

A Generative Software of English Grammar

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ملخص:

نقترح في هذه الدراسة إجراء تحليل وتصميم لتطوير هيكل لبرنامج يفهم منطق اللغة الإنجليزية بشكل عام. وبشكل أكثر تحديدا معرفة كل من الاشارات النفسية والاجتماعية المصاحبة في البنية اللغوية من حيث علاقاتها المنطقية. ومن هنا ، فإن العلاقات المنطقية ستساعد في توفير بعض تقنيات التعلم التي من شأنها أن تسمح لاستخراج المعرفة تلقائيا من الأشكال اللغوية. وهكذا ، على مدخلات معينة محددة، فإن المعادلات المنطقية ستقوم بتوليد أنواع مختلفة من الجمل المطلوبة. وعلاوة على ذلك، سيقوم البرنامج باستخراج المعرفة النحوية من الجمل والعبارات، بما في ذلك نوعها، مكوناتها (فعل، إسم، فاعل، صفة'....). وما إذا كانت الجملة سلبية أم ايجابية وهكذا دواليك. لهذا فإن النحو للغة يعتبر بمثابة الروح للجسد بدونها الهيكل اللغوي سيكون باطلا.

Abstract

In this study, we propose an analysis, design and development of the structures of language software that comprehends the logic of the English language at large. More specifically, both psychological and social cues concomitant in the linguistic structure are expressed in terms of their logical relations. Hence, such logical relations would provide some learning techniques that would allow an automatically knowledge extraction from linguistic forms. Thus, for a given specific input, the logic would generate the different kinds of required sentences. Furthermore, "pure" syntactic knowledge from a sentence, including its type, its constituent parts of speech, its negative/positive forms and so forth can also be extracted. Therefore, it follows that, in our sense, the grammar of a language could be, somehow, considered as the digital soul of a body without which the structure would be void.

Introduction

Research into artificial intelligence and logic as well as in e-learning has been carried out since the end of the last century and has allowed the emergence of many fields in what we may, now, safely refer to as the modern “electronic era”. Nowadays, the terms e-commerce, e-filing, e-business, e-booking and so forth, have become an integral part of our daily and common knowledge; with the main medium in use in all these domains being, to a great extent, the English variety. In this era of technology, where computers are available everywhere, interactive and user-friendly software can, indeed, aid in the learning process, provide better learning environment, and lead to proficiency in learning results. It follows that the universality of the English language makes it not only the most important medium of communication but also a subject and a candidate to be investigated and exploited in the creation, development, and implementation of computer software. Indeed, computers play an important role in the classroom activities, as they have become ineluctable tools of communication with humans.

Indeed, in the past decade computers have made a merriment entry into the educational system and brought significant benefits to teachers and students alike. They can be used in English language teaching, with a view to helping educators make the most of the opportunities granted to their students. In these computer assisted learning environments, the teacher guides the students in using computers and software and assists them in certain tasks which were traditionally performed solely by and through human contacts. Now, however, computers provide, in a proactive manner, the students with the required or needed information to be processed. Computer software has, thus, integrated the classroom via both written and acoustic/oral/aural processes, making it easier for students to work efficiently and effectively. Computers, therefore, render certain tasks easy by helping in composition processes such as editing, spell checking, correcting and suggesting grammatical changes as well as creating multiple drafts of the same work. Learning through computer software has become, then, the ultimate goal for individuals and organizations as it can handle both speech and writing in a native like competence. One such targeted e-learning domain is language itself with all its array of form and content constituents.

Language is a composite knowledge constituted of a multi layered structured set of phonological and semantic systems underlying psychological, sociolinguistic and cognitive variables which are wielded together by logical sets of constructs referred to as syntactic systems or grammar. The latter is the art of thinking logical relations and a means of translating them in terms of a set of operators, traditionally known as “rules” of grammar. If, mankind has still a long way to understand all the intricacies of thought, we, can however, safely state that thinking and the forms of thought are, precisely, modelled in terms of these logical rules. Thus, by analyzing the latter, we can expect a fair representation of the former and vice versa. On that account John Stuart Mill [1, p. 47] states that:

"Grammar is the most elementary part of Logic. It is the beginning of the analysis of the thinking process. The principles and rules of grammar are the means by which the forms of language are made to correspond with the universal forms of thought. The distinctions between the various parts of speech, between the cases of nouns, the modes and tenses of verbs, the functions of participles, are distinctions in thought, not merely in words. The structure of every sentence is a lesson in Logic."

