Case Study: Matching XPs with Overt Heads in Italian

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Italian

- High degree of syntax-prosody non-isomorphism (Ghini 1993, Nespor & Vogel 1986)

\[
[\text{Vaccinerò tutte le scimmie del mondo}]\]

\[\phi^\text{Max}(\text{vaccinerò tutte}) \phi^\text{Max}(\text{le scimmie del mondo})\]

‘I will vaccinate all the monkeys in the world’

- Rampant SP mismatches make it an interesting test case for Match Theory
Roadmap

1. Introduce two processes that diagnose $\phi^{\text{Max}}$ boundaries

2. Analyze Italian in Match Theory
   - Requires an alternative formulation of MATCHXP: only match XPs projected by a phonologically overt $X^0$

3. Show how to implement analysis in SPOT
   - Comparison of two constraint sets confirms that Italian is only generated when MATCHXP is defined to see overtly headed XPs
   - Built-in analysis available at spot.sites.ucsc.edu
The Phenomena
Italian $\phi^{\text{Max}}$ Processes

- Stress retraction (SR)
- Final lengthening (FL)
- N.B. Traditionally considered $\phi$ diagnostics; see Van Handel (today’s poster session) for argument to treat them as $\phi^{\text{Max}}$ diagnostics

All examples from Ghini (1993), Nespor & Vogel (1986)
Stress Retraction

- Avoid clash between two words in the same $\phi^{Max}$, $\omega_1$ and $\omega_2$, by moving stress on $\omega_1$ leftward (Nespor and Vogel 1986, Ghini 1993)

- If retraction occurs: diagnose **absence** of $\phi^{Max}$ boundary after $\omega_1$
  
  a. $\phi^{Max}$ (Le città nórdiche) non mi piacciono. /cittá nórdiche/

  ‘I don’t like Nordic cities’

- If retraction doesn’t occur: diagnose **presence** of $\phi^{Max}$ boundary after $\omega_1$

  b. $\phi^{Max}$ (Le città) $\phi^{Max}$ (mólto nordiche) non mi piacciono.

  ‘I don’t like very Nordic cities’

6
Final Lengthening

• Stressed vowel of $\phi^{Max}$-final word undergoes lengthening
  (Nespor and Vogel 1986, Ghini 1993)

• If lengthening occurs: diagnose $\phi^{Max}$ boundary

  $\phi^{Max}(L’entraata) \phi^{Max}(alla fiera di Milaano)$

  ‘Admission to the fair of Milan’
Analysis in Match Theory
MATCHXP

• MATCHXP:

  “Assign a violation for each XP without a matching $\phi$”

- For now, assuming that all syntactic XPs are matched
  (Elfner 2015)
Binarity Constraints

• Binarity Minimum (BINMIN):

  “Assign one violation for every $\phi$ that dominates fewer than two $\omega$”

• Binarity Maximum (BINMAX):

  “Assign one violation for every $\phi$ that dominates more than two $\omega$”
**STRONGSTART**

- **STRONGSTART:** (Elfner 2012, Selkirk 2011)

  “Assign one violation for every prosodic constituent whose leftmost daughter constituent is lower in the Prosodic Hierarchy than its sister constituent immediately to its right: *(κ_n κ_{n+1} …)*”

```
  l
    | a. φ  b. φ  c. * φ
    φ  φ  φ  ω  ω  φ
  φ  φ  φ  ω  ω  φ
ω
```
Upper Limits on $\phi$ Size

- Italian $\phi$ are maximally binary: sequences of more than two prosodic words are split into separate $\phi$

- Verb + DO: verb and adjective, but not noun, undergo lengthening

$$\text{TP[ ho VP[ mangiato DP[ dei NP[ NP[ pasticcini ] AP[ ripieni]]]]]}$$

$$\phi_{\text{Max}}(\omega \text{ho-mangiato}) \phi_{\text{Max}}(\omega \text{dei-pasticcini } \omega \text{ripieeni})$$

