The grammaticality of one mapping entails the grammaticality of any mapping with greater internal similarity. [5]

**Restrictiveness & Paradigmatic Subsets**
- Traditional restrictiveness: phonotactic subsets [1-4].
- Recent concern: paradigmatic subsets [5].
- Example, L25 and L45 below: \textit{L45 has a subset of paradigmatic morpheme behaviors of L25.}
- L25 has a suffix that alternates in length as well as one that does not. L45 only has one that does not.

\begin{tabular}{|c|c|c|c|c|}
\hline
Lang. & r1 & r2 & r3 & r4 \\
\hline
\textit{s1} = /ka/ & paka & paka & paka & paka \\
\textit{s2} = /-ka:/ & paka: & paka: & paka: & paka: \\
\textit{s3} = /ká/ & paka: & paka: & paka: & paka: \\
\textit{s4} = /-ká:/ & paka: & paka: & paka: & paka: \\
\hline
\end{tabular}

L45: WSP \(\gg\) ID[Stress] \(\gg\) Oblig \(\gg\) ID[Length] \(\gg\) [No.Long, MR] \(\gg\) ML

L25: WSP \(\gg\) ID[Length] \(\gg\) NoLong \(\gg\) ID[Stress] \(\gg\) (MR, Oblig) \(\gg\) ML

**The Output-Driven Learner**

### Pitch-Accent/Stress Typology
**GEN** allows outputs with no stress.

**Constraints** [6-10]:
- WSP: long vowels must be stressed
- MAINLEFT: main stress on the initial syllable
- MAINRIGHT: main stress on the final syllable
- NOLONG: no long vowels
- OBLIG: outputs must have exactly one main stress
- ID[Stress]: corresps have equal stress value
- ID[Length]: corresps have equal length value

62 languages, with strictly bi-syllabic words

2 features per syllable: (+/-) stress and (+/-) length

16 input forms (Richness of the Base)


**Max Mismatch Ranking Induction**

- r1s1 \textbf{[paka]} \textbf{Current lexicon r1 = /-/?/, s1 = /-/?/}
- Max mismatch input for r1s1, /-/\(\gamma\)/ +/? = /páka/:, is consistent with learner's ranking information.
- Unknown: relative ranking of ID[stress], ID[length]

L25 has r1, s1 set short
only /páka/ \(\rightarrow\) [páka],
but /páka: \(\rightarrow\) [páka]

L45 has r1, s1 unset for length
/páka:/ \(\rightarrow\) [páka]

L45 maps all 4 inputs to same output, increasing neutralization.

Max Mismatch Ranking presumes the bottom mapping, forcing the more \textbf{restrictive} ranking.

/páka:/ \(\not\rightarrow\) [páka] requires that ID[stress] \(\gg\) ID[length]

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**References**


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**Simulations**

- Ranking information: exhaustive loser selection (related to the Contenders algorithm [11]).
- Word evaluation: max mismatch input with Biased Constraint Demotion-generated ranking [3,4].
- Learning succeeds when all words pass evaluation.

Two forms of induction:
- Max Mismatch Ranking – adds ranking information.
- Fewest Set Features [5] – sets additional features

FSF used only when MMR cannot apply.

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**Results**

- Without MMR, 4 languages fail (including L45).
- With MMR, all 62 languages learned successfully.
- MMR invoked on 12 languages (once in each case).
- FSF invoked on 6 languages (when MMR couldn’t apply).

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**Discussion**

- MMR is more restrictive than FSF because it imposes more neutralization, across the grammar.
- How aggressively to pursue ranking information?
  - Biased Constraint Demotion [3,4] is insufficient
  - How to choose the word for MMR to focus on?
  - Currently any word that fails evaluation but is consistent with the learner's ranking information.

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**Enforcing restrictiveness through ranking induction in the Output-Driven Learner**

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