Spatial adpositions in sign language
Enoch O. Aboh & Roland Pfau
(University of Amsterdam)

1 Introduction

→ In the sign language literature, it is commonly assumed that sign languages (SLs) lack spatial adpositions and that information about the spatial location of referents is encoded within the predicate by means of a spatial modulation of the predicate sign.
→ For instance, in many SLs, in order to express that an object (e.g. a book) is located on a table, the signer would generally start by articulating TABLE (i.e. the Ground), followed by BOOK (the Figure) which in turn would be followed by the locational predicate.
→ Crucially, the predicate will be modulated such that its endpoint coincides with the location in the signing space at which the Ground has been articulated, thereby yielding the complex meaning ‘be located on the top/surface of’. No overt preposition is used.
→ Despite this modality-specific peculiarity, we argue that SLs employ the same syntactic machinery for expressing spatial relations as spoken languages do.
→ In particular, spatial expressions generally involve a complex predicate structure which involves two types of adpositions, P₁ and P₂:
  • P₁ encodes direction/path/goal and selects a predicate phrase PredP, the specifier of which hosts the phrase expressing the Ground, while the portion expressing location represents a part of the Ground.
  • P₂ is shown to develop from a bare noun, functioning as complement of Pred.
→ We show that the distribution and combination of these two elements result in the various types of adpositions observed cross-linguistically.

2 Spatial adpositions in spoken languages
2.1 Some typological observations

→ In many languages, spatial expressions are encoded by adpositions which may precede or follow the NP expressing the ground. In the Germanic/Romance examples in (1), for instance, the elements on, auf, and sur are analyzed as prepositions.

(1) a. The cards are on the table [English]
    b. Die Karten sind auf dem Tisch [German]
    c. Les cartes sont sur la table [French]

→ In Maithili, an Indo-Aryan language spoken in India, however, the adpositions occur following the ground (2) (Yadav 1989: 249). Sometimes, but not always, the choice between pre- and postpositions correlates with head-initial versus head-final word order.

(2) a. dokan só shop from ‘from the shop’ [Maithili]
    b. ghar me house in ‘inside the house’

1 We are indebted to Joni Oyserman, Marijke Scheffener, Pamela Perniss, and Brendan Costello for input.
Interestingly, in many African languages spatial expressions systematically involve two adpositions (glossed here as $P_1$ and $P_2$). These may occur on each side of the noun phrase, as in the Gungbe (Kwa) example in (3a), or may both precede the noun phrase, as in the Zina Kotoko (Chadic) example in (3b) (Holmberg 2002).

(3) a. $Kọjọ$ $zé$ $gò$ $lọ$ $dọ$ $[DP$ $âkpótín$ $lọ]$ $kàn$ [Gungbe]
   Kojo take bottle DET $P_1$ box DET $P_2$
   ‘Kojo put the bottle beside the box [lit. at the side of the box].’

   b. $Kàrtà$ dé $a$ $gmá$ tábál [Zina Kotoko]
   cards DET $P_1$ $P_2$ table
   ‘The cards are on the table’

Similar examples are found in certain creoles. For instance, 18th century Sranan displayed the contrast illustrated in (4) (van den Berg 2007: 131).

(4) a. Putti na tafra tappo b. Putti na tappo tafra [Sranan]
   put $P_1$ table $P_2$ put $P_1$ $P_2$ table
   ‘Put it on the table.’   ‘Put it on the table.’

$P_1$ and $P_2$ differ formally in at least two respects. First, elements of the class $P_1$ often form a small class and generally develop from relators, copulas, or verbal predicates. For instance, the Gungbe element $dọ$ in (3a) is arguably a cognate of the verb $dọ$, roughly translated as ‘have’ in (5).

(5) $Kọjọ$ $dọ$ kwè [Gungbe]
   Kojo have money
   ‘Kojo has money.’

Elements of the class $P_2$, on the other hand, form a larger class and generally derive from nouns expressing body parts or landmarks. For instance, the particle $kàn$ in (3a) derives from the noun $nùkàn$ (‘forehead’) (Aboh 2005, in press).

(6) $Kọjọ$ xò $nùkàn$ ná $mì$ [Gungbe]
   Kojo hit forehead $P_1$ 1.SG
   ‘Kojo hit me at my forehead.’

Second, while $P_1$ can introduce a new argument (and therefore assign case) or introduce a clause (7a), $P_2$ never does so and must always occur in the context of a ‘governor’, either $P_1$ (7b) or a verb (7c).

