Spatial P in English

Peter Svenonius*
CASTL, University of Tromsø

October 7, 2008

1. Introduction

The syntactic structure of prepositional phrases is quite rich, as has been demonstrated in numerous recent detailed studies of individual languages. In this paper I present an analysis of the prepositional system of English, focusing on spatial expressions and applying a cartographic approach (of the sort pioneered by Cinque 1999).

A recurring observation is the basic distinction between what can be called Place (associated with locational meanings) and what is often called Path (associated with directed motion).[1] Place elements give information about the physical configuration of the relationship between a Figure (an object whose location is at issue) and a Ground (the reference landmark for the location of the Figure).[2] This is illustrated in (1a), where *the elephants* is the Figure and *the boat* the Ground. Path elements give information about a trajectory; Path elements may specify whether a Place is a Goal (1b) or a Source (1c), and may specify the orientation of a trajectory (1d).

(1)   a.   The elephants remained **in** the boat.
        b.   They cast a wistful glance **to** the shore.
        c.   The boat drifted further **from** the beach.
        d.   Their ears sank **down** several notches.

When Path and Place elements cooccur, Path is morphosyntactically outside Place — either further away from the nominal stem, in a local case system (cf. Kracht 2002), or further away from the noun phrase, when they are unbound morphemes (van Riemsdijk and Huybregts 2002). This can be illustrated with a pair of languages as in the example here.

[1]*Path* and *Place* is the terminology used by Jackendoff (1983), Koopman (2000), and Emonds (2000); compare the *dir[ectional]* and *loc[ative]* of Wunderlich (1991), van Riemsdijk and Huybregts (2002), and den Dikken (to appear); and cf. also Kracht's (2002) *mode* and *configuration*.

[2]These terms, along with much of the background assumptions, are due to the pathbreaking work of Talmy (2000) inter alia.

1 INTRODUCTION

(2)   a.   ná gmá tábèl (Zina Kotoko, Holmberg 2002)
          to on table
          'onto the table'

     b.   cal-i-q-na   (Tabasaran, Comrie and Polinsky 1998, 99)
          *wall-*ERG*-behind-to*
          'to behind the wall'
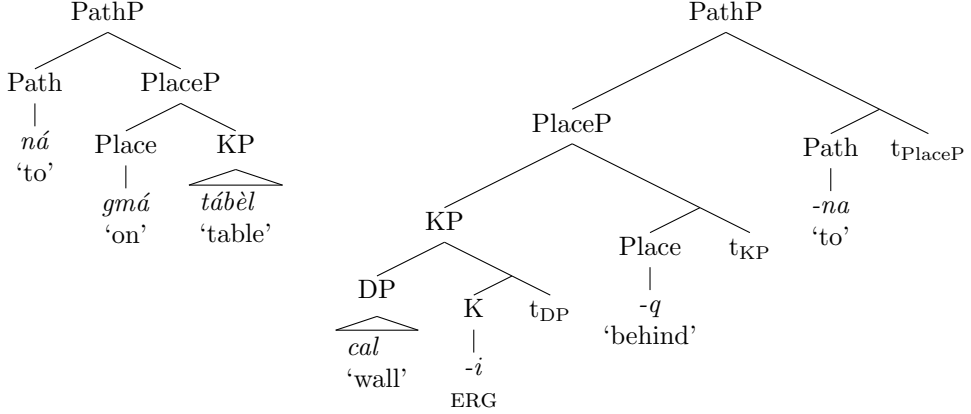
In (2a), the base order of Path and Place is preserved at the surface. In (2b), both are affixal and the tree is represented in 'roll-up' fashion (in the tree for Tabasaran, I represent the case morpheme as a K head, on the inessential assumption that the 'ergative' morphology projects).

In this paper I examine the detailed structure of English Place and Path projections and the words that appear in them. I concentrate on spatial expressions (see Roy and Svenonius to appear for an extension to temporal and other non-spatial uses). In particular, I consider four classes of P elements, as presented in the table below.

(3)

PROJECTIVE	BOUNDED	EXTENDED	PARTICLE
behind	among	around	up
in front of	between	through	down
inside	next to	across	on
outside	beside	along	off
above	upon	over	in
below	near	under	out
beyond	against	past	away

Within each of these classes, there are further distinctions; for example *under* and *over* have some properties which distinguish them from the other 'extended' Ps.[3] Also, *in* and *on* have 'Bounded' place uses which are distinct from their particle uses, and *near* has several properties which distinguish it from the other 'bounded' Ps. Nevertheless, the table above gives an approximate first categorization; the distinction between the first and second columns is laid out in §2; the character of the elements in the third column is discussed in §3 (along with Path elements like *to* and *from*); and the particles in the fourth column are discussed first in §2 and then further in §4.

---

[3]'Extended' prepositions were referred to as PATHPLACES in earlier versions circulated of this work.

2. Place

2.1. Distribution of PlaceP

As an initial hypothesis it can be assumed that the elements in the leftmost column in the table in (3) (the column headed 'Projective') head a class of syntactic entities called PlaceP which can express locational relations in certain contexts in English. One external diagnostic for PlaceP is that it can be the complement of stative verbs expressing location, such as *remain* or *be located*, and can also occur as a locative adjunct to verb phrases which imply no motion.

(4)   a.   The boat remained **behind** the hill
      b.   The boat was located **inside** the cave
      c.   The boat stood **below** the bend
      d.   The boat burned **beyond** the city limits
      e.   The boat was painted **in front** of the palace
      f.   The boat remained **above** the dam

This is also true of certain more complex expressions which are discussed in §4.

(5)   The boat remained six miles up the river

Verbs can be organized into obligatory direction (e.g. *go*), optional direction (e.g. *fly*), and non-direction (e.g. *stay*), on the basis of the interpretations of expressions like those in (6) below; the first example is obligatorily directional, the second ambiguously directional or locative, and the third obligatorily locative (I discuss the P element *over* later).

(6)   a.   The plane went over the city.
      b.   The plane flew over the city.
      c.   The plane stayed over the city.

The most natural interpretation for a Projective PlaceP with an optional motion verb is the locative one, though a directional reading is often freely available.

(7)   a.   The plane flew behind the trees.
      b.   The rabbit jumped inside the cage.
      c.   The submarine sailed below the ice.
      d.   The marathoners ran beyond the city limits.
      e.   The revelers danced in front of the palace.
      f.   The mountaineers climbed above the dam.

All of the PlaceP expressions in (4) can also serve as the complement to the preposition *from*:

(8)   a.   The boat drifted from behind the hill
      b.   The boat drifted from inside the cave
      c.   The boat drifted from below the bridge
      d.   The boat drifted from beyond the city limits
      e.   The boat drifted from in front of the palace
      f.   The boat drifted from above the dam

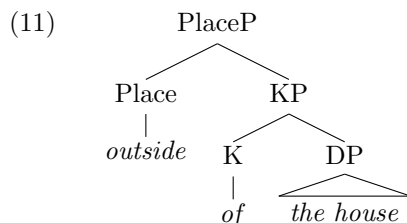Furthermore, PlaceP expressions can appear with ordinary common nouns, as restrictive modifiers.

(9)   a.   the boat behind the hill
       b.   the boat inside the cave
       c.   the boat below the bridge
       d.   the boat beyond the city limits
       e.   the boat in front of the palace
       f.   the boat above the dam

When these sequences (i.e. PlacePs) take on a directional or path-denoting meaning, as with motion verbs like *drift*, I assume it is due to a null path element with the approximate semantic value of overt *to* (Gruber 1967). In fact, overt *to* is marginally licit in these contexts.
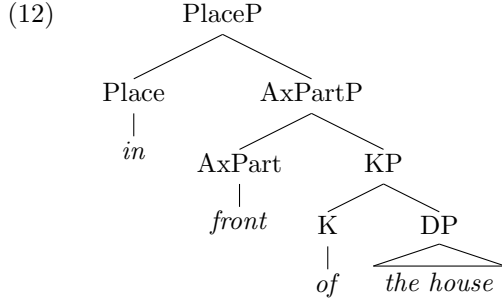
(10)   a.   The boat drifted (?to) behind the hill
       b.   The boat drifted (?to) inside the cave
       c.   The boat drifted (?to) below the bridge
       d.   The boat drifted (?to) beyond the city limits
       e.   The boat drifted (?to) in front of the palace
       f.   The boat drifted (?to) above the dam

On the cartographic approach to phrase structure, there is at least roughly a category Path over a category Place, in a functional sequence (cf. e.g. van Riemsdijk and Huybregts 2002).

However, an even more refined structure can sometimes be discerned. In many cases, Place itself can be further decomposed. There is evidence for a category which I call K for case, manifested by a genitive marker in many languages (as with English *of* in *out of the box*, *outside of the house*, *east of Russia*) (compare Starke's 1993 structures for French prepositional phrases, and Yadroff's 1999 ones for Russian, which both postulate a functional head below a more contentful one).

(11)   PlaceP
              /   \
          Place   KP
            | /   \
         outside   K   DP
                     | /   \
                    of *the house*

Complex expressions like *on top of* and *in front of* can be analyzed as in (12), with an additional component of Place (see Svenonius 2006 on Ax[ial]Parts).

(12)

```
              PlaceP
             /      \
         Place      AxPartP
          |         /     \
          in    AxPart    KP
                  |       /  \
                front    K    DP
                         |    /\
                         of  the house
```

Elements like *outside* might similarly be decomposed into *out* plus *side* (an AxPart implying sidelike boundaries).[4] I also assume that it is in the functional area that I am calling AxPart that frames of reference are fixed, since e.g. a *front* can be identified either relative to the viewer or on the intrinsic properties of the Ground; cf. Levinson (1996a, 2003); Rooryck and Vanden Wyngaerd (2007). AxParts are important for the understanding of the spatial systems of many languages, though distinct AxPart morphemes like *front* and *back* do not play a large role in the English P system.

Importantly, multi-part examples like *in back of* or *on top of* often have distributions and meanings like monomorphemic examples like *behind* or *against*.[5] This raises an important question: If *in back of* is syntactically complex, and *behind* has the same syntax, does it follow that *behind* is syntactically complex? This paper pursues the hypothesis that the answer is yes, and that there is a very tight syntax-sematics isomorphism.

For instance, the presence or absence of an overt morpheme corresponding to K doesn't seem to have major consequences for syntax of semantics, so if K is determined to serve a function when it is overt, then a null K serving the same function might be posited in cases where it is not overt. Thus, in many cases, a single overt morpheme will correspond to a rich syntactic structure (a hypothesis that my colleague Michal Starke calls *Nanosyntax*). Part of the goal of the analysis is to identify the syntactic structures that are spelled out by each preposition.

