Abstract

This paper, based on original fieldwork, presents an analysis of locative morphemes in the Bantu language Mushunguli (Somalia). This is the first formal analysis of locatives in any Bantu language. The Mushunguli data motivate the claim that points of view, abstract entities consisting of a location and an orientation, are arguments of some spatial expressions. Incorporating such points of view is in analyses of the meanings of English spatial expressions is shown to improve their empirical predictions.

1 Introduction

Cross-linguistically, spatial expressions specify the location of one entity in terms of its relation to the location of another (Talmy 1985; Zwarts and Winter 2000; Kracht 2002; Levinson 2003). An example is presented in (1).

(1) The banana is near the book.

Following Talmy (1985), the entity whose location is being described (the banana in 1) is called the called the Figure. The entity relative to which the location of the Figure is specified (the book) is called the Ground. In (1), the spatial relation between the Figure and the Ground is encoded by the spatial expression near.

The spatial relation expressed in (1) can be expressed in the Bantu language Mushunguli\(^1\) (Somalia) using a locative copula construction with either of two locative morphemes, ha- and ku-, as shown in (2).\(^2\)

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\(^1\)Mushunguli is a dialect of Kizigua spoken by approximately 23,000 residents of the Juba River region of Somalia (pre-war estimate; Lewis 2009). The Mushunguli data presented here are from original fieldwork conducted with a native speaker outside Somalia between 2010 and 2012. The name Mushunguli is typically used to refer to the language when speaking Somali and Maay, while Kizigua is the Swahili name, and Chizigula the name in the language itself (Holman Tse p.c.). My consultant refers to the language as Mushunguli, so I use that name as well.

Mushunguli is severely under-documented. There is no reference grammar (though see Odden 2013 for some documentation), and the only published work is (Tse 2013, to appear) and Author (2013, to appear a and b). Mushunguli has tones, but tone does not appear to be significant for the analysis of locative morphemes. Tones are not indicated in the examples presented here.

\(^2\)Except where explicitly noted, the contexts described were physically constructed during elicitation. The objects mentioned are the props used, and the position of the interlocutors reflects the actual position of the speaker (consultant) and addressee (researcher) at the time of utterance. The immediate discourse context is the
Like (1), the examples in (2) involve a copula construction and specify the location of the Figure relative to the location of the Ground. However, the examples in (2) are not acceptable across all of the contexts in which (1) is acceptable. Their acceptability depends on the distance between the interlocutors and the banana and book, as depicted graphically in Figure 1. In contrast, (1) is acceptable and can be true regardless of the distance between the interlocutors and the book and banana.

Figure 1: Variability in the acceptability of Mushunguli locative constructions across contexts

(2a), with the locative morpheme ha-, is acceptable in a context in which the Figure and Ground are close to the interlocutors, and unacceptable in context in which they are distant. (2b), with ku-, displays the opposite pattern. Based on examples such as those in (2), in this paper I argue that ha- and ku- exemplify two classes of context-sensitive spatial expressions which are new to the literature. The class exemplified by ha- and analyzed in Section 3 is sensitive to the distance between the Ground and a reference location, which may or may not be the location of the interlocutors. The class represented by ku-, analyzed in Section 4, is slightly different. The meaning of ku- is sensitive to the location of the point of view (henceforth, POV) adopted by the speaker.

The ku- data motivate the proposal that interlocutors keep track of POVs in the discourse context. They also motivate the representation of these POVs as ordered pairs consisting of a location and an orientation, as shown in (3).

(3) \( x_i := < r_i, \text{front}_i > \), where \( x_i \) is a POV, \( r_i \) is the region occupied by the POV, and \( \text{front}_i \) is the direction of the POV (intuitively the direction of gaze of an observer, following Levinson 2003).
In Section 5, I present novel English data which show that incorporating such povs into analyses of English spatial expressions improves their empirical predictions. Finally, in the conclusion I discuss potential implications of this work for unified theories of perspectival expressions, which treat spatial expressions as members of a larger class. (e.g. Mitchell 1986; Doron 1991; Speas and Tenny 2003).

2 An introduction to Mushunguli locatives

Throughout the Bantu family, locative morphemes are a closed class. The Proto-Bantu locative morphemes have been reconstructed as pa-, ku-, mu-, and -ni (Ružička 1959, 1960; Ziervogel 1971). Synchronically, a given Bantu language may have none, some, or all of the morphemes, and across languages the morphemes have different phonological realizations. Much work has been done on the morphosyntax of Bantu locative constructions (Ružička 1959, 1960; Ziervogel 1971; Bresnan and Kanerva 1989; Bresnan 1991; Bresnan and Mchombo 1995; Machobane 1995; Carstens 1997; Amidu 2004; Muriungi 2006, *inter alia*). However, only a few detailed studies of the semantics of Bantu locatives exist, and none are formal. Neumann’s (1999) monograph on Shengologa and Taylor’s (2007) work on Zulu are representative examples.

In both syntactic and semantic studies, the meanings of locatives are claimed to be context dependent and even pov-sensitive (see e.g. Bresnan and Kanerva 1989: 39, the summaries in Ružička 1959 and Ziervogel 1971, and the detailed description of Shengologa locatives in Neumann 1999). The claim that the meanings of ha- and ku- are context sensitive in Mushunguli thus correlates with observations about the meanings of locatives across the family. As a result, the compositional analysis of Mushunguli locatives presented below provides a starting point for analyses of locative morphemes in other Bantu languages.\(^3\)

The analysis provides a starting point for analyses of pov-sensitive spatial expressions in unrelated languages as well. Following Herskovits (1986), spatial expressions such as in or near (and Mushunguli ha- and ku-), which relate the location of the Figure to that of the Ground in non-directional terms, are known as topological expressions. Only a few potentially pov-sensitive topological expressions have been described in the literature (Hyslop 2002; Smith 2004), and the present work is the first formal analysis of such expressions.

2.1 The Simple LCC

In order to focus attention on context-sensitivity, the Mushunguli data used here include examples of locative morphemes in only the construction exemplified in (2) above: the locative copula construction (henceforth, LCC). The remainder of Section 2 consists of a morphemic description of two variants of the LCC. (2a), repeated for convenience, is a typical example of the “simple LCC,” which is described immediately below. The “complex LCC” is discussed in Section 2.2.

\(\text{(2a) Context: A banana and a book are sitting side by side on top of a pedestal. The book is 1-2m from the interlocutors.} \)

\[
i-di-boko \quad di-i \quad ha-a-i-chi-tabu \\
\text{AUG}5-\text{CL}5-\text{banana} \quad \text{AGR}5-\text{LCOP} \quad \text{LOC}_{\text{ha}}-{\text{ASSOC}}-\text{AUG}7-\text{CL}7-\text{book}
\]

‘The banana is near the book.’

\(^3\)For reasons of space, only ha- (the realization of Proto-Bantu pa-) and ku- are considered here. Mu- is not discussed at length in this study, although it is part of the Mushunguli locative paradigm and appears in a few examples.
(2a) includes three words: a subject, a locative copula, and a locative predicate. The subject is \textit{i-di-boko} (\textit{AUG5-CL5-banana}) ‘the banana.’ The subject comprises three morphemes. Its base is the root \textit{-boko} ‘banana.’ The root is prefixed with the class 5 prefix \textit{di-} ‘\textit{CL5}.’ This class marker agrees with the gender of the root and, as in other Bantu languages (Carstens 1997), encodes number—here, singular.4

The morpheme \textit{i-} ‘\textit{AUG5}’ attached to the class marker is the “augment,” “initial vowel,” or “pre-prefix” (unrelated to the augmentative form, despite the name). Across Bantu languages, the augment agrees with the class of the word to which it attaches. In some languages, the augment is associated with definiteness, specificity, or topicality (Bokamba 1971; Givón 1972, 1978; von Staden 1973; Zerbian and Krifka 2008). However, in many Bantu languages the augment is licensed by syntactic or phonological factors, and its presence does not necessarily correlate with definite or specific meanings (de Blois 1970; Hyman and Katamba 1993; Odden 2003; Halpert 2011, 2012). The distribution of the augment and the means for expressing definiteness, specificity, and topicality in Mushunguli have yet to be investigated. As a result, here I model the meaning of the augment as the identity function.

The word following the subject is \textit{di-i} (\textit{AGR5-LCOP}) ‘is.’ Its base is the locative copula root \textit{-i} ‘\textit{LCOP},’ which occurs only in constructions with a locative predicate. This root is prefixed with a class 5 agreement marker, which agrees in gender and number with the subject.

The final word in (2a) is the simple locative predicate \textit{ha-a-i-chi-tabu} (\textit{LOC\textit{ha}-ASSOC\textit{-AUG7-CL7-book}) ‘at the book.’ Like the subject, the simple locative predicate includes a root, a class prefix, and the augment. The prefix \textit{a-} ‘\textit{ASSOC}’ attached to the augment is known as the “associative” or “connective” in the Bantu literature. Across Bantu languages, the associative is used in constructions that denote a relation between the denotations of two nouns, e.g. part-whole and possessive relations (Van de Velde forthcoming). The set of possible relations is similar to the set of relations expressed by the genitive in Indo-European languages, and I follow Bresnan and Mchombo (1995: 211) in equating the associative with the genitive (for more on the range of relations expressed by genitives cross-linguistically, see Partee and Bosrchev 2000; Vikner and Jensen 2002). The final prefix in the simple locative predicate in (2a) is the locative morpheme \textit{ha-}.

Following Givón’s (1972) analysis of ChiBemba, I assume that the morphosyntactic structure of a Mushunguli locative corresponds to its surface realization.5 I do not attempt to resolve the vexed question of the categorical status of locatives and locative predicates. Instead, I follow Haspelmath (2007) in assuming that languages need not have the same syntactic categories and create new category labels as needed, e.g. “LocP” for Mushunguli locative predicates. The constituency structure assumed for the simple locative predicate \textit{ha-a-i-chi-tabu} ‘at the book’ is given in (4).

\begin{equation}
\text{ha-a-i-chi-tabu} \text{ ‘at the book’} = \left[\text{LocP} \text{ ha-\textit{Loc}} [\text{a-\textit{Gen}} \text{ [\text{NP} \text{i-chi-tabu}]]} \right]
\end{equation}

4Thanks to Mark Van de Velde (p.c.) for pointing out that in general the data are actually more complex. In many Bantu languages, a given root combines with class morphemes of different classes to yield words with different, though often related, meanings (e.g. ‘tree’ and ‘branch’). Accounting for this kind of data would overly complicate the analysis presented here, so for now I assume that such cases involve two distinct and homophonous roots. This assumption makes it possible to preserve the simpler picture in which gender is a feature of the root with which the class morpheme agrees.

5There is considerable debate about the internal morphosyntax and categorical status of Bantu locatives and locative predicates (see references listed above). Using the Mushunguli data to inform this debate is beyond the scope of this paper. In addition, the fact that the associative occurs within a simple locative phrase in Mushunguli differentiates it from most of the languages for which extensive morphosyntactic analyses have been given (e.g. Chichewa: Bresnan and Kanerva 1989; Bresnan and Mchombo 1995; Carstens 1997).
2.2 The Complex LCC

The term “complex LCC” is adapted from Givón’s (1972: 34-5) description of the equivalent construction in ChiBemba. (5) is an example. (5) includes the same context, subject, locative copula, and simple locative predicate as (2a). The difference between is that (5) includes an additional word: *ha-nkhandha* (LOC$_{ha}$-side) ‘at the side of.’
i-di-boko  di-i  ha-nkhanda  ha-a-i-chi-tabu
AUG5-CL5-banana  AGR5-LCOP  LOC\(h_a\)-side  LOC\(h_a\)-ASSOC-AUG7-CL7-book
‘The banana is beside the book.’

**Ha-nkhanda** ‘at the side of’ consists of the locative morpheme *ha-* and the locative root *-nkanda* ‘side.’ I call words such as *ha-nkhanda* “locative relators,” reflecting the fact that they relate two locations to each other (syntactic category LocRel in (7) below). Typically, locative relators are unacceptable unless followed by a locative predicate specifying one of those two locations. This unacceptability is illustrated in (6).

Hypothetical context: The interlocutors have been watching a bird. It has landed to the side of one of them. The other interlocutor has lost track of the bird’s location and asks *Di kuhi ididege?* (‘Where is the bird?’). The speaker responds:

*di-i  ha-nkhanda  AGR5-LCOP  LOC\(h_a\)-side

Intended meaning: ‘It [the bird] is to the side.’

(6) can be made acceptable in the context given by the addition of a simple locative predicate to form a complex LCC, as in (5). Such a locative predicate would encode information about the Ground and therefore clarify what individual the bird is to the side of, as *ha-a-i-chi-tabu* ‘at the book’ does in (5).

A locative relator combined with a simple locative predicate constitutes a complex locative predicate. A complex locative predicate specifies the location of the Figure relative to the location of the Ground more precisely than a simple locative predicate alone. For example, (5) is acceptable if the banana is on or near a side of the book, but not if it is sitting on top of and near the center of the book. A simple LCC with *ha-* , on the other hand, is acceptable in both cases. The morphosyntactic structure of a complex locative predicate is given below:

\[
\text{ha-nkhanda  ha-a-i-chi-tabu  ‘at the side of the book’ =  } \\
[\text{LocP}  [\text{LocRel}  \text{ha-loc  -nkanda}  ]  [\text{LocP}  \text{ha-loc}  [\text{a-gen}  [\text{NP}  \text{i-chi-tabu}  ]]]]
\]

3 **The the meaning of Mushunguli *ha-*

In this section, I analyze context sensitivity in the meaning of *ha-* . The data show that *ha-* encodes proximity between the Ground and a reference location, which is a salient location entailed to exist by the discourse context.

