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# **Paths in First Language Acquisition: Motion through Space in English, French and Japanese**

**David Stringer**

## **Part III**

### **Path Predication and Universal Grammar**

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Submitted in partial fulfilment of the degree of Doctor of Philosophy

Department of Linguistics and English Language

University of Durham

2005

16 JAN 2006

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## Abbreviations used in glosses

ACC	accusative case marker
ASP	aspect (used for the various forms of the Japanese light verb <i>shimau</i> ( <i>chau</i> ), sometimes but not always translatable into English with ‘go and’, e.g. he’s gone and left; he’s gone and broken the record)
AUX	auxiliary (used to gloss both French <i>avoir</i> ‘have’ and <i>être</i> ‘be’ in their auxiliary function)
DAT	dative case
EXC	exclamative
GEN	genitive case
HON	honorific
INT	intentional morpheme, used to gloss the Japanese suffix <i>-yō</i> , translatable as ‘want to’, ‘would like to’, etc.
NOM	nominative case
ONOM	onomatopoeia
P	pre- or postposition (used to gloss featureless, late-inserted P such as English <i>of</i> , French <i>de</i> , and Japanese <i>no</i> ; or alternatively to gloss French <i>en</i> in cases of ambiguity between cause ( <i>by</i> doing something) and correlation ( <i>while</i> doing something))
PART	particle (used for Japanese discourse particles irrelevant to the syntax. Never used for ‘verbal particles’, which are here argued to be of the category P)
P <sub>Loc</sub>	Locative P, used as a default to gloss spatial prepositions whose closest English analogues are different enough so as to be misleading if used in glosses)
PROG	progressive (continuous) aspect (especially used for Japanese <i>te iru</i> construction, which in the elicited production transcripts was phonologically cliticized to the verb)
PST	past tense
TE	Japanese -TE form (This verbal suffix has two main functions, both exemplified in the following utterance from a Japanese 6-year-old (example 4.14 in the main text): <i>dōkutsu no naka e hashitte, ōmu-san o oikakete ikimasu</i> - cave GEN inside to run-TE, parrot-HON ACC chase-TE go - ‘He runs inside the cave, and goes chasing after the parrot.’ The first use corresponds to a complementizer function, demarcating a subordinate clause, which could be (poorly) translated with an <i>on</i> -phrase (e.g. <i>On running into the cave, he goes chasing after the parrot</i> ), but is often translated with the connective <i>and</i> (as in this example). The event in the <i>te</i> -clause occurs before the other event in the matrix clause. The second use of this suffix is to indicate that two activities are simultaneous. Thus the ‘chasing’ and the ‘going’ occur at the same time – they are different aspects of the same event. In examples from the data where -TE has this second function, and where confusion with the other function is not possible, I occasionally gloss it as English <i>-ing</i> , for ease of comprehension.)
TITLE	used to gloss Japanese <i>-san</i> (Mr., Mrs., Miss., etc.)
TOP	topic marker

**PART III**

**PATH PREDICATION AND UNIVERSAL GRAMMAR**

## **Chapter 9**

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### **Paths and Satellites: From functionalism to formalism**

Following the empirical investigations reported in the central chapters of this thesis, it is now possible to embark upon a more informed endeavour to provide theoretical analyses of lexical and syntactic issues in the predication of PATH. In Part III, the first issue to be addressed is how the terms ‘path’ and ‘satellite’, introduced by Talmy (1985, 1991, 2000b), have developed a somewhat nebulous nature in the linguistics literature; clarification of these pivotal terms is essential for understanding the phenomena under discussion. Attention is then turned to lexical semantics and syntax, respectively. In Chapter 10, the lexical representational formalism of what I have termed ‘computational semantic features’ is compared to the semantic structure approach of Jackendoff (1990) and Pinker (1989), and is given theoretical justification. The semantic feature approach is shown to have sufficient descriptive power to capture all variation in the expression of directional motion events, both within and between languages, and is argued to be more parsimonious than competing notational frameworks. In Chapter 11, certain intriguing aspects of shared syntax observed between languages in previous chapters are subjected to more rigorous inspection. On the final analysis, it is maintained that the combinatorial principles driving the syntax of motion events are both invariant across languages and evident in continuity throughout the acquisition process (within the age range tested); as such they are prime candidates for inclusion in the theory of Universal Grammar.

Let us first turn to the problem of the varying senses of the terms ‘path’ and ‘satellite’, for precision in nomenclature is a fundamental prerequisite of formal description. Talmy’s typology of motion events is expressed in terms of a conceptual

element, 'path', being lexicalized in one of two ways: either in a verb, or in a 'satellite' to a verb (Talmy, 1991). As such, this typology has been widely accepted within and beyond the field of cognitive linguistics. However, the term 'path' has been subject to diverse interpretations in research on motion events, with the result that it can sometimes appear rather fuzzy. At least part of the confusion stems from the fact that in cognitive linguistics, 'path' is understood as an element of general cognition, rather than a specifically linguistic element that bears on grammaticality; attempts at stricter linguistic definitions have trailed in the wake of intuitive acceptance of its cognitive reality. Similarly, the novel coining 'satellite' (Talmy, 1985) has been understood both as a category and as a relation in the cognitive linguistics literature, although there has more recently been a convergence on the idea that satellites constitute a new grammatical category. Preliminary definitions of both terms were given in Section 1.2, and a detailed critique was put on hold pending the empirical investigation into how the lexicalization patterns might best be formalized from a generative perspective. As argued in Part II, Talmy's typology is most accurately left as a generalization concerning 'rhetorical style' (Slobin, 2004: 248), and resists formalization as a parametric statement of variation in grammars. We may now examine in more depth the terminology which is often taken for granted in research on motion events. In the light of the many specific examples of variation in English, French and Japanese furnished by the elicited production technique in Experiment I, which gave a fair sample of the phenomena to be explained in these languages, it is possible to evaluate (i) four senses in which the term 'path' has been used in the last decade of cognitive linguistic research on motion events; and (ii) the twin claim that satellites are a grammatical category, and that verb complexes (V + satellites) are a syntactic constituent.

## 9.1 Paths revisited

### 9.1.1 PATH as a computational primitive

Following Talmy's (e.g. 1972, 1975, 1983, 1985) introduction of the term 'path' as a grammatical element in the linguistic analysis of motion events, the term has been widely applied in the sense of a semantic primitive in lexical concepts and in syntactic/semantic computations, meaning something like 'direction'. As such, it has been posited as a component of lexical entries such as *go*, *enter*, and *across* (both in cognitive linguistic research, e.g. Berman and Slobin, 1994, and in generative work, e.g. Emonds, 1991; Jackendoff, 1990; Pinker, 1989). This is the sense in which the computational semantic feature PATH has been used throughout this thesis. For example, it is this feature that distinguishes between complement restrictions in pairs of verbs such as *dart* (V [MOTION, MANNER], +<P [PATH]>) and *fidget* (V [MOTION, MANNER]) (Section 2.2.2.2). In the following subsections, I shall consider three other uses of this term, and shall argue that this first interpretation is the *only* sense in which it may be fruitfully incorporated into a generative syntactic account of motion events.

### 9.1.2 Vector, Conformation and Deictic

A second use of the term 'path' is found in Talmy (2000b). Although Talmy's (1972, 1985, 1991) earlier formulations of Path (with a capital 'P') were atomic, his revised account of lexicalization patterns in motion events suggests that Path is not a primitive, but may be split into at least three subcomponents: the Vector, the Conformation, and the Deictic (Talmy 2000b: 53-57).

Vectors comprise the 'basic types of arrival, traversal and departure that a Figural schema can execute with respect to a Ground schema' (ibid. 53), and include notions of TO, FROM, VIA, TOWARDS, ALONG, and ALENGTH (e.g. *across*, *through*).

The Conformation component relates the moving object to the Ground schema in terms of a geometric complex. Talmy's examples involve detailed paraphrases: for example, the preposition *into* is decomposed as follows.

(9.1) TO a point which is of the inside of [an enclosure] = in(to)

(Talmy, 2000b: 55)

In this example, TO is a Vector, 'a point' is a 'fundamental Ground schema', and the Conformation is understood as 'which is of the inside of [an enclosure]' (ibid. 54). In this way, Vectors and Conformations can be combined to produce spatial concepts lexicalized as e.g. *onto*, *past* or *through* in the following examples.

(9.2) The rabbit jumped onto the table.

Vector: TO

Ground Schema: a point

Conformation: (a point) on the surface of a volume

(9.3) The dart flew past my head.

Vector: VIA

Ground Schema: a point

Conformation: (a point) to one side of

(9.4) Lance cycled through the tunnel.

Vector: ALENGTH

Ground Schema: a bounded extent

Conformation: (a bounded extent) coterminous and coaxial with [a bounded cylinder]

Talmy (2000b: 138) notes that the Deictic component of Path crosslinguistically appears only to encode the notions ‘toward the speaker/person of reference’ and ‘away from the speaker/person of reference’, and he suggests that ‘the Deictic is...[...].just a special choice of Vector, Conformation and Ground, not a semantically distinct factor, but its recurrence across languages earns it structural status.’

The phenomena that the terms Vector, Conformation and Deictic attempt to capture (trajectories, geometric characterization of the GROUND, and deixis) were highly relevant in characterizing the expression of motion in the elicited production data of Experiment I. Nonetheless, they are not considered here as subcomponents of the feature PATH, and only one, DEIXIS, is a plausible candidate for incorporation into the computational semantic feature system elaborated in this thesis. Let us briefly examine each in turn.

The notion of Vector, whilst intuitively appealing, plays no role in syntax (unless it is equated with the term PATH). For this reason, it cannot be incorporated into a system of computational semantic features; the latter, by definition, must all play a role in syntactic derivations.

The concepts of Conformation and Deictic are very much related to the fundamental distinction made throughout this thesis between Geometric and Deictic V

[PATH]. The working definitions of these terms were given in examples (3.45) and (3.46), repeated below.

- (9.5) Geometric V [PATH]: A verb necessarily expressing directional movement in the context of a particular spatial configuration, e.g. E: *cross*, *enter*; F: *traverser* ‘cross’, *entrer* ‘enter’ J: *wataru* ‘cross’, *hairu* ‘enter’.
- (9.6) Deictic V [PATH]: A verb necessarily expressing directional movement towards / away from the speaker or an event participant, e.g. E: *go*, *come*; F: *aller* ‘go’, *venir* ‘come’; J: *iku* ‘go’, *kuru* ‘come’.

This distinction between Geometric and Deictic V [PATH] was argued for in Section 4.4 in terms of the particular syntactic behaviour of deictics. As for Talmy’s (2000b) term ‘Conformation’, a general specification ‘geometry of the GROUND object’ does not seem to characterize the behaviour of a class of verbs in any language: as shown by the range of data in Experiment I, there is no ‘V-framed syntax’ shared by all PATH verbs in any of the languages studied. The geometry of the GROUND in English, French and Japanese may be constructed by combining various elements lexicalized in different ways: geometric V [PATH] (*enter*), adpositions (*into*), N [LOC] (*top*), and spatial DPs (*the top*); as such, it cannot assume feature status in this system. Thus Talmy’s term ‘Conformation’, whilst intuitively appealing, has no independent computational status in derivations.<sup>1</sup>

<sup>1</sup> That said, some elements this term is intended to subsume may possibly be considered as independent semantic features with a derivational role, e.g. the dimensional features 0D, 1D, 2D, and 3D (Pinker, 1989); whilst others, such as ‘sphere’ or ‘cylinder’ seem to play no explicit role in syntax, yet clearly have a role in lexicalization (e.g. of nominal classifiers) and are perhaps best handled in a mental module specifically dealing with spatial representations (Jackendoff, 1997; Landau and Jackendoff, 1993).

Of the three proposed subcomponents of Path, the Vector, the Conformation and the Deictic, only DEIXIS is a likely candidate for the status of computational semantic feature (as defined in Section 3.4). Deictic verbs are the exceptional case, crosslinguistically playing syntactic roles that earn them the status of ‘light verbs’ e.g. aspectual phenomena in English (*She went and drank the whole pint*, *The monkey goes ‘weee!’ down the slide*; *Come see the daffodils*); aspectual phenomena in French (*Il va arriver* - he goes arrive - ‘He is going to arrive’, *Il vient d’arriver* - he comes arrive - ‘He has just arrived’); complex verb formation in Japanese (*motte iku* - carry go - ‘take’, *motte kuru* - carry come - ‘bring’), as well as various other types of well-studied phenomena in other languages (e.g. ‘restructuring’ in Italian (Rizzi, 1978; Emonds, 2000)). The range of phenomena associated with deictics would seem to favour treatment in terms of an interpretable feature [DEIXIS], rather than restricting its use to a subcomponent of PATH in the spatial field.

To summarize, regardless of the possibility of its conceptual decomposition, PATH remains a computational primitive<sup>2</sup> at least in the selection of arguments. To give another paired example to further the evidence provided in previous chapters, a PATH complement is licensed by the motion verb *shuffle* (*across the hall / into the library*) but not the motion verb *shiver* (*\*across the hall / \*into the library*). Thus the verb *shuffle* can be merged with any PATH complement, but no V [MANNER], as far as I am aware, specifies complement restrictions in terms of Vector alone (*to / from / \*across / \*over*), or the Conformation alone (*into / inside / \*onto / \*on top of*). The

<sup>2</sup> Carey (1982) suggests that concepts may be viewed as primitive in at least three different senses: (i) if there is a single set of concepts out of which all other concepts expressible in the language can be defined, then members of this set are *definitional primitives*; (ii) if there is a set of innate concepts, or at least very early-acquired concepts, out of which all other concepts are built, then members of this set are *developmental primitives*; (iii) if there is a set of concepts constituted by the elements manipulated in thinking, then members of this set are *computational primitives* (Carey, 1982: 350-51). Only this third sense is pursued here.

appropriate level of decomposition for complement selection is PATH, and any further conceptual decomposition is not syntactically relevant.

### 9.1.3 From LI to phrasal category

In a third variation on the use of the term ‘path’, Ross (1995) pursues the concept of ‘extended paths’, and characterizes directional PPs in terms of a ‘cognitive syntactic’ constituent Path, which subsumes the semantic categories spelled out in individual Ps, such as SOURCE, DIRECTION and GOAL. On this account, Path is viewed not as a feature on heads, but a ‘cognitive category’ mapped directly onto a maximal phrasal projection (a type of phrase, not a type of head). As we shall see, such complex ‘Paths’ cannot be simply regarded as an extension of the computational semantic feature PATH argued for in this thesis, and I consider them to be adjunct expressions of ‘trajectory’.

Ross (1995) defines ‘Paths’ as something specifically observable in syntax, and is conceived as a potential series of three Legs:

- (i) Initial Leg (*from*)
- (ii) Medial Legs (e.g. *above, across, beside, on, towards, underneath* etc.)
- (iii) Final Leg (*to*)

Each Leg can be further modified in terms of cognitive categories such as Extent, Speed, Mode, etc., as shown in the example below, in which the Initial Leg (SOURCE) is from LA, the Final Leg (GOAL) is to SF, and the Medial Leg is underlined.

(9.7) I travelled [PATH [SOURCE from LA [TRAJECTORY along Rt. 1 [DIRECTION northwards [EXTENT 450 miles [SPEED at 60 [EXTENT all the way [GOAL to SF [MODE by car]]]]]]]]]]

(adapted from Ross, 1995: 273)<sup>3</sup>

Ross (1995) claims that extended PATHS are always constituents, as justified by tests including ‘only focus’ (*Only from LA to SF will we drive*) and conjunction (*We drove both from LA to SF and from NY to NH*). As additional evidence that these observations on constituency are correct, Pascual Masullo (p.c.) observes that they may be moved to subject position, as in *From Durham to Edinburgh is where they plan to build a new railroad*, and Anders Holmberg (p.c.) notes that complex PATHS can move in their entirety to initial position in V2 languages.

However, the present study takes the perspective that constituency in these cases comes from the syntactic status of PP, rather than association with a category of general cognition. PATH interpretation of such extended constituents is a by-product of the phrasal elements they combine (more on this anon, in Section 9.3).

One notable characteristic of such examples is that the internal ordering is quite free e.g.

- (9.8) a. We drove from LA along Rt. 1 to SF.  
 b. We drove to SF from LA along Rt. 1.  
 c. We drove along Rt. 1 from LA to SF. (etc.)

<sup>3</sup> I have substituted *by car* for *on foot* in Ross’s example, as 60 mph seems somewhat ambitious for pedestrians.

One pair of examples in the English version of Experiment I (5.186 and 5.187, repeated below) is arguably of the same type.

(9.9) <E6a [12]: *he runs out of the cave away from the lion*>

(9.10) <EAe [12]: *the monkey's running away from the lion out of the cave*>

If an abstract TO is posited immediately preceding *out of* in these examples, then they may be considered an instance of the *from-to* construction. However, as noted in Section 5.2.3, this type of 'extended PP' is exceptional: most concatenated PPs in the data are in fixed temporal order. The free ordering specific to the *from-to* construction is suggestive of a co-ordinate rather than hierarchical structure.

Evidence of the adjunct status of the construction as a whole comes from the fact that whilst directional complements only merge with certain classes of verb (which specify the possibility of a PATH complement), the *from-to* construction is quite liberal in its liaisons with verbs, and is also possible in the presence of a direct object DP.<sup>4</sup>

- (9.11) a. Paddy { \*shivered / \*laughed his head off / \*played his guitar } to the station.  
 b. Paddy { shivered / laughed his head off / played his guitar } from the pub to the station.

---

<sup>4</sup> Such freedom of combination in the syntactic expression of motion events recalls the 'way construction', which similarly produces apparent violations of the argument structures of predicates, although in this case the trajectory really does seem to be a complement, requiring that the predicate have no other (although see Jackendoff, 1990: Ch.10, for an analysis in terms of 'superordinate adjuncts') e.g.

- (i) Paddy { whistled / danced / ate } his way to the station.  
 (ii) Paddy { \*whistled a tune / \*danced a jig / \*ate some chips } his way to the station.

The non-selectional aspect of the *from-to* construction may also be observed in French and Japanese with verbs such as ‘dance’ that never take directional complements in these languages, as illustrated respectively in the examples below.

- (9.12) a. \*Fanny a dansé à la gare.

Fanny AUX danced P<sub>LOC</sub> the station

‘Fanny danced to the station.’

- b. \*Fanny a dansé de la maison.

Fanny AUX danced P the house

‘Fanny danced from the house.’

- c. Fanny a dansé de la maison à la gare.

Fanny AUX danced P the house P<sub>LOC</sub> the station

Fanny danced from the house to the station.’

- (9.13) a. \*Emi wa eki ni odotta.

Emi TOP station P<sub>LOC</sub> danced

‘Emi danced to the station.’

- b. \*Emi wa uchi kara odotta.

Emi TOP house from danced

‘Emi danced from the house.’

- c. Emi wa uchi kara eki ni odotta.

Emi TOP house from station P<sub>LOC</sub> danced

‘Emi danced from the house to the station.’

As seen above, the complex ‘Paths’ of Ross (1995) have both internal freedom in the ordering of directional PPs, and external freedom in their lack of restrictions on merging with verbs of particular classes. They do not succumb to analysis as an extension of the computational semantic feature PATH argued for in this thesis, and they are here considered as adjunct expressions of ‘trajectory’.

Ross (1995: 283-285) also proposes an interesting crosslinguistic generalization about the possibility of constructing such complex trajectories. He suggests that End Legs (Initial and Final) are unmarked and usually monomorphemic, whilst Medials are marked and often polymorphemic; he then makes a prediction that if a language has Medials, it necessarily has Ends. Evidence from French indicates that this claim, if true, must be so in qualified form. French has Medials, e.g. *par* (‘via’ / ‘through’), but arguably neither of the elements used to mark Ends inherently specify SOURCE and GOAL like their English counterparts. The P commonly assumed to express SOURCE, *de*, cannot express SOURCE in isolation, but is dependent on syntactic context for PATH interpretation, as shown below. These sentences may be considered variations of those in (9.12), with the ‘whole trajectory’ understood as ‘from the house to the station’.

(9.14) a. Jean a couru de la maison à la gare. (SOURCE → GOAL)

Jean AUX run P the house P<sub>LOC</sub> the station

‘Jean ran from the house to the station’

b. Jean a couru à la gare. (GOAL)

Jean AUX run P<sub>LOC</sub> the station

‘Jean ran to the station’

- c. \*Jean a couru de la maison. (\*SOURCE)  
 Jean AUX run P the house  
 ‘Jean ran from the house’
- d. Jean est sorti de la maison. (SOURCE interpretation due to V)  
 Jean AUX go-out P the house  
 Jean went out of the house.

Note that in contrast to *danser* ‘dance’, *courir* ‘run’ can take directional complements as in (9.14b), but that *de la maison* (P the house) is not such a complement.<sup>5</sup> This indicates that on this analysis, *de* lacks inherent semantic features. Thus although *de* is often translated into English as ‘from’ when used with verbs forcing a SOURCE interpretation of the GROUND (*sortir* ‘go-out’, *partir* ‘leave’), I assume that that these two items are not equivalent, and *de* much more closely approximates the English P *of*, inserted for reasons of syntax, not semantics. Just as *of* marks complements in nominalizations, assigning abstract case to the object DP, perhaps it also marks the complements of certain V or P that cannot themselves directly assign case (in Emonds’ (1985) framework, this is expressed in terms of ‘late insertion of grammatical P’: see Section 6.3, fn. 5).

As for French *à*, whilst this locational P clearly has inherent semantics, as indicated by the transcription P<sub>LOC</sub>, this too is dependent on the verb for a GOAL interpretation, as explained in detail with examples in Section 3.1. When combined with V [STATIVE] (e.g. *être* ‘be’, *vivre* ‘live’), or non-directional V [ACTIVITY] (e.g. *danser* ‘dance’, *chanter* ‘sing’) it means ‘at’; when combined with a with V [PATH] (e.g. *aller* ‘go’, *descendre* ‘go-down’) or a directional V [MANNER] (e.g. *courir* ‘run’,

<sup>5</sup> Various other examples of PATH complements of *courir* ‘run’ were provided in Section 5.2.2.

*voler* ‘fly’) it means ‘to’, and only in this case does it mark the Final Leg in Ross’s sense.

On this analysis, *de* has no meaning and the meaning of *à* is syntax-dependent. French does not have lexical items meaning ‘to’ and ‘from’ to mark End Legs, and appears to contradict Ross’s (1995) generalization. In summary, the complex ‘path’ of Ross’s (1995) analysis is here viewed neither as a phrasal category (the category is PP), nor as directional complement, nor as an extension of the computational semantic feature PATH, but rather as an adjunct of trajectory.

#### 9.1.4 Paths out of syntax

The fourth, quite influential, interpretation of the term ‘path’ in the cognitive linguistics literature is Slobin’s (1996) extension of the term to cover a more complex conceptual entity meaning something like ‘journey’, which necessarily involves the concept of duration in time as well as motion through space. Slobin (1996) claims that differences in the lexicalization of path defy satisfactory analysis at the level of the verb or the clause, and can only be fully understood with reference to the frame of discourse. This can be at various levels: a grouping of clauses, a short text, or an entire narrative.

Narrators need not limit a path description to a single verb and its adjuncts [...]; a narrator may present a series of linked paths or a path with way-stations. I will call a complex path a *journey* – that is, an extended path that includes *milestones* or *subgoals*. [italics in original]

(Slobin, 1996: 202)

A possible example of such an extended path may be extracted from the Experiment I transcripts. The series of responses by test subject E5e following the monkey's escape from the lion were delivered one after the other without prompting, thereby forming a mini-narrative of the 'return journey' (scenes [12, 13, 14, 15, 16, 17, 19]).

(9.15) <E5e:           *he ran out the cave ...and then climbed up there ...and then went down the hill...then swam across the river...then went through there...and then jumped over the thingy...then ducked under there...and then followed the path and then went back up*>

Of course, if narrative elicitation had been the focus of the experiment, as in the Frog Story research (Berman and Slobin, 1994; Strömquist and Verhoeven, 2004a), and the participants had been allowed more freedom in telling the story, each entire transcript would have constituted a 'path' in this sense. That this interpretation can be seen as an extension of the lexical semantic element PATH comes from the fact that in cognitive linguistics, as mentioned at the beginning of this chapter, 'path' is understood as an element of general cognition.

As such, whilst of relevance to cognitive semantic approaches to narrative construction, this use of the term 'path' appears to have no relevance to generative approaches to grammaticality. The psychological understanding of the whole cannot characterize the syntax of the parts. Extending this logic, the whole of Homer's 'Odyssey' might be considered a complex 'path'; this could be a fruitful perspective for many approaches to the poem, but it would not help explain the syntax of directional predication at the clause-level in Ancient Greek. The computational semantic feature PATH, as characterized in this thesis, is an abstract element that plays

a role in determining well-formed derivations, and its relation both to longer trajectories spelled out in multiple clauses, or to whole journeys conveyed through narrative texts, is irrelevant to grammatical analysis.

In these four sub-sections, I have argued that amidst multiple interpretations of the term PATH in research on motion events over the last decade, the most useful application of this term in approaching the possibility and impossibility of combinations of V and P is strictly in terms of a grammatically relevant semantic feature, which is essentially independent of extra-linguistic concepts of trajectories and journeys.

## **9.2 Satellites revisited**

### **9.2.1 Satellites of direction are adpositions**

In Talmy's initial definition of 'satellite', he avoids claiming categorial status for the term, because of the overlap with other well-established syntactic categories, namely P, N, and A, and he says that this notion is intended to capture a grammatical relation (Talmy, 1985: 102). Nevertheless, in the same article (pp.104-105), and in subsequent definitions, he explicitly considers satellites to be a new 'grammatical category', distinct from P, N, and A (Talmy, 1991: 46, 2000b: 102) (see Section 1.2 for full citations). Following this clear shift towards the positing of a new category of grammar, 'satellite' is now accepted in much of the cognitive linguistics literature as such, on a par with N, A, V, and P (see e.g. the papers in Strömquist and Verhoeven, 2004a).

It is clearly desirable to distinguish grammatical categories from relations and constituents: for example, the category N (with its associated projections NP and DP) is distinct from the relations of 'subject' and 'object', and the category V remains

independent of whether a verb has an object relation or not. I remain agnostic on the question of whether ‘satellite’ expresses a consistent syntactic relation between particles and verbs, but take issue with the claim of categorial status. I argue that satellites are not a category in any formal sense, and that all instances of these elements in motion events can be reduced to the category P.

Clear examples of utterances from the English elicited production data with such elements were given in Section 5.2.3 (examples 5.135-5.139), and are reproduced below.

(9.16) <E6b [7]: *he crawls up*>

(9.17) <E5b [2]: *he slides down*>

(9.18) <E4e [12]: *runs out*>

(9.19) <E7a [6]: *he swims across*>

(9.20) <E5e [5]: *climbs through like what I would do, I could do that*>

Talmy’s (1985, 1991, 2000b) new category ‘satellite’ is defined in terms of linear proximity to the verb and perceived function. Any single morpheme that is adjacent to and modifies the verb appears to be a candidate. However, from a generative perspective, function alone cannot suffice to determine categorial status. When syntactic evidence is considered, the term ‘satellite’ does indeed seem to

collapse distinct categories. The following evidence is all drawn from English, the satellite-framed language of principal relevance to this thesis.

There is reason to believe, *contra* Talmy (1985: 104; 2000: 104-5), that the satellites in (9.21) are of a different syntactic category to those in (9.22).

(9.21) The thief climbed {*in / up / through*}.

(9.22) The boat {*broke free / drifted clear / pulled loose*} (from the ice).

The postverbal particles of (9.21) are demonstrably of the category P; I assume that the contrasting elements of (9.22) are resultative adjectival predicates, of the category A, and lie outside the focus of this thesis. In order to illustrate the distinction, I draw on Emonds (1985: 252-263), who provides several convincing arguments that directional verb particles are intransitive P, on the basis of shared syntactic behaviour between particles and PPs. If we apply such arguments to the postverbal elements in (9.21) and (9.22), a uniform difference emerges.

First, the P in (9.21), but not the A in (9.22), may take the strictly prepositional modifier *right*:<sup>6</sup>

(9.23) a. He climbed right {*up / in / through*}

a'. He climbed right {*up the drainpipe / in(to) the room / through the gap*}

b. The boat {*\*broke right free / \*drifted right clear / \*pulled right loose*}

---

<sup>6</sup> As mentioned in Section 5.2.3, the observation that *right* modification is a test of prepositional status is due to Jespersen (1992 [1924]).

Second, expletive PP constructions of the type '*Into the castle with her! Off with her head!*' may be formed with the elements of (9.21) but not those of (9.22):

- (9.24) a. {Up / in / through} with him!  
 a'. {Up the scaffold / in(to) the pit / through the gauntlet} with him!  
 b. \*{Free / clear / loose} with it!

Third, both directional particles and PPs, but not resultative adjectives, may be preposed without being followed by a pause. In such cases, the verb may also raise past the subject if the latter is a full DP rather than a pronoun (the phenomenon known as 'locative inversion'). Again, such movement is illicit with resultative adjectives.

- (9.25) a. {In / up / through} he climbed.  
 a'. {Up the drainpipe / in(to) the room / through the gap} climbed the thief.  
 b. \*{Free / clear / loose} it broke.  
 b'. \*{Free / clear / loose} broke the boat.

Henceforth no categorial distinction will be made between such verb particles and pre/postpositions, and non-spatial examples of 'satellites' will be excluded from the discussion.

Another type of directional satellite is the directional prefix, which is not relevant to the languages under investigation in this thesis. Despite much debate in the literature on particular processes in particular languages, I assume that all such

elements are of the category P, although much crosslinguistic work remains to be done. This analysis finds strong empirical support in German, in which the same phonological words appear both as postpositions and prefixes, as in the case of *hinauf* ‘up’ in the examples below.

- (9.26) a. ...weil sie das Klavier auf den dritten Stock *hinauf* hätten tragen sollen  
 ...because they the piano on the third floor up had carried should  
 ‘...because they should have carried the piano up to the third floor.’
- b. ...weil sie das Klavier auf den dritten Stock hätten *hinauf-tragen* sollen  
 ...because they the piano on the third floor had up-carried should  
 ‘...because they should have carried the piano up to the third floor.’

(adapted from van Riemsdijk and Hutbregts, 2001: 14)

That this pattern of prefixation can be generalized to cases where there is no corresponding overt adposition is suggested by the lack of co-occurrence of directional prefixes and directional adpositions. In other words, if there is a PATH prefix, there is no corresponding PATH adposition, and vice-versa.

