Goals of Syntactic Theory

1. Build a grammar that generates all possible sentences of English: A Generative Grammar
2. Explain cross-language universals and cross-language variation in the possible forms of sentences
3. "It would be a HUGE BONUS if the theory could explain how children acquire syntactic knowledge so quickly and with so few errors"

Our progress so far:
The first goal

• We have taken a first step at building a grammar which describes English. We have a grammar that contains...

Syntactic System

• Templates for phrases and sentences
  – Phrase structure rules or trees
• The lexicon
  – Individual words dictate requirements for obligatory phrases (arguments)
• Transformations
  – Rules for transforming basic sentences in systematic ways (pre-no question transformation)
• System-wide Constraints and Requirements

System-wide Constraints and Requirements

• Requirement of English: All tensed clauses must have an overt subject
  – The soup was boiling.
  – Mary watered the flowers.
  – "Watered the flowers.
  – The flowers were watered.
  – There was an explosion.
  – "Was an explosion.
  – It is raining.
  – Is raining.

System-wide Constraints

• Constraint of English: You cannot move something out of a coordinate structure
  – I saw Dick Cheney with his daughter at the airport
  – Who did you see Dick Cheney with __ at the airport?
  – I saw Dick Cheney and his daughter at the airport
  – "Who did you see Dick Cheney and __ at the airport?"

Very similar on the surface, but structures very different

What determines what counts as a well-formed sentence of English?

• Templates for phrases and sentences
  – Phrase structure rules or trees
• The lexicon
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• Transformations
  – Rules for transforming basic sentences in systematic ways (pre-no question transformation)
• System-wide Constraints and Requirements
  – All tensed clauses must have an overt subject
  – No movement of phrases out of a coordinate phrase
  – Etc.

What determines what counts as a well-formed sentence of Japanese, Polish, Basque, Yoruba, Navajo?

• You could pursue this question independently for every language. This would satisfy Goal #1, but not #2 and #3
• Question related to Goal #2: When you look across languages, which of the things that determine what counts as a well-formed sentence vary? Which things do not vary? How do they vary?

Language Variation

With enough details from enough languages, we observe:

a) Persistent similarities
b) Curious restrictions on variability
c) And also continuous variation

...for different parts of grammar

Implications for Goal #3: a) and b) are potential candidates for innate expectations about what human language can look like
Languages differ, but many differences are tightly constricted.

Parameters
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  - All that the child needs to do is to determine from the input which setting each of the parameters needs to have for the language in his/her environment.

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Some features of syntactic systems are invariant across all human languages.

Principles (Universals)
- Some features of syntactic systems are invariant across all human languages
- Principles and Parameters
  - So what are the Principles and Parameters?
  - Good question! — That’s what linguists spend their time trying to figure out.
  - Since 1981, many principles and parameters have been proposed. As our understanding of language grows, new evidence comes to light, and previous proposals are discarded in favor of better motivated ones. It’s hard to keep a current tally of “the principles we know of” because of the active nature of the field.

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Cross-linguistic Variation in Word Order
- Word-order patterns for different languages can be generated using:
  - (i) same rules/tree-fragments as English
    - NP → N Det
    - PP → P NP
    - VP → N P
    - S → S' V
    - S' → S Comp
  - (ii) changing order of rules/tree-fragments
- Question: what kind of variation is this?

One parameter: Head Direction
1. Heads come before their complements (English)
   - VP → V NP
   - V' → V S'
   - PP → P NP
   - e.g. ate [dinner]
   - believe [that you are here]
   - e.g. under [the table]
2. Heads come after their complements (Japanese)
   - VP → NP V
   - V' → S' V
   - PP → NP P
   - e.g. [dinner] ate
   - [that you are here] believe
   - e.g. [table] under

Which parts of the syntax of languages do and do not show variation? What type of variation?
- Templates for phrases and sentences
- The lexicon
- Transformations
- System-wide Constraints/Requirements

Universal Grammar
- Existence of these principles and switches for parameters
- Plus a procedure for setting the parameters

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Japanese phrase structure rules

NP → N Det
PP → NP P
VP → NP V
S → NP VP

Japanese

a. きれいなデパート
beautiful store
b. 京都へ
to Kyoto

c. すみません、今から
pardon me, now

d. 飛行機で成田へ
fly to Narita

Two friends from Tokyo
Masa ate the apple.
Daiko said that Ayumi praised Kazuko.

What will the word order look like in Japanese?

Cross-linguistic Variation in the Lexicon

• What does the word for “dog” sound like?
• What are the arguments (obligatory phrases) of specific verbs?
• Where can the arguments of verbs occur?

– Question: What kinds of variation in these areas?

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Cross-linguistic Variation in Transformations

• English vs. German yes-no questions

Question: When an auxiliary moves to the beginning of the sentence in English yes-no questions, where does it end up?

Verb Movement to Comp Parameter

In English, auxiliaries move to C to form a question

Code Talker Paradox

How can two languages like English and Navajo be simultaneously so similar and so different?

How does Baker try to resolve the paradox?

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Cross-linguistic Variation in Transformations

• English vs. German yes-no questions

Question: When an auxiliary moves to the beginning of the sentence in English yes-no questions, where does it end up?

Verb Movement to Comp Parameter

In English, auxiliaries move to C to form a question
Recall: Some sentences don’t have auxiliaries

Recall: To form a question in English, if the sentence doesn’t have an auxiliary, you insert a dummy auxiliary (do-support).

Notice something that you CANNOT do in English.

Notice: VERBS never move to C in English.