‘I ate some filled donuts’
Upper Limits on φ Size

- Verb and direct object are split up when the latter contains two ω
- Candidates B, C: BinMax >> MatchXP, BinMin
- Candidate D: MatchXP >> BinMin

<table>
<thead>
<tr>
<th></th>
<th>TP[ho mangiato DP[dei pasticcini AP[rippieni]]]</th>
<th>BinMax</th>
<th>MatchXP</th>
<th>BinMin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Φ</td>
<td>φ(ω ho-mangiaato) φ(ω dei-pasticcini φ(ω ripieeni))</td>
<td></td>
<td>*TP</td>
<td>**</td>
</tr>
<tr>
<td>b.</td>
<td>φ(ω ho-mangiaato φ(ω dei-pasticcini ω ripieeni))</td>
<td>*!</td>
<td>*AP</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>φ(ω ho-mangiaato φ(ω dei-pasticcini φ(ω ripieeni)))</td>
<td>*!</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>d.</td>
<td>φ(ω ho-mangiaato ω dei-pasticciini) φ(ω ripieeni)</td>
<td></td>
<td><em>TP</em>DP!</td>
<td>*</td>
</tr>
</tbody>
</table>
Ditransitive Mismatch

• SR applies between V and Direct Object in ditransitive

$$\text{TP[ darò VP[ DP[ libri ] PP[ a Gianni ] ] ]}$$

a. $$\phi_{\text{Max}}(\omega \text{darò } \omega \text{libri}) \phi_{\text{Max}}(\omega \text{a-Gianni})$$

b. $$\ast \phi_{\text{Max}}(\omega \text{darò}) \phi_{\text{Max}}(\omega \text{libri } \omega \text{a-Gianni})$$

‘I will give books to Gianni’
Ditransitive Mismatch

- Problem: syntax suggests DP and PP phrase together (Larson 1988)

```
(a) TP
   pro_i T'
   T daro_j ti v'
   v
   t_j VP
   libri
   V PP
   a Gianni

(b) *
   t
   FMAX
   ω
   φ daro
   ω
   libri
   a
   ω Gianni
```
Ditransitive Mismatch

- Desired candidates A and B fare worse on MATCHXP

<table>
<thead>
<tr>
<th>TP[ darò VP[ DP[ libri ] PP[ a Gianni ] ] ]</th>
<th>BinMax</th>
<th>MATCHXP</th>
<th>STRONG START</th>
<th>BinMin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 😞 ( \phi(\omega \text{darò}) \phi(\text{libri}) \phi(\omega \text{a-Gianni}) )</td>
<td><em>TP</em>VP!</td>
<td>***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. 😢 ( \phi(\omega \text{dáro} \phi(\text{libri}) \phi(\omega \text{a-Gianni}) )</td>
<td><em>TP</em>VP!</td>
<td>*</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>c. 🛑 ( \phi(\omega \text{darò}) \phi(\phi(\omega \text{libri}) \phi(\omega \text{a-Gianni}) )</td>
<td>*TP</td>
<td>***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. ( \phi(\omega \text{dáro} \phi(\phi(\omega \text{libri}) \phi(\omega \text{a-Gianni}) )</td>
<td>*!</td>
<td>*</td>
<td>**</td>
<td></td>
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</table>

- N.B. STRONGSTART & BinMin variably ranked for independent reasons (Van Handel, this conference)
Ditransitive Mismatch

• Problematic for Match Theory (Kalivoda 2018)

• Is there a principled reason to ignore VP?