The example below from French shows that when the P *par* ‘via / through’ is prefixed to the verb, there can be changes in meaning, which might lead to the (mistaken) assumption that the P and prefix are different lexical items (LIs), or that the semantics are due to the ‘verb-complex’ as a whole.

(9.27) a. Alice a couru *par* les allées du labyrinthe { \*en 2 heures / pendant 2 heures }.

Alice AUX ran via the paths of-the labyrinth { in 2 hours / for 2 hours }

‘Alice ran through the paths of the labyrinth (for 2 hours).’

b. Alice a *parcouru* les allées du labyrinthe { en 2 heures / \*pendant 2 heures }.

Alice AUX via-ran the paths of-the labyrinth { in 2 hours / for 2 hours }

‘Alice ran through the paths of labyrinth (in two hours).’

When *par* ‘via / through’ is a preposition dominating the GROUND object, it forces an unbounded interpretation, as can be seen by the difference in possible time adjuncts in the examples above. However, when it is prefixed, the event as a whole takes on a bounded interpretation. This needs no independent account in terms of boundedness, as it is predicted by the general principle of object affectedness (Gropen et al, 1989; discussed in Section 6.4). The interpretive distinction with and without the preposition is arguably the same as for other syntactic alternation effects, such as the lack of affectedness in the conative construction (e.g. *I shot the sheriff / I shot at the sheriff*), and the ‘holistic-partitive’ effect in the locative alternation (e.g. *Bob loaded crates onto the boat / Bob loaded the boat with crates*). Only when the GROUND is the direct object is it necessarily wholly affected, so that in only in (9.27b) does Alice run through all the paths in the labyrinth (and is hopefully, though not necessarily, out by now). Such morphosyntactic distribution reinforces the principal argument of this subsection – that satellites of direction *are* adpositions.

### 9.2.2 Other orbital issues

In addition to the question of the categorial status of satellites, there are also problematic issues regarding the relation of satellites to verbs. Satellites are by

definition all in ‘a sister relation to the verb root’ (Talmy, 1991:46, 2000b: 102), and the two form a syntactic unit: ‘A verb root, together with its satellites forms a constituent in its own right, the ‘verb complex’, also not generally recognized’ (Talmy, 1985: 102). I shall consider the questions of sisterhood and verb complexes in turn.

In a sentence such as the following, Talmy claims that all the italicized elements are right-hand sisters to the verb, presumably indicating a flat structure.

(9.28) Come *right back down out* from up in there!

(said, for example, by a parent to a child in a treehouse)

Talmy (2000: 103) [italics in original]

It is worth recalling that *right* is understood to be a classic prepositional modifier, rather than something with a relation to the verb root. Talmy (2000: 103) recognizes this dependency, but still maintains that *right* is a satellite, and thus a sister, to the verb. It is also worthy of note that these four satellites are subject to a strict ordering restriction.

(9.29) a. \*Come *back right down out* from up in there!

b. \*Come *right down back out* from up in there!

c. \*Come *right back out down* from up in there!

d. \*Come *out right back down* from up in there!

The claim that these are all sisters to the verb may have intuitive appeal, but no syntactic argumentation is provided to justify the flat structure, which in itself cannot explain the ordering restriction.

I find example (9.28) at the very edge of acceptability, and predictably most variations of this utterance concocted for the purpose of syntactic analysis also have borderline status. For this reason I shall modify it slightly by removing one of the elements, *out*, and making the sentence declarative, before providing an analysis of the pile-up of Ps:

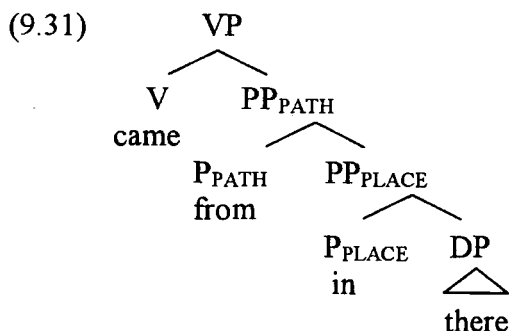
(9.30) He came right back down from up in there.

An alternative to a line-up of sisters to V in (9.30) is a structure in which some of the Ps in this string function as modifiers. Evidence that Ps can take on a modificational function in PP structure is provided by Ayano (2001: 93-97), who convincingly argues that in a sentence such as *Sam disappeared down into the darkness*, the intransitive P *down* has precisely this function: for example, the degree modifier *right* may be inserted before *down* at the top of the PP, (*right down into the darkness*), but not between *down* and *into*, (*\*down right into the darkness*), indicating that *into* is not the highest element in its own projection. In order to distinguish between modificational elements such as *right* and *straight* on one hand, and elements such as *back*, *out*, *over* and *down* on the other, I shall refer to the former as degree modifiers, and the latter as directional modifiers.<sup>7</sup>

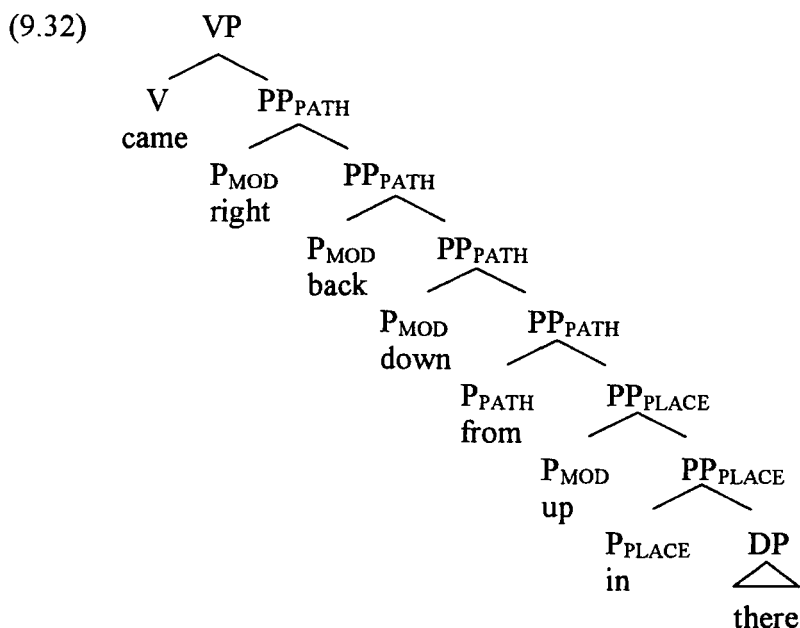
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<sup>7</sup> I postpone a more detailed theoretical treatment of the ordering restrictions on prepositional modifiers until Section 11.5.1, where types of 'directional modifiers' are further distinguished ('Flow modifiers' such as *back* and 'Trajectory modifiers' such as *down* also exhibit a rigid ordering restriction).

At least on one reading of (9.30), there is a layered PP structure, with *from* as the higher P [PATH] head, and in as the lower P [PLACE] head. A simplified version of the structure without P modifiers is given below.



Assuming temporarily<sup>8</sup> that all prepositional modifiers are adjoined to PP, they may be added to the structure in (9.31) as follows.



One piece of evidence for this structure is that it should be possible to insert *right* at the top of the modificational structure above any head P, and this does seem possible.<sup>9</sup>

<sup>8</sup> This is perhaps the simplest analysis. However, in Section 11.5.1 I suggest that there is no adjunction; rather, such elements are nested in a limited series of functional projections above both P<sub>PLACE</sub> and P<sub>PATH</sub>.

(9.33) He came (right) back down from (right) up in there.

In contrast, it is not possible to insert *right* between directional modifiers, or between a directional modifier and the head P.

(9.34) He came back (\*right) down (\*right) from up (\*right) in there.

The same logic can be applied to the utterances in Experiment I transcripts which might be posited as having multiple satellites as sisters to the verb. For example, E7d's response to the cave entrance scene (first given in example 5.177) was as follows.

(9.35) <E7d [9]: *he runs straight through into it*>

If *straight* and *through* are, respectively, a degree modifier and a directional modifier to the head preposition *into*, this order should be fixed, and indeed it is.

(9.36) \*He runs through straight into it.

However, perhaps the strongest evidence that such strings of intransitive P between the verb and the head P 'orbit' the latter and not the former comes from movement tests. If the PP moves, so do the modifiers it contains.

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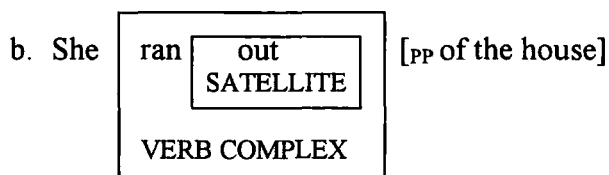
<sup>9</sup> *Right* is always the highest element in any string of prepositional modifiers (cf. Ayano, 2001: 79, fn. 1). Only one instance of insertion seems (stylistically?) possible.

- (9.37) a. It was straight through into the cave that he ran.  
 b. \*It was into the cave that he ran straight through.  
 c. \*It was through into the cave that he ran straight.

The above sets of examples count as evidence against the claim that all the elements in examples such as (9.28) are in a flat structure, in the same ‘sister relation to the verb root’ (Talmy, 1991: 46, 2000b: 102). They also speak against the notion of the ‘verb complex’, intimately related to the claim of sisterhood, according to which the verb and satellite form a single syntactic unit. We now turn more specifically to the syntactic status of verb complexes.

As discussed above, Talmy (1991, 2000b) considers satellites to be categorially distinct from prepositions, so that in the example below *out* is a satellite, whilst *of* is a preposition. The verb *run* and the satellite *out* together constitute a verb complex.

- (9.38) a. She ran out of the house.



(adapted from Talmy, 1985: 103)

Whether verb complexes have some cognitive reality is not at issue in the present discussion. The question is whether verb complexes with directional particles can be shown to be syntactic constituents. In the above example, standard constituency tests

show that *out* is a real preposition, integral to the PP constituent. The PP acts as a unit in syntax and may for example be clefted, or pseudo-clefted, as shown below.<sup>10</sup>

(9.39) It was [out of the house] that she ran

(9.40) Where she ran was [out of the house]

Moreover, in other contexts, the phrase *out of the house* is not only found as a sister to V, but in other canonical PP positions such as the complement to N (9.41) and P (9.42).

(9.41) the path [out of the house]

(9.42) from [out of the house]

In contrast, the ‘verb complex’ does not show signs of syntactic constituency; it may neither be co-ordinated nor moved, e.g.

(9.43) \*She ran out, not walked out, of the house.

(9.44) \*What she did of the house was run out.

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<sup>10</sup> This is independent of the question of the status of [*of the house*]. The fact that this latter string fails movement tests I assume to be due to late-insertion of the grammatical P of at PF: \**It was [of the house] that she ran out*, \**Where she ran out was [of the house]*. For more on the idea of late insertion of ‘grammatical *of*’, see Section 6.3, fn. 5, and Emonds (1985: 183–4).

Thus *out of the house* is a *bona fide* PP in (9.38a), with constituent status, whilst the verb complex *ran out* does not form a syntactic structural unit. Although the notion of ‘verb complex’ as a grammatical constituent has gained ground in cognitive linguistics due to its intuitive appeal, it remains without empirical support.

In this chapter, some of the most influential uses of the terms ‘path’ and ‘satellite’ in the cognitive linguistics literature have been examined, with reference to utterances from the elicited production data as well as constructed examples. Whilst I accept that several of these senses may have merit in cognitive linguistic frameworks, which take as their goal descriptions of general cognition, I have argued that most have no place in a formal account of the workings of syntax in motion events. Whilst PATH remains a strong candidate for the status of computational semantic feature, attempts to decompose it into Vector, Deictic and Conformation are less convincing, although such approaches are interesting and provide fuel for future research. Extensions of the term ‘path’ to headless phrase types or stretches of discourse seem less amenable to formalization. As for the terms ‘satellite’ and ‘verb complex’, it has been shown that they cannot be characterized as formal elements in syntactic computation. We now turn to a more complete formulation of a generative account of the findings in Experiments I and II, in terms of shared computational semantic features, shared categories and principles of syntax, and language-specific lexicons.

## **Chapter 10**

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### **Computational semantic features: Representation and learnability**

This chapter deals with the formalization of PATH predication phenomena in terms of interpretable features associated with lexical items (LIs), and carried on heads in syntactic computations. Theoretical background is provided for the version of subcategorization theory adopted for this investigation, whose formalism was adopted with brief argumentation in Section 2.2.2.2. This particular approach was chosen in conscious pursuit of parsimony in lexical representation. Such a decision merits discussion, especially as it is in contrast to the more prevalent notion that semantic elements must be combined in a second, independent, combinatorial system (Jackendoff, 1983, 1990, 2002; Pinker, 1989). In the first three sections, I discuss the rationale behind positing computational semantic features in syntax, and show how the interplay of such features on V and P determines grammaticality. A fundamental distinction is then made between conceptual features on predicates versus those on lexical nouns, only the former being part of the computational semantic feature system advanced in this thesis. The final two sections deal with issues of acquisition. It is shown that despite the existence of a learnability paradox in the acquisition of semantic feature specifications, which stubbornly remains without solution, the results of Experiments I and II provide strongly suggestive evidence that children move from more general to more specific feature specifications, first assigning the feature LOCATION to predicates (allowing both locative and directional complements) and later the more specific features PATH and PLACE.

## 10.1 Classical subcategorization theory

Subcategorization theory was introduced by Chomsky (1965) primarily to provide an account of the systematicity of complement selection in terms of strictly syntactic features, and as such the arguments for this aspect of the theory are as powerful today as they were 40 years ago (see Section 2.2.2.2). However, he also, more tentatively, posited an extension of subcategorization theory to include the selection of certain semantic features. The following sentences are drawn from two sets of examples serving as the original basis for discussion.

(10.1) a. Sincerity may admire the boy.

The harvest was clever to agree.

The book dispersed.

b. Occulists are generally better trained than eye-doctors.

I'm memorizing the score of the sonata I hope to compose someday.

That ice cube that you finally managed to melt just shattered.

(Chomsky, 1965: 75-77)

Chomsky (1965: 75) suggests that the examples in (10.1b) are syntactically well-formed, but semantically incongruous. They are 'pure' cases of semantic violation, and outside the realm of syntax proper. However, the examples in (10.1a) 'have a borderline character' (ibid: 77), and raise a particularly 'difficult and rather vexing question' (ibid: 75), namely, whether this selectional information should be in the syntactic component of the grammar. He calls this the question of 'presentation', and

argues that ‘a priori there is no way to decide whether the burden of presentation should fall on the syntactic or semantic component of the generative grammar’ (ibid: 78). If the solution is semantic, then the sentences of (a) are syntactically well-formed but incongruous, i.e. they may be generated by the syntax, but the lexical items are specified in such a way as to rule out the combination of such items on semantic grounds. If the solution is syntactic, then they cannot be generated by the syntactic component of the grammar (unless selectional restrictions are ‘relaxed’ by knowing linguists). Chomsky (1965) opts for the syntactic solution, proposing ‘interpretable syntactic features’ such as ANIMATE, HUMAN, ABSTRACT etc. to account for such constraints on argument structure.<sup>1</sup> However, he maintains a distinction between ‘strict subcategorization rules’ (category selection) and ‘selectional rules’ (feature selection), within a general syntactic subcategorization process (Chomsky, 1965: 95). To date, the arguments for the syntactic or the semantic approach remain conceptual rather than empirical. Although the semantic option developed by researchers such as Grimshaw (1979) and Pesetsky (1982) has come to predominate in most current assumptions, Chomsky’s (1965) assessment of the borderline character of semantic selectional restrictions remains valid. More recently, whilst Jackendoff (1990) and Pinker (1989) have made influential proposals for stating such complement restrictions in semantic structures, Emonds, (1991, 2000) has elaborated the proposal of Chomsky (1965), with the goal of incorporating all syntactically relevant semantic features into syntax.

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<sup>1</sup> This represents a conceptual shift between *Syntactic Structures* (1957) and *Aspects* (1965). Chomsky’s famous example *Colorless green ideas sleep furiously* was treated as syntactically well-formed in *Syntactic Structures*, but in *Aspects* it is ungrammatical. On the *Aspects* view, there are degrees of grammaticality, and the sentence is out only as regards the violations of feature-matching.

## 10.2 Extending subcategorization theory: Syntactically relevant semantic features

Emonds' (1991, 2000) extension of Chomsky's (1965) subcategorization theory into the domain of conceptual semantics has implications for a wide range of syntactic problems. His feature-based analysis encompasses phenomena such as nominalization, null arguments, causatives and passives, and is used as the basis for a unified theory of morphology and syntax. However, I restrict discussion to those aspects related to directional predication.

As discussed briefly in Section 2.2.2.2, extended subcategorization theory has drawn on the semantic work of Talmy (1975, 1983, 1985) and Jackendoff (1983, 1990) in the formulation of 'interpretable syntactic features', which may be incorporated into the syntactic selection process. The objective is to state all grammatical restrictions on complement selection in terms of syntactic categories carrying features such as ACTIVITY, STATIVE, MOTION, LOCATION, PATH, PLACE, etc. (with certain aspects of interpretation, such as FIGURE and GROUND, derived from general principles of interpretation, as discussed below).

Thus the verbs *reside* and *glance*, which both select an obligatory PP complement, may fine-tune their complement selection as follows:

(10.2) *reside*, V [STATIVE], + <P [PLACE]>

(10.3) *glance*, V [ACTIVITY], + <P [PATH]>

This simple distinction in PP specification is enough to account for the range of possible and impossible complement types.

(10.4) Mary {\*resided / glanced} {down / {toward / into} a small apartment}.

(10.5) Mary {resided / \*glanced} {within walking distance / at home}.

(Emonds, 2000: 37)

In this system, the features LOCATION, {PATH / PLACE} are located in an inclusional hierarchy (similar to [ANIMATE [HUMAN]]), such that all P [PATH] and P [PLACE] are instances of P [LOC] (Emonds, 1991: 385; 2000: 45).<sup>2</sup> As such, [LOC] is a necessary condition for the occurrence of [PATH] or [PLACE]. Thus *reside* selects P [LOC, PLACE], and *glance* selects P [LOC, PATH].

The syntactic and semantic approaches to Chomsky's (1965) 'problem of presentation' each have their advantages, but in what follows I hope to illustrate that whilst both are 'workable solutions', extended subcategorization is by far the more parsimonious of the two. Jackendoff's (1990, 2002) solution to Chomsky's (1965) 'problem of presentation' is semantic: he proposes that in parallel to the syntactic structure, there is a conceptual semantic structure, including all grammatically relevant information, as well as conceptual information irrelevant to syntax. Recall that he does not believe that it is possible to entirely dispense with subcategorization frames (as discussed in Section 2.2.2.2), and thus this semantic structure is in addition to the specifications of a classical subcategorization frame.

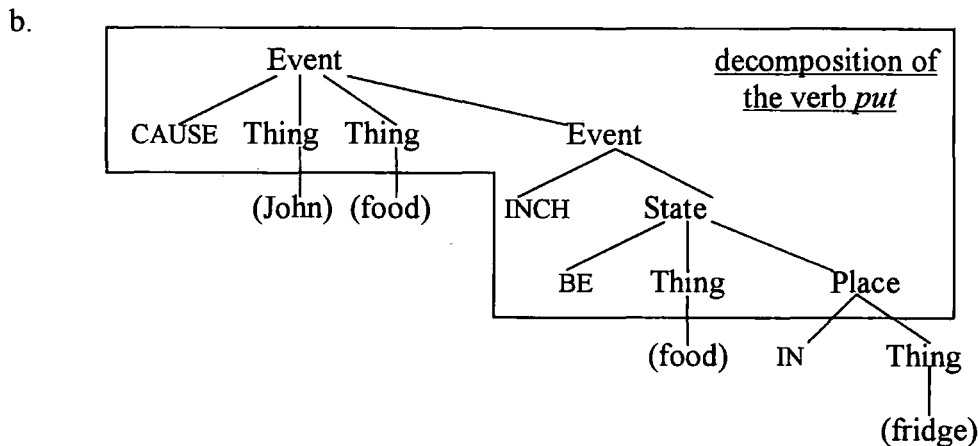
In order to appreciate the economy of stating selectional restrictions in terms of syntactic subcategorization, two more detailed comparisons may be drawn between specific representations in the two frameworks. Jackendoff (2002: 366) proposes an

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<sup>2</sup> Emonds (2000: 45) also splits LOCATION into SPACE and TIME, with (physical) PATH/PLACE under SPACE, but I shall leave this distinction aside in the current discussion.

elaborate lexical semantic structure for the verb *put*, stored in its entirety in the lexicon, and spelling out inherent aspects of meaning: that it is a causative inchoative, that there are three arguments, and that an agent acts on an object causing it to change location, as shown in the following example.

(10.6) a. John put the food in the fridge



(adapted from Jackendoff, 2002: 366)

Such semantic structures include ‘ontological categories’ like Thing, Event, State and Place in the above example, which Jackendoff (1990: 22-25) views as the essential categories of complex thought. Each of these may be decomposed into a function-argument structure, each argument being in turn a conceptual constituent of some major category. He also invokes ‘conceptual functions’ such as CAUSE, BE, and INCH (‘inchoative’ or ‘change-of-state’), which combine conceptual arguments to form major ontological categories. Functions are the means by which ontological categories may be optionally expanded. For example, in (10.6b) the event-function CAUSE combines two Things and a subevent to form an Event. The event-function INCH combines with a State to form the subevent. The state-function BE combines with a

Thing and a Place to form a State, and the place-function IN combines with a Thing to form a Place.

One can contrast Jackendoff's representation of *put* (10.6b, above), with Emonds' (2000: 40) representation of the same verb, to which he assigns a subcategorization frame identical in crucial respects to the following, given in the notation used throughout this thesis:<sup>3</sup>

(10.7) *put*, V [ACTIVITY], + <D, P [PATH]>

The verb *put* is here specified as an ACTIVITY verb, although in Emonds (2000) this is so by default, ACTIVITY being the unmarked type of verb. It selects two obligatory complements, a D (which projects DP in syntax) and a P [PATH] (which projects PP in syntax), listed in order-free notation. This is all the lexical information that the syntax needs to know. On the latter account, all hierarchical relationships in a sentence, between subject and predicate, between internal arguments, between event and sub-event (i.e. the acting on the food and the food's moving to the fridge) fall out from general syntactic principles and the specifications of the elements that enter into computation. Rather than having two very similar forms of phrase structure operating in parallel, one semantic and one syntactic, the compositional semantics follows from how the elements are combined in syntax.

As is readily apparent, the interpretation of the precise semantics differs in the two versions of the lexical entry, though this is a matter of analysis rather than one of notational framework; either approach could accommodate changes to bring the interpretations in line. In the conceptual structure (10.6b), the representation of *put*

<sup>3</sup> The notation in the cited example has been altered to preserve consistency with the other frames given in this thesis, although it is the same in essence. The original formulation is in 'classical subcategorization' style: *put*, V, + \_\_\_ DP^[P, PATH] (Emonds, 2000: 40).

may be paraphrased as follows: an agent causes a thing to enter a state of being in a certain location. On this account, the verb is a ‘causative inchoative’; directionality may be implied, but it is not encoded. The extended subcategorization frame (10.7), however, explicitly encodes PATH, forcing the interpretation that the D argument moves in a direction to be specified by the choice of preposition. These two interpretations may be respectively broken down as follows.

- (10.8) a. Interpretation 1: *One thing – John - caused another thing – food - to change state such that it was in a location - the fridge*
- b. Interpretation 2: *The subject – John - acted on the object – food - such that it moved in a direction specified by the PP - in(to) the fridge*

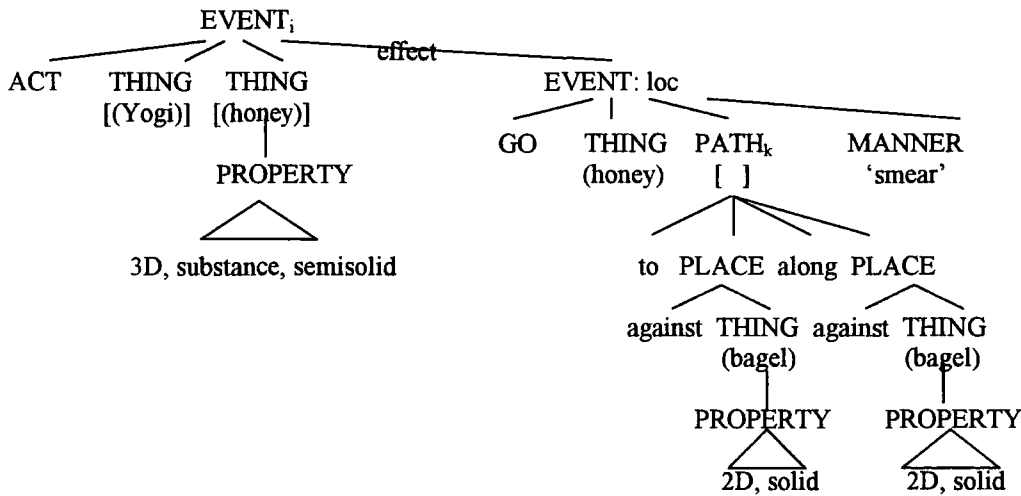
This latter account favours a parallel with the sentence:

(10.9) John put the food *into* the fridge.

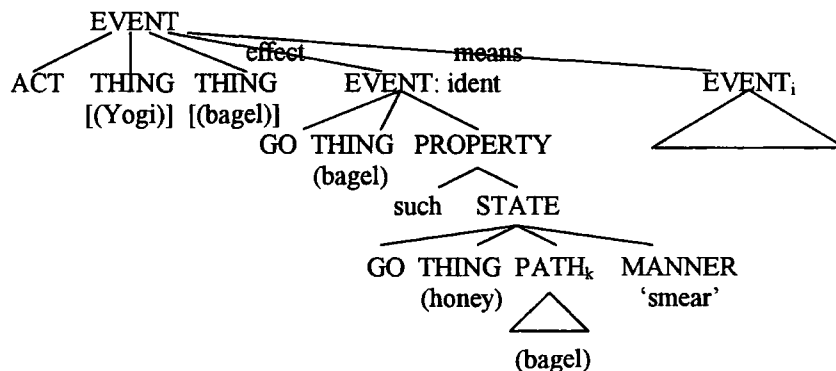
However, although the choice between *in* and *into* here does not appear to effect semantic interpretation, the conceptual structure representations for the two sentences would be highly divergent: (10.6a) being a change-of-state event, and (10.9) being a motion event. In other words, given Jackendoff’s (2002: 366) representation of *put* in example (10.6b), a second, distinct lexical entry for *put* would be required to account for (10.9). In terms of the extended subcategorization frame in (10.7), however, *putting food in the fridge* and *putting food into the fridge* is conceptually the same thing (which accords with my own intuitions).

A second set of contrasting representations may be given for the verb *smear*, this time using Pinker's (1989) variation on semantic structure theory. This verb participates in the locative alternation, and accordingly must have two linked lexical entries in Pinker's (1989) framework, which might be rendered as follows, with arguments slots filled in by appropriate participants (PROPERTIES omitted in (10.10b)):

(10.10) a. *smear*<sub>1</sub>: e.g. Yogi smeared the honey onto the bagel.



b. *smear*<sub>2</sub>: Yogi smeared the bagel with honey.



The structure in (10.10a) can be paraphrased as 'Yogi acted on a semisolid, 3-dimensional substance, namely honey, causing it to go to, against and along a 2-dimensional solid, namely a bagel, in a 'smearing' manner. Likewise, (10.10b) can be

paraphrased as ‘Yogi acted on a 2-dimensional solid, namely a bagel, causing it to attain a property (‘smear’), by means of Event (10.10a). This information is all deemed conceptually necessary for semantic interpretation.

The sisters of the ACT function in the main event in both representations include a THING interpreted as Agent and linked to subject position, a second THING interpreted as Patient and linked to direct argument position, and subsidiary event structures. Note that in (10.10a), Yogi is primarily acting on the honey, whilst in (10.10b) he is acting primarily on the bread. In (10.10a), the honey is interpreted as a Patient in the main event, but also has the interpretation of a Theme in the sub-event. These two structures corresponding to the different meanings of *smear* in either form of the alternation are, in effect, two separate lexical entries. A lexical rule generates one from the other, although which is primary is a matter of debate (see Pinker, 1989: 63).

The arguments of *smear* in example (10.10) are linked to syntactic positions by means of linking rules: square brackets (‘[ ]’) indicate the open arguments that undergo the linking process. Those properties of THING arguments selected as necessary contextual features required by the verb form a closed set of what Pinker considers to be cross-linguistic, grammatically relevant semantic components. He draws on Talmy’s (1983, 1985) cross-linguistic investigations to help formulate a set of PROPERTY features that include: ANIMATE, HUMAN, SHAPE (i.e. extension or dimensions, e.g. 1D, 2D, 3D), COUNT / MASS, RIGID / FLEXIBLE, SUBSTANCE / AGGREGATE (including subclassifications such as LIQUID, SEMISOLID, etc.).

The simplicity of Emonds’ (1991) representation of *smear* is in stark contrast to the elaborate semantic structures of example (10.10) (again the formalism has been slightly altered to match the other frames given in the thesis):

(10.11) *smear*, V ([LOC]), +<D, P ([LOC])>

This entry indicates that the verb and the selected preposition can either carry the feature [LOC] or not. However, it is elsewhere specified as an extra-lexical principle that [LOC] may be carried *either* on V *or* on P, but not on both. On this account, this feature plays a crucial role in the identification of the GROUND. The GROUND object is specified not in terms of any inherent features (any DP can play this role), but through a general principle of interpretation:

(10.12) Ground specification: An object DP of  $Y^0$  ( $Y = V, P, N, A$ ) is a Ground if and only if  $Y^0$  is +LOCATION.<sup>4</sup>

(Emonds, 2000: 63)

For current purposes,  $Y^0$  may be understood as either V or P. For example, the verb *fill* has the inherent feature [LOC], and obligatorily selects a GROUND as direct object, e.g.

- (10.13) a. The girl [<sub>v, LOC</sub> filled] the glass [<sub>P with</sub>] juice;  
 b. \*The girl filled juice into the glass.

The verb *pour* does not have [LOC] as an inherent feature, but selects a P [LOC] complement, which in turn selects a GROUND as direct object, e.g.