2.2. PlaceP and vector spaces

Generally, a spatial adposition can be modeled as a function from a DP object (a Ground) to a REGION in the sense of Creary et al. (1989) or Nam (1995) — a contiguous set of points in space. However, to capture various complexities such as the distribution of measure phrases (as in *ten centimeters above the window*) and directional adverbials (as in *diagonally above the window*), Zwarts (1997)

---

[4]In that case *side* in *inside, outside* and *alongside* is a contentful morpheme. Of a person standing in a box one can say *She is in the box* even if the box is not large enough to contain her, because of the encyclopedic associations we have with boxes and the way they are used to carry things; but one cannot say *She is inside the box* in the same situation, because *inside* invokes the space as defined using the sides of the box; furthermore, a bird can be *in the air* but not *inside the air* because the air has no sides.

[5]Sometimes it is suggested that prefixal components like *be-* in *behind* represent distinct heads, but I have been unable to identify any common component shared by *behind, between, beside, beneath*, and *before* that distinguishes them from *in back of, among, next to, underneath*, and *after*. I therefore assume that if *behind* is bimorphemic, the parts are idiomatically, and not compositionally, combined.

and Zwarts and Winter (2000) develop a vector space semantics for location PPs.

For example, to calculate the space picked out by the preposition *above*, one projects vectors of all lengths pointing upward from the Ground DP, as illustrated in (13) for a PP like *above the window* (two alternative conceptions are illustrated, one with vectors pointing straight, and another with vectors pointing upwards at various angles). Each vector ends at a point in space, and this collection of points picks out the place *above the window.*

(13)
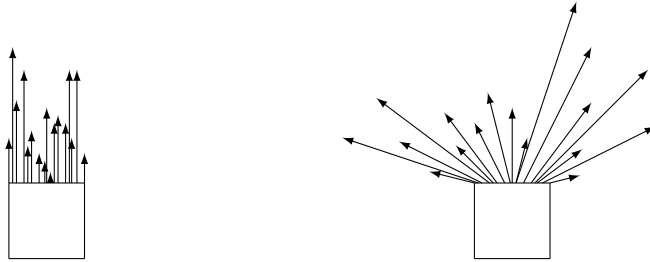
A measure expression like *one meter* can then be assumed to pick out a subset of vectors, those which intersect a plane defined by the length *one meter* measured on the vertical vectors. Thus, if you were told to look for a bug one meter above the window, you might look in the space indicated by the arrowheads in (14) (again, diagrammed twice, once on the assumption that vectors point straight up and again on the assumption that they point upward at varying angles).[6]

(14)
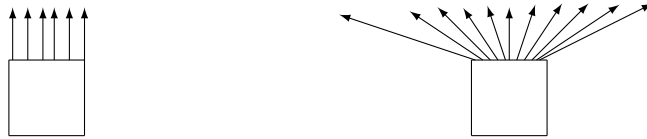
The vector-based analysis provides an explicit semantic decomposition of the meaning of Projective prepositions. Below I will present some evidence that suggests that each component of the semantic decomposition corresponds to a

---

[6]I present both options to illustrate a complication with the vector-based analysis: if the vectors project at angles and the measure expression gives their length, then *one meter above the window* picks out an arc, but this does not conform to intuition. If vectors project at angles and a line is picked out, as in the diagram to the right in (14), then the measure expression does not directly measure the vectors. The simplest analysis would seem to be that the vectors project directly upward, as in the diagram to the left in (14), and any sense that something diagonally above is 'above' is due to vagueness. The horizontal line picked out by the vectors would be salient and extensible in a way that would mimic the effect of the diagram to the right.

syntactic projection. In this decomposition, K is a function from a Ground DP to a region. Specifically, K returns what Wunderlich (1991) call an *eigenplace*, the space occupied by the Ground.[7] An AxPart (words like *front* and *top*, mentioned in the previous section) is a function from eigenplaces to subparts of them.[8]

A Projective preposition must include as part of its meaning a function from regions to vector spaces, composed of vectors pointing away from the region (upward for *above*, backward for *behind*, and so on). Finer discriminations about precise angles, distance and so on is (I assume) left up to pragmatics and conditions of language use, e.g. someone may feel that some of the vectors in (14) are too oblique, or that some are be preferred over others as more canonically picking out 'above,' but I am not concerned with these details (see e.g. Carlson et al. 2003 for evidence of how functional considerations affect intuitions about spaces described by prepositions).

As a locative PP must identify a region in space on the basis of those vectors, there must be another function mapping vector spaces onto the regions picked out by the relevant vectors (the loc^- function of Zwarts and Winter 2000); in effect, a Projective adposition has to turn a region (the eigenplace of the Ground) into a vector space, and then back into a region (the set of points in which the Figure is located).

Measure expressions restrict vector spaces, not regions, so strict compositionality would suggest that measure expressions are introduced in between these two steps; if the steps are directly represented in the syntactic structure, then this means that what I have been calling Place consists of at least two parts (not including AxPart and K): one part which creates the vector space, and another part which identifies the ends of the vectors as a region. Koopman (2000) proposes a Deg head above Place which introduces measure expressions in its specifier; I will use the label Deg for the head which is responsible for picking out regions on the basis of the vector spaces which I now assume are the output of a distinct category, Loc. Thus, what was called Place at the beginning of this section is now decomposed into at least the components Deg–Loc–AxPart–K. Deg and Loc are present at least in all Projective adpositions. AxPart and K are present at least in all adpositions which presuppose something about the axial structure of the Ground reference object (e.g. *along* presupposes that the Ground has a 'long' axis).

For present purposes it can be assumed that it is in AxPart that a preposition like *above* is specified to point upward (i.e. that the relevant subpart of the Ground, away from which vectors are projected, is its top); note that *above* can have different frames of reference, which implies the presence of AxPart on the proposal of Rooryck and Vanden Wyngaerd (2007) that it is in AxPart that frame of reference is determined.[9]

---

[7]Wunderlich (1991, 598) suggests that the eigenplace function (my K) is never expressed overtly, but I assume that genitive case in many languages is an overt expression of K; see Svenonius 2006.

[8]The exterior and interior of a Ground object may also be picked out by an AxPart expression, and possibly also other spaces related to the part structure of the Ground, even if they are not conventional parts of it, for example its edges, perimeter, or possibly even its 'aura' or proximity.

[9]For example, cf. Clark's (1973) example *There's a fly two inches above your knee*, of a girl lying on the beach, where intrinsic reference would mean 'above with respect to the girl's intrinsic axis' — thus two inches toward the girl's head — while relative or absolute reference

The term Place will continue to be useful as a cover term for whatever collection of functional heads converts a reference object into a locative expression, in a given situation.

Since a locative PP is relational, a Figure argument must also be introduced. Such adpositions as *in* and *on* seem to name relations between a Figure and some kind of space (roughly, containment and contact, respectively). In the case of projective prepositions, the Figure is related not directly to the Ground but rather to the space picked out by the functions which I referred to above with the label Place, possibly decomposed into Deg–Loc–AxPart–K. Thus, it seems likely that the Figure is introduced above Deg.
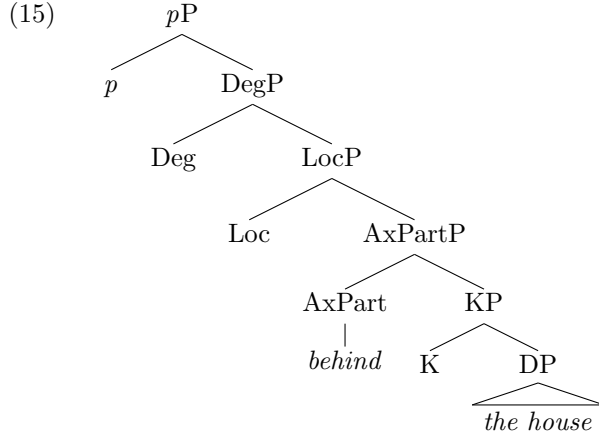
I therefore posit a category p (Svenonius 2003, 2007), which introduces a Figure in Neo-Davidsonian fashion (parallel to Kratzer's 1996 voice head in the verb phrase). This p is the natural locus of relational notions of containment, attachment, and support which are commonly expressed by prepositions such as *in* and *on* and their counterparts crosslinguistically (cf. Levinson 1996b). I will present arguments shortly that p is above Deg, as discussed below (this hierarchy is discussed further in Svenonius 2008).

In a path-denoting prepositional phrase, p is dominated by additional structure, including the projection called Path in §1. Path is canonically expressed by *to* or *from*. A path is an organized collection of spaces, normally arranged with a directionality (see Krifka 1998, Zwarts 2005 and references there; see also Gawron 2006 on stative uses of paths). In a Source expression (e.g. *from the frying pan*), the complement of *from* is interpreted as the initial part of the path; in a Goal expression (e.g. *to the fire*), the complement is the endpoint. To keep the semantics of these Path heads constant, it can be assumed that when they appear to combine directly with a DP Ground (as in *to the fire*, as opposed to e.g. *to inside the fire*), there is also syntactic material identifying Place (i.e. some or all of the p–Deg–Loc–AxPart–K structure just postulated); but nothing much in the present account hinges on this (see Svenonius 2008).

2.3. Degree in PlaceP

As already noted, following Koopman's (2000) and den Dikken's (to appear) analyses of Dutch, I assume a Deg head as a component of Place; the usual denotation of this Deg head, I assume, is a function from vector spaces to the regions of space that the vectors pick out (making it the syntactic manifestation of Zwarts and Winter's 2000 loc^{-}, as noted above). A locative PP like *behind the house* might look something like (15), where I represent *behind* under the AxPart node. The relationship of the vocabulary item to the other syntactic nodes in the tree will be discussed shortly.

---

would mean 'above from the observer's (or the world's) perspective' — meaning two inches toward the sky.

(15)

```
                    pP
                  /    \
                 p      DegP
                      /      \
                    Deg      LocP
                           /      \
                         Loc      AxPartP
                                /        \
                            AxPart        KP
                              |          /  \
                           behind       K    DP
                                             /\
                                         the house
```

A measure phrase, I assume, is introduced in the specifier of a different head of category Deg, Deg_μ (corresponding to what Svenonius and Kennedy 2006 called *Meas* in APs).[10] Deg_μ is like Deg except that it takes a measure phrase as its specifier. This is illustrated in (16), for *ten meters behind the house*.

