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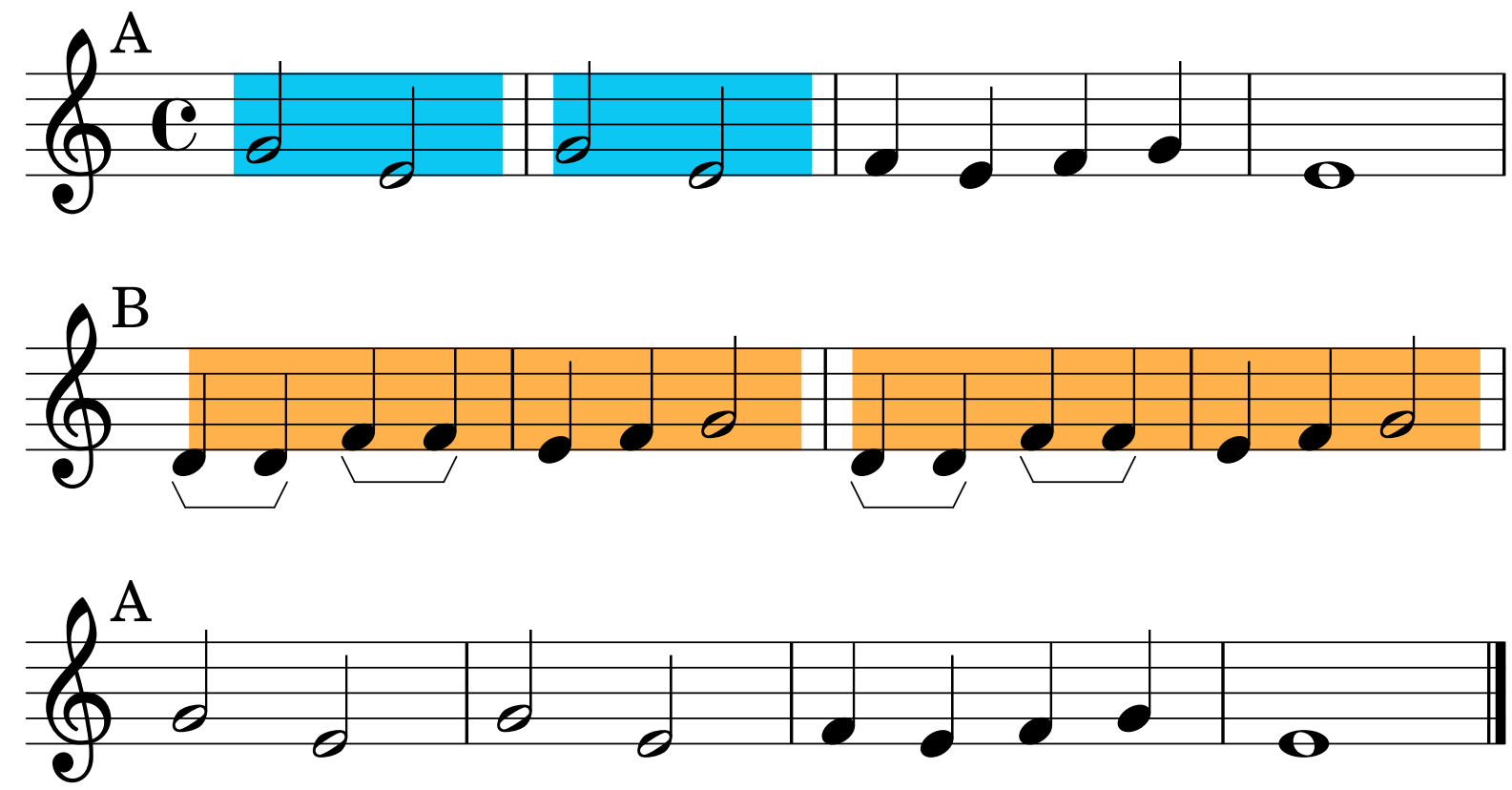
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Form and Repetition

Form deals with the way music is organized in segments. An important aspect of form is **repetition**, as segments are often repeated.