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<sup>4</sup> This is the principle in truncated form. It continues: 'Subcases of Ground (Location, Goal etc.) are determined by the features co-specified with +LOCATION'.

- (10.14) a. The girl [<sub>v</sub> poured] juice [<sub>P, LOC</sub> into] the glass  
 b. \*The girl poured the glass with juice.

Returning to *smear*, the principle of Ground specification can also be seen at work in the locative alternation. This verb is characterized as (LOC), with parentheses indicating optionality. If the verb carries the feature [LOC], then the preposition does not, e.g.

- (10.15) Yogi [<sub>v, LOC</sub> smeared] the bagel [<sub>P</sub> with] honey.

If *smear* does not carry the feature, then it selects a P [LOC] complement which in turn specifies its own object as the GROUND, a phenomenon I refer to as ‘feature shift’.

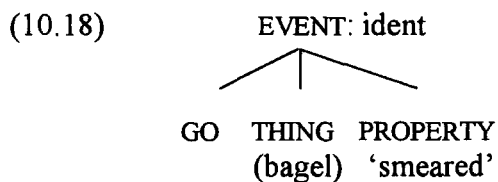
- (10.16) Yogi [<sub>v</sub> smeared] honey [<sub>P, LOC</sub> onto] the bagel.

Another issue is how the Agent is mapped to the syntactic subject position, and must *never* appear in complement phrases. Again a general principle of interpretation is posited, originally formulated by Chomsky (1972), which applies to all sentences with ACTIVITY verbs.

- (10.17) Agent Specification: ‘Thus one rule (probably universal) will stipulate that for verbs of action, the animate subject may be interpreted as the agent’ (Chomsky, 1972: 75).

In comparison with Pinker's (1989) lexical entries, Emonds' (1991) representations may seem somewhat underspecified. For example, there is a complicated semantic substructure for the PATH in the locational event in (10.10a): *Yogi smeared the honey onto the bagel*, which has no parallel in Emonds' representations. However, I propose that the fundamentals of Emonds' lexical entry for *smear* can remain intact as long as the locative P selected by V has an additional interpretable feature such as [CONTACT] (e.g. *on, onto, along, against*) which would be enough to accurately characterize the selectional restrictions on P in (10.10a). Any additional spatial representation need not be specified in syntax. Talmy's (1985) crosslinguistic study of lexicalization and Levin's (1993) study of English verb classes both indicate that [CONTACT] seems to be a syntactically relevant semantic component, which renders it a plausible candidate for inclusion in the system.

Another possible example of necessary specification present in Pinker's system but absent in Emonds' is the substructure indicating the 'change of state' of the bread (10.10b): *Yogi smeared the bagel with honey*. This substructure may be given a simplified notation like 'smeared', as in (10.18) below (a parallel example may be found in Pinker, 1989: 199):



However, given a syntactic representation of *Yogi smeared the bagel with honey*, it is unnecessary to provide additional formalisms to convey the fact that the bread 'gets smeared'. A more parsimonious solution would be to invoke a general principle stating that all direct objects are affected by inherent properties of the verb that selects

them (Gropen et al.'s (1991) 'Principle of Object Affectedness' may be a suitable candidate).

This 'feature shift' account of the locative alternation leaves certain issues unaddressed and is perhaps circular to some degree: only verbs marked as (LOC) may alternate, and only verbs that alternate are marked (LOC). Nonetheless, alternative accounts are no more enlightening about the source of the alternating predicate classes. Pinker (1989; 1994) attempts to escape circularity by invoking 'observational learning'. He has influentially argued that among verbs that specify a manner of motion for the FIGURE, only those that obligatorily specify a change of state in the GROUND may alternate. If you spray water onto a plant, the plant gets wet, so therefore you can also spray the plant with water. This knowledge is attributed to children, too; by hypothesis, if they allow a verb such as *pour* to alternate, it means that they associate pouring events with filling events. They can recover from such overgeneralizations by attending to multiple uses of the verb until they hear *pour* in a context with no change of state of the GROUND (e.g. pouring water down a sink, pouring toys onto the floor), after which they can reclassify *pour* as a non-alternator. However, this account of unlearning (which plays a pivotal role in Pinker's (1989) admirable attempt at solving 'Baker's Paradox') does not work, because it is not true that all locative alternators necessarily specify a change of state. On hearing sentences such as *He sprayed the water {out of the window / up into the air}* one does not assume that *spray* is a non-alternator. This leaves us back where we started. *Spray* is an alternator because of its lexical semantic specifications, which are assigned by virtue of its behaviour as an alternator.

To return to Emonds' (1991) 'feature shift' account, the principle of GROUND specification works on such a wide range of non-spatial predication that it maintains

its appeal by virtue of its descriptive power.<sup>5</sup> When applied to PATH predicates of the type found in Experiment I, this reasoning finds both support and new questions to address. A verb such as English *enter* presumably carries the feature [LOC], as it standardly specifies a GROUND object. However, this verb too may alternate, in which case it selects a preposition with exactly the same spatial specifications:

(10.19) Miles [<sub>V,LOC</sub> entered] the workshop.

(10.20) a. Miles [<sub>V</sub> entered] the screw [<sub>P,LOC</sub> into] the hole.

b. Miles [<sub>V</sub> entered] the data [<sub>P,LOC</sub> into] the computer.

What appears to be shifting here is not just the general feature [LOC] but the specific PATH lexicalized in *into*.

In French and Japanese, the analogues to ‘enter’ raise questions about what may get shifted when. Recall that French *entrer / rentrer* ‘enter’ and Japanese *hairu* ‘enter’ never directly select a DP, but rather a specific P, French *dans* ‘in’, and Japanese *ni* ‘P<sub>LOC</sub>’, respectively. Thus by the principle of GROUND specification (Emonds, 2000: 63), these verbs, contrary to intuition, never specify the GROUND argument. Another curious point is that they differ in what is shifted: in the French case, P has the same spatial geometry as V; in the Japanese case, only the most abstract spatial feature, [LOC], is selected, more geometrically specific P being entirely absent from the Japanese lexicon (for more detailed comparative discussion, see Section 3.3).

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<sup>5</sup> For a sample of non-locative alternations operating on the same principles, see Emonds (2000: 62-65).

However, there is reason to believe that the feature specifications of V are not displaced in such cases. Consider the following three examples from the French data:

(10.21) <F6a [9]: *il rentre dans la caverne*>

he enters in the cave

‘He goes into the cave.’

(10.22) <F3a [19]: *il monte dans sa maison*>

he climbs-up in his house

‘He climbs up into his house.’

(10.23) <F4a [6]: *il est tombé dans l’eau*>

he AUX fallen in the-water

‘He’s fallen into the water.’

In the first example, there appears to be redundant specification of the spatial geometry, and it might be argued that just as *spray* is V [-LOC] in combination with a P [+LOC], so *rentrer* ‘enter’ lacks inherent feature specification in this regard, and the P does all the work in selecting a GROUND which is a 3D internal space. However, the second example shows that it is not the case that [LOC] features abandon the verb in this particular type of structure: rather, they do not play a role in object selection, and are interpreted entirely *in situ*. The verbs *monter* ‘climb-up’ and *tomber* ‘fall’ retain their inherent PATH specifications, which are elaborated by means of the preposition *dans* ‘in’. The principle of GROUND interpretation holds in any case, with GROUND interpretation of the DP determined by the preposition.

In this section, the argument structures of non-alternating verbs (e.g. *put*) and alternating verbs (e.g. *smear*) have been analyzed both in terms of Jackendoff's (1990) semantic structure theory and Emonds' (2000) extended subcategorization theory, and it is apparent that both representational systems have sufficient descriptive power. However, it is more economical to elaborate a single system to account for combinations of verbs and their arguments, if this is at all possible, rather than repackaging recalcitrant problems in additional combinatorial systems. Rather than stipulating that EVENTS and STATES are canonically linked to verbs, and that THINGS are canonically linked to nouns, one could posit that conceptually EVENTS and STATES *are* verb-types and that THINGS *are* nouns. This would enable a radical purging of redundant linking rules from the lexicon, and at the very least would constitute an extremely interesting hypothesis about the relationship between language and propositional thought. Emonds (1991) proposes just such a solution, and in no uncertain terms. The only alternative, he argues, is that 'in addition to an ability to name, human beings have two further *independent* mental faculties for combining names which set their expressive/communicative system apart from that of primates' (Emonds, 1991: 370). He does not equate all thought with language, but claims that when thoughts are combined to create complex thoughts, they are combined through the generative mechanism of syntax. Such reasoning leads to the striking conclusion that 'the categories of syntax *are* the categories of connected thought' (Emonds, 1991: 371). This may seem a radical step, but Pinker's (1984, 1989) 'semantic bootstrapping theory also holds that the earliest stages of acquisition of syntax depend upon children being able to innately associate THINGS with nouns and EVENTS with verbs, which is not so far away from Emonds' (1991, 2000) proposal.<sup>6</sup>

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<sup>6</sup> In his reply to Emonds (1991), Jackendoff (1993) argues that the mapping is not one-to-one, and that

All the utterances attested in the elicited production data of Experiment I, and all the possible and impossible test sentences in Experiment II, are amenable to treatment in both types of formalism: either in conceptual semantic structures, or in terms of extended subcategorization theory. The choice between the two systems of representation is not a question of descriptive adequacy, but a case of Ockham's razor. The syntactic solution has been adopted here on the grounds of parsimony.

Emonds' (1991, 2000) approach to lexical representation makes possible a welcome simplification of lexical entries, although a full inventory of plausible syntactic features on V and P is yet to be established. Extended subcategorization and a small set of general interpretive semantic principles may suffice to account for all linguistic aspects of lexical selection.

### 10.3 Feature congruence on V and P

The discussion now turns to how this feature-based approach can be used to distinguish between contrasting argument structures in English, French and Japanese without reference to language-particular grammars. At the outset of this thesis, in Section 1.3, I gave a set of three examples each (a, b, c) from English, French and Japanese, respectively, to illustrate the S-framed quality of the former and the V-framed characteristics of the latter two (ex.s 1.11, 1.12 and 1.13). I repeat the (a) sentences below for ease of reference.

(10.24) Chihiro danced *into* the house.

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an NP can express a THING (e.g the dog), an EVENT (the war) or a PROPERTY (redness). However, I maintain that whenever something is lexicalized as a noun, it is conceptualized as a THING (consider: *The war was a terrible thing, though it brought Rick and Ilsa together again; The thing that surprised me was the bright redness of her cheeks*).

(10.25) Chihiro est *entré* dans la maison en dansant.

Chihiro AUX entered in the house P dancing

‘Chihiro danced into the house.’

(10.26) Chihiro wa uchi ni odotte *haitta*.

Chihiro TOP house P<sub>LOC</sub> dancing entered

‘Chihiro danced into the house.’

In (10.25) and (10.26), French *dans* and Japanese *ni* and are both [LOC], unlike English *into*, which is [PATH]. In (10.24), if *in* [LOC] is substituted for *into* [PATH], the directional interpretation is impossible due to the non-directional MANNER verb, leaving a strictly locational interpretation.

(10.27) Chihiro danced in the house.

In the French and Japanese examples, the primary predicate (*hairu* ‘enter’, *entrer* ‘enter’) specify a directional interpretation. However, if the non-directional manner verb ‘dance’ takes the place of the primary predicate, interpretation again is strictly locational, not directional. As discussed earlier, Japanese *de* here replaces *ni* for an independent reason (*de* is required by locational adjuncts to activity verbs, rather than stative verbs: see Sections 6.6 and 8.3.1).

(10.28) Chihiro a dansé dans la maison.

Chihiro AUX danced in the house

‘Chihiro danced in the house.’

(10.29) Chihiro wa uchi de odotta.

Chihiri house P<sub>PLACE</sub> danced

‘Chihiro danced in the house.’

Therefore, interplay between P and V determines whether the interpretation is locational or directional, and if the verbal and adpositional predicates in these sentences have congruent features, locational interpretation is identical in each language: (10.27) = (10.28) = (10.29). Semantic interpretation in this case is driven not by language-wide rules of PATH lexicalization, nor by syntax alone, but by universal interpretable features on the heads of the relational categories V and P. The reason that the English example (10.24) finds its nearest equivalents in French and Japanese (10.25) and (10.26) has nothing whatsoever to do with grammar at the whole-language level, but is simply due to the fact that English *into* has no lexical equivalent in Japanese or French. This points to the overarching conclusion of this thesis: that variation in the expression of PATH in motion events is entirely determined by the inherent and contextual properties of LIs, with no language-particular grammar settings.

#### **10.4 Restricting subcategorization theory: Conceptual mechanisms in argument selection**

Chomsky’s (1965) syntactic treatment of selectional restriction was concerned mostly with the properties of nominal arguments (e.g. ANIMATE, HUMAN, ABSTRACT, etc.) rather than concepts expressed by relational terms such as V and P (e.g. MOTION, PATH, PLACE). It would be natural to assume that on extending Chomsky’s (1965) subcategorization theory, argument properties would remain part of the system, and

indeed they do on Emonds' (2000) approach. However, there are several reasons to suppose that argument property selection is not syntactic at all.

I maintain that a distinction must be made between computational semantic features borne by verbal and prepositional predicates on the one hand, and conceptual features borne by nominal arguments on the other. Computational semantic features on verbal and prepositional predicates (i) are probably extremely restricted across lexical items and across languages, as suggested by studies such as Talmy (1985) and Levin (1993); and (ii) by definition are relevant to syntax. However, in these two regards, selectional features on nominal arguments differ from those on predicates.

Firstly, *features on nominal arguments do not form a restrictive set*. As McCawley (1976: 67) points out, for example, the verb *devein* as used in cookery requires an object denoting a shrimp or prawn. Such cases can be multiplied: *berth* is only of 'ships'; *taxi* [+\_\_PP] is only of 'aircraft'; *blonde* is only of 'hair', and by extension people, wheat etc. One need not look to relatively obscure examples to find examples of selectional restrictions in terms of 'open class' semantic categories that seem to play no role in syntactic computation. The verb *play*, for example, in unidiomatic use requires not just that its internal argument be ABSTRACT, but that it be a 'game', or 'music', whilst *write* appears to select only 'texts':

(10.30) Coltrane played {dominoes / the blues / \*boxing / \*his feelings}.

(10.31) Byron wrote {the poem / the song / \*the war / \*their love}.

Two additional considerations reinforce the assertion of non-restrictiveness. Firstly, presumed ‘closed class’ selectional categories exhibit the same relations of inclusion as ‘open class’ categories, as shown in the following examples:

(10.32) {The dog / The boy / John} admired his master

Animate > Human > Token (John)

(10.33) {The ship / The liner / The Queen Mary} berthed at the dock.

Ship > Liner > Token (the Queen Mary)

The fact that such specific open class lexical items participate in the same selectional process as proposed semantic components such as ANIMATE, MASS and LIQUID favours an account of selectional restrictions in terms of conceptual representations rather than syntactic features.

A further indication of their non-restrictive nature is that such ‘closed class’ selectional categories seem to be invariably found together with ‘open class’ categories in various lexical processes across languages. We have already seen this with argument selection in English. In Japanese, the numerical quantifier system does have elements that correspond to proposed ‘closed class’ features, e.g. HUMAN (-*nin*) and 2-DIMENSIONAL (-*mai*), but it also has elements that correspond to ‘birds’ (-*wa*), ‘cattle’ (-*tō*) and ‘footgear’ (-*soku*) (Makino and Tsutsui, 1986). Nominal classifiers are often invoked as evidence for the special status of a closed set of properties (e.g. Pinker, 1989: 185), as they too often include categories of Animacy, Count / Mass, Dimensions etc., but on close investigation nominal classifier systems provide weighty evidence that property specification is in terms of lexical conceptual

representations. Chinese certainly has several of these ‘restricted’ properties in its classifier system, but it also has ‘mixed classifiers’ such as *go* (which marks ‘humans’, ‘bottles’ and ‘fruit’). Trask (1991:44) reports that some languages (such as Malay) have a small set of twenty or so classifiers, that Vietnamese has been claimed to have over a hundred, and that Tzeltal (Mayan) has perhaps several hundred, although such classification systems may succumb to reanalysis.<sup>7</sup> However, even when languages have a small set of classifiers, they do not necessarily correspond to a universal set of properties.

The second way in which nominal argument properties differ from computational semantic features on V and P is that *they play no role in syntax*. It is clear from examples like (10.10) that a verb such as *smear* selects the properties of its FIGURE and GROUND arguments independently of the preposition that dominates them. The FIGURE is always a 3D, semisolid substance, and the GROUND a 2D, solid surface, irrespective of the syntax. Although it could be said that the V ‘sees through’ the P and selects properties of the ‘NP inside the PP’, it seems much more plausible to assume that argument property selection must be treated as independent phenomenon.

Given that the properties of FIGURE and GROUND for an alternating verb like *smear* hold irrespective of syntactic position, we may posit that inherent semantic properties are relevant only for the entering of arguments into the (pre-syntactic) Numeration, and that these properties pass through the derivation to the interpretive semantic component *without playing a role in computation*. Syntactic transformations never alter such properties: e.g. the NP ‘the boy’ cannot cease to be animate after

<sup>7</sup> Even what is perhaps the most well-known (and the most misunderstood) example of an apparently multifarious classifier system succumbs to a reductive analysis. Lakoff’s (1987: 92-103) reappraisal of classifiers in Dyirbal (Pama-Nyungan, Australian), as first described by Dixon (1982), leads him to reduce the elements of the system to [HUMAN MALE], [HUMAN FEMALE], [EDIBLE PLANTS] and [EVERYTHING ELSE].

movement. This is also true of the *wh*-word *who*; its animacy specification is assigned pre-syntactically.<sup>8</sup>

These characteristics of nominal argument features favour a non-syntactic solution to the problem of property selection. A final, more intuitive, consideration is that if constraints on argument properties may be understood by minds in the absence of a language faculty, then such knowledge is conceptual rather than linguistic. It seems reasonable to assume that whilst chimpanzees have concepts such as FLEXIBLE, LIQUID and ANIMATE, as well as BEND, DRINK and TICKLE, they also understand that as rocks are neither flexible, nor liquid, nor animate, it is impossible to bend, drink, or tickle them; in the same way, bears understand that honey cannot be smeared onto water; and bonobos, like humans, do not entertain pseudo-propositions such as *fear grooms bananas*.

Emonds (p.c.) is more optimistic about the possibility of capturing the selection of inherent properties of arguments in terms of syntactic features, as in Chomsky (1965). He cites a set of interesting examples from Chomsky (given in lectures in the late 1960s):

(10.34) The swarm of bees dispersed.

(10.35) \*John dispersed.

(10.36) \*John, who had by magic turned into a swarm of bees, dispersed.

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<sup>8</sup> Such features can alter in the course of a single sentence, as in *The book that he is planning will weigh at least five pounds*, or *The bank was blown up after it raised the interest rate* (examples from Chomsky, 2000b: 16). However, these shifts are never the result of a syntactic operation such as movement; the change is clearly a conceptual operation. See Chomsky (2000b: 15-16, 36-37, 126-127).

The fact that (10.36) is ungrammatical seems to indicate that selectional restrictions are syntactically rather than semantically determined, and thus supports the contention of Chomsky (1965) and Emonds (p.c.) that this aspect of lexical selection is best handled in terms of interpretable syntactic features. However, if the ungrammaticality of (10.36) is solely dependent on the syntactic relation between the lexical head in subject position and the verb, then (10.37) should be acceptable. The ungrammaticality of (10.37) lessens the force of the argument for a purely syntactic treatment in terms of inherent features on lexical heads.

(10.37) \*The swarm of bees, which had by magic turned into John, dispersed.

Selectional restrictions depend not only on features borne by the lexical head but on the compositional semantics of the whole NP.<sup>9</sup>

Thus the position I adopt in respect of extended subcategorization is that only those grammatically relevant features carried on the relational categories V and P (what I am calling *computational semantic features*) may be integrated into a formal system of syntactic selection. Property selection ultimately depends on non-linguistic mechanisms of thought.

## 10.5 A logical problem in the acquisition of feature specification

As discussed in Section 10.2, Emonds' (2000) hierarchy of spatial features is the source of the systematic encoding of P in this thesis as either [LOC], [PATH], or [PLACE]: in the first case the choice between direction or static location is not

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<sup>9</sup> McCawley (1976: 66-67) makes a similar point when he notes the contrast in grammaticality between *My neighbor is the father of two* and \**My buxom neighbor is the father of two*: conceptual selectional features on arguments are determined at the phrase level.

specified, and in the latter two cases, one or the other is excluded. It was thus possible to distinguish analogous LIs in the three languages investigated, making crosslinguistic comparison much more precise, and to provide a possible account of certain lexical errors in the utterances of younger participants, as well as variation in the lexical entries of adults.

This can be spelled out with respect to the classification of analogous predicates in the three languages which do not correspond in terms of argument structure. The following are Ps analogous to English *at/to*, with their inherent computational semantic features:<sup>10</sup>

- (10.38) a. English: *at*, P [PLACE] (i.e. only locational interpretation possible)  
 b. English: *to*, P [PATH] (i.e. only directional interpretation possible)  
 c. French: *à*, P [LOC] (i.e. both interpretations possible)  
 d. French: *en*, P [LOC] (i.e. both interpretations possible)  
 e. Japanese: *ni*, P [LOC] (i.e. both interpretations possible)  
 f. Japanese: *de*, P [PLACE] (i.e. only locational interpretation possible)

There are at least two ways children might start to map such spatial features onto newly-acquired or semantically developing phonological forms. They could start small (over-specified), allowing adpositional elements only one interpretation, so that all are initially treated as either [PATH] or [PLACE]. Or they could start big (under-specified), by first assigning the feature [LOC], and allowing such elements to be used in both directional and locational contexts. However, both alternatives present a logical problem for learnability.

<sup>10</sup> Again, these are only those conceptual features relevant to syntax, and are in no way to be understood as 'definitional primitives' (in the sense of Carey, 1982: see Section 9.1.2, fn. 2).

First, let us consider the implications if they start small. In one unproblematic scenario, they might misclassify an ‘adult’ P [LOC] (e.g. *under*) as strictly P [PLACE]. In such a case, hearing this P in both PATH and PLACE contexts over multiple exposures would allow them to reclassify it as P [LOC], on the basis of positive evidence. However, if they misclassify ‘adult’ P [PLACE] as P [PATH] (e.g. *at*, as in *\*I went at school*) or vice-versa, they must not only allow the PLACE interpretation following positive evidence, but must also delete the original PATH specification from the lexical entry. How such unlearning might take place is a real problem, on the widely-accepted assumption that ‘negative evidence’ is either unavailable or unreliable.<sup>11</sup>

Second, let us examine the alternative strategy, by which children might start big. In this case, all P are initially classified as P [LOC], and then children must learn how to narrow this specification in those cases of P that are strictly PATH or PLACE (e.g. after at first accepting both *I was at school* and *\*I went at school*, they must come to recognize that the latter is ungrammatical). Again, this presents children with a learnability impasse, as evidence of the ungrammaticality of the alternative narrow specification is absent from the input; in theory, their errors should persist into adulthood (at which point they would no longer be considered ‘errors’, but new forms in the language).

The scenarios sketched above are arguably variations of the ‘subset problem’ in language acquisition. In what will prove to be the most general case as we pursue this issue in the next section, the subset problem in the acquisition of directional predicates may be stated as follows: how can children retreat from the superset (LOC)

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<sup>11</sup> The term ‘negative evidence’ refers to corrective feedback and/or instruction in respect of ungrammaticality. The obvious point needs to be made that all children converge on the adult grammar irrespective of the differences in parental feedback, and empirical research into first language acquisition has produced convincing evidence indicating that children do not make use of what little feedback is sometimes made available (see Brown and Hanlon, 1970; Pinker, 1989; Marcus, 1993).

to the subset (PATH or PLACE) in the absence of negative evidence? I provide no answer to this learnability conundrum here; whilst providing a description of the problem is relatively straightforward, the solution is more elusive. It is worth noting, however, that many similar cases of ‘unlearning’ prove similarly intractable. In Section 10.2, it was argued that Pinker’s (1989) attempt at tackling the problem of how children reclassify verbs such as *pour* and *fill* as non-alternators after initially allowing them to alternate ultimately founders, leaving Baker’s Paradox unresolved.

Leaving aside this thorny issue for future investigation, it is nevertheless possible to provide an answer as to *which* strategy children actually adopt. As we shall see, the errors that children make indicate that they start big, with the general feature LOC, and are later able to narrow their feature specifications in the cases of P [PATH] and P [PLACE].

## 10.6 Lexical features and frames as the source of developmental syntactic errors

If children start big and underspecified, we expect that those who make *one* type of production error (PATH for PLACE or PLACE for PATH) should allow *both* interpretations, and evidence of this in production data would count as confirmation of the underspecification approach. As noted earlier in Section 2.2.3.2, children often make errors with spatial adpositions, using several common prepositions as general markers of location. For example, the prepositions *on* and *under* are often used as synonyms of adult *in*, and *under* is sometimes found as a synonym of *on* (Clark, 1973). In Section 6.6, I argued that this was a plausible if not watertight analysis of certain systematic uses of *under* and *through* in Experiment I (both used with the meaning of *in/into*). The interesting thing here is that they are used with multiple meanings first,

and the semantics are honed over time into adult-like representations. The transcripts of Experiment I and the grammaticality judgements of Experiment II indicate that this observation in respect of spatial geometry can be generalized to the semantics of direction and location in English and Japanese (French arguably has no P<sub>PLACE</sub>, only P<sub>LOC</sub>). Consider the following paired utterances and judgements *from the same test subjects*.<sup>12</sup>

(10.39) a. **Unambiguous locational use of English at (P<sub>PLACE</sub>):**

(i) <E4a [1]: *a monkey...a banana...a parrot at the window*>

(ii) <E5b [8]: *falls over at the top*>

b. **Acceptance of unambiguous directional use of English at (\*P<sub>PATH</sub>):**

Toto: English Test Sentence No. 7.

*The monkey climbs at the top of the hill.* [directional context]

(i) E4a: grammatical

(ii) E5b: grammatical

(iii) Adult rejection rate: 100%

(10.40) a. **Unambiguous locational use of Japanese *de* (P<sub>PLACE</sub>):**

(i) <J3e [11]: *dōkutsu no soto de 'kora'-tte okotta n ja nai?*>

cave GEN outside P<sub>PLACE</sub> 'hey'-TE got-angry PART is not  
'Didn't he get angry, shouting 'hey' outside the cave?'

(ii) <J5e [15]: *kawa de oyoida*>

river P<sub>PLACE</sub> swam  
'He swam in the river.'

<sup>12</sup> All utterances with locational *at* and most utterances with locational *de* were culled from utterances that were *discounted* from the main analysis (as there was no PATH predication).

b. **Acceptance of unambiguous directional use of Japanese *de* (\*P<sub>PATH</sub>):**

Toto: Japanese Test Sentence No.9.

*Saru-san wa dōkutsu no naka de hashirimasu.* [directional context]

monkey-TITLE TOP cave GEN inside P<sub>PLACE</sub> run

‘The monkey runs into a cave.’

- (i) J3e: grammatical
- (ii) J5e: grammatical
- (iii) Adult rejection rate: 100%

The combined results of Experiments I and II provide clear evidence that for these young participants who accept directional readings of English *at* (P<sub>PLACE</sub>) and Japanese *de* (P<sub>PLACE</sub>), the feature is underspecified (P<sub>LOC</sub>) rather than overspecified (P<sub>PATH</sub>), as they allow both interpretations. From this, in conjunction with the evidence from errors with spatial geometry mentioned above (Clark, 1973), I conclude that underspecification rather than overspecification is the starting point. Whilst the learnability problem discussed above remains, I assume that any solution must provide for lexical semantic fine-tuning on the basis of multiple exposures (a process of lexical learning rather than syntactic acquisition).

More solid evidence would be the finding of both interpretations in the elicited production data of one individual participant, but there were no such transcripts.<sup>13</sup> No English participant produced errors with *at*, and the few Japanese children who produced errors with *de* (P<sub>PLACE</sub>) (see Section 6.6, ex.s 6.41 and 6.42), did not use *de* in purely locational contexts in the same transcript. This is hardly surprising, as there

<sup>13</sup> However, anecdotally, as I was writing this chapter my 4-year-old daughter, Tamsin, ran into my office, threw a ball towards me, and said, ‘Daddy, pass the ball *at* Tami’. Naturally, I obliged. Later on that evening, she told me what she did *at* nursery, thus nonchalantly providing me with what I could not find in hours of scrutinizing transcripts.

were no stimuli designed to elicit predicates with locational interpretation, and recorded instances were few and far between.<sup>14</sup>

Feature errors in lexical frames can also explain certain child errors in complement selection. To re-emphasize one of the major findings of Experiment I, most of the MANNER predicates in the French and Japanese production data *can* take directional complements in colloquial speech, contrary to previous claims on this topic. The following list of analogous motion events correspond in the three languages in terms of their computational semantic features, and thus have a shared syntax in terms of complement selection *in colloquial grammar*.

(10.41) a. English:

*slide, run, jump, swim, roll*

V [MOTION, MANNER], (+ <P [PATH]>)

b. French:

*glisser, courir, sauter, nager, rouler*

V [MOTION, MANNER], (+ <P [PATH]>)

c. Japanese:

*suberu, hashiru, tobu, oyogu, korogaru*<sup>15</sup>

V [MOTION, MANNER], (+ <P [PATH]>)

<sup>14</sup> To be specific, in the entirety of the English child transcripts, including utterances with the most tenuous link to the materials (e.g. <E3g [1]: *my mummy's got a real Monster's Inc. storybook*>; <E3a [15]: *he's swimming, splish splash, under, under the sea, oh do like to be beside the seaside... [loss of attention]*>) as well as those that described the the monkey's actions but had no PATH predication (e.g. <E3b [1]: *he pinches that monkey's banana*>; <E6a [3]: *he tries to catch the parrot*>), there were only 4 instances of locational *at* out of a total of 1324 child utterances. In other words, *at* was attested in only 0.3% of child utterances that made their way from the recording onto paper. In the Japanese data, locational *de* was attested in 27/1278 (2.1%) of child utterances. Recall that the number of instances of PATH predication served as the main data set, not the number of utterances (Section 4.4).

<sup>15</sup> Again, all are considerably 'improved' with a deictic, e.g. *oka no shita made korogatte itta* - hill GEN bottom until rolling went - 'He went rolling to the bottom of the hill', but all are also attested without a deictic in colloquial speech (as well as in the elicited production data).

