The role of Strong Strong Start in Mandarin Tone 3 Sandhi
NELS 51 | UQAM | November 7th
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1. Introduction

- **Match Theory** (Selkirk 2011): distinctness of prosodic and syntactic structures.
- **Match constraints**: the prosodic structure is isomorphic to the syntactic structure in the default case.

(1) a. **Match**(XP, φ)
   The left and right edges of a lexical phrasal projection (XP) in the syntactic representation must correspond to the left and right edges of a phonological phrase (φ) in the phonological representation.
   
   b. **Match**(φ, XP)
   The left and right edges of a phonological phrase (φ) in the phonological representation must correspond to the left and right edges of a lexical phrasal projection (XP) in the syntactic representation.

- **Prosodic markedness constraints**: correspondence between the syntactic and prosodic structure can be altered on a language-particular basis.

- Selkirk’s (2011) **Strong Start** constraint predicts a left-/right-branching asymmetry.

(2) **Strong Start**
   A prosodic constituent optimally begins with a leftmost daughter constituent not lower in the prosodic hierarchy than the constituent that immediately follows.

(3)

<table>
<thead>
<tr>
<th>a. <strong>Left-branching structure:</strong></th>
<th>b. <strong>Right-branching structure:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong Start is <strong>satisfied</strong></td>
<td>Strong Start is <strong>violated</strong></td>
</tr>
</tbody>
</table>

\[
\begin{align*}
\varphi_1 & \quad \varphi_1 \\
\varphi_2 & \quad \omega \\
\varphi_3 & \quad \omega \\
\omega & \quad \omega \\
\end{align*}
\]

\[
\begin{align*}
\varphi_1 & \quad \varphi_1 \\
\omega & \quad \varphi_2 \\
\omega & \quad \varphi_3 \\
\omega & \quad \omega \\
\end{align*}
\]
Myrberg’s (2013) EqualSisters constraint ...
- ... predicts that an unbalanced, left- or right-branching syntactic structure will be “matched” by a balanced, flat or recursive prosodic structure.

\(4\) EqualSisters
Sister nodes in prosodic structure are instantiations of the same prosodic category.

\(5\)
<table>
<thead>
<tr>
<th>a. Balanced, flat structure: EqualSisters is satisfied</th>
<th>b. Balanced, recursive structure: EqualSisters is satisfied</th>
<th>c. Unbalanced structure: EqualSisters is violated</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
</tbody>
</table>

\*Strong Start vs EqualSisters:*
(i) Strong Start is asymmetrical, while EqualSisters is symmetrical.
(ii) \(5c\) satisfies Strong Start, but violates EqualSisters.

**This talk:** Mandarin (Chinese) Tone 3 Sandhi evidences a more restrictive version of Strong Start, which I refer to as Strong Strong Start:

\(6\) Strong Strong Start
A prosodic constituent optimally begins with a leftmost daughter constituent not lower in the prosodic hierarchy than any sister constituent that follows.

- Like Strong Start but unlike EqualSisters, **Strong Strong Start predicts a left-/right-branching asymmetry.**
- Unlike Strong Start but like EqualSisters, **Strong Strong Start is violated by \(5c\).**

**The effect of Strong Strong Start:** a right-branching syntactic constituent is “matched” by an equal-sisters prosodic constituent in the sense of Myrberg (2013), by
(i) “flattening” the recursive structure \(5a\), or
(ii) grouping syntactic non-sisters at the left edge \(5b\).
2. Tone 3 Sandhi: a domain-sensitive phenomenon

- Tone 3 Sandhi (T3S) ...
  - ... a phonological process by which a T3 (L) is changed to a sandhi tone (s) (LH) when it is followed by another T3 (L).¹
  - ... a dissimilatory process where a H tone is inserted between two L tones (Yip 1980, 2002).

(7) T3S in Mandarin

<table>
<thead>
<tr>
<th>L</th>
<th>LH</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>s</td>
<td>__ 3</td>
</tr>
</tbody>
</table>

(8) ‘good wine’

UR: hao3 jiu3
SR: s 3

- T3S is a domain-sensitive phenomenon ...
  - ... three distinct patterns of realization when more than two successive T3 syllables occur.