Nested Segmentation

A nested segmentation can be represented as a list of rules that reconstruct the tree below. To link this to form, we restrict the rules to follow a limited set of rule prototypes (greek letters).

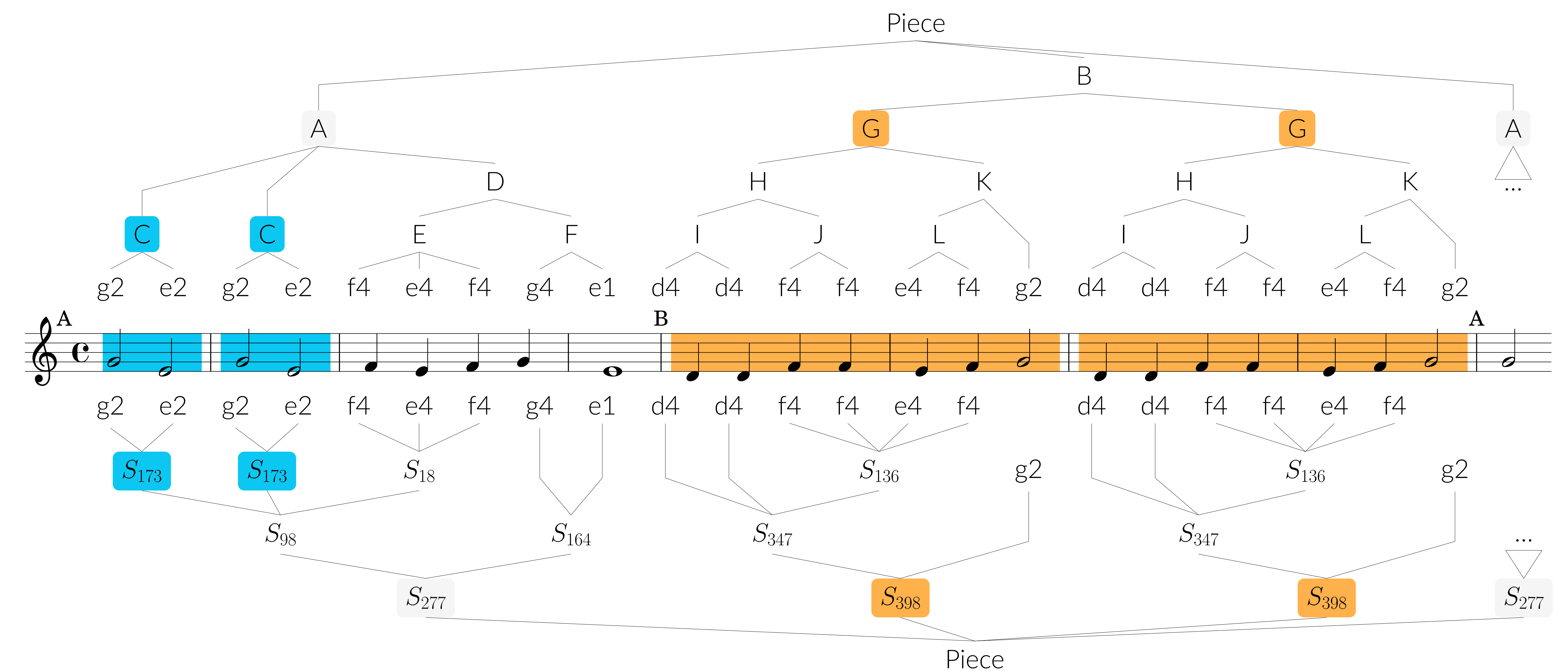
Piece \rightarrow A B A $\alpha\beta\alpha$
 A \rightarrow C C D $\alpha\alpha\beta$
 B \rightarrow G G $\alpha\alpha$
 C \rightarrow g2 e2 $\alpha\beta$
 ...