However, not all MANNER verbs have the same specifications. The following predicates are analogous in terms of ‘core meaning’, but do not correspond in terms of computational semantic feature selection.

(10.42) a. English:

*walk, crawl*

V [MOTION, MANNER], (+ <P [PATH]>)

b. French:

*marcher, ramper*

V [MOTION, MANNER]

c. Japanese:

*aruku, haihai suru*

V [MOTION, MANNER]

One possibility in line with the lexicalist approach is that some children will group these exceptional MANNER verbs with the others, and allow them to subcategorize a P<sub>PATH</sub> complement. In this case, PATH would be a contextual feature in the frame, subject to deletion sometime before adulthood. There is no sign of this in the production data, but there is some slight evidence in the French judgement data.<sup>16</sup> The relevant French test sentence is repeated below.

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<sup>16</sup> The same-scene Japanese test sentence targeted a different issue: *ni* P<sub>Loc</sub> vs. *o* (ACC).

(10.43) Toto: French Test Sentence No.5.

*Le singe marche à quatre pattes par le tronc de l'arbre.*

the monkey walks on four legs via the trunk of the tree

'The monkey crawls through the tree-trunk.'

The grammaticality judgements, extracted from Tables 8.3 and 8.4, were as follows:

**Table 10.1.** *French Group Results. Experiment II: Test Sentence no. 5. Percentages of positive responses by age group.*

Age Groups	F3	F4	F5	F6	F7	FA
Acceptance	80%	100%	100%	80%	80%	42.9%
Rate	(4/5)	(4/4)	(4/4)	(4/5)	(4/5)	(3/7)

As noted earlier, these results were messier than expected. Whilst on the one hand confirming that children do allow this complement structure, the adult judgements did not supply the expected contrast which would be necessary to illustrate a true developmental trend (see Section 8.2.2 for discussion).

There are, however, individual utterances in the production data that support this kind of feature-based account. Another set of analogous verbs with this kind of mismatch of features is used to express the English *fall over*. Whilst 'fall' in a directional sense has the same subcategorization frame in each language (10.44), 'fall over' varies in that Japanese has a specific verb for this meaning, *korobu* 'fall over' in (10.45).

(10.44) a. English:

*fall*,

V [MOTION, PATH→DOWN], (+<P [PATH]>)

b. French:

*tomber*,

V [MOTION, PATH→DOWN], (+<P [PATH]>)

c. Japanese:

*ochiru*,

V [MOTION, PATH→DOWN], (+<P [PATH]>)

(10.45) a. English:

*fall over*,

V [MOTION, PATH→DOWN, MANNER]

b. French:

*tomber*

V [MOTION, PATH→DOWN], (+<P [PATH]>)

c. Japanese:

*korobu*,

V [MOTION, PATH→DOWN, MANNER]

As previously shown in the introduction to Section 5.2, direction cannot be predicated of the moving object in sentences with Japanese *korobu* ‘fall over’, unlike with French *tomber* ‘fall / fall over’ (see especially ex.s 5.1-5.8). However, some children appeared to have assigned the same frame to both *ochiru* ‘fall’ and *korobu* ‘fall over’, such that the latter both could be used in directional contexts, as can be seen in these unambiguous examples, which are decidedly ungrammatical in adult Japanese.

(10.46) <J5c [8]: *ue kara koronjatta*>  
 top from fall-over-ASP-PST  
 ‘He fell over from the top.’

(10.47) <J5e [14]: *yama no ue kara yama no shita ni koronda*>  
 mountain GEN top from mountain GEN bottom P<sub>LOC</sub> fell-over  
 ‘He fell over from the top of the mountain to the bottom of the  
 mountain.’

In summary, although children made precious few production errors in complementation, being quite adult-like in this particular respect from the youngest subjects upwards, what few errors there were can be attributed to underspecification of computational semantic features on P (i.e. a default inherent LOC feature allowing both PATH and PLACE interpretations), or by general acceptance of PATH complements to MANNER verbs (i.e. starting out with a general MANNER V frame, to be adjusted in item-specific ways at a later stage).

In this chapter, the computational semantic feature system, given descriptive treatment at the outset of this thesis and used throughout in lexical semantic notation, has been examined from a more theoretical perspective, both in terms of representational framework and in respect of its application to issues of language acquisition. It was argued that Emonds’ (1991, 2000) system of extended subcategorization offers a more parsimonious treatment of directional predication than the semantic structure theories of Jackendoff (1990) and Pinker (1989), and has the descriptive and explanatory adequacy required of any theory by the data under investigation. It was further suggested that, of Emonds’ (2000) proposed interpretable

features relevant to complement selection, only those on predicates play a role in syntactic selection. In respect of language acquisition, it was shown that despite the existence of a logical problem in accounting for children's recovery from feature specification errors, it appears relatively clear that errors are due to under- rather than overspecification.

Computational semantic features are by hypothesis universal, and part of the initial state. What children must learn is how to map such elements to particular LIs, such that the LI becomes visible to the syntactic component as a matrix of syntactically relevant semantic features. Falling out from this creative assembly process is the fact that any given LI is likely to have a fairly unique feature-matrix when examined in detail, so that we cannot expect English *walk*, *climb*, *at* or *top* to correspond in anything more than fuzzy fashion to their French analogues *marcher*, *grimper*, *à* and *dessus*, or their Japanese analogues *aruku*, *noboru*, *ni* and *ue*. This is absolutely in line with the argumentation presented in Chapter 3 in respect of the Lexical Relativity Hypothesis. So much for the differences between languages. One of the most important bubbling undercurrents of the story so far, which briefly surfaced in Section 6.3, has been the possibility that the syntax of directional predication is fundamentally the same in each language. The focus now shifts to the possibility that children never have to learn how to string together P [PATH], P [PLACE], N [LOC] in order to relate the motion of the FIGURE to the reference point of the GROUND. Rather, the internal structure of PP, inasmuch that its elements are lexicalized in particular languages, is itself uniform across languages, and constitutes part of the initial state of knowledge of language.

## Chapter 11

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### Universals in the syntax of PP

In the previous chapter, it was argued that grammatically relevant semantic components interact through syntax, rather than in an additional level of linguistic representation. Building on this hypothesis, this chapter examines how elements carrying such features as [LOC], [PATH] and [PLACE] enter into the computational system, with particular focus on the PP system. Evidence is marshalled to support the contention that English, French and Japanese share a PP structure with a fixed internal hierarchy, which is plausibly universal. Two versions of the PP hierarchy are considered: a 'minimal' tree, containing only those elements considered so far, and an 'extended' tree, containing additional projections in the forms of Agreement, Degree and Complementizer Phrases. The minimal layered PP structure is adopted, with a speculative twist. I draw attention to three potentially fruitful areas for future research: (i) modificational structure associated with both the lower and higher P projections, arguably parallel to functional projections above V; (ii) functional structure hosting deixis above both P and V, again suggesting a parallel analysis; and (iii) the extension of the principle of Alternative Realization (Emonds, 1987, 2000) to adpositions, in line with previously proposed analyses in the verbal, nominal, and adjectival domains. It is argued that the principles of linguistic computation discussed in this chapter are made available by Universal Grammar, and that the internal structure of PP is something that children do not have to learn. I suggest that such knowledge, as part of the initial state, might be considered not so much a target as a tool of acquisition, which facilitates the task of learning a particular-language lexicon.

## 11.1 The story so far: A shared syntax of PATHS and PLACES

On examining the English, French and Japanese production data, the same categories were found in layered PP structures in all three languages, and they were found to combine in the same hierarchical order, across age groups (Section 6.3). That is, despite the difference in linear order between head-initial English and French on the one hand, and head-final Japanese on the other, the order is identical in terms of proximity to the DP. Examples (6.11 - 6.15) were previously illustrated with tree-diagrams, and are partially repeated below in bracketed format for quick reference. The English utterance exemplifies the full range of basic projections discussed so far (ignoring modifiers).

- (11.1) a. <E3e [4]: [he jumps...] *from on top of the rock*>  
 b. [PP, PATH from [PP, PLACE on [NP, LOC top [PP of [DP the rock]]]]]

The only French example in the production data which apparently shows all these positions filled is the following.

- (11.2) a. <FAb [2]: *il glisse jusqu'en bas de l'arbre*>  
 he slides until-P<sub>LOC</sub> bottom of the-tree  
 'He slides to the bottom of the tree.'  
 b. [PP, PATH jusque [PP, PLACE en [NP, LOC bas [PP de [DP l'arbre]]]]]

However, as the status of *jusque* 'until / as far as' as a P [PATH] is questionable (Section 6.3), a composite example was given based on the French utterances describing the monkey going under the bridge by F6a [3], F7a [3], F6a [3], F5b [3],

with the elements *par* ‘via’, *en* (P<sub>LOC</sub>), *dessous* ‘underneath’, and *de* ‘of’, which provided the following structures (omitting any covert elements).

- (11.3) a. [PP, PATH *par* [PP, PLACE *dessous*]]  
 b. [PP, PLACE *en* [NP, LOC *dessous*]]  
 c. [PP, PATH *par* [PP, PLACE *en* [NP, LOC *dessous*]]]  
 d. [PP, PLACE *en* [NP, LOC *dessous* [PP *du* [DP *pont*]]]]]

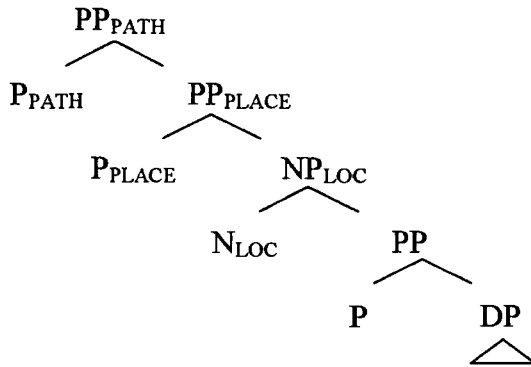
Japanese also provides evidence for the same layered PP structure without filling all the slots simultaneously, as spatial adpositions never stack. The two examples provided were as follows, the first with covert P [PATH], and the second with covert P [PLACE]:

- (11.4) a. <J5d [9]: *dōkutsu no naka ni haittereru no*>  
 cave GEN inside P<sub>LOC</sub> enter-TE-go-PROG PART  
 ‘He’s going inside the cave.’  
 b. [[[[[[[*dōkutsu* DP] no P] *naka* NP, LOC] ni P, LOC] Ø P, PATH] *haittereru* VP]
- (11.5) a. <J6d [14]: *yama no ue kara korogatta*>  
 mountain GEN top from rolled  
 He rolled from the top of the mountain.’  
 b. [[[[[[[*yama* DP] no P] *ue* NP, LOC] Ø P, LOC] *kara* P, PATH] *korogatta* VP]

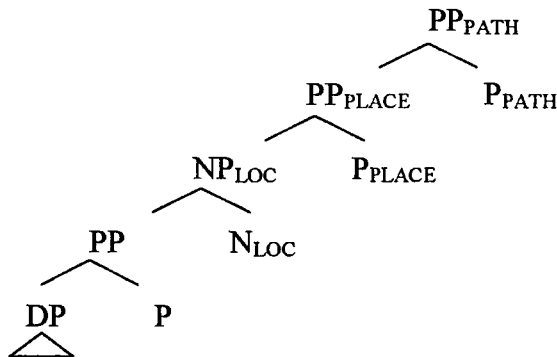
The above sets of examples illustrate a skeletal structure which will now serve as a basis for more detailed discussion. I assume that syntactic structures are binary

branching (following Kayne, 1984), but not uniformly right-branching (*contra* Kayne, 1994). Rather, in a particularly pure instance of the head parameter, Japanese layered PP is the mirror image of the same structure in English and French, as shown below.

(11.6) Layered PP in English and French (basic structure, without modifiers).



(11.7) Layered PP in Japanese (basic structure, without modifiers).



The question may now be posed as to whether these striking regularities of form may be of relevance beyond the analysis of English, French and Japanese, and whether this phenomenon might be a window on the workings of Universal Grammar.

## 11.2 The minimal layered PP hypothesis

The idea of a higher P [PATH] and a lower P [PLACE] has been adapted in various ways by several syntacticians (e.g. van Riemsdijk, 1990, 2001; Koopman 2000 [1993];

Ayano, 2001; den Dikken, 2003) from Jackendoff's (1983, 1990) theory of Conceptual Semantics, in which syntactic structures like (11.8a) and (11.9a) are assigned semantic representations like (11.8b) and (11.9b).

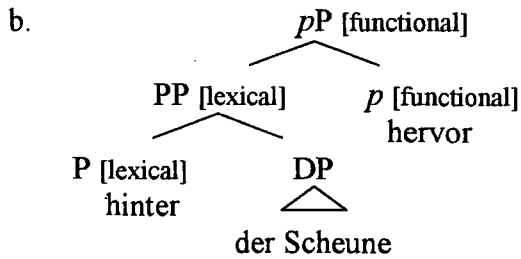
- (11.8) a. [IP [DP The deer] [VP [V came] [PP [P from] [PP [P behind] [DP the tree]]]]]  
 b. [Event COME ([Thing DEER], [Path FROM ([Place BEHIND ([Thing TREE]))])])]

- (11.9) a. [IP [DP Zidane] [VP [V went] [PP [P onto] [DP 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, in line with the experimental findings in this thesis, there is accumulating evidence that the [PATH [PLACE]] configuration is part of syntactic structure (regardless of its status in conceptual 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). This structure is exemplified below:

- (11.10) a. hinter der Scheune hervor  
           behind the barn     from  
           'from behind the barn'



(van Riemsdijk, 1990: 233)

Certain German Ps may occupy either position, e.g.

(11.11) gegenüber ihm vs. ihm gegenüber

opposite him vs. him opposite

‘opposite him’

(van Riemsdijk, 1990: 232)

However, there is often extra morphology when the P is found in the higher position: several Ps are marked with *hin-* or *her-*, indicating deictic movement towards or away from the point of reference (11.12), and in Swiss German the postposition in layered PP is systematically marked with schwa (11.13).

(11.12) a. auf den Berg *hinauf*

on the mountain to-on

‘up onto the mountain’

b. auf den Berg *herauf*

on the mountain from-on

‘from up on the mountain’

- (11.13) a. *uf DP uwe* 'up'  
 b. *ab DP abe* 'down, off'  
 c. *us DP use* 'out of'  
 d. *i DP ije* 'into'  
 e. *dur DP dure* 'through'

(van Riemsdijk, 1990: 233-234)

Van Riemsdijk (1990: 240) maintains that in the case of simple postpositional phrases, the P is generated in the lower, lexical P (where presumably,<sup>1</sup> it fulfils its lexical duties of case assignment, subcategorization, and idiosyncratic selectional restrictions), then moves up by head-to-head movement, whilst in the case of circumpositional phrases the postposition is based-generated in the higher projection.

A further claim is that there is only one functional projection above lexical P, which I refer to as the 'minimal layered PP hypothesis'. For van Riemsdijk (1990), this same minimal functional structure holds across categorial domains, which leads him to propose the Categorial Identity Thesis (CIT). He argues that in each case, the functional projection shares with its lexical counterpart the same categorial features ( $\pm N, \pm V$ ), and he re-labels the functional heads with corresponding lower case letters, so that the higher nominal projection is *n* (= D), the higher verbal projections is *v* (= I), and the higher adpositional projection is *p*.<sup>2</sup>

<sup>1</sup> This is not explicitly stated by van Riemsdijk in respect of the movement analysis, but it does follow from his treatment of the differences in properties between elements in lower P and higher *p*.

<sup>2</sup> Note that little *v* in this proposal is not to be confused with the little *v* now generally assumed in minimalist analysis, which is associated with transitivity and is distinct from the higher IP/TP projection.

The minimal layered PP hypothesis has been adopted and extended<sup>3</sup> by Ayano (2001), who also maintains that there is one and not more than one functional projection above lexical P. He provides a survey of previous work on related phenomena (including agreement and case) in a wide range of languages, and illustrates how the examples cited can all be reanalysed in terms of a single functional *p*P (hosting [PATH]) dominating a single lexical PP (hosting [PLACE]). Research surveyed to this end includes Watanabe (1993) on Navajo (drawn from Kaufman, 1975), K'ekchi (drawn from Berinstein, 1984), English and Japanese; Baker (1996) on Nahuatl (drawn from Launey, 1981); Ackerman (1987) and Marácz (1986) on Hungarian; McCloskey and Hale (1984) on Irish; Rouveret (1991) on Welsh; and Brlobaš and Šarić (2000) on Croatian; and van Riemsdijk (1978, 1990) and Koopman (2000) on Dutch. I assume that such an approach is essentially on the right track, despite the inevitability of there being the devil in the detail, and refer the reader to the original for the relevant argumentation (Ayano, 2001: Ch.2).

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) draw on work by Haspelmath (1993) on the Caucasian language Lezgian, in order to present a paradigm of locational case suffixes, which I replicate in full below.

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<sup>3</sup> Of course, any extension makes the proposal ever-so-slightly less 'minimal'. As we shall see, Ayano (2000) proposes an elaboration of the lower part of the structure to include N [LOC]. However, I use the term 'minimal' here primarily in relation to other, much more elaborate proposals of multiple functional projections upward of lexical P, to be reviewed in Section 11.4.

**Table 11.1.** Paradigm of spatial case-marking in Lezgian, as exemplified with the noun *sew* 'bear' (van Riemsdijk and Huybregts, 2001: 4).

Absolutive	sew	the bear
Ergative	sew-re	the bear
Genitive	sew-re-n	of the bear
Dative	sew-re-z	to the bear
Adessive	sew-re-w	at the bear
Adelative	sew-re-w-aj	from the bear
Addirective	sew-re-w-di	toward the bear
Postessive	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
Subdirective	sew-re-k-di	to under the bear
Superessive	sew-re-l	on the bear
Suerelative	sew-re-l-aj	off the bear
Superdirective	sew-re-l-di	onto the bear
Inessive	sew-re	in the bear
Inelative	sew-re-aj	out of the bear
Indirective	-----	-----

In this striking paradigm, 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 and the second corresponding to PATH. The first interpretable morpheme slot is filled by elements such as 'at', 'behind', 'under' and 'on' ('in' being somewhat defective). The second interpretable morpheme slot contains overt elements meaning 'to' and 'from'. Van Riemsdijk and Huybregts (2001: 3-4) assume that there is a third empty suffix  $\emptyset$  meaning 'at', so that the three-way split in the various groupings in Table 11.1 involves three different elements in the second morpheme slot. However, I do not believe that this is strong enough motivation to posit the empty category. For one thing, it is at odds with the division of labour between the lower and higher projections in respect of the expression of PLACE and PATH. Moreover, it introduces unnecessary redundancy into the system: firstly,

the morpheme *w* ‘at’ already exists; secondly, it is clearly in the lower slot, and in complementary distribution with other PLACE elements, not the directional morphemes; and thirdly, such an assumption would mean that the underlying representation for the adessive would be something like *sew-re-w-w* ‘at at the bear’.

There is, however, another plausible candidate for this higher position in other languages. In addition to ‘to’ and ‘from’, 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). This lends further support to the posited structure for the French phrase given above in example (11.3c), and repeated below with its own gloss.

(11.14) [<sub>PP, PATH</sub> *par* [<sub>PP, PLACE</sub> *en* [<sub>NP, LOC</sub> *dessous*]]]

via P<sub>LOC</sub> underneath

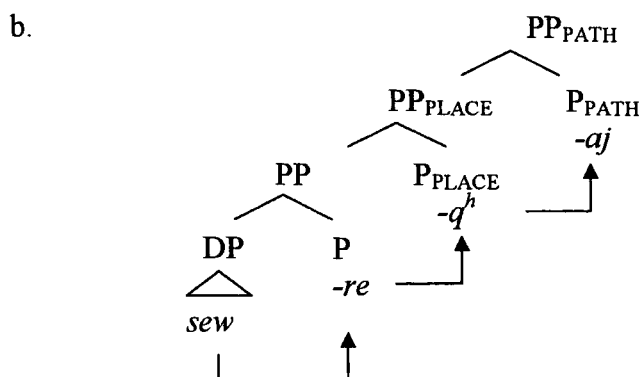
‘under (and through to the other side)’

Analyses of how exactly Lezgian root nouns pick up their suffixes are provided both by Van Riemsdijk and Huybregts (2001), and by Cinque (1999). The former authors allow both right- and left-branching syntactic structures, and assume that in this case the structure is left-branching, with the root moving up the tree as follows (tree labels have been altered to fit the present framework).

(11.15) a. *sew-re-q<sup>h</sup>-aj*

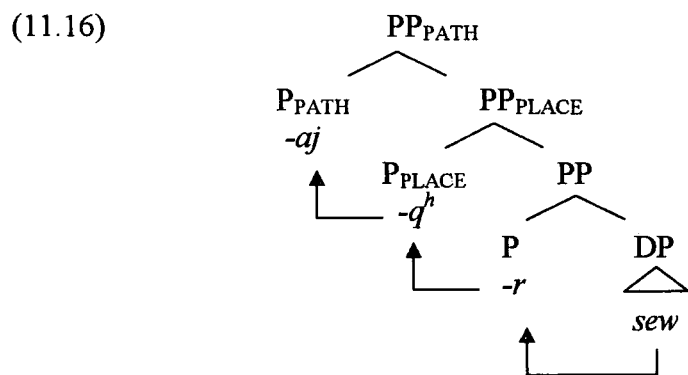
bear-of-behind-from

‘from behind the bear’



(adapted from van Riemsdijk and Huybregts, 2001: 9)

Cinque (1999) follows Kayne (1994) in assuming strictly right-branching structures; he cites the same Lezgian example and suggests the following derivation (again, tree labels have been (slightly) altered to fit the present framework).



On this right-branching account, the fact that locative suffixes are invariably in the mirror image sequence to prepositions in other languages follows from the same principles invoked by Cinque (1999) to account for the fact that ‘adverbial’ suffixes are invariably in the mirror image sequence of corresponding adverbs in other languages. This is indeed a beautiful parallel, but, as is well-recognized, universal right-branching looks decidedly unparsimonious from the perspective of Japanese.

As I assume that both structures are possible, selecting between these analyses would require a deeper investigation of Lezgian syntax than can be pursued here. Nevertheless, the relations of c-command are clear enough. Thus far, the generalization appears to be that the proposed hierarchy of heads in layered PP holds irrespective of the setting of the head parameter and irrespective of whether it is expressed in syntax or bound morphology. When one focuses on which element is closest to the head noun and in which order successive layers are added, the ‘basic’ structure  $[_{PP, PATH} \alpha [_{PP, PLACE} \beta ([_{PP} \gamma)]]]$  appears to be a prime candidate for inclusion in the theory of Universal Grammar.

### 11.3 Notes on the lower reaches of layered PP

This section examines the somewhat controversial contention made throughout this thesis that an N [LOC] may appear between the layered PP structure and DP, forcing the appearance of a ‘grammatical P’ (English *of*, French *de*, Japanese *no*) to assign abstract case to the DP. The N [LOC] projection is absent from most influential analyses of PATHS and PLACES in PP structure (e.g. van Riemsdijk, 1990; 2001; Watanabe, 1993; Koopman, 2000 [1993]; den Dikken, 2003). Notable exceptions include Ayano (2001) and Inagaki (2002), who argue in different ways for the nominal analysis. As discussed earlier in Section 6.2, Ayano (2001) suggests that this is a ‘bare N’ which does not project DP, providing evidence that N [LOC] has only very abstract referential capacity (see ex. 6.4). To this observation, I added my own, concerning lack of pluralization and lack of modification, the absence of both traits being indicative of the absence of DP. However, these elements are often treated as P [PLACE], and so discussion of both positions is in order. Further evidence is now

given for the [<sub>PP, PLACE</sub> α [<sub>NP, LOC</sub> β ] ] analysis in Japanese, where evidence is thinnest on the ground, before possible analogues in other languages are considered.

The fact that overt elements can sit in all three interpretable positions in English (e.g. [<sub>PP, PATH</sub> from [<sub>PP, PLACE</sub> on [<sub>NP, LOC</sub> top ]]]) and French (e.g. [<sub>PP, PATH</sub> par [<sub>PP, PLACE</sub> en [<sub>NP, LOC</sub> dessous]]]), as shown in the previous sub-section, makes it easier to argue the case for N [LOC] elements in these languages. However, some restriction on doubly-filled layered PP in Japanese leaves room for only two of these three slots to be filled (see ex.s 11.4, 11.5) This creates a string which is subject to alternative analyses. Watanabe (1993) assumes that in the following example, the elements that I claim to be N [LOC] (*ue* ‘top’, *shita* ‘bottom’, *mae* ‘front’, *ushiro* ‘back / behind’) are in fact lexical P, and the element that I claim to be P [LOC] (*ni*) is in fact base-generated in the higher functional projection.

(11.17) *tsukue no {ue ni / shita ni / mae ni / ushiro ni}*

desk GEN {top P<sub>LOC</sub> / bottom P<sub>LOC</sub> / front P<sub>LOC</sub> / behind P<sub>LOC</sub>}

‘{on top of/ underneath / in front of / behind} the desk’

(adapted from Watanabe, 1993: 435)

This pattern is typical in the elicited production data of Experiment I, and is seen in the examples below.

(11.18) <J7a [9]: *saru ga dōkutsu no naka ni haitta*>

monkey NOM cave GEN inside P<sub>LOC</sub> entered

‘The monkey went into the cave.’

(11.19) <J5c [12]: *soto ni nigeta*>

outside P<sub>LOC</sub> flee-PST

‘He ran outside.’

(11.20) <J6b [2]: *shita ni subette itta*>

bottom P<sub>LOC</sub> sliding went

‘He went sliding down.’

(11.21) <J6d [13]: *yama no ue ni itte...*>

mountain GEN P<sub>LOC</sub> went and...

‘He went to the top of the mountain and...’

However, there is some evidence that these pairs of elements are not in the relationship  $[[ue, \text{etc. } PP] \text{ } ni \text{ } PP]$ , as claimed by Watanabe (1993), but rather are one rung down the ladder, sharing the structure  $[[ue, \text{etc. } N, LOC] \text{ } ni \text{ } PP, PLACE]$ .

First let us consider the occupants of the lower position. Uncontroversially, these elements can all be found in positions where they are unambiguously nominal, with the meaning of their English nominal analogues ‘top’, ‘bottom’, ‘front’ and ‘back’. This is at least suggestive of an across-the-board nominal analysis. But more importantly, Japanese locative nouns, like their counterparts in English (e.g. *top*, *front*) and French (e.g. *haut*, *dessous*), have two properties that distinguish them from all uncontroversial cases of P: (i) they require one of five postpositional elements - *ni* (P [LOC]), *de* (P [PLACE]), *e* ‘to’, *kara* ‘from’, or *made* ‘until/as far as’ - somewhere upstairs, in either the lower or the upper P position, in both locational and directional contexts, such that they cannot directly predicate anything of the FIGURE; and (ii) they

cannot assign case to the direct object, but require the insertion of the ‘grammatical P’ *no* (English *of*, French *de*), which functions as a genitive case marker.<sup>4</sup> Let us assume that these elements really are in their own nominal projection between the DP and the layered PP. Turning to the upstairs neighbour, the question remains whether it is in the lower or higher P position. Ayano (2001: 72-75) provides two arguments that *ni* is in the lower P. One is that this element is fundamentally locational, and only supports directional interpretation when selected by motion verbs, as seen in the following contrast.

- (11.22) a. Keiko wa sono apato *ni* {iru / sundeiru}.
- Keiko TOP that flat P<sub>LOC</sub> {be / live-PROG}
- ‘Keiko {is / lives} in that flat.’
- b. Keiko wa sono apato *ni* {iku / hairu}.
- Keiko TOP that flat P<sub>LOC</sub> {go / enter}
- Keiko is {going to / going into} that flat.’

This distinguishes *ni* from elements such as *e* ‘to’ and *kara* ‘from’, which are always directional. The second argument is that direction can be expressed in DP-internal PPs with *e* ‘to’, but never with *ni*.

- (11.23) a. \*Tokyo ni no ressha
- Tokyo P<sub>LOC</sub> GEN train
- ‘a train to Tokyo’

<sup>4</sup> Recall that they are also distinguished from lexical nouns in that they cannot be modified within PP, hence their treatment as a subclass that does not project DP (Section 6.2).

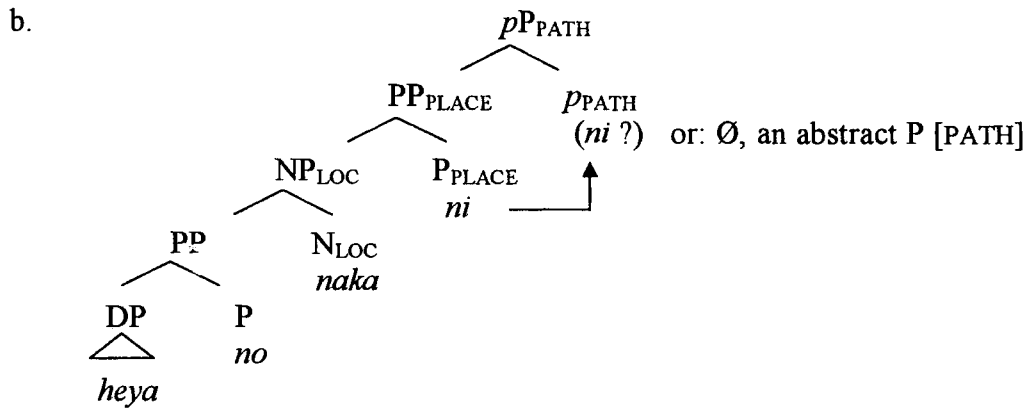
- b. Tokyo e no ressha  
 Tokyo to GEN train  
 ‘a train to Tokyo’

(Ayano, 2001: 75)

Ayano (2001: 75, fn. 36) suggests that this is due to the fact that *ni* cannot co-occur with case markers, but an alternative analysis (or perhaps a complementary analysis - both could be right) is simply that directionality is not inherent to this morpheme. That is, as previously argued in respect of French *à* (P [LOC]) (Section 3.1), Japanese *ni* (P [LOC]) is dependent on appropriate syntactic structure for directional interpretation. If this is correct, then the behaviour of *ni* in both environments discussed by Ayano (2001) (exemplified in 11.22 and 11.23 above) may be given a unified analysis: *ni* supports directional interpretation only if its host PP structure is licensed as such by an appropriate verb.

