بسم الله الرحمن الرحیم

**علوم شناختی**

## جلسه ۳ (ب)

# زبان‌شناسی و تحلیل صوری زبان

## Linguistics and the formal analysis of language


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http://courses.fouladi.ir/cogsci

# PART 1:
# HISTORICL LANDMARKS

# Chapter 1:
# The Prehistory of Cognitive Science

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# Chapter 1.3: Linguistics and the formal analysis of language

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# Chomsky's (1957) *Syntactic Structures*

- Provided a way to analyze language in algorithmic terms
- Provided an explanation for why languages work the way they do
- Highly influential across cognitive science

# Deep structure

"John has hit the ball."

"The ball has been hit by John."

Different deep structure, same meaning

"Susan is easy to please."

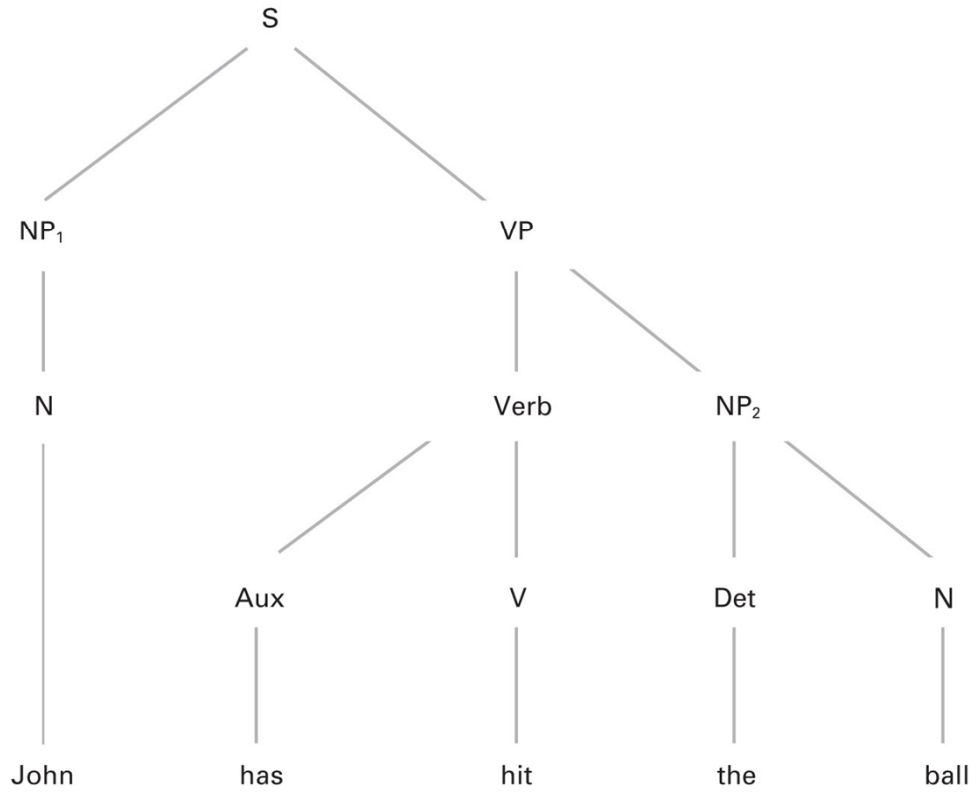
"Susan is eager to please."

Similar deep structure, different meaning

# The goal is to understand the transformation of deep structures

***Key***

| | |
|---|---|
| S | Sentence |
| NP | Noun phrase |
| VP | Verb phrase |
| Verb | Aux + V |
| Aux | Auxiliary (e.g. "was" or "will") |
| V | Verb |
| Det | Determiner (e.g. "the" or "a") |
| N | Noun |



# Deep structure

"John has hit the ball."

$$NP_1 + Aux + V + NP_2$$

"The ball has been hit by John."