Optimal Ruleset

We find the optimal segmentation by enumerating all possible rules and then selecting the ruleset with minimal cost (e.g., description length).

$$\min_R \sum_{r \in R} \text{cost}(r)$$

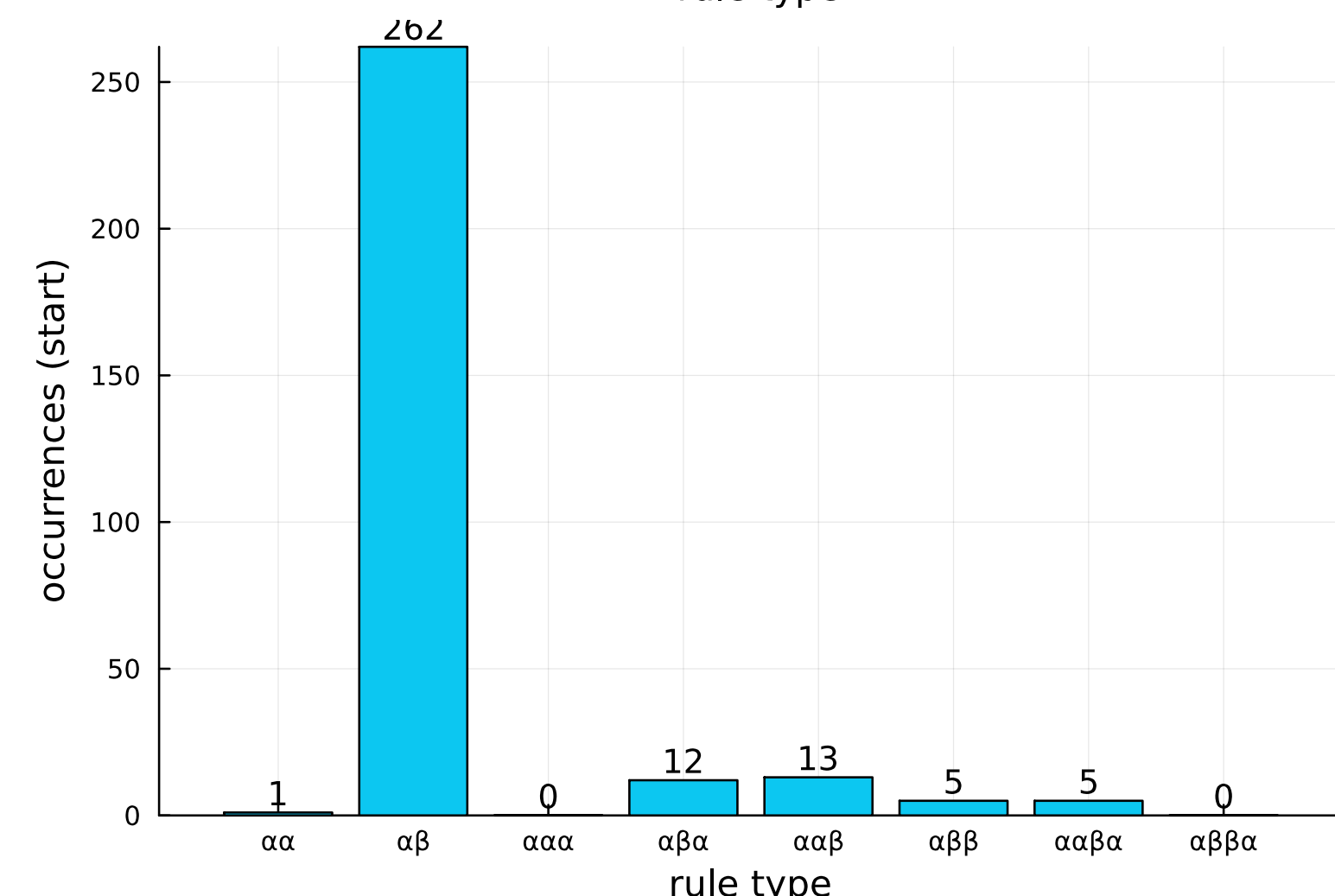
