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## 1 Introduction

Several generative analyses of pre/postpositional phrases (PP) have converged in recognizing a strict structural hierarchy with directional adpositions (PathP) above locational adpositions (PlaceP) (van Riemsdijk 1990, Koopman 2000, Ayano 2001, den Dikken 2003). However, characterizing spatial elements within this layered PP that exhibit nominal properties has proven more problematic. Japanese spatial terms such as *ue* 'top/on/above/up' and *shita* 'bottom/under/below/down' have sometimes been treated as P with nominal properties (Watanabe 1993), sometimes as N (Ayano 2001), or as N which move to a higher P position in the course of a syntactic derivation (Inagaki 2002). French terms such as *haut* 'top/up' and *bas* 'bottom/down' are often left unanalyzed within larger structures such as *en haut de* 'on top of' or *en dessous de* 'underneath'. In this paper, I argue that such terms in the context of layered PP are unambiguously of the category N, not P, even though they lack certain characteristic aspects of full lexical nouns. In Section 2, I extend the standard analysis of layered PP structure to include a bare NP projection, which hosts this closed subclass of locative nouns, here termed LocN. The following three sections provide a comparative analysis of LocN in Japanese, French and English. In Section 3, it is argued that in each language LocN is syntactically distinct from open-class, lexical N; Section 4 shows that it is categorially distinct from adpositions; and in Section 5, experimental evidence is used to support the hypothesis that this extended PP-hierarchy is available throughout the process of first language acquisition.

## 2 The Layered PP Hypothesis

Recent analyses of a higher PathP and a lower PlaceP in syntax have their origins in Jackendoff's (1983, 1990) theory of Conceptual Semantics, in

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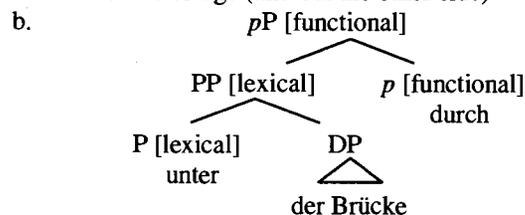
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which sentences like (1a) and (2a) are assigned semantic representations like (1b) and (2b).

- (1) a. The deer came from behind the tree.  
 b. [Event COME ([Thing DEER], [Path FROM ([Place BEHIND ([Thing TREE]))])])]
- (2) a. Zidane went onto the pitch.  
 b. [Event GO ([Thing ZIDANE], [Path TO ([Place ON ([Thing PITCH]))])])]

This layered spatial structure has become standard in autonomous semantic representations. However, irrespective of its status in conceptual structure, there is independent evidence that the [PATH [PLACE]] configuration is part of syntactic structure. In van Riemsdijk's (1990) seminal article on this topic, he provides convincing evidence of a higher functional layer in German PPs with circumpositions. In cases where there is a (lower) preposition and a (higher) postposition, the lower lexical P (but *not* the higher functional P) may assign case, may subcategorize the DP, and may impose idiosyncratic selectional restrictions, among other distinctions (van Riemsdijk 1990:236–237). For example, the preposition *unter* 'under' may assign either dative or accusative case, while *durch* 'through' can only assign accusative case. In the following circumpositional structure, it is clearly the lexical preposition *unter* 'under' that assigns case to the object, not the functional postposition.

- (3) a. unter der Brücke durch  
 under the-DAT bridge through  
 'under the bridge (and out the other side)'



Subsequent work by Koopman (2000) and den Dikken (2003) has bolstered this analysis for directional PPs in Dutch and German, and Ayano (2001) provides a comprehensive crosslinguistic survey of previous work that supports an account of PP layers in syntax drawing on data from a broad range of language families including Altaic, Aztecan, Celtic, Finno-Ugric, Germanic, Mayan, Na-Dene and Slavic.

The universality of this structure is further supported by the discovery that in languages that express notions of PATH and PLACE in extended spatial case systems, there is a strict hierarchy of PATH, PLACE, and 'grammatical' affixes which exactly mirrors the PP-internal hierarchy. Van Riemsdijk and Huybregts (2001) (following work by Haspelmath 1993) present a paradigm of locative case suffixes in the Caucasian language Lezgian, which includes the following examples.