(16)

```
              pP
            /    \
           p      DegP
                /      \
            MeasP      DegP
             /\       /    \
        ten meters  Deg_μ   LocP
                          /      \
                        Loc      AxPartP
                               /        \
                           AxPart        KP
                             |          /  \
                          behind       K    DP
                                            /\
                                        the house
```
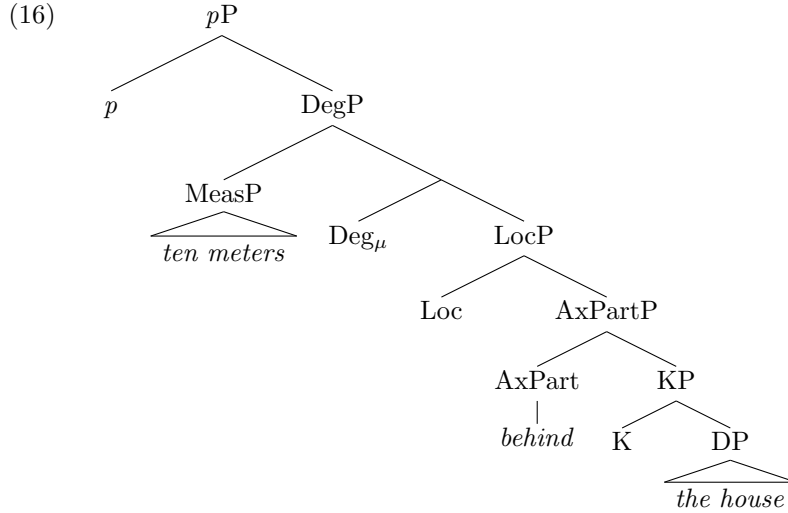
    The Projective expressions in the first column in (3) (*in front of, below*, etc.) but not the Bounded expressions from the second column (*between* and *next to*, etc.) can be modified by measure expressions which, as already noted, basically give the lengths of vectors (subject to the caveat in n. 6).

(17)   a.   We remained sixty feet in front of the palace.
        b.   My clothes are ten meters below the bridge.

(18)   a.   *They came from six feet between the trees.

---

[10]The expression *right* may also be a realization of a Deg head, as suggested by Koopman (2000); this would explain why it cannot cooccur with measure expressions. However, *right* has much wider distribution than measure phrases, also appearing with Path expressions, for example, and so it seems there are multiple places in which it can be introduced, as noted by Koopman (2000) and den Dikken (to appear). Therefore something else needs to be said to ensure that it does not cooccur with measure phrases.

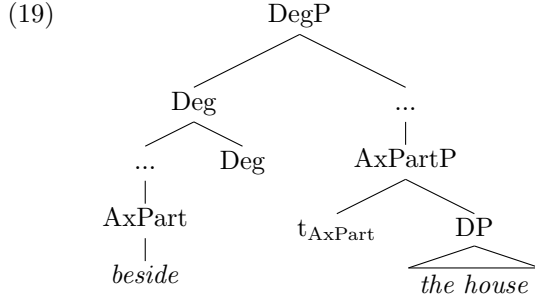   b. *They opened the door one meter next to the stage.

What unifies the Bounded prepositions is that they each include a meaning component not found in the Projective prepositions. Some presuppose a complex relation between a Figure and a Ground (*among, between, amid*), some imply a short distance (*next to, beside*), and others imply contact (*upon, against*). This contrasts with the Projective prepositions, which all feature the same basic relationship between a Figure and a Ground: a region is projected from some part of the Ground, and the Figure is located in that region.

I have identified three distinct functions in the construction of a projective adpositional meaning (in addition to AxPart and K): the projection of vectors (Loc), the identification of a region on the basis of that vector space (Deg), and the introduction of a Figure argument with some relationship to that region (p). Each Bounded adposition is different in at least one way which makes the inclusion of Deg_μ in the Deg position inappropriate or impossible. For example, *upon* and *against* include the meaning component of contact, like *on*. I have suggested that contact is a relational meaning contributed by p; if contact is simply incompatible with Deg_μ, which introduces a measure argument measuring vector lengths, then *upon* and *against* will be incompatible with measure expressions.

Similarly, if *beside* and *next to* imply closeness to the Ground, which is a function of the lengths of vectors, then conceivably *beside* and *next to* supply a meaning component for Loc and/or Deg which is incompatible with Deg_μ (see Svenonius 2008 for a development of this line of reasoning).

It is also possible that some of the Bounded prepositions are not projective at all; if a preposition like *between* or *among* includes in its meaning some non-projective sense where Projective prepositions have Deg and Loc, then it might not provide a vector space at all, and Deg_μ would be inapplicable. I will suggest below that there is reason to think that *between* and *among* supply p meanings, and that that is enough to make them incompatible with Deg_μ, but the argument is a subtle one and the non-projective analysis might be right after all.

In a late-insertion model of syntax (e.g. Halle and Marantz 1993), vocabulary items are inserted postsyntactically into syntactic trees. Assuming such a model, a Bounded preposition like *beside* would be specified with Deg features, because it supplies lexical content for Deg ('close,' following Svenonius 2008), as well as some lower Place features, such as AxPart (where 'side' makes its contribution). If lexical insertion is the association of vocabulary items with terminals, then some independent factor must ensure that Deg and AxPart are in the right configuration at the time of insertion for one vocabulary item to associate with both features. For example, it might be assumed that all P heads in English are conflated by head-movement, before lexical insertion, as illustrated in (19).

(19)

                    DegP
                   /   \
                Deg   ...
               /   \ |
             ...   Deg AxPartP
              | /   \
           AxPart   t$_{AxPart}$ DP
              | / \
           beside   *the house*

Alternatively, vocabulary insertion might allow vocabulary items to associate with several heads, without head movement (as in Ramchand 2008); what will be important below is that when two heads X and Y are lexicalized by a single vocabulary item, the phrasal projection of Y, YP, cannot undergo phrasal movement to a specifier between X and Y (specifically, in the account developed below, the movement of a certain phrasal subconstituent of PlaceP to a higher Place-internal position is incompatible with the spelling-out of both AxPart and Deg or *p* by *beside* and other Bounded Ps).[11]

2.4. Omission of Ground in PlaceP

In the previous section, I suggested that the Bounded prepositions each have a meaning component of contact, closeness, or interpolation not found among the Projective prepositions. This meaning component requires the Bounded prepositions to lexicalize syntactic structure which is incompatible with the head introducing measure expressions, and as a result, the Bounded prepositions cannot be modified by measure expressions.

However, I have not yet demonstrated how that account is superior to one in which the incompatibility between boundedness and measurement is handled in a non-syntactic semantic component, or one in which bounded features and measurability features block each other without the mechanism of syntactic projection. In this section I show how additional consequences are predicted by this analysis which would not be predicted on the alternatives.

As noted in §1, the landmark which is the complement of a preposition can be called the Ground. Omission of the Ground is possible in certain contexts; with the Projective prepositions from the first column in (3), anaphoric identification of the Ground is generally sufficient.

(20)   a.   As the group approached the final summit, Espen stayed **behind** (them).
        b.   There was a box on the table. **Inside** (it) was fine Swiss chocolate.
        c.   We stood on a bridge. **Below** (it) we could see barges laden with port wine.

---

[11]Other assumptions could also be made to work, for example a version of the model of Borer (2005), in which lexical items may be forced to move from one head position to another according to the features they are specified with, or the model of Brody (2000). The general question of how to associate vocabulary items with non-trivial syntactic structures is a major concern of work exploring the *Nanosyntax* hypothesis, originally due to my colleague Michal Starke and being pursued by several of us at CASTL in Tromsø. See various papers in Bašić et al. (2007).

    d.   Nils looked over the snowdrift. The frozen fjord **beyond** (it) was dotted with seals.

    e.   I saw a line of soldiers. The one **in front** (of it) was talking on the phone.

    f.   There was a beach. **Above** (it), the cliffs swarmed with birds.

The 'Bounded' series of prepositions, the one listed in the second column in (3), disallows anaphoric identification of Ground.

(21)   a.   As the group approached the final summit, Espen stayed **among** *(them).

    b.   We stood below a bridge. **Upon** *(it) we could see trucks laden with port wine.

    c.   There were two stacks of boxes in the warehouse. **Between** *(them) was a forklift.

    d.   I saw a small house. **Beside** *(it) was a gas pump.

    e.   There was a beach. **Next** *(to it), the cliffs swarmed with birds.

The possibility of a null anaphoric Ground correlates roughly with the possibility of overt *there*.

(22)   a.   Get **behind/inside/in front of/?below/?above/?beyond** there.

    b.   *Get **among/upon/between/beside/next to** there.

Kayne (2004) notes that in expressions like *in there* and *under here*, *here* and *there* are not interpreted as the Ground; *under here* means or can mean something like "here, under something" rather than "under this place."[12] This suggests that in at least some expressions like (22a), the Ground is null, and the deictic element is introduced higher up; assuming that higher material is introduced on the left (Kayne 1994), the preposition in (22a) has moved to the left, as Kayne (2004) suggests.

    The spatial words *here* and *there* can appear in a PP to the left of the preposition, as seen in (23).

(23)   a.   Come here inside the closet.

    b.   Lie there behind the dresser.

Note that the Ground must be overt in such cases.

(24)   a. ??Come here inside.

    b. ??Lie there behind.

The words *here* and *there* can also be added to full DPs, but not easily to pronouns.

(25)   a.   the house there

    b.   the man here

    c.   *it there

    d.   *him here

---

[12]However, this is not true of e.g. *?above here*, which means "above this place," not "here, above something." Interestingly, this seems to correlate at least somewhat with reduced acceptability, as indicated.

On the basis of these observations, we can see that (26a) must involve a DP with *here* inside it, since (26b) is ungrammatical, except on a reading where *here* is not interpreted outside the PP altogether (i.e. with a structure like the one in *get inside the spacecraft at this end*).

(26)   a.   Get inside the house here.
        b.   *Get inside it here.

Now, taking (26b) to show that PP-internal *here* cannot appear to the right of a full PP with overt Ground, it can be concluded from (27a) and (27b) that a PlaceP with a null KP must move across the position of PP-internal *here*, and furthermore that this movement is only possible when KP is null.

(27)   a.   Get inside here.
        b.   *Get here inside.

What appear to be two facts (appearing with a null KP and appearing with a following *here* or *there*) then reduce to a single one, namely the obligatory movement of PlaceP with null KP to a position left of the deictic element (illustrated here using shorthand labels PP and PP$'$ for as-yet unidentified categories, to be discussed in §2.5).

(28)
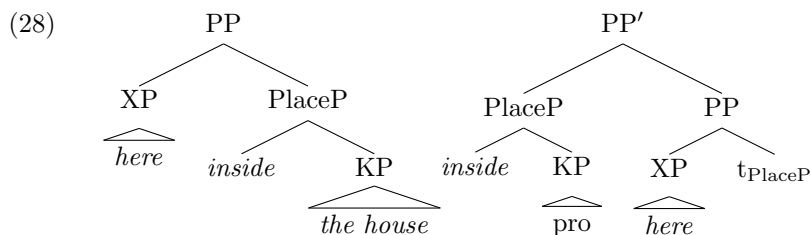
Suppose, then, that it is this movement which somehow licenses the null KP. This will be an important assumption in the analysis sketched below.

It remains to be explained why this option is available for some Ps and not others: why Place expressions like *above* are compatible with a null anaphoric KP which means something like *there*, while 'Bounded' prepositions like *beside* are not. In addressing this, I turn to some cross-linguistic observations below, after introducing some general facts about degree measurement.

