

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
- ▶ Urdu spatial expressions in a hierarchy devised by Svenonius (2008,2007,2006)
- ▶ Rendering spatial expressions in LFG

path and place markers

Place/Path	Case Clitic
Place	<i>par</i> 'on'
	<i>mẽ</i> 'in'
Path	<i>se</i> 'from'
	<i>ko</i> 'to'
	<i>tak</i> 'up to'

Table: Spatial case clitics in Urdu

Location Marking I

(1) a.

kitab **mez=par** hε
book.F.3Sg table.F.3Sg=Loc.on be.Pres.Sg
'The book is on the table.'

b.

bacce **sakul=mẽ** hẽ
child.Pl school.M.3Sg=Loc.in be.Pres.Pl
'The children are in school.'

Location Marking II

In Urdu, a non-verbal noun cannot be modified by mere a locative phrase in contrast with English.

(2) a.

mez=par *(pari hu-i) kitab
table.F.3Sg=Loc.in *(lie-Perf.F be-Perf.F) book.F.3Sg
'The book (lying) on the table'

b.

sakul=mē *(mojud) bacce
school.M.3Sg=Loc.in *(present) child.M.PI
'The children (present) in the school'

Location Marking III

- ▶ 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 g^har=* (par/mě) he
Ali.M.3Sg home.M.Sg=* (Loc.at/Loc.in) be.Pres.Sg
'Ali is at home.' (Urdu)

b.

ali g^har he
Ali.M.3Sg home.M.Sg be.Pres.Sg
'Ali is at home.' (Saraiki)

Path Marking I

(4) a.

ali g^har=se a-ya
Ali.M.3Sg home.M.3Sg=Abl come-Perf.M.Sg
'Ali came from home.'

b.

ali g^har=**ko** ga-ya
Ali.M.3Sg home.M.3Sg=Loc go-Perf.M.Sg
'Ali went home.'

c.

ali dūkan=**tak** ga-ya
Ali.M.3Sg shop.F.3Sg=Loc go-Perf.M.Sg
'Ali went up to the shop.'

Path Marking II

- ▶ 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 *pahũc* 'reach', etc. in Urdu.

(5) a.

ali bay=se guzr-a
Ali.M.3Sg garden.M.3Sg=Abl pass-Perf.M.Sg
'Ali passed through the garden.'

b.

ali g^har ga-ya
Ali.M.3Sg home.M.3Sg go-Perf.M.Sg
'Ali went home.'

Path Marking III

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

(6)

ali or nida darya=ke **pul=par**
Ali.M.3Sg and Nida.F.3Sg river.M=Gen.Obl bridge.F=Loc.on
ja rah-e hẽ
go Prog-Perf.M.PI be.Pres.PI

'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.

Path Marking IV

The *se* marker can embed another locative marked phrase.

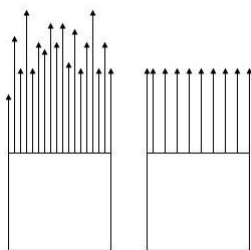
(7) a.

ali bay=**mē**=se guzr-a
Ali.M.3Sg garden.M.3Sg=Loc.in=Abl pass-Perf.M.Sg
'Ali passed through the garden.'

b.

ali=ne mez=**par**=se kitab uṭ^ha-i
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



(adapted from Svenonius 2006)

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

Urdu Axial Parts

Following is a list of AxialParts in Urdu.

Axial Parts	Meanings
andar	'inside'
bahar	'outside'
age	'in front of'
pic ^h e	'behind'
upar	'above/over'
nice	'under'
nazdik	'near'
qarib	'near'
gird	'around'
darmīyan	'between'

Table: AxialParts in Urdu

Examples of use of Axial Parts

(8) a.

ali dukan=ke age k^harā hε
Ali.M.Sg shop=Gen.Obl front standing be.Pres.Sg
'Ali is standing in front of the shop.'

b.

kursi=ke nice billi hε
chair=Gen.Obl under cat be.Pres.Sg
'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.

ke should not be considered to form a compound adposition with Axial Part I

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 fuṭ nice
ground=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)

zamin= se 3 fuṭ nice
ground=Abl.Obl 3 foot under
'three feet under the ground'

ke should not be considered to form a compound adposition with Axial Part IV

The *ke* marked complement can be postposed.

