

# Generative Power of **Simple Matrix Grammars** Depending on the Number of Their Components

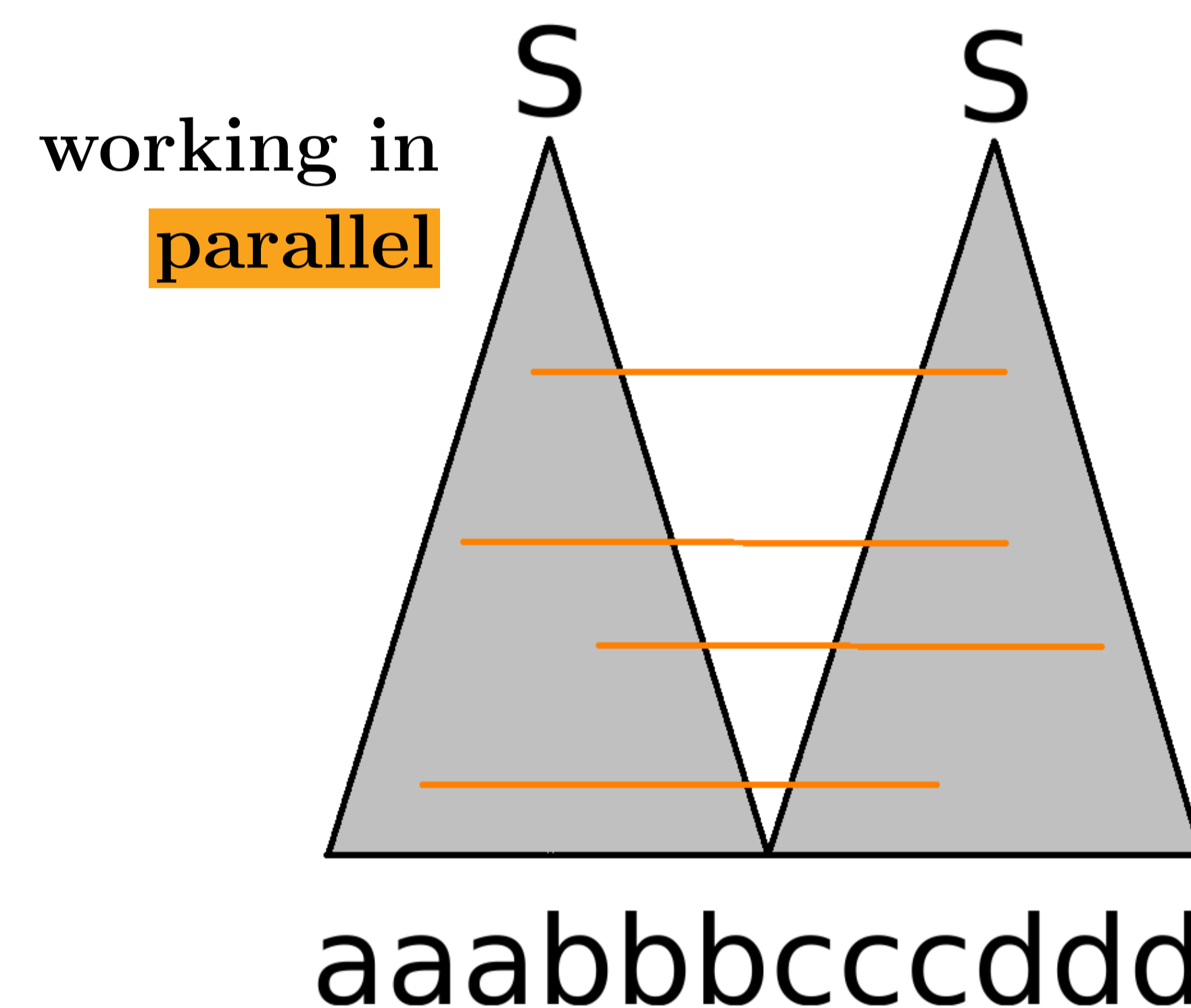
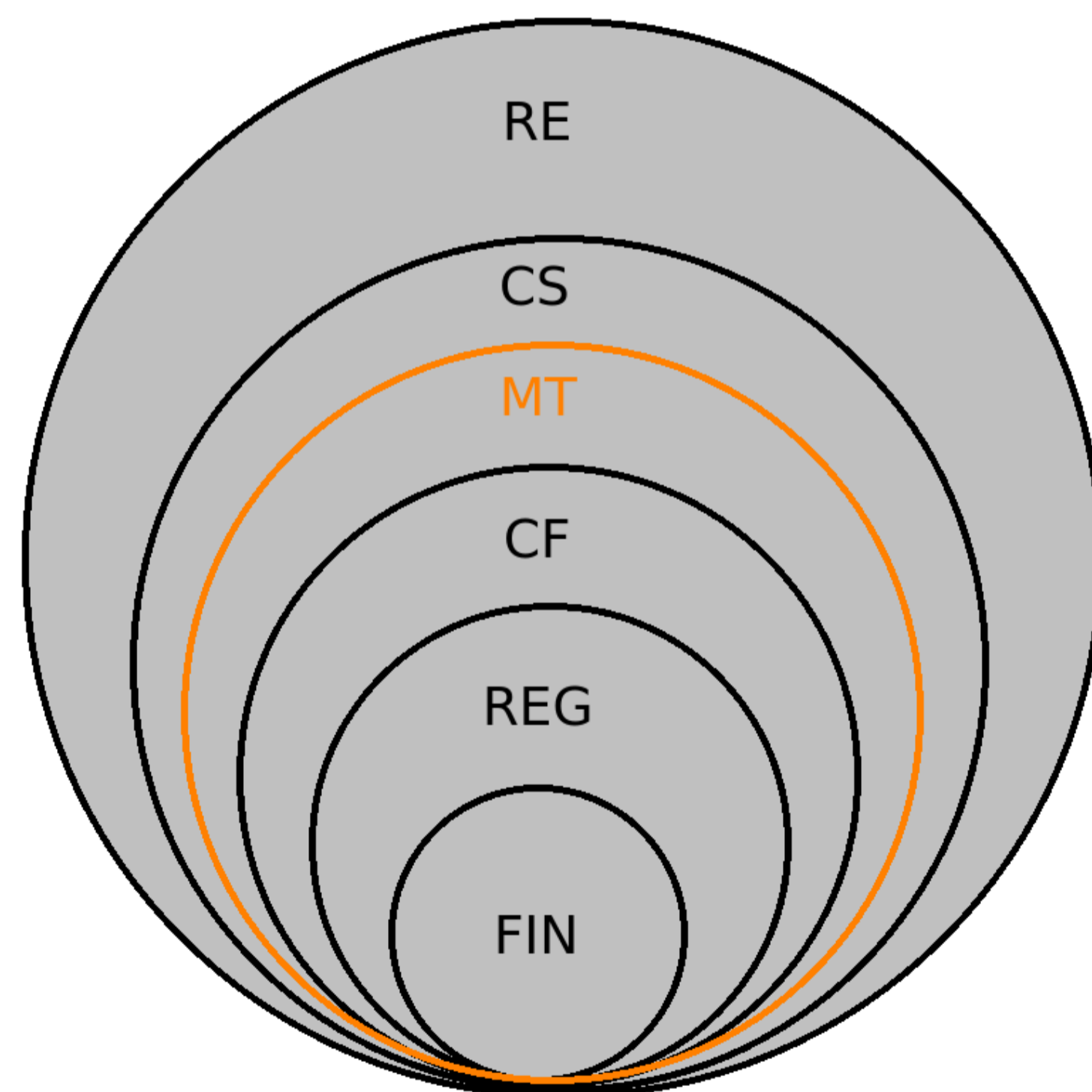
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## Abstract