Postesstive	sew-re-q <sup>h</sup>	'behind the bear'
Postelative	sew-re-q <sup>h</sup> -aj	'from behind the bear'
Postdirective	sew-re-q <sup>h</sup> -di	'to behind the bear'
Subessive	sew-re-k	'under the bear'
Subelative	sew-re-k-aj	'from under the bear'
Postesstive	sew-re-q <sup>h</sup>	'behind the bear'

Table 1: Examples of spatial case-marking in Lezgian (van Riemsdijk and Huybregts 2001:4).

The full paradigm from which these examples are drawn is striking in its uniformity. In each case, the noun *sew* 'bear' is followed by a stem augmentative suffix, which is arguably a morphological analogue of 'grammatical P' (English *of*, French *de*, Japanese *no*). This is followed by one or two interpretable morphemes, the first corresponding to PLACE ('behind' and 'under' in Table 1), and the second corresponding to PATH ('to' and 'from'). Crosslinguistic evidence suggests that there is another plausible candidate for this higher position, as several agglutinative languages have another morpheme in the same slot meaning 'via' or 'past'. Such languages include Inuit (Bok-Bennema 1991) and Walpiri (Hale 1986). As we shall see, this appears to have a syntactic counterpart in prepositions such as French *par* 'via/through'.

### 3 Spatial Nouns in the PP Complex

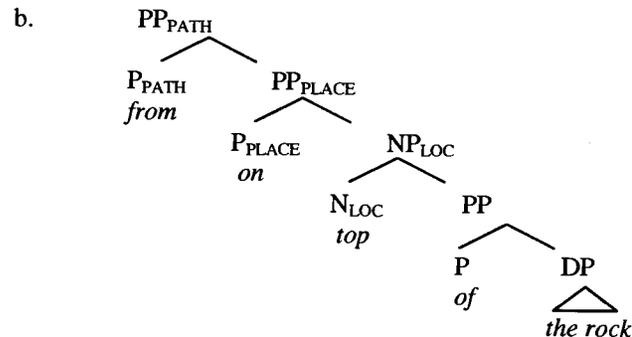
Almost all previous research on elaboration in the PP system has focused on the PathP and PlaceP layers. However, this line of analysis may be extended to include a further common category in a particular, fixed position in the hierarchy: namely, a subclass of spatial nouns here termed LocN. Although several authors have made interesting forays into the role of noun-like elements in PP structure (e.g. Ayano 2001, Holmberg 2002), much work remains to be done on this topic. My own experimentation on the acquisition of the syntax of motion events has focused on English (which usually expresses direction in PP), French (which typically expresses direction in either

PP or V), and Japanese (which tends to express direction in V). This particular selection of languages serves to illustrate that the syntactic possibilities discussed hold irrespective of the so-called "verb-framed / satellite-framed" distinction (Talmy 1985). These experiments, to be discussed in more detail in Section 5, furnished the elicited production data from which the following examples are taken. PPs have been italicized for ease of comparison.

### 3.1 LocN in English

The only elements characterized here as LocN in English are the terms *top* (as in *on top of*), *front* (as in *in front of*), and, in American English only, *back* (as in *in back of*). An example from the elicited production data is given below.

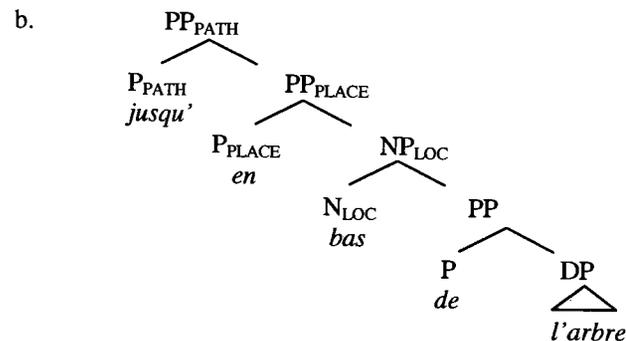
- (4) a. He jumps *from on top of the rock* (English 3-yr-old)



### 3.2 LocN in French

French terms here treated as cases of LocN include *haut* 'top', *bas* 'bottom', *dessous* 'below', *dedans* 'inside' and *dehors* 'outside'. The only French example in the production data which apparently shows the positions in layered PP all filled is the following.