2.5. A Deictic projection

I pointed out in §2.4 above that the Projective prepositions, but not the Bounded ones, allow a null KP, through movement to a PP-internal position. In §2.3, it was shown that the same two classes are also distinguished by the possibility of measure modification.[13]

(29)   a.   He was a hundred meters behind the bus.
        b.   We were a few inches in front of the bull.

(30)   a.   *He was a hundred meters between the airplanes.
        b.   *We were a few inches next to the bull.

---

[13]The same correlation is found in Serbian; see Bašić (2007) for discussion and analysis.

I have identified three semantic features which distinguish Bounded Ps: contact (clearest for *against* and *upon*), closeness (suggested for *beside* and *next to*), and interpolation (*among* and *between*). By making certain assumptions about projection and the organization of functional categories, I suggested that the presence of these features could be incompatible with measure expressions.

The question to be addressed here is why this cluster of properties should also prevent Bounded Ps from having null KPs. The answer I propose is based on the assumption, outlined above, that a Bounded preposition expresses features which must be checked on a higher head (namely, the p or Deg features). I suggested above that licensing of null KP requires movement of some projection of PlaceP. If PlaceP moves as a phrase to a specifier position below p or Deg, then the right configuration for checking p or Deg features cannot be achieved (assuming, on a head-movement analysis, that a head cannot move out of a specifier, cf. Baker 1988). In this section, I try to bolster the plausibility of that account by showing in a little more detail some of the evidence for a fine structure of Place.

There is evidence from other languages for a layer of functional structure below Deg which can express different degrees of proximity to a deictic center (Svenonius 2006); for example, in Korean, a demonstrative can be added to a PP structure, adding a proximal or distal interpretation, as exemplified in (31) (originally from Son 2006).

(31)   Ku sangca-nun oscang ce   mit-ey   twu-ess-ta.
        the box-TOP   *chest* DIST *bottom*-LOC *place*-PAST-DC
        'I put the box over there under the chest'

Similarly, in Tsez, there is a distal morpheme which separates the Place suffix from the Path suffix in the local case system (examples constructed on the basis of Comrie and Polinsky 1998).[14]

(32)   a. besuro-ƛ-āy
            fish-under-from
            'from under the fish'
        b. besuro-ƛ-āz-ay
            fish-under-DIST-*from*
            'from there under the fish'

Suppose that these distal and proximal morphemes are the spell-out of features in a layer called Deix[is]. There is evidence that Deix is below Deg, at least in Persian (see Pantcheva 2006, 2008 on Deix elements in Persian), as shown by the order of the measure phrase and the distal marker in (33a) (data from Marina Pantcheva, personal communication).

(33)   a. dær 10 metri-ye un birun-e   xane
            at   10 meters-EZ DIST *outside*-EZ *house*
            'there, 10 meters outside the house'

---

[14]For a suitable context of use, imagine that you have misplaced your scaling knife in a large kitchen, and somebody produces it from under a fish, which in the distal case would be distant from the speaker, for example across the kitchen. Thanks to Maria Polinsky (personal communication) for verifying that these are possible words in Tsez, and for providing attested examples.

b. *dær 10   un metri-ye   birun-e   xane
    at   DIST *10 meters*-EZ *outside*-EZ *house*

On a generally cartographic approach to PP structure, we might then expect
that if a language like English introduced proximal or distal information into a
PP structure, it would do so in the same region.

PlaceP which precedes Deix in English cannot also precede Deg.

(34)   a.   a few centimeters under here
        b.   *under a few centimeters here

Thus, it seems that the movement of the Groundless PlaceP is to a specifier
below Deg but above Deix; suppose it is the specifier of Deix itself. Somehow,
this movement licenses a null KP complement of Place. If a Bounded preposition
is to be inserted, PlaceP cannot move to the specifier of Deix, because those
Ps must head-move to Deg or to p, which as argued are both higher than Deix
(Deg was shown to be higher than Deix in Persian, and p was argued to be
higher than Deg on interpretive grounds).

I speculated above that a preposition like *between* might simply be non-
projective, for example requiring a Deg or Loc head with a denotation other
than the projective one. That would be sufficient to explain why it does not
occur with measure expressions, but not to explain why it does not occur with
a null Ground. The explanation suggested here for the distribution of null
Grounds suggests that *between* must specify either Deg or p meaning, which on
current assumptions means it must head-move up to Deg or p. Recall that p is
the locus of relational meanings like containment, contact, and attachment. If
a component of the meaning of *between* is something like a Figure-Ground rela-
tion of 'interpolation,' then *between* would have to head-move to p, which would
preclude PlaceP movement to SpecDeixP. Stated differently, PlaceP movement
to SpecDeixP precludes insertion of a bounded preposition, because the config-
uration suitable for such insertion is destroyed by the phrasal movement.

As it happens, there is evidence bearing on this speculation. The exact
Figure-Ground relation expressed by *between* is slightly different from that ex-
pressed by *in between*; the latter requires a sense of enclosure, so that for ex-
ample one can say that India is *between* Europe and Australia, but not that
India is *in between* Europe and Australia; one could say that India is *in between*
Bangladesh and Pakistan.

This shows that the meaning component of 'interpolation' that *between* car-
ries can be replaced by the meaning component 'containment' carried by *in*; and
when *in* means 'containment' it is by hypothesis a p element. Now, if p can be
separately lexicalized, then obviously *between* doesn't have to move there, and
this predicts that when *in* is present, *between* should be able to move by PlaceP
movement to SpecDeixP and license a null KP. The prediction is fulfilled.

(35)   a.   The street was lined with trees. There were benches between
             *(them).
        b.   The street was lined with trees. There were benches in between
             (them).
        c.   We laid down sheets of pasta with sauce between *(them).
        d.   We laid down sheets of pasta with sauce in between (them).

Since the alternative p option for *between* is *in*, which resists measurement, Deg_μ is still impossible (**three meters in the house, *three meters between the trees*).[15]

Another case which supports this approach is found in *near*. This word is unusual as it is also an adjective (*nearer, nearest*). However, as a preposition it combines with *right*, and when it does so it is not compatible with null KP, consistent with other Bounded prepositions.

(36)   a.   I was very near (it).
         b.   I was right near *(it).

I suggested above that *beside* and *next to* contained a meaning component of closeness, which corresponded to a value of the head Deg, preventing Deg_μ from being inserted there. This same value is plausibly shared by *near*, in its prepositional use, and is responsible for the impossibility of measure phrases with the prepositional use (*one inch near me). Needing to combine with Deg, on the assumptions outlined here, prevents *near* from undergoing PlaceP to DeixP movement, which prevents it from taking null KP. But given what we saw for *in between*, if there were a way to allow *near* to lexicalize Deg directly, letting some other element lexicalize Place, then PlaceP movement to Deix would be possible; and in this case the other element is *by*: *nearby*, like *in between*, allows the null KP.

(37)   a.   There is a bookstore in the middle of town. There is a café near *(it).
         b.   There is a bookstore in the middle of town. There is a café nearby.

The following minimal pair repackages (36) to illustrate the contrast between *near* and *nearby*.

(38)   a.   I was {very/*right} near.
         b.   I was {right/*very} nearby.

For some speakers, *nearby* is best with no overt Ground, suggesting that for those speakers, *by* does not carry additional content not already present in *near* and is inserted only when required by the movement of PlaceP. The deictic element *there* is fully acceptable, as predicted: *There's a café nearby there*.

In sum, Projective prepositions and Bounded prepositions differ in how much functional structure they spell out, in keeping with an approach to lexical variation that has been pursued in much recent work (see for example Cardinaletti and Starke 1999, Longobardi 2001, or Ramchand 2008). On an account in which they all correspond to single Place heads with different features, it is unclear how to capture the correlations between null KP, the distribution of *here* and *there*, measure phrases, and multi-part *in between*.

---

[15]Some speakers have reported to me that they can use *in among the trees*, but not *in among. On the account outlined here, if *in* occupies p in *in among the trees*, then the null Ground should be licensed. It is possible that the string *in among the trees* is only possible when *in* is understood as a modifying particle (cf. §2.6), as in *down among the trees* and *out among the trees*; this is also an alternative parse for *in between the trees*. If this is right, then the reason that only *in between* allows the null Ground is that *between*, unlike *among*, can appear with *in* in p.

2.6. Particles with Place

I have suggested that the central uses of the words *in* and *on* in English are expressions of *p* heads, perhaps with additional features; I will not discuss that use further in this paper. They also appear, apparently lower down, in expressions like *in front of* and *inside* (lower down, not *p*, since measure expressions are possible with these collocations). The same words are also used as so-called particles in expressions like *put the coat on* or *take the laundry in*, so I treat them together with particles here, along with *up, down, off*, and *out*. I also include some examples with *over*, which has particle uses, though it was not listed with the particles in (3).

All of these expressions can have locative meanings in simple PP constructions.

(39)   a.   The cat is up the tree.
        b.   The horse is down the hill.
        c.   The dog is out of the house.
        d.   The parrot is off its perch.
        e.   The monkey is on the roof.
        f.   The polar bear is in the wine cellar.

These expressions have much the same external distribution as other locative PPs, e.g. those headed by Projective prepositions like *above*. Null complementation, degree modification, combination with other elements, and directional meanings will be addressed in other sections.

Projective and Bounded Place expressions like *in front of* and *between* do not generally combine easily with each other.

(40)   a.   *the boat behind in front of the rock
        b.   *the cabin inside behind the mast
        c.   *the rudder above beyond the porthole
        d.   *the clouds beyond above the skylight

On the other hand, Particles like *up, down on, off*, and so on combine more freely with Place expressions:

(41)   a.   The boat drifted from **back** behind the hill
        b.   The boat drifted from **down** inside the cave
        c.   The boat drifted from **off** below the bridge
        d.   The boat drifted from **out** beyond the city limits
        e.   The boat drifted from **over** in front of the palace
        f.   The boat drifted from **up** above the dam

Particles which modify locative PPs do not restrict the space denoted by the PP. Instead, particles introduce viewpoint for the space, generally as a presupposition. To determine whether a Figure, say someone's stray reindeer, is *inside the cave*, it is sufficient to examine the location of the reindeer and the spatial extent of the cave. If the reindeer occupies the space bounded by the cave, then it is inside. In evaluating an assertion that a reindeer is *down inside the cave*, the truth conditions are essentially the same, but it is presupposed that the region bounded by the cave is lower than some logophoric center, e.g. the speaker or the subject is above the cave, or imagines himself at the mouth

of the cave, looking downward.

Similarly, looking down from a mountaintop at a boat in the higher part of a dammed river, one can describe the boat as *above the dam*, but not *up above the dam*, without invoking the perspective of someone below the dam. The vector space for *above the dam* is calculated by considering the dam as a region, and projecting vectors upward from it. If the boat is in that space, it is *above the dam*. In principle, then, the hiker on the mountaintop could call attention to it as *that boat down above the dam*. Similarly, a diver could refer to something, for example his clothes, as *up below the bridge*, though these situations are of course unusual. Far more common is a strengthening effect with a supportive particle: *down below, up above, out beyond, back behind*.