(7) a. $Kọjọ$ yi $xwègbè$ $dọ$ $âgbọ$ $kpé$ े [Gungbe]
   Kojo go home $P_1$ fatigue suffice 3.SG
   ‘Kojo went home because he was tired’

   b. * $Kọjọ$ zé $wémá$ *(xlán) yòvóto $mè$ [Gungbe]
   Kojo take letter $P_1$ Europe $P_2$
   ‘Kojo sent a letter to Europe [lit. Kojo sent a letter in-to Europe].’
c. Kojo sat next to the box

‘Kojo sat next to the box’

→ The generalization is therefore that while the two elements can occur independently of each other, \( P_2 \) occurs in contexts where it must be ‘governed’.

→ Put together, these facts lead to the question whether the languages described under (1) and (2) and those under (3) to (7) resort to completely different strategies in encoding spatial expressions or whether there is a principled way of accounting for the variation we observe here.

2.2 Suggested analysis

→ Traditionally, the prepositions in (1) and (2) are analyzed as heading a prepositional phrase, as represented in (8) for English (but see Koopman (2000), Svenonius (in press), and den Dikken (in press) for recent alternative proposals). A similar structure can be proposed for the Maithili example in (3), modulo the directionality parameter.

\[
\begin{array}{c}
\text{Spec} \\
\text{P'} \\
\text{P} \\
\text{Det} \\
\text{NP} \\
\text{on} \\
\text{the} \\
\text{table} \\
\text{inside} \\
\text{the} \\
\text{house}
\end{array}
\]

\( (8) \)

→ However, the data we just presented suggest that this structure is too simplistic. Indeed, it appears that even in Germanic and Romance, one finds bipartite adpositions, i.e. morphologically complex (9a) or phrasal (9b) prepositions.

\[
\begin{array}{c}
\text{John put the bottle } \text{in-side} \text{ the box } \text{[English]} \\
\text{L’arbre est } \text{à-côté-de} \text{ la maison } \text{[French]} \\
\text{‘The tree is next to the house.’}
\end{array}
\]

\( (9) \)

→ Again, as we suggested for the data in (3) and (4), while both English \( \text{in} \) and French \( \text{à} \) and \( \text{de} \) can occur on their own (10ab), the same does not hold for the elements \( \text{side} \) and \( \text{côté} \), respectively (11ab).

\[
\begin{array}{c}
\text{John lives in Paris} \\
\text{Jean vit à Paris}
\end{array}
\]

\( (10) \)

\[
\begin{array}{c}
\text{John lives side Paris} \\
\text{Jean vit côté Paris}
\end{array}
\]

\( (11) \)

→ For the examples in (11) to be grammatical, an element of the type \( \text{in} \) or \( \text{à} \) is required. Accordingly, elements of the type \( \text{side} \) or \( \text{côté} \) behave just like elements of the type \( P_2 \) presented before, while \( \text{in} \) and \( \text{à} \) behave like elements of the type \( P_1 \).
Building on this, we propose that complex prepositions in Germanic/Romance have a certain resemblance to those observed in West African languages. We further suggest to take this resemblance seriously and to analyze the former on a par with the latter.

To that end, we adopt Aboh’s (in press) idea that spatial expressions involve a complex predicate phrase embedded under an element $P_1$ which encodes path (direction/goal). Cross-linguistically, it has been shown that $P_1$ often derives from verbs.

In contrast, the Part-NP within PredP encodes location and may grammaticalize into $P_2$. This explains why these adpositions commonly derive from nouns (Heine & Kuteva 2002). The relevant part of the structure is given in (12).

![Diagram](image)

Let us consider again the Gungbe example in (3a). $P_1$ íó encodes path and selects a predicate phrase inside which the reference object àkpótín lás (DP) is the subject, and its part expressing location represents a bare noun phrase headed by $kón$. The latter subsequently incorporates into Pred⁰ and surfaces as $P_2$. This derivation yields the sequence $P_1 > DP > P_2$, as illustrated in (13).

![Diagram](image)

In contrast, the Zina Kotoko example (3b) involves predicate (head) inversion where $P_2$ moves past the reference object DP tából to a position in the vicinity of $P_1$ (Kayne 1994; den Dikken 1998). This results in the pattern $P_1 > P_2 > DP$ shown in (14).

![Diagram](image)
We further claim that in some languages, fusion of $P_1$ and $P_2$ may yield morphologically complex adpositions like English *inside* and *in front of* or French *à côté de*. The proposed analysis extends to these cases, too (see Aboh (in press) for discussion).