- (5) a. Il glisse *jusqu'en bas de l'arbre* (French adult)  
 he slides until- $P_{LOC}$  bottom of the-tree  
 'He slides to the bottom of the tree.'



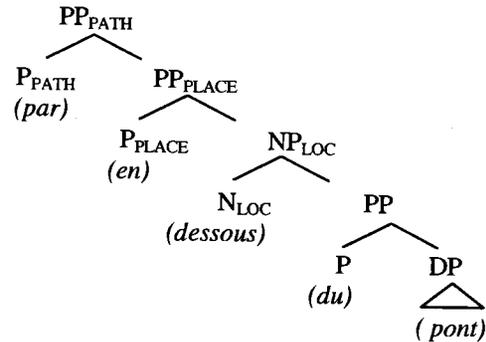
However, the status of *jusque* 'until' in such cases is controversial. It might be argued that *jusque* is not directional *per se* but rather, like Japanese *made* 'until', functions as an 'event-delimiter' (Beavers 2003). This does not preclude analyses in which it occupies the same position in the hierarchical structure (a functional P projection above PlaceP).

As an alternative, consider the following French utterances describing someone running under a bridge (and coming out the other side).

- (6) a. Il passe *par-dessous* (French 6-yr-old)  
 he passes via-underneath  
 'He goes under it (and out the other side).'
- b. Il passe *en dessous* (French 7-yr-old)  
 he passes LocP underneath  
 'He goes under it (and out the other side).'
- c. Il passe *par en dessous* (French 6-yr-old)  
 he passes via LocP underneath  
 'He goes under it (and out the other side).'
- d. Il passe *en dessous du pont* (French 5-yr-old)  
 he goes-via LocP underneath of-the bridge  
 'He goes under the bridge (and out the other side).'

The terms *par* 'via' and *en* 'at/in/on' (here glossed as LocP) may be used as the sole P above LocN, as in (6a, b), or may stack in accordance with the [PATH [PLACE]] hierarchy, as in (6c). While the former two constructions may be used transitively (6d is one example), the latter, layered PP appears only to be possible in the intransitive form. As mentioned earlier, French *par* 'via' is arguably a prepositional equivalent of locative case suffixes in Inuit and Warlpiri, bearing the same semantics in the same syntactic position. A composite example is given below in the form of a tree diagram.

(7)

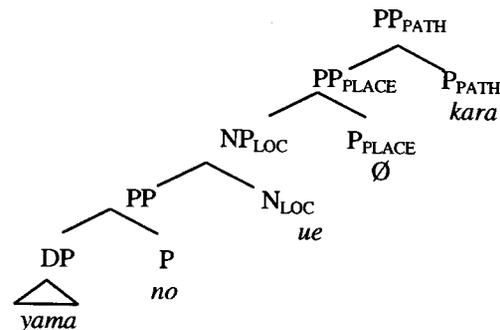


### 3.3 LocN in Japanese

Despite being occasionally characterized as postpositions, I shall argue that Japanese elements such as *ue* 'top/above', *shita* 'bottom/below', *naka* 'inside', *soto* 'outside', *mae* 'front' and *ushiro* 'behind' are all cases of LocN. Above this nominal position in the hierarchy, Japanese spatial postpositions never stack, so separate examples are given below, with PathP and PlaceP, respectively.

- (8) a. *yama no ue kara korogatta* (Japanese 6-yr-old)  
 mountain GEN top from rolled  
 'He rolled from the top of the mountain'.

b.



- (9) a. *dōkutsu no naka ni haitteru no* (Japanese 5-yr-old)  
 cave GEN inside P<sub>LOC</sub> enter-TE-go-PROG PART  
 'He's going inside the cave'

- (11) a. \*He climbed on tops of the mountains.  
 b. \*He climbed on snow-covered top of the mountain.
- (12) a. He climbed on the tops of the mountains.  
 b. He climbed on the snow-covered top of the mountain.

These contrasts are also found in French, as shown below.