- In grammatically unstructured strings of numbers such as wu3 ‘five’ ...
  - ... strings of four or more wu3 ‘five’ are grouped into “Minimal Rhythm Units” (MRUs) that consist of two or three wu3 ‘five’ (Chen 2000).
  - (9b): rhythmic grouping

(9)

<table>
<thead>
<tr>
<th>Underlying representation</th>
<th>Surface representation</th>
</tr>
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<tbody>
<tr>
<td>a. wu3 wu3 wu3</td>
<td>(s s 3)</td>
</tr>
<tr>
<td>‘five five five’</td>
<td></td>
</tr>
<tr>
<td>b. wu3 wu3 wu3 wu3</td>
<td>(s 3) (s 3)</td>
</tr>
<tr>
<td>‘five five five’</td>
<td></td>
</tr>
<tr>
<td>c. wu3 wu3 wu3 wu3 wu3</td>
<td>(s 3) (s s 3)</td>
</tr>
<tr>
<td>‘five five five five’</td>
<td></td>
</tr>
</tbody>
</table>

¹ T3 has three variants (Chao 1968): it is LLH (dipping tone) in citation form and pre-pausally, LH (sandhi tone) before another T3, and L elsewhere. I assume, following Yip (1980, 2002) a.o., that a T3 is underlyingly L.
A left-branching structure only has a non-alternating T3S pattern.
- (11a): the rhythmic grouping seen in (9b) is not possible with a left-branching structure.

(10) ‘leave a bit earlier’
UR:  
\[
\text{[VP [AP zao3 dian3] zou3]}
\]
\begin{align*}
\text{early} & \quad \text{a bit} & \quad \text{leave} \\
\text{a. SR:} & \quad *3 & \quad s & \quad 3 \\
\text{b. SR:} & \quad s & \quad s & \quad 3
\end{align*}

(11) ‘It is good to leave a bit earlier.’
UR:  
\[
\text{[IP [VP [AP zao3 dian3] zou3] hao3]}
\]
\begin{align*}
\text{early} & \quad \text{a bit} & \quad \text{leave} & \quad \text{good} \\
\text{a. SR:} & \quad *s & \quad 3 & \quad s & \quad 3 \\
\text{b. SR:} & \quad *3 & \quad s & \quad s & \quad 3 \\
\text{c. SR:} & \quad s & \quad s & \quad s & \quad 3
\end{align*}

The pattern of realization of a right-branching structure is more variable.
- (12a) and (13a): alternating T3S pattern.

(12) ‘buy good wine’
UR:  
\[
\text{[VP mai3 [NP hao3 jiu3]]}
\]
\begin{align*}
\text{buy} & \quad \text{good} & \quad \text{wine} \\
\text{a. SR:} & \quad 3 & \quad s & \quad 3 & \quad \text{(slow speech)} \\
\text{b. SR:} & \quad s & \quad s & \quad 3 & \quad \text{(fast speech)}
\end{align*}

(13) ‘want to buy good wine’
UR:  
\[
\text{[VP1 xiang3 [VP2 mai3 [NP hao3 jiu3]]]}
\]
\begin{align*}
\text{want} & \quad \text{buy} & \quad \text{good} & \quad \text{wine} \\
\text{a. SR:} & \quad s & \quad 3 & \quad s & \quad 3 \\
\text{b. SR:} & \quad 3 & \quad s & \quad s & \quad 3 \\
\text{c. SR:} & \quad s & \quad s & \quad s & \quad 3
\end{align*}

T3S applies cyclically bottom-up on the syntactic structure (C. C. Cheng 1970, 1973, a.o.):
- A left-branching structure has a non-alternating T3S pattern;
- A right-branching structure has an alternating T3S pattern.
- The various possibilities for a right-branching structure can be derived when the initial cycle coincides with a larger syntactic constituent.

T3S applies on a prosodic structure (Shih 1986, 1997; Chen 1991, 2000; a.o.):
- (14d): syntactic non-sisters can form a sandhi domain.
(14) ‘want to buy a good book’

UR: \([\text{VP}_1 \text{xiang}^3 \text{VP}_2 \text{mai}^3 \text{NP} \text{hao}^3 \text{shu}^1]]\]

\begin{align*}
a. \text{SR:} & \quad ^*3 \quad 3 \quad 3 \quad 1 \\
b. \text{SR:} & \quad 3 \quad s \quad 3 \quad 1 \\
c. \text{SR:} & \quad s \quad s \quad 3 \quad 1 \\
d. \text{SR:} & \quad (s \quad 3) \quad (3 \quad 1)
\end{align*}

3. A Match-Theory analysis

- **Proposal:** T3S applies cyclically bottom-up on a prosodic structure ...
  - ... “matched” from the syntactic structure of an expression, along the lines of the Match Theory of syntactic-prosodic constituency correspondence (Selkirk 2011).