Now take a look at German:

Notice: In German, Inf comes after the VP, not before.

How to ask a yes/no question in German, if there is an auxiliary in the sentence.
Verb Movement to Comp Parameter

How to ask a yes/no question in German, if there is an auxiliary in the sentence

How to ask a yes/no question in German, if there is *NOT* an auxiliary in the sentence

ANSWER: It works just like English!

ANSWER: The VERB moves to C (unlike English)

Verb Movement to Comp Parameter

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How to ask a yes/no question in German, if there is *NOT* an auxiliary in the sentence

ANSWER: It works just like English!

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Cross-linguistic variation in system-wide constraints and requirements

• Coordinate Structure Constraint
• Tensed Sentences Have to Have an Overt Subject
• that-gap constraint
• Negative polarity items have to “get licensed” in a very particular way
• A constraint on interpretation: Condition C

Do tensed clauses have to have an overt subject?

• English: yes
  • The soup was boiling.
  • Mary watered the flowers.
  • The flowers were watered.
  • There was an explosion.
  • It is raining.

• Italian and Spanish: no
  • Italian: “piace” (is-raining)
  • Spanish: “llueve” (is-raining)
### Cross-linguistic variation in system-wide constraints and requirements

- Coordinate Structure Constraint
- Tensed Sentences Have to Have an Overt Subject
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### that-gap Constraint

<table>
<thead>
<tr>
<th>Language</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>*</td>
</tr>
<tr>
<td>French</td>
<td>*</td>
</tr>
<tr>
<td>Italian</td>
<td>ok</td>
</tr>
<tr>
<td>Spanish</td>
<td>ok</td>
</tr>
<tr>
<td>Levantine Arabic</td>
<td>*</td>
</tr>
<tr>
<td>Berber-Hassani Arabic</td>
<td>ok</td>
</tr>
</tbody>
</table>

**Question:** How do children ever figure out whether their language has the that-gap Constraint?
Parametric Clusters

- Life is easier for the learner if hard-to-observe properties can be linked to easy-to-observe properties
- This leads to a search for groups of syntactic properties that always occur together in a language
- Parametric Clusters

Subject Positions

- *that*-gap sequences
  - English: no
  - French: no
  - Italian: yes
  - Spanish: yes
  - Levantine Arabic: no
  - Beni-Hassan Arabic: yes

- Post-verbal subject
  - English: no
  - French: no
  - Italian: yes
  - Spanish: yes
  - Levantine Arabic: no
  - Beni-Hassan Arabic: yes

\begin{itemize}
  \item Who did they say that likes Bill?  
  \item Has telephoned John
\end{itemize}

Schematic of ‘Parametric Clusters’

Cross-linguistic Variation in Constraints and Requirements

- Coordinate Structure Constraint
- Tensed Sentences Have to Have an Overt Subject
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Negative Polarity Items

- a. Nobody said anything.
- b. Wallace didn’t say anything.
- c. *Somebody said anything.
- d. *Anybody left.
- e. Nobody said that anybody left.
- f. Paula didn’t think that somebody said anything.

When is anything possible in English?

Similar terms: any, anybody, ever, a damn thing, lift a finger
‘Negative Polarity Items’

Negative Polarity Items

- g. *Anybody read nothing.
- h. *A person who has nothing pleases anybody.
- i. *Because nobody came, anybody left.
- j. *After the president said nothing, the media said anything.
Structural Relations

- Negative Polarity Items, e.g., any, must be \(c\)-commanded by a negative element

Cross-linguistic Variation in Constraints and Requirements

- Coordinate Structure Constraint
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A Constraint on Interpretation

John thinks that he is a great cook
A Constraint on Interpretation

• When can a pronoun and a name refer to the same person?

‘Condition C’

• A name cannot be c-commanded by a pronoun that co-refers with it
A Constraint on Interpretation

S
NP
VP
V
NP
Comp
while
S
VP

John ate the apple while he was reading the book

A Constraint on Interpretation

S
NP
VP
V
NP
Comp
while
S
VP

He ate the apple while John was reading the book

Sum Up: What determines what counts as a well-formed sentence?

- Templates for phrases and sentences
  - Phrase structure rules or trees
- Tense-Specifier
  - Individual words dictate requirements for obligatory phrases (arguments)
- Transformations
  - Rules for transforming basic sentences in systematic ways (yes-no question transformation)
- System-wide Constraints and Requirements
  - Coordinate Structure Constraint (universal)
  - Tensed Clauses Have to Have an Overt Subject (or not)
  - that-gap constraint (or not)
  - Negative polarity items have to “get licensed” in a very particular way (universal)
  - A constraint on interpretation: Condition C (universal)

Sum Up: Cross-linguistic Variation

- Variation itself varies for different aspects of language:
  - Some things are invariant
  - Some things show highly limited variation
  - Some things vary continuously

What is the source of limited variation and of invariance?

- Condition C?
- that-gap constraint
- Mis-matching of polarity in tag questions

Spelke Revisited

The core knowledge systems found in human infants are through some human be, and they vary to different domains specific, task-specific, encyclopedic, and isolate representations for abilities they do for example. With development, however, some emerges once capacity to combine together stimulus, core representations. This capacity depends on a system that has three of the laws of the core knowledge system it is separate from our task specific, for it allows representations to be combined across any corpora of domains and that humans can represent and to be used for any task that we can understand and evaluate. Our representations are neither encyclopedic nor isolated, for they are available to any explicit cognitive process. This seems to a virtually acquired universal language, and the cognitive development that gives rise to it is almost unique to humans (human language facility. Natural languages are...