- (13) Il a grimpé en haut de la montagne.  
 he AUX climbed P<sub>LOC</sub> top of the mountain  
 'He climbed on top of the mountain.'
- (14) a. \*Il a grimpé en hauts des montagnes.  
 he AUX climbed P<sub>LOC</sub> top-PL of-the-PL mountain-PL  
 'He climbed on tops of the mountains.'  
 b. \*Il a grimpé en haut enneigé de la montagne.  
 he AUX climbed P<sub>LOC</sub> top snow-covered of the mountain  
 'He climbed on snow-covered top of the mountain.'
- (15) a. Il a grimpé sur les hauts des montagnes.<sup>2</sup>  
 he AUX climbed on the-PL top-PL of-the-PL mountain-PL  
 'He climbed on the tops of the mountains.'  
 b. Il a grimpé sur le haut enneigé de la montagne.  
 he AUX climbed on the top snow-covered of the mountain  
 'He climbed on the snow-covered top of the mountain.'

Despite the lack of overt Ds in Japanese, the same restrictions on modification may be observed by replacing the LocN with a *bona fide* lexical N, such as *chōjō* 'summit', which accepts modification, as in (17b).

- (16) Yama no ue ni nobotte itta.  
 mountain GEN top P<sub>LOC</sub> climb-TE went  
 'He climbed on top of the mountain.'
- (17) a. \*Yama no yuki no tsumotta ue ni nobotte itta.  
 mountain GEN snow GEN covered top P<sub>LOC</sub> climb-TE went  
 'He climbed on snow-covered top of the mountain'  
 b. Yama no yuki no tsumotta chōjō ni nobotte itta.  
 mountain GEN snow GEN covered summit P<sub>LOC</sub> climb-TE went  
 'He climbed on the snow-covered summit of the mountain.'

<sup>2</sup>In general French speakers dislike this form, preferring to keep *haut* in the singular; however, some speakers accept it, and all informants agree that there is a definite grammaticality contrast with (14a).

## 5 Differences between LocN and P

Despite the differences in referential properties between LocN and fully lexical nouns, it can be clearly demonstrated that these elements are of the category N rather than P, using constructed examples. The first two observations concern the relation of LocN to the FIGURE and the GROUND in the motion event. The FIGURE is the object that is moving or located with respect to a reference point, the GROUND. Therefore, in the example below, the boy is the FIGURE, and the hill is the GROUND.

(18) The boy clambered on top of the hill.

First, LocN cannot directly predicate anything of the FIGURE; rather, it requires a true P to "relate" the FIGURE and the LocN. (In his paper on PP structure in Zina Kotoko, Holmberg (2002) refers to these higher elements as "relators"). The PP variations on example (19), below, illustrate this in English, French and Japanese, respectively.

- (19) a. \*(on) top of the hill  
 b. \*(en) haut de la colline  
     LocP top of the hill  
 c. oka no ue \*(ni)  
     hill of top at

Second, LocN cannot directly assign case to the GROUND object, but requires the insertion of a grammatical P (English *of*; French *de*; Japanese *no*), as shown with another set of variations on the same example.

- (20) a. on top \*(of) the hill  
 b. en haut \*(de) la colline  
     LocP top of the hill  
 c. oka \*(no) ue ni  
     hill of top at

A third observation is that modifiers of P and LocN are distinct. In English, the degree modifier *right* is used only with P (Jespersen 1992 [1924]), as shown below.

- (21) a. Julie fell (right) from (right) on (\*right) top of the mountain.  
 b. The stalker ran (right) in (\*right) front of the queen.

Similarly, in Japanese the degree modifier *ma-* 'right/straight' is used only with LocN; such modification of uncontroversial cases of the category P results in ungrammaticality.

- (22) a. Tēburu no ma-ue de odotta  
table GEN right top LocP danced  
'He danced right on top of the table'  
b. Tēburu (\*ma-) de odotta  
table (right) LocP danced  
'He danced (right) on the table'
- (23) a. Gakko no man-mae ni hashitte itta  
school GEN right front LocP run-TE went  
'He ran straight in front of the school'  
b. Gakko (\*ma-) ni hashitte itta  
school (straight) LocP run-TE went  
'He ran (straight) to school'

A fourth contrast is found in Japanese only; unlike in English or French, LocN in Japanese may be assigned accusative case, as in the following examples from the elicited production data.

- (24) ki no naka o tōtte itta no. (Japanese 3-yr-old)  
tree GEN inside ACC go-via-TE went PART  
'He went through the tree.'
- (25) hashi no shita o kugurimashita (Japanese adult)  
bridge GEN underneath ACC go-via-under-PST  
'He went under the bridge.'

