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<tbody>
<tr>
<td>chair</td>
<td>silla</td>
</tr>
<tr>
<td>XXXX</td>
<td>silla</td>
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</table>
Single vs. Dual System

De Goot & Nas (1991)

Semantic priming only occurs with words that share phonological and orthographic properties

- **e.g.,** rich primes rico
- but, not for words that do not share these properties
  - **e.g.,** woman does not prime mujer

Conclusion: separate but interconnected systems

Bilingualism and Cognitive Reserve

Fig. 2. A schematic representation of potential bilingual CR mechanisms. Bilingualism may delay the onset of clinical AD symptoms through positive effects on the functioning of frontostriatal and frontoparietal brain systems involved in executive control functions.


C. Struggle in the school systems

Local and National Issue:

Increasing number of children in the public schools are English learners.

These children often fall behind academically, and are expensive to educate.

(Sources: NYT; National Clearinghouse for English Language Acquisition and Language Instruction Educational Programs; National Center for Educational Statistics; state boards of education; U.S. Department of Education; Editorial Projects in Education Research Center)
C. Struggle in the school systems

In Rutherford County:
- 700 kids in which English is not their first language
- 280 are Low English Proficiency (LEP)
- 20 different languages spoken
- Followed by Lao, Japanese, Korean
These children are given instruction in English as a second language. Typically this is one hour a day. The rest of the day they attend class with other students. It typically takes 7 years to get through the program.
C. Struggle in the school systems

Single language education:
Pros: Assimilation?
Economic advantage?
Cons: -associated with high drop out rates
(August & Garia, 1988; Ruiz, 1988)

In studies of Bilingual Education
(Carden, 1984; Wong-Fillmore et al. 1985)
children more involved in learning
participate more in classroom activities
learned the second language more quickly

V. Summary

A. There is great variability across languages
   (linguistic diversity)
B. In spite of this diversity, there are many things
   common across languages
   (linguistic universals)
C. To be competent users of a language we must have
   three things:
syntactic system, semantic system, phonological system
D. Chomsky’s theory explains how these systems work
   and how they are the source of linguistic universals.
E. Research concerning bilingual education suggests
   that such education can be valuable.