A FST description of noun and verb morphology of Azarbaijani Turkish

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Azarbaijani Turkish
oxumayacaqsansa
read not will you if
Agglutinative

gutudakilardakilardakilardakilardaki.....lardakindən
from those in the boxes of those in the boxes (repeat n times)
Vowel Harmony
Approach

- **Slots**
  - `<key : value>`: surface form
  - Ex: `<Case: Abl>` : -NAn (Arch-morpheme)
- `<key>` : surface form
Nominal and Verb Inflection

- Nominal: Nouns, Adjective, Postpositions
- Verb: Finite inflection
Nominal Inflection

- Fully slot-based
- Order: Stem + Number + Possessor + Family + Case
- Family: not considered in inflection generally
  - xalamlar
    aunt-P1SG-PLU
  - xalalarım
    aunt-PLU-P1SG
  - xalamgil
    aunt-P1SG-FAM
  - *xalagilim
    aunt-FAM-P1SG
Ambiguity in Possessor

- their book kitabları
- his/her books kitabları
### Possessor

#### Abstract morpheme | First level output
--- | --- | ---
<Poss:None> | - | - | -
<Poss:1s> | -(l)m | -(l)m | -(l)m
<Poss:2s> | -(l)n | -(l)n | -(l)n
<Poss:3s> | -(s)(l)n | - | -
<Poss:1p> | -(l)m|z | -(l)m|z
<Poss:2p> | -(l)n|z | -(l)n|z
 | -(l)|z | -(l)|z
 <poss:3p> | -(l)n | -lAr|(l)n

**Table:** Possessor person paradigms for Figure 15. Empty cells are undefined. Apart from epenthesis, the only difference between $sn_1$ and $sn_2$ is <Poss:3p>.
Nominal Inflection

A FST description of noun and verb morphology of Azarbaijani Turkish
kitabalrıımızınan
book s our with
Nom Pl Poss1 Case
Slot-based nominal inflection in AT

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Case slot values

The case symbols for $s_{n4}$ are of the form $<\text{Case}:v>$: a where $(v,a)$ pair is one of

- $(\text{Nom}, -)$
- $(\text{Dat}, -(y)A)$
- $(\text{Loc}, -dA)$
- $(\text{Acc}, -(n)l)$
- $(\text{Abl}, -\text{NAn})$
- $(\text{Gen}, -(n)\text{In})$
- $(\text{Ins}, -(y)\text{InAn})$
Verb paradigm

Order of sub-paradigms
- Stem + Voice + Ability + Polarity + Probability + TAM + Person
5 Voices: Active, Passive, Reflexive, Reciprocal, Cause

Order: (Recip|Refl) + Cause + Passive

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Morpheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>sv₁</td>
<td>&lt;Caus&gt;:-lrt</td>
</tr>
<tr>
<td></td>
<td>&lt;Caus&gt;:-Art</td>
</tr>
<tr>
<td></td>
<td>&lt;Caus&gt;:-l</td>
</tr>
<tr>
<td>sv₂</td>
<td>&lt;Caus&gt;:-dlr</td>
</tr>
<tr>
<td>sv₃</td>
<td>&lt;Passv&gt;:-l</td>
</tr>
<tr>
<td></td>
<td>&lt;Passv&gt;:-ln</td>
</tr>
</tbody>
</table>

Table: Voice suffixes
Lexical Conditioning

- Attachment to stem is mostly lexically conditioned
- Manually marked, 5909 verb-stems
Voice paradigm
Voice

Verb Stem

<VERB>

<Rcpr>: -(I)s

<Rflx>: -(I)n

SV₁

SV₂

SV₃

Rcpr

Rflx

Caus₁ᴮ

Pasv

Caus₁ᴬ
Voice Diagram

Voice Diagram

Verb Stem

<Rcpr>(I)s

<Rflx>(I)n

SV_1

SV_2

SV_3

Rcpr

Rflx

Caus^1_B

Pass

Caus^1_A

SV_2

SV_2

SV_2
Voice paradigm
Ability, Polarity, Probability

- Polarity slot: &lt;Pol:Pos&gt;, &lt;Pol:Neg&gt;