These four sets of observations support an analysis of such elements as N (following Ayano 2001), rather than P (as in Watanabe 1993).

## 6 The PP hierarchy in first language acquisition

Evidence bearing on children's knowledge of the PP hierarchy comes from a series of experiments on the acquisition of motion events, reported in full in Stringer (2005). In the elicited production experiment from which several examples in this paper have been drawn, a total of 95 English, French and Japanese monolingual test subjects were divided into 5 age groups from 3 to 7 years, and there was a sixth group with adult test subjects. There were on average 5 participants in each age group (2 groups of 4, 12 groups of 5, 1 group of 6, and 3 groups of 7). Utterances with directional predicates were

elicited using a purpose-designed picture-story, illustrating events with both MANNER and PATH. The narrative runs as follows: a monkey sits in a tree-house about to eat his banana; a parrot swoops in, steals the banana, and flies off. The monkey chases the parrot, determined to retrieve his banana. Their chase takes the monkey through several different spatial environments. On each page relevant to the analysis, he follows a particular trajectory (e.g. 'down', 'under', 'over', etc.), varying with the obstacles he encounters, and he exhibits a particular manner of motion (e.g. he 'slides' down a tree-trunk, 'runs' under a bridge, 'jumps' over a rock etc.). The monkey follows the parrot into a cave, where they encounter a lion. The lion chases them out of the cave, after which the parrot drops the banana and flies away. The monkey recovers it, then retraces his steps back home as fast as he can, going through all the motions a second time, before eating his banana in peace. The experiment made use of a simple and relatively straightforward elicitation procedure. The experimenter introduced each page by describing the location, in order to encourage subjects to focus on trajectory rather than locational setting.<sup>3</sup> Subjects were then asked to describe the monkey's actions; if they did not do so, a prompting strategy was adopted to elicit appropriate responses; the use of directional predicates of any type was scrupulously avoided in the prompts. Each experiment was recorded on micro-cassette, all responses related to the materials were transcribed, and 1608 examples of PATH predication were selected for analysis.

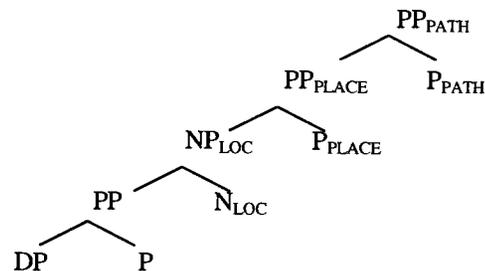
For posited universal structures such as layered PP, assuming the "continuity hypothesis", it is to be predicted that they will be present and inviolable at all stages of acquisition. Thus, despite the range of child errors in the expression of motion events, we should never find the following types of utterance.

- |      |    |   |  |
|------|----|---|--|
| (26) | a. | <i>*on from</i> top of the rock   | *[P <sub>PLACE</sub> [P <sub>PATH</sub> ]] |
|      | b. | <i>*from top on</i> of the rock<br>(context: from on top of the rock)   | *[N <sub>LOC</sub> [P <sub>PLACE</sub> ]]  |
| (27) | a. | <i>*en jusque</i> bas de l'arbre<br>P <sub>LOC</sub> until bottom of the-tree   | *[P <sub>PLACE</sub> [P <sub>PATH</sub> ]] |
|      | b. | <i>*jusque bas en</i> de l'arbre<br>until bottom P <sub>LOC</sub> of the-tree<br>(context: to the bottom of the tree) | *[N <sub>LOC</sub> [P <sub>PLACE</sub> ]]  |

<sup>3</sup>Slobin's (1996) comparative study of English and Spanish motion events indicates that speakers of verb-framed languages may have a locational bias in event descriptions, elaborating on the environmental detail and leaving aspects of the trajectory to be inferred.



(31) Layered PP in Japanese.



The standard analysis of layered PP structure may thus be minimally elaborated to incorporate a bare NP projection, which hosts the closed subclass of locative nouns I have termed LocN. While this element differs in certain characteristics from fully referential, lexical N, it is clearly of the same syntactic category, and is distinct from spatial adpositions in English, French and Japanese. The position of LocN in the PP hierarchy appears to be fixed not only across languages, but at all stages of the acquisition process, making it a plausible component of the machinery of Universal Grammar.

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