Before analyzing the context-sensitivity of *ha-* in Section 3.2, in Section 3.1 I consider the relation between the Figure and the Ground encoded in the meaning of *ha-* . Understanding that relation allows for distinguishing examples that are unacceptable due to the configuration of the Figure and the Ground from those that are unacceptable for reasons having to do with the reference location.

3.1 **Ha- and the Figure-Ground relation**

(2a) above shows that a simple LCC with *ha-* is acceptable in a context in which the Figure is proximal to the Ground. (8) demonstrates that a simple LCC with *ha-* is unacceptable if the Figure is distant from the Ground.\(^6\)

\(^6\)In (8), as in many examples that follow, the subject is not overtly realized, but that does not contribute to the unacceptability of the utterance (c.f. 9).
(8) **Context:** An onion and a cloth napkin are on the ground about 10m apart. The interlocutors are standing 1-2m from the napkin.

\#chi-i \ ha-a-i-ny-guwo
AGR9-LCOP LOC_{ha} \ ASSOC-AUG9-CL9-cloth

Intended meaning: ‘It [the onion] is far from the cloth.’

In (8), the Figure, an onion, is approximately ten meters from the side of the Ground, a cloth. With the Figure so distant from the Ground, a simple LCC with ha- is unacceptable. Although 10m is a sufficient distance in this case, in general the distance depends, among other things, on the size of the Figure and the Ground. For instance, a simple LCC with ha- is acceptable for describing a tree that is 10m from a building. This kind of dependence on size is cross-linguistically attested (Kracht 2002).

The examples in (9) demonstrate that, in addition to describing a Figure that is merely near the Ground, a simple LCC with ha- can be used to describe the location of a Figure that is on the surface of (9a) or inside (9b) the Ground.7

(9) a. **Context:** A banana is affixed to the trunk of a tree at about shoulder height. The tree is 1-2m from the interlocutors.

\#chi-i \ ha-a-u-mu-ti
AGR5-LCOP LOC_{ha} \ ASSOC-AUG3-CL3-tree

‘It [the banana] is on the tree.’

b. **Context:** A bowl containing a banana is sitting on the ground. The bowl is 1-2m from the interlocutors.

\#chi-i \ ha-a-i-di-bakuli
AGR5-LCOP LOC_{ha} \ ASSOC-AUG5-CL5-bowl

‘It [the banana] is in the bowl.’

In (9a), a simple LCC with ha- is used to describe a banana attached to the side of a tree. In (9b), the same construction is used to describe a banana contained by a bowl. The Figure-Ground relations described in (2a) and these examples are depicted graphically in Figure 2.

Figure 2: Figure-Ground relations compatible with the meaning of ha-

(2a), (8), and (9) provide evidence that the meaning of ha- is compatible with any relation between the Figure and the Ground, provided that the two are not distant from one another. This meaning is similar to the meanings of English near and at, at least in terms of entailments.

In light of the argument to be made below, it is important to observe that in the contexts in (9), the Ground is proximal to the interlocutors. As with (2a), in minimally different contexts in which the Ground is distant from the interlocutors, the examples in (9) are unacceptable.

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7Given literally, English translations of the examples in (9) would actually be less specific than the translations provided here. For example, (9b) is more literally translated as ‘The banana is at the bowl.’ Because such translations with at sound unnatural in English, I opt for the more specific versions, as is common practice in the Bantu literature.
Like simple LCCs with *ha-* complex LCCs with *ha-* are acceptable when the Figure is near, attached to the surface of, or contained by the Ground. Nearness is exemplified by the complex LCC in (5) above. The second two relations are exemplified in (10).

(10)  

a. **Context:** A banana is affixed to the trunk of a tree at about shoulder height. *The interlocutors stand 1-2m from the side of the tree to which the banana is attached.*

\[
\text{di-i} \quad \text{ha-nkhandla} \quad \text{ha-a-u-mu-ti} \\
\text{AGR3-LCOP LOC}_{ha}\text{-side} \quad \text{LOC}_{ha}\text{-ASSOC-AUG3-CL3-tree} \\
\text{‘It [the banana] is on the side of the tree.’}
\]

b. **Context:** A few white beans are sitting in a bowl, pushed toward one side of the bowl. *The interlocutors are sitting at the table.*

\[
\text{i-i} \quad \text{ha-nkhandla} \quad \text{mu-a-i-di-bakuli} \\
\text{AGR6-LCOP LOC}_{ha}\text{-side} \quad \text{LOC}_{mu}\text{-ASSOC-AUG5-CL5-bowl} \\
\text{‘They [the beans] are inside at the side of the bowl.’}
\]

In (10a), the Figure, a banana, is attached to the side of the Ground, a tree. A complex LCC with the locative relator *ha-nkhandla* ‘at the side of’ is acceptable. In (10b), the figure is a handful of beans contained by the Ground, a bowl. The beans are located near one side of the bowl rather than in the center. The locative relator *ha-nkhandla* ‘at the side of’ is acceptable in this case as well.\(^8\) These data suggest that part of the meaning of *ha-nkhandla* ‘at the side of’ is to encode proximity between the Figure and a side of the Ground. This characterization fits with the idea that *ha-* encodes proximity between its argument and the Figure. When the meaning of *ha-* composes with the meaning of *-nkhandla* ‘side,’ the side of the Ground rather than the entire Ground is the argument to which the Figure is proximal.

Importantly for the upcoming discussion of context-sensitivity, (5) and (10a), which include simple locative predicates with *ha-* are unacceptable in minimally different contexts in which the Ground is 25-30m away from the interlocutors.

### 3.2 The reference location argument of the meaning of *ha-*

In this section, I demonstrate that the meaning of *ha-* encodes proximity between the argument of *ha-* and a contextually salient reference location.

All of the examples in Section 3.1 with simple locative predicates with *ha-* (2a, 5, 9, and 10a) are acceptable in contexts in which the Ground is proximal to the location of both interlocutors and unacceptable in minimally different contexts in which it is not. (11) shows that using *ha-* does not simply encode proximity to the speaker. In (11), the Ground, a cloth, is proximal to the addressee but distant from the speaker, as depicted in Figure 3.

(11) **Context:** An onion is sitting on top of a cloth napkin which is itself spread out on the ground. *The addressee is 1-2m from the cloth. The speaker is approximately 30m from the cloth.*

\[
\text{chi-i} \quad \text{ha-a-i-ny-guwo} \\
\text{AGR7-LCOP LOC}_{ha}\text{-ASSOC-AUG9-CL9-cloth} \\
\text{‘It [the onion] is on the cloth.’}
\]

\(^8\)The second locative morpheme in (10b) is *mu-* rather than *ha-* due to the containment relation between the Figure and the Ground. The meaning of *ha-* is compatible with containment, as demonstrated in (9b). However, like *near* in English, *ha-* is not typically used to describe containment of the Figure by the Ground. Instead, *mu-* is used in such situations (Author 2012). The choice between *mu-* and *ha-* appears to be similar in some respects to the choice between *near* and *in* or *on* in English.
(11) is also acceptable if the positions of the speaker and addressee are exchanged, so that the cloth is proximal to the speaker and distant from the addressee. Proximity to either the addressee or the speaker is sufficient.

A simple LCC with ha- can also be used acceptably even when the Ground is distant from both interlocutors but proximal to another individual. In (12), a simple LCC with ha- is embedded under a verb of saying. The Ground, a forest, is proximal to the location of the matrix subject, but not to that of the interlocutors.

(12) Hypothetical context: The speaker has a cow and did not tie it down, so the cow is just wandering around. The speaker and his wife are at their home, which is not near the forest, and do not know where the cow is. Hasani calls the speaker on the phone from the forest and tells him that the cow is at the forest. The speaker’s wife then asks the speaker where the cow is. The speaker responds:

Hasani kaga i-i ha-i-ny-bago
Hasani says AGR<sub>9</sub>-LCOP LOC<sub>ha-</sub>-ASSOC-AUG<sub>9</sub>-CL<sub>9</sub>-forest

‘Hasani says it [the cow] is at the forest.’

In a minimally different context in which Hasani goes in person to the speaker’s house to report the location of the cow, (12) is not acceptable. Thus in (12), it is proximity to Hasani’s location that satisfies the proximity requirement associated with ha-.

The examples presented so far have shown that a simple locative predicate with ha- can encode proximity to the location of the speaker, the location of the addressee, or the location of an attitude holder mentioned in the discourse. (13) demonstrates that a simple locative predicate with ha- can also encode proximity to an overtly mentioned location. In (13) two locative predicates, ku-a-u-mu-ti ‘at the tree’ and ha-nkhanda ha-a-i-di-hanshi ‘at the side of the paper’ are predicated of the same Figure.

(13) Context: A paper and a banana are affixed side by side to the trunk of a large tree. Hypothetical context: The interlocutors have gone far enough away that they cannot see the tree.

i-di-boko di-i ku-a-u-mu-ti ha-nkhanda
AUG<sub>5</sub>-CL<sub>5</sub>-banana AGR<sub>5</sub>-LCOP LOC<sub>ku-</sub>-ASSOC-AUG<sub>3</sub>-CL<sub>3</sub>-tree LOC<sub>ha-</sub>-side
ha-a-i-di-hanshi
LOC<sub>ha-</sub>ASSOC-AUG<sub>5</sub>-CL<sub>5</sub>-paper

‘The banana is on the tree, at the side of the paper.’

The two locative predicates n (13) are interpreted intersectively, just as they are in the English translation. Ku-a-u-mu-ti ‘at the tree’ encodes that the banana is at or on a tree that is itself distant from the interlocutors. Ha-nkhanda ha-a-i-di-hanshi ‘at the side of the paper’
encodes that the Figure is near a different Ground, a piece of paper. *Ha-nkhanda ha-a-i-di-hanshi* ‘at the side of the paper’ is acceptable even though the paper is not proximal to the speaker, the addressee, or the subject of an attitude verb or verb of saying. Instead of encoding proximity to the location of one of those individuals, *ha-a-i-di-hanshi* ‘at the paper,’ encodes proximity to the location of the tree, which is salient in the discourse due to being mentioned overtly in the first locative predicate. A minimal variant of (13) without *ku-a-u-mu-ti* ‘at the tree’ is unacceptable in the context given.

(14) confirms that the meaning of *ha-* can encode proximity to a location mentioned in the utterance rather than the location of a discourse participant or other attitude holder. (14) includes a complex locative predicate with the locative relator *ha-nkhanda* ‘at the side of’ and the simple locative predicate *ku-a-u-mu-ti* ‘at the tree.’ In the context in (14), the Ground, a tree, is distant from the interlocutors.

(14) **Context:** An cloth is on the ground a few centimeters from a tree. The speaker and the addressee are standing 30-35m from the side of the tree opposite the cloth.

i-i ha-nkhanda ku-a-u-m-ti
AGR9-LCOP LOC<sub>ha</sub>-side LOC<sub>ku</sub>-ASSOC-AUG3-CL3-tree

‘It [the cloth] is beside the tree.’

In (14), as in (13), interpreting *ku-a-u-mu-ti* ‘at the tree’ makes the location of the tree, which is distant from the interlocutors, salient. As a result, it is the reference location required by the meaning of *ha-* in *ha-nkhanda* ‘at the side of.’

The data in this section yield the generalization that LCCs with *ha-* are acceptable in contexts in which the argument of *ha-* is proximal to some contextually salient location. That location may be the location of the speaker, the addressee, or another individual, or it may be a location mentioned overtly in the discourse.

The idea that the meaning of an expression can involve a location as an implicit argument is not new. Partee (1989) and Condoravdi and Gawron (1996) investigate a range of open class expressions with anaphorically interpreted implicit arguments, some of which are locations. A much discussed example is *local*, exemplified in (15).

(15) Bill watched the game at a local bar.

(15) asserts that Bill watched the game at a bar, and encodes that the bar is proximal to some other location. It may be the location of the speaker, Bill’s location, or some previously discussed location, depending on the context. The location can be called the reference location, following Partee (1989) and on analogy to Reichenbach’s (1947) reference time. Mitchell (1986) argues that, in the case of *local*, the reference location often is the location of the POVs adopted by the speaker. However, both Partee (1989) and Condoravdi and Gawron (1996) present examples which show that while the reference location may be the location of a POV, it need not be. For instance, consider the following example, in which the reference location of *local* is anaphorically interpreted as the location introduced by the NP the university district: *The university district has many places to eat, and local bars and restaurants often have daily specials.* Partee (1989) and Condoravdi and Gawron (1996) provide analyses in which reference locations are anaphorically interpreted. I follow them in this assumption, and analyze the reference location of *ha-* as an anaphorically interpreted implicit argument.
3.3 Modeling the meaning of ha-

The data in Sections 3.1 and 3.2 show that to model the meaning of ha-, all that is needed is to define two proximity relations. The first encodes proximity between the Figure and the Ground. The second encodes proximity between the Ground and the reference location. Before these relations are defined, the semantic framework is introduced in Section 3.3.1. The translation of ha- is developed in the following section.

