Rendering spatial expressions involving Axial Parts in LFG

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Points of the presentation

- Presenting data for spatial expressions mainly from Urdu language
- Order of different elements in spatial expressions might not be the same cross linguistically
- A single word or more than one word can encode different components of place
- Rendering spatial expressions in LFG
path and place markers

<table>
<thead>
<tr>
<th>Place/Path</th>
<th>Case Clitic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place</td>
<td>par ‘on’</td>
</tr>
<tr>
<td></td>
<td>mē ‘in’</td>
</tr>
<tr>
<td>Path</td>
<td>se ‘from’</td>
</tr>
<tr>
<td></td>
<td>ko ‘to’</td>
</tr>
<tr>
<td></td>
<td>tak ‘up to’</td>
</tr>
</tbody>
</table>

*Table: Spatial case clitics in Urdu*
(1) a.  

\textit{kıtab mez=par}  
book.F.3Sg table.F.3Sg=Loc.on be.Pres.Sg  
‘The book is on the table.’

b.  

\textit{bacce sakul=m̄e}  
child.Pl school.M.3Sg=Loc.in be.Pres.Pl  
‘The children are in school.’
In Urdu, a non-verbal noun cannot be modified by mere a locative phrase in contrast with English.

(2) a. \textit{mez=p} *(pa\textit{r}i hu-i) kıtab
\textit{table.F.3Sg=Loc.in *(lie-Perf.F be-Perf.F) book.F.3Sg}
‘The book (lying) on the table’

b. \textit{sakul=m}˜e *(m\textit{ojud}) bacce
\textit{school.M.3Sg=Loc.in *(present) child.M.Pl}
‘The children (present) in the school’
Absolute locations in Urdu are always overtly marked by case clitics.

However, in some Indo Aryan languages, some times locations can be overtly unmarked in copula constructions.

(3) a. Ali.M.3Sg home.M.Sg=*(Loc.at/Loc.in) be.Pres.Sg
   ‘Ali is at home.’ (Urdu)

b. Ali.M.3Sg home.M.Sg be.Pres.Sg
   ‘Ali is at home.’ (Saraiki)
(4) a. 
\[
\text{g}\text{h} \text{ar}=\text{se} \quad \text{a}-\text{ya} \\
\text{Ali.M.3Sg home.M.3Sg=Abl come-Perf.M.Sg}
\]
‘Ali came from home.’

b. 
\[
\text{g}\text{h} \text{ar}=\text{ko} \quad \text{g}\text{a}-\text{ya} \\
\text{Ali.M.3Sg home.M.3Sg=Loc go-Perf.M.Sg}
\]
‘Ali went home.’

c. 
\[
\text{dukan}=\text{tak} \quad \text{g}\text{a}-\text{ya} \\
\text{Ali.M.3Sg shop.F.3Sg=Loc go-Perf.M.Sg}
\]
‘Ali went up to the shop.’
The clitic *se* is not only used to mark the source path in Urdu but also the route path.

The destination path, sometimes, is not overtly marked with some verbs like *ja* ‘go’ and *pahûc* ‘reach’, etc. in Urdu.

(5) a. 

\[
\text{Ali.M.3Sg garden.M.3Sg}=\text{se pass-Perf.M.Sg} \\
\text{‘Ali passed through the garden.’}
\]

b. 

\[
\text{Ali.M.3Sg home.M.3Sg go-Perf.M.Sg} \\
\text{‘Ali went home.’}
\]
Path Marking III

Sometimes, locative phrases are ambiguous between location and path readings.

(6)  
\[\text{Ali.M.3Sg and Nida.F.3Sg } \text{darya=ke } \text{pul} = \text{par} \]
\[\text{ja rah-e h}^\text{\text{-}h}\text{\text{-}E} \text{be.Pres.Pl} \]
‘Ali and Nida are going over the river’s bridge.’
‘Ali and Nida are going to the river’s bridge.’

Gehrke (2007) has argued that prepositions like *in*, *on*, *behind* and *under* only denote places and the meaning of directionality is licensed by other means.
The *se* marker can embed another locative marked phrase.