Hence, grammar can be considered as the heart and engine of language, a complex system of communication fuelled by the logical and somehow mathematical set of symbolic formulae. These, unfortunately, are singularly perceived by the foreign language learner in terms of sheer formulaic, linear colligations, most of the time, to be acquired through a “Do and don’t” compartmentalizing memorization processes often induced by some mechanical, repetitive and much often boring teaching approaches. In other words, scarcely grammar has been taught (if ever) as a model of cognition, a system of both intellectual and social references and a set of logical constructs.

1. Methodology

The purpose of the study is, thus, to demonstrate the clear correlation between language and logic as well as to describe the propositional content of an utterance. It purports to describe these underlying rules of English and to digitalize them in such a way that the student becomes a proactive participant in language learning. It is

to describe algorithms for determining the type of logical relationships in an English sentence.

This study, thus, aims to design and develop the different logical structures of English language which can later be programmed/generated using programming languages. For instance, if, on the one hand, specific linguistic information such as subject, object and verbs and so forth, are given as input together with some other logical, social and psychological data, it is hoped that the logical relations would generate the required sentences that would not only be linguistically correct but also socially acceptable. Such a new pedagogical tool would help create a new attitude towards L2 learning and render the students the centre/focus of the learning environment. The purpose of the study is, thus, initially to demonstrate the clear correlation between language and logic and, it is hoped that in later stages, we will be able to show the correlations between the linguistic output and some sociolinguistic variables.

In this study, the different structures of English language are developed in terms of programmable logic. Thus, if specific information such as, say, subject, object and verbs are given as inputs, it follows that the output would be generated in terms of the required sentences. This can be achieved as follows (see Figure 2.1).

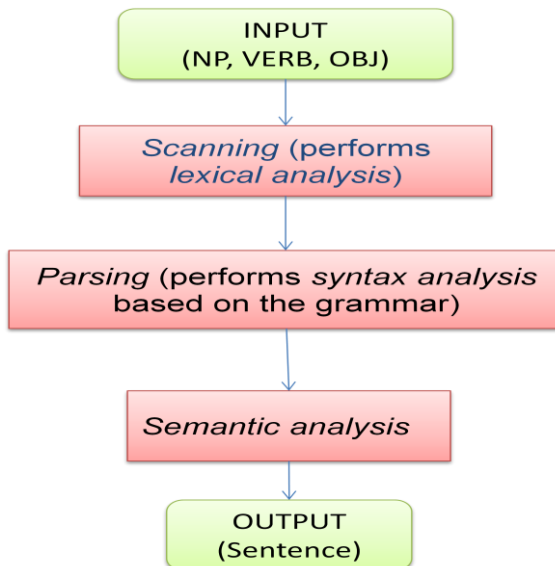


Figure 2.1: Flowchart for developing logical relations in English language

In the first stage, the inputs are given by the learner/user. In the second stage the inputs are read (scanned). Then, as language, in general, has a direct correlation with logic, parsing is performed after using a syntactic analysis based on what is known, traditionally, as English grammar rules. The 4th stage concerns the semantic analysis which is performed on the parsed components to build sentences of specific required forms. The sentence will appear as output [2].

As an instance of the correlation between the conceptual/cognitive, the linguistic and the computational logic let us examine Table 2.1 which presents a non exhaustive and tentative list of Auxiliaries. The 1st column contains the type of expression related to some sociolinguistic relational patterns. Columns 2-6 present the auxiliary verbs corresponding to the type of expression characterizing low to high degree of these relational patterns. We have to bear in mind, though, that these relational patterns as well as their exact place in the spectrum are given, here, only in terms of an illustration purpose of the research possibility targeted in this paper. Their true nature will, indeed, be determined in later investigations through some surveys conducted with both EFL and native speaker informants.