3.3.1 Theoretical preliminaries

To model the meanings of ha- and ku-, I adopt the semantics developed by Kracht (2002, 2008), with minor changes, most of which are either simplifications or notational variations. Two particular simplifications are worth noting. First, the temporal arguments of spatial predicates are not included. In the general case, these arguments are necessary due to examples in which either the Figure, the Ground, or both are in motion. In all of the examples used here, the Figure and Ground are stationary. Second, rather than adopting the continuous truth degrees proposed by Kracht (2002) and represented by the interval of real numbers [0,1], I assume the more standard binary truth values: \{0,1\}. To handle the fact that judgments in borderline cases are difficult and often inconsistent, I assume that spatial expressions are vague predicates, and that whatever theory of vagueness is adopted will extended to them as well.

In addition to the standard types e for individuals and t for truth values, I assume types p and ν for space-points and real numbers, respectively. The extension of p, the set of points, is defined as a topological space, specifically a Euclidean metric space. Regions (type r) are defined as path-connected sets of points (for details, see Appendix 1).

The fact that the extension of p is a Euclidean metric space entails that it includes a distance metric, which returns the distance between any two points and which I label dist(p,p,ν). From this it is easy to define a function d(r,r,ν), that returns the distance between two regions (Kracht 2002: 188) and a diameter function δ(r,ν) that returns the diameter of a region (Kracht 2002: 189). The nearness relation, n(r,r,ν), is defined such that two regions, s and t are near each other if d(s,t) is suitably small in relation to δ(s) and δ(t) (Kracht 2002: 189).

To relate entities to the regions in space that they occupy, I introduce the loc(e,r) function, adapted from similar functions in the work of Wunderlich (1991), Zwarts and Winter (2000), and Kracht (2002, 2008). This function takes an individual as its argument and returns the region in space occupied by that individual.

3.3.2 The meaning of ha-

The meaning of a simple LCC with ha- is the result of composing the meanings of the subject, locative copula, and simple locative predicate. As a concrete example, consider again the simple LCC in (2a): i-di-boko di-i ha-a-i-chi-tabu ‘AUG5-CL5-banana AGR5-LCOP LOChaha-ASSOC-AUG7-CL7-book; The banana is near the book.’ (2a) asserts that the Figure, a banana, is near the

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9 Thanks to Marcus Kracht (p.c.) and an anonymous Journal of Semantics reviewer for insisting that it should be possible to account for the Mushunguli data without significantly altering the semantic ontology, a move that I considered in a previous draft.

10 Gambarotto and Muller (2003) demonstrate that many spatial relations can be defined using regions as the only spatial type. Thus one question that arises is why points are considered basic and regions defined as sets of points. Zwarts and Winter (2000), Zwarts (2005), and Kracht (2008) argue convincingly that in order to represent the meanings of a variety of directional expressions, it is necessary to have either points or vectors as an additional basic type. Nothing hinges on which of the two is considered basic, because each can be defined in terms of the other. Introducing the basic type p is thus independently motivated, but for reasons that cannot be investigated further here. In this case, I introduce points because using them to define relations between regions is more intuitive than using e.g. Gambarotto and Muller’s system.
Ground, a book. It also asserts that the Ground is proximal to an anaphorically interpreted reference location.

Informally, the composition of (2a) proceeds as follows. The simple locative predicate *ha-a-i-chi-tabu* ‘at the book’ defines a set of regions that stand in a particular relation to the Ground, the book. As a set of regions, the meaning of the locative predicate is thus a property that ranges over regions. The function of the locative copula *di* ‘is’ is to predicate this property of the region occupied by the Figure, which is denoted by the subject *i-di-boko* ‘the banana.’ The result of this composition, the translation of (2a), is given in (16). Readers interested in the formal details of the composition are referred to Appendix 2, where the composition of both simple and complex LCCs is fully specified.

(16) Translation of (2a): *i-di-boko di-i ha-a-i-chi-tabu* ‘The banana is at the book.’

\[ n(\text{loc}(i.x. \text{book'}(x)), \text{loc}(i.y. \text{banana'}(y))) \land d(a_r, \text{loc}(i.x. \text{book'}(x))) \leq c, \]

where *a* is the contextually given reference location, *c* is a contextually given standard of proximity and \( \leq \) is the standard order on the real numbers.

The first clause of (16) asserts that the nearness relation *n* holds of the location of the Ground, the book, and the location of the Figure, the banana. The second clause asserts that the distance between the Ground and the anaphorically interpreted reference location *a* is less than or equal to some standard, *c*. Thus, the bowl is proximal to the reference location, where proximity is defined in terms of *c*.

Proximity to the reference location is represented using the proximity measure *c*, rather than with the nearness function *n*, because it is defined differently than ordinary nearness between regions. In most contexts, a simple locative predicate with *ha-* is acceptable until the interlocutors are 25-30m from the Ground. By contrast, in most of those contexts a Figure that is even 10m from the Ground cannot be described using a simple locative predicate with *ha-* (see example 8). Thus proximity between the Ground and the Figure and proximity between the Ground and the reference location are not equivalent notions, so they are represented differently in (17). The reference location itself is represented as a free variable because it is interpreted anaphorically.

The meaning of *ha-* used in the derivation of (16) is given in (17). It takes an individual, *x*, as its argument and returns a set of regions, *s*, that are proximal to that individual.

(17) *ha-* ‘LOC\(_{ha}\) := \( \lambda x_r. \lambda s_r. n(\text{loc}(x), s) \land d(a_r, \text{loc}(x)) \leq c, \)

(17) provides a translation of *ha-* that accounts for its meaning in simple LCCs with *ha-. However, in a complex LCC *ha-* combines with a locative root to form a locative relator. Thus, in order to account for complex LCCs such as those in (5) and (10), it is necessary to model the meanings of locative roots, such as -nkhanda ‘side.’

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11 For arguments that the meanings of spatial expressions must be sets of regions rather than merely regions, see (Kracht 2002: 190).
12 In the absence of a study of nominal reference in Mushunguli, in the translations of the examples included here and the semantics that follow, I make the simplifying assumption that NPs with the augment are interpreted in the same way as English definites. That is to say, I assume that for each such NP there is a familiar, unique discourse referent that serves as that NP’s antecedent (Roberts 2003). As far as I can tell, this assumption accurately reflects the discourse conditions under which the examples were elicited. The assumption simplifies the representations involved in the analysis, but makes no difference to the semantics, which would work for indefinites as well.
13 This difference has implications for a conversational implicature associated with the use of *ku-. See Section 4.2.5.
14 For ease of exposition, I assume that *ha-* and *ku-* take individuals as their first argument. The facts are actually slightly more complicated than that due to the presence of the associative morpheme *a- ‘ASSOC’ in locative predicates. See Appendix 2 for details.
A locative root is analyzed as a functor that takes a locative morpheme as its first argument and the required locative predicate described in Section 2.2 as its second argument. The second argument is necessarily encoded in the meaning of the root, because nothing in the semantics of locative morphemes such as ha- requires it. Given these assumptions, the type of locative roots is \( \langle \langle e, \langle r,t \rangle \rangle, \langle \langle r,t \rangle \rangle \rangle \). The first argument, call it \( R_{\langle e, \langle r,t \rangle \rangle} \), represents the meaning of the locative morpheme (i.e. ha- or ku-) that combines with the root to form the locative relator. The second argument, call it \( P_{\langle r,t \rangle} \), is the meaning of the required locative predicate. The result of composing a locative root with its two arguments denotes the set of regions that are proximal to the part of the Ground included in the meaning of the locative root. As a prototypical example, the translation of -nkhanda ‘side’ is given in (18).

(18) \(-nkhanda \ ‘side’ := \lambda R_{\langle e, \langle r,t \rangle \rangle}. \lambda P_{\langle r,t \rangle}. \lambda t. \exists z_{e}. \text{side}’(b, z) \wedge R(z, t) \wedge P(t)\), where \( b \), the entity of which \( z \) is a side, is interpreted anaphorically.

As shown in (18) the use of an LCC with -nkhanda ‘side’ asserts the existence of an entity \( z \). \( z \) is asserted to be the side of some entity in the context, \( b \). \( b \) is represented as a free variable in (18) because I follow Nakamura and Mori (2004) and assume that, for at least some relational terms with meanings like ‘side,’ the “possessor” argument is interpreted anaphorically. In most cases, the antecedent is the Ground entity denoted as part of the meaning of the second argument of the locative root. This relationship accounts for the requirement of the simple locative predicate. Without it, the addressee cannot resolve the anaphora. The intended Ground is unclear, as illustrated in (6) above.

This analysis predicts that it should be possible to elide the second argument of the locative relator when a contextually salient individual is the antecedent for the Ground argument (Partee 1989; Condoravdi and Gawron 1996). (19) constitutes such a case. Like (6), (19) presents a locative relator without a locative predicate. However, in (19) the context is minimally different in that the speaker points to the bird. In both cases, the speaker is attempting to communicate that the Figure, a bird, is beside him, and thus that he himself is the Ground. In (19) but not in (6), pointing makes the speaker’s status clear.

(19) Hypothetical context: The interlocutors have been watching a bird. It has landed to the side of one of them. The other interlocutor has lost track of the bird’s location and asks Di kuhi ididege? (‘Where is the bird?’). The speaker points to the bird at his side and responds:

di-i \( \begin{array}{c}
ha-nkhanda \\
AGR_{5-LCOP} \ LOC_{ha} \ • \ \text{side}
\end{array} \)

Intended meaning: ‘It [the bird] is to the side.’

In (19), the demonstration makes it possible for the addressee to recover the intended Ground, the speaker. The expression referring to the Ground can be elided because the Ground is made familiar and salient in another way.

Returning to the explication of (18), the second clause of the translation of -nkhanda applies its first argument, the meaning of the locative morpheme, to \( z \) and \( t \). This yields the set of all regions \( t \) such that \( t \) and the location of \( z \) are in the relation encoded in the meaning of the locative morpheme. Since \( n \) is the relation encoded by ha-, composing ha- and -nkhanda ‘side’ yields a set of regions that stand in the \( n \) relation to a given side of the Ground.

The final clause of (18) applies the second argument of -nkhanda ‘side,’ \( P_{\langle r,t \rangle} \), to \( t \) as well. \( P \) is the meaning of the simple locative predicate selected for by -nkhanda ‘side.’ The result of composing the meaning of ha- in (17), the meaning of -nkhanda ‘side’ in (18), and a simple locative predicate ha-a-i-chi-tabu ‘at the book’ is given in (20).
The denotation of (20) is the set of all regions, \( t \), that are proximal to the location of a side of the book (\( \text{loc}(z) \)) and proximal to the location of the book itself (\( \text{loc}(\text{book}'(x)) \)) as well. This is exactly the desired result, although the second predication seems superfluous. In fact, in terms of the Figure-Ground relation, that predication is superfluous, because any region that is near a side of the book is necessarily near the book itself.

However, the impact of predicating the simple locative predicate, \( P \), of \( t \) is seen in the final conjunct: \( d(a'_r, \text{loc}(\text{book}'(x))) \leq c \). This conjunct asserts that the location of the Ground is proximal to \( a'_r \), a reference location. In many cases, \( a \) is the location of the POV adopted by the speaker, though it may also be an overtly mentioned location, as in (13). Similarly, the third conjunct, \( d(a'_r, \text{loc}(z)) \leq c \), encodes proximity between the location of the side, \( \text{loc}(z) \) and \( a'_r \), a possibly different reference location. A question that remains to be answered is whether \( a'_r \) must be the same location as \( a \), or may be the location of the Ground, resulting in two distinct reference locations in the same utterance. In Author (to appear a) I tentatively conclude that the reference locations may be different, but more evidence is needed to resolve the issue completely. Nothing here hinges on this, however. The translation in (20) correctly predicts the truth conditions of complex LCCs with \( ha- \). The region occupied by the Figure, \( t \), is proximal to a side of the Ground, and the Ground is proximal to the reference location, here the location of the interlocutors.

Before summarizing the results of this section, it is useful to describe a correct prediction made by the current analysis. The second argument of a locative root is a predicate of type \( \langle r, t \rangle \). This argument is typically a simple locative predicate. However, complex locative predicates are also of type \( \langle r, t \rangle \), as demonstrated in (20). Thus, the analysis predicts that locative relators can take complex locative predicates as arguments. This prediction is correct, as illustrated in (21).

(21)  Context: An onion is sitting on the rear bumper of a car. The interlocutors are 1-2 m away from the car.

Chi-i ku-nyuma mu-langa mu-a-i-di-gari
AGR7-LCOP LOC\(_{\text{ku}}\)-back LOC\(_{\text{mu}}\)-surface LOC\(_{\text{mu}}\)-ASSOC-AUG5-CL\(_5\)-car

‘It [the onion] is on the back of the car.’

In (21), the locative relator \( ku-\text{nyuma} \) ‘behind’ takes the bold faced complex locative predicate \( mu-langa \ mu-a-i-di-gari \) ‘on the car’ as its argument.