- The left-/right-branching asymmetry lends support to the Match Theory.
  - Because left- and right-branching structures show distinct T3S patterns compared to grammatically unstructured strings ...
  - ... **both the right edge** of a left-branching structure **and the left edge** of a right-branching structure **must be detectable in the phonology.**

- The grammatical analogue of speech rate: **STRONG STRONG START is ranked variably with respect to the Match constraints.**

(15)a. \text{Match}(\text{XP}, \phi), \text{Match}(\phi, \text{XP}) \gg \text{STRONG STRONG START} \quad \text{(slow speech)}

b. \text{Match}(\text{XP}, \phi), \text{Match}(\phi, \text{XP}), \text{STRONG STRONG START}

c. \text{STRONG STRONG START} \gg \text{Match}(\text{XP}, \phi), \text{Match}(\phi, \text{XP}) \quad \text{(fast speech)}

- Assumption: the top node of the prosodic structure of an expression is an intonational phrase (\(i\)) and the terminal nodes are prosodic words (\(o\)).

(16) ‘buy good wine’

UR: \([\text{VP} \text{mai}^3 \text{NP} \text{hao}^3 \text{jiu}^3]]\]

\begin{align*}
a. \text{SR:} & \quad (t \quad (\phi_1 \quad 3 \quad (\phi_2 \quad s \quad 3))) \quad \text{(slow speech)} \\
& \quad \text{Match}(\text{XP}, \phi) ; \text{Match}(\phi, \text{XP}) \quad \text{STRONG STRONG START} \\
& \quad \quad \quad \quad \phi_1 \\
b. \text{SR:} & \quad (t \quad (\phi_1 \quad s \quad s \quad 3)) \quad \text{(fast speech)} \\
& \quad \text{STRONG STRONG START} \quad \text{Match}(\text{XP}, \phi) ; \text{Match}(\phi, \text{XP}) \\
& \quad \quad \quad \quad \text{NP}
\end{align*}
The various possibilities for a right-branching structure ...
- ... follows from constraint interaction (17).
- Candidate (a): the prosodic structure is isomorphic to the syntactic structure.
- Candidates (b), (c), (d): a right-branching syntactic structure is “matched” by a (partially) balanced, flat prosodic structure.
- Candidate (e): a right-branching syntactic structure is “matched” by a balanced, recursive prosodic structure.\(^2\)

\[(17) \quad \text{‘want to buy good wine’} \]

\[
\begin{array}{cccc}
\text{UR:} & [\text{VP}_1 \ xiang^3] & [\text{VP}_2 \ mai^3] & [\text{NP} \ hao^3 \ jiu^3] \\
\text{want} & \text{buy} & \text{good} & \text{wine} \\
\text{a.} & \text{SR:} & (1 \ (\varphi_1 \ s \ (\varphi_2 \ 3 \ (\varphi_3 \ s \ 3))) ) \\
\text{ Match}(XP, \varphi) : \text{ Match}(\varphi, XP) & \text{ Strong Strong Start} & \varphi_1, \varphi_2 & \text{ Strong Start} & \text{ EqualSisters} & \varphi_1, \varphi_2 \\
\text{b.} & \text{SR:} & (1 \ (\varphi_1 \ 3 \ (\varphi_2 \ s \ s \ 3))) \\
\text{ Match}(XP, \varphi) : \text{ Match}(\varphi, XP) : \text{ Strong Strong Start} & \text{ Strong Start} & \varphi_1 & \text{ EqualSisters} & \varphi_1 \\
\text{c.} & \text{SR:} & (1 \ (\varphi_1 \ s \ 3 \ (\varphi_2 \ s \ 3))) \\
\text{ Match}(XP, \varphi) : \text{ Match}(\varphi, XP) : \text{ Strong Strong Start} & \text{ Strong Start} & \text{ EqualSisters} \\
\text{d.} & \text{SR:} & (1 \ (\varphi \ s \ s \ s \ 3)) \\
\text{ Strong Start} & \text{ EqualSisters} & \text{ Strong Strong Start} & \text{ Match}(XP, \varphi) : \text{ Match}(\varphi, XP) \\
\text{VP2, NP} & \varphi_1 & \varphi_1 \\
\text{e.} & \text{SR:} & (1 \ (\varphi_1 \ (\varphi_2 \ s \ 3) \ (\varphi_3 \ s \ 3))) \\
\text{ Strong Start} & \text{ EqualSisters} & \text{ Strong Strong Start} & \text{ Match}(XP, \varphi) : \text{ Match}(\varphi, XP) \\
\text{VP2} & \varphi_1 & \varphi_2 \\
\end{array}
\]