These considerations lead to the postulation of the structure below, with a question remaining over whether there is movement to the higher *pP*, or whether some abstract directional element is base-generated there.

- (11.24) a. heya no naka ni  
 room GEN inside P<sub>LOC</sub>  
 ‘into the room’



Ayano (2001) suggests that there is an abstract  $p$  [PATH] in such cases, with N [LOC] downstairs, based on the argumentation cited above. Although I agree with his conclusion, the argumentation itself only determines that *ni* bears the inherent feature [LOC], not what happens to it once it enters the derivation. Even if it is true that *ni* PPs only have a directional interpretation when merged with certain verbs, this is compatible with a number of different theoretical interpretations. Perhaps there is an abstract  $p$ , with a directional feature interpreted *in situ*. Perhaps there is an abstract  $p$  with no inherent directional feature, which incorporates into motion verbs following Merge, such that directional interpretation is determined solely by the verb. Or perhaps there is no such element, as the arguments for *ni* as a locational element are still compatible with a movement analysis. Recall van Riemsdijk's (1990: 236-237) observations on the behaviour of certain lexical Ps in German. Some may appear before the noun (with a locational interpretation) or after the noun (with a directional interpretation), making a movement analysis plausible. More is revealed on inspection of circumpositions, in which only the lexical preposition can assign case, subcategorize the DP, and/or impose selectional restrictions. For example, the preposition *unter* 'under' may assign either dative or accusative case, whilst *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.

(11.25) *unter der Brücke durch*

under the-DAT bridge through

‘under the bridge (and out the other side)’

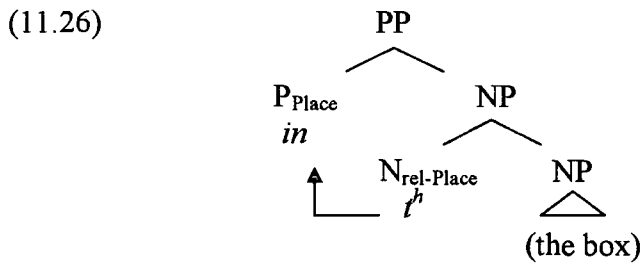
(adapted from van Riemsdijk, 1990: 236)

This was one phenomenon that led van Riemsdijk (1990) to the conclusion that in German and Dutch, in simple postpositional cases the P starts out in the lexical projection and moves up after fulfilling its obligations to the DP.

In the absence of hard evidence from Japanese (we cannot be sure if *ni* raises or not), I follow Ayano (2001) in assuming that there is no movement; rather a null morpheme sits in  $p^0$ . Crosslinguistically, movement is possible but not universal. I also assume a ‘silent  $p^0$ ’ analysis for when English and French elements classified as P [LOC] (the vast majority of English prepositions) take on directional interpretation. Despite the clear need for further investigation of these issues, I draw the interim conclusion that for example (11.18) (generalizable to 11.19-11.21), the appropriate structure is [[[[[yama<sub>DP</sub>] no<sub>P</sub>] ue (etc.)<sub>NP, LOC</sub>] ni<sub>P, LOC</sub>] Ø<sub>P, PATH</sub>].

Inagaki (2002) also assumes that *ue* ‘top’, *shita* ‘bottom’, *mae* ‘front’, *ushiro* ‘back / behind’, etc. are generated and remain in a nominal projection; he terms such elements ‘relational Place Nouns’ ( $N_{\text{rel-Place}}$ ), to capture the fact that they help locate the FIGURE in terms of the GROUND. He goes on to argue that in locational contexts

monomorphemic English P [LOC] such as *in* are realizations of  $N_{\text{rel-Place}}$  that are incorporated into P [PLACE] in syntax, as shown below.



(Inagaki, 2002: 200)

On this account, directional uses of *in* involve further movement up the tree. Inagaki (2002) argues that this structure mirrors that proposed for Japanese *naka-ni* ‘inside- $P_{\text{LOC}}$ ’, and suggests an account in parallel to Hale and Keyser’s (1993) approach to verb argument structure. However, such arguments are all conceptual, and the proposal remains without empirical justification. Elements such as English *in* do not exhibit any nominal properties; moreover, they can co-occur with overt N [LOC] (e.g. *in front of*). Therefore, I continue to assume that they enter the derivation under the lexical P node with default PLACE interpretation.

With broader generative objectives in mind, it is of minor interest to posit a grammatical element of relevance to only one or a handful of languages. That N [LOC] appears in English (a little), French (quite a bit) and Japanese (a lot) (Section 6.2, Table 6.1) raises the question of whether it might exist in many other languages. Very little research bears directly on this topic, but there are indications that at least some other languages make heavy use of this nominal projection inside PP.

On Holmberg’s (2002) analysis of PPs in Zina Kotoko, a Chadic language spoken in Northern Cameroon, there are a number of complex prepositional

expressions with two heads, which he terms ‘Place’ and ‘Relator’. I tentatively associate these elements with N [LOC] and P [PATH / PLACE], respectively, although the correspondence is not straightforward. Examples are given below.

(11.27) a. Kàrtà dé *a gmá* táb` 1.

cards DEF (be) at on table

‘The cards are on the table.’

b. D` vát` kàrtà dé *má gmá* táb` 1.

he took cards DEF from on table

‘He took the cards from the table.’

c. D` `dva kàrtà dé *gmá* táb` 1.

he put cards DEF (to) on table

‘He put the cards on the table.’

(Holmberg, 2002)

In these examples, *gmá*, glossed as ‘on’, is the Place, the Relators being *a* ‘at’, *má* ‘from’, and an abstract P  $\emptyset$  ‘to’. The element *gmá* behaves like a P in that it can directly assign case to the object, but it behaves like an N in that it cannot directly predicate anything of the FIGURE; rather, it requires a true P to relate the FIGURE and the N [LOC], hence the term Relator for these higher elements. The N[LOC] interpretation suggests the gloss ‘top’, in line with French *haut* and Japanese *ue*.<sup>5</sup>

This recalls the borderline status of several possible cases of P [LOC] in French, as discussed in Section 6.2. For example, French *dessous* ‘underneath’ can be used with or without a higher ‘Relator’ *en* (P [LOC]) for all speakers in intransitive contexts,

<sup>5</sup> Holmberg (2002) notes that *gmá* ‘on / top’ is etymologically derived from *g` máyá* ‘head’.

but in transitive contexts, *en* (or *au* ‘P<sub>LOC</sub>-the’) is required and at least for some speakers it can be used without the insertion of the ‘grammatical P’ *de* (although this is unacceptable in prescriptive grammar). The parallel with English *(on) top (of)* and *(in) front (of)* is suggestive, as *top* and *front* always need a Relator, but unlike their Zina Kotoko analogues they cannot assign case.

Holmberg (2002) suggests that ultimately, category assignment to borderline elements such as *gmá* ‘on / top’, *lyá* ‘behind / back’ and *fká* ‘front’ in Zina Kotoko is a matter of definition, and he remains agnostic on the issue, referring to them simply as ‘Place’. If one accepts that by definition prepositions are two-place predicates denoting a relation, whilst most nouns including ‘top’, ‘front’ and ‘back’ are one-place predicates, then these elements are all a subclass of nouns, and therefore N [LOC] on the current analysis.

Ayano (2001: 68-71) draws on Plag (1998) to argue that in Sranan, an English-based creole spoken in Surinam, elements such as *tapu* ‘top’ are N [LOC] when not inside DP. Consider the example below.

(11.28) *na tapu fu mi tafra*

P<sub>LOC</sub> top of my table

‘on (the) top of my table’

(adapted from Ayano, 2001: 69)

This may be either referential or not, the two interpretations corresponding to the difference mentioned in Section 6.2 (ex.6.4) between English *in front-of* and *in the (very) front of*. Ayano (2001: 71) suggests that in the referential case (‘on *the* top of

the table’) there is an abstract DP, and in the non-referential case (‘on top of the table’), this is another case of N [LOC].

At the end of the previous sub-section, the ‘basic’ structure assumed in the minimal layered PP hypothesis was  $[_{PP, PATH} \alpha [_{PP, PLACE} \beta ([_{PP} \gamma])]]$ . To the earlier evidence from English, French and Japanese (Section 6.2) further evidence has now been posited from Japanese, as well as from Zina Kotoko and Sranan, indicating that at the very least it is plausible to posit a special subcategory of nouns, N [LOC], in a bare NP projection below PP [PLACE]. The basic structure of what I have called the ‘minimal layered PP hypothesis’ is now in place:

(11.29) Basic structure assumed in the ‘minimal layered PP hypothesis’:

$[_{PP, PATH} \alpha [_{PP, PLACE} \beta [_{NP, LOC} \gamma ([_{PP} \delta])]]]$ .

#### 11.4 Extended projections in PP

Following van Riemsdijk’s (1990) proposal for a single functional projection above PP (the ‘minimal layered PP hypothesis’), Koopman’s (2000 [1993]) detailed investigation of Dutch Ps in all their various guises led her to propose a much richer functional architecture in an extended PP projection. Koopman (2000 [1993]) discusses two main sources of motivation for positing the additional structure. Firstly, an explanation is required for the fact that certain pronominal elements (‘r-pronouns’ and ‘non-r-pronouns’)<sup>6</sup> and modificational elements (degree modifiers such as *pal* ‘right’ and *vlak* ‘just’, and Measure Phrases such as *twee meter* ‘two metres’) show up

<sup>6</sup> The term ‘r-pronouns’ was coined by van Riemsdijk (1978) to describe those pronominal arguments of P that are always found to the left of P, even when the P is otherwise strictly prepositional; these elements may also be extracted from PP, unlike other P complements in Dutch. The label comes from the fact that all such element have a *r* in them (*er* ‘ther’, *waar* ‘where’, *hier* ‘here’, *ergens* ‘somewhere’ etc.), although as den Dikken (2003: 2, fn. 3) points out, the reverse is not true (not all Ps with the letter ‘r’ in them are r-pronouns).

in various positions higher than lexical PP. For example, (11.30) illustrates how full DPs and ‘normal’ pronominal complements such as *het meisje* ‘the girl’ and *haar* ‘her’ remain in situ, whilst an r-pronoun such as *er* ‘there’ must raise, and (11.31) shows how *er* ‘there’ can appear either side of a Measure Phrase.

(11.30) a. Jan zat naast [het meisje]

Jan sat beside the girl

‘Jan sat beside the girl.’

b. Jan zat naast [haar]

Jan sat beside her

‘Jan sat beside her.’

c. Jan zat [er<sub>i</sub>] naast [<sub>j</sub>]

Jan sat there beside

‘Jan sat beside there.’

(11.31) a. [twe meter naast de deur]zat Jan

two metres beside the door sat Jan

‘Jan sat two metres from the door.’

b. [(er) twe meter (er) naast] zat Jan

(there) two metres (there) beside sat Jan

‘Jan sat two metres from there.’

(adapted from den Dikken, 2003: 2-3)

As Koopman (2000 [1993]) shares with Kayne (1994) and Cinque (1999) the conviction that it is theoretically desirable to do away with syntactic adjunction altogether, this necessitates the projection of extra functional material to host such elements.<sup>7</sup> The second general type of motivation is in the form of a desire to find parallels with other syntactic categories; just as it has been generally assumed in the last decade or so that VP and NP are dominated by a multiple functional projections, so it might be with PP, and perhaps at some point all three systems might show themselves to be structurally identical in some way.<sup>8</sup>

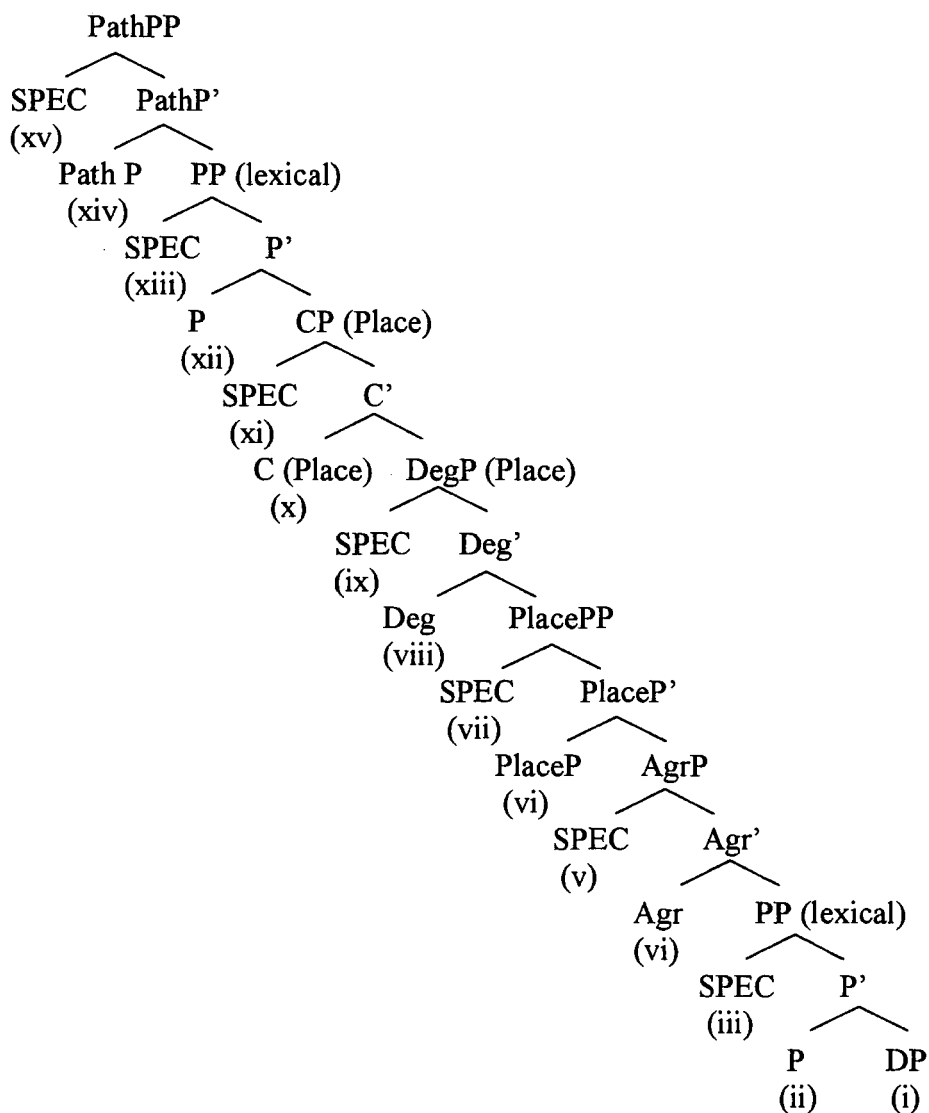
Without delving too deeply into the Dutch data, the following is the final structure underlying Koopman's (2000 [1993]) proposal, with Roman numerals in each slot to facilitate a brief discussion of the type of elements that different parts of the structure may host. Note that in this structure, equivalents of N [LOC] or grammatical P are entirely absent.

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<sup>7</sup> Cinque (1999: 44) is most explicit on this point: 'A system that countenances both specifiers and adjuncts is clearly less restrictive than a system that does away with one or the other (while still expressing all the correct generalizations). Suppose we find positive evidence for locating some adjunct XPs in Spec. Then the desirable possibility arises of doing away with the competitor (adjunction) entirely.'

<sup>8</sup> This line of argument is taken furthest by den Dikken (2003), who proposes an explicit parallel between extended VP and extended PP.

(11.32)



I shall briefly indicate at least one proposed function of each node, so that some assessment can be made of the weight of motivation for each projection.<sup>9</sup> The following table follows the Roman numerals in the tree-diagram, from bottom to top.

<sup>9</sup> This proposal is too complex to be given a thorough review here. Koopman's (2000 [1993]) analysis is clearly-presented, well-argued, and amply exemplified; I refer the reader to the original for more detailed inspection.

**Table 11.2.** Some functions of the proposed nodes in Koopman's (2000 [1993]) fully extended PP structure.

(i)	DP	where nominals are generated; full DPs stay here, both r- and non-r-pronouns move
(ii)	P	where prepositions and simple postpositions are generated; after which they move up to PlaceP or PathP
(iii)	SpecPP	intermediate landing site for pronominals
(iv)	Agr	nothing here in Dutch; the proposed site of agreement in languages with inflecting adpositions
(v)	SpecAgrP	the landing site for non-r-pronouns
(vi)	PlaceP	where locative prepositions move to for interpretation
(vii)	SpecPlacePP	one landing site for r-pronouns
(viii)	Deg	where simple P modifiers are generated, e.g. <i>pal</i> 'right', <i>vlak</i> 'just'
(ix)	SpecDegP	may either host a base-generated Measure Phrase or act as another landing site for r-pronouns (the two are in complementary distribution)
(x)	C	nothing here in Dutch
(xi)	SpecCP	one landing site for r-pronouns
(xii)	P	where a very specific type of postposition is generated: those found in circumpositional structures which are homophonous with the lower preposition
(xiii)	SpecPP	(I assume) an intermediate landing site for CP (Place) as it moves
(xiv)	PathP	where directional postpositions move to for interpretation; also, where postpositions are generated in circumpositional structures, in the case that they are not homophonous with the lower preposition
(xv)	SpecPathPP	where the whole of CP (Place) must move in the case of prepositional directional PPs, once an empty PATH head in PathP has incorporated into a motion verb

The first projection that might be questioned is the lower lexical PP. Ps freshly delivered from the lexicon are not quite ready for interpretation, and are held here for a while before being released into the more semantically interactive atmosphere of the upper reaches of syntactic structure. The function of the P head in this structure appears to be that of an 'incubator', and I shall refer to this type of phrase as an 'incubator PP'. As I understand it, this position has no inherent features associated with it, and I presume it is here only to ensure local case-checking of DP. However, if P [LOC] and P [PLACE] are generated in Place P, and if there is no AgrP, then P and

DP are left as sisters and this problem disappears. The next question is naturally whether AgrP is sufficiently motivated.

Note that there is no independent motivation in Dutch for the Agreement Phrase as such. It is posited (i) to provide a SPEC position landing site for non-r-pronouns; (ii) as a reflection of Agr in the verbal and nominal domains; and (iii) because some languages do have inflecting prepositions. There are several problems with this account. First, the need for a landing site for wandering pronouns may warrant some projection in this framework, but by no means specifically an Agreement Phrase. Another consideration is that whilst parallel functional architecture above all lexical categories has an air of formal beauty to it, this is insufficient motivation to posit extra structure in the absence of independent evidence *for* particular projections (rather than evidence that some unrelated element has to move somewhere).<sup>10</sup> A final point is that the fact that some other language has inflecting adpositions is not a strong argument for positing a corresponding AgrP in Dutch.

PlaceP is conceptually and empirically necessary in all the frameworks discussed so far. In the absence of an ‘incubator PP’, I assume that this is where Ps with the inherent features [PLACE] and [LOC] enter the derivation. P [PLACE] must stay in situ; if P [LOC] stays in situ, it is interpreted as PLACE, and if it moves up to the higher P, it is interpreted as PATH.

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<sup>10</sup> Interestingly, this is also a problem with the original argumentation for AgrP in the verbal domain, as the Inflectional Phrase (Infl / IP) was split into TP and AgrP primarily in order to provide a landing site for verb movement (Pollock, 1989). As pointed out by Iatridou (1990), the housing of agreement features was never part of the original argumentation. More recently, Fender, Marsden, van Espen and Whong-Barr (2002) have argued that agreement is in fact a structural relation, not a functional projection, and they provide an alternative account in terms of Alternative Realization (Emonds, 1987, 2000). In Minimalism, despite the assumption of AgrS, AgrO, and AgrIO projections by Chomsky (1993), the problematic nature of agreement remains: Chomsky (1995: Ch.4) notes that Agreement heads have no interpretable features, rendering them structureless after feature-checking. This latter problem is an issue in example (11.32) for *both* the lower PP and AgrP.

DegP is necessary on the assumption that there is no adjunction; modifiers across domains thus require their own projections (see fn. 7 above). However, on such an account, one wonders how satisfactory it is to have modifiers such as *pal* ‘right’ and *vlak* ‘just’ base-generated in the head position, and Measure Phrases such as *two meter* ‘two meters’ base-generated in SPEC of the same phrase. Koopman (2000 [1993]: 216-217) does provide a well-argued account of this in terms of the bare head modifier blocking P-incorporation and the phrase in SPEC not getting in the way. Nonetheless, it might seem plausible to extend the structure to include different phrases for different types of modifier, an idea I shall return to in the next sub-section.

CP (Place), rather like AgrP, appears to be posited (i) to provide a SPEC position landing site for non-r-pronouns; and (ii) as a reflection of CP in the verbal domain. Once CP (Place) is assumed, Koopman (2000 [1993]: 217-223) uses its presence or absence to distinguish between ‘independently licensed’ constituent PPs (that can undergo PP over V, scrambling, and pied-piping under *wh*-movement) from lower, dependent projections and idiomatic PPs (that cannot do any of the above). However, once more there is a functional projection with no empirical evidence for any functional head. I suggest that CP also lacks sufficient motivation.

PathP, like PlaceP, is conceptually and empirically necessary. I assume that P [LOC] in directional contexts either raises to this position or sits below a null *p* [PATH], and that all forms of *p* [PATH] are base-generated here. Contrary to my previous emphasis on paring the structure down, it seems that given Koopman’s (2000 [1993]) assumptions about phrase structure, *more* material is needed above Path P, at least to accommodate modifiers of the higher head P. The idea is given the form of an explicit proposal in den Dikken (2003). He provides the following examples to illustrate not

only that the PathP can be modified, but also that the same modifier can appear twice in the structure, in one case modifying PathP, and in the other modifying PlaceP.

(11.33) De rivier loopt twee meter achter het huis langs.

the river goes two meters behind the house along

‘The river goes along behind the house for two metres.’

or:

‘The river goes along at a distance of two meters from the back of the house.’

(11.34) De rivier loopt (over een afstand van) twee meter twee meter achter het huis langs.

the river goes (over a distance of) two meters two meters behind the house along

‘The river goes along behind the house for two metres, at a distance of two meters from the back of the house.’

(adapted from den Dikken, 2003: 13; the glosses as  
in the original - translations have been added)

In (11.33), the reading is ambiguous between whether two metres is the length of the part of the river that flows behind the house, or whether the river flows along the length of the back of the house at a distance of two metres from the building. On den Dikken’s (2003: 13) analysis, the first reading requires the Measure Phrase to be a

modifier of PathP, whilst in the second case it is a modifier of PlaceP.<sup>11</sup> In (11.34), the Measure Phrase appears twice, clearly showing that the two functions are independent instances of the modifier. He thus treats PathP as a *second lexical projection* of P, with its own DegP, and, following further argumentation, proposes that the lower and higher Ps have identical functional architecture, other than a lack of AgrP in the higher projection. Den Dikken's (2003) final proposal for the most complete form of extended spatial PP has the following shape.

(11.35) V [<sub>CP(Path)</sub> C(Path) [<sub>DegP(Path)</sub> Deg(Path) [<sub>PathP</sub> Path [<sub>P<sub>Dir</sub></sub> [<sub>CP(Place)</sub> C(Place)  
           [<sub>DegP(Place)</sub> Deg(Place) [<sub>PlaceP</sub> Place [<sub>AgrP</sub> Agr [<sub>PP</sub> P<sub>Loc</sub> DP<sub>DAT/\*ACC</sub>]]]]]]]]]]]

Whilst I am in agreement with the need for modificational structure above P [PATH], I do not think that this necessarily implies that this PP is something other than a functional projection, as other functional elements, such as quantifiers, can also be modified (e.g. {*Nearly / almost*} *all the boys got a prize*). In Section 11.5.1, I return to this issue, and present evidence from the English production data that one DegP above each P is not enough to accommodate all possible modificational elements, and it is empirically necessary either to posit further (optional) functional structure, or to establish an ordering principle for adjunction.

Aside from the need to accommodate modificational elements, the same objections to Koopman's (2000 [1993]) extended functional architecture in respect of agreement and complementizer projections can be carried over to den Dikken's representation in (11.35). There is also an additional redundancy: there are now two 'incubator PPs', one specifically for P [PLACE] and the other specifically for P [PATH],

<sup>11</sup> This is not the only possible analysis here. The same difference in interpretation might follow if in the first case the Measure Phrase modifies the verb, and in the second it modifies the preposition.

annotated as  $P_{Loc}$  and  $P_{Dir}$ , respectively. As before, I suggest that the most economical solution is that P [PLACE] is generated directly in the P [PLACE] node, and P [PATH] is generated directly in the P [PATH] node. P [LOC] is generated in P [PLACE] (the default interpretation), and may support directional interpretation only if merged with a null  $p^0$ .

One potential worry with such large extended projections is that material intervening between certain heads might block syntactic processes that require locality. Van Riemsdijk and Huybregts (2001) argue that in particular circumstances, strict locality must obtain between N and P [PLACE], to account for dependencies between the two (one says *on the wall* in English but {‘at / in’} *the wall* in Dutch, and there is systematic expression of the analogues of {*in / into / out of*} or {*on / onto / off*} with names of towns in many languages). Similarly, strict locality must obtain between P [PATH] and P [PLACE]. If both are present and one attaches to the verb, it must be P [PATH]: bound morphemes must attach to an adjacent host, and if P [PATH] is overt, it always immediately c-commands P [PLACE], making it impossible for the lower P to attach itself to the verb. The relationship of locality between V and P [PATH] is clear from the fact that verbs can so precisely choose their sisters, in terms of features or even specific LIs; in addition, P [PATH] can incorporate into V in some languages, and must do so in others such as Yucatec Maya (Van Riemsdijk and Huybregts, 2001: 15-16).

However, on den Dikken’s (2003) account, such elaborate functional structures are rarely realized in their entirety. Functional architecture is projected only when needed, and in any case material hypothesized to be in SPEC will not block head movement. This makes a prediction: when an element hypothesized to be in an intervening head is overt, it should block syntactic processes dependent on locality

between higher and lower projections. This idea is not examined in depth in den Dikken (2003), but it remains an interesting and testable hypothesis.

Just as there is no evidence in Dutch for projections to host Agreement or Complementizers (bar the need for some (any) landing site for r-pronouns), there is similarly no evidence for these projections in either English, French or Japanese. I conclude that of the two major competing hypotheses for the basic, universal, internal structure of PP, the ‘minimal layered PP hypothesis’ seems the more plausible.

### 11.5 Three speculative forays into PP structure

Let us assume that the basic architecture of layered PP is as proposed in ex. (11.29):  $[_{PP, PATH} \alpha [_{PP, PLACE} \beta [_{NP, LOC} \gamma ([_{PP} \delta])]]]$ . The following sub-sections discuss three ideas pertaining to this phrasal hierarchy which show a degree of promise for future investigation, all related to suggestive patterns in the elicited production data of Experiment I. The first observation is that modificational structure above P, although relatively limited, shows the same kind of rigid ordering as the modificational hierarchy of adverbs in the verbal domain (Cinque, 1999), and may be analysed in the same fashion. The second observation is that another structural parallel may be drawn between PP and VP in that deictic elements in both domains are arguably in a functional projection above the lexical predicate, which supports the incorporation of [DEIXIS] into the system of computational semantic features. The third observation concerns the syntax of the English prepositions *in* and *on*. Whilst a comprehensive account of why *in* and *on* behave differently from other locational Ps in English remains elusive, the related Ps *into* and *onto* do succumb to an interesting structural analysis, parallel to verbal, nominal and adjectival phenomena, which may be part of the solution.

### 11.5.1 Toward a hierarchy of P modifiers

English is the only language in this study with a considerable number of Ps, and what follows is a necessarily tentative proposal made on the basis of a small but extremely suggestive set of data from the English transcripts. In Section 9.2.2, evidence was presented that some of the proposed English ‘satellites’ of Talmy (2000b) are in fact P modifiers, and it was observed that the ordering seems quite inflexible. On consideration of the English elicited production data, three distinct types of P modifier emerge. The first and best understood class is that of the Degree modifiers. The other two classes were previously conflated in Section 9.2.2 and assigned the temporary label ‘Directional modifiers’, but on closer inspection they require independent treatment, and are here termed ‘Flow modifiers’ and ‘Trajectory modifiers’. The three types are exemplified in the following three sets of utterances.

English P modifiers, Type 1: Degree modifiers, e.g. *right*, *straight*

(11.36) <E6b [9]: *he just runs right into it*>

(11.37) <EAf [9]: *well!* [surprised tone] *he runs straight into the deep, dark cave!*  
*he hasn't got any brains...>*

(11.38) <E6b [9]: *he runs straight out of the cave*>

English P modifiers, Type 2: Flow modifiers, e.g. *on*, *back*

(11.39) <EAe [3]: *he's running on down the path, he sees the bridge and he goes underneath it*>

(11.40) <E3b [16]: *crawls back out of it again*>

(11.41) <E7e [16]: *goes back through it*>

English P modifiers, Type 3: Trajectory modifiers, e.g. *up*, *down*, *in*, *out*, *through*, etc.

(11.42) <E6e [13]: *he's climbing up to the top of the hill*>

(11.43) <E6a [14]: *he rolls down into the river*>

(11.44) <E4c [6]: *swims over to the shore*>

Degree modifiers (especially *right*) are well-recognised, and they are standardly used as a test of prepositional status.<sup>12</sup> It has also been recognised that *right* is the highest element in an English PP layer (cf. Ayano, 2001: 79, fn. 1). These P modifiers are hard to define precisely, but they usually have a sense of 'directly', 'exactly', or 'completely'. Other examples include *clear* and *bang* in phrases such as *clear out of the window*, and *bang in the middle of the road*. Measure phrases such as 'two metres'

<sup>12</sup> As mentioned in Section 5.2.3, this observation in respect of *right* modification is due to Jespersen (1992 [1924]).

also appear to be in complementary distribution with such modifiers, and are thus candidates for the same slot.<sup>13</sup>

The second class of P modifiers has only two members: *on* and *back*, of which *on* was attested only once in the data, whilst *back* was attested in 29 utterances. I have termed these ‘Flow modifiers’: *on* expresses the continuation of the directional flow, and *back* expresses the reversal of the directional flow. The difference in meaning between the P modifiers *on* and *back* is akin to the concept of forward and reverse gears in a car, or forward-wind versus rewind on a cassette recorder. The motivation for independent classification of these elements springs from the fact that they have their own particular position in the fixed modificational hierarchy, always following Degree modifiers, and always preceding Trajectory modifiers.