3.4 Summary of Section 3

On the analysis presented here, \( ha- \) represents a new class of topological spatial expressions with similarities to two attested types of expressions. First, the meaning of \( ha- \) is similar to the meaning of \( near \) and other topological spatial expressions in that it encodes a non-directional relation between overtly realized Figure and Ground arguments. Second, the meaning of \( ha- \) is similar to the meaning of \( local \) in that it encodes proximity between its argument and a reference location. This combination of both meanings in a single morpheme is otherwise unattested, making \( ha- \) unique among spatial expressions described in the literature. The data in this section make it clear that the implicit argument of \( ha- \) is a reference location, not an individual or a POV. However, the location of the interlocutors or that of the POV adopted by the speaker often serves as the reference location argument of \( ha- \).
4 The meaning of *ku-* and povs as arguments

This section demonstrates that the meaning of *ku-* is similar to that of *ha-* in that it also takes an anaphorically interpreted argument. However, *ku-* differs from *ha-* in that its implicit argument is the pov adopted by the speaker, rather than a salient location.

As with the meaning of *ha-*, it is useful to consider the two aspects of the meaning of *ku-* somewhat separately. Section 4.1 demonstrates that *ku-* encodes the same Figure-Ground relation as *ha-*: proximity. The pov-sensitivity of *ku-* is considered in Section 4.2.

4.1 The meaning of *ku-* and the Figure-Ground relation

Example (2b), repeated here for convenience, demonstrates that a simple LCC with *ku-* is acceptable in a context in which the Figure is proximal to the Ground. When the Figure is distant from the Ground, a simple LCC with *ku-* cannot be used to specify the Figure’s location. This is illustrated in (22).

(2b) Context: A banana and a book are sitting side by side on top of a pedestal. The book is 25-30m from the interlocutors. The banana is near the book.

\text{i-di-boko di-i ku-a-i-chi-tabu}  
\text{AUG5-CL5-banana AGR5-LCOP LOC_{ku}^*ASSOC*AUG7-CL7-book}  

‘The banana is near the book.’

(22) Context: An onion and a cloth napkin are on the ground about 10m apart. The interlocutors are standing 25-30m from the napkin in the opposite direction from the onion.

\text{#chi-i ku-a-i-ny-guwo}  
\text{AGR7-LCOP LOC_{ku}^*ASSOC*AUG9-CL9-cloth}  

Intended meaning: ‘It [the onion] is far from the cloth.’

In (22), the Figure, an onion, is about 10m from the Ground, a cloth, and a simple LCC with *ku-* is unacceptable. As with the meaning of *ha-*, the exact distance involved depends on contextual factors such as the size of the Figure and Ground.

Like simple LCCs with *ha-*, simple LCCs with *ku-* are also acceptable when the Figure is on the surface of the Ground or contained by it. The examples in (23) demonstrate.

(23) a. Context: A banana is affixed to the trunk of a tree at about shoulder height. The tree is 25-30m from the interlocutors.

\text{di-i ku-a-u-mu-ti}  
\text{AGR5-LCOP LOC_{ku}^*ASSOC*AUG3-CL3-tree}  

‘It [the banana] on at the tree.’

b. Context: A bowl containing a banana is sitting on the ground. The bowl is 25-30m from the interlocutors.

\text{di-i ku-a-i-di-bakuli}  
\text{AGR5-LCOP LOC_{ku}^*ASSOC*AUG5-CL5-bowl}  

‘It [the banana] is in the bowl.’

The examples in (2b) and (23) demonstrate that the range of Figure-Ground configurations that can be described using a simple LCC with *ha-*—proximity, surface contact, and containment—can also be described using a simple LCC with *ku-.* The same Figure-Ground relation is encoded
by both locative morphemes. Given the discussion of pov-sensitivity to follow, it is important to observe that in (2b) and the examples in (23) the Ground is 25-30m from the interlocutors. In minimally different contexts in which the Ground is 1-2m from the interlocutors, the examples are unacceptable.

Like simple LCCs with ku-, complex LCCs with locative relators with ku- are acceptable when the Figure is near, on, or in the Ground. Like locative relators with ha-, locative relators with ku- are used in cases in which the Figure is proximal to the particular part of the Ground encoded in the meaning of the locative stem. As in the examples above, here the locative stem is -nkhanda ‘side.’

(24) a. Context: A banana and a book are sitting side by side on top of a pedestal. The book is 25-30m from the interlocutors.
   di-i  ku-nkhanda ku-a-i-chi-tabu
   AGR$_5$-LCOP LOC$_{ku}$-side LOC$_{ku}$-ASSOC-AUG$_7$-CL$_7$-book
   ‘It [the banana] is beside the book.’

b. Context: A banana is affixed to the trunk of a tree at about shoulder height. The interlocutors stand 25-30m from the side of the tree to which the banana is attached.
   di-i  ku-nkhanda ku-a-u-mu-ti
   AGR$_5$-LCOP LOC$_{ku}$-side LOC$_{ku}$-ASSOC-AUG$_3$-CL$_3$-tree
   ‘It [the banana] is on the side of the tree.’

c. Context: A few white beans are sitting in a bowl on a round table. The interlocutors are sitting at the table at a 90 degree angle to one another. The beans are arranged in the bowl such that they are pushed to the side of the bowl farthest from the speaker.
   ma-yombo i-i  ku-nkhanda mu-a-i-di-bakuli
   CL$_6$-bean AGR$_5$-LCOP LOC$_{ku}$-side LOC$_{mu}$-ASSOC-AUG$_5$-CL$_5$-bowl
   ‘Beans are inside at the side of the bowl.’

In (24a), the Figure, a banana, is sitting a few centimeters to the side of the Ground, a book. In (24b) the banana is attached to the side of the Ground, here a tree. In (24c), the Figure, a handful of beans, is in the Ground, a bowl. These examples confirm that the Figure-Ground relation encoded by ku- is identical to that encoded by ha-. Accordingly, relation is modeled below using the n function, just as the Figure-Ground component of the translation of ha- is modeled in (17).

It is important for the discussion of pov-sensitivity that follows to observe that (24a) and (24b), which include simple locative predicates with ku-, are typically unacceptable in minimally different contexts in which the Ground is 1-2m from the interlocutors, modulo certain discourse-context factors to be described below. By contrast, (24c), with a simple locative predicate with mu-, is acceptable when the Ground is 1-2m from the interlocutors.

4.2 Ku- and the pov adopted by the speaker

The examples in (2b), (23), (24a), and (24b) demonstrate that utterances with simple locative predicates with ku- are acceptable in contexts in which the Ground is distant from the interlocutors. In minimally different contexts in which the Ground is 1-2m from the interlocutors, those examples are unacceptable. In this section, I propose that the distance observed in the acceptable examples represents one way in which a presupposition associated with the use of ku-
is satisfied. The presupposition is that the Figure and the POV adopted by the speaker do not both stand in the same relation to the Ground: the relation encoded by the locative predicate. When this presupposition is satisfied, the POV and the Figure are necessarily separated from one another in some way. Accordingly, I call it the “separation presupposition.” Assuming that the speaker adopts his own POV in the examples in (2b), (23), (24a), and (24b), then the presupposition is satisfied by absolute distance. In those examples, the Figure stands in the n relation to the Ground, as encoded by a simple locative predicate with ku-. The POV, on the other hand, does not stand in the n relation to the Ground. As a result, the two are separated.

In Section 4.2.1, I continue to use examples in which the speaker adopts his own POV in order to focus on the position of the Figure and the Ground. The data presented in that section show that the separation presupposition can be satisfied by other kinds of separation besides absolute distance, for example when the Ground intervenes between the POV and the Figure. Then, in Section 4.2.2, I present evidence that it is in fact the POV adopted by the speaker, and not merely a contextually salient reference location or even the speaker’s actual location that is relevant for defining separation. In Section 4.2.3, evidence that the meaning is presupposed rather than asserted is presented. Section 4.2.4 formalizes the separation presupposition. Section 4.2.5 describes a conversational implicature that arises with the use of ku-, which accounts for some otherwise puzzling data. Section 4.2 as a whole is designed to argue that the implicit argument of ku- is the POV adopted by the speaker. Thus, the ku- data motivate the proposal made above that POVs themselves are anaphorically interpreted arguments of spatial expressions.

## 4.2.1 Separation from the Figure, not merely distance from the Ground

In the examples of simple LCCs with ku- given above, the separation presupposition is satisfied because the POV is distant from both the Figure and the Ground in absolute terms: 25-35m distant. However, (24c) demonstrates that the separation presupposition cannot be defined merely in terms of absolute distance. In (24c), the POV is proximal to the Ground. Nonetheless, the Figure and the POV do not stand in exactly the same relation to the Ground. As shown in Figure 4, the interlocutors are both proximal to some side of the bowl, but not to the same side. The beans are pushed to the side of the bowl farthest from the interlocutors. The examples in (25) show that this difference is critical. Like (24c), they involve Figures and POVs that are located near different sides of the Ground (see the graphic representation in Figure 4).

![Figure 4: Graphic representations of the contexts for (24c) and (25)](image)

<table>
<thead>
<tr>
<th>(24c)</th>
<th>(25a)</th>
<th>(25b)</th>
</tr>
</thead>
</table>

(25) a. *Context: A banana is affixed to the trunk of a tree at about shoulder height. The interlocutors stand 1-2m from the side of the tree opposite that to which the banana is attached.*

\[
\begin{align*}
\text{di-i} & \quad \text{ku-nkhands ha-a-u-mu-ti} \\
\text{AGR5-LCOP LOC}_{\text{ku-}}-\text{side} & \quad \text{LOC}_{\text{ha-}}\text{ASSOC-AUG3-CL3-tree} \\
\text{‘It [the banana] is on the side of the tree.’}
\end{align*}
\]
b. **Context:** A banana and a book are sitting side by side on top of a pedestal. *The book is 1-2m from the interlocutors.*

\begin{align*}
\text{di-i} & \quad \text{ku-nkhanda ha-a-i-chi-tabu} \\
\text{AGR5-LCOP LOC}_{\text{ku}}-\text{side} & \quad \text{LOC}_{\text{ha}}-\text{ASSOC-AUG7-CL}-\text{book}
\end{align*}

‘It [the banana] is beside the book.’

In (25a), the Figure and the POV are proximal to opposite sides of the tree, and the complex locative predicate *ku-nkhanda ha-a-u-mu-ti* ‘at the side of the tree’ is acceptable. The context is represented schematically in Figure 5(a). In this context, both (25a) and a complex LCC with the locative predicate *ha-nkhanda ha-a-u-mu-ti* ‘at the side of the tree’ are acceptable. In contrast, in a context in which the Figure and POV are located at the same side of the tree, as depicted in Figure 5(b), only the complex LCC with *ha-nkhanda ha-a-u-mu-ti* ‘at the side of the tree’ is acceptable. (25a) with *ku-nkhanda* ‘at the side of’ is not. These data show that the locative relator *ku-nkhanda* ‘at the side of’ with *ku-* is the source of the requirement that the Figure and the POV be proximal to different sides of the Ground in (25a).

![Figures 5(a) and 5(b)](image)

Figure 5: Variability in the acceptability of *ha-nkhanda* ‘at the side of’ and *ku-nkhanda* ‘at the side of’ depending on the location of the Figure and the POV

(25b) confirms this generalization. It also demonstrates that being on different sides does not necessarily mean being on opposite sides. (25b) is acceptable with the banana on the right side of the book relative to the POV of the interlocutors. These examples show that the separation presupposition is satisfied as long as the Figure and the POV do not both stand in the particular relation to the Ground encoded by the locative predicate.

**4.2.2 Separation from POV adopted by the speaker, not a reference location or the speaker’s own location**

The evidence in the preceding section might be taken to show that the meaning of *ku-* entails separation from some reference location, not necessarily the location of the POV adopted by the speaker. Likewise, it could be taken to show that the meaning of *ku-* does not involve a POV or reference location at all, but is in fact indexical to the location of the speaker or the utterance location. In this section, I provide evidence that neither of these approaches makes good predictions for the acceptability of LCCs with *ku-*.

**The POV rather than a reference location:** The data in Section 3.2 show that an overtly mentioned location can serve as the reference location for a locative predicate with *ha-*.. For example, in (13), repeated here for convenience, the location of a tree, denoted by *ku-a-u-mu-ti*
‘at the tree,’ is mentioned first, and then followed by the locative predicate ha-nkhand ha-a-i-di-hanshi ‘at the side of the paper.’ Both the location denoted by ku-a-u-mu-ti ‘at the tree’ and that denoted by ha-nkhand ha-a-i-di-hanshi ‘at the side of the paper’ contain the location of the Figure, as depicted in Figure 6.

(13)  
**Context:** A paper and a banana are affixed side by side to the trunk of a large tree.  
**Hypothetical context:** The interlocutors have gone far enough away that they cannot see the tree.

\begin{align*}
\text{i-di-boko} & \quad \text{di-i} & \quad \text{ku-a-u-mu-ti} & \quad \text{ha-nkhand} \\
\text{AUG5-CL5-banana} & \quad \text{AGR5-LCOP} & \quad \text{LOC_{ku}-ASSOC-AUG3-CL3-tree} & \quad \text{LOC_{ha}-side} \\
\text{ha-a-i-di-hanshi} & \quad \text{LOC_{ha}-ASSOC-AUG5-CL5-paper} \\
\end{align*}

‘The banana is on the tree, beside the paper.’