Table 2.1: Auxiliary Verbs

Type of expression	Low				High
Permission(Politeness/Degree of Formality)	can	could	may	might	
Possibility	might	may	could	can	must
Probability	might	may	could	can	must
Suggestion	can	could	would	should	
Obligation	have to	must	ought to	should	to be to

Present		Past		Future	
Imperative		-		-	
Simple		Simple		Simple	
Emphatic	Non-Emphatic	Emphatic	Non-Emphatic	Emphatic	Non-Emphatic
Perfect		Perfect		Perfect	
Continuous		Continuous		Continuous	
Perfect continuous		Perfect continuous		Perfect continuous	

Table 2.2: Tenses

Present		Past		Future	
Imperative		-		-	
Simple		Simple		Simple	
Emphatic	Non- Emphatic	Emphatic	Non- Emphatic	Emphatic	Non- Emphatic
Perfect		Perfect		Perfect	
Continuous		Continuous		Continuous	
Perfect continuous		Perfect continuous		Perfect continuous	

Table 2.3: Type of sentence

Active	Passive
Positive	Positive
Negative	Negative
Interrogative	Interrogative
Interro-negative	Interro-negative

Tenses are listed in Table 2.2. Table 2.3 shows the type of sentence. Table 2.4 gives the formula of present tense for active sentences in that V indicates the verb and PP the past participle. These tables are important to build the relations between English language and logic.

Table 2.4: Formula of Present Tense for Active Sentences

Tense Type of Sentence	Simple	Continuous	Perfect	Perfect Continuous
Positive	(do) V	have + PP	be + Ving	have + PP + be + Ving

				have + been + Ving
Negative	do +not + V	have + not + PP	be + not + Ving	have + not + PP <u> + be + Ving</u> have + not + been + Ving
Interrogative	(do)+ NP + V	have + NP + PP	be + NP + Ving	have + NP + PP <u> + be + Ving</u> have + NP + been + Ving
Interro- negative	do+NP+ not+V	have + NP + not + PP	be + NP + not + Ving	have+NP+not+PP <u> + be +Ving</u> have+NP +not +been+Ving

In Figure 2.2, development of logical relations in English language is shown. First, the input NP (Noun, Pronoun), auxiliary, verb, and object are scanned and checked from the user input. A *Syntax Analyzer or parser* creates the syntactic structure of the English language corpus on the basis of some linguistic parameters such as tense, auxiliary types, form of the sentence and so forth. Then, in addition to syntactic checks, a semantic check will be performed. A *semantic rule* will, thus, be used to assign expression types (type of sentence e.g., positive, negative, interrogative) to the grammar. In this way, the sentence could, for instance, be build on the basis of -among other categories-, any or all of tense, auxiliary and type of expressions.

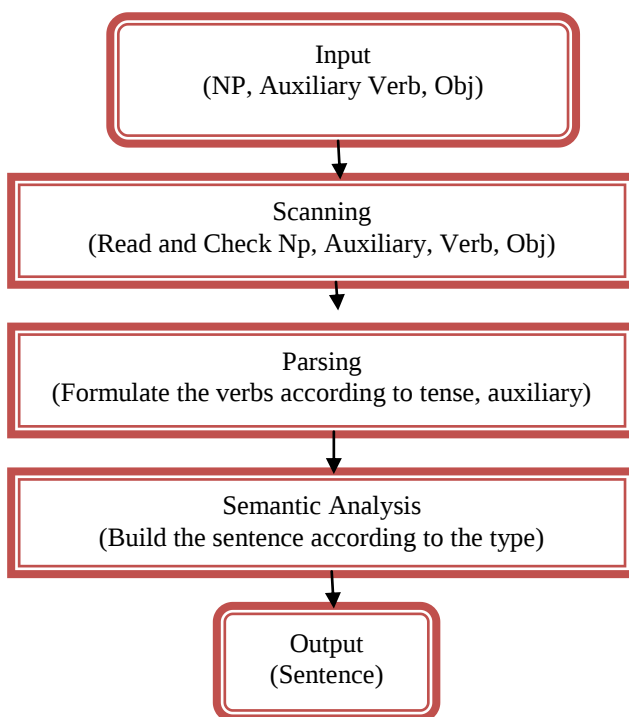


Figure 2.2: Demonstration of developing logical relations in English language

2. Conclusion

The use of technology inside or outside the classroom participates in making the class more interesting and knowledge more appealing by incorporating challenge, lucidity and curiosity into a program./ learning process That technology will, certainly, stimulate more interest which, in turn, will lead to a greater motivation, a higher stimulation and, by the same token, a development of the learning process. Therefore, in our sense, the use of computer in education increases the confidence and independence of the students as well as allows them to manage their time more rationally and monitor their learning pace efficiently. Thus, the students will make their own judgment as to what and how to learn. This, in turn, will aid them in gaining competency in learning which, in turn, will certainly increase their proficiency.

References

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