- \textbf{Not Strong Start}: prefers candidate (c) over candidates (b), (d), and (e).
- \textbf{Not EqualSisters}: predicts various possibilities for a left-branching structure.

The lack of variation for a left-branching structure ...
- ... follows from the fact that its prosodic structure satisfies both the Match constraints and \text{Strong Strong Start} in the default case; thus \textbf{any alteration is less optimal}.

\(^2\) One might speculate that candidate (d) is preferred over candidate (e) with \text{Match}(\varphi, \text{XP}) >> \text{Match}(\text{XP}, \varphi), while candidate (e) is preferred over candidate (d) with \text{Match}(\text{XP}, \varphi) >> \text{Match}(\varphi, \text{XP}).
It is good to leave a bit earlier.

<table>
<thead>
<tr>
<th>Time</th>
<th>UR:</th>
<th>a. SR:</th>
<th>b. SR:</th>
<th>c. SR:</th>
</tr>
</thead>
<tbody>
<tr>
<td>early</td>
<td>IP</td>
<td>[AP</td>
<td>zao3 dian3 zou3 hao3]</td>
<td>*s 3 s 3</td>
</tr>
<tr>
<td></td>
<td>VP</td>
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</tbody>
</table>

- **Size constraints**: constraints that require a prosodic constituent to be binary (Elfner 2012, 2015).

(19) a. **BinMin(κ)**

A prosodic constituent of type κ must immediately dominate at least two daughter constituents in the output phonological representation.

b. **BinMax(κ)**

A prosodic constituent of type κ must immediately dominate at most two daughter constituents in the output phonological representation.

- In Mandarin, BinMin(φ) is top-ranked.
  - **BinMin(φ) >> Strong Strong Start**: a ω cannot be promoted to a φ.
  - **BinMin(φ) >> MATCH**: a single-word XP is not “matched” by a φ.

(20) ‘buy good book’

<table>
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<th>b. SR:</th>
<th>c. SR:</th>
</tr>
</thead>
<tbody>
<tr>
<td>buy</td>
<td>[VP1 mai3 [NP hao3 shu1]]</td>
<td>(t (φ1 s (φ2 3 1)))</td>
<td>(t (φ1 s 3 1))</td>
<td>*(t (φ1 (φ2 3) (φ3 3 1)))</td>
</tr>
<tr>
<td>good</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>book</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
(21) ‘Horses roar.’

UR: [IP [NP ma3] [VP hou3]]

\[
\begin{array}{|c|c|c|}
\hline
{\text{BinMin}}(\varphi, \omega) & \text{Match(XP, } \varphi) & \text{Match(} \varphi, \text{XP)} \\hline
\varphi_1, \varphi_2 & & \text{Strong Strong Start} \\hline
\end{array}
\]

b. SR: (t s 3)

- BinMax is absent at the phonological phrase level but present at the foot level ...
  - ... which accounts for the rhythmic grouping in grammatically unstructured strings.

(22)

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<td>b. wu3 wu3 wu3 wu3</td>
<td>(s 3) (s 3)</td>
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<tr>
<td>c. wu3 wu3 wu3 wu3 wu3</td>
<td>(s 3) (s s 3)</td>
</tr>
<tr>
<td>‘five five five five five’</td>
<td></td>
</tr>
</tbody>
</table>

- Chen (2000) takes (23d) to evidence that correspondence between syntactic and prosodic structure can be overridden in virtue of a preference for the rhythmic grouping seen in (22b).

