Disentangling Tense and Agreement in Western Armenian

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Yale & Stony Brook & Rochester

February 20, 2021
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• Conclusion
Disentangling tense and Agreement in Western Armenian

(Western) Armenian is Indo-European with heavy Turkic influence (~ millennium)

On the surface, tense and agreement look fusional

Segmentation is tricky!

On an abstract level, inflection acts agglutinative

(Hidden) agglutination captures syncretism and interactions
Verbal morphology combines IE fusionality with Turkic agglutination.

Verbs indicate tense, aspect and (subject) agreement through suffixes.

On the surface:
- Three synthetic paradigms: present, past imperfective, past perfective
- Only Perfective aspect marked
- TENSE and Agreement often lack overt, separate morphs

Questions:
- Do we need zero morphs to model this?
- How truly agglutinative are these suffixes?

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1 Adjarian (1909); Donabédian (2018)
Aims

What would we like from a morphological theory/segmentation?

1. Minimize number of exponents
2. Minimize number of operations
3. Capture syncretism if non-accidental
4. Capture typological tendencies
5. Capture ‘elsewhere’ behavior

Can you do all of them?

Armenian: not really...
Zeros

• How to model tense and agreement without separate morphs?
• With or without zero morphs?

1. **NoZero:**
   no explicit zero morphs; non-marking of T or AGR due to fusion, impoverishment, or elsewhere zeros
   → fusional

2. **UseZero:**
   use zero morphs!
   → agglutinative

• Both models work ...
• ... but UseZero captures generalizations better than NoZero
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Infinitivals and roots

• Simple regular verbs:
  Root + Theme + Tense (+ Agr)

• 3 conjugation classes for 3 theme vowels

<table>
<thead>
<tr>
<th>E-Class</th>
<th>I-Class</th>
<th>A-Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>ker-e-l</td>
<td>xos-i-l</td>
<td>gart-a-l</td>
</tr>
<tr>
<td>‘to scratch’</td>
<td>‘to speak’</td>
<td>‘to read’</td>
</tr>
<tr>
<td>66%</td>
<td>29%</td>
<td>5%</td>
</tr>
</tbody>
</table>

• E-Class is most common and seen as default
• Class membership is root-specific but often correlates with transitivity
Basic structure

- Assume Theme is adjunct to $v$

![Diagram]

- Choice of Theme depends on root

1. $\text{Th} \leftrightarrow -e / \sqrt{\text{Root}_E} \downarrow v$
2. $\text{Th} \leftrightarrow -i / \sqrt{\text{Root}_I} \downarrow v$
3. $\text{Th} \leftrightarrow -a / \sqrt{\text{Root}_A} \downarrow v$
Present tense

- In present, post-THEME segments mark TENSE and AGR
- Same marking for all 3 classes

<table>
<thead>
<tr>
<th></th>
<th>E-Class</th>
<th>I-Class</th>
<th>A-Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG</td>
<td>ker-e-m</td>
<td>xos-i-m</td>
<td>gart-a-m</td>
</tr>
<tr>
<td></td>
<td>‘I scratch’</td>
<td>‘I speak’</td>
<td>‘I read’</td>
</tr>
<tr>
<td>2SG</td>
<td>ker-e-s</td>
<td>xos-i-s</td>
<td>gart-a-s</td>
</tr>
<tr>
<td>3SG</td>
<td>ker-e</td>
<td>xos-i</td>
<td>gart-a</td>
</tr>
<tr>
<td>1PL</td>
<td>ker-e-nk</td>
<td>xos-i-nk</td>
<td>gart-a-nk</td>
</tr>
<tr>
<td>2PL</td>
<td>ker-e-k</td>
<td>xos-i-k</td>
<td>gart-a-k</td>
</tr>
<tr>
<td>3PL</td>
<td>ker-e-n</td>
<td>xos-i-n</td>
<td>gart-a-n</td>
</tr>
</tbody>
</table>
Present tense