The point is further illustrated in (42).

(42)   a.   A plane flew low (up) above the treetops.
       b.   A bee flew low (#up) above the clover.

In (42), the particle most naturally suggests that the event is taking place somewhere which is 'up' from the speaker's point of view, making it absurd in (42b) unless the speaker is shorter than the clover. In fact, it seems just possible to say *The bee flew low down above the clover*, though examples in which the particle 'matches' the Place expression tend to sound more natural.

These examples show that the particles in locative PPs with Place expressions do not take the PlaceP as their complement (cf. also Hendrick 1976 and van Riemsdijk 1978 for insightful observations about headedness in complex PPs). The Ground of *up* in (42) is not the PlaceP *above the treetops*; rather, it is a logophoric space, generally understood from context, often the space that the speaker is in. The external argument that they locate is, however, the same Figure as that predicated of by the preposition as a whole. Therefore, it is plausible that they are adjoined at the p level, the level at which the Figure is introduced. Consistent with this, they precede Bounded prepositions, which by assumption are spelled out at the level of p or Deg, depending on the preposition.[16]

(43)   a.   I left my spear down between the floorboards.
       b.   I saw a wolverine out beside the fish-drying racks.

I return to particles below in §3 and §4.

2.7. Lexical versus functional heads

den Dikken (to appear), building on Koopman (2000), proposes the following structure for analogous constructions in Dutch:

(44) C_{Place} — Deg_{Place} — Place — P_{loc} — DP

---

[16]Notice that measure expressions can combine with these particles.

(i)   a.   I left my spear four inches down between the floorboards.
       b.   I saw a wolverine twenty meters out beside the fish-drying racks.

In these examples the spear would be four inches down, the wolverine twenty feet out; thus the particle can support a Deg phrase, and these examples do not suggest that the particle is attached below Deg.

For den Dikken, P$_{loc}$ is the lexical locus of prepositions including (locative uses of) *naast* 'beside,' *in* 'in,' *onder* 'under,' *over* 'over,' *op* 'on,' and *achter* 'behind,' while Place simply provides a landing site for moved elements including the locative pronoun *er*. Similarly, C$_{Place}$ seems mainly to be used as a landing site. I am using the label Loc for a head which denotes a function from regions to vector spaces, and assuming that in some cases the complement of Loc is an AxPart, which is a function from regions to regions; its complement K is a function from DP denotations to regions. I have also adopted Koopman's Deg and postulated layers p and Deix.[17]

(45) p — Deg — Deix — Loc — AxPart — K — DP

It seems to me that the most important difference is that on my account, the contentful material of spatial adpositions is distributed over a series of functional heads, for example *between* combines a sense of interpolation, in p, with a sense of bifurcation, in AxPart (presumably), contrasting with *among* with the same sense of interpolation in p but a sense of compositeness, rather than bifurcation, lower down. Similarly, *near* expresses closeness in Deg, as does *beside*, but *beside* has distinct AxPart content. On the assumption that rich 'encyclopedic' or conceptual content can be associated with vocabulary items which are inserted under functional heads, there is no need for a special lexical root at the bottom of a sequence of functional heads.[18]

To a certain extent my account resembles one in which P is part of the extended projection of N, as in Grimshaw (1991).

Apart from this difference between the present model and those of Koopman (2000) and den Dikken (to appear), my analysis of English looks very much like their analyses of Dutch in the richness of the functional structure postulated, an encouraging convergence as the accounts were developed on the basis of rather different data.

3. Paths

The canonical Paths are Goal (*to*) and Source (*from*); I have repeatedly used the distribution of *to* and *from* together with locative expressions in examples above. A Goal Path is one in which the locative expression names the final point in a path of motion (Kracht's 2002 COFINAL mode), and a Source Path is one in which the locative expression names the initial point (Kracht's ibid COINITIAL mode).

As noted in §2, English so commonly allows the Goal interpretation with locative expressions (e.g. *The twins raced under the bridge to get out of the rain*) that it is useful to posit a null TO, licensed under certain syntactic restrictions (e.g. adjacency to a motion verb, cf. Gruber 1967; Bennett 1975; Son and Svenonius to appear).

---

[17]Recall that I have been using 'Place' somewhat loosely for whatever collection of functional heads is present in a locative adpositional structure.

[18]Botwinik-Rotem (2004) argues for a lexical projection as part of a decomposition of spatial P, on the basis of its predicative properties. Here, I assume that the Figure is introduced by p, much as an applicative or possessive head, though functional, would be assumed to introduce a thematic argument.

PPs built around the preposition *to* generally cannot express a static location; they are not good after *from*, and not good as complement to verbs like *remain*.[19]

(46) a. *The boat drifted from to the edge.
      b. *The boat drifted from onto the shoals.
      c. *The boat remained to the edge.
      d. *The boat remained up to the cave.

As a restrictive modifer to common nouns, prepositional phrases with *to* may denote a route or path of travel.

(47) a. the boat to Narvik
      b. the tracks into the cave
      c. the path up to the summit

If these readings are not available, then *to*-phrases are bad as noun modifiers.

(48) a. *The cat to the edge was incautious.
      b. *The butter onto the knife was soft

Thus, there are at least three elements in English which fairly freely select PlacePs: *from, to*, and a null variant of *to* which is licensed by verbs of motion. They can be assumed to project PathPs which indicate where an expressed or implied movement begins or ends.[20]

3.1. 'Extended' Path-Places

I pointed out in §2 that examples with Projective prepositions, like (7) (repeated here as (49)), are most naturally interpreted as locative even when appearing with motion verbs.

(49) a. The plane flew **behind** the trees.
      b. The rabbit jumped **inside** the cage.
      c. The submarine sailed **below** the ice.
      d. The marathoners ran **beyond** the city limits.
      e. The revelers danced **in front** of the palace.
      f. The mountaineers climbed **above** the dam.

There is another series of prepositional elements in English with equally rich spatial content for which the most natural interpretation in these same contexts is directional. These prepositions, illustrated in (50), were introduced under the label 'Extended' in the table in (3) (Zwarts 2005 groups them together with uncontroversial Path prepositions *to* and *from*).

(50) a. The plane flew **around** the trees.
      b. The rabbit jumped **through** the cage.

---

[19]Exceptions include constructions with *next to* and *to the right of* etc., interesting facts which I will not be able to analyze here.

[20]Following Jackendoff (1983), there may also be a Path head meaning *via*, in order to allow *He ran between the trees*, on the reading where the endpoint is beyond the space between the trees, or *We'll have to crawl under the fence to get out* (Kracht's 2002 TRANSITORY mode). This head would indicate that some non-initial, non-final point along the path of movement was at the location specified.

    c.   The boat sailed **under** the bridge.
    d.   The marathoners ran **along** the river.
    e.   The revelers danced **across** the palace.
    f.   The mountaineers climbed **over** the dam.

A difference between the prepositions in (49) and those in (50) is that on the directional reading, those in (49) can be paraphrased with *to* (*to behind the trees*, etc.), while those in (50) cannot (i.e. the path meaning of *through the trees* does not mean 'to through the trees').

    The two classes behave differently with (non-path and non-vehicular) nominals.

(51)   a.   The climb above the dam was arduous.
          b.   The climb over the dam was arduous.
          c.   A dive below the bridge would be refreshing.
          d.   A dive under the bridge would be refreshing.
          e.   Kari's flip in front of the mat brought applause.
          f.   Kari's flip across the mat brought applause.

The examples with Projective prepositions (here, *above*, *below*, and *in front*) are (nearly) obligatorily interpreted as locative, while the directional reading is favored in the examples with the Extended prepositions (*over*, *under*, and *across*).

    The normal interpretation for (51a), for example, would be that the event of climbing was located above the dam, a locative reading; the normal interpretation for (51b) would be that the event took the climbers from one side of the dam to the other, a directional reading.

    This contrast can be accentuated by adding context.

(52)   a.   A dive below the bridge would allow us to see its foundations.
          b. ??A dive below the bridge would get us to Canada.
          c.   A dive under the bridge would get us to Canada.

The Extended prepositions include a Path component in their meaning, whereas Projective and Bounded prepositions must combine with TO or some other Path element in order to appear as Path expressions.

    Like Projective and Bounded prepositions, Extended prepositions have rich descriptive content regarding a spatial configuration based on topological or physical properties of a Ground object; for example, *through* is based on the identification of the outer limits of a three-dimensional Ground, *across* requires a two-dimensional Ground, and *along* requires an elongated or 'ribbonal' Ground; *around* makes reference to the perimeter of a Ground, and *over* and *under* pick out the regions above and below the Ground, in much the same way as *above* and *below* do. Thus, on the decompositional approach to prepositional meaning, we can assume that these prepositions lexicalize one or more of the lower heads in the extended projection of P, e.g. Place or AxPart, in addition to having a Path component.

    On the assumptions outlined in §2, a locative expression (specifically, a DegP) denotes a region, a contiguous set of points; a Figure introduced by p is understood to be located at any one or more of the points in that region. Extended prepositions, on the other hand, typically do not pick out points but

arrangements of points, i.e. 'paths.' *Through* and *across* pick out paths that connect opposing edges of the Ground, *along* picks out paths that run parallel to the Ground, and on their Extended use, *over* and *under* pick out paths that cross the Ground in the relevant dimension (unlike *above* and *below*).

This is seen most clearly in the static, locative senses of Extended prepositions; in order to determine whether a log is *across* a stream, it is necessary to consider whether the stream is bisected by the log; i.e. whether the log occupies one of the sets of contiguous arrangements of points which connect one side of the stream with the other. Similarly, it is quite clear that to evaluate whether something is *around* or *through* something else, it will not be sufficient to identify a region and assert that the Figure occupies some point in that region.

For concreteness I will continue to assume that Ps which combine two or more categorial features spell out complexes created by head movement; thus an Extended preposition involves movement of Place to Path (that is, roll-up of whichever of p, Deg, Deix, Loc, AxPart, and K are present). This correctly predicts that they should not cooccur with each other nor with other prepositions expressing Place or other categories in between Path and Place (**across in front of, *through behind*, etc.).

Furthermore, it is predicted that Extended prepositions do not easily cooccur with *to* or *from*, if those are morphological expressions of Path heads (as discussed below).