(23) ‘want to buy a good book’

UR: [VP1 xiang3 [VP2 mai3 [NP hao3 shu1]]]

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{want} & \text{buy} & \text{good} & \text{book} \\hline
\text{SR: } & *3 & 3 & 3 & 1 \\hline
\text{SR: } & 3 & s & 3 & 1 \\hline
\text{SR: } & s & s & 3 & 1 \\hline
\text{SR: } & (s & 3) & (3 & 1) \\hline
\end{array}
\]

- Two obvious problems:
  1. The rhythmic grouping is not possible with a left-branching structure.
  2. The rhythmic grouping is not possible with a mixed-branching structure such as (24). \(^3\)

\(^3\) To confront this problem, Chen (2000) has to stipulate that terminal nodes that are sisters in the syntactic structure must be sisters in the prosodic structure.
‘want to leave a bit earlier’

UR: \([\text{VP}_1 \text{ xiang}^3 [\text{VP}_2 [\text{AP} \text{ zao}^3 \text{ dian}^3 \text{ zou}^3]]] \text{ want early a bit leave}\)

a. SR: \((t (\phi_1 3 (\phi_2 (\phi_3 s s) 3)))\)

\[
\begin{array}{ccc}
\text{Match(XP, } \phi) & \text{Match(} \phi, \text{ XP)} & \text{Strong Strong Start} \\
\hline
\text{VP2, AP} & \phi_1 \\
\end{array}
\]

d. SR: \((t (\phi_1 s s s 3))\)

\[
\begin{array}{ccc}
\text{Strong Strong Start} & \text{Match(} \phi, \text{ XP)} & \phi_1 \\
\hline
\text{VP2, AP} & \phi_1 \\
\end{array}
\]

c. SR: \(* (t (\phi_1 (\phi_2 s s) s (\phi_3 s 3)))\)

\[
\begin{array}{ccc}
\text{Strong Strong Start} & \text{Match(} \phi, \text{ XP)} & \phi_1 \\
\hline
\text{VP2, AP} & \phi_2, \phi_3 \\
\end{array}
\]

4. Asymmetrical EqualSisters?

- The Match Theory is a retreat from Selkirk’s (1986) Align-XP model.
  - Align-XP: in the default case only one edge of a syntactic constituent aligns with a prosodic boundary.

(25)a. **ALIGN-L(\text{XP}, \phi)**

The left edge of a lexical phrasal projection (\text{XP}) in the syntactic representation must correspond to the left edge of a phonological phrase (\(\phi\)) in the phonological representation.

b. **ALIGN-R(\text{XP}, \phi)**

The right edge of a lexical phrasal projection (\text{XP}) in the syntactic representation must correspond to the right edge of a phonological phrase (\(\phi\)) in the phonological representation.

c. **ALIGN-L(\phi, \text{XP})**

The left edge of a phonological phrase (\(\phi\)) in the phonological representation must correspond to the left edge of a lexical phrasal projection (\text{XP}) in the syntactic representation.

d. **ALIGN-R(\text{XP}, \phi)**

The right edge of a phonological phrase (\(\phi\)) in the phonological representation must correspond to the right edge of a lexical phrasal projection (\text{XP}) in the syntactic representation.
Alternative analysis: the left-/right-branching asymmetry indicates ...
- ... the right edge (of a left-branching structure) always aligns with a prosodic boundary;
- ... alignment of the left edge (of a right-branching structure) and a prosodic boundary can be overridden in virtue of other prosodic considerations.
- Proposal: ALIGN-R(XP, φ) is top-ranked; EQUALSISTERS is ranked variably with respect to ALIGN-L(XP, φ).

The various possibilities for a right-branching structure ...
- ... follows from constraint interaction (26) (cf. 17).
- Candidate (a): the prosodic structure is isomorphic to the syntactic structure.
- Candidates (b), (c), (d): a right-branching syntactic structure is “matched” by a (partially) balanced, flat prosodic structure.
- Candidate (e): a right-branching syntactic structure is “matched” by a balanced, recursive prosodic structure.\footnote{One might speculate that candidate (d) is preferred over candidate (e) with ALIGN-R(φ, XP) >> ALIGN-L(XP, φ), while candidate (e) is preferred over candidate (d) with ALIGN-L(XP, φ) >> ALIGN-R(φ, XP).}