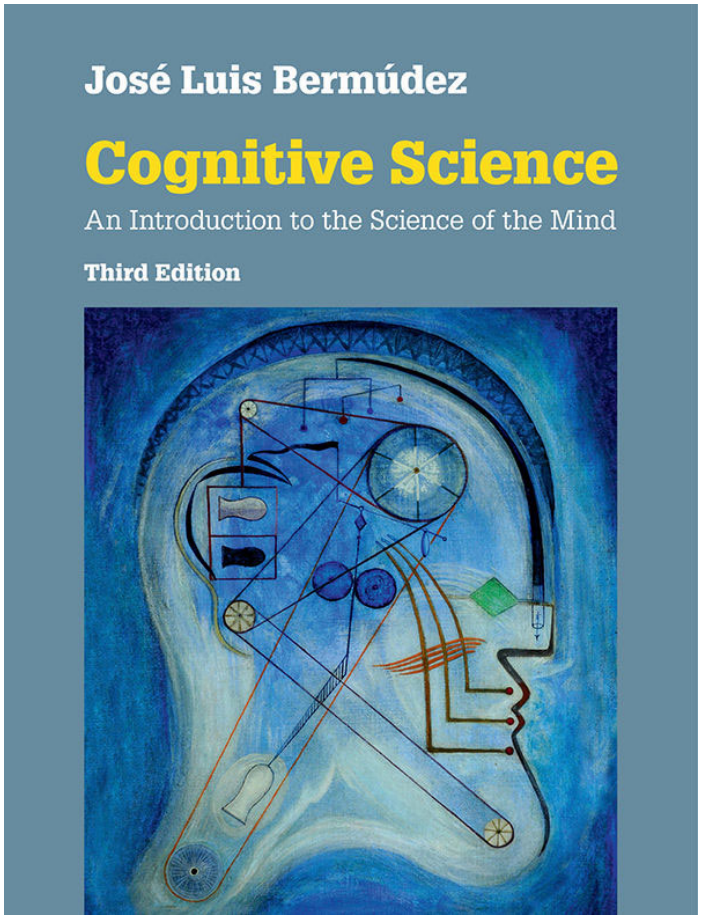
$$NP_2 + Aux + been + V + by + NP_1$$

# Take-home points

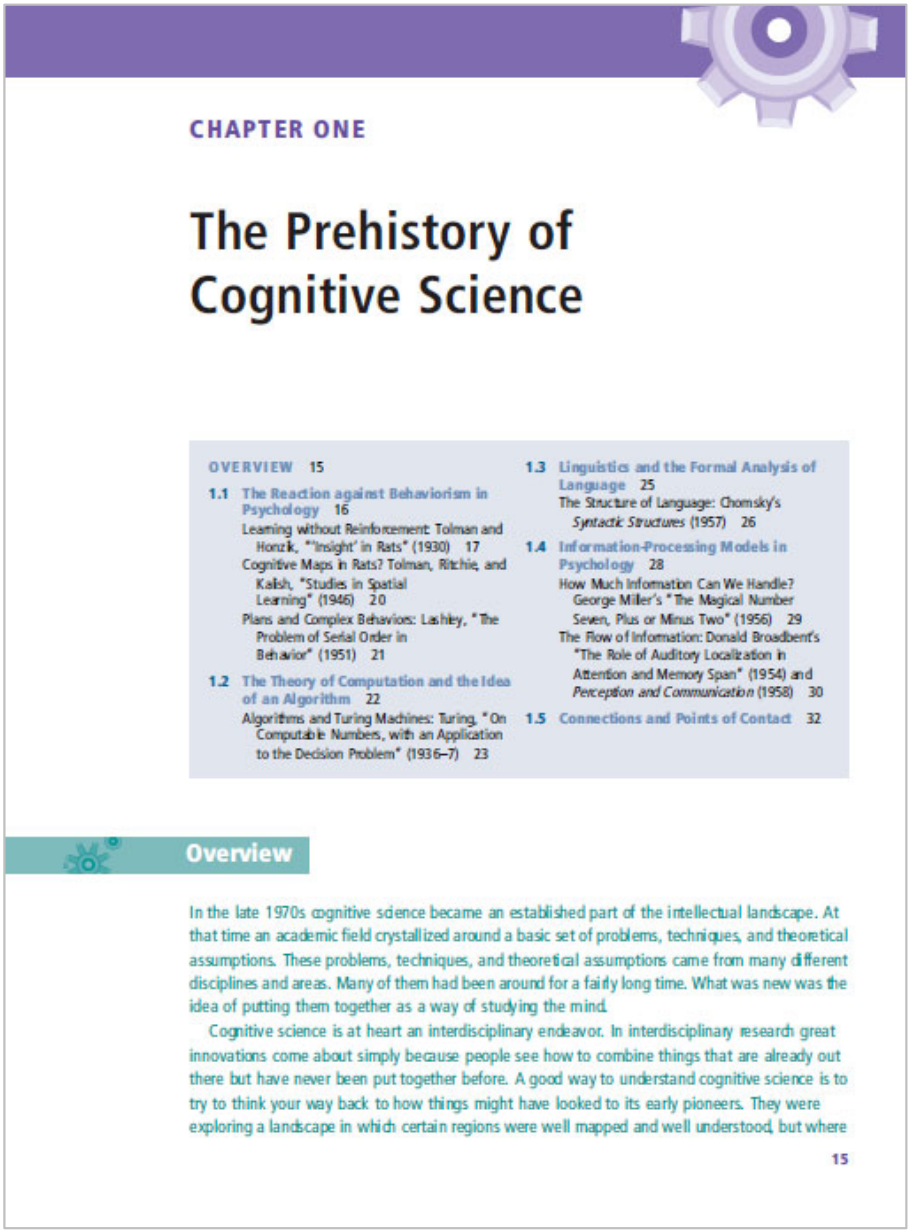
- Chomsky's analysis illustrates Lashley's point about hierarchical processes
  - The transformation of deep structures to produce language clearly requires internal storage and processing of information

- Linguistic processes can be understood algorithmically

# منبع اصلی




José Luis Bermúdez,
**Cognitive Science:**
**An Introduction to the Science of the Mind,**
3rd ed., Cambridge University Press, 2020.
**Chapter 1 (Section 1.3)**



CHAPTER ONE

## The Prehistory of Cognitive Science



### Overview

In the late 1970s cognitive science became an established part of the intellectual landscape. At that time an academic field crystallized around a basic set of problems, techniques, and theoretical assumptions. These problems, techniques, and theoretical assumptions came from many different disciplines and areas. Many of them had been around for a fairly long time. What was new was the idea of putting them together as a way of studying the mind.

Cognitive science is at heart an interdisciplinary endeavor. In interdisciplinary research great innovations come about simply because people see how to combine things that are already out there but have never been put together before. A good way to understand cognitive science is to try to think your way back to how things might have looked to its early pioneers. They were exploring a landscape in which certain regions were well mapped and well understood, but where

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