

NLP101

THEORETICAL NATURAL LANGUAGE PROCESSING

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# **Survey on Syntax-Semantic Interface: from Formal Languages to Natural Languages**

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## Abstract

*The purpose of this paper is to inspect various models for the semantics of natural language. In this paper, we attempt to re-organize existing theories of syntax-semantic interface starting from the corresponding counterparts in formal languages. We begin by reviewing the definition of the language and various classes of languages from the perspective of formal language theory, proposed in Chomsky Hierarchy [Chomsky, 1956]. To be specific, regular, context-free, context-sensitive languages will be discussed in the perspective of syntactic model. Thereafter, examples of regular and context-free languages will be discussed.*

## 1. INTRODUCTION : WHAT IS NATURAL LANGUAGE PROCESSING?

There has been much research regarding syntax, semantic, and their relationships in natural language. Paradoxically, this shows the extreme vagueness and shallowness of our understanding on semantic. Various models have been proposed to illustrate the semantics of natural language, with their own meta-language to express the semantics. To list few examples, logical forms [Pietroski, 2015], Montague Semantics [Janssen, 2015], Davidsonian and Neo-Davidsonian Event Semantics, real-valued vector [Mikolov et al., 2013] could be some of the examples.

I. What is Language?

II. What Language is 'Natural'?

III. Why is Natural Language so HARD?

## 2. SYNTAX OF LANGUAGES

## 3. SEMANTIC OF LANGUAGES

## REFERENCES

- [Chomsky, 1956] Chomsky, N. (1956). Three models for the description of language. *IRE Transactions on Information Theory*, 2:113–124.
- [Janssen, 2015] Janssen, T. M. V. (2015). Montague semantics. In Zalta, E. N., editor, *The Stanford encyclopedia of philosophy*. 2020 ed. edition.
- [Mikolov et al., 2013] Mikolov, T., Sutskever, I., Chen, K., Corrado, G. S., and Dean, J. (2013). Distributed representations of words and phrases and their compositionality. In *NIPS*, pages 3111–3119. Curran Associates, Inc.
- [Pietroski, 2015] Pietroski, P. (2015). Logical form. In Pietroski, P., editor, *The Stanford encyclopedia of philosophy*. 2015 ed. edition.