Describing Syntax with Star-Free Regular Expressions

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1 – The main contribution

1. Regular languages are **not** captured in first-order (FO) logic (Büchi -60)
2. Finite-State Intersection Grammar (FSIG) (Koskenniemi -90)
   allows **full** regular expressions

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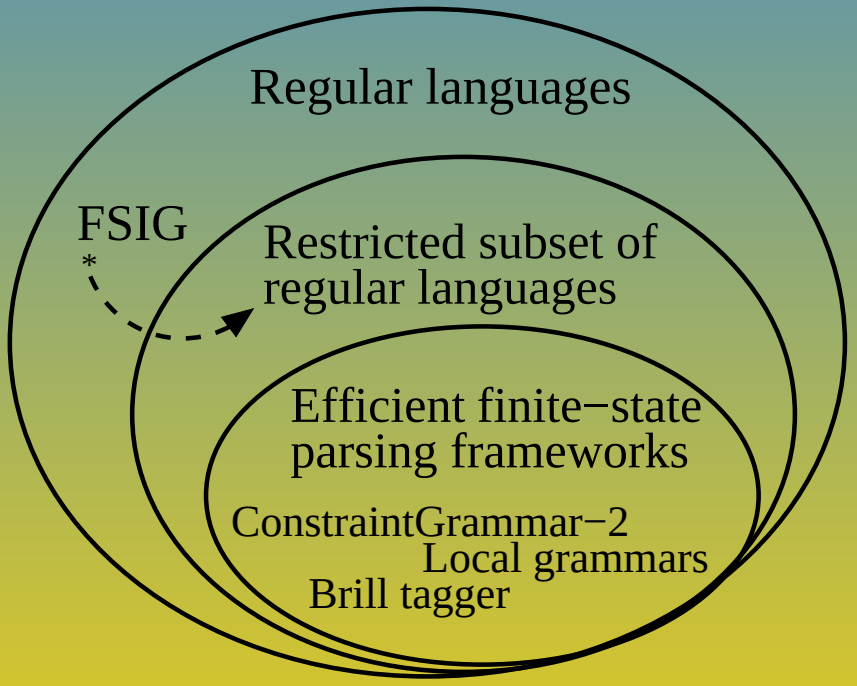
ENGFSIG describes local properties only

2 – Why locality restriction is so interesting?

Finite-state frameworks $\not\rightarrow$ **efficient parsing in practice.**

Pursue efficient parsing frameworks: make restrictions to the expressive power e.g. by requiring that the rules are **local**.

Restricted expressive power $\rightarrow$ **infer grammars more easily**.



A restriction in the expressive power of the FSIG framework is a step **towards** practical and fast parsing.

3 – The FSIG rule formalism

Structural descriptions that are encoded as strings:

bracketing	surface form	base form	morphosyntactic tags			bracketing
@<	*it*	it	PRON	NOM	SG3 SUBJ	@
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Checked with **context-restriction rules** (← TWOL, Koskenniemi -83). E.g.

```
V PRES SG3 ⇒  SG3 SUBJ @ ··· __ ,
                  __  AUX @ ···  SG3 SUBJ;
```

(A distributional constraint for 3^{rd} person singular finite verbs in English.)

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Grammar components:

1. Domain D of structural description strings
2. A finite limit d for nested brackets (center-embeddings)
3. Context restriction rules $c_1^d, c_2^d, \ldots c_n^d$

A **Finite-State Intersection Grammar (FSIG)** (Koskenniemi -90)

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1. **model restrictions** for $L(G)$?
2. reducing parsing to a set of **local tests**?

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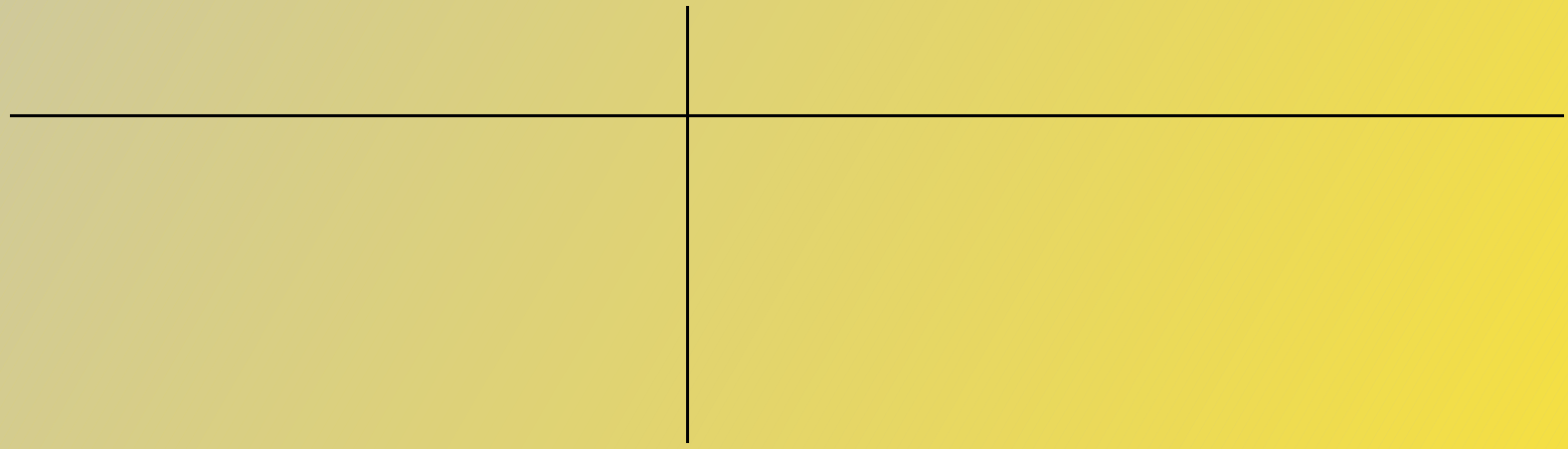
Basic regular (and star-free regular) expressions: $a \in \Sigma$ and Σ^* (the universal language)



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Kleene's star	α^*	**complementation**	$\sim\alpha$

A regular language is **star-free** if it has a star-free regular expression.

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(*Local properties* in the sense of Hanf and Gaifman)

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- "NLs form a proper (star-free) subset of regular languages" (Kornai -85)
- varieties of star-free languages → further model restrictions?