• Unlike other XPs considered, VP is headed by a phonologically empty trace (Truckenbrodt 1999; Selkirk & Lee 2017)

  \[ TP[ V_j \ VP[ DP \ t_j \ PP ]] \]
Redefining MATCH

- Proposal: MATCH constraints only see XPs with a phonologically overt $X^0$ (Truckenbrodt 1999; Selkirk and Lee 2017)

- Ditransitive VP will be invisible to MATCHXP
Redefining MATCH

• New definition of MATCHXP no longer rules out A and B

• But it doesn’t ensure that V and DP phrase together

<table>
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<th>BinMin</th>
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<tr>
<td>a. ( \phi(\phi(\omega \text{darò}) \phi(\omega \text{libri}) \phi(\omega \text{a-Gianni})) )</td>
<td>*TP</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>b. ( \phi(\omega \text{darò} \phi(\omega \text{libri}) \phi(\omega \text{a-Gianni})) )</td>
<td>*TP</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>c. ( \phi(\omega \text{darò}) \phi(\phi(\omega \text{libri}) \phi(\omega \text{a-Gianni})) )</td>
<td>*TP</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>d. ( \phi(\omega \text{darò}) \phi(\omega \text{libri}) \phi(\omega \text{a-Gianni}) )</td>
<td>*TP</td>
<td>*</td>
<td>***</td>
</tr>
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</table>
What constraint would favor $\phi_{\text{Max}}(\omega \phi(\omega))$ over $\phi_{\text{Max}}(\omega) \phi_{\text{Max}}(\omega)$?

Binarity?

- General $\text{BINMIN}$ is ranked low
- A $\phi_{\text{Max}}$ that’s unary may be particularly marked (Selkirk and Elordieta, 2010)

$\text{BINMIN}$-$\phi_{\text{Max}}$:

“Assign one violation for each $\phi_{\text{Max}}$ that does not dominate at least two $\omega$”

$\phi_{\text{Max}}$ Binarity
**φ\textsuperscript{Max} Binarity**

- BinMin-φ\textsuperscript{Max} rules out flat Candidate D, but C still wins!

<table>
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<th>TP[ darò VP[ DP[ libri ] PP[ a Gianni ] ] ]</th>
<th>MATCHXP</th>
<th>BinMInc-φ\textsuperscript{Max}</th>
<th>Strong Start</th>
<th>BinMin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>φ(φ(ωdarò) φ(λíbri)) φ(ωa-Gianni)</td>
<td>*TP</td>
<td>*</td>
<td>**</td>
<td>***</td>
</tr>
<tr>
<td>b</td>
<td>φ(ωdarò φ(λíbri)) φ(ωa-Gianni)</td>
<td>*TP</td>
<td>*</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>φ(ωdarò φ(λíbri)) φ(ωa-Gianni))</td>
<td>*TP</td>
<td>*</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>φ(ωdarò) φ(λíbri) φ(ωa-Gianni)</td>
<td>*TP</td>
<td>***!</td>
<td>***</td>
<td></td>
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</table>
STRONGSTART

• What would favor Cand A over Cand C?
STRONGSTART

- Cand A: $\iota$-initial $\phi^\text{NonMin}$ is sister to $\phi^\text{Min}$
- Cand C: $\iota$-initial $\phi^\text{Min}$ is sister to $\phi^\text{NonMin}$
- Intuitively, a minimal $\phi$ is “weaker” than a non-minimal $\phi$
Redefine STRONGSTART to see prosodic subcategories:

“Assign one violation for every prosodic constituent whose leftmost daughter is lower in the Prosodic Hierarchy, or is of a lower subcategory, than the sister on its immediate right”

ι will prefer to start with a $\phi^{\text{NonMin}}$ over a $\phi^{\text{Min}}$

\[
\begin{array}{c}
\phi^{\text{Max}} \\
\phi \\
\phi^{\text{Min}}
\end{array}
\]

\[
\begin{array}{c}
\phi^{\text{NonMin}} \\
\phi^{\text{Min}}
\end{array}
\]

\[
\begin{array}{c}
\phi^{\text{Min}} \\
\phi^{\text{Min}}
\end{array}
\]

\[
\begin{array}{c}
\phi^{\text{Min}} \\
\phi^{\text{NonMin}}
\end{array}
\]

\[
\begin{array}{c}
\phi^{\text{Min}} \\
\phi^{\text{Min}}
\end{array}
\]

\[
\begin{array}{c}
\phi^{\text{Min}} \\
\phi^{\text{Min}}
\end{array}
\]

\[
\begin{array}{c}
\phi^{\text{Min}} \\
\phi^{\text{Min}}
\end{array}
\]
**STRONGSTART**