At first this seems to be false: one can say, for example, *They came from across the sea*; but notice that this means that their starting point was a point on the other side of the sea, i.e. a point that you would have to cross the sea to get to. I call this a G-location, for reasons explained in the next section. To anticipate the analysis, it means that there is a recursion of P structure in *from across the sea*.
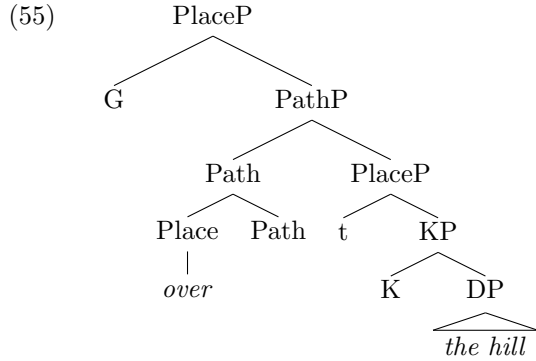
3.2. G-Locations

It is clear that Paths contain Places, as observed by Jackendoff (1983) and as I have repeatedly sketched in this paper; but there is also evidence that Places can sometimes be formed from Paths, which may lead to recursion. Cresswell (1978) investigated examples like that in (53).

(53)   Across a meadow a band is playing excerpts from *H.M.S. Pinafore*.

There is a locational interpretation of *across*, in which the band is stretched out in a line from one end of the meadow to the other, certainly not the most salient reading. The more natural reading is that the band is located in a space which is on the other side of the meadow from some point of view (e.g. the speaker's). Cresswell defines a function G which handles the natural locative interpretation of *across* in this case, which he paraphrases as 'at the end of a journey across the meadow.' The start point of the hypothetical journey is generally logophorically determined, or can be made explicit by use of a *from*-phrase, as illustrated in (54).
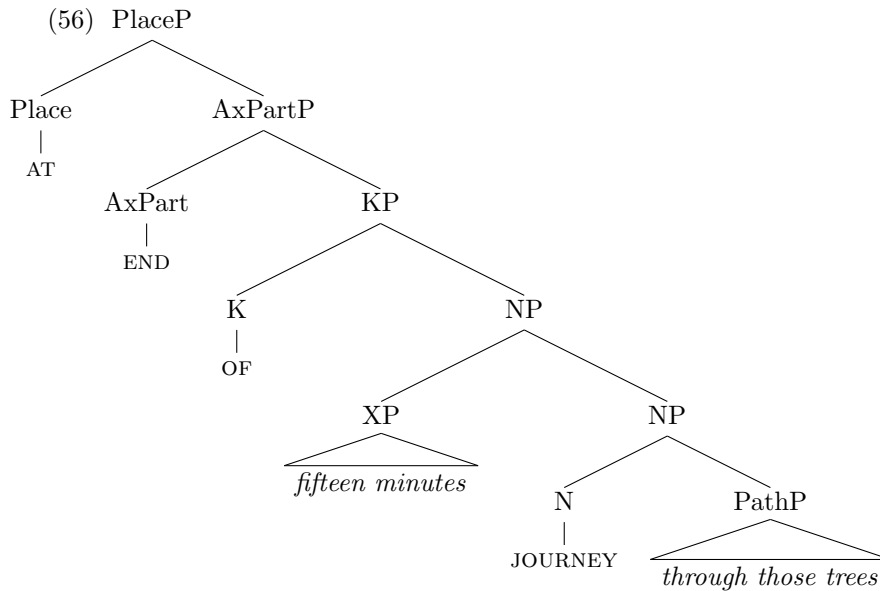
(54)   a.   The library is very noisy. There's a sawmill right over the hill.
         b.   The sawmill is over the hill from the library.

Cresswell did not suggest a syntactic manifestation of G, but I will: G is like
Place in what it projects, but with the special property that it selects a Path
complement, meaning something like Cresswell's 'at the end of a journey.'

(55)   PlaceP
            ┌──────────┴──────────┐
            G   PathP
                          ┌────────┴────────┐
                        Path   PlaceP
                     ┌────┴────┐   ┌────┴────┐
                   Place   Path   t   KP
                     │   ┌───┴───┐
                   over   K   DP
                                                  ╱──╲
                                               the hill

The function G, in placing Place above Path, disrupts what has otherwise been a
highly consistent cartographic functional hierarchy of projections. A hierarchy
could be preserved by decomposing the Path-to-Place expression, so that G
includes an entire functional sequence below Place. There is some evidence for
internal structure in G, for example time expressions can be used to measure G-
locations, e.g. *Fredrik's house is fifteen minutes through those trees* means that
Fredrik's house is at the end of a fifteen minute journey through those trees.

An option, then, would be to structurally represent G locations as involving
a null noun (corresponding to Cresswell's 'end of a journey') which in turn takes
the path-denoting PathP as its complement.

(56) PlaceP
   ┌─────┴─────────┐
 Place   AxPartP
   │   ┌──────┴───────┐
   AT   AxPart   KP
            │   ┌─────┴──────┐
           END   K   NP
                       │   ┌────┴────┐
                       OF   XP   NP
                             ╱──╲   ┌───┴────┐
                        *fifteen   N   PathP
                         minutes*   │   ╱───╲
                                  JOURNEY *through those trees*

The obligatory plural on *fifteen minutes* here is unexplained, however (cf. *a
fifteen-minute journey* vs. **fifteen-minute through those trees*), and I will not
have resolved the problem by the end of this paper.

Something which will become important later in conjunction with a full understanding of particles is a constraint on the Path-to-Place function G, namely that it does not operate on all paths.

(57) a. A band is playing from the town hall.
      b. A band is playing into the town hall.

While these sentences are grammatical, neither of them has the meaning expected if the G function could apply to Goal or Source Paths, e.g. 'A band is playing at the end of a journey from the town hall' (which could, perhaps, be anywhere). Compare these with the sentences below.

(58) a. A band is playing sixty yards from the town hall.
      b. A band is playing sixty yards into the woods.

Here, the interpretation is clearly locative in the intended sense, and roughly true to the paraphrase 'at the end of a sixty-yard journey from the town hall' etc. It seems that the Path-to-Place operator cannot operate on Goal or Source Paths, in the absence of a measurement.

Compare the following set as well; in (59), no Path-to-Place reading is possible, while in (60), such readings are readily available.

(59) a. A band is playing beside the town hall.
      b. A band is playing between the trees.

(60) a. A band is playing past the town hall.
      b. A band is playing through the trees.

Recall that the Bounded prepositions like *beside* and *between*, though they may form Paths with null TO, do not permit measure expressions, because (I suggested) they do not provide simple vector structures for measure expressions to limit, rather they stipulate closeness and interpolation respectively as part of their spatial meaning. Here, the contrast with the Extended prepositions *past* and *through* shows that they are also inappropriate complements for the G function.

I suggest that these different observations can be unified if what the G function requires is a scalar structure (cf. Kennedy 1999, Hay et al. 1999 on scalar structures in adjectives), and non-measured Goal and Source paths are not scalar in the relevant sense (cf. Fong 1997 for a non-scalar analysis of Goal and Source Paths; on this view, the measurable path in *Fran ran 100 yards to the car* is introduced by the verb, not by the preposition).

Paths constructed from *between* and *beside* are Goal Paths (with null TO), and so provide no scalar structure, hence are incompatible with G. Extended prepositions provide scales as part of their meaning (even *past*, which has minimal Place content, meaning something like 'via by').

To see where the measure comes from in Extended prepositions, consider the other locative interpretation that Extended prepositions provide, already mentioned briefly above. The other locative interpretation is paraphraseable as 'occupying the whole of a path' — for example, a pencil which is through a cushion occupies the whole of the path which goes through that cushion. Similarly for the other examples in (61). Call it the 'extended location' use.

(61) a. The pencil is all the way through the cushion.

> b.   There is a fence around the house.
> c.   We found a log across the stream.
> d.   The cloth lay over the table.

The extended location meaning is also not available for Goal and Source Paths (not even with measures). In this use, the scalar structure made available by the Extended preposition is mapped onto the extent of the Figure, which must be extended in space (cf. Gawron 2006 on non-canonical mappings of paths to scales other than time). Thus, extended location meanings are syntactically PathPs, even though they denote locations.

To sum up, there are two different ways to get a locative meaning from an Extended preposition. One is by the same mechanism that a Bounded or Projective prepositional phrase gives a locative meaning: a Bounded or Projective prepositional phrase denotes a set of points, and the Figure is asserted to occupy one or more of those points. An Extended preposition denotes a set of paths, and the Figure can be asserted to occupy one or more of those paths. That is the extended location reading.

The second way to get a locative meaning from an Extended preposition is to apply the G function, a Path-to-Place function which combines with scalar paths and returns the location at the 'end' of the path. Measure phrases can provide Goal and Source paths with the necessary scalar structure to provide the input to G, but without measure phrases, Goal and Source paths are not themselves scalar in the relevant way.

I provide additional evidence for these conclusions in §4 below.

3.3. Path with Particles

The same Particles which combine with PlaceP (see §2.6) also combine with PathP composed of Place and *from* or null or overt *to*, as shown in (62), (63), and (64), respectively.[21]

(62)   a.   The boat drifted **over** from behind the hill
       b.   The boat drifted **off** from below the bend
       c.   The boat drifted **in** from beyond the city limits
       d.   The boat drifted **back** from in front of the palace
       e.   The boat drifted **down** from above the dam
       f.   The boat drifted **up** from inside the cave

(63)   a.   The boat drifted **back** behind the hill
       b.   The boat drifted **off** below the bend
       c.   The boat drifted **out** beyond the city limits
       d.   The boat drifted **over** in front of the palace
       e.   The boat drifted **up** above the dam
       f.   The boat drifted **down** inside the cave

---

[21]In addition to its directional meaning, there is a reversative use of *back* which can occur in PathP, optionally cooccurring with Particles.

(i)   a.   She went back to the city where she was born.
      b.   They swam back down to the wreckage.

This use implies a return to an earlier location. This is not necessarily the case for the uses of *back* as a Particle illustrated in (62) and (63).

(64) a. The boat drifted **up** onto the shoals.
     b. The boat drifted **down** to the edge.
     c. The boat drifted **off** into the cave.

They may furthermore appear with the richer Extended prepositions of (50), repeated here as (65).

(65) a. The plane flew **out** around the trees.
     b. The rabbit jumped **down** through the cage.
     c. The boat sailed **back** under the bridge.
     d. The revelers danced **in** across the palace.
     e. The mountaineers climbed **up** over the dam.

The meanings here seem to restrict the Path denotations, in contrast to what was observed in §2.6 for particles in PlacePs. That is, if *into the room* denotes the set of paths which end in the room, then *up into the room* denotes that subset of those paths which are oriented upward. Thus, particles can serve a path-to-path function.

Apart from restitutive *back*, which can combine with other particles, there seems to be a limit of one per Place and one per Path. One particle in each of the two regions can be seen in (66).

(66) a. The boat drifted **out** from **over** behind the hill
     b. The boat drifted **off** from **down** below the bridge
     c. The boat drifted **in** from **off** beyond the city limits
     d. The boat drifted **over** from **up** in front of the palace
     e. The boat drifted **down** from **up** above the dam
     f. The boat drifted **down** from **back** inside the cave

With null TO, this gives sequences of two particles in a row.