- No separate exponents for T and Agr
- All ‘fused’ into one set of exponents

<table>
<thead>
<tr>
<th>Present</th>
<th>√</th>
<th>TH</th>
<th>T/Agr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG</td>
<td></td>
<td>ker-e</td>
<td>-m</td>
</tr>
<tr>
<td>2SG</td>
<td></td>
<td></td>
<td>-s</td>
</tr>
<tr>
<td>3SG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1PL</td>
<td></td>
<td></td>
<td>-nk</td>
</tr>
<tr>
<td>2PL</td>
<td></td>
<td></td>
<td>-k</td>
</tr>
<tr>
<td>3PL</td>
<td></td>
<td></td>
<td>-n</td>
</tr>
</tbody>
</table>
Present NoZero: Fusion

- T/AGR fuse in present
  \[(4) \quad T_{[-\text{past}]} \sim \text{AGR} \rightarrow T/\text{AGR}_{[-\text{past}]}\]

- 1SG and 2SG reference T/AGR features because not used in other tenses
  \[(5) \quad [1, -\text{pl}, -\text{past}] \leftrightarrow -\text{m}\]
  \[(6) \quad [2, -\text{pl}, -\text{past}] \leftrightarrow -\text{s}\]

- XPL don’t reference T because same in all tenses
  \[(7) \quad [1, +\text{pl}] \leftrightarrow -\text{nk}\]
  \[(8) \quad [2, +\text{pl}] \leftrightarrow -\text{k}\]
  \[(9) \quad [-1, -2, +\text{pl}] \leftrightarrow -\text{n}\]

- 3SG is elsewhere-zero
Present Use Zero

- If we use Zero morphs, then no fusion needed
- 1SG and 2SG are on Agr and reference T

\[
\begin{align*}
(10) \ [1, \text{-pl}] & \leftrightarrow -m \ / \ T[\text{-past}] \ _ \\
(11) \ [2, \text{-pl}] & \leftrightarrow -s \ / \ T[\text{-past}] \ _
\end{align*}
\]

- T and 3SG are still elsewhere-zeros
Present trees

- Visually, NoZero and UseZero both start with the same tree
- But NoZero fuses T/Agr

<table>
<thead>
<tr>
<th>Input</th>
<th>UseZero</th>
<th>NoZero</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Tree" /></td>
<td><img src="image2.png" alt="Tree" /></td>
<td><img src="image3.png" alt="Tree" /></td>
</tr>
</tbody>
</table>

- So far, no biggie
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Past Imperfective has post-THEME replaced again

T/AGR same for all conjugations

I-Class has theme-vowel change for independent reasons (irrelevant)

<table>
<thead>
<tr>
<th></th>
<th>E-Class</th>
<th>I-Class</th>
<th>A-Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG</td>
<td>ker-e-i</td>
<td>xos-e-i</td>
<td>gart-a-i</td>
</tr>
<tr>
<td></td>
<td>‘I was scratching’</td>
<td>‘I was speaking’</td>
<td>‘I was reading’</td>
</tr>
<tr>
<td>2SG</td>
<td>ker-e-ir</td>
<td>xos-e-ir</td>
<td>gart-a-ir</td>
</tr>
<tr>
<td>3SG</td>
<td>ker-e-r</td>
<td>xos-e-r</td>
<td>gart-a-r</td>
</tr>
<tr>
<td>1PL</td>
<td>ker-e-ink</td>
<td>xos-e-ink</td>
<td>gart-a-ink</td>
</tr>
<tr>
<td>2PL</td>
<td>ker-e-ik</td>
<td>xos-e-ik</td>
<td>gart-a-ik</td>
</tr>
<tr>
<td>3PL</td>
<td>ker-e-in</td>
<td>xos-e-in</td>
<td>gart-a-in</td>
</tr>
</tbody>
</table>
Past imperfective post-Theme decomposable into two overt nodes

- \(-i\) for T PAST and the rest for AGR

<table>
<thead>
<tr>
<th></th>
<th>Bundled</th>
<th>Decomposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\sqrt{\text{Th}})</td>
<td>T&amp;AGR</td>
<td>-T</td>
</tr>
<tr>
<td>1SG</td>
<td>ker-e</td>
<td>Agr</td>
</tr>
<tr>
<td>2SG</td>
<td>-ir</td>
<td>-i</td>
</tr>
<tr>
<td>3SG</td>
<td>-r</td>
<td>-r</td>
</tr>
<tr>
<td>1PL</td>
<td>-ink</td>
<td>-i</td>
</tr>
<tr>
<td>2PL</td>
<td>-ik</td>
<td>-i</td>
</tr>
<tr>
<td>3PL</td>
<td>-in</td>
<td>-i</td>
</tr>
</tbody>
</table>