- Cand A satisfies **STRONGSTART**: $\phi^{\text{NonMin}}$ is higher than $\phi^{\text{Min}}$
- Cand C violates **STRONGSTART**: $\phi^{\text{Min}}$ is lower than $\phi^{\text{NonMin}}$
Ditransitive Mismatch

• New definition of **STRONSTART** correctly rules out Candidate C

• Redefined **MATCHXP**, with additional markedness constraints, derives the mismatch

<table>
<thead>
<tr>
<th>TP[ darò VP[ DP[ libri ] PP[ a Gianni ] ] ]</th>
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<th><strong>BINMIN</strong></th>
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<th><strong>BINMIN</strong></th>
</tr>
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<tbody>
<tr>
<td>a.  ❧  $\phi(\phi(\omega d\grave{a}ro) \phi(\omega a-Gianni))$</td>
<td>*TP</td>
<td>*</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>b.  ❧  $\phi(\omega d\grave{a}ro \phi(\omega a-Gianni))$</td>
<td>*TP</td>
<td>*</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>c.  $\phi(\omega d\grave{a}r\grave{o}) \phi(\phi(\omega a-Gianni))$</td>
<td>*TP</td>
<td>*</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>d.  $\phi(\omega d\grave{a}r\grave{o}) \phi(\omega a-Gianni)$</td>
<td>*TP</td>
<td>**!</td>
<td></td>
<td>***</td>
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</tbody>
</table>
Subj + Verb

- New MATCHXP finds support in Subj + Verb sequences
  - Subj and Verb phrase separately, despite both being dominated by FP (Cardinaletti 2004)
  - F is phonologically null: MATCH doesn’t see FP
Subj + Verb

- But again, just redefining MATCH is not sufficient

- $\text{BINMIN}\cdot\phi^{\text{Max}}$ will motivate creating a $\phi^{\text{Max}}$ containing both words

<table>
<thead>
<tr>
<th>Subj + Verb</th>
<th>MATCHXP</th>
<th>$\text{BINMIN}\cdot\phi^{\text{Max}}$</th>
<th>STRONG START</th>
<th>$\text{BINMIN}$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a. 😍 $\phi(\omega \text{la verità}) \phi(\omega \text{vince})$</strong></td>
<td>****</td>
<td>*</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td><strong>b. $\phi(\omega \text{la vérita} \phi(\omega \text{vince}))$</strong></td>
<td>*DP</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>c. 💣 $\phi(\phi(\omega \text{la vérita}) \phi(\omega \text{vince}))$</strong></td>
<td></td>
<td></td>
<td>**</td>
<td></td>
</tr>
</tbody>
</table>
**MATCHXP_{MAX}**

- **MATCHXP_{MAX}:** assign a violation for each maximal XP without a matching maximal $\phi$ (Ishihara 2014)

- If this MATCH constraint is defined to only see XPs with overt heads, then DP and TP are maximal in the syntax and will be mapped to maximal $\phi$

