One Class to Rule Them All?
A Study of TSL Languages Motivated by Typological Outliers

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Introduction

Formal language theory can be used to describe the **complexity of linguistic processes**. Unbounded dependencies in phonotactics, morphology, and even syntax can all be captured by the class of **Tier-based Strictly Local languages** (TSL) [1]. However, some patterns have been **problematic** for this approach [2]. In this work:

- I review some of the limits of TSL
- I present extensions of TSL that can account for some problematic patters

The Subregular Hypothesis

- Phonology is **subregular** [3]
- Local phonotactic dependencies are **strictly local**

SL Example

Word-final devoicing in German: $^{*}[+\text{voice}]\rtimes$

$^{*}\rtimes$ r a d $\rtimes$

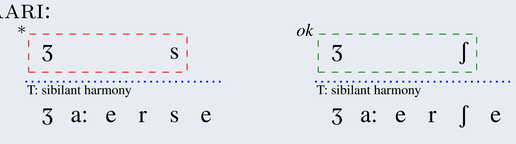
$^{ok}\rtimes$ r a t $\rtimes$

TSL Grammars

- Problem: **unbounded dependencies** cannot be captured by strictly local grammars
- Solution: select a subset of segments (a **tier**) and enforce local constraints only over it

TSL Example

Long-distance sibilant harmony in anteriority in Aari:



Sibilant Harmony in Imdlawn Tashlhiyt [4]

Generalization:

- Sibilants must agree in anteriority and voicing
- Voiceless obstruents block agreement in voicing

1) Underlying causative prefix /sː-/

	Base	Causative	
a.	uga	**sː**-uga	"be evacuated"
b.	a**sː**twa	**s**-a**sː**twa	"settle, be levelled"

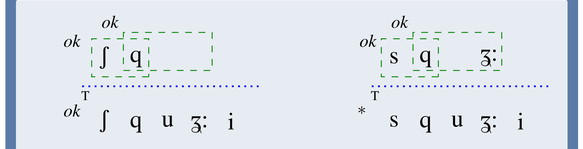
2) Sibilant harmony

	Base	Causative	
a.	fia**ʃ**r	**ʃ**- fia**ʃ**r	"be full of straw, of discord"
b.	n**z**a	**zː**-n**z**a	"be sold"

3) Sibilant voicing harmony blocked

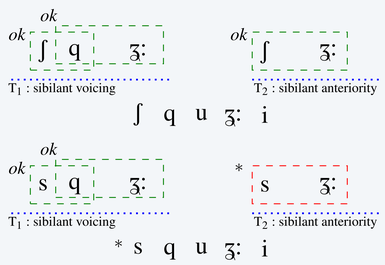
	Base	Causative	
a.	u**k**z	**sː**-u**k**z	"recognize"
b.	q**ː**u**ʒː**i	**ʃ**- qu**ʒː**i	"be dislocated, broken"

SH in Imdlawn Tashlhiyt is not TSL



Multi-tier Strictly Local

- Allow for **multiple tier-projections**



Sibilant Harmony in Samala [5]

Generalization:

- Anticipatory sibilant harmony
- Palatalization to avoid local restriction
- Sibilant harmony overrides palatalization

1) Unbounded sibilant harmony

a.	/k-**su**-**ʃ**ojin/	k**ʃu**ʃojin	"I darken it"

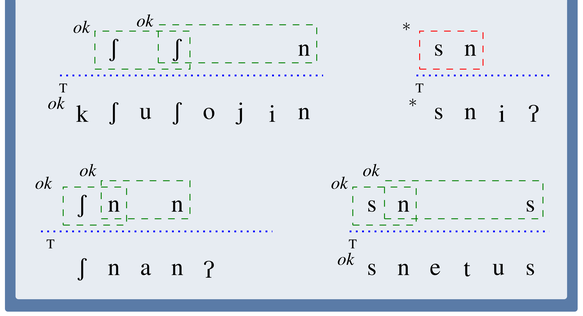
2) /s/→ [ʃ] when preceding (adjacent) [t, n, l]

a.	/**s**-niʔ/	**ʃ**niʔ	"his neck"
b.	/**s**-nanʔ/	**ʃ**nanʔ	"he goes"

3) Long-distance harmony overides palatalization

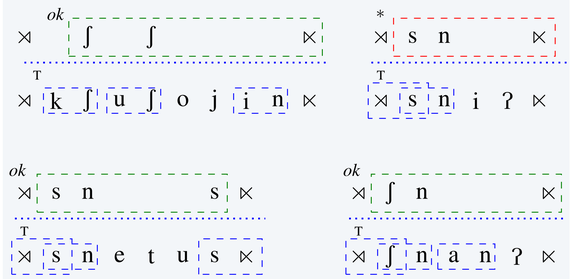
a.	/**s**-net-u**s**/	**s**netu**s**	"he does it to him"

SH in Samala is not TSL

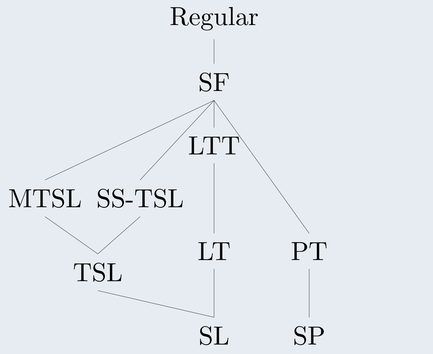


Structure Sensitive TSL

- **Tier-projection** sensible to n-local properties



The Subregular Hierarchy



Conclusion

Tracing Back Our Steps

- Subregular hypothesis is a strong computational theory of language complexity
- Phonology is SL + SP + TSL ...
- but there are patterns that are unaccounted for!

In This Poster

- TSL is not **exactly** the right fit, but close!
- Minor changes lead to interesting new classes

Future Work

- Further study of the TSL neighborhood
- Learning algorithms, AGL experiments ...

References

[1] Heinz J., C. Rawal, and H. Tanner. 2011. Tier-based strictly local constraints for phonology. In ACL 49th 2011. **[2]** McMullin, K. J. 2016. Tier-based locality in long-distance phonotactics?: learnability and typology. PhD thesis, University of British Columbia. **[3]** Heinz J. 2015. The computational nature of phonological generalizations. Ms., U. of Delaware. **[4]** Hansson G. Ó. 2010. Consonant harmony: long-distance interaction in phonology. UC Publications in Linguistics. **[5]** Applegate R.B. 1972. Ineseno Chumash grammar. PhD thesis, UC Berkeley.

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