The third class of P modifiers consists of elements normally appearing as lexical P, but functioning in this case as modifiers of lexical P, thus elaborating on simple trajectories. The examples above are all modifying *to* or *into* (heads that cannot function as modifiers) for the sake of clarity. However, very often in a string of Ps close inspection is required to distinguish Trajectory modifiers from head Ps (see Section 9.2.2 for examples of *right*-insertion tests and movement tests).

Composite examples may be constructed on the basis of the English data, in order to (i) illustrate the strict ordering principle, and (ii) demonstrate constituent status by movement. Examples should be read without inserting pauses.

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<sup>13</sup> However, recall that in Dutch, measure phrases but not bare degree modifiers block P-incorporation (Koopman (2000 [1993]: 216-217). I leave a closer examination of Measure Phrases aside for future work.

Directional examples: [Degree [Flow [Trajectory [ $p^0$ ]]]]

- (11.45) a. He ran straight on through into the cave.  
b. \*He ran {straight through on / on straight through / on through straight / through straight on / through on straight} into the cave.  
c. Straight on through into the cave ran the monkey.
- (11.46) a. He jumped clear on over to the other side of the rock.  
b. \*He jumped {clear over on / on clear over / on over clear / over clear on / over on clear} to the other side of the rock.  
c. Clear on over to the other side of the rock jumped the monkey.
- (11.47) a. He swam right back across to his side of the river.  
b. \*He swam {right across back / back right across / back across right / across right back / across back right} to his side of the river.  
c. Right back across to his side of the river swam the monkey.

Locational examples: [Degree [Flow [Trajectory [ $P^0$ ]]]]

- (11.48) a. He found himself sitting right back down at the bottom of the hill.  
b. \*He found himself sitting {right down back / back right down / back down right / down right back / down back right} at the bottom of the hill.  
c. Where he found himself sitting was right back down at the bottom of the hill.

- (11.49) a. He was now clear on out in front of the cave.
- b. \* He was now {clear out on / on clear out / on out clear / out clear on / out on clear} in front of the cave.
- c. Where he was now was clear on out in front of the cave.
- (11.50) a. The road to his house lay straight back over on the other side of the river.
- b. \* The road to his house lay {straight over back / back straight over / back over straight / over straight back / over back straight} on the other side of the river.
- c. Where the road to his house lay was straight back over on the other side of the river.

Both Flow and Trajectory modifiers, as their names imply, do seem to be intrinsically directional. When used in locational contexts, *on* implies a continuing ‘forward flow’, from a temporary location, whilst *back* implies a previous ‘reverse flow’. These elements do not always sit comfortably in constructed examples, and longer, complex concatenations might occasionally give one pause, but simple examples with one or two modifiers are uncontroversially grammatical, e.g.

(11.51) After years of wandering, he was right back in his home town again.

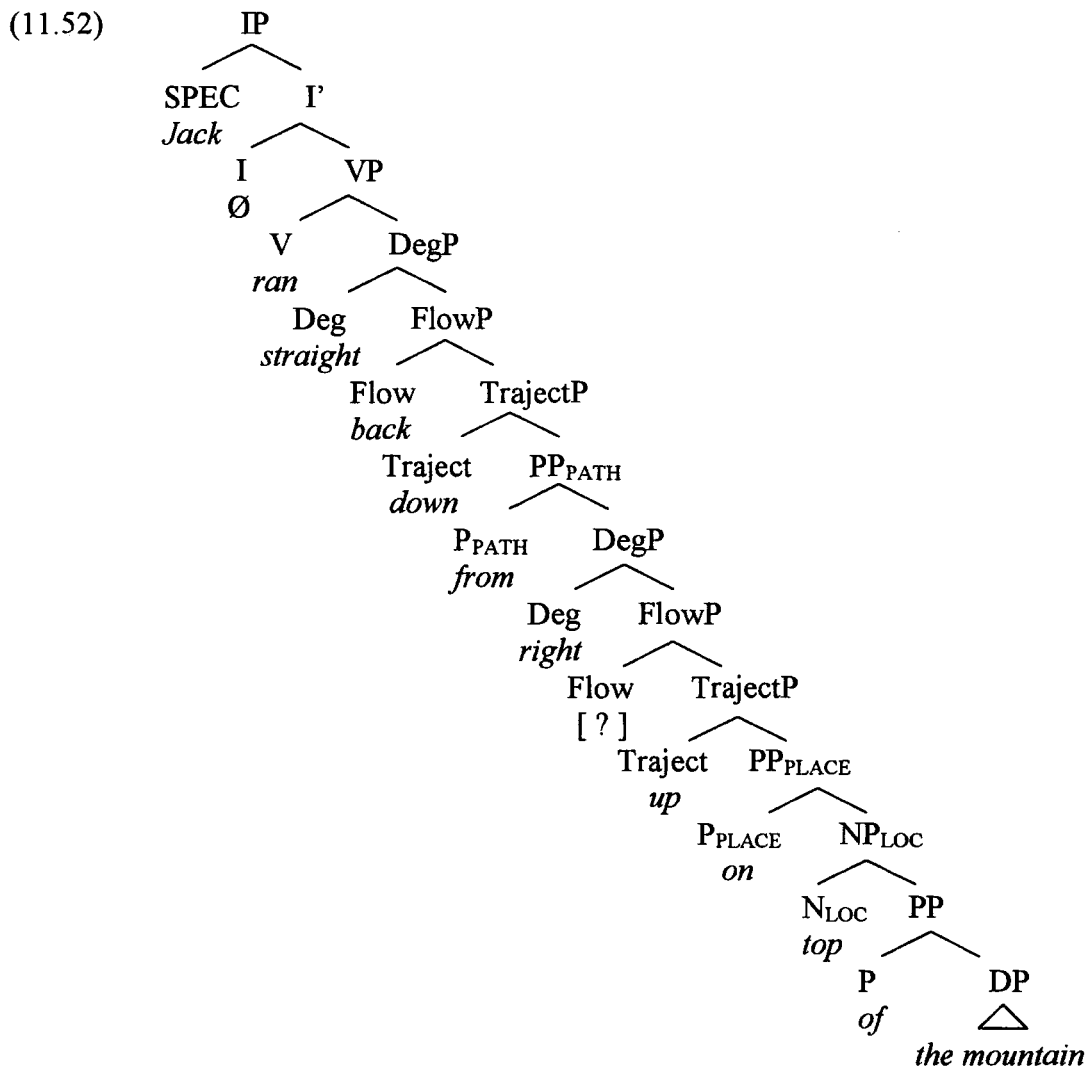
Flow modifiers are also tricky because of their other related meanings. Note that in the above example, *back* does not mean ‘again’, as these two words co-occur, though it may be that *back* sometimes does take on this meaning.<sup>14</sup> *Back* can sometimes mean

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<sup>14</sup> Also note that *He ran back home* does not mean that he did so for a second time.

the opposite of 'front' (e.g. *She moved back, because she hated sitting at the front*), and in such cases it cannot be construed as a reverse Flow modifier. However, in the present discussion, I sidestep such issues, and simply note that the above observations hold for the structures under investigation.

The full range of modifiers discussed can be presented in a constructed example, showing (some of) the possibilities of modification of P [PATH] and P [PLACE]:



The modificational string differs from P [PLACE] to P [PATH] in that if P [PATH] has a Flow modifier, then P [PLACE] may not be so modified. However, the appearance of

the other two modifiers above both P [PLACE] and P [PATH] is in line with den Dikken's (2003) arguments for treating the latter as independent projections in such complex PP structures.

With much fewer Ps than English, it is unsurprising that French and Japanese are not abundant sources of evidence for this type of modificational structure. However, at least one type, Degree modifiers, exists in both languages. Examples from French are given below, with modifiers and their glosses in italics.

(11.53) a. Il a sauté *en plein* dans le flaqué d'eau.

he AUX jumped *P<sub>LOC</sub> full* in the pool of-water

'He jumped right into the puddle.'

b. Le gateau est arrivé *pile* sur son visage.

the cake AUX arrived *heap* on his face

'The cake landed bang on his face.'

c. Il est allé *tout droit* jusque dans sa maison.

he AUX went *all straight* until in his house

'He went straight inside his house.'

In the last example, the status of *jusque* 'until / as far as' is a contentious issue. It was noted in Sections 6.3 and 10.2.1 that French *jusque* 'until / as far as', and by extension Japanese *made* 'until / as far as', although usually translated into English by 'to', may actually not be P [PATH] at all. An alternative account, suggested by Beavers (2003), is that the role of such elements is not to demarcate trajectories but to delimit events. In this way, the semantics is uniform across temporal and spatial events. Another candidate for projection above lexical P might be a functional head to host this feature

of telicity / boundedness. If such a projection exists, the above distributional evidence from French suggests that it must be somewhere above P [PLACE] and below Degree modifiers. Another, more parsimonious, solution is to posit that telicity and PATH are bedfellows in the same functional projection, namely *pP*. This is what I assume, although confirming this intuition requires more targeted investigation than can be afforded in this study.

Examples of Degree modifiers in Japanese include *ma(n)*- ‘right / just’ and *sugu*- ‘immediately’.<sup>15</sup> The following example may at first seem suggestive of the hierarchy outlined above, with a Degree modifier, a geometry-specifying element, and a lexical P in linear order; however, genitive case is presumably assigned by N [LOC], so this is not a modifier (it is unclear whether N [LOC] can indeed ever function as modifiers). A more standardly assumed structure is given in (11.54b), with a head-final PP and the nominal modifier on the left.

(11.54) a. *atama no ma ue de*

head GEN right top P<sub>PLACE</sub>

right on top of his head

b. [[DEGREE *ma* ‘right’ [*ue* ‘top’ N, LOC]] *de* ‘at’ P, PLACE]

On the current analysis, *ma(n)*- ‘right / just’ and *sugu*- ‘immediately’ differ from Degree modifiers in English in that they attach to N [LOC]. Indeed, as shown below, they are ungrammatical when used to modify elements such as *de* (P [PLACE]) and *ni* (P [LOC]), which are uncontroversial examples of postpositions.

<sup>15</sup> Thanks to Seiki Ayano (p.c.) for providing the original variants of all the examples with Japanese P modifiers, and for insightful discussion.

- (11.55) 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’
- (11.56) 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’

Such evidence (and other variations: *\*man-made* ‘right as far as’, *\*ma-e* ‘straight to’, *\*ma-kara* ‘right from’) supports the analysis in Section 11.3 of the proposed N [LOC] elements as N (following Ayano, 2001), rather than P (as in Watanabe, 1993). Ayano (p.c.) suggests that these modifiers may be prefixed or adjoined to N [LOC] in the lexicon, or at least before the phrase as a whole enters the derivation. They appear to the left of N [LOC], and may be further modified by *chōdo* ‘exactly’, as shown below.

- (11.57) *michi no (chōdo) man-naka ni*  
 road GEN right-inside P<sub>Loc</sub>  
 ‘right in the middle of the road’

- (11.58) *dōkutsu no (chōdo) sugu-soto de*  
 cave GEN immediately-outside P<sub>PLACE</sub>  
 ‘just outside the cave’

Measure phrases may also appear in what appears to be the same position as these N [LOC] modifiers, as shown in (11.59); however, when both are used they do not stack: rather, the Degree modifier is to the left of N [LOC] and the Measure Phrase is to the left of P [LOC], as shown in (11.60).

- (11.59) *ni meetoru ue de*  
 two meters top P<sub>PLACE</sub>  
 ‘two meters up’

- (11.60) a. *ma-ue ni meetoru de*  
 right-top P<sub>LOC</sub> two meters P<sub>PLACE</sub>  
 ‘exactly 2 metres up’
- b. *\*ma ni meetoru ue de*  
 right two metres top P<sub>LOC</sub>  
 ‘exactly 2 metres up’
- c. *\*ni meetoru ma ue de*  
 two metres right top P<sub>LOC</sub>  
 ‘exactly 2 metres up’

It is curious that Degree modifiers and Measure Phrases appear not to be able to modify the same head in Japanese, and in English they cannot co-occur at all, as mentioned above.

To return to the general observation on word order, I have presented the string of modificational elements in a Cinque-style series of functional projections above lexical heads (Cinque, 1999), as the parallels with adverb modification in the verbal domain seem an interesting springboard for study. Cinque has free-form adverbs generated in the SPEC of functional projections, whose heads are potential hosts to bound morphemes. As we saw in the examples from Lezgian in Section 11.2, this provides one account of how free and bound modificational morphemes are spelled out in the mirror order. If the possible parallel with PP structure turns out to be robust, then one might expect some languages to have Degree, Flow, and Trajectory modifiers as bound morphology, in the mirror order. If this prediction pans out, one could argue that these English P modifiers are base-generated in SPEC positions.

Of course, the limited empirical facts presented here could support any number of analyses. If one were to argue that P modifiers, adverbs and adjectives are all cases of adjunction, or multiple SPECS, then a non-syntactic (presumably semantic) account of the hierarchy would have to accompany such a proposal. The facts as they stand point only to a potentially interesting line of inquiry.

### 11.5.2 Deixis in PP and VP

There appears to be a further parallel between PP and VP, in that deictic elaboration of a motion event may be expressed in both cases by means of a higher functional projection, which bears elements indicating motion towards or away from a point of reference (e.g. the speaker). As discussed in Section 11.2, the functional *p* [PATH]

projection above lexical P [PLACE] hosts elements with the meanings of ‘to’ or ‘from’; this appears to be the case across languages, in both adpositional systems and locative case systems. Similarly, it was shown in Sections 4.4, 5.2.1, 5.2.3, 8.3 and 8.4 that expressions such as *come running* in English and *hashitte kuru* ‘running come’ in Japanese share the same fixed internal ordering, and at least in Japanese, this type of expression is certainly a complex predicate (recall that the deictic carries tense but the MANNER verb assigns case: see Section 5.2.1, ex.s (5.65, 5.66) and fn. 17 in the same section). These related findings suggest a structural parallel between the expression of *to / from* in layered PP, and *go / come* in complex verbal predicates.

Evidence that that the internal order of PP is fixed throughout the acquisition process was drawn primarily from Experiment I, whilst evidence for a similar fixed ordering within deictic verb complexes was furnished by Experiment II. In Experiment I, across the whole age range, in 1608 instances of PATH predication, there was not a single violation of the ordering [PATH [PLACE]], expressed syntactically as [*p* [P]]. That is, formulations such as those given in examples (6.16) (English: *\*on from* top of the rock) and (6.17) (French: *\*en jusque* bas de l’arbre - P<sub>LOC</sub> until bottom of the-tree - ‘to the bottom of the tree’) would appear not to be possible products of the grammar.

In a parallel finding, it was conclusively demonstrated in Experiment II that the hierarchical internal structure of deictic complex predicates is fixed and inviolable at all tested stages of acquisition. Japanese test sentences with the reversed order (e.g. *\*itte korogaru* ‘roll going’, *\*itte oyogu* ‘swim going’ and *\*itte noboru* ‘climb going’), were rejected by 100% of the adults, and by the children at rates of 93.%, 92.9% (26/28) and 92.9% (26/28) for the three test sentences, with the exceptions being clear cases of ‘noise’. In contrast, the three test sentences with canonical order were

accepted by 100% of the adults, and at rates of 96.4% (27/28), 92.7% (26/28) and 92.7% (26/28) by the children. Comparable English test sentences with reversed order (e.g. *\*run coming*, *\*crawl going*) showed a similar uniformity in patterns of rejection, at rates of 93.5% (29/31) and 100% (31/31) across all age groups, whilst their grammatical correlates were accepted at rates of 90.3% (28/31) and 93.6% (29/31). The related test sentence with the combination *\*cross swimming* was likewise roundly rejected, at a rate of 96.8% (30/31).

Such findings suggest that deixis is associated with a higher functional projection in both PP and VP, accounting for inviolable word order constraints in both domains. Given the richness of functional structure above lexical V assumed in many syntactic frameworks, it seems premature to attempt to precisely specify which functional projection hosts deixis, or to determine whether it has a shared or particular position in respect of other functional elements, and I leave such matters for future research. In any case, the fact that in both the PP and VP systems the functional deictic must dominate the lexical predicate makes plausible the notion that [DEIXIS] is indeed, as mooted in Section 9.1.2, part of the computational semantic feature system associated with functional structure.

### 11.5.3 Alternative Realization in PPs: The case of *into* and *onto*

The third observation that provides fuel for further research into the internal structure of PP concerns the morphing relationship between the English prepositions *in* and *into*, and *on* and *onto*. The simplest explanation, that *in* and *on* are purely locational whilst *into* and *onto* are purely directional, is demonstrably false in the former case. *In* and *on* can often be seen behaving like ‘common or garden’ locative prepositions,

allowing both locational and directional interpretation when used with motion verbs, as in the following constructed examples.

(11.61) The cat jumped {in the puddle / on the fly}.

(11.62) The spider fell {in the soup / on the rug}.

(11.63) The dog ran {in his kennel / on the lawn}.

To add empirical evidence to these introspective judgements, in the English transcripts of Experiment I, the sequence V [MOTION]<sup>in</sup>DP was found in 23 elicited PATH utterances, describing how the monkey entered the cave, the river, the hollow tree trunk, and his house (in order of frequency). These utterances were found in each age group from the 3- to 7-year-olds, and although none was found in adult responses, in the post-experimental feedback sessions *all* the adults judged *all* these child utterances to be grammatical. The most common was for the cave entrance scene, to which typical responses were as follows:

(11.64) <E7e [9]: *he goes in the cave*> (also: E3e, E4a, E4b, E5b)

(11.65) <E7c [9]: *he runs in the cave*> (also: E3a, E3f, E4d, E5a, E6a, E7a)

Descriptions of the river scene included variations such as:

(11.66) <E3e [6]: *he jumps in the river*>

(11.67) <E4a [6]: *falls in the river*>

The light verb *get* was also found in this context:

(11.68) <E3f [6]: *he gets in the water*>

(11.69) <E4a [6]: *he gets in the river and then he swims to the side*>

Such utterances in response to the hollow trunk scene include:

(11.70) <E4b [5]: *first he goes in this end and then he comes out that end*>

(11.71) <E4d [16]: *he climbs in it*>

Again, the light verb *get* was also used.

(11.72) <E4a [5]: *gets in it*>

As argued extensively in Part II, substitution of *into* for *in* changes register, but not interpretive possibilities in the above contexts. As such, the syntax of *in* and *on* appears to be the same as that of prepositions like *under*, *over*, *up*, *down*, *through*, *across*, *behind* and *beyond*, which support the projection of functional *p* and the realization of the PATH feature, as illustrated below.

(11.73) The dog ran [<sub>PP</sub> Ø [<sub>PP</sub> {under / over / up / down / through / across / behind / beyond} the tree-trunk.

I do assume that this is the underlying structure which supports PATH interpretation in all the examples above. However, *in* and *on* do not always support such an interpretation in the same contexts as other P<sub>LOC</sub>. Directional interpretation fails in the former case but not the latter (i) with certain motion verbs (11.74); (ii) after movement of the PP (11.75); and (iii) with any intervening material between V and P other than Degree modifiers (11.76).<sup>16</sup> In these examples, stars indicate that the directional reading is impossible.

(11.74) The girl {danced / skateboarded} {under the bridge / beyond the crowd / {into / \*in} the hall / {onto / \*on} the dance-floor.

(11.75) a. Owen ran {down the field / behind the defence / in the dressing room / on the pitch}

b. It was {down the field / behind the defence / {into / \*in} the dressing room / {onto / \*on} the pitch} that Owen ran.

(11.76) a. Kitajima {fell in the pool / jumped on the podium}.

b. He {fell right in the pool / jumped straight on the podium}.

<sup>16</sup> See Thomas (2001) for further discussion of these phenomena. However, Thomas' (2001) judgements differ from my own in crucial cases. I maintain that sentences such as e.g. *The boy ran on the pitch* and *The fish swam in the cave* are fine on a directional interpretation in colloquial English speech, at least for most speakers in the U.K., U.S., Canada, Australia and New Zealand (see Section 6.6). Thomas, by contrast, rules out such combinations as questionable or ill-formed. It is true, of course, that prescriptive / colloquial may not be the only factor here, and dialectal variation may also be involved. Still, in respect of the fundamental distinction between *in* and *on* and other prepositions, I fully concur with Thomas' (2001) basic distinction between the two forms: unlike *into* and *onto*, which have robust interpretation across verb classes, *in* and *on* are fine with some verbs (e.g. *jump*, *fall*, *?run*, *?swim*) and bad with others (e.g. *dance*, *skateboard*, *?run*, *?swim*).

- c. He fell {2 metres / dramatically} {into / \*in} the pool.
- c. He jumped {across / with a flourish} {onto / \*on} the podium.

Clearly, an explanation of the syntax of directional *in* and *on* must involve (i) a characterization of verb-types that support this interpretation; (ii) some well-articulated theory of locality; and (iii) an account of how *in* and *on* differ from other locative prepositions. At first blush, this may seem simple enough, but on close inspection a number of quirks and contradictions arise that make *in* and *on* difficult to accommodate in a crosslinguistic account of directional argument selection.<sup>17</sup> Whilst I leave the development of a complete syntactic treatment of these elements for more focused future study, here I restrict comment to the third aspect of the solution, in considering how *in* / *into* and *on* / *onto* differ from other English prepositions.

One obvious approach is to say that directional *in* involves the overt element downstairs in P<sub>PLACE</sub>, and a covert element upstairs in P<sub>PATH</sub>, which forces the directional interpretation, whilst *into* involves an exceptional case of movement from P<sub>PLACE</sub> to P<sub>PATH</sub>, with *in* adjoining to *to*. However, this seems somewhat unprincipled: on current versions of generative theory, movement must be motivated, not capricious. An intriguing alternative which permits just a little more flexibility is Emonds' (1987, 2000) theory of Alternative Realization (AR), which has been successfully applied in

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<sup>17</sup> Contrary to my previous analyses of this phenomenon (e.g. Stringer, 2003), if a verb such as English *dance* can merge with *into*, *under*, and *beyond* on a directional reading, then its subcategorization frame must include +<PATH>, as frames specify no more or less than the range of possible complements (thanks to Joe Emonds for insightful discussion on this point). This wrongly predicts that directional *in* and *on* should be fine. As for verbs such as *skateboard*, Thomas (2001) follows Jones (1983) in suggesting that these verbs have 'heaviness of manner'. I suggest that a more robust generalization is that these are denominals, and, for some reason yet to be investigated, denominals are always impossible with directional *in* and *on* (e.g. \**pirouette on the stage* / \**kayak in the gorge*). It is not the case that these verbs can never license an empty *p* [PATH], as directional interpretation is possible with other locative Ps (e.g. *under*, *around*), so the problem appears very much tied to the nature of the relationship between *in* and *into*, and *on* and *onto*.

the nominal, verbal and adjectival domains, and which I propose should be naturally extended to the domain of adpositions.

On this account, interpretable syntactic features (here *computational semantic features*) always sit in canonical structural positions. However, such elements may be alternatively realized as bound morphology when a particular configuration obtains. AR may be defined as follows.

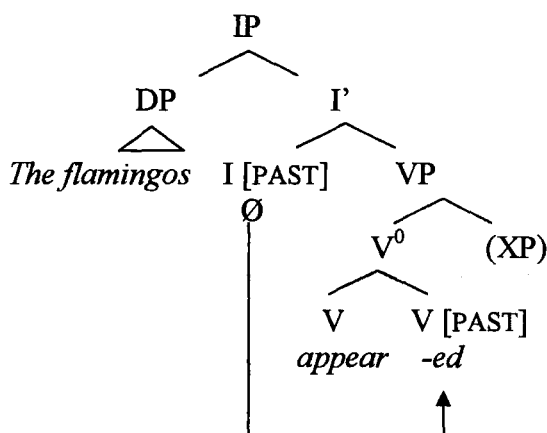
(11.77) Alternative Realization (AR). A syntactic feature F canonically associated in UG with category B can be alternatively realized in a closed class grammatical morpheme under  $X^0$ , provided  $X^0$  is the lexical head of a sister of  $B^j$ .

(Emonds, 2000: 125)

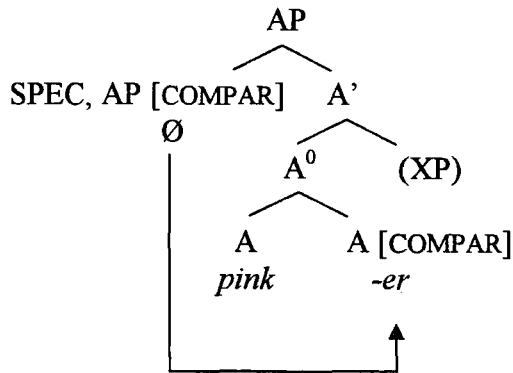
The principle is perhaps most easily understood by means of tree diagrams; below are examples with features canonically hosted in IP and AP, accounting for alternative realization of Tense and Comparative, respectively.

(11.78) a. The flamingos appeared pinker than before.

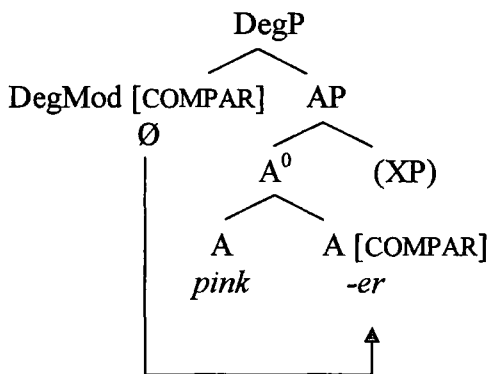
b. AR in IP: e.g., the past tense of *appear*



c. AR in AP: e.g., the comparative of *pink* (assuming a SPEC analysis)

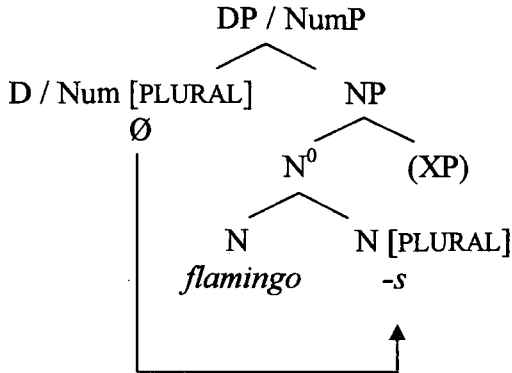


d. AR in AP: e.g., the comparative of *pink* (assuming a Degree projection)



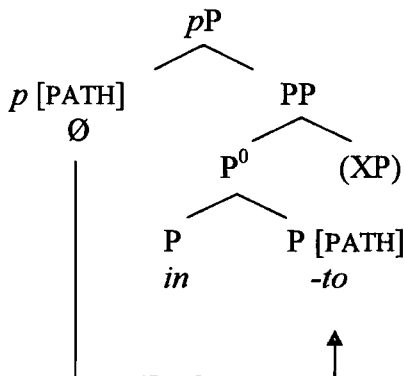
Note that the place of canonical realization may be filled in other circumstances, by e.g. *did* in the former example, and by *more* in the latter. Whether one assumes that the comparative morpheme is canonically associated with the SPEC position or with a functional projection above AP, the AR account still holds, as A remains the *lexical* head. Arguably, the phonological form of the plural of *flamingos* in this example is also derived by AR, if one assumes that the feature [PLURAL] is associated with a functional head (e.g. NumP) in an extended DP structure (Ritter, 1995). Even if there are several projections in the DP system, this analysis remains valid, as the N *flamingo* is the *lexical* head of whatever projection ends up as the sister to the appropriate functional head.

(11.79) AR in DP / NumP: e.g., the plural of *flamingo*



It is striking that on the analysis of layered PP argued for in this chapter, the canonical locus of the [PATH] feature and that of the [PLACE] feature are in *exactly* the same syntactic environment as the examples above, and the decomposition of the prepositions *into* and *onto* results in precisely the same switching of functional material from a free morpheme to the left of the head, to a bound morpheme on the right. This favours an extension of the phenomena captured by AR theory to the domain of adpositions in the case of *into* / *onto*, as shown below.

(11.80) AR in PP: the derivation of *into* / *onto*



On this account, rather than *in* moving to adjoin to a functional head, it stays put, and is ‘inflected’ with late-inserted bound morphology spelling out the feature of the functional head.<sup>18</sup>

This does not explain why certain verbs and not others allow *in* and *on* to carry directional interpretation, nor does it characterize the relevant locality conditions. However, it does distinguish *in/into* and *on/onto* from other English prepositions, and is likely to form an integral part of any account of restrictions on Merge for *in* and *on*. As a theoretically pleasing consequence, it extends the theory of AR to all four lexical categories. One possible line of investigation, which I will not pursue here, is that some verbs (*jump, fall, run, roll, swim, etc.*) may syntactically incorporate the [PATH] feature, whilst others (*dance, twist, wiggle, etc.*) may not (see Stringer, in press, for related discussion). In this case, these latter verbs would *require* the spelling out of the PATH morpheme through AR. This account could easily be extended to denominal verbs, as well as to onomatopoeia, which, as discussed in Section 6.9, is subject to the same restriction. I leave such issues for future study.

## 11.6 Adpositional syntax and the initial state

The universal nature of the ‘minimal’ PP structure and the highly principled structuring of modification and deixis within the PP system have clear implications for language acquisition. Whilst much more crosslinguistic research is necessary, it seems entirely justifiable on the basis of available evidence to adopt the hypothesis that the internal structure of PP is something children *never have to learn*. As highlighted in discussion of the experimental work in Part II, and again in this chapter,

<sup>18</sup> Thomas (2002) makes a related proposal in an unpublished paper. She accepts the Distributed Morphology version of the ‘Lowering’ hypothesis proposed by Embick and Noyer (2001) to explain what Chomsky (1957) called ‘affix hopping’, i.e. the fact that tense may be spelled out as a verbal suffix rather than in the higher functional projection. She then proposes that Tense (in the case of regular Vs) and Direction (in the case of *into*) are both subject to the same ‘Lowering’ analysis.

they simply never err when it comes to this aspect of the computational system. In the generative framework, it is generally accepted that functional architecture associated with the IP and DP systems above V and N, respectively, is built according to universal blueprints in the human mind. Not all languages provide examples of all functional elements, but when such an items are present in a particular language, they are hypothesized to appear in particular positions, and are never randomly distributed (for a potent example of this approach, see Cinque, 1999). I argue that the same holds for PP structure. This hypothesis may be summarized in the following statement:

(11.81) The internal structure of PP [<sub>PP, PATH</sub> α [<sub>PP, PLACE</sub> β [<sub>NP, LOC</sub> γ [<sub>P</sub> δ]]]] is universal, and available at all stages of acquisition.

