

# Potential fuzziness in Generative Grammar: discreteness and fuzziness in Chomskian GG

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## Abstract

*The purpose of this article is exploring the potential fuzziness within Generative Grammar (GG), especially in regard to the final output, in the process ranging from generative grammar rules to the infinite set of sentences they generate. We start by identifying some fuzzy dynamics within the aforementioned process, to then concluding both discreteness and fuzziness coexist, within a model describing the process ranging from rules to sentences and from sentences to rules.*

**Keywords:** *discreteness, fuzziness, Generative Grammar (GG), infinite set of sentences, language, lexicon.*

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## I. INTRODUCTION

Generative Grammar has placed itself as one of the cornerstones of modern linguistics, starting with Chomsky (1957) through his book *Syntactic Structures*. Throughout the decades, the constant of discreteness has been fundamental in this theory. A discrete view of lexicon for that matter, is key to the general understanding of Generative Grammar and how rules generate an infinite set of grammatical sentences. Following Chomskian line of thought, a sentence can have 5 or 6 words, not 5 and a half (Chomsky, 2011).

However, a solely discrete approach to Generative Grammar does not seem to be enough, especially because some generated sentences may contain words with obscure meanings. Therefore, operationalizing with sentences and words of this kind solely on discrete grounds, may not be optimal at some point. For this reason, a better option is trying a fuzzy approach to deal with these operationalization issues, within Generative Grammar. The following sections will explore these matters.

## II. THEORETICAL FRAMEWORK

### 2.1 Generative Grammar

Generative Grammar is a system of rules that can iterate to generate an indefinitely large number of structures (Chomsky, 2015). The rules of a generative grammar generate or produce, all and only the correct combinations of elements in a language (Rooryck, 2006). For the purpose of this research, we will focus on the infinite set of sentences this system of generative rules yields (Chomsky, 1957, 2015; Rooryck, 2006).

### 2.2 Lexicon and fuzzy/discrete lexicon

Lexicon can be defined as a multifaceted and dynamic system, in charge of word knowledge storage. It is constantly changing as new words are learned and existing knowledge refined (Tsouri Bentsouri & Larabi, 2025). Parallely, if lexicon is empirically discrete (Rothe et al, 2016; Haines, 2021), it may be fuzzy as well (Alvarez, 2019).

## III. DISCUSSION

If we have an infinite set of grammatical sentences, we may wonder what would happen if we could look at them in an orderly manner. For this to happen let us consider the following sentences:

Colorless green ideas sleep furiously (Chomsky, 1957)  
Colorless green ideas sleep glottally  
Colorless green ideas sleep greatly

As we have mentioned, this is just an example of how an extract of the infinite grammatical sentences set may look. The point here is some sentences may have one or more lexical units holding obscure meanings, making a discrete view of lexicon (Rothe et al, 2016; Haines, 2021) likely but highly impractical. For that reason, a better idea is going for a fuzzy view of lexicon, not just in regard to memory (Alvarez, 2019) but as a property of infinite grammatical sentences as a given set (Chomsky, 1957), as well. Then if this infinite set is fuzzy, we may wonder whether Generative Grammar itself is fuzzy as well.

Last point may look like too big a statement, especially because we seem to examine the tip of the iceberg to understand the whole. In other words, we aim at revising Generative Grammar (Chomsky, 1957, 2015; Rooryck, 2006), including its generative processing, by observing its generated sentences instead of its generative syntactic rules. However, the approach is far from being imprecise. Maybe analyzing the whole generative process backwards, in other words from sentence to rule, can provide insights about GG, especially because these considerations are not “backwards” *per se*. Additionally, we have not considered the idea Chomskian rules may be initially fuzzy, and we do not intend to do so.

Rather, as we have mentioned, we begin by identifying there are subsets of sentences, which contain words holding obscure meanings, making them hard to deal with. We have to consider the identification of a potential fuzzy property for these subsets of generated sentences (Chomsky, 1957, 2015; Rooryck, 2006; Alvarez, 2019), takes place *a posteriori*, and therefore cannot be interpreted as belonging to the initial syntactic rules. The issue with an analysis of this kind, is our understanding of the infinite set of generated sentences may get “colored” by the fuzziness property considerations we are dealing with right now. After all, the very construction of an article like the one being presented, might be based on some of the sentences we can find in the infinite set of generated sentences (Chomsky, 1957, 2015; Rooryck, 2006)., because of the discrete nature of language, at least partially. Therefore, we have a question of sentential meaning which, as interesting as it may sound, we are not in position to deal with right now.

However, last considerations have taken us to a point in which we have to take discreteness into account as well. We can sum this idea up by saying the following: if the GG system is initially discrete, but it becomes at least partially fuzzy (once we take a quick look at some of the generated sentences), then we can provisionally conclude the GG system is both discrete and fuzzy. These properties might be taking place *a priori* and *a posteriori*, correspondingly, within the Generative Grammar system. Additionally within GG, discreteness is likely to be moving *forward* (rule-output), while fuzziness, *backwards* (output-rule).

#### IV. CONCLUSION

Through this article, we have explored the potential fuzziness within Generative Grammar, considering aspects like rules, sentences, fuzziness and discreteness. It was found both the discreteness property and potential fuzziness property within GG, take place from the generated sentences to generative rules, and from generative rules to generative sentences.

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