The concept of simple matrix grammars was introduced and first studied in early seventies. All the achieved results were summarized in a few following studies and the simple matrix grammars start disappearing from the forefront, despite their concept may be still actual. This work returns to them and aims to correct some generally accepted historical mistakes. In the following studies, the very first definition of simple matrix grammars has slightly evolved to the modern and currently generally accepted form, nevertheless, the validity of the former related results were not revised. However, these modifications have significant influence on the simple matrix grammars. Despite the existing beliefs that the simple matrix grammars define an infinite hierarchy of languages depending on the number of their components, we show that two components are exactly strong enough and the addition of another component does not increase the generative power. Moreover, we prove that simple matrix grammars with two components are precisely as strong as matrix grammars.

Generative power of **Matrix Grammars**  $\Rightarrow$  using just two **Context-free Grammars**



## Conclusion

Despite the concept of simple matrix grammars is nothing new in the field of theoretical computer science, we showed that there was still serious outstanding historical debt, which we aimed to repay. Since simple matrix grammar with two components is just a pair of parallel context-free grammars, the topic might be still actual. Let us state all the achieved results.

$$\mathbf{CF} = \mathbf{{}_1\text{SM}} \subset \mathbf{{}_2\text{SM}} = \mathbf{SM} = \mathbf{MT} \subset \mathbf{CS}$$

We proved, simple matrix grammars with two components are exactly as strong as matrix grammars. Additionally, we disprove mistaken belief that they form an infinite hierarchy of languages based on the number of their components proving that a presence of more than two components has no influence on their generative power.