(26) ‘want to buy good wine’
\begin{center}
\begin{tabular}{cccc}
\text{UR:} & [VP1 xiang3 [VP2 mai3 [NP hao3 jiu3]]] & want & buy & good wine \\
\text{a. SR:} & (t (φ_1 s (φ_2 3 (φ_3 s 3))) & ALIGN-R(XP, φ) & ALIGN-L(XP, φ) & EQUALSISTERS & ALIGN-R(φ, XP) & φ_1, φ_2 \\
\text{b. SR:} & (t (φ_1 3 (φ_2 s s 3))) & ALIGN-R(XP, φ) & ALIGN-L(XP, φ) & EQUALSISTERS & ALIGN-R(φ, XP) & NP & φ_1 \\
\text{c. SR:} & (t (φ_1 s 3 (φ_2 s 3))) & ALIGN-R(XP, φ) & ALIGN-L(XP, φ) & EQUALSISTERS & ALIGN-R(φ, XP) & \text{VP2} & φ_1 \\
\text{d. SR:} & (t (φ s 3 s s 3)) & ALIGN-R(XP, φ) & EQUALSISTERS & ALIGN-L(XP, φ) & ALIGN-R(φ, XP) & \text{VP2, NP} \\
\text{e. SR:} & (t (φ_1 (φ_2 s 3) (φ_3 s 3))) & ALIGN-R(XP, φ) & EQUALSISTERS & ALIGN-L(YP, φ) & ALIGN-R(φ, XP) & NP & φ_2 \\
\end{tabular}
\end{center}
- The lack of variation for a left-branching structure ...
  - ... follows from the fact that top-ranked $\text{ALIGN-R}(\text{XP, } \varphi)$ demands the prosodic structure to also be left-branching (cf. 18).

(27) ‘It is good to leave a bit earlier.’

<table>
<thead>
<tr>
<th>UR:</th>
<th>[ip] [vp] [ap]</th>
<th>zao3</th>
<th>dian3</th>
<th>zou3</th>
<th>hao3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>early</td>
<td>a bit</td>
<td>leave</td>
<td>good</td>
<td></td>
</tr>
</tbody>
</table>

| a. SR: | *s 3 s 3 |
| b. SR: | * 3 s s 3 |
| c. SR: | (1 (\varphi_1 (\varphi_2 s s) s) s) 3 |

<table>
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<tr>
<th>$\text{ALIGN-R}(\text{XP, } \varphi)$</th>
<th>$\text{ALIGN-L}(\text{XP, } \varphi)$</th>
<th>$\text{EQUALSisters}$</th>
<th>$\text{ALIGN-R}(\varphi, \text{XP})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>t, \varphi_1</td>
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<th>$\text{EQUALSisters}$</th>
<th>$\text{ALIGN-L}(\text{XP, } \varphi)$</th>
<th>$\text{ALIGN-R}(\varphi, \text{XP})$</th>
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<td>t, \varphi_1</td>
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- Problem: the non-alternating T3S pattern of (28) cannot be generated (cf. 24).

(28) ‘want to leave a bit earlier’

<table>
<thead>
<tr>
<th>UR:</th>
<th>[vp1] xiang3 [vp2 [ap] zao3 dian3 zou3]</th>
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<tr>
<td></td>
<td>want early a bit leave good</td>
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| a. SR: | (1 (\varphi_1 3 (\varphi_2 s s) s) 3) |
| b. SR: | (1 (\varphi_1 s s s s 3)) |

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5. Conclusion

- I proposed a Match-Theory analysis of Mandarin T3S that captures a left-/right-branching asymmetry.
  - Both the right edge of a left-branching structure and the left edge of a right-branching structure are detectable in the phonology.

- Mandarin T3S evidences a more restrictive version of Strong Start, which I refer to as Strong Strong Start.

- The effect of Strong Strong Start: a right-branching syntactic constituent is “matched” by an equal-sisters prosodic constituent in the sense of Myrberg (2013), by
  (i) “flattening” the recursive structure, or
  (ii) grouping syntactic non-sisters at the left edge.
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I would like to thank Michael Kenstowicz for his patient guidance and constructive advice on this research work. For feedback and comments, I am also grateful to the participants of the Fall 2019 Workshop in Linguistics at MIT and audience at the 2020 Annual Meeting on Phonology (AMP), Danfeng Wu, Daniel Asherov, David Pesetsky, Donca Steriade, Edward Flemming, Jennifer Bellik, Norvin Richards, and Suzanne Flynn.

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