Figure 6: Two spaces containing the Figure in (13)

If locatives with ku- took recently mentioned, salient reference locations as arguments, then an example with two locative predicates with ku- and a similar structure to (13) would be predicted to be unacceptable. Such an example would be unacceptable because the first locative predicate would predicate that the Figure was in a certain region analogous the region near the tree in (13), and the second locative predicate would presuppose that the Figure was not in that region. The two implications would contradict each other. However, such examples are acceptable, as demonstrated in (26). (26) has the same structure as (13), but instead of overtly mentioning a location near a tree it mentions a location in front of the interlocutors.

(26)  
**Context:** The speaker and addressee are standing near a round table, on top of which sit a toy giraffe and a banana. The giraffe is facing the interlocutors, and the banana is located to its (intrinsic) right.

\begin{align*}
\text{di-i} & \quad \text{longozi} & \quad \text{ku-etu} & \quad \text{ku-a-i-m-bigiri} \\
\text{AGR5-LCOP} & \quad \text{in.front.of} & \quad \text{LOC_{ku}-1.pl.poss} & \quad \text{LOC_{ku}-ASSOC-AUG9-CL9-giraffe} \\
\end{align*}

‘It [the banana] is in front of us, near the giraffe.’

In (26), the first locative phrase, longozi ku-etu ‘in front of us’ denotes an area in space that contains the Figure, the banana. If that area were then taken as a reference location argument for ku-a-i-m-bigiri ‘at the giraffe,’ then the utterance would be infelicitous, because the Figure is not separated from that reference location. In fact, that location contains the Figure.
However, in (26) the Figure is separated from the pov adopted by the speaker. The first locative predicate in (26), *longozi ku-etu* ‘in front of us,’ explicitly locates the Figure in a region in front of the pov. Their separation is thus entailed by that locative predicate. As a result, the presupposition of *ku-a-i-m-bigiri* ‘at the giraffe’ is either canceled or locally satisfied. In fact, such cancellation or satisfaction occurs every time a locative predicate that locates the Figure with respect to the location of the pov precedes a locative predicate with *ku-* as illustrated in additional examples in Section 4.2.4.

**The pov rather than the location of the speaker:**  The separation presupposition requires separation between the Figure and the pov adopted by the speaker, not between the Figure and the speaker’s location or utterance location. (27) provides support for this claim. In (27), the speaker is specifying his own location. Therefore the speaker is the Figure. Thus, the two necessarily stand in exactly the relation to the Ground encoded in the locative predicate. Even so, a simple LCC with *ku-* is used.

(27) **Context:** A Lego model includes a house, a field, and two figurines. One figurine, who represents the speaker, is standing in the field. The other figurine, who represents the addressee, is on the opposite side of the house from the field and far away from both. The house and field belong to the speaker. The friend has just arrived and believes the speaker is at home, so he calls out *wi kuhi we?* (‘Where are you?’). The speaker responds:

\[
\text{ni} \quad \text{ku-a-i-ny-nkhonde} \\
1s.lcop \text{LOC}_{ku^{-}}\text{ASSOC}\text{-AUG}_{9}\text{-CL}_{9}\text{-farm}
\]

‘I am at the farm.’

If the meaning of *ku-* encoded separation between the speaker’s location and the Figure, or even the Ground, for that matter, then examples such as (27) would be impossible. In (27), the speaker is identical with the Figure and is in the Ground. Thus, he is separated from neither. On the other hand, if the meaning of *ku-* encodes separation between the pov adopted by the speaker and the Figure, (27) can be accounted for. In (27), the speaker adopts the addressee’s pov in order to help the addressee locate him, and the separation presupposition is satisfied by the separation of the addressee’s pov from the Figure. (28) shows that, in addition to adopting the pov of another sentient individual as in (27), a speaker can also adopt the pov of an oriented object. In (28) the oriented object is a car. Examples such as (28) motivate the abstract conceptualization of a pov argued for in the present proposal.

(28) **Context:** An onion is on the ground the near the intrinsic rear of a car. The speaker and addressee are standing 1-2m beyond the onion, also in the rear of the car.

\[
\text{di-i} \quad \text{ku-nyuma} \quad \text{ha-a-i-di-gari} \\
\text{AGR}_{5}\text{-LCOP} \text{LOC}_{ku^{-}}\text{behind} \text{LOC}_{ha^{-}}\text{ASSOC}\text{-AUG}_{5}\text{-CL}_{5}\text{-car}
\]

‘It [the bag] is behind the car.’

In (28), the povs of the interlocutors do not satisfy the separation presupposition. Rather, they stand in exactly the same relation to the Ground as the Figure does. They are near the back of the car. Even so, the example is felicitous. To account for examples such as (28), it is necessary to develop a more abstract characterization of a pov than simply the location and orientation of an observer.
To develop the more abstract characterization, I take the car’s location and orientation, its center and front axis, respectively, to define a POV. (28) is acceptable because this POV satisfies the separation presupposition triggered by ku-. Unlike the POVs of the interlocutors, this POV does not stand in the same relation to the Ground as the Figure. The POV is inside the car at its center, while the Figure is asserted to be near the back of the car. This separation between the POV and the Figure is illustrated in Figure 7.

Figure 7: A POV defined by the location and orientation of the car satisfies the separation presupposition

Examples such as (28) motivate the formalization of a POV as an ordered pair of a location and an orientation, or front axis (rather than, say, a sentient observer). In Section 5, I show that using this conceptualization of a POV makes better predictions for English spatial expressions as well.

An important question that (28) raises is what makes the POV that is defined in terms of the location and orientation of the car more salient or relevant than those of the interlocutors. Part of the answer is related to the fact that in Mushunguli, unlike in English, the direction involved in the meaning of a spatial expression such as ‘behind’ can be defined in terms of an intrinsic axis of the Ground, it must be. Directions can be defined in terms of the axes of an observer only when the Ground is a non-oriented entity such as a tree rock. Thus a phrase such as ku-nyuma ha-a-i-di-gari ‘behind the car’ does not have two possible readings in Mushunguli, as its English equivalent does. This restriction raises the salience of the vectors involved in defining the coordinate system located at the center of the car.

The answer also has to do with the particular locative relator used in (28): ku-nyuma ‘behind.’ To see the importance of the particular locative relator, consider (29). In (29), the context is identical to that in (28), except that in (29) the Figure is a bag rather than an onion, and the Figure and POV are located at the left side of the car rather than its rear. In (29), the locative relator ku-moso ‘to the left of’ is used, rather than ku-nyuma ‘behind.’

(29) Context: A bag is on the ground the near the intrinsic left side of a car. The speaker and addressee are standing 1-2m beyond the bag, on the same side of the car.

#di-i ku-moso ha-a-i-di-gari
AGR5-LOC LOC_{ku-left} LOC_{ha-ASSOC-AUG5-CL5-car}

‘It [the bag] is to the left of the car.’

(29) is unacceptable, indicating that the POV adopted is that of the speaker or addressee. The POV defined by the car’s location and front axis is apparently not made salient here.

The difference between (28) and (29) is that the interpretation of ku-nyuma ‘behind’ involves the front-back axis of the car, which is the axis used to define a POV. Using an expression such as ku-nyuma ‘behind’ with a meaning involving that axis makes the POV associated with that axis salient. Using an expression such as ku-moso ‘to the left of,’ the interpretation of which involves a different axis, does not.
The examples in this section demonstrate that the meaning of ku- encodes separation between the Figure and the Pov adopted by the speaker. Of course, it is the location of the Pov, and not the Pov itself that is actually used in calculating separation. However, the data here show that only the location of a Pov can be used to satisfy the implication. In this way, the Pov-sensitivity in the meaning of ku- differs from the dependence on a reference location encoded in the meaning of ha-.. The meaning of ha- requires a location, of which the location of a Pov is one possible value. The meaning of ku- requires the location of a Pov. No other location will do.

4.2.3 Presupposed not asserted

In the introduction to Section 4.2, it was claimed that the implication that the Figure and Pov are separated is presupposed rather than asserted. However, all of the evidence presented thus far is compatible with the idea that the separation implication is asserted. On this assumption, all of the examples that are marked as infelicitous would actually be unacceptable due to being false. They would be false because the separation presupposition would be an asserted implication falsified by the context. This approach predicts that the negations of the unacceptable utterances above should be felicitous and true in contexts in which the Figure and Pov stand in the same relation to the Ground.

On the other hand, if separation truly is presupposed, then the negation of an LCC with ku- is predicted to be infelicitous in a context in which the Figure and Pov are not separated. Infelicity is predicted because the separation presupposition projects outside negation and must still be satisfied in the global context. Such projection is one of the standard tests for presuppositions (Chierchia and McConnell-Ginet 1990). To test the predictions of these two analyses, the negation of the unacceptable utterance in (29) is presented in (30). The contexts are identical.

(30) Context: A bag is on the ground near the intrinsic left side of a car. The speaker and addressee are standing 1-2m beyond the bag, on the same side of the car.

\[#ha\ di-i ku-moso ha-a-i-di-gari mali\]
\[NEG\ AGR5-LCOP LOC_{ku-}\text{-left} LOC_{ha-\text{--assoc-aug-cl}5-car} NEG\]

Intended: ‘It [the bag] is not to the left of the car and separate from me.’

In (30), the interlocutors are standing 1-2m from the Figure, a bag, which is near the left side of a car, the Ground. The locative relator ku-moso ‘to the left of’ triggers the presupposition that the Pov is not near the left side of the car. The unacceptability of (30) and other similar examples demonstrates that this presupposition projects outside negation and fails to be satisfied in the context. Thus, (30) shows that the presuppositional analysis of separation is the right choice.

4.2.4 Formalizing the meaning of ku-

The meaning of ku- has two elements: the asserted content and the separation presupposition. The asserted content is simply applying the n function to the location of the argument of ku- and the location of the Figure. The separation presupposition encodes the felicity condition that the Figure and the Pov adopted by the speaker do not stand in the same relation to the argument of ku-. Therefore, it is formalized as the negation of the application of the n function.

---

15 Recently, Tonhauser et al. (2013) have demonstrated that not all projective contents are presuppositional and have developed a typology of projective contents. While I continue calling the separation presupposition a presupposition, the crucial point is that it is not asserted content. Determining whether it is actually presupposed, rather than, say, conventionally implicated, is a subject for future work.
to the location of the argument of \( ku- \) and the location of the \( \text{POV} \). The translation of \( ku- \) is presented in (31).

(31) \( ku- \) ‘LOC’
   a. is felicitous in a context in which \( \neg n(loc(x), loc(\text{POV}_s)) \), where \( x \) is the first argument of \( ku- \) and \( \text{POV}_s \) is the \( \text{POV} \) adopted by the speaker, and
   b. \( ku- := \lambda x_r \lambda s_r n(loc(x), s) \)

Defining the separation presupposition in terms of “the first argument of \( ku- \)” rather than in terms of the Ground itself is crucial, as shown in the discussion of two cases. First, in a simple LCC with \( ku- \), the argument of \( ku- \) is the Ground. Therefore, the simple LCC is felicitous provided the \( \text{POV} \) does not stand in the \( n \) relation to the Ground itself. This condition is represented in (32), where the Ground is assumed to be a tree and the locative predicate is \( ku-a-u-mu-ti \) ‘at the tree.’

(32) \( \neg n(loc(\text{tree'}(x)), loc(\text{POV}_s)) \)

For a simple LCC with \( ku-a-u-mu-ti \) ‘at the tree’ to be felicitous, the \( \text{POV} \) adopted by the speaker must not be proximal to the tree. This condition, and its analogs with the appropriate Grounds, are satisfied in all of the examples of simple LCCs with \( ku- \) above.

In contrast, an LCC with a locative relator with \( ku- \)—for example, (29) and (30) with \( ku-moso \) ‘to the left of’—does not necessarily require the \( \text{POV} \) to be distant from the Ground. Such an example is felicitous in a context in which the \( \text{POV} \) does not stand in the \( n \) relation to the particular part of the Ground encoded in the meaning of the locative relator, even if the \( \text{POV} \) is near the Ground itself. The presupposition that results from the composition of the meanings of \( ku- \) and the locative stem -moso ‘left,’ is presented in (33).

(33) \( \neg n(loc(\text{left-side'}(x, x), \text{car'}(x)), loc(\text{POV}_s)) \), where \( \text{left-side'}(x, x, \text{car'}(x), z) \).\(^{16}\)

In the contexts of (29) and (30), \( loc(\text{POV}_s) \) is near the left side of the car. Therefore, (33) is not satisfied, and the examples are infelicitous.

One obvious question this account raises is how the presuppositions combine in complex locative predicates with two instances of \( ku- \), such as \( ku-moso ku-a-ichitabu \) ‘to the left of the book.’ In (34), complex LCCs with two instances of \( ku- \) are used in contexts in which the Ground is proximal to the \( \text{POV} \) adopted by the speaker.

(34) a. Context: A banana is affixed to the trunk of a tree at about shoulder height. \textit{The banana is on the side opposite the interlocutors, who stand 1-2m from the tree.}

\( \text{di-i } \text{ku-nkhanda ku-a-u-mu-ti} \)
\( \text{AGR}_{5-\text{LCOP}} \text{LOC}_{ku-\text{side}} \text{ LOC}_{ku-\text{ASSOC-Aug3-CL3-tree}} \)

‘It [the banana] is on the side of the tree.’