- Issue is 3SG (which we talk about later)
**Pitstop:** PL agreement is same for present and past

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Past Imperfective</th>
</tr>
</thead>
<tbody>
<tr>
<td>TH</td>
<td><strong>√</strong></td>
<td><strong>√</strong></td>
</tr>
<tr>
<td>1SG</td>
<td>ker-e</td>
<td>-m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-i</td>
</tr>
<tr>
<td>2SG</td>
<td></td>
<td>-s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-i -r</td>
</tr>
<tr>
<td>3SG</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-r</td>
</tr>
<tr>
<td>1PL</td>
<td></td>
<td>-nk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-i -nk</td>
</tr>
<tr>
<td>2PL</td>
<td></td>
<td>-k</td>
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<td></td>
<td></td>
<td>-i -k</td>
</tr>
<tr>
<td>3PL</td>
<td></td>
<td>-n</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-i -n</td>
</tr>
</tbody>
</table>
Aspect

- Assume separate ASP underlyingly for [-perf]
- ‘You were scratching’: ker-e-i-r

- IMPF is elsewhere zero or just inserted -∅ – no biggie
Easy without 3SG

- T is -i- and PLs are straightforward

\[(12) \quad T_{[+\text{past}]} \leftrightarrow -i\]

- 2SG is its own exponent

\[(13) \quad \text{AGR}[2, -\text{pl}] \leftrightarrow -r / T_{[+\text{past}]} \quad \_\_\_

- 1SG can be elsewhere-zero
Three issues for Past Impf 3SG

1. Capture syncretism of segment -r in Agr
2. Allow omission of -i- in T
3. Also allow covert T to still license overt Agr

<table>
<thead>
<tr>
<th>Past Imperfective</th>
<th>T</th>
<th>Agr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG</td>
<td>-i</td>
<td></td>
</tr>
<tr>
<td>2SG</td>
<td>-i</td>
<td>-r</td>
</tr>
<tr>
<td>3SG</td>
<td></td>
<td>-r</td>
</tr>
</tbody>
</table>
UseZero: Captures syncretism

- T is $\emptyset$ in Past 3SG
  
  $T_{[\text{+past}]} \leftrightarrow \emptyset / _{-1,-2,-\text{pl}}$  

- For AGR $-r$, can’t use impoverishment to remove -2 because it couldn’t license zero $T$
  
  $AGR_{[2, \text{-pl}]} \leftrightarrow -r / T_{[\text{+past}]}$  
  $AGR_{[-2]} \rightarrow AGR / ASP_{[-\text{perf}]} T_{[\text{+past}]} AGR_{[3, \text{-pl}]}$

- Instead, make $-r$ license Past -1 sg
  
  $AGR_{[-1, \text{-pl}]} \leftrightarrow -r / T_{[\text{+past}]}$
**NoZero: Awkward fusion**

- **Direct route:**
  T must be impoverished in past imperfective 3SG
  \[T_{\text{+past}} \rightarrow T / \text{ASP}_{-\text{perf}} \quad \_ \_ \beta_{-1,-2,-pl}\]
  ! But if T is impoverished, then T can’t license \(-r\) in 3SG

- **Indirect route:**
  Fusion and unique \(-r\)

  \[(18) \quad T_{\text{+past}} \sim \beta_{-1,-2,-pl} \rightarrow T / \beta_{-1,-2,-pl, \text{+past}} / \text{ASP}_{-\text{perf}} \quad \_ \_\]
  \[(19) \quad T / \beta_{-1,-2,-pl, \text{+past}} \leftrightarrow -r\]

  ☹ Doesn’t capture syncretism: needs two \(-r\)
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Past Perfective

- Past perfective is almost identical to past imperfective but...