![Diagram](image)
Subj + Verb

- \textsc{MatchXP}_{\textsc{Max}}\textsc{P}\textsc{Max} derives correct output

- New definition of \textsc{Match} is once again crucial

\begin{tabular}{|l|c|c|c|c|}
\hline
FP[ DP[ la verità ] TP[ vince ] ] & \textsc{MatchXP}_{\textsc{Max}} & \textsc{MatchXP} & \textsc{BinMin}-\phi_{\textsc{Max}} & \textsc{Strong} \\
\hline
a. \(\phi(\omega \text{ la verità}) \phi(\omega \text{ vince})\) & & & ** & * \\
\hline
b. \(\phi(\omega \text{ la vérita } \phi(\omega \text{ vince}))\) & *DP!*TP & *DP & * & * \\
\hline
c. \(\phi(\phi(\omega \text{ la vérita }) \phi(\omega \text{ vince}))\) & *DP!*TP & & & ** \\
\hline
\end{tabular}
Implementing the Analysis in SPOT

Follow along at spot.sites.ucsc.edu
GEN

Built-in systems

Italian (Van Handel 2019)

GEN options

☐ No prosodic recursion.
☐ Enforce headedness.
☐ No level skipping.
☐ Only generate branching constituents.
☐ Allow clitics to move
Inputs

- Parameterize MATCH constraints by indicating lexical status, overt vs. silent head

- Is an XP lexical?
  - “func”: false

- Is an XP overtly headed?
  - “silentHead”: false

```json
},
{
  "cat": "xp",
  "id": "VP",
  "func": false,
  "silentHead": true,
  "children": [
    {
      "cat": "xp",
      "id": "DP",
      "func": true,
      "silentHead": false,
      "children": [
        {
          "id": "unLibro",
          "cat": "x0"
        }
      ]
    }
  ]
}
```
CON

- **MATCHXP**

- **MATCHXP_{MAX}**

  Parameters allow researcher to test consequences of different implementations of MATCH

```
Match Theory

☐ Match(Syntax → Prosody)

☐ MatchMax(Syntax → Prosody)

☐ MatchNonMinimal(Syntax → Prosody)

☐ Custom Match(Syntax → Prosody)

☐ Match (Prosody → Syntax)
```
• **BinMin**

• **BinMin-ψ^{Max}\**

• **BinMax**
CON

- **STRONGSTART**

  Specialized subcategory-sensitive STRONGSTART proposed here
Factorial Typology

• The typology contains 31 languages

• 2 are compatible with Italian (L1, L8)
Factorial Typology

- L1 ranking:

  - matchSP-OvertHead(xp)
  - matchMaxSP-OvertHead(xp)
  - binMinLeaves(phi)
  - binMaxLeaves(phi)
  - strongStart_SubCat

- L8 ranking:

  - matchSP-OvertHead(xp)
  - matchMaxSP-OvertHead(xp)
  - binMinLeaves(phi)
  - binMaxLeaves(phi)
  - strongStart_SubCat
Alternative CON

• Sanity check: is the new definition of MatchXP necessary?

• MATCHXP

• MATCHXP\textsubscript{MAX}
  
  - Now set the parameters to match \textit{all} XPs

  - Generate a second typology
Factorial Typology 2

• The new typology contains 31 languages

• None of the languages correspond to Italian

• Theoretical insight from SPOT: MATCHXP must only match overtly headed XPs, at least in Italian
Conclusions
Conclusions

• Italian requires a particular definition of MATCHXP: match XPs with phonologically overt X⁰ (Truckenbrodt 1999, Selkirk and Lee 2017)

• Do all languages ignore XPs with silent heads?
  - Could explain ubiquity of Ditransitive Mismatch (Kalivoda 2018)
  - But Irish appears to match all XPs (Elfner 2015)
Conclusions

• Cross-linguistic variation in implementation of MATCH is an important question for future work

• SPOT is particularly well-suited to address this question
  - Parameters facilitate testing different constraint definitions
  - Theory comparison would be labor-intensive without automatic generation and evaluation of candidates
Thank you!

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Amanda Rysling, Ryan Bennett

Jenny Bellik, Nick Kalivoda

Netta Ben-Meir

UCSC Winter 2019 Research Seminar Participants

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Meinschaefer, J. (2005). The prosodic domain of Italian troncamento is not the clitic group. Arbeitspapier Nr. 118.