If one accepts that this is the case, it is also reasonable to assume that syntactic structure is likely to be instrumental in the acquisition of the functional (and semi-lexical) spatial lexicon, whose elements V, P and N are so constrained in their patterns of combination by the computational semantic features they carry. Realization of a lexical item in a given structural position in PP is often indicative of the presence or absence of a syntactically relevant aspect of meaning; thus the ordering of words and or affixes in the input provides a source of evidence as to the feature specifications of particular spatial morphemes.

The initial state for the acquisition of grammatical knowledge underlying directional predication is seen as comprising universal principles of syntactic computation, a universal inventory of syntactic categories, and a universal inventory of computational semantic features. The interaction of categories and features with the computational system is automatic; what children have to learn is to associate

categories and features with pieces of morphology. To this end, the relevant aspects of syntax may be a medium rather than a goal for the acquisition process.

To return to the core issue investigated in this chapter, and summarize the account advanced here: elements carrying the features [PATH], [PLACE] and [LOC] are combined through mechanisms of syntax which are putatively part of Universal Grammar, a claim supported by the experimental evidence from English, Japanese and French, and by a number of other studies on different languages. Two principle approaches to the internal structure of PP were considered: the 'minimal' layered PP, which is amply supported by a range of phenomena; and the 'extended' layered PP, which was argued to remain in need of substantive evidence. Three more speculative avenues were then pursued, all involving the nature of or relationship between the lower PP and the higher *p*P. First, a tentative hierarchy of P modifiers was proposed on the basis of the Experiment I data, together with constructed examples. Second, it was observed that deixis is associated with a functional projection in both PP and VP, leading its plausible inclusion in the system of computational semantic features. Third, it was noted that *in* and *on* behave differently from other English prepositions in terms of their directional interpretation with certain verb classes; it was then argued that this is likely to be related to their intimate relationship with *into* and *onto*, the latter being derivable by Alternative Realization (Emonds, 1987, 2000). Finally, on considering the implications of such phenomena for first language acquisition, it was argued that children do not have to learn (non-parameterized) aspects of syntax that are spelled out by Universal Grammar, a hypothesis which is supported by the absence of errors in the production data of Experiment I, and the robust rejection of structure violations in Experiment II. PP structure may be used to support various grammatical elements,

such as prepositions, postpositions, or locative case markers, but the combinatorial possibilities latent in layered PP are part of the initial state.

## Chapter 12

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### Summary and Conclusion

Typological patterns in motion events have led to much cognitive linguistic research on whether particular languages are ‘verb-framed’ or ‘satellite-framed’, following the distinction set out by Talmy (1991). As discussed in Part I, co-ordinated investigations into hundreds of languages initially appeared to confirm a robust binary dichotomy in the expression of PATH in verbs on the one hand, and adpositions or affixes on the other (e.g. Berman and Slobin, 1994). However, more recent studies in the same tradition have brought to light a significant number of complications, and there has been debate as to whether the same patterns might be best characterized in terms of a greater number of typological settings or in terms of ‘clines of salience’ (e.g. Strömquist and Verhoeven, 2004a). This thesis departed tangentially from this research tradition, by adopting a different approach to the same phenomena. A shift in emphasis was made away from ‘typologies of use’ and toward the issue of what is possible and impossible in the grammars of English, French and Japanese in respect of PATH predication, at various stages of acquisition. In line with certain suggestions posited very tentatively in generative research (e.g. Levin and Rapoport, 1988; Jackendoff, 1990; Snyder, 1995), an endeavour was undertaken to directly address the issue of whether such a binary split in the world’s languages might be formalized in terms of parameter theory. Two contrasting hypotheses were formulated as to how the patterns of predicate-argument structure underlying the two-way typology might succumb to formal treatment: (i) the Path Parameter Hypothesis (PPH), which suggests binary parameterization at the whole-language level; and (ii) the Lexicalist Path Hypothesis (LPH), which eschews a whole-language analysis in order to account

for all variation exclusively in terms of the properties of individual lexical items. In advance of experimentation, one further problematic preliminary issue was addressed: how comparative lexical analysis can be conducted given general non-equivalence between lexical items across languages. It was proposed that lexical items may be directly compared following decomposition in terms of sub-lexical ‘computational semantic features’, which were defined as those elements of lexical meaning that play a role in syntax.

Part II provided descriptions and analyses of two experiments conducted with monolingual English, French, and Japanese children and adults, with a view to testing between the two hypotheses (the PPH and LPH), and ascertaining any developmental trends, language-particular phenomena or shared aspects of lexicalization and syntax. Experiment I made use of an elicited production technique to furnish 1608 examples of PATH predication from children aged 3 – 7 years old and adults, and the principal findings were as follows. Firstly, in terms of use of language (what people *usually* say), Talmy’s typology accurately describes English and Japanese, but French is a mixed language with regard to the ‘framing’ of motion events. Moreover, use of language is the only sense in which this typological characterization is possible. In terms of knowledge of language (what people *can* say), PATH may be expressed in either V, or in P, or in both, in each language, at all tested stages of acquisition.

The second main conclusion of Experiment I was that formalization of predicate-argument structure in motion events cannot be in terms of a binary parameter in the P&P framework. The syntax of PATH predication was shown to be determined at the level of individual lexical items, such that the Lexicalist Path Hypothesis was borne out in full.

A third, perhaps surprising, finding was the extent to which all three languages exhibit commonalities in their expression of direction in motion events, using the same set of syntactic categories, semantic features and principles of syntactic combination. Attention was drawn to eight such shared aspects of PATH predication, including a universal PP structure, a bare NP projection inside PP, and colloquial combinations of V [MANNER] and PP [LOC] (usually associated with only ‘satellite-framed’ languages). Another particularly intriguing commonality was the delay in acquisition of ‘predicates of traversal’ (e.g. *across*, *through*) in all three languages, regardless of expression in verbs or adpositions, which calls out for further study.

The results of Experiment II, in which grammaticality judgements were obtained from the same test subjects with the help of a toy ‘robot’, extended the findings of the first experiment in various ways. Several observations simultaneously revealed (i) the lexical (rather than syntactic or ‘constructional’) nature of developmental errors in this domain, and (ii) the efficacy of a decompositional approach to crosslinguistic comparison of lexical items. Japanese *de* ‘at / in / on’ and English *at*, both characterized as P [PLACE], revealed common error patterns in Experiment II, with sporadic acceptance in directional contexts until age 6 in Japanese and age 7 in English. The acceptance of Japanese *ni* ‘at / in / on / to’, characterized as P [LOC], in contexts of traversal mirrored the path of development suggested by the production data: completely accepted by the 3- and 4-year-olds, accepted by only half the 5- to 7-year-olds, and rejected by all the adults. Variation in acceptance rates of English *above* and *below* in directional contexts indicate that the end result of lexical fine-tuning of spatial adpositions may not be the same for all members of the same speech community (for some, these are strictly P [PLACE], for others, they are P

[LOC]). Such results favour an account of the acquisition of the knowledge underlying PATH predication in terms of lexical learning rather than syntactic parameter setting.

Several findings from Experiment II bear on the idea that syntactic principles are invariant rather than parameterized in the domain of directional predication. In line with the liberal use of P [LOC] in directional contexts in the elicited production data in all three languages (the ‘satellite-framed’ pattern), combinations of V [MANNER] and PP [LOC] in directional contexts were accepted by all age groups in the grammaticality judgement test. Another shared aspect of the syntax of PATH predication confirmed in Experiment II included the fixed hierarchy of deictic and geometric predicates. Phrases such as Japanese *hashitte iku* - run-TE go - ‘go running’ and English *come swimming* may never allow inverse hierarchy on this interpretation, i.e. *\*itte hashiru* - go-TE run - ‘run going’; *\*swim coming*. This finding is arguably parallel to the fixed order of deictic and locative adpositions that was observed in the first experiment (*from on top of the rock* / *\*on from top of the rock*). At least this aspect of syntactic knowledge seems to be present from the beginning, and supports the view of uniform syntax that has emerged so strongly in this investigation. As mentioned earlier, the fact that these two tasks were part and parcel of the same experimental session for participants made it impossible to formulate hypotheses for Experiment II based on the findings of Experiment I; one predication that awaits confirmation by means of grammaticality judgements is that children should consider the internal structural hierarchy of PP to be similarly inviolable at all stages of acquisition (as suggested, though not proven, by the absence of any errors in the elicited production data).

These empirical investigations served as a springboard for Part III, in which I pursued a more detailed theoretical analysis of both lexical and syntactic issues in the

expression of directed motion. Various senses of the terms ‘path’ and ‘satellite’ found in the cognitive linguistics literature were re-examined in the light of the formalist account put forward in this thesis; it was argued that the most useful application of this term in approaching the possibility and impossibility of combinations of V and P is strictly in terms of a grammatically relevant semantic feature which is essentially independent of extra-linguistic concepts of ‘trajectories’ and ‘journeys’. As for the proposed categorial distinction between ‘satellites’ and adpositions, syntactic argumentation was provided to show that satellites of direction *are* adpositions.

The next issue to be addressed was the nature of what I have termed ‘computational semantic features’, i.e. those aspects of lexical meaning that play a role in syntax. It was argued that parsimony favours the incorporation of such features into subcategorization theory (Emonds, 1991, 2000), rather than elaborating semantic structures in parallel to the syntax (Jackendoff, 1990). Semantic features were used to provide a clear descriptive account of the transition from childlike to adult-like representations of particular adpositions. Children’s errors in the predication of PATH were shown to indicate initial underspecification of semantic features, although how they recover from such errors remains an intractable problem on current assumptions.

The final theme taken up in Part III was the internal structure of directional PP. The PP hierarchy was shown to be fixed and inviolable in English, French and Japanese, and evidence from other languages was introduced to bolster the suggestion that a ‘minimal’ form of this structure (without the Agreement and Complementizer Phrases proposed by Koopman (2000 [1993]) and den Dikken (2003)) is crosslinguistically pervasive. Three aspects of the layered PP system were highlighted as intriguing areas for future investigation: the strict ordering of P modifiers in English, the expression of deixis in the domains of both verbs and adpositions, and the

alternative realization of the higher, functional *p* [PATH] as bound morphology on the lower, lexical P [LOC] (e.g. [*to[in]*] → [∅ [*into*]]). As regards the role of PP-internal structure in acquisition, it was suggested that such fundamental aspects of the syntax of motion events need not be acquired at all: rather, they constitute part of the initial state, and may themselves support the acquisition of the lexicon.

To return to the issue that lit the fuse for this project, the experimental evidence and theoretical argumentation presented here suggests that whilst Talmy's typology may be useful in characterizing general tendencies of language use, there is no 'path parameter' operational at the whole-language level, and formalization in terms of the grammar is feasible only at the level of individual lexical items. Variation in PATH predication, both across languages and within languages, is of the same ilk, determined by inherent and contextual properties of lexical items, and subject to analysis in terms of shared syntactic categories, shared computational semantic features, and shared syntactic principles of combination. Children come to the task of acquisition with prior knowledge of the relevant aspects of syntax, but must learn the particular complexities of their lexicon, which is the primary locus of variation in the linguistic expression of motion events.

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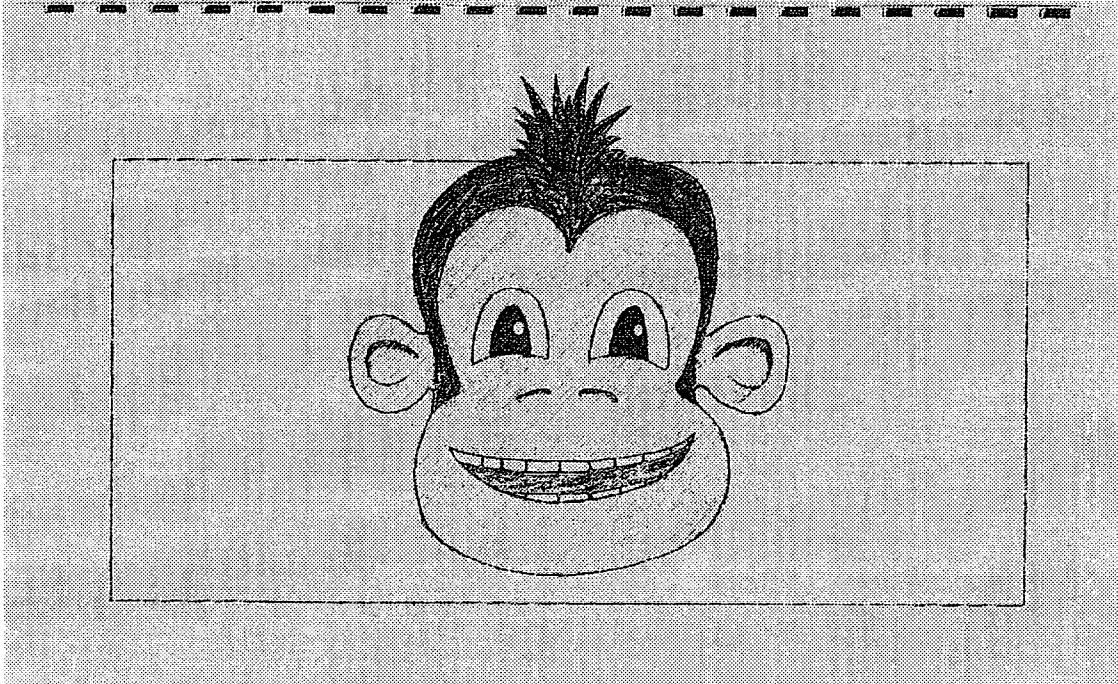
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## **APPENDICES**

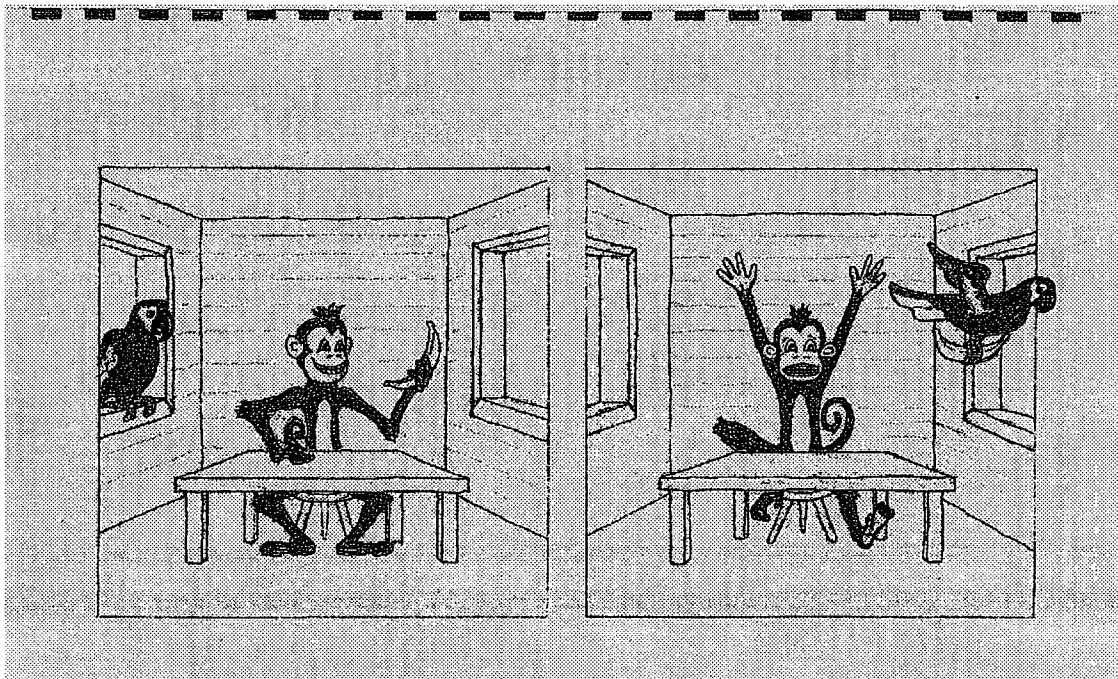
## Appendix A

### The Monkey Book

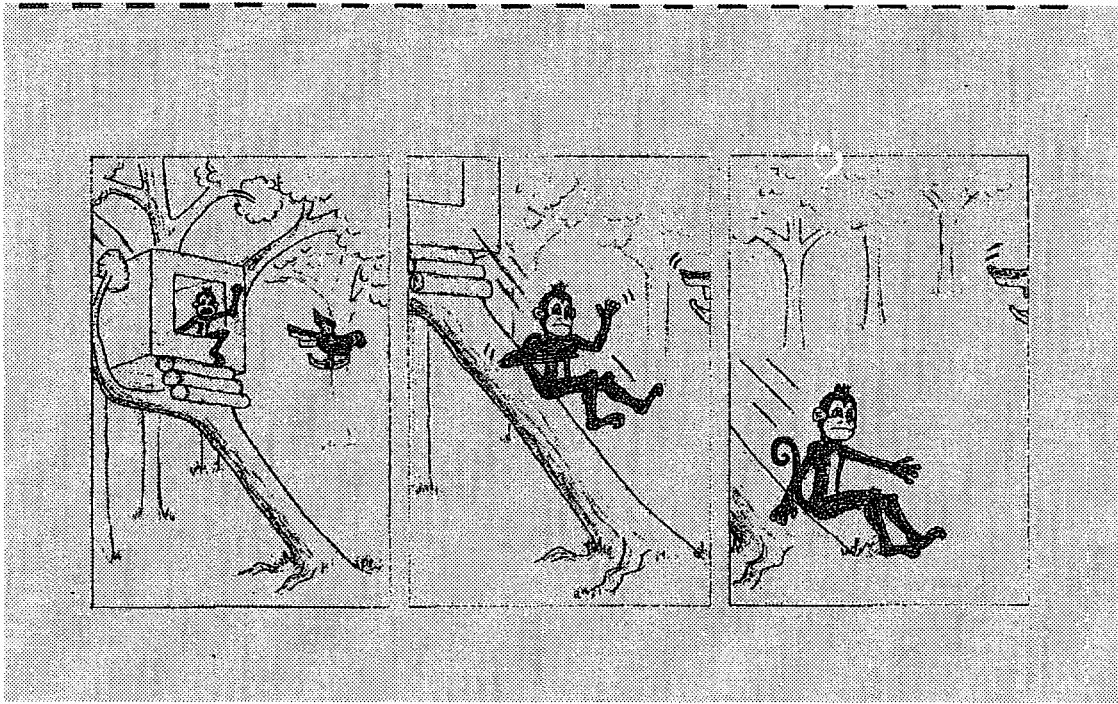
(The following are scanned images from the monochrome sketch version. The originals are A4 size (210 x 297mm), brightly coloured, and laminated.)