<table>
<thead>
<tr>
<th></th>
<th>E-Class</th>
<th>I-Class</th>
<th>A-Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1SG</td>
<td>ker-e-[^ts]-i</td>
<td>xos-e-[^ts]-a</td>
<td>gart-a-[^ts]-i</td>
</tr>
<tr>
<td></td>
<td>‘I scratched’</td>
<td>‘I spoke’</td>
<td>‘I read’</td>
</tr>
<tr>
<td>2SG</td>
<td>ker-e-[^ts]-i-r</td>
<td>xos-e-[^ts]-a-r</td>
<td>gart-a-[^ts]-i-r</td>
</tr>
<tr>
<td>3SG</td>
<td>ker-e-[^ts]-</td>
<td>xos-e-[^ts]-a-v</td>
<td>gart-a-[^ts]-</td>
</tr>
<tr>
<td>1PL</td>
<td>ker-e-[^ts]-i-nk</td>
<td>xos-e-[^ts]-a-nk</td>
<td>gart-a-[^ts]-i-nk</td>
</tr>
<tr>
<td>2PL</td>
<td>ker-e-[^ts]-i-k</td>
<td>xos-e-[^ts]-a-k</td>
<td>gart-a-[^ts]-i-k</td>
</tr>
<tr>
<td>3PL</td>
<td>ker-e-[^ts]-i-n</td>
<td>xos-e-[^ts]-a-n</td>
<td>gart-a-[^ts]-i-n</td>
</tr>
</tbody>
</table>

- Adds extra perfective aspect marker -[^ts]- after THEME, before T i
- Allomorphy of T/AGR for I-Class vs. E/A-Class
- As before, theme -i- can change (again irrelevant)
- E/A-Class are the same
- I-Class has minimal differences in T and AGR

<table>
<thead>
<tr>
<th>E/A-Class Elsewhere</th>
<th>I-Class Marked</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERF</strong></td>
<td><strong>T</strong></td>
</tr>
<tr>
<td>1SG</td>
<td>-ts</td>
</tr>
<tr>
<td>2SG</td>
<td>-ts</td>
</tr>
<tr>
<td>3SG</td>
<td>-ts</td>
</tr>
<tr>
<td>1PL</td>
<td>-ts</td>
</tr>
<tr>
<td>2PL</td>
<td>-ts</td>
</tr>
<tr>
<td>3PL</td>
<td>-ts</td>
</tr>
</tbody>
</table>
Past Perfective: Marked allomorphs

- Marked allomorphy is simple to capture
- ‘You spoke’: \(xos-e-ts-a-r\)
- T is -a- when Root is I-Class & Asp is perfective
  \[(20) \ T_{[+\text{past}]} \leftrightarrow -a / \sqrt{\text{Root}_I} \cdots \text{Asp}_{[+\text{perf}]} \]
- ‘He spoke’: \(xos-e-ts-a-v\)
- Perfective 3SG in I-Class is -v
  \[(21) \ \text{Agr}_{[-1,-2, -\text{pl}]} \leftrightarrow -v / \sqrt{\text{Root}_I} \cdots \text{Asp}_{[+\text{perf}]} \sim T_{[+\text{past}]} \]
- UseZero: -v beats elsewhere -r allomorph for Past 2SG/3SG
  \[(22) \ \text{Agr}_{[-1, -\text{pl}]} \leftrightarrow -r / T_{[+\text{past}]} \]
Past Perfective: Everything but 3SG

- For the default class, everything is simple again in 1/2SG and PL
- Same exponents as past imperfective, just extra PERF marker

<table>
<thead>
<tr>
<th></th>
<th>Past Imperfective</th>
<th>Elsewhere Past Perfective</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPF</td>
<td>T</td>
<td>AGR</td>
</tr>
<tr>
<td>1SG</td>
<td>-i</td>
<td></td>
</tr>
<tr>
<td>2SG</td>
<td>-i</td>
<td>-r</td>
</tr>
<tr>
<td>3SG</td>
<td></td>
<td>-r</td>
</tr>
<tr>
<td>1PL</td>
<td>-i</td>
<td>-nk</td>
</tr>
<tr>
<td>2PL</td>
<td>-i</td>
<td>-k</td>
</tr>
<tr>
<td>3PL</td>
<td>-i</td>
<td>-n</td>
</tr>
</tbody>
</table>
**Past Perfective: 3SG troubles**