(12)

3 fuṭ nice zamin= ke
3 foot under ground=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)

kūrsi= 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)

ali bazar=ki taraf cal-a
Ali.M.Sg market=Gen.F side head-Perf.M.Sg
'Ali headed towards the market.'

Axial Parts vs Nouns I

- ▶ 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 vs Nouns II

Axial Parts (oblique form of original nouns) in Urdu generally give a locational sense without being marked overtly by case clitic.

(15)

dʊkan=ke age(=*par/mẽ)
shop=Gen.Obl front(=Loc.on/in)
'In front of the shop'

Axial Parts vs Nouns III

In modern Urdu the AxialPart *age* 'front' is not used as a noun.

(16) a.

ali dūkan=ke *age* rūk-a
Ali shop=Gen.Obl front stop-Perf.3Sg.M
'Ali stopped *in front of* the shop.'

b.

jāhaz=ke **age*=ko ag lag gā-i
aeroplane front=Acc fire.3Sg.F catch go-Perf.3Sg.F
*'*The front* of the aeroplane caught fire'

c.

jāhaz=ke **age*=mē ag lag gā-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 **agle** hisse=ko ag lag ga-i
aeroplane front part=Acc fire.3Sg.F catch go-Perf.3Sg.F
'**The front** of the aeroplane caught fire'

b.

jahaz=ke **agle** hisse=mẽ ag lag 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 *kinare* '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.

sarāk=ki donō taraf pani hε
road=Gen.Obl both side.Sg water be.Pres
'There is water on both sides of the road.'

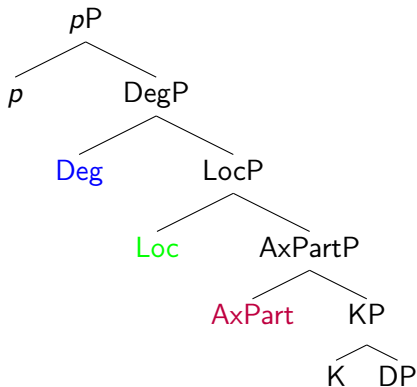
b.

makan=ki carō taraf pani hε
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 - Deg(ree) - Deix(is) - Loc - Ax(ial)Part - K - DP

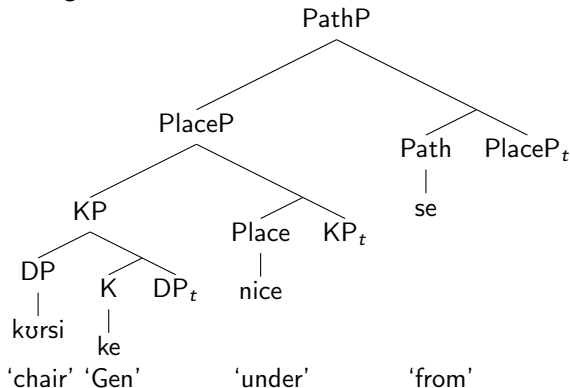


There was a monkey 100 meters in front of the car.

An example of a postpositional Phrase

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

Tree of postpositional phrase *kūrsi=ke nice=se* 'from under the chair' as a mirror image.



Deixis Example in Urdu

- ▶ 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'

Order of spatial elements

(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^he se* (Urdu)
(Axial Part & Loc + Path)
- ▶ *pic^h-ũ* (Saraiki)
(Axial Part & Loc & Path)
- ▶ *-qh-aj* (Lezgian: Haspelmath 1993)

c- and f-structure

- ▶ 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.

A Spatial Model I

- ▶ 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
- ▶

LFG Implementation

- ▶ 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'

$$\left[\begin{array}{ll} \text{PRED} & \text{'gHar'} \\ \text{CASE} & \text{LOC-in} \\ \text{LEX-SEM} & \left[\begin{array}{ll} \text{PLACE} & \text{IN} \end{array} \right] \end{array} \right]$$

- ▶ $gHar=sE$ 'from the house'

$$\left[\begin{array}{ll} \text{PRED} & \text{'gHar'} \\ \text{CASE} & \text{INST} \\ \text{LEX-SEM} & \left[\begin{array}{ll} \text{PATH} & \left[\begin{array}{ll} \text{SRC} & + \\ \text{END} & - \end{array} \right] \end{array} \right] \end{array} \right]$$

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

Features for the Axial Part

- ▶ 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 mlTar plcHE (house INST 5 meter behind)