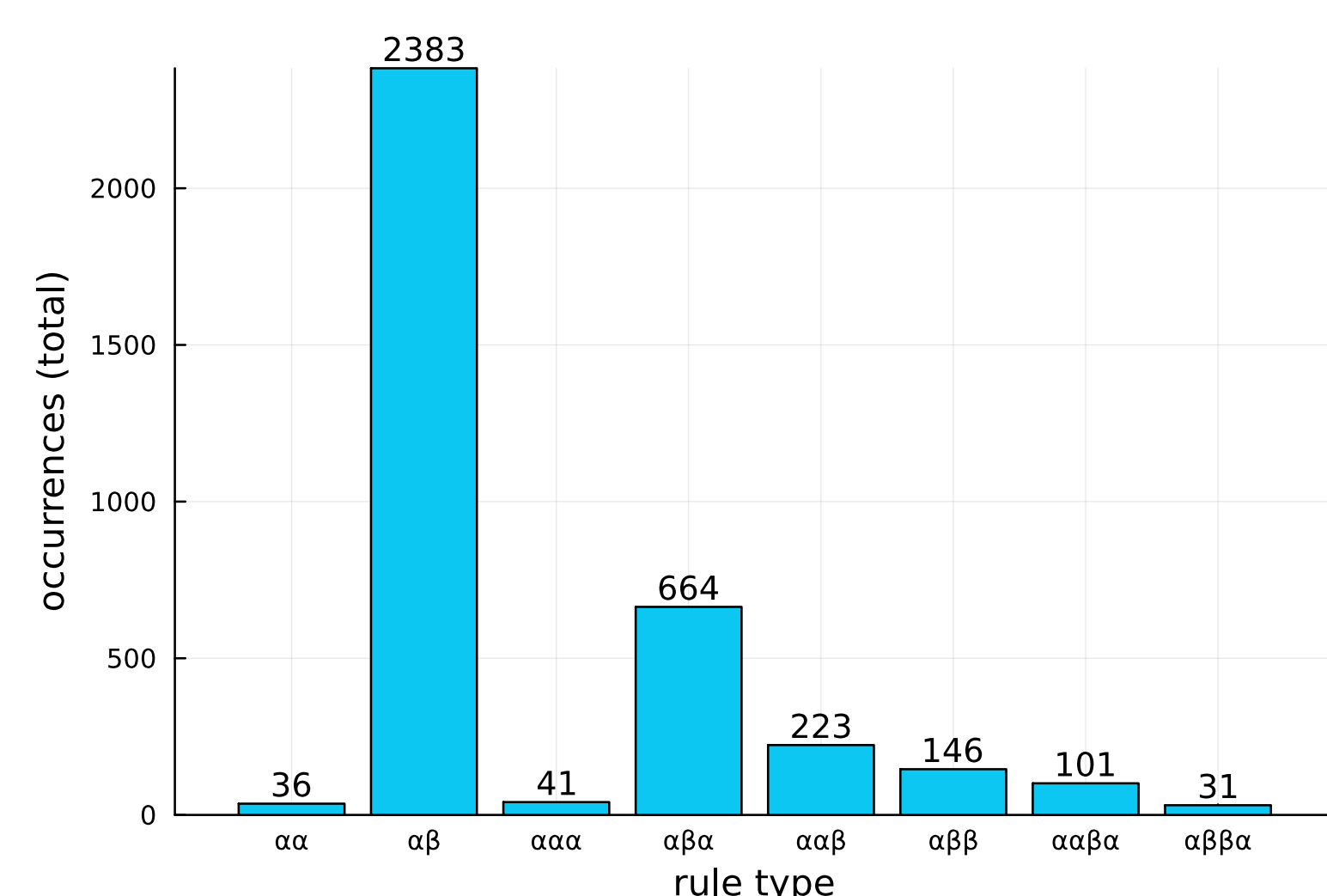
abca \rightarrow a bca $\alpha\beta$
 abca \rightarrow ab ca $\alpha\beta$
 abca \rightarrow abc a $\alpha\beta$
 abca \rightarrow a bc a $\alpha\beta\alpha$
 ...