- But back to 3SG, things get messy
- 3SG overt in marked I-Class allomorph
  - ‘He spoke’: xos-e-\(\hat{t}s\)-a-v
- For elsewhere classes, everything is deleted after Asp -\(ts\)
  - ‘He scratched’: ker-e-\(\hat{t}s\)
- No T and no Agr, unlike past imperfective with -\(r\)

<table>
<thead>
<tr>
<th></th>
<th>Past IMPERF</th>
<th>Elsewhere</th>
<th>Marked PERF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IMPF   T AGR</td>
<td>PERF T AGR</td>
<td>PERF T AGR</td>
</tr>
<tr>
<td>2SG</td>
<td>-i     -r</td>
<td>-(ts) -i -r</td>
<td>-(ts) -a -r</td>
</tr>
<tr>
<td>3SG</td>
<td>-r</td>
<td>-(ts)</td>
<td>-(ts) -a -v</td>
</tr>
</tbody>
</table>
3SG PROBLEM

- **Past Impf vs. Past Perf (E-Class) vs. Past Perf (I-Class):**
- **Perf** licenses deleting 3SG T and **Agr**
  for **elsewhere class** *ker-e-ts*
- **Perf** licenses overt allomorphs for 3SG T and **Agr** for **marked class**
  ‘He spoke’: *xos-e-êts-a-v*
- **Wrinkle:** prevent -r syncretism with 2SG in **Perf**
  ‘He scratched’: *ker-e-êts-r*

<table>
<thead>
<tr>
<th></th>
<th>Past IMPERF</th>
<th>Elsewhere Perf</th>
<th>Marked Perf</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IMPF T Agr</td>
<td>Perf T Agr</td>
<td>Perf T Agr</td>
</tr>
<tr>
<td>2SG</td>
<td>-i -r</td>
<td>-êts -i -r</td>
<td>-êts -a -r</td>
</tr>
<tr>
<td>3SG</td>
<td>-r</td>
<td>-êts</td>
<td>-êts -a -v</td>
</tr>
</tbody>
</table>
UseZero: Easy again

- 3SG needs special zero so it doesn’t take \(-r\)

\[
(23) \quad \text{AGR}[-1,-2,-pl] \leftrightarrow -\emptyset / \text{Asp}[+perf] \sim T[+past] __
\]

- T is zero in 3SG for Past Impf; not in marked Past Perf

- Class-based allomorphy precedes AGR-based allomorphy

\[
(24) \quad T[+past] \leftrightarrow \emptyset / __ \text{AGR}[-1,-2,-pl]
\]

\[
(25) \quad T[+past] \leftrightarrow -a / \sqrt{\text{Root}_I} \cdots \text{Asp}[+perf] __
\]

- Limits of theory:
  Can’t just say "do fusion and use zero morph unless one of them has marked allomorph"
**NoZero: Hard Again**

- Need to delete T and Agr just for elsewhere-class, not marked-class
- But, if use impoverishment on T, then have to reference Root class.
- Elsewhere-class is no longer elsewhere!

\[
(26) \quad T_{[+\text{past}]} \rightarrow T / \sqrt{\text{ROOT}_E,A} \ldots \text{ASP}_{[+\text{perf}]} \rightarrow \text{AGR}_{[-1,-2,-\text{pl}]}
\]
Zeroes can help

- Needed zeros to do syncretism
- Needed zeros to capture elsewhere status
- We assume all operations like fusion/impoverishment precede insertion rules
  - Fewer zero allomorphs if zero allomorph of T could precede AGR impoverishment in Past Impf 3SG
- **Class-based allomorphy must precede AGR-based allomorphy**
  → Agglutination with zeros is pretty useful
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CONCLUSION

- Western Armenian aspect, tense & agreement paradigms: lots of cells without separate morphs for all three categories
- Zero morphs improve morpheme-based analysis
  - Captures generalizations
  - Minimizes number of operations
- Implications for non-morpheme-based models?
- Western Armenian verbal suffixes: between fusional and agglutinative
  - Indo-European language & Turkic influence
- Open question:
  How does pre-Ottoman (Classical) Armenian fare with syncretism?