\(^{16}\)This translation does not appear to involve vectors or frames of reference, raising the question of whether or not the analysis of topological expressions presented here is unified with the analysis of projective spatial expressions to be described below. In fact, the two are unified. I assume that a contextually defined vector is included in the definition of the predicate \( \text{left-side'} \), but I suppress that definition for ease of exposition. Such an assumption is need to account for examples in which \( ku-moso \) ‘to the left of’ and similar expressions are used in the relative frame of reference. In contrast, for languages with spatial expressions used only in the intrinsic frame of reference, it could be the case that those expressions refer directly to particular parts of the Ground, and do not involve vectors. See Heine (1989) for discussion.
b. **Context:** A tomato and a bowl are sitting 4-5cm apart on top of a round table. The interlocutors are sitting at the table. The tomato is beyond the side of the bowl opposite the speaker and to the right of the bowl from the addressee’s perspective.

\[
\text{di-i ku-nyuma ku-a-i-di-bakuli} \\
\text{AGR5-LCOP LOC}_{\text{kun-khanda}} \text{ -back LOC}_{\text{kun-assoc}} \text{-AUG5-CL5-bowl}
\]

‘It [the tomato] is behind the bowl.’

In (34a), the Figure, a banana, is attached to the side of a tree. The pov is located close to the opposite side of the tree. The complex locative predicate \(\text{ku-nkhanda ku-a-u-mu-ti}\) ‘at the side of the tree’ is acceptable. In (34b), the Figure is a tomato, and the Ground is a bowl. The interlocutors are sitting at a round table, on which the tomato and the bowl are placed. The tomato is located on the opposite side of the bowl from the speaker, and the complex locative predicate \(\text{ku-nkhanda ku-a-i-di-bakuli}\) ‘at the side of the bowl’ is acceptable. The examples in (34) are unacceptable if the Figure is on the side of the Ground nearest the speaker, as predicted by the separation presupposition associated with \(\text{ku-nkhanda}\) ‘at the side of.’

The unacceptability of the examples in (34) in contexts in which the Figure and pov are on the same side of the Ground demonstrates that the separation presupposition of the locative relator must be satisfied at the global level in order for these examples to be felicitous. However, their acceptability in the contexts given, in which the Ground is proximal to the pov adopted by the speaker, suggests that the presupposition of the simple locative predicate is either satisfied locally or canceled. This satisfaction or cancellation is similar to that observed in (26) above.

In (26), the separation presupposition associated with \(\text{ku-a-i-m-bigiri}\) ‘at the giraffe’ is satisfied or canceled due to the presence of the locative predicate \(\text{longozi ku-etu}\) ‘in front of us’ which encodes separation between the Figure and the pov. The examples in this section suggest that the presence of a locative relator which presupposes the separation of the Figure and the pov has the same effect. Exactly how this satisfaction works is a subject for future study.

4.2.5 **Ku-**, reference locations, and a scalar implicature

Two potential objections to the current proposal exist. It turns out that both relate to a conversational implicature associated with the use of \(\text{ku-}\). The first problem has to do with the distance between the Ground and the pov required for many acceptable uses of \(\text{ku-}\). In the contexts for the simple LCCs with \(\text{ku-}\) presented above (see e.g. 23), the pov is always 25-35m from the Ground. Furthermore, if that distance is reduced only slightly, say to 15-20m, the examples are unacceptable. This pattern is not predicted, given the definition of the separation presupposition. The separation presupposition is defined in terms of the \(n\) relation, which typically requires much smaller distances. Thus, while a separation of 25-35m is certainly compatible with the separation presupposition, nothing in the way the presupposition is defined requires such a large distance. The presupposition should be satisfied if the pov is 10-15m from the Ground. What accounts for the fact that such large distances are required for acceptability?

Even more puzzling, significant distance from the Ground is sometimes required not only for simple LCCs with \(\text{ku-}\), but also for complex LCCs with \(\text{ku-}\). This is illustrated in (35).

(35) **Context:** A bag is lying 1-2m from the intrinsic left side of a car. The interlocutors are standing 1-2m from the front bumper. This example follows questions involving simple locative predicates with different locative morphemes.

\[
\text{#di-i ku-moso ku-a-i-di-gari} \\
\text{AGR5-LCOP LOC}_{\text{kun-mosoo}} \text{-left LOC}_{\text{kun-assoc}} \text{-AUG5-CL5-car}
\]

Intended meaning: ‘It [the bag] is to the left of the car.’
In (35), the Figure, a bag, is lying on the ground 1-2m from the intrinsic left side of the Ground, a car. The interlocutors are standing 1-2m from the car’s front bumper. A complex LCC with the locative predicate *ku-moso ku-a-i-di-gari* ‘to the left of the car’ is used. Given the discussion of local presupposition satisfaction above, this example is predicted to be acceptable. However, (35) is unacceptable in the context given, in which the Ground is 1-2m from the interlocutors. On the other hand, it is acceptable in a minimally different context in which the Ground is 25-30m from the interlocutors. Both the extreme distance required and the requirement of distance in examples such as (35) lead to a common conclusion: the distance requirement is not simply a function of the separation presupposition. Another element of the meaning of LCCs with *ku-* is generating the requirement of extreme distance.

A critical piece of evidence about this distance requirement comes from a contrast between (35) and (36). (36) shows that the requirement of extreme distance does not arise with the use of a given sentence in every possible discourse context, even when physical conditions are held constant. In the context of (36), the physical positions of the Figure, Ground and interlocutors are identical to their positions in (35). The utterance is identical as well, except that (36) includes two sentences. In the first, the consultant negates a sentence proposed by the researcher, which includes an incorrect locative relator. In the second, he provides exactly the sentence that is rejected in (35) as the correct description of the situation. Thus, the only difference between (35) and (36) is the discourse context in which the examples are uttered. The discourse context differs not only in that (36) includes an additional sentence, but also in terms of the topics under discussion at utterance time. This difference is discussed in more detail below.

(36) **Context:** A bag is lying on the ground 1-2m from the intrinsic left side of a car. The speaker and addressee are standing 1-2m from the front bumper of the car. The researcher asks if it is possible to answer the question Di kuhi idibursa? ‘Where is the bag?’ with Di kulume hedigari ‘It [the bag] is to the right of the car.’

Ha di-i ku-lume ha-a-i-di-gari mali. Di-i *ku-moso*

NEG AGR5-LCOP LOC$_{ku}$-right LOC$_{ha}$-ASSOC-AUG5-CL5-car NEG AGR5-LCOP LOC$_{ku}$-left

$\text{LOC}_{ku}$-ASSOC-AUG5-CL5-car

‘It [the bag] is not to the right of the car. It is to the left of the car.’

The discourse preceding (35) consists of a number of elicitation questions that involve variation in simple locative predicates. This discourse is focused on determining the exact conditions in which particular simple locative predicates can be used. The acceptability of a simple locative predicate depends in part on the distance between the Ground and the POV. As a result, that distance is relevant to the discourse. In the discourse context of (35), the simple locative predicate with *ku-* is unacceptable.

In contrast, (36) follows several questions in which the direction from the Ground to the Figure has been manipulated, and different locative relators have been used. Thus, both the previous elicitation questions and the question provided in the context are focused on locative relators and the directions to which they refer. The distance between the Ground and the POV is not relevant to this topic. In such a context, the simple locative predicate with *ku-* is acceptable despite the proximity of the Ground to the location of the interlocutors.

The fact that the distance requirement arises only when relevant suggests that it is a conversational implicature (see van Kuppevelt 1996). Furthermore, the lexical entries for *ha-* and *ku-* proposed above predict that a scalar implicature requiring distance between the Ground
and the interlocutors is likely to arise with the use of an LCC with ku-. The translations of the asserted content of simple locative predicates with ha- and ku-, given in (37), illustrate how the implicature is calculated.

\begin{align*}
(37) & \quad a. \text{ ha-a-i-di-gari ‘at the car’ } = \lambda s, r_n(loc(i.x.\text{car}^r(x)), s) \land d(a_r, loc(i.x.\text{car}^r(x))) \leq c \\
& \quad b. \text{ ku-a-i-di-gari ‘at the car’ } = \lambda s, r_n(loc(i.x.\text{car}^r(x)), s)
\end{align*}

The meaning of a simple LCC with ha- encodes that the Figure is near the Ground and that the Ground is near the reference location, while the meaning of a simple LCC with ku- encodes merely that the Figure is near the Ground, but says nothing about a reference location. The meanings of minimally different simple LCCs with ha- and ku- differ only by the presence or absence of the second conjunct in (37a). The meanings of the complex LCCs in (35) and (36) differ in exactly this way as well.

The comparison in (37) shows that an asymmetric entailment relation exists between any two utterances that differ only in the choice of a locative morpheme. In a given discourse context, an LCC with ha- asymmetrically entails an otherwise identical LCC with ku-. Due to this entailment relation and the fact that ha- and ku- are members of a closed class of expressions with equivalent distributions, ha- and ku- constitute a Horn scale (Levinson 2000; Geurts 2010, inter alia). Ha- is the stronger term, as represented in (38).

\begin{align*}
(38) & \quad \text{Mushunguli locative Horn scale: } (\text{ha-}, \text{ku-})
\end{align*}

Perhaps the most discussed Horn scale is English \( (\text{all}, \text{some}) \). In that scale, all is the entailing, or stronger term. As is well attested, using some, the weaker term, typically gives rise to the implicature that the speaker could not have used the stronger term because doing so would have resulted in falsity. In the Mushunguli locative Horn scale in (38), ha- is the stronger term, so using ku- implicates that using ha- would have resulted in falsity. The only difference between the two meanings is the clause asserting that the Ground is proximal to the reference location. Therefore, using ku- implicates that this clause is false. If this clause is false, then the Ground is distant from the reference location. In all of the relevant examples above, the reference location is the location of the speaker. In those examples, the scalar implicature arises that the interlocutors are distant from the Ground.

In addition to accounting for variability in whether or not the distance requirement arises, this analysis also accounts for the extreme distance required by the use of ku-. The conjunct in the meaning of ha- that defines proximity to the reference location does so in terms of the contextually supplied constant, \( c \), rather than the nearness relation, \( n \). This constant was introduced specifically to account for the fact that the distance from the Ground to the reference location required to make an LCC with ha- unacceptable is greater than the distance associated with the \( n \) function. The fact that this larger distance, \( c \), is required to make simple locative predicates with ku- acceptable suggests that they are unacceptable not because the separation presupposition is violated but because the scalar implicature involving c arises.

### 4.3 Summary of Section 4

Before summarizing the contributions of this section, it is important to reiterate that the analysis presented here is based only on predicative uses of locatives in LCCs. As in other Bantu languages (e.g. Chichewa: Bresnan and Kanerva 1989; Bresnan 1991), locatives in Mushunguli occur in other constructions as well: they can be adjuncts to verbs, elements of noun phrases, subjects, arguments of verbs of motion, etc. Two of these possibilities, subject and argument of motion verb, are exemplified in (39).
(39) a. Complex locative predicate as subject:

ku-ndani ku-a-i-ny-nyumba ni ku-edi.

LOC_{ku} inside LOC_{ku} & Assoc AUG_{9} & CL_{9} house COP AGR_{ku} & good.

‘Inside the house is good.’

b. Complex locative predicate as an argument of a verb of motion:

chi-bonkho chi-jinkha ha-nkhanda ha-a-i-ny-nyumba.

AUG_{7} CL_{7} hippopotamus AGR_{7} pass LOC_{ha} side LOC_{ha} & Assoc AUG_{9} & CL_{9} house

‘The hippopotamus passed beside the house.’

In (39a), the complex locative predicate ku-ndani ku-a-i-ny-nyumba ‘inside the house’ is the subject of the copula ni ‘cop’ and governs agreement on the adjective ku-edi (AGR_{ku} & good). Ku-ndani ku-a-i-ny-nyumba ‘inside the house’ is not only the grammatical subject, as in locative inversion constructions, but also the logical subject (c.f. Bresnan 1991). In (39b), ha-nkhanda ha-a-i-ny-nyumba ‘at the side of the house’ is an argument of the motion verb chi-jinkha ‘passed.’

The semantics proposed here for ha- and ku- has yet to be systematically tested on such examples. It does make several clear predictions, though. For example, the analysis predicts that in order for (39a) to be uttered felicitously, the pov adopted by the speaker must not stand in the relation to the house denoted by ku-ndani ku-a-i-ny-nyumba ‘inside the house.’ In other words, that pov should not be located inside the house. Furthermore, the scalar implicature associated with the use of a simple locative predicate with ku- (ku-a-i-ny-nyumba ‘at the house’) makes it likely that in (39a) the house is distant from the reference location, by default the location of the speaker. Third, in (39b), due to the meaning of the simple locative predicate ha-a-i-ny-nyumba ‘at the house,’ the current analysis predicts that the house is proximal to some contextually salient reference location. In the default case, that reference location is the location of the interlocutors. Testing these predictions is the next step for continued investigation of locative expressions in Mushunguli.