(7) a. 
\[\text{Ali.bay}=\text{mē}=\text{se}=\text{guzr}-a\]
\[\text{Ali.M.3Sg garden.M.3Sg=Loc.in=Abl pass-Perf.M.Sg}\]
‘Ali passed through the garden.’

b. 
\[\text{Ali}=\text{nez}=\text{par}=\text{se}=\text{ktb}=\text{ut}-^\text{h}-a\]
\[\text{Ali.M=Erg table.F.3Sg=Loc.on=Abl book.F.3Sg pick-Perf.F.3Sg}\]
‘Ali picked the book off the table.’
What Axial Parts are

- Vector Space Semantics originally developed by Zwarts (1997, 2000)
- Axial Parts are vector spaces projected from the Ground (For example: above, behind, etc.)
- Measure expressions define subset of vectors (For example: 3 meters)
Following is a list of AxialParts in Urdu.

<table>
<thead>
<tr>
<th>Axial Parts</th>
<th>Meanings</th>
</tr>
</thead>
<tbody>
<tr>
<td>andar</td>
<td>‘inside’</td>
</tr>
<tr>
<td>bahar</td>
<td>‘outside’</td>
</tr>
<tr>
<td>age</td>
<td>‘in front of’</td>
</tr>
<tr>
<td>piche</td>
<td>‘behind’</td>
</tr>
<tr>
<td>upar</td>
<td>‘above/over’</td>
</tr>
<tr>
<td>nice</td>
<td>‘under’</td>
</tr>
<tr>
<td>nazdik</td>
<td>‘near’</td>
</tr>
<tr>
<td>qarib</td>
<td>‘around’</td>
</tr>
<tr>
<td>gırd</td>
<td>‘between’</td>
</tr>
</tbody>
</table>

Table: AxialParts in Urdu
Examples of use of Axial Parts

(8)  a.  
\[\text{Ali.	extsc{M.Sg} shop=Gen.Obl \text{front standing} be.Pres.Sg}\]
‘Ali is standing in front of the shop.’

b.  
\[\text{kursi=ke nice bılli hε}\]
‘There is a cat under the chair.’

In grammar books (e.g. Schmidt 1999) *ke age* and *ke nice* are considered as compound postpositions in Urdu.
The *ke* form

- The spatial postpositions (Axial Parts) in Urdu actually are the oblique forms of words which once were used as nouns.
- The form of genitive case is due to the gender of the original noun (Platts 1967). So the genitive oblique form *ke* should only be considered as case marker rather than the part of compound postposition.
The emphatic marker *hi* can intervene between the case marker *ke* and the Axial Part.

(9)  
kursi= ke hi nice  
chair=Gen.Obl Emph under  
‘really under the chair’
ke should not be considered to form a compound adposition with Axial Part II

Some measure/description can come between the case marker ke and the Axial Part.

(10)  
zamin=ke 3 fût nice groung=Gen.Obl 3 foot under
‘three feet under the ground’
ke should not be considered to form a compound adposition with Axial Part III

The complement of Axial Part can optionally take an alternate case marker.

(11)  
\[ \text{zamin= se 3 f\text{u}
\text{t} } \text{groung=Abl.Obl 3 foot under} \]

‘three feet under the ground’
The *ke* marked complement can be postposed.

(12)

3 fut nice zamin= ke
3 foot under groung=Gen.Obl
‘three feet under the ground’
ke should not be considered to form a compound adposition with Axial Part V

The clitic form *ke* can be distributed over the coordinated Axial Parts.

(13)  
kurši= ke upar or nice  
chair= Gen.Obl over and under  
‘over and under the chair’
ke should not be considered to form a compound adposition with Axial Part VI

The feminine form of a genitive marker is used when the Axial Part is originally from some feminine noun.

(14)
\[ \text{Ali.M.Sg market=} \text{ki taraf cal-a} \]
'Ali headed towards the market.'
Many Axial Parts in Urdu were originally nouns.
Now only some of them are used also as nouns. But their syntactic distribution is different when used as Axial Parts and when used as nouns.
Others are used only in an adposition sense.
Axial Parts (oblique form of original nouns) in Urdu generally give a locational sense without being marked overtly by case clitic.