- Ability, Probability same surface form in positive polarity. cannot say : I may be able to come.
  *gələbiləbilərəm

  can say : I may not be able to come.
  gələbilənərəm
Ability-Polarity-Probability
Ability, Polarity, Probability

Diagram showing relationships between Ability (Abil), Polarity (Pol), and Probability (Prob) with nodes labeled as follows:

- Abil:
  - (y)An
  - (y)Abil
  - -(y)Abil

- Pol:
  - Pos
  - Neg

- Prob:
  - TAMP

Nodes are connected with arrows indicating dependencies or relationships between concepts. The diagram illustrates how these concepts interact within a linguistic or logical framework.
Ability, Polarity, Probability
Tense-aspect-mood and person paradigm

- Order: Tense + Copula + (Person + Condition + Question)
- 11 Tense values (9 distinct behavioral groups)
- Too complicated to put on a single slide
Tense-aspect-mood and person paradigm
Tense-Person

\[ \text{Tens}_2 \rightarrow \langle \text{Cpl:Aor} \rangle \rightarrow \langle \text{Cpl:Narr} \rangle \\
\langle \text{Cpl:Narr} \rangle \rightarrow \langle \text{Cpl:Aor} \rangle \rightarrow \text{Prsn} \\
\text{Cpl}_1 \rightarrow \text{Cpl}_2 \rightarrow \text{Prsn} \\
\text{Tens}_1 \rightarrow \text{Prsn} \]

\[ p_1, p_2, p_3, p_4 \]
Tense-Person

\[\text{Cond} \rightarrow \text{Prsn} \quad \langle \text{Cpl:Cond} \rangle : \text{sA} \]

\[\langle \text{Quest} \rangle : \text{-mI} \]

\[\text{Cond} \rightarrow \text{Q} \]
### Person morphemes

<table>
<thead>
<tr>
<th>Person</th>
<th>$p_1$</th>
<th>$p_2$</th>
<th>$p_3$</th>
<th>$p_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="">Prsn:1s</a></td>
<td>-</td>
<td>-yAm</td>
<td>-Am</td>
<td>-m</td>
</tr>
<tr>
<td><a href="">Prsn:2s</a></td>
<td>-</td>
<td>-sAn</td>
<td>-sAn</td>
<td>-n</td>
</tr>
<tr>
<td><a href="">Prsn:3s</a></td>
<td>-</td>
<td>-yIq</td>
<td>-Iq</td>
<td>-</td>
</tr>
<tr>
<td><a href="">Prsn:1p</a></td>
<td>-lAr</td>
<td>-lAr</td>
<td>-lAr</td>
<td></td>
</tr>
<tr>
<td><a href="">Prsn:2p</a></td>
<td>-lAr</td>
<td>-lAr</td>
<td>-lAr</td>
<td></td>
</tr>
<tr>
<td><a href="">Prsn:3p</a></td>
<td>-lAr</td>
<td>-lAr</td>
<td>-lAr</td>
<td></td>
</tr>
</tbody>
</table>

Table: Person morphemes in Figure 32.
Phonology

- Epenthetics
  1. (y), (s), (n)
  2. Considered as part of morphemes
  3. Dropped depending on the context

- Harmony, Velarization and Approximation
  1. N → n or m
  2. A → a or ə
  3. Q → K (after front vowel)
  4. K → k, y
  5. Q → q or ğ
Future Work

- Derivation (Productive ones)
  1. Noun to Verb
  2. Verb to Noun
  3. Verb to Adverb
  4. Noun to Adverb

- Nominal Predicates

- Lexicon Reduction

- Publicly available as a web service