3 The expression of spatial relations in sign languages

Within the signing space, a Ground object (usually the backgrounded, bigger, and immobile entity) and a Figure object (usually the focal, smaller, and more mobile entity) can be located in various configurations with respect to each other.

For the most part, we will use examples from Sign Language of the Netherlands (NGT) for illustration, implicitly assuming that other SLs express comparable situations in a similar way. Still, we acknowledge the possibility of cross-linguistic variation (see e.g. Perniss & Özyürek 2008; Özyürek et al. 2009a,b; Arik 2009).

We assume that there are two basic spatial predicates, *BE-LOCATED* (location) and *TRANSFER* (transitive motion, e.g. *PUT-DOWN*). Note, however, that in the following, we will only be concerned with the former of the two.

3.1 Canonical locative constructions

Perniss (2007) observes certain regularities with respect to the (canonical) expression of Figure and Ground in locative relations across SLs.

First, in both spoken and signed languages, referents are typically introduced before information about them is predicated. This tendency, she claims, is due to a general modality-independent discourse property (i.e. Topic-Comment articulation).

Secondly, the Ground is usually mentioned before the Figure in the locative construction (cf. Engberg-Pedersen (1993) for Danish SL; Emmorey (1996) for American SL).

Third, the classifier handshape that represents the Ground is commonly held in place while the other hand positions the Figure in relation to the Ground. That is, the locative construction is depicted by a simultaneous classifier construction.

These canonical properties are illustrated by the DGS example in (15b) (Perniss 2007: 78; glosses slightly adapted); the stimulus picture which elicited (15b) is given in (15a).
(15) a.  

b.  

rh: MAN BROWN  SASS(hat) CL(man)loc(r)
lh: TREE CL(tree)loc(l)-------------------------------------------------------------

‘A man is standing next to a tree, facing the tree.’

→ (15b) is canonical in the sense that (i) both referents (A & C-E) precede the predicate (F), (ii) the Ground entity (A) is mentioned before the Figure entity (C-E), and (iii) a classifier handshape representing the Ground is held (B-F) while the other hand localizes the Figure in relation to the Ground (F).

→ All of the static scene descriptions analyzed by Perniss (2007) depict entities that are localized next to each other, e.g. a man and a tree or two men. For scenes containing two identical entities, it cannot be determined which of the two functions as the Ground.

→ We will therefore focus on situations in which the Ground entity can be unambiguously identified. In the glosses, we will neglect the classifier morphemes which commonly constitute a part of location predicates (implicitly adopting proposals that analyze them as gender agreement markers; e.g. Glück & Pfau (1998), Zwitserlood (2003)).

3.2 Hold as part of the Ground

→ Let us start our discussion by looking at the spatial relation ‘on (the top/surface of)’. For localizing a non-human Figure like CAT, the predicate BE-LOCATED is used. This predicate combines with the appropriate classifier handshape (b-hand in (16a)).

→ As is evident from the pictures in (16a), the feature [location] of the predicate expresses the location of the Figure CAT in relation to the Ground CHAIR. As before, both entities precede the predicate and the Ground precedes the Figure. The same is true for (16b) which involves a non-animate figure (video stills from NGC (2002)).

→ In contrast to (15b), we do not observe a simultaneous classifier construction in (16ab). In principle, the Ground could be represented by a one-handed surface classifier signed simultaneously with the predicate, as in (16c); according to our informants, however, this strategy is marked and hardly ever observed.
(16) a. \[ \text{rh: CHAIR}_{\text{loc}(x)} \text{ CAT} \text{ BE-LOCATED}_{\text{top-of-loc}(x)} \]
\[ \text{lh: CHAIR}_{\text{loc}(x)} \text{ CAT} \]
‘A cat is sitting on (top of) the chair.’

b. \[ \text{rh: TABLE}_{\text{loc}(x)} \text{ MILK} \text{ BE-LOCATED}_{\text{top-of-loc}(x)} \]
\[ \text{lh: TABLE}_{\text{loc}(x)} \text{ MILK} \]
‘A glass of milk is on (top of) the table.’

c. ? \[ \text{rh: CHAIR/TABLE}_{\text{loc}(x)} \text{ CAT/CUP} \text{ BE-LOCATED}_{\text{top-of-loc}(x)} \]
\[ \text{lh: CHAIR/TABLE}_{\text{loc}(x)} \text{ CAT/CUP} \text{ SURFACE}_{(x)} \]
‘A cat/glass is on (top of) the chair/table.’

→ It is worth pointing out, however, that in less prototypical spatial configurations, e.g. in (17a) below, it is more likely for the non-dominant hand to serve as (Part of) the Ground.