(15) dukān=ke āge(*par/mē) shop=Gen.Obl front(=Loc.on/in) ‘In front of the shop’
In modern Urdu the AxialPart *age 'front’ is not used as a noun.

(16) a. 
\[ \text{Ali dukan}=\text{ke } \text{age } \text{ruk-a} \]
Ali shop=Gen.Obl front stop-Perf.3Sg.M
‘Ali stopped in front of the shop.’

b. 
\[ \text{jahaz}=\text{ke } *\text{age}=\text{ko } \text{lag } \text{ga-i} \]
aeroplane front=Acc fire.3Sg.F catch go-Perf.3Sg.F
*‘The front of the aeroplane caught fire’

c. 
\[ \text{jahaz}=\text{ke } *\text{age}=\text{mē } \text{lag } \text{ga-i} \]
aeroplane front=Loc fire.3Sg.F catch go-Perf.3Sg.F
*‘The front of the aeroplane caught fire’
Axial Parts vs Nouns IV

Now for the meaning of noun ‘front’, a noun phrase *agla hissa* is used in Urdu.

(17) a.

jahaz=ke aogle hisse=ko ag laq ga-i aeroplane front part=Acc fire.3Sg.F catch go-Perf.3Sg.F
‘The front of the aeroplane caught fire’

b.

jahaz=ke aogle hisse=mẽ ag laq ga-i aeroplane front part=Loc fire.3Sg.F catch go-Perf.3Sg.F
‘The front of the aeroplane caught fire’
The notions *taraf* ‘side’ and *kınare* ‘bank’ in Urdu

Axial Parts in Urdu cannot be used in plural forms. However, there is an Axial Part *taraf* ‘side’ which can be modified by a quantifier for plural meaning.

(18) a. saɾak=ki donõ taraf pani he road=Gen.Obl both side.Sg water be.Pres
‘There is water on both sides of the road.’

b. makan=ki carõ taraf pani he road=Gen.Obl four side.Sg water be.Pres
‘There is water on all sides of the house.’
Structure of PPs proposed by Svenonius

Path - Place - K

\[ p - \text{Deg(ree)} - \text{Deix(is)} - \text{Loc} - \text{Ax(ial)Part} - \text{K} - \text{DP} \]

There was a monkey 100 meters in front of the car.
An example of a postpositional Phrase

DP - K - Deg(ree) - Deix(is) - Loc - Ax(ial)Part - p

Tree of postpositional phrase **kursi**=ke **nice**=se ‘from under the chair’ as a mirror image.

```
  PathP
    PlaceP
      KP
      Place
      nice

  Path
      se

  PlaceP_t
```

‘chair’ ‘Gen’ ‘under’ ‘from’
There are only some Axial Parts in Urdu that can be preceded by a demonstrative (deixis head).

DP - K - Deg(ree) - Deix(is) - Loc - Ax(ial)Part - p

(19)

darya=ke us par
river=Gen.Obl that other-side
‘far across the river’
(20) makan=ke 5-mitar age se
house=Gen 5-meter front from
‘from five meters in front of the house.’ (Urdu)

Order in English: Path + Deg + Loc + Axial Part
Order in Urdu: Deg + Axial Part + Loc + Path
Morphological or syntactically composed expressions

- from in front (English)
  (Path + Loc + Axial Part)
- from behind (English)
  (Path + Loc & Axial Part)
- $pic^h$e se (Urdu)
  (Axial Part & Loc + Path)
- $pic^h$-ũ (Saraiki)
  (Axial Part & Loc & Path)
- -qh-aj (Lezgian: Haspelmath 1993)
c-structure: There could be different c-structures for different languages. Different order of some spatial elements in different languages could be accommodated in c-structures. So c-structure is not our concern.

f-structure: f-structures should be as parallel as possible.
Ahmed (2009) proposed a feature based model for spatial markers of 10 South Asian languages.

The model is proposed by combining important points of Ostler (1971), Jackendoff (1990) and Kracht (2002).