The need for further investigation notwithstanding, this section has made two principle theoretical contributions. One is to show that the separation presupposition entails separation between the Figure and the pov adopted by the speaker. Assuming that the present account can be generalized to other Bantu languages characterization of the presupposition makes it possible to account for certain conditions associated with the use of ku- across the family. Throughout the family, realizations of ku- are used in contexts in which the Figure is either distant from the speaker or occluded (Ruzićka 1959, 1960; Ziervogel 1971; Opalka 1982; Neumann 1999). However, as shown for Mushunguli in e.g. (34b), distance and occlusion are neither necessary nor sufficient conditions for the use of ku-, just tendencies. A separation analysis accounts for these tendencies by assuming that a Figure can be separated from a pov either by distance or by an intervening Ground. In either case it is likely, but not necessary, that the Figure will not be visible. However, the definition of separation entails neither distance nor occlusion.

More importantly, Section 4 has demonstrated that ku- represents a new class of topological spatial expression. This class takes the pov adopted by the speaker as an argument. Other examples of this type of expression may exist in North East Ambae (Hyslop 2002) and Pima (Smith 2004). Both Hyslop and Smith describe topological spatial expressions with meanings that depend in part on the location of the deictic center. While it is not clear that the deictic center is identical with the pov adopted by the speaker, in his discussion of deictic motion verbs (e.g. come and bring) Fillmore (1975: 67) suggests that the two may be related. If this suggestion is correct, it may be possible to provide an analyses of the North East Ambae and Pima expressions described by Hyslop and Smith in terms of the conceptualization of povs developed here. In addition, the data have shown that the povs available in the discourse
context must include POVs defined by the location and *front* axis of non-sentient entities such as the car in (28), not just POVs associated with sentient entities. This fact motivates the inclusion of abstract POVs, modeled as ordered pairs of a location and an orientation, in the set of entities interlocutors keep track of in a discourse. In the next section, I show that assuming such POVs improves analyses of English spatial expressions involving directions.

5 Projective spatial expressions, point of view, and the problem of behind

In this section, I show that assuming that abstract POVs are possible arguments of direction-related spatial expressions in English improves accounts of the meanings of such expressions. Following Herskovits (1986) spatial expressions that relate the location of the Figure to that of the Ground in terms of a direction, such as *behind* in (40), are called projective spatial expressions.\(^{17}\)

(40) The dog is behind the car.

For (40) to be true, the dog must be located in a particular direction from the car. Just being near any side of the car is insufficient. On arguably the most prominent reading of (40), the direction from the car to the dog is determined by considering intrinsic features of the car: its canonical direction of motion, the position of a human using it, the location of its exhaust pipe, etc. We can label this direction *back*. Intrinsic features of the car can also be used to define other directions that stand in systematic relations to *back*: *front*, *right*, *up*, etc. These directions form a coordinate system, a set of axes that stand in certain systematic relations to one another (see Fillmore 1975; Herskovits 1986; Levinson 2003 for more on how axes are determined). This coordinate system corresponds to a frame of reference (Levinson 1996, 2003; Danziger 2010, 2011; Bohnemeyer and O’Meara 2010; Bohnemeyer 2012). The particular frame of reference involved in the interpretation of (40) is called the intrinsic frame of reference, because the axes are determined by intrinsic features of the Ground (Levinson 1996, 2003).

Another frame of reference described by Levinson (1996, 2003) is the relative frame of reference. The relative frame of reference is exemplified using *behind* in (41).

(41) The dog is behind the tree.

The interpretation of (41) cannot involve a direction defined in terms of an intrinsic axis of the tree, because the tree has no intrinsic axes in the horizontal plane. Instead, in the relative frame of reference, the axes of the coordinate system are defined with respect to the position and orientation of an observer. This observer could be conceptualized more abstractly as a POV (Levinson 1996, 2003; Kracht 2008; Bohnemeyer 2012). In examples such as (41) in which no observer is overtly specified, the observer is usually assumed to be the speaker.

In the relative frame of reference, the same utterance, spoken with a different observer’s viewpoint, can have different truth conditions, as illustrated in Figure 8. In the context depicted in Figure 8, if the speaker speaks from her own POV, the direction from the tree to the dog must be the direction labeled *behind* for (41) to be true. On the other hand, if the speaker adopts the POV of the addressee, as she might if the addressee has just asked about the dog’s whereabouts, the direction from the tree to the dog must be *behind*: Thus, which viewpoint is adopted determines the direction involved in the interpretation of *behind* and therefore also determines the truth conditions of (41).

\(^{17}\)This kind of projectivity is distinct from the presupposition projection discussed in Section 4.
This characterization of the relative frame of reference in terms of the viewpoint of an observer raises an interesting question. Do projective spatial expressions used in the relative frame of reference require an actual or hypothetical observing individual as an implicit argument? Or do they require merely a location and a direction, the abstract pov hypothesized to be relevant for Mushunguli ku-? Two kinds of data suggest that the latter option is correct.

First, (42) provides evidence that the individual whose orientation is used to define directions in a relative frame of reference need not be a sentient observer. In (42), the individual is a cannon, paralleling the Mushunguli example (28) in which a pov is contributed by the location and orientation of a car. (42) is represented graphically in Figure 9.

(42)  Context: A and B, two engineers on a construction job, are planning to use a remote controlled cannon to destroy an old wall. They are standing relatively far from the cannon and the wall and off to one side, such that they have a good view of both. The cannon is pointing at the wall. A is about to fire the cannon.
B: Stop! A workman is in front of the wall.

On the interpretation of B’s utterance that is true in the context depicted in Figure 9, the workman is near the side of the wall facing the cannon. On this reading, the direction involved in the interpretation of in front of, labeled $f$ in Figure 9, is defined relative to the location and
orientation of the cannon. This interpretation would not be available if the cannon were located elsewhere or pointing in a different direction.

Example (43) provides additional evidence that only an abstract **POV** is a necessary argument of a projective spatial expression used in the relative frame of reference. (43) mentions only a non-oriented entity, a hill. It also explicitly mentions a direction from that hill toward the Ground. There is no sentient observer, and no oriented entity like a car or a cannon. A context in which (43) is true is depicted in Figure 10.

Figure 10: Defining a **POV** without an oriented individual

(43) A: Is the pond just in front of the the large oak tree?
B: Yes, that’s right. And from that hill over there, the pond is to the right of the large oak tree.

It is useful to compare (43) to a counterfactual along the lines of *If someone was standing on that hill over there, the pond would be to the right of the tree from her point of view.* The truth conditions of both utterances with respect to the relative positions of the tree and the pond are the same. However, while the counterfactual introduces a hypothetical sentient, oriented individual, (43) does not. Instead, (43) presents a **POV** in terms of merely a location and a vector: the location of the non-oriented hill and the vector from the hill to the tree. This vector is labeled “$f$” in Figure 10. The vector involved in the interpretation of *to the right of* is defined by its systematic relation to $f$, as described for a related case by Fillmore (1975). The vector cannot be defined based on intrinsic features of the hill or the tree, since neither has intrinsic axes in the horizontal plane. Thus, in (43), the combination of a location and a direction is sufficient to define a **POV**. No oriented individual is needed.

The data in this section demonstrate that a **POV** can be defined in terms of the location and orientation of an observer, the location and orientation of a non-sentient individual, or a

18Other similar examples that are sometimes discussed in the literature are those involving giving directions. However, for such examples, it is possible to argue that the addressee at a future time constitutes a hypothetical observer.
location and direction that are mentioned individually in the discourse. The unifying feature of all of these different *pov* sources is that they entail the existence of a location, represented formally as a region, and an orientation or direction, represented as a vector. In examples such as (43) where the location and direction are mentioned overtly, they are clearly available for anaphoric reference. In the other cases, the existence of an oriented individual located in space entails the existence of a location and a *front* vector, and thus a *pov*. Following Roberts (2002, 2003, 2005), elements that are entailed to exist by the common ground are available as antecedents for anaphoric reference. Thus, the *povs* associated with these individuals are available as anaphorically interpreted arguments of spatial expressions because the common ground entails their existence.

Assuming that spatial expressions used in the relative frame of reference take *povs* as implicit arguments makes it possible to solve a long-standing problem in spatial semantics. To understand the problem, consider the juxtaposition of (41), repeated from above, and (44).

(41) The dog is behind the tree.

(44) The dog is behind me.

The relevant observation is that if (41) and (44) are uttered in the same context by an individual facing the tree, the direction from that individual to the dog differs depending on the utterance, as depicted graphically in Figure (11). To understand the significance of this observation, it is necessary to consider how current analyses of spatial expressions incorporate directional information.

Figure 11: Graphic representations the directions denoted by *behind* in (41) and (44)

For Bohnemeyer (2012) and Author (to appear a), the direction involved in the meaning of a projective spatial expression is determined by an axis function. The axis function takes an implicit argument, called an anchor, following Levinson (1996, 2003). Essentially, the anchor is the element of the context that determines the directions involved in the meaning of the projective spatial expression. For example, for the expression *behind me* in (44), the direction involved in the interpretation of *behind* is determined based on facts about the intrinsic orientation of the speaker’s body. Thus, in such an example, the speaker is the anchor. In (44), the speaker is also the Ground. Having the same anchor and Ground is the defining characteristic of the intrinsic frame of reference.

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19 For reasons not directly related to the issues under discussion here, Danziger (2010, 2011) argues that examples such as (44), rather than being examples of the intrinsic frame of reference, involve what she calls the “direct frame of reference.” Either way, the problem described here remains.

20 The approach of Kracht (2008) is similar to these accounts, except that Kracht proposes an unspecified number of parameters as implicit arguments rather than a single anchor. If the source of those parameters is assumed to be the anchor, then the accounts are functionally identical.
The axis function takes the anchor as its argument and returns a vector, which is then located at the center of the Ground as its origin. In intrinsic frame of reference examples such as (44), the location of the anchor and the origin at the Ground are the same point. However, in examples in the relative frame of reference such as (41), the vector is defined relative to an anchor located in one place (e.g. at the location of the speaker) and then transposed to an origin located at the center of the Ground as part of the interpretation of the spatial expression. The vector, now projecting from the Ground, is the argument of a function that defines the space that is the denotation spatial expression composed with the Ground.

The problem posed by pairs such as (41) and (44) is that they involve different vectors, yet on previous analyses the speaker is the anchor in both cases. This is a problem because on those analyses the vector is simply the result of applying the axis function to the anchor argument. In cases such as (41) and (44), where the expression and the anchor are held constant, the output should be identical. The solution of Bohnemeyer (2012) and Author (to appear a) is to assume that there is more than one axis function associated with a given expression. In each utterance, the axis function involved is determined pragmatically.

The current proposal makes it possible to model behind as having exactly one axis function, given one additional assumption. The assumption is that Povs are individuals of type e. The axis function takes an anchor of type e, regardless of the frame of reference. If the anchor is an oriented individual, the axis function in the meaning of behind returns the vector pointing away from the back of the anchor, and the example involves the intrinsic frame of reference. In contrast, if the anchor is a Pov, the axis function of behind returns the front vector of that Pov, and the example involves the relative frame of reference. This analysis gets the truth conditions of (41) and (44), depicted in Figure (11), correct. It also entails that, for any given example, the frame of reference involved is determined by the nature of the anchor argument. 21

This proposal is supported by examples in which the relative frame of reference associated with an oriented individual is introduced linguistically rather than implicitly, as in (45).

(45) From {John’s perspective/#John}, the dog is behind the tree.

When the relative frame of reference associated with an oriented individual is introduced linguistically, the perspective itself must be mentioned. It is not sufficient to simply mention the individual.

The data in this section demonstrate that incorporating abstract Povs into the set of individuals entailed to exist in the discourse context makes better predictions for the meanings of English projective spatial expressions than previous accounts.

6 Conclusions

This paper constitutes the first formal analysis of the Bantu locative morphemes ha- (Proto-Bantu pa-) and ka-. The analysis reveals that, as realized in Mushunguli, each represents a new class of topological spatial expression. The interpretation of ha- involves a reference location. The interpretation of ka-, on the other hand, involves the Pov adopted by the speaker. The Mushunguli data presented here also motivate the conceptualization of Povs involved in the interpretations of spatial expressions as abstract individuals consisting, minimally, of a location and a direction. This conceptualization of Povs makes better predictions for English projective spatial expressions.

21 The same result can be achieved without assuming that Povs are of type e by including disjoint union as a type constructor and analyzing axis functions as ranging over the disjoint union of Pov-type ordered pairs and type e individuals. On the approach above taken above, the restriction to Pov arguments associated with Mushunguli ka- is a selectional/sortal restriction. If the approach described in this footnote is taken, the restriction is due to a difference in argument types.
spatial expressions than previous accounts. It also yields a principled account of the difference between intrinsic and relative frames of reference without recourse to multiple axis functions.

The work presented here on spatial expressions in Mushunguli and English also raises a more general question about Povs and perspective. The meanings of many types of linguistic expressions have been claimed to be sensitive to a Pov, perspective, or something similar. The range of such expressions includes pronouns interpreted de se (Mitchell 1986; Stalnaker 2008), logophoric pronouns (Sells 1987), definite descriptions (Doron 1991), demonstratives (Doron 1991), predicates of personal taste (Lasersohn 2005), expressives (Potts 2007), and conventional implicatures (Amaral et al. 2007; Harris and Potts 2009). Furthermore, unified analyses of some of these Pov-sensitive expressions have been proposed (Mitchell 1986; Doron 1991; Speas and Tenny 2003). However, none of these analyses takes into account the conceptualization of a Pov developed here. Instead, in those accounts a Pov is equated with the individual whose Pov it is. As noted above, in the spatial domain, assuming such an equivalence makes bad predictions for the meanings of spatial expressions that are used in both the intrinsic and the relative frames of reference. Given the success of the more abstract conceptualization of a Pov in the spatial domain, the question that arises is whether such a conceptualization can be used to inform analyses of other Pov-sensitive expressions.