Top: hand-made form analysis; bottom: optimal segmentation.

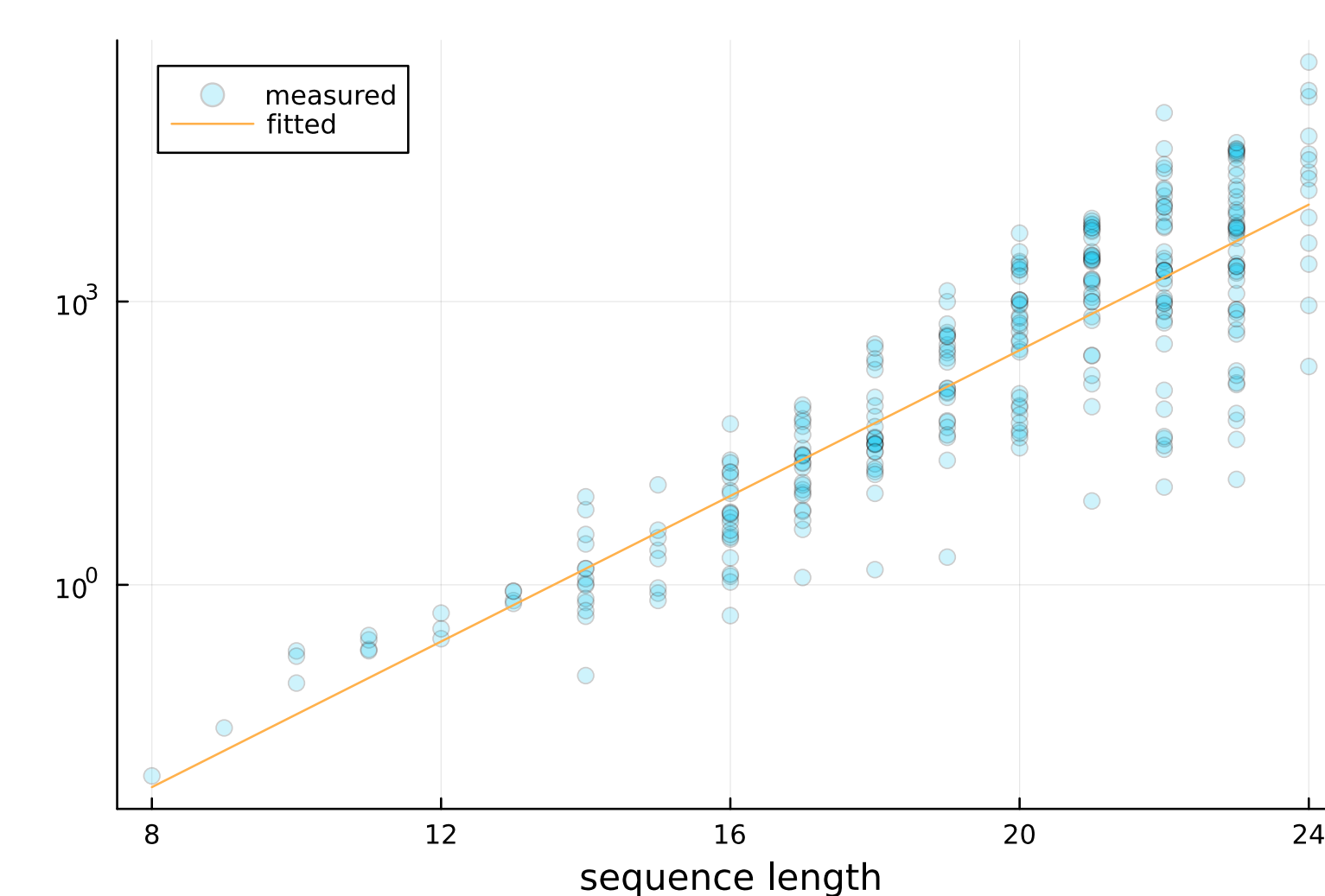
Rule Usage

Applied to 300 short melodies from the Essen Folksong Collection:

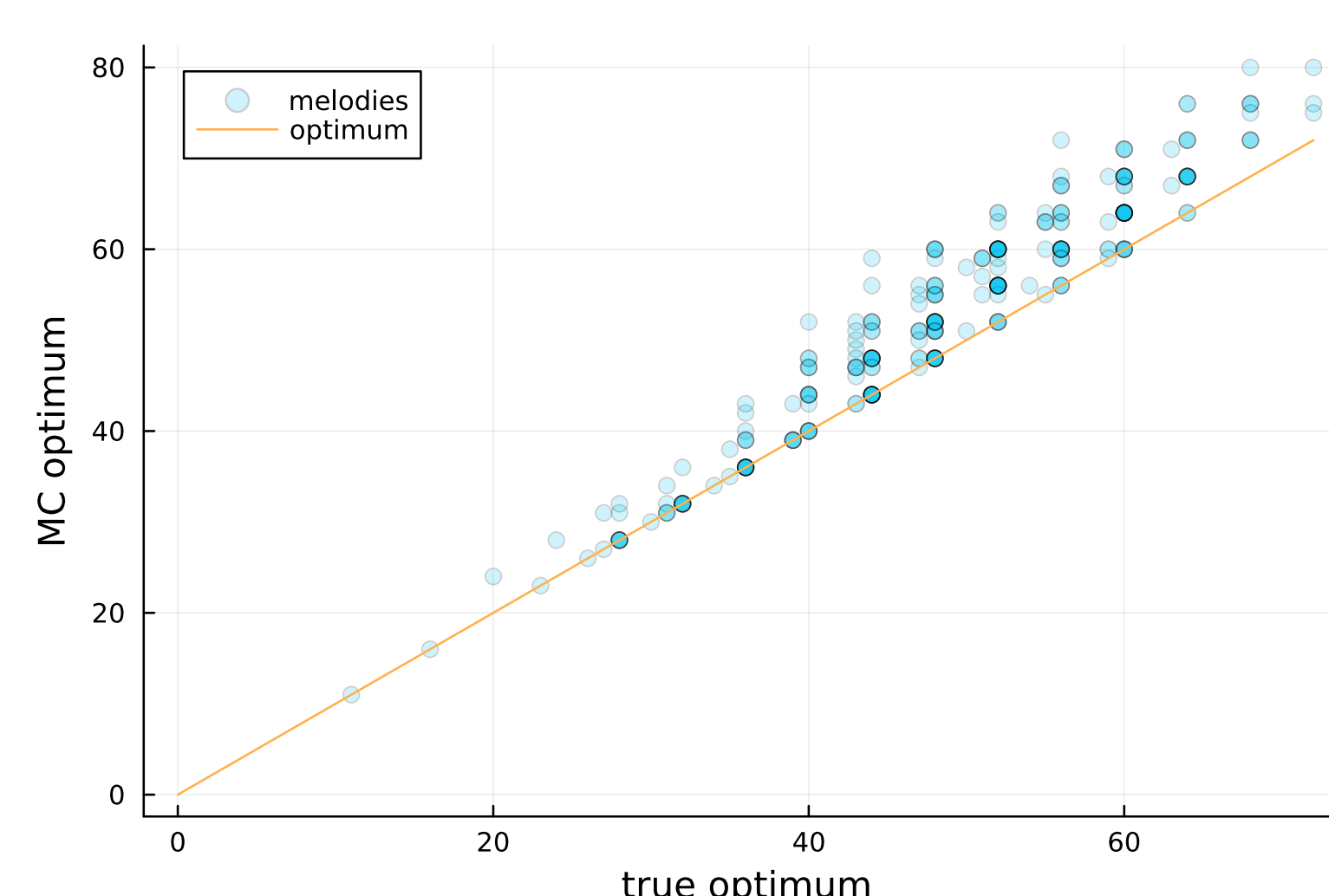


Efficiency

Runtime complexity:



Optimal vs. monte-carlo solutions:



Funding and Paper Link



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