These models, however, could not model all the phenomena of South Asian languages, So Ahmed introduced some new concepts/features.
A Spatial Model II

Important points of the model are:

- Every spatial marker has three primary features: PLACE, PATH and DYN(amic).
- Each of the above features may have a set of features as the value.
- The feature PLACE may have following values: UNDERSPEC, ON, AT, IN, BESIDE, . . .
- The feature PATH may have the following features as values: S(ou)RC(e), END
- The features SRC, END and DYN have a positive (+) or negative (-) value or they can be underspecified
- ....
These features can be used to get parallelism when f-structures are not parallel.

We introduce LEX-SEM features PLACE and PATH.

- gHar=mEN 'in the house'

  \[
  \begin{array}{c}
  \text{PRED} \quad \text{`gHar'} \\
  \text{CASE} \quad \text{LOC-in} \\
  \text{LEX-SEM} \quad \text{PLACE IN}
  \end{array}
  \]

- gHar=sE 'from the house'

  \[
  \begin{array}{c}
  \text{PRED} \quad \text{`gHar'} \\
  \text{CASE} \quad \text{INST} \\
  \text{LEX-SEM} \quad \text{PATH} \quad \text{SRC + END -}
  \end{array}
  \]
Features for the Axial Part

- Explode the feature PLACE to model the Axial Part and the components related to it.
- These LEX-SEM features mark the parallel spatial semantic concepts even if they are rendered by somewhat different features and structures in f-structures of two different languages.
- For example, the ground is preposition’s OBJ in English and German, however it is an OBL/SPEC in Urdu.
- The new proposed feature values of PLACE are: AX-PART, GROUND, DEIX, DEG, LOC
These features have values according to their nature.

- Possible values of AX-PART are BESIDE, FRONT, ABOVE etc.
- Possible values of DEIX are PROX and DIST.
- Possible values of LOC are UNDERSPEC, IN, ON etc.
An example from Urdu

gHar sE 5 mITar plcHE (house INST 5 meter behind)

\[
\begin{align*}
\text{PRED} & : \text{'plcHE} \langle \text{gHar} \rangle' \\
\text{LEX-SEM} & : \\
\text{PLACE} & : \begin{bmatrix}
\text{AX-PART} & \text{BEHIND} \\
\text{LOC} & \text{UNDERSPEC}
\end{bmatrix}
\begin{bmatrix}
1 \\
2
\end{bmatrix}
\\
\text{ADJUNCT} & : \\
\text{SPEC} & : \begin{bmatrix}
\text{NUMBER} & 5
\end{bmatrix}
^{1}
\\
\text{OBL} & : \\
\text{PRED} & : \text{gHar} \rangle_{2}
\end{align*}
\]
An example from German

5 Meter hinter dem Haus (5 meters behind the house)
The comparison of these two (Urdu and German) f-structure shows that the feature GROUND occurs with the spatial ground irrespective of the fact that it is an OBJ in German and OBL in Urdu.
More Examples - PATH following PLACE

\[
\text{LEX-SEM}: \begin{cases}
\text{PRED} & \text{plcHE} \left(g\text{Har}\right) \\
\text{PLACE} & \text{AX-PART BEHIND UNDERSPEC} []_1 \\
\text{PATH} & \begin{bmatrix} \text{SRC} \\ \text{END} \end{bmatrix} \\
\text{CASE} & \text{INST} \\
\text{OBL} & \begin{bmatrix} \text{PRED} \left(g\text{Har}\right)_1 \end{bmatrix}
\end{cases}
\]
More Examples - PATH following PLACE

gHar dE pIcHUN (house GEN behind-abl) - SARAIKI

\[\begin{array}{c}
\text{PRED} & \llbracket \text{pIcHUN} \langle \text{gHar} \rangle \rrbracket \\
\text{LEX-SEM} & \\
\text{PATH} & \llbracket \text{AX-PART BEHIND UNDERSPEC} \rrbracket \\
\text{OBL} & \llbracket \text{PRED \ 'gHar'} \rrbracket_1
\end{array}\]
More Examples - PATH following PLACE

\[[\text{daryA kE blc}] \text{ mEN }] \text{ sE (river GEN middle LOC-in INST)}\]
Conclusion

- Similar notions of spatial elements do exist cross linguistically
- The order of different spatial elements might not be the same across languages
- However, spatial expressions can be represented uniformly in f-structure
- The Lex-Sem features encode what actually the spatial elements being contributed by morphemes
References