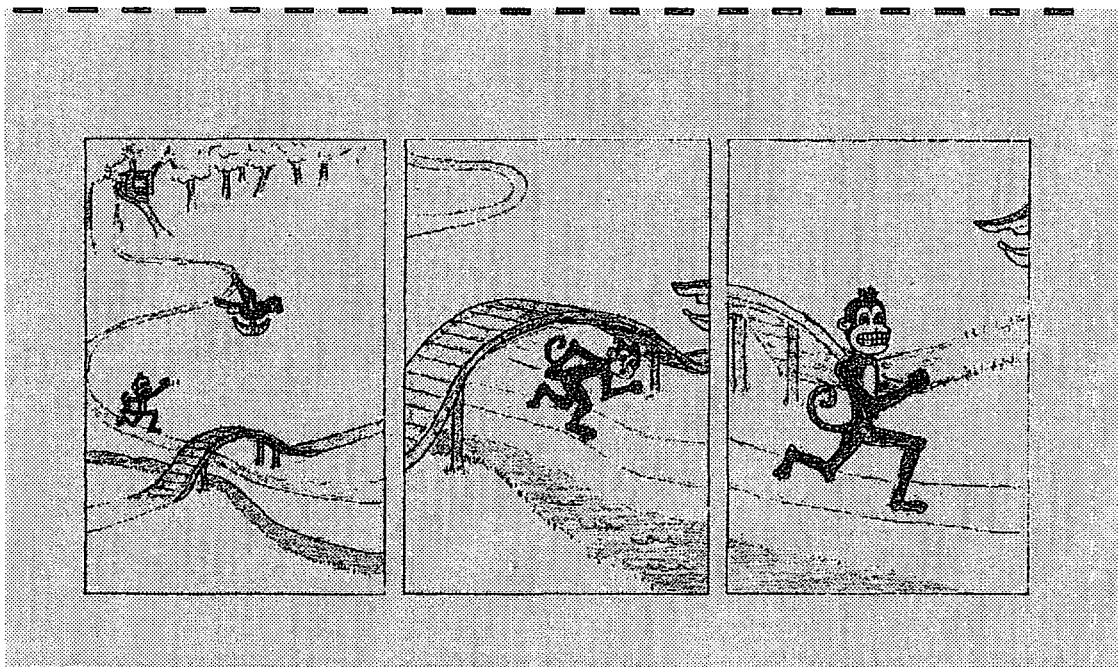
The Monkey Book: Cover



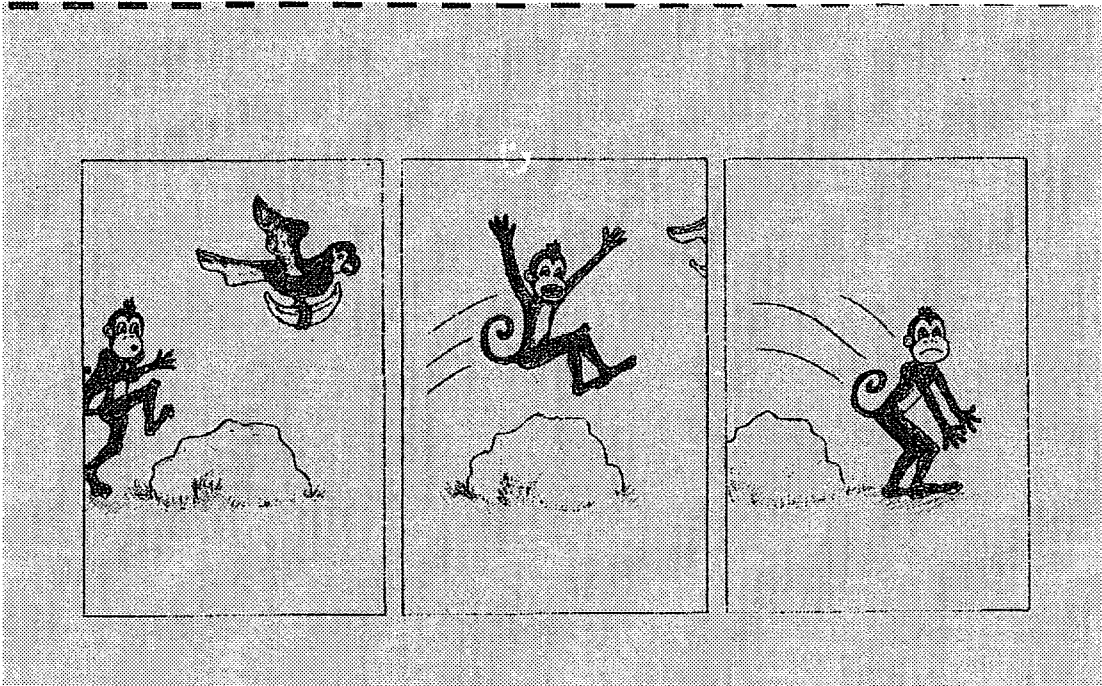
[1] The treehouse scene



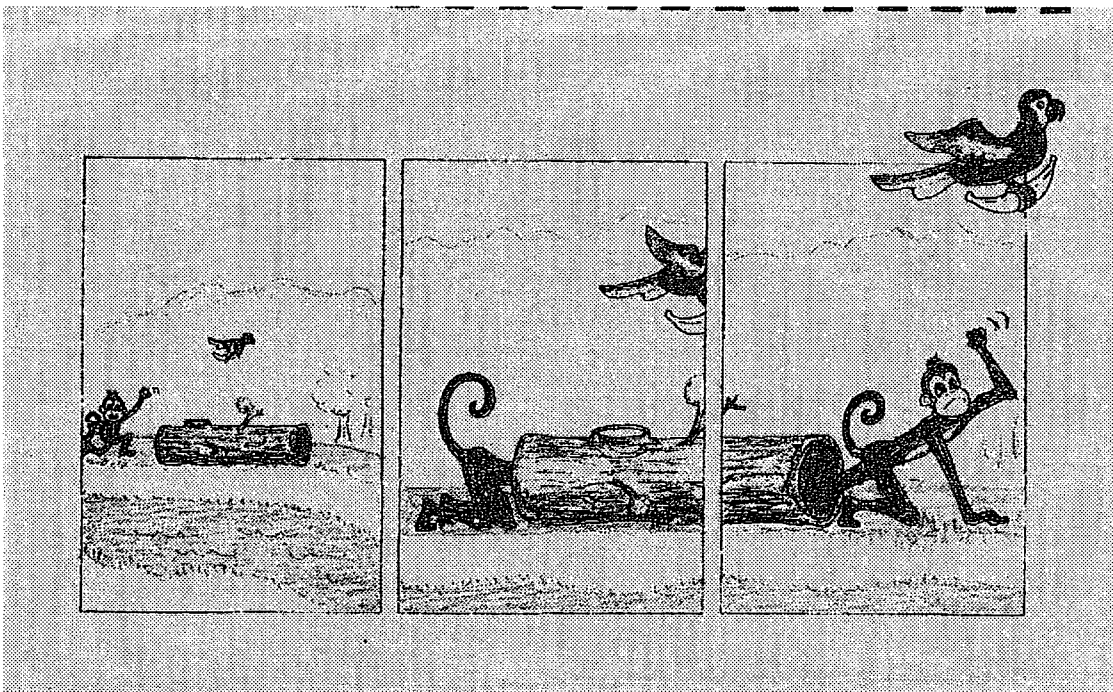
[2] The tree-sliding scene



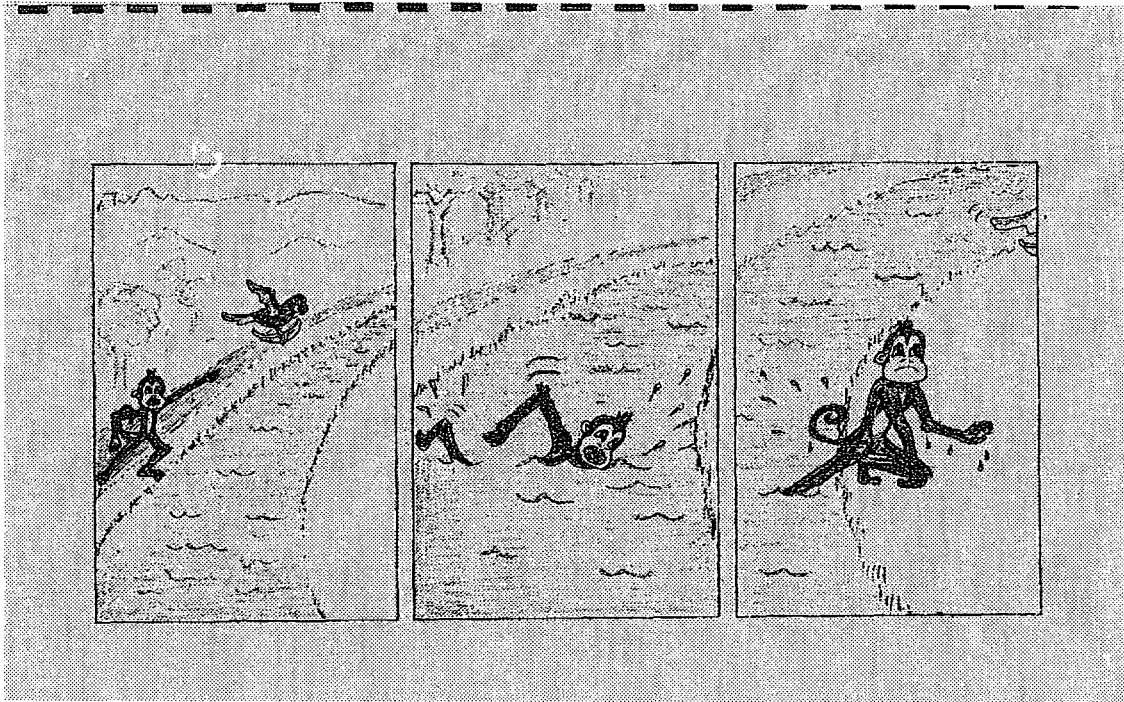
[3] The (first) bridge scene



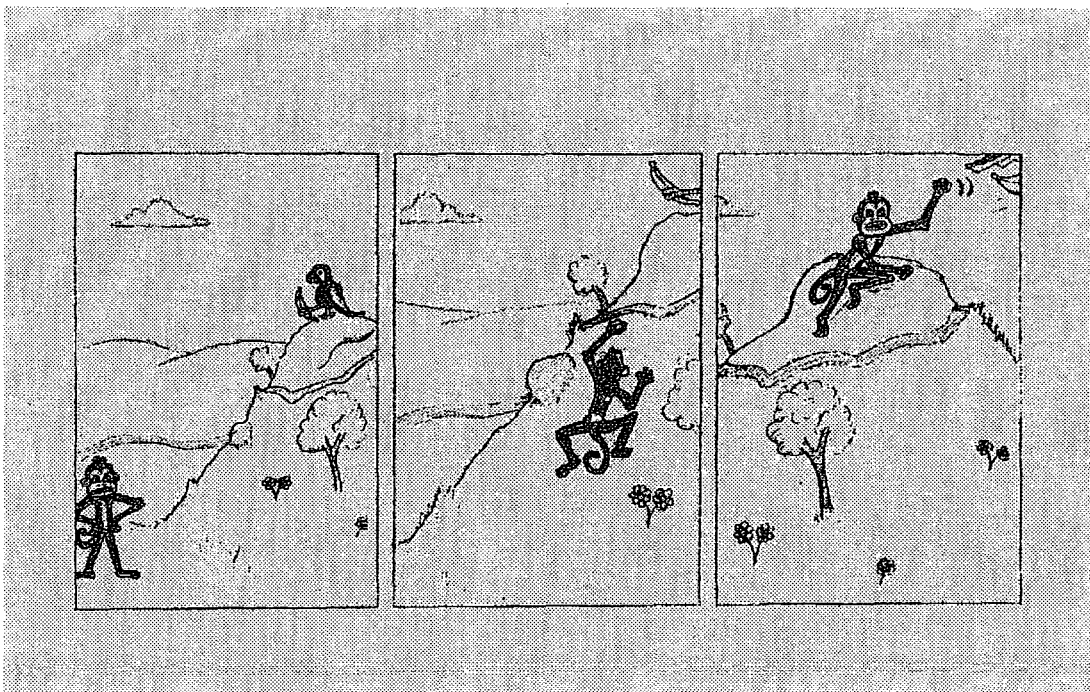
[4] The (first) rock scene



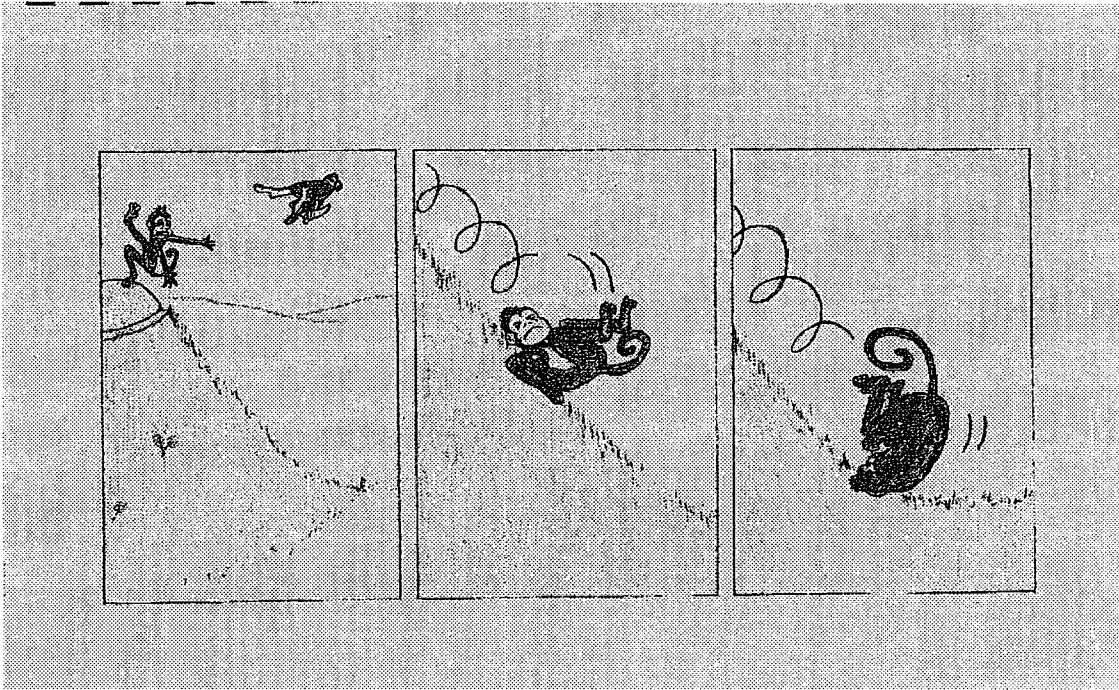
[5] The (first) hollow trunk scene



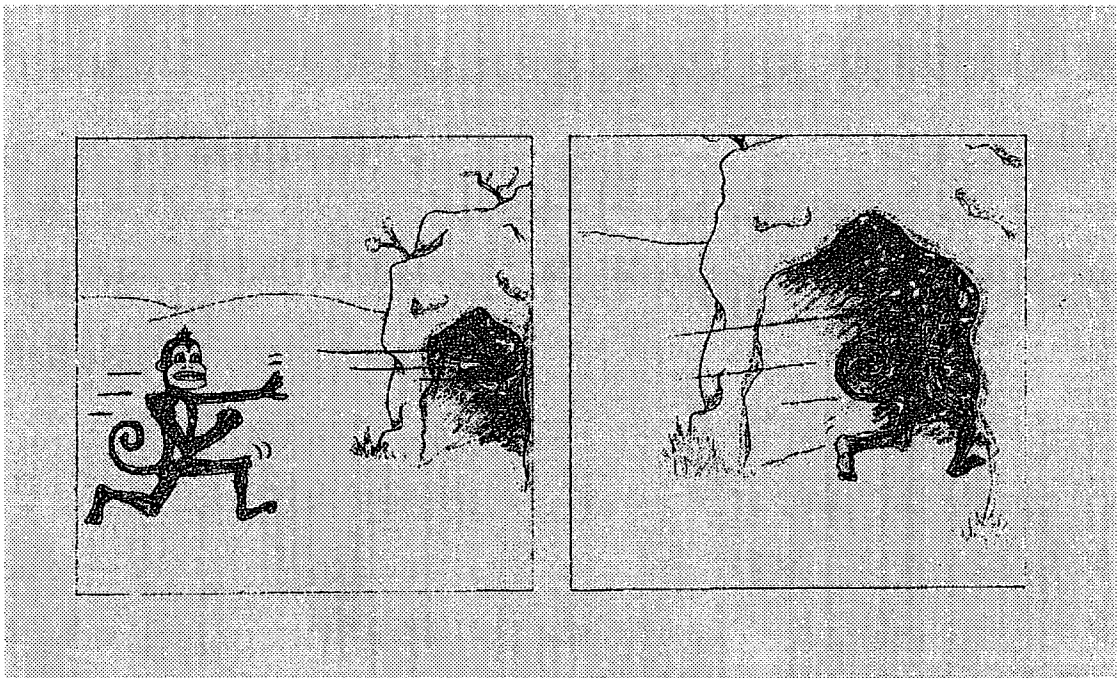
[6] The (first) river scene



[7] The (first) uphill scene



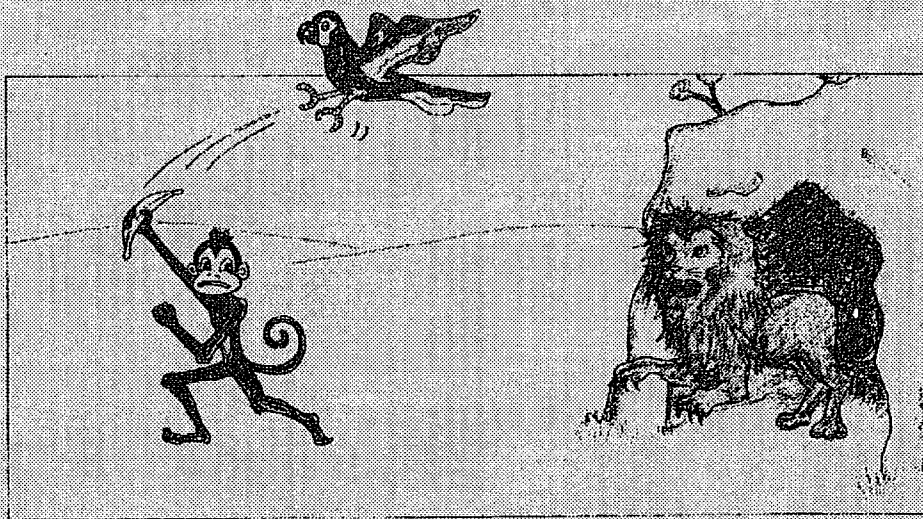
[8] The (first) downhill scene



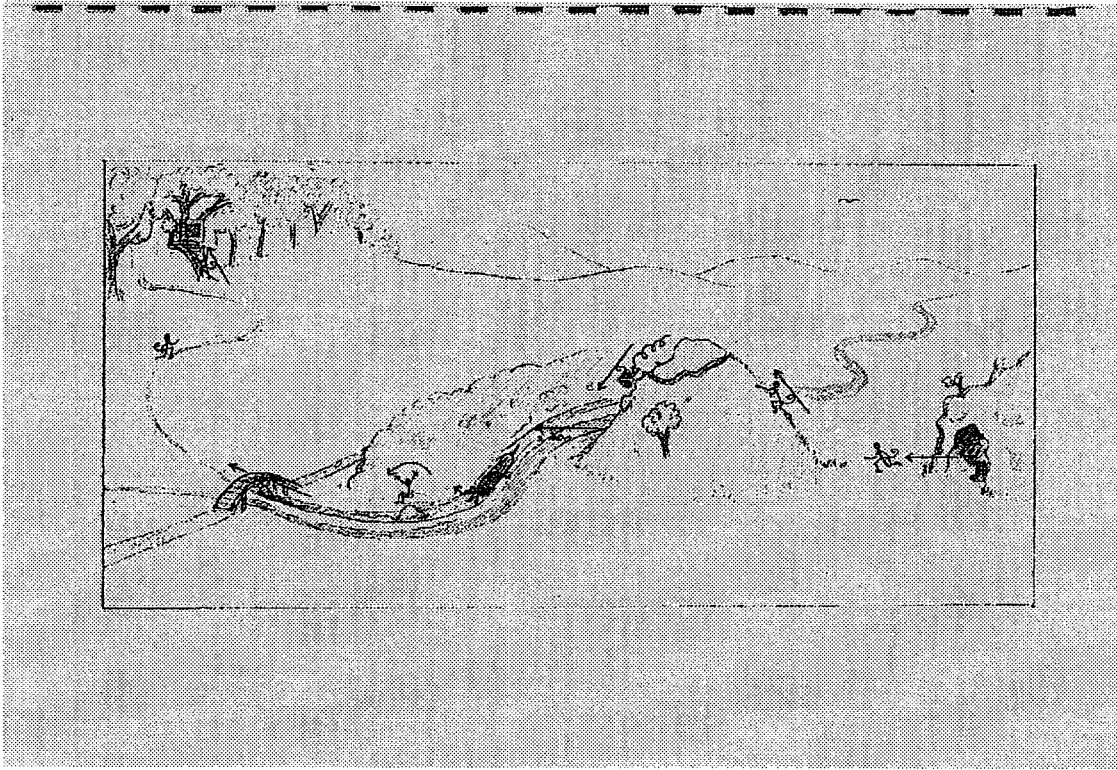
[9] The cave entrance scene



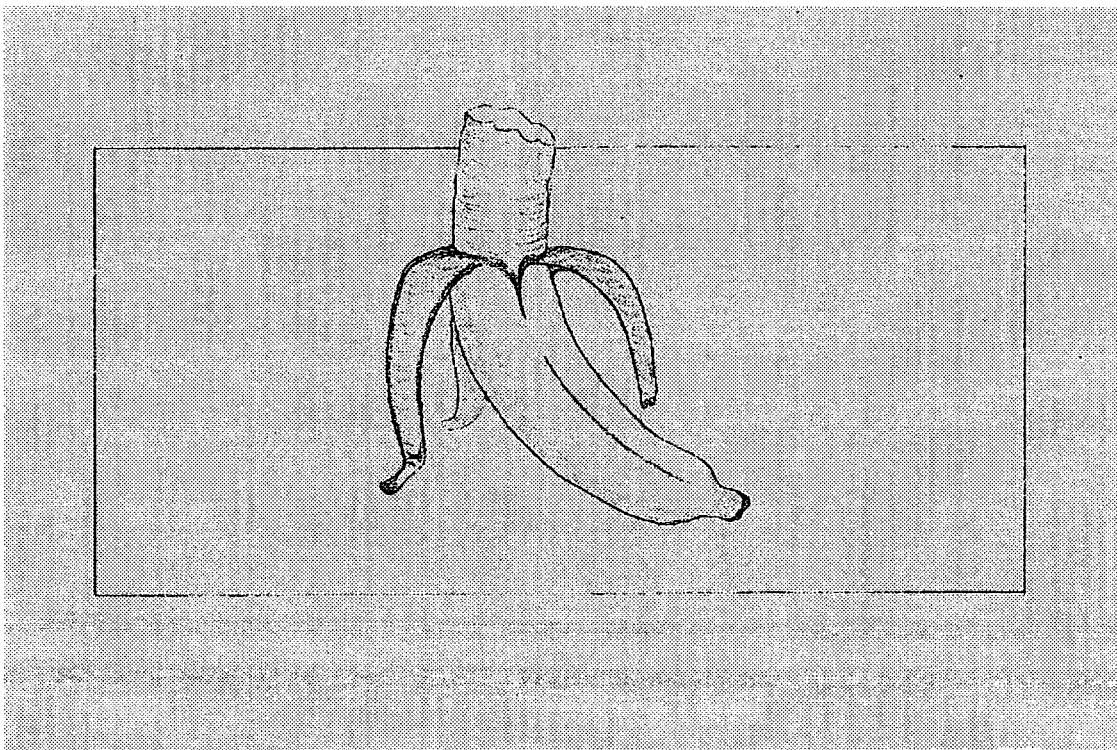
[10] The dark cave scene



[11] The chasing out scene



The Return Journey: [12] The cave exit scene; [13] The (second) uphill scene; [14] The (second) downhill scene; [15] The (second) river scene; [16] The (second) hollow trunk scene; [17] The (second) rock scene; [18] The (second) bridge scene; [19] The tree-climbing scene



[20] The banana reward scene

## Appendix B

### Test subjects

The tables below indicate the sex, age, and experimental participation of each test subject. Reference codes are explained in Section 4.5. Age is given in years and months. In column EXP, it is noted whether subjects participated successfully in both experiments (1&2), only one experiment (e.g. 1,\*), or in neither experiment. In the latter case, it is noted whether the subject was silent or whether the elicited utterances did not contain PATH predicates.

#### (i) English participants

	REF	SEX	AGE	EXP
(1)*	E3a	M	3;3	1, *
(2)	E3b	M	3;4	1&2
(3)	E3c	F	3;9	1&2
(4)	E3d	M	3;9	1&2
(5)	E3e	F	3;10	1&2
(6)*	E3f	F	3;11	1, *
(7)	E3g	M	3;11	1&2
**	EG	F	3;2	**silent
(8)	E4a	F	4;0	1&2
(9)	E4b	M	4;1	1&2
(10)	E4c	F	4;2	1&2
(11)	E4d	F	4;9	1&2
(12)	E4e	M	4;11	1&2
(13)	E5a	F	5;1	1&2
(14)	E5b	M	5;6	1&2
(15)	E5c	F	5;8	1&2
(16)	E5d	F	5;9	1&2
(17)	E5e	M	5;10	1&2
(18)	E6a	F	6;4	1&2
(19)	E6b	M	6;5	1&2
(20)	E6c	F	6;7	1&2
(21)	E6d	M	6;9	1&2
(22)	E6e	F	6;10	1&2
(23)	E7a	F	7;0	1&2
(24)	E7b	F	7;1	1&2
(25)	E7c	M	7;9	1&2
(26)	E7d	M	7;11	1&2
(27)	E7e	F	7;11	1&2

Adults				
(28)	EAa	F	18	1&2
(29)	EAb	F	32	1&2
(30)	EAc	F	58	1&2
(31)	EAd	F	60	1&2
(32)	E Ae	M	64	1&2
(33)	E Af	M	67	1&2

**(ii) French participants**

	REF	SEX	AGE	EXP
(1)	F3a	M	3;1	1&2
(2)	F3b	F	3;2	1&2
(3)	F3c	M	3;6	1&2
(4)	F3d	M	3;9	1&2
(5)	F3e	F	3;10	1&2
**	ML	F	3;0	**silent
**	MD	F	3;5	**no paths
**	MT	F	3;5	**no paths
(6)	F4a	M	4;1	1&2
(7)	F4b	F	4;3	1&2
(8)	F4c	F	4;5	1&2
(9)*	F4d	M	4;7	1, *
(10)	F4e	M	4;8	1&2
(11)	F5a	M	5;0	1&2
(12)	F5b	F	5;1	1&2
(13)	F5c	M	5;10	1&2
(14)	F5d	F	5;10	1&2
(15)	F6a	M	6;2	1&2
(16)	F6b	F	6;4	1&2
(17)	F6c	M	6;6	1&2
(18)	F6d	F	6;8	1&2
(19)	F6e	F	6;10	1&2
(20)	F7a	F	7;2	1&2
(21)	F7b	M	7;4	1&2
(22)	F7c	M	7;6	1&2
(23)	F7d	F	7;6	1&2
(24)	F7e	M	7;8	1&2

Adults				
(25)	FAa	F	25	1&2
(26)	FAb	F	29	1&2
(27)	FAc	F	32	1&2
(28)	FAd	F	33	1&2
(29)	FAe	F	43	1&2
(30)	FAf	M	50	1&2
(31)	FAg	F	61	1&2

**(iii) Japanese participants**

	REF	SEX	AGE	EXP
(1)*	J3a	F	3;4	1, *
(2)	J3b	F	3;6	1&2
(3)	J3c	F	3;6	1&2
(4)	J3d	M	3;7	1&2
(5)	J3e	F	3;10	1&2
**	KH	F	3;0	**silent
**	MM	F	3;1	**silent
**	RY	F	3;2	**silent
**	AA	F	3;3	**silent
**	AH	F	3;3	**silent
**	YY	M	3;11	**no paths
(6)	J4a	F	4;2	1&2
(7)*	J4b	M	4;4	1, *
(8)	J4c	M	4;5	1&2
(9)	J4d	F	4;8	1&2
(10)	J4e	F	4;9	1&2
**	MN	M	4;1	**no paths
(11)	J5a	F	5;1	1&2
(12)	J5b	M	5;7	1&2
(13)	J5c	M	5;10	1&2
(14)	J5d	F	5;11	1&2
(15)	J5e	M	5;11	1&2
(16)	J6a	M	6;2	1&2
(17)	J6b	F	6;2	1&2
(18)	J6c	F	6;4	1&2
(19)*	J6d	M	6;5	1, *

(20)	J6e	M	6;5	1&2
(21)	J6f	M	6;6	1&2
(22)	J6g	M	6;11	1&2
**	SK	M	6;2	**silent
(23)	J7a	F	7;10	1&2
(24)	J7b	M	7;11	1&2
(25)	J7c	M	7;11	1&2
(26)	J7d	F	7;11	1&2
Adults				
(27)	JAa	F	20	1&2
(28)	JAb	F	20	1&2
(29)	JAc	M	21	1&2
(30)	JAd	M	23	1&2
(31)	JAe	M	24	1&2

## Appendix C

### Experiment I: Prompting materials

#### (i) Experiment I: English prompting materials

#### INTRODUCTION:

Let's start by looking at this nice book. It tells the story of a little monkey and a naughty parrot. You can look at the pictures, and tell us the story, OK?

#### QUESTIONS AND PROMPTS:

- EVENT 2** look, the parrot flies away. and what does the little monkey do?  
(down tree)  
prompts:    ☐ [he slides]: yes, he slides...where?  
              ☐ [he goes down]: yes. how does he go down?  
              ☐ he starts here, at the top of the tree, and he ends up here, at the bottom of the tree.  
              so what does he do?
- EVENT 3** and now there's a bridge. what does the monkey do?  
(under bridge)  
prompts:    ☐ [he runs]: yes, he runs...where?  
              ☐ yes. but to get to this side of the bridge, what does he do?
- EVENT 4** as above, *mutatis mutandis*  
(over rock)  
prompts:    ☐ [he jumps]: yes, he jumps...where?  
              ☐ he starts here, and he ends up here, so what does he do?  
              ☐ look! the rock is right in the middle of the path. what does he have to do to get to  
              the other side?
- EVENT 5** as above, *mutatis mutandis*  
(through trunk)  
prompts:    ☐ [he goes inside]: does he stay inside? what does he do?  
              ☐ he starts here, and he ends up here, so what does he do?  
              ☐ look! the tree-trunk is right in the middle of the path. what does he do to get to the  
              other side?
- EVENT 6** as above, *mutatis mutandis*  
(across river)  
prompts:    ☐ [he {dives / goes} into the water]: yes. but to get to this side of the river, what does  
              he do?  
              ☐ [he swims. yes, he swims...where?  
              ☐ [in the river]: does he stay in the river? what does he do?
- EVENT 7** as above, *mutatis mutandis*  
(up hill)  
prompts:    ☐ [he climbs]: yes, he climbs...where?  
              ☐ he starts here, at the bottom of the hill, and he ends up here, at the top of the hill. so  
              what does he do?
- EVENT 8** as above, *mutatis mutandis*  
(down hill)  
prompts:    ☐ [he {rolls / falls}]: yes, he {rolls / falls}...where?

☐ he starts here, at the top of the hill, and he ends up here, at the bottom of the hill. so what does he do?

**EVENT 9** as above, *mutatis mutandis*

(into cave)

prompts:

☐ [he runs]: yes, he runs...where?

☐ does he stay outside the cave? no...what does he do?

**EVENT 12** In the cave he saw a big lion didn't he? So what does the little monkey do HERE?

(out of cave)

prompts:

☐ does the monkey stay inside the cave?

**NB. Intial questions for the 'repeated' events 13 – 18 were of the form:**

and what does he do HERE? [experimenter points to picture]

**EVENT 19** his house is right at the top of the tree, remember? so to get to his house what does he have to do?

(up tree)

prompts:

he starts here, at the bottom of the tree, and he ends up here, at the top of the tree. so what does he do?

## (ii) Experiment I: French prompting materials

### INTRODUCTION:

*Pour commencer, on va regarder un joli livre. C'est l'histoire d'un petit singe et un perroquet malicieux. Tu peut regarder les images et nous raconter l'histoire. D'accord?*

Let's start by looking at this nice book. It tells the story of a little monkey and a naughty parrot. You can look at the pictures, and tell us the story, OK?

### QUESTIONS AND PROMPTS:

**EVENT 2** *regarde, le perroquet s'envole. qu'est-ce qu'il fait le petit singe?*

(down tree)

prompts:

'look, the parrot is flying away. what does the little monkey do?'

☐ *[il glisse]: oui, il glisse...ou?*

[he slides]: yes, he slides...where?

☐ *[il descend]: oui. comment il descend?*

[he goes down]: yes. how does he go down?

☐ *il commence ici, en haut de l'arbre, et il finit ici, en bas de l'arbre. alors qu'est-ce qu'il fait?*

he starts here, at the top of the tree, and he ends up here, at the bottom of the tree. so what does he do?

**EVENT 3** *voilà un pont. qu'est-ce qu'il fait le singe?*

(under bridge)

prompts:

and now there's a bridge. what does the monkey do?

☐ *[il court]: oui, il court...ou?*

[he runs]: yes, he runs...where?

☐ *oui. mais pour arriver de ce côté du pont qu'est-ce qu'il fait?*

yes. but to get to this side of the bridge, what does he do?

**EVENT 4** as above, *mutatis mutandis*

(over rock)

prompts:

☐ *[il saute]: oui, il saute...ou?*

[he jumps]: yes, he jumps...where?

☐ *il commence ici, et il finit ici, alors qu'est-ce qu'il fait?*

he starts here, and he ends up here, so what does he do?

☐ *le rocher se trouve au milieu du chemin. alors qu'est-ce qu'il doit faire pour continuer sa route?*

the rock is in the middle of the path. so what does he have to do to keep going on his way?

**EVENT 5** as above, *mutatis mutandis*

(through trunk)

prompts:

☐ *il commence ici, et il finit ici, alors qu'est-ce qu'il fait?*

he starts here, and he ends up here, so what does he do?

☐ *le tronc d'arbre se trouve au milieu du chemin. alors qu'est-ce qu'il doit faire pour continuer sa route?*

the tree-trunk is in the middle of the path. so what must he do to keep going on his way?

**EVENT 6** as above, *mutatis mutandis*

(across river)

prompts:

☐ *[il {plonge/entre} dans l'eau]: oui. mais pour arriver de ce côté de la rivière, qu'est-ce qu'il fait?*

[he {dives into / enters} the water]: yes. but to get to this side of the river, what does he do?

☐ *[il nage]: oui. il nage...ou?*

[he swims. yes, he swims...where?

☐ *il commence ici, de ce côté, et il finit ici, de l'autre cote. alors qu'est-ce qu'il fait?*

he starts here, at this side, and he ends up here, at the other side. so what does he do?

**EVENT 7** as above, *mutatis mutandis*

(up hill)

prompts:

☐ *[il {monte / grimpe}]: oui, il {monte / grimpe}...ou?*

[he {goes-up / climbs}]: yes, he {goes-up / climbs}...where?

☐ *il commence ici, en bas de la colline, et il finit ici, en haut de la colline. alors qu'est-ce qu'il fait?*

he starts here, at the bottom of the hill, and he ends up here, at the top of the hill. so what does he do?

**EVENT 8** as above, *mutatis mutandis*

(down hill)

prompts:

☐ *[il {roule / tombe}]: oui, il {roule / tombe}...ou?*

[he {rolls / falls}]: yes, he {rolls / falls}...where?

☐ *il commence ici, en haut de la colline, et il finit ici, en bas de la colline. alors qu'est-ce qu'il fait?*

he starts here, at the top of the hill, and he ends up here, at the bottom of the hill. so what does he do?

**EVENT 9** as above, *mutatis mutandis*

(into cave)

prompts:

☐ *[il court]: oui, il court...ou?*

[he runs]: yes, he jumps...where?

☐ *est-ce il reste en dehors de la cave? non...qu'est-ce qu'il fait?*

does he stay outside the cave? no...what does he do?

**EVENT 12** *dans la caverne il a vu un gros lion, n'est-ce pas? alors, qu'est ce qu'il fait ICI le petit singe?*

(out of cave)

In the cave he saw a big lion didn't he? So what does the little monkey do HERE?  
[experimenter points to picture]

prompt:

☐ *est-ce que le singe reste à l'interieur de la cave?*

does the monkey stay inside the cave?

**NB.** Intial questions for the 'repeated' events 13 – 18 were of the form:

*et qu'est ce qu'il fait ICI?*

and what does he do HERE? [experimenter points to picture]

**EVENT 19**  
**(up tree)**

*sa maison se trouve tout en haut de l'arbre, tu te souviens? Alors pour arriver à sa maison, qu'est-ce qu'il doit faire?*

his house is right at the top of the tree, remember? so to get to his house what must he do?

**prompt:**

☐ *il commence ici, en bas de l'arbre, et il finit ici, en haut de l'arbre. alors qu'est-ce qu'il fait?*

he starts here, at the bottom of the tree, and he ends up here, at the top of the tree. so what does he do?

**(iii) Experiment I: Japanese prompting materials**

**INTRODUCTION:**

*Soredewa, omoshiroi e-hon o mitemimshō ne. E-hon wa suki desu ka? Kore wa o-saru-san to itazura ōmu san no o-hanashi desu. E o mite o-hanashi o oshiete kudasai ne.*

So let's look at this nice picture-book. Do you like picture-books? This is the story of a monkey and a naughty parrot. You can look at the pictures, and tell us the story, OK?

**QUESTIONS AND PROMPTS:**

**EVENT 2**  
**(down tree)**  
**prompts:**

*hora! Omu-san wa tondeitte shimaimasu. Saru-san wa nani o shimasu ka?*

'look! the parrot is flying away. what does the monkey do?'

☐ *[suberu]: doko? Motto kuwashiku oshiette ne?*

[he slides]: where? Can you give more details?

☐ *[oriru]: do yatte?*

[he goes down]: how (in what way?)

☐ *koko wa ki no ue desu ne. koko wa ki no shita desu. Saru-san wa doo shimashita ka?*

This is the top of the tree, and this is the bottom of the tree. What did the monkey do?

☐ *Hajime koko de, owari wa koko. To yu koto wa, nani o shimashita ka?*

He starts here, and finishes here. In other words, what does he do?

**EVENT 3**  
**(under bridge)**  
**prompts:**

*{hora / ima / soredewa} hashi ga arimasu ne. saru-san wa nani o shimasu ka?*

{look / now / so now} there's a bridge. what does the monkey do?

☐ *[hashiru]: doko?*

[he runs]: ...where?

☐ *So desu ne. Kedo, ima saru san wa hashi no kochira gawa ni imasu ne, to yu koto wa saru-san wa nani o shimashita ka?*

That's right. But now that monkey is on this side of the bridge. In other words, what did he do?

**EVENT 4**  
**(over rock)**  
**prompts:**

as above, *mutatis mutandis*

☐ *[jampu suru]: doko?*

[he jumps]: where?

☐ *so desu ne. Kedo, ishi ga michi no mannaka ni arimasu ne. Saru-san wa saki ni susumu tame ni, do shimashu ka?*

That's right. But there's a rock in the middle of the path. What does the monkey do to keep going on his way?

☐ *Hajime koko de, owari wa koko. To yu koto wa, nani o shimashita ka?*

He starts here, and finishes here. In other words, what does he do?

**EVENT 5** as above, *mutatis mutandis*  
**(through trunk)**  
**prompts:** ☐ [tsutsu ni hairu]: sore de do shimasu ka?  
 [he goes inside]: then what does he do?  
 ☐ so desu ne. Kedo, ki no tsutsu ga michi no mannaka ni arimasu ne. Saru-san wa saki ni susumu tame ni, do shimashu ka?  
 That's right. But there's a tree trunk in the middle of the path. What does the monkey do to keep going on his way?

**EVENT 6** as above, *mutatis mutandis*  
**(across river)**  
**prompts:** ☐ [kawa ni hairu]: so desu ne. Kedo, ima saru san wa muko gawa ni imasu ne, to yu koto wa saru-san wa nani o shimashita ka?  
 [he goes into the river]: that's right. But now he's on the other side, isn't he, so what did he do?  
 ☐ [oyoideru]: ... so desu ne. doko?  
 [he swims]. ...that's right. where?  
 ☐ Hajime koko de, owari wa koko. To yu koto wa, nani o shimashita ka?  
 He starts here, and finishes here. In other words, what did he do?

**EVENT 7** as above, *mutatis mutandis*  
**(up hill)**  
**prompts:** ☐ [agaru / nobotteru]: ... so desu ne. doko?  
 [he {goes-up / climbs}]: ...that's right. where?  
 ☐ Hajime koko de, owari wa koko. To yu koto wa, nani o shimashita ka?  
 He starts here, and finishes here. In other words, what does he do?

**EVENT 8** as above, *mutatis mutandis*  
**(down hill)**  
**prompts:** ☐ [korobu / korogaru]: ... so desu ne. doko?  
 [he {rolls / falls}]: .....that's right. where?  
 ☐ koko wa oka no ue desu ne. koko wa oka no shita desu. Hajime koko de, owari wa koko desu ne. Sorekara saru-san wa nani o shimashita ka?  
 this