Of course, it is possible that the Pov-sensitivity of spatial expressions is of a different kind than that demonstrated by other types of expressions mentioned above. However, if future work provides empirical support for the idea that a range of perspectival expressions require a unified analysis and that spatial expressions are within this range, this paper suggests two possible ways forward. The first is to continue to analyze a Pov as an abstract discourse-informational tuple, the two elements of which are a location and an orientation. On this approach, accounting for Pov-sensitivity in non-spatial expressions would consist of adding other elements to the tuple. This approach would follow Doron (1991) in spirit, if not in detail. The second possibility consists of adopting a strong version of the localist hypothesis (e.g. Lyons 1977, Jackendoff 1983). On this approach, a Pov would always consist entirely of a location and an orientation. However, for a non-spatial expression, the Pov would be located in some non-physical multi-dimensional space, rather than in the physical world. Future work is necessary to determine the set of expressions for which a unified account is motivated and which of these approaches yields the best empirical coverage.

### Appendix 1 Formal Framework

#### Basic types and extensions

\[(46)\]

- **a.** e, objects: \([e] := D\), where D is the set of individuals.
- **b.** p for points: \([p] := P\), where P is the set of points.
- **c.** t for truth values: \([t] := \{0, 1\}\).
- **d.** \(\nu\) for real numbers: \(\([\nu] := \mathbb{R}\).\)

#### Type constructors

\[(47)\]

- **a.** \(\langle \cdot \rangle\) is the functional type constructor.
- **b.** \(\langle \times \rangle\) is the type constructor for Cartesian products.
- **c.** If \(\alpha\) and \(\beta\) are types, then \(\langle \alpha, \beta \rangle\) and \(\langle \alpha \times \beta \rangle\) are too.
- **d.** Nothing else is a type.
- **e.** If \(\alpha\) and \(\beta\) are types, then \(\[\langle \alpha, \beta \rangle\] := \) the set of functions from \(\alpha\) to \(\beta\).
f. If $\alpha$ and $\beta$ are types, then $\llbracket \alpha \times \beta \rrbracket := \llbracket \alpha \rrbracket \times \llbracket \beta \rrbracket$

g. If $a$ is of type $\alpha$ and $\langle a, t \rangle$ is closed, then $\alpha_a$ is a type. Informally, $\alpha_a$ is the subtype of $\alpha$ whose members satisfy the predicate $a$ (c.f. Pollard 2008: definition 36a).

Regions

(48) a. The type $\langle p,t \rangle_{\text{region}}$ is the type of regions, abbreviated $r$. These are sets of points that satisfy the predicate $\text{region}$. The predicate $\text{region}$ is defined in (48a-i)-(48a-iii).

i. $\text{region}$ is of type $\llbracket \langle p,t \rangle \rrbracket$. Informally, it is the set of sets of points that are path-connected.

ii. $\text{region} := \text{Given a set of points, } s_{\langle p,t \rangle}, \text{ for any points } m_p, n_p \in s, \text{ there exists a path } u \text{ from } [0,1] \text{ to } P, \text{ such that } u(0) = m, u(1) = n, \text{ and } \forall x \in [0,1], u(x) \in s.$

iii. $\lambda s_{\langle p,t \rangle} \forall m_p, n_p \in s[\exists u_{\langle n,p \rangle}[u(0) = m \wedge u(1) = n \wedge \forall x_n \in [0,1] [u(x) \in s]]$;

Three-dimensional Euclidean space (following Kracht 2008: 57ff)

(49) a. Where $P$ is the set of points, given: a three dimensional Euclidean metric space $E$, consisting of

i. $G \subseteq (P)$, the set of lines,

ii. $H \subseteq (P)$, the set of planes, and

iii. $\text{dist}_{\langle p \times p \rangle, \nu} := P \times P \rightarrow \mathbb{R}_+$, the distance function.

As Kracht (2008) demonstrates, this formulation is sufficient for defining vectors and the centers of regions, both of which are necessary elements of the meanings of directional expressions. However, since directional expressions are not the focus of this study, I omit those definitions.

Matter

(50) Following Link (1983), I assume a relation between portions of matter and individuals. Link calls this the “constitution relation.” A portion of matter constitutes an individual if it is exactly the matter that makes up the individual.

(51) Following Link (1983), I assume that portions of matter are themselves individuals of type $e$.

Relations between regions

(52) a. $\subseteq_{\langle r,\langle r,t \rangle \rangle} := \lambda s.\lambda t.\forall m_p \in s [m \in s \rightarrow m \in t]$ 

b. $d_{\langle r,\langle r,\nu \rangle \rangle} := \lambda s.\lambda t.\inf \{\text{dist}(m,n) : m \in s, n \in t\}$

c. (adapted from Kracht 2002: 187-189, simplified by the removal of time variables)

i. $n_{\langle r,\langle r,t \rangle \rangle} := \lambda s.\lambda t.\text{dist}(s,t) \leq c$ where $c$ is some contextually given standard determined by a variety of factors, including the diameter of $s$ and $t$ and the purpose for which nearness is being evaluated.

ii. Diameter of a region: $\delta_{\langle s,\nu \rangle} := \lambda s.\sup \{\text{dist}(m,n) : m, n \in s\}$

Relations between entities and regions

(53) $\text{loc}_{\langle e,r \rangle} := \lambda x_e.s_r$ iff $s$ is the region occupied by $x$.

(54) $\text{loc}^-_{\langle e,r \rangle} := \lambda s_r.x_e$ iff $x$ is the portion of matter that occupies $s$.  

34
Appendix 2 Compositionality

In this appendix, I present a compositional account of the meanings of LCCs. To maintain compatibility with as many syntactic frameworks as possible, the only combinatorial operator used is function application.

Appendix 2.1 The composition of locative predicates

A simple locative predicate such as *ku-a-i-chi-tabu* ‘at the book’ includes a term that is the combination of the stem, class marker, and augment morpheme: here, *i-chi-tabu* ‘the book.’ Under the simplifying assumption that all NPs in these examples are definite, the translation of *i-chi-tabu* ‘the book’ is simply \( \text{i.e. } \text{book}'(x) \).

*I-chi-tabu* ‘the book’ is an argument of the associative morpheme, *a-*. As mentioned above, the meaning of *a-* is to relate the denotations of two nouns. As for the Indo-European genitive, in a given example the relation is determined either by intrinsic features of the entities themselves or by information in the context of utterance. Following Vikner and Jensen’s (2002) analysis of the genitive, I represent *a-* as requiring two arguments: an entity and a relational predicate. This assumption allows intrinsically relational predicates, such as *mother* and *arm*, to specify the relation encoded by the genitive in their semantics. It also requires that non-relational predicates, when used in the genitive construction, are coerced into becoming relational predicates, with the appropriate relation provided contextually. The meaning of *a-* is represented in (55), and the result of composing that meaning with its first argument, \( \text{i.e. } \text{book}'(x) \), in (56).

\[
\begin{align*}
(55) \quad a- & := \lambda x. \lambda y. R(e, \langle e, t \rangle) \\
(56) \quad a-i-chi-tabu \ 'of \ the \ book' & = \lambda R(e, \langle e, t \rangle) \lambda y. R(\text{book}'(x))(y)
\end{align*}
\]

*A-i-chi-tabu* ‘of the book,’ requires a relational predicate as its second argument. The meanings of locative predicates such as *ha-* and *ku-* are relational predicates, but with a type mismatch: \( \langle e, \langle r, t \rangle \rangle \) rather than \( \langle e, \langle e, t \rangle \rangle \). Accordingly, I introduce a locative type shifter for the associative construction. The type shifter relies on the existence of a function that is the inverse of \( \text{loc}_{(e, e)} \). Zwarts and Winter’s (2000) \( \text{loc}^- \) function and Kracht’s (2002) \( a-\text{loc}' \) function are similar functions. I borrow Zwarts and Winter’s notation, though I define the function in a slightly different way (see Appendix 1). The type shifter must apply to the associative construction rather than to the locative, because the result of composing the locative and the associative construction must be of type \( \langle r, t \rangle \) in order to compose with a locative relator or locative copula. The locative type shifter is defined in (57). Whether the type shifter is represented as a rule or a phonologically null item will depend on the syntax-semantics interface that is assumed.

\[
\begin{align*}
(57) \quad \text{locative type shifter} & := \lambda Q \langle \langle e, \langle e, t \rangle \rangle, \langle e, t \rangle \rangle \lambda R(e, \langle e, t \rangle) \lambda s \lambda r. Q(e, \langle e, t \rangle, \langle e, r, t \rangle) \\
& = \lambda Q \langle \langle e, \langle e, t \rangle \rangle, \langle e, t \rangle \rangle \lambda R(e, \langle e, t \rangle) \lambda s \lambda r. Q(e, \langle e, t \rangle, \langle e, r, t \rangle)
\end{align*}
\]

The locative type shifter in (57) takes (56) as its argument and returns an expression of type \( \langle \langle e, \langle r, t \rangle \rangle, \langle e, t \rangle \rangle \). All that changes in the semantics is that the second argument of the relational predicate is now a region. The result of type shifting (56) is given in (58).

\[
\begin{align*}
(58) \quad a-i-chi-tabu \ 'of \ the \ book' \ (\text{type-shifted}) & = \lambda R(e, \langle e, t \rangle) \lambda s.r. R(\text{book}'(x))(s)
\end{align*}
\]

(58) takes a locative morpheme as its argument. For simplicity, I use *ku-* rather than *ha-* and ignore the separation presupposition. The result of composing the meaning of *ku-* with (58) is given in (59).

\[
\begin{align*}
(59) \quad ku-a-i-chi-tabu \ 'at \ the \ book' & = \lambda s.r. n(\text{loc}(\text{book}'(x)), s)
\end{align*}
\]
(59) is exactly the meaning of *ku-a-i-chi-tabu* ‘at the book’ desired: the set of all regions $s$ that stand in the $n$ relation to the region occupied by the book.

**Appendix 2.2  The composition of LCCs**

The meaning of a locative predicate composes with the meaning of the locative copula. Unlike the English copula, the Mushunguli locative copula has a locational meaning. For other copula constructions, the non-agreeing copula *ni* ‘be’ is used. As noted in Section 2.1, the locative copula consists of two morphemes: an agreement marker agreeing with the class of the subject and the locative copula stem, -i ‘LCOP.’ I assume the agreement marker is semantically vacuous, and provide the meaning of -i ‘LCOP’ in (60).

$$-i \text{ ‘LCOP’} := \lambda P_{(v,t)}.\lambda z_e. P(\text{loc}(z))$$

The locative copula -i ‘LCOP’ takes the locative predicate, $P$, as its first argument and the subject as its second. The meaning of -i ‘LCOP’ is simply to predicate the locative predicate of the location of the subject. This analysis of -i ‘LCOP’ draws on Bohnemeyer’s (2012) translation of the Yucatec copula *y`aan* ‘BE.AT.’ The type of *y`aan* ‘BE.AT’ is $\langle\langle v,t \rangle, \langle e,t \rangle \rangle$, where $\langle v,t \rangle$ is the type of regions, following Zwarts and Winter (2000). Its function is to transform a region-denoting expression into a predicate over individuals. Similarly, the function of Mushunguli -i ‘LCOP,’ is to transform a predicate over regions into a predicate over individuals.

The result of composing the meanings of the locative copula and *ku-a-i-chi-tabu* ‘at the book’ is given in (61). The locative copula in (61) includes the class agreement prefix di- ‘AGR$_5$’ in anticipation of the class 5 subject to be added below.

$$di-i \text{ ku-a-i-chi-tabu} \ ‘is \ at \ the \ book’ = \lambda z_e. n(\text{loc}(\text{ix. book’}(x)), (\text{loc}(z)))$$

(61) denotes the set of entities $z$, the locations of which stand in the nearness relation to the location of the book. Supplying a Figure as the second argument of the locative copula results in (62).

$$i-di-boko \ di-i \ ku-a-ichitabu \ ‘The \ banana \ is \ at \ the \ book.’$$
$$= n(\text{loc}(\text{ix. book’}(x)),\text{loc(iy. banana’}(y)))$$

(62) asserts that the banana stands in the nearness relation to the book. This is exactly the desired result.

**References**


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22Dorothee Beerman Hellan (p.c.) and Peter Svenonius (p.c.) have expressed concern that the present analysis relies heavily on the meaning of the locative copula. This reliance makes it impossible to generalize the analysis to account for languages, such as English and even some other Bantu languages, in which there is no designated locative copula. To address these concerns it would be possible to add an additional type-shifter from sets of regions to sets of individuals. This type-shifter would apply after the composition of the locative predicate but before the locative predicate composes with other elements of the sentence. The locative copula would then be modeled as a standard copula. Since such a type-shifter does not seem necessary to account for the Mushunguli data, I do not include it here.