→ Also, Arik (2009: 179f) observes structures of the type in (16c) in Turkish SL (TİD), Croatian SL (HZJ), ASL, and Austrian SL (ÖGS); see (17b) (the stimulus picture showed a mug on top of a book). We will come back to that option in section 3.3.

(17) a. \[ \text{rh: TABLE}_{\text{loc}(x)} \text{ BOY} \text{ BE-LOCATED}_{\text{top-of-loc}(x)} \]
\[ \text{lh: TABLE}_{\text{loc}(x)} \text{ SURFACE}_{(x)} \]
‘A boy is standing on a/the table.’

b. \[ \text{TİD} \quad \text{HZJ} \quad \text{ASL} \quad \text{ÖGS} \]

→ We assume that (12) can be extended to the SL data (18). As for the realization of $P_1$ and $P_2$, we argue that in (16ab), $\text{PART}$ ($P_2$) is spelled out by a hold-morpheme (cf. Rathmann (2005), Wilbur (2008) for aspectual hold morphemes). $P_1$, on the other hand, is realized by a zero movement. At spell-out, a (phonetic) default movement will be inserted.
The head of the PART-NP raises to the (zero) predicate head, where spatial agreement with the GROUND is established under Spec-head agreement (indicated by the broken circle).

Subsequently, PART adjoins to P1. The latter movement produces morphological fusion comparable to English complex prepositions (e.g. *inside*, where *side* equals the Part (P2) and *in* equals P1).

This analysis leads us to assume that there is no lexical posture verb (e.g. ‘lie’, ‘stand’, etc.) in these constructions (cf. the Zina Kotoko example in (3b)). Hence, what we gloss as BE-LOCATED is just a short-hand for a fused P1-P2-Agreement complex.

Finally, we interpret the fact the Ground precedes the Figure as resulting from a general Topic-Comment articulation, where the Ground acts as topic. Consequently, we assume that the GROUND moves to a topic position within the left periphery of the clause.

### 3.3 The non-dominant hand as Part of the Ground

In the above examples, we observe prototypical situations where the Figure is located on the (upper part of) the Ground, e.g. the surface of a table. As shown in (16c), in NGT, in these cases, the part of the Ground encoding location is usually left unexpressed.

However, there are good reasons to believe that the final hold that is part of the movement component of BE-LOCATED is indicative of the part of the Ground that is functioning as location.

Though this awaits further confirmation, it could be argued that the hold represents the surface indirectly, which would mean that it derives from a nominal, just as P2 in spoken languages; cf. examples in (3), (4), and (9).

Partial evidence for an analysis along these lines comes from the observation that occasionally, the Part component can be overtly and simultaneously realized by the non-dominant hand. In (17), e.g., PART is simultaneously spelled out by SURFACE; see (19).
Things are somewhat different for the ‘under’-relation. It seems that in this case, the predicate \textsc{be-located} by itself does not provide sufficiently specific information (20a). Signers show a preference for introducing a two-handed directional sign glossed as \textsc{under-surface} (20b). In this case, the predicate is even optional.

\begin{enumerate}
\item \textbf{a.} \textit{rh: chair_{loc(x)} cat \textsc{be-located}_{below-loc(x)}} \quad \textit{lh: chair_{loc(x)} cat (surface)} \quad [\text{NGT}]
\item \textit{b.} \textit{rh: chair_{loc(x)} cat \textsc{under} (\textsc{be-located}_{below-loc(x)})} \quad \textit{lh: chair_{loc(x)} cat surface-------------------------}
\end{enumerate}

\textit{‘A cat is sitting under a/the chair.’}

As for the \textsc{under-surface} case, we assume that \textsc{surface} spells out the Part of the Ground (\(P_2\)) while \textsc{under} is a directional occupying the head of \(P_1P\).

We suggest to analyze SL structures in which the Part component is optionally expressed on a par with English sentence pairs such as the one in (21).

\begin{enumerate}
\item \textbf{a.} \textit{The bottle is \textit{in} the box} \quad \textit{(only \(P_1\) realized)} \quad [\text{English}]
\item \textbf{b.} \textit{The bottle is \textit{inside} (of) the box} \quad \textit{(\(P_1\) and \(P_2\) realized)}
\end{enumerate}

Turning to the ‘next to’-relation, we observe that the use of the non-dominant hand (\(H_2\)) as Part of the Ground is more common (also cf. the DGS example (15b)). Depending on characteristics of the Ground, there are two ways for \(H_2\) to participate in such structures.

First, both Ground and Figure can be introduced before the locative predicate is signed simultaneously with the Part of the Ground (\textsc{side} in this case), as in (22a).

Secondly, the Ground can be localized by a classifier predicate, which in the ASL example in (22b) is held stationary by \(H_2\) (a ‘perseveration’ (Miller 1994; Vermeerbergen et al. 2007)) while the signer articulates the Figure BIKE and the locational predicate (Emmorey 2002: 87).

\begin{enumerate}
\item \textbf{a.} \textit{rh: house_{loc(x)} car \textsc{side}_{(x)}} \quad [\text{NGT}]
\item \textit{b.} \textit{rh: house_{loc(x)} car \textsc{be-located}_{next-to(x)}}
\end{enumerate}

\textit{‘The car is (located) next to the house.’}

\begin{enumerate}
\item \textbf{a.} \textit{rh: house_{loc(x)} \textit{be-located}_{next-to(x)}} \quad [\text{ASL}]
\item \textit{b.} \textit{lh: house_{loc(x)} \textit{be-located}_{next-to(x)}}
\end{enumerate}

\textit{‘The bike is (located) next to the house.’}
c.

→ The NGT example (22c) is similar to (22b). In this case, however, the classifier is articulated by the dominant hand and is not held stationary. Despite the use of a classifier which represents the object, we still assume that H2 in (22b) and H1 in (22c) function as Part of the Ground, just like SURFACE in (17) and SIDE in (22a).

→ Let us finally consider the ‘inside-of’-relation. It appears that NGT makes use of two overt prepositions: INSIDE-1 (<B-hand, (23a)) and the two-handed INSIDE-2 (a combination of H1 and H2).

→ Still, H2 may occasionally be used as Part of the Ground in ‘inside’-constructions, too, as is shown in (23b). Note that optionally, H2 of the Ground is perseverated.

→ (23c) suggests that in cases in which H2 does not provide sufficiently specific information about the containment relation, use of H2 as Part of the Ground results in ungrammaticality. Further research is necessary to verify this claim.

(23) a. rh: FENCE SASS:SQUAREloc(x) TREE INSIDE-1loc(x) [NGT]
   lh: FENCE SASS:SQUAREloc(x) TREE
   ‘The tree (located) within the fence.’

b. rh: BOWLloc(x) DOLL BE-LOCATEDinside(x)
   lh: BOWLloc(x) SIDE(x)
   ‘The doll is standing inside the bowl.’

c. * rh: FENCE SASS:SQUAREloc(x) TREE BE-LOCATEDinside(x)
   lh: FENCE SASS:SQUAREloc(x) TREE SIDE(x)
   ‘The tree (located) within the fence.’

→ In (24ab), we cite comparable examples from Gungbe and English, respectively, and in (24c), we provide a comparative structure for the NGT, Gungbe, and English examples.
bottle DET P₁ box DET P₂
‘The bottle is inside the box [lit. in the inner side of the box].’
b. The bottle is inside (of) the box
c. IP
  Spec P₁P
  FIGURE P₁ PredP
    Spec Pred’
    GROUND Pred NP
    DOLL BE-LOC BOWL Ø SIDE → NGT
    [gò lọ] tò [àkpótín lọ] Ø mè → Gungbe
    bottle in box (of) side → English

4. Conclusion

→ The above discussion suggests that a common pattern found in both spoken and sign languages is that locative expressions require a relation between a Figure and a Ground.
→ Following Talmy’s (2000) theory of cognitive semantics, we assume that generally, a preposition establishes a relation between a Ground and its Part. In this regard, Talmy (2000: 196f) argues that

  “a major group of space-characterizing linguistic forms makes appeal to a Ground object’s having some form of asymmetry, or biasing in its structure. Either it has structurally distinct parts – parts that in themselves are distinguishable from one another and can form a basis for spatial discriminations – or it has some kind of unidirectionality.”

→ We argue that this characterization holds for all the languages under study here and we propose that the Ground may be complex in that it involves a Reference Object whose Part is used to localize the Figure. Literally, this implies that a sentence like “The book is on the table” could be paraphrased as “The book is on the top of the table”.

→ The paper therefore shows that when it comes to spatial expressions, SLs are not exceptional despite the fact that they have the potential to make use of the signing space.
→ If our analysis is on the right track, this would mean that the apparent iconic properties of locative constructions in SLs are an artifact of the syntax of spatial expressions. Iconicity thus reduces to a spell-out phenomenon and is not part of the computational system. As such, it is comparable to surface effects in spoken languages.
References