(67) a. The boat drifted **out over** behind the hill
     b. The boat drifted **off down** below the bend
     c. The boat drifted **away off** beyond the city limits
     d. The boat drifted **up over** in front of the palace
     e. The boat drifted **along up** above the dam
     f. The boat drifted **down back** inside the cave

In such sequences, I think, the first particle always modifies the Path and the second always has the deictic reading discussed in §2.6. Therefore, it seems that particles cannot recursively modify Path, as might be expected if they were Path-to-Path functions which attached as adjuncts. This might motivate assigning them to a distinct category, Dir[ectional], which dominates Path. I discuss particles further in the next section.

4. Particles

4.1. The importance of overt Grounds for Locative readings

I suggested above that Path prepositions in English include *from, to*, and a null TO licensed by verbs of motion. The overt heads, at least, do not easily license

null PlaceP complements.

(68)   a. *The boat drifted from.
        b. *The boat drifted to.

However, Particles quite freely express Path without any overt Path preposition, as already illustrated in (63) in the previous section, and in fact also freely express Path without any overt PlaceP.

(69)   a. The boat drifted **over**.
        b. The boat drifted **off**.
        c. The boat drifted **in**.
        d. The boat drifted **back**.
        e. The boat drifted **down**.
        f. The boat drifted **up**.

The implicit Ground can correspond to a suitable location.

(70)   a. They slid off (the boat).
        b. They jumped on (the back).
        c. They rolled down (the drainpipe).
        d. They bounced up (the wall).
        e. They ran away (from the rhinoceros).
        f. They spilled over (the lip of the bucket).

The implicit Ground in these examples is freely contextualizable, as illustrated below.

(71)   a. What a high fence! A cow could never jump **over** (it).
        b. Listen to the glacier! A chunk is about to break **off** (it).
        c. Watch the ice hole! A seal is about to pop **out** (of it).
        d. Smell the well! I think an opossum must have fallen **in** (it).
        e. Keep away from the hill! There's a lot of snow ready to slide **down** (it).
        f. That ladder looks too wobbly for anybody to climb **up** (it).

This is not true of particles when used as locative expressions. Although locatives allow Particles as modifying elements (cf. §2.6), Particles cannot typically be the sole overt element in a locative PP (taking the complement of *from* in (72b) to be a locative PlaceP).

(72)   a. What a high fence! I wonder what is **over** *(it).
        b. Look at the glacier! I bet all these ice chunks came from **off** *(it).
        c. Look at the seal! It looks like it has a bite **out** *(of it).
        d. Smell the well! I think there must be a dead opossum **in** *(it).
        e. Smell the well! I think there must be a dead opossum **down** *(it).
        f. That ladder looks too wobbly for anybody to stay **up** *(it).

There are idiosyncratic, stative meanings associated with most of the Particles, but there is no simple locative meaning (except perhaps with *on*). The idiosyncratic meanings are often different for animates and inanimates.

(73)   a. She's off (*off shift*; or, *mistaken*)

    b. He's up (*awake*)

    c. He's down (*depressed*; or *prone*; or *(lying) on the ground*; not *downstairs*)

    d. She's in/out (*of house* or *office*)

    e. We're away (*from home*)

    f. We're on (*performing*; not easily, e.g., *on a boat*)

    g. She's over (*visiting me*)

(74)   a. It's off (*of an electric appliance or motor*; or, *spoiled*; or, *cancelled*)

    b. It's on (*motor or electric*)

    c. It's up/down (*in up or down position*, e.g. of a switch or a signpost)

    d. It's in (*fashionable*)

    e. It's away (*launched*)

    f. It's over (*ended*)

Although these idiosyncratic meanings are also available in dynamic contexts, the unavailability of simple Place meanings for bare Particles stands in stark contrast to the Path use, where Path contexts systematically license a vague meaning for Particles (in which Place can easily be understood as any suitable location, with a little bit of context).

My solution to the pattern noted here is based on the assumption that the locative uses of particles are derived by the G-function (the Path-to-Place function inspired by Cresswell 1978, introduced in §3.2). This distinguishes the particles from simple Place prepositions like *above* and so on, which can express locations easily, with or without complements. This means that *The pirates are up the ladder* means something like, 'The pirates are at the end of a journey up the ladder,' and *My orangutan is out of his cage* means roughly 'My orangutan is at the end of a journey out of his cage.'

Now, recall that the G-function does not apply freely to all PPs. Specifically, I suggested in §3.2, it can only apply to PPs which have a measured scalar structure. This was provided either by a measure expression with a Goal Path or Source Path, in the case of *six feet from the wall* or *sixty meters into the woods*, or else by an Extended preposition together with a Ground, in the case of *across the meadow* and *over the hill* and so on. In those cases, the measure is provided directly by the Ground; the extent of the meadow or the hill measures the path (in what I called the 'extended location' reading). In the next section I show how this account extends to particles.

4.2. Degree with Particles

Degree expressions are freely combinable with particles, with or without overt Grounds.

(75)   a. They slid two centimeters off (the center of the picture).

    b. They jumped way off (the back).

    c. They rolled twenty feet down (the drainpipe).

    d. They bounced partway up (the wall).

    e. They ran miles away (from the rhinoceros).

    f. They flew twenty meters out (of the yard).

Strikingly, measure expressions enable locative readings with particles, even in the absence of an overt Ground.

(76) a. They were two centimeters off (the center of the picture).
      b. They were way off (the back).
      c. They were twenty feet down (the drainpipe).
      d. They were partway up (the wall).
      e. They were miles away (from the rhinoceros).
      f. They were twenty meters out (of the yard).

The measure expressions are necessary in the absence of a Ground, for a general locative reading. In the absence of both the overt Ground and the overt measure expression, each of these sentences takes on a narrower meaning, less contextually dependent, more like the idiosyncratic meanings of the particles discussed above; because of this, examples like *They were off* are perfectly grammatical, but with a completely different meaning. Therefore, the bad examples must be shown in context.

(77) I threw a dart at the target with my eyes closed, and when I opened them, ...
      a. *...the dart was off.
      b. ...the dart was off the target.
      c. ...the dart was one inch off.
      d. ...the dart was one inch off the target.
      e. *...the dart was right off.

(78) We lost a frisbee in the wind. We looked all over for it at the top of the hill but we finally found it ...
      a. *...down.
      b. ...down the hill.
      c. ...sixty yards down.
      d. ...sixty yards down the hill.
      e. *...right down.

As indicated, the Degree expression *right* does not facilitate locative readings. Since *on* implies contact, and is therefore incompatible with measurement of distance, *on* cannot have a contextually specified locative meaning without an overt Ground.

(79) I bumped the table hard, but when I looked, ...
      a. *...all the glasses were still (right) on.
      b. ...all the glasses were still (right) on the table.
      c. *...all the glasses were still ten centimeters on (the table).

The pattern here recalls the connection, discussed in §2.4 and §2.3, between the omissibility of the Ground and the measurability of distance in PlaceP, as illustrated in (80) (cf. also (18) in §2.3).

(80) a. We were (*six feet) against/among/upon/beside the trees.
      b. We were against/among/upon/beside *(them).
      c. They were (six feet) below/above/inside/beyond/in front of the cave.

      d.   They were below/above/inside/beyond/in front of (it).

There seem to be three classes of elements. One, the Projective elements like *above*, allow null Ground freely, with locative meanings. Another, the Bounded elements like *against*, do not allow null Ground at all. The third class, including both the Extended prepositions and the Particles, allow a null Ground freely only in their directional use; with a locative meaning, they require either an overt Ground or an overt measure expression.

    Recall that the particles can only get their locative meanings in conjunction with G, as I suggested above, unlike Place prepositions like *above* and *in front*, which are basically locative, picking out simple vector spaces. Recall, too, that G requires a measured scalar structure to operate on: either through an overt measure expression, or an Extended preposition like *across* or *through*, which by assumption have internal structure. Combining these two observations, it seems that the mysterious distribution of the null complement of the particle can be explained if it can be shown that the DP complement to a particle provides a measured scalar structure.

    This seems to be the case, most clearly with particles like *up* and *down*. These particles only combine with DPs which can be understood to describe the ground traversed; thus, one can go up a hall, a ladder, a staircase, or a hill, but not up a table or a house, unless the table or house is actually climbed (as in *the mouse climbed up the table*). I suggested above that the basic meaning of particles is as a Path-to-Path function; essentially, a particle combines with a DP only when the DP itself can be construed as a Path (similarly, a DP which can be construed as a Path can be the complement of a verb like *walk*, as in *I walked the Appalachian Trail*; cf. Ramchand 2008).

5. Conclusion

I have proposed a structure for a rather rich class of locative expressions in English. I have used different labels for the different subtypes, using distributional evidence as my chief criterion, but noting that the semantic interpretation of the members of each class shares important features. In the end, I postulated a category K, for functional prepositions and case-markers; a category AxPart, for shape characteristics of the Ground; a category Loc, for mapping Grounds to vector spaces; a category Deix, for introducing deictic information about proximity to a contextual center; a category Deg, for constructing regions on the basis of vector spaces; a category p, for expressing the configurational relation between the Figure and the space; a category Path for prepositions like *to* and *from*; and a category Dir for the particles, which I analyze as primarily path to path functions but which also appear in several other roles, notably as Place modifiers. These heads appear to be fairly rigidly ordered in a hierarchical way, recalling much recent work on the architecture of other categories.

    Some indications emerged that the order might not be entirely rigid. Importantly, there is the possibility of recursion. But even apart from that, it appears that degree expressions and measures, and possibly also particles, may attach either to projections of Path or of Place (see in particular den Dikken to appear on Deg in Path).

    Another recurring complication is the fact that many elements appear to be

multiply ambiguous. It is a very interesting question to what extent this reflects homophony, polysemy, or the possibility of inserting the same morpheme into different parts of a functional structure.

The complications of recursion and polysemy aside, the consistency, within each group of adpositional elements, of certain aspects of the semantic contribution of the constituent components raises the hope that the various complex cooccurrence restrictions could be completely derived from a proper understanding of the semantics of these elements. If that is the case, then it might be expected that some of the elements here could occur in different locations in the hierarchy — the hierarchy itself being epiphenomenal.

References

Baker, Mark C. 1988. *Incorporation: A Theory of Grammatical Function Changing*. University of Chicago Press, Chicago.

Bašić, Monika. 2007. Serbian Ps with and without *iz* and the Superset Principle. In *Tromsø Working Papers on Language and Linguistics: Nordlyd 34.2*, Special issue on Space, Motion, and Result, edited by Monika Bašić, Marina Pantcheva, Minjeong Son, and Peter Svenonius, pp. 300–319. University of Tromsø, Tromsø. Available at http://www.ub.uit.no/baser/nordlyd/.

Bašić, Monika, Marina Pantcheva, Minjeong Son, and Peter Svenonius (eds.). 2007. *Tromsø Working Papers on Language and Linguistics: Nordlyd 34.2*, Special issue on Space, Motion, and Result. University of Tromsø.