PRED	‘plcHE <gHar>’										
LEX-SEM	<table style="border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 5px;">PLACE</td> <td style="padding: 5px;"> <table style="border-collapse: collapse;"> <tr> <td style="padding: 5px;">AX-PART</td> <td style="padding: 5px;">BEHIND</td> </tr> <tr> <td style="padding: 5px;">LOC</td> <td style="padding: 5px;">UNDERSPEC</td> </tr> <tr> <td style="padding: 5px;">DEG</td> <td style="padding: 5px;">[₁]</td> </tr> <tr> <td style="padding: 5px;">GROUND</td> <td style="padding: 5px;">[₂]</td> </tr> </table> </td> </tr> </table>	PLACE	<table style="border-collapse: collapse;"> <tr> <td style="padding: 5px;">AX-PART</td> <td style="padding: 5px;">BEHIND</td> </tr> <tr> <td style="padding: 5px;">LOC</td> <td style="padding: 5px;">UNDERSPEC</td> </tr> <tr> <td style="padding: 5px;">DEG</td> <td style="padding: 5px;">[₁]</td> </tr> <tr> <td style="padding: 5px;">GROUND</td> <td style="padding: 5px;">[₂]</td> </tr> </table>	AX-PART	BEHIND	LOC	UNDERSPEC	DEG	[₁]	GROUND	[₂]
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OBL	[PRED ‘gHar’] ₂										

An example from German

5 Meter hinter dem Haus (5 meters behind the house)

PRED	‘hinter ⟨ Haus ⟩’										
LEX-SEM	<table style="border-collapse: collapse; margin-left: 20px;"> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px;">PLACE</td> <td style="padding: 5px;"> <table style="border-collapse: collapse; margin-left: 10px;"> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px;">AX-PART</td> <td style="padding: 5px;">hinter</td> </tr> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px;">LOC</td> <td style="padding: 5px;">UNDERSPEC</td> </tr> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px;">DEG</td> <td style="padding: 5px;">[₁]</td> </tr> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px;">GROUND</td> <td style="padding: 5px;">[₂]</td> </tr> </table> </td> </tr> </table>	PLACE	<table style="border-collapse: collapse; margin-left: 10px;"> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px;">AX-PART</td> <td style="padding: 5px;">hinter</td> </tr> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px;">LOC</td> <td style="padding: 5px;">UNDERSPEC</td> </tr> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px;">DEG</td> <td style="padding: 5px;">[₁]</td> </tr> <tr> <td style="border-left: 1px solid black; border-right: 1px solid black; padding: 5px;">GROUND</td> <td style="padding: 5px;">[₂]</td> </tr> </table>	AX-PART	hinter	LOC	UNDERSPEC	DEG	[₁]	GROUND	[₂]
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Comparison

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

[gHar kE plcHE] sE (house GEN behind INST) - URDU

PRED	'plcHE <gHar>'														
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END	-														
CASE	INST														
OBL	[PRED 'gHar'] ₁														

More Examples - PATH following PLACE

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

PRED	'plcHUN <gHar>'														
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SRC	+														
END	-														
OBL	[PRED 'gHar'] ₁														

More Examples - PATH following PLACE

[[daryA kE blc] mEN] sE (river GEN middle LOC-in INST)

PRED	'blc <daryA>'														
LEX-SEM	<table border="1"> <tr> <td>PLACE</td> <td> <table border="1"> <tr> <td>AX-PART</td> <td>MIDDLE</td> </tr> <tr> <td>LOC</td> <td>IN</td> </tr> <tr> <td>GROUND</td> <td>[1]</td> </tr> </table> </td> </tr> <tr> <td>PATH</td> <td> <table border="1"> <tr> <td>SRC</td> <td>+</td> </tr> <tr> <td>END</td> <td>-</td> </tr> </table> </td> </tr> </table>	PLACE	<table border="1"> <tr> <td>AX-PART</td> <td>MIDDLE</td> </tr> <tr> <td>LOC</td> <td>IN</td> </tr> <tr> <td>GROUND</td> <td>[1]</td> </tr> </table>	AX-PART	MIDDLE	LOC	IN	GROUND	[1]	PATH	<table border="1"> <tr> <td>SRC</td> <td>+</td> </tr> <tr> <td>END</td> <td>-</td> </tr> </table>	SRC	+	END	-
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END	-														
CASE	INST														
OBL	[PRED 'daryA'] ₁														

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

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