Bennett, David C. 1975. *Spatial and Temporal Uses of English Prepositions: An Essay in Stratificational Semantics*. Longman, London.

Borer, Hagit. 2005. *In Name Only (Structuring Sense, vol. I)*. Oxford University Press, Oxford.

Botwinik-Rotem, Irena. 2004. *The Category P: Features, Projections, Interpretation*. Ph.D. thesis, Tel Aviv University.

Brody, Michael. 2000. Mirror theory: Syntactic representation in perfect syntax. *Linguistic Inquiry* 31 1: 29–56.

Cardinaletti, Anna and Michal Starke. 1999. The typology of structural deficiency: A case study of three classes of pronouns. In *Clitics in the Languages of Europe*, edited by Henk van Riemsdijk, pp. 145–233. Mouton, Berlin.

Carlson, Laura, Terry Regier, and Eric Covey. 2003. Defining spatial relations: Reconciling axis and vector representations. In *Representing Direction in Language and Space*, edited by Emile van der Zee and John Slack, pp. 111–131. Oxford University Press, Oxford.

Cinque, Guglielmo. 1999. *Adverbs and Functional Heads: A Cross-Linguistic Perspective*. Oxford University Press, New York.

Clark, H. H. 1973. Space, time, semantics, and the child. In *Cognitive Development: The Acquisition of Language*, edited by T. E. Moore, pp. 28–64. Academic Press, New York.

Comrie, Bernard and Maria Polinsky. 1998. The great Daghestanian case hoax. In *Case, Typology and Grammar: In Honor of Barry J. Blake*, edited by Anna Siewierska and Jae Jung Song, pp. 95–114. Benjamins, Amsterdam.

Creary, Lewis G., J. Mark Gawron, and John Nerbonne. 1989. Reference to locations. In *Proceedings of the 27th Annual Meeting of the Association for Computational Linguistics*, pp. 42–50. Association for Computational Linguistics, Morristown, NJ.

Cresswell, M. J. 1978. Prepositions and points of view. *Linguistics and Philosophy* 2: 1–41.

den Dikken, Marcel. to appear. On the functional structure of locative and directional PPs. In *Cartography of Syntactic Structures, vol. 6*, edited by Guglielmo Cinque and Luigi Rizzi. Oxford University Press, Oxford.

Emonds, Joseph. 2000. *Lexicon and Grammar: The English Syntacticon*. Mouton, Berlin.

Fong, Vivienne. 1997. *The Order of Things: What Directional Locatives Denote*. Ph.D. thesis, Stanford.

Gawron, Jean-Mark. 2006. Generalized paths. In *Proceedings of SALT XV*, edited by Effi Georgala and Jonathan Howell. CLC, Ithaca, NY.

Grimshaw, Jane. 1991. Extended projections. Ms. Brandeis University.

Gruber, Jeffrey. 1967. Look and see. *Language* 43 4: 937–947.

Halle, Morris and Alec Marantz. 1993. Distributed Morphology and the pieces of inflection. In *The View from Building 20: Essays in Linguistics in Honor of Sylvain Bromberger*, edited by Kenneth Hale and Samuel Jay Keyser, pp. 111–176. MIT Press, Cambridge, Ma.

Hay, Jennifer, Christopher Kennedy, and Beth Levin. 1999. Scalar structure underlies telicity in "Degree Achievements". In *Proceedings of SALT IX*, edited by Tanya Matthews and Devon Strolovitch, pp. 127–144. CLC Publications, Ithaca, NY.

Hendrick, Randall. 1976. Prepositions and the X′ theory. In *UCLA Papers in Syntax, vol. 7*, edited by Joseph E. Emonds, pp. 95–122. UCLA, Los Angeles.

Holmberg, Anders. 2002. Prepositions and PPs in Zina Kotoko. In *Some Aspects of the Grammar of Zina Kotoko*, edited by Bodil Kappel Schmidt, David Odden, and Anders Holmberg, pp. 162–174. Lincom Europa, München.

Jackendoff, Ray. 1983. *Semantics and Cognition*. MIT Press, Cambridge, Ma.

Kayne, Richard S. 1994. *The Antisymmetry of Syntax*. MIT Press, Cambridge, Ma.

Kayne, Richard S. 2004. Here and there. In *Lexique Syntaxe, et Lexique-Grammaire/Syntax, Lexis, & Lexicon-Grammar: Papers in Honor of Maurice Gross*, edited by C. Leclère, E. Laporte, M. Piot, and M. Silberztein, pp. 253–275. John Benjamins, Amsterdam.

Kennedy, Christopher. 1999. *Projecting the Adjective: The Syntax and Semantics of Gradability and Comparison*. Garland, New York. (1997 UCSC Ph.D. thesis).

Koopman, Hilda. 2000. Prepositions, postpositions, circumpositions, and particles. In *The Syntax of Specifiers and Heads*, edited by Hilda Koopman, pp. 204–260. Routledge, London.

Kracht, Marcus. 2002. On the semantics of locatives. *Linguistics and Philosophy* 25: 157–232.

Kratzer, Angelika. 1996. Severing the external argument from the verb. In *Phrase Structure and the Lexicon*, edited by Johann Rooryck and Laurie Zaring, pp. 109–137. Kluwer, Dordrecht.

Krifka, Manfred. 1998. The origins of telicity. In *Events and Grammar*, edited by Susan Rothstein, pp. 197–235. Kluwer, Dordrecht.

Levinson, Stephen C. 1996a. Frames of reference and Molyneux's questions: Cross-linguistic evidence. In *Language and Space*, edited by Paul Bloom, Mary A. Peterson, Lynn Nadel, and Merrill F. Garrett, pp. 109–169. MIT Press, Cambridge, Ma.

Levinson, Stephen C. 1996b. Relativity in spatial conception and description. In *Rethinking Linguistic Relativity*, edited by John J. Gumperz and Stephen C. Levinson, pp. 177–202. Cambridge University Press, Cambridge.

Levinson, Stephen C. 2003. *Space in Language and Cognition: Explorations in Cognitive Diversity*. Cambridge University Press, Cambridge.

Longobardi, Giuseppe. 2001. Formal syntax, diachronic minimalism, and etymology: The history of French *chez. Linguistic Inquiry* 32 2: 275–302.

Nam, Seungho. 1995. *The Semantics of Locative PPs in English*. Ph.D. thesis, UCLA.

Pantcheva, Marina. 2006. Persian preposition classes. In *Nordlyd, Tromsø Working Papers in Language & Linguistics: 33.1, Special Issue on Adpositions*, edited by Peter Svenonius and Marina Pantcheva, pp. 1–25. University of Tromsø, Tromsø. Available at http://www.ub.uit.no/baser/nordlyd/.

Pantcheva, Marina. 2008. The place of PLACE in Persian. In *Syntax and Semantics of Spatial P*, edited by Anna Asbury, Jakub Dotlačil, Berit Gehrke, and Rick Nouwen, pp. 305–330. John Benjamins, Amsterdam.

Ramchand, Gillian. 2008. *Verb Meaning and the Lexicon*. Cambridge University Press, Cambridge.

van Riemsdijk, Henk. 1978. *A Case Study in Syntactic Markedness: The Binding Nature of Prepositional Phrases*. Foris, Dordrecht.

van Riemsdijk, Henk and Riny Huybregts. 2002. Location and locality. In *Progress in Grammar: Articles at the 20th Anniversary of the Comparison of Grammatical Models Group in Tilburg*, edited by Marc van Oostendorp and Elena Anagnostopoulou, pp. 1–23. Meertens Instituut, Amsterdam. www.meertens.knaw.nl/books/progressingrammar/.

Rooryck, Johan and Guido Vanden Wyngaerd. 2007. The syntax of spatial anaphora. In *Tromsø Working Papers on Language and Linguistics: Nordlyd 34.2,* Special issue on Space, Motion, and Result, edited by Monika Bašić, Marina Pantcheva, Minjeong Son, and Peter Svenonius, pp. 33–85. University of Tromsø, Tromsø. CASTL, Tromsø. Available at http://www.ub.uit.no/baser/nordlyd/.

Roy, Isabelle and Peter Svenonius. to appear. Complex prepositions. In Proceedings of *Autour de la préposition*, Presses Universitaires de Caen.

Son, Minjeong. 2006. Syntactic status of spatial terms in Korean locative expressions. Handout from Moving Right Along seminar in Tromsø.

Son, Minjeong and Peter Svenonius. to appear. Microparameters of cross-linguistic variation: Directed motion and resultatives. Proceedings of WCCFL XXVII, UCLA.

Starke, Michal. 1993. Notes on prepositions and clause-structure. Memoire de Diplôme, University of Geneva.

Svenonius, Peter. 2003. Limits on P: *filling in holes* vs. *falling in holes. Nordlyd, Tromsø Working Papers on Language and Linguistics. Proceedings of the 19th Scandinavian Conference of Linguistics* 31 2: 431–445.

Svenonius, Peter. 2006. The emergence of axial parts. In *Nordlyd, Tromsø Working Papers in Language & Linguistics: 33.1, Special Issue on Adpositions*, edited by Peter Svenonius and Marina Pantcheva, pp. 49–77. University of Tromsø, Tromsø. Available at http://www.ub.uit.no/baser/nordlyd/.

Svenonius, Peter. 2007. Adpositions, particles, and the arguments they introduce. In *Argument Structure*, edited by Eric Reuland, Tanmoy Bhattacharya, and Giorgos Spathas, pp. 71–110. John Benjamins, Amsterdam.

Svenonius, Peter. 2008. Projections of P. In *Syntax and Semantics of Spatial P*, edited by Anna Asbury, Jakub Dotlačil, Berit Gehrke, and Rick Nouwen, pp. 63–84. John Benjamins, Amsterdam.

Svenonius, Peter and Christopher Kennedy. 2006. Northern Norwegian degree questions and the syntax of measurement. In *Phases of Interpretation*, edited by Mara Frascarelli, pp. 133–161. Mouton de Gruyter, Berlin.

Talmy, Leonard. 2000. *Toward a Cognitive Semantics: Concept Structuring Systems*, vol. I. MIT Press, Cambridge, Ma.

Wunderlich, Dieter. 1991. How do prepositional phrases fit into compositional syntax and semantics? *Linguistics* 29: 591–621.

Yadroff, Michael. 1999. *Formal Properties of Functional Categories: The Minimalist Syntax of Russian Nominal and Prepositional Expressions*. Ph.D. thesis, Indiana University.

Zwarts, Joost. 1997. Vectors as relative positions: A compositional semantics of modified PPs. *Journal of Semantics* 14: 57–86.

Zwarts, Joost. 2005. Prepositional aspect and the algebra of paths. *Linguistics and Philosophy* 28: 739–779.

Zwarts, Joost and Yoad Winter. 2000. Vector space semantics: A model-theoretic analysis of locative prepositions. *Journal of Logic, Language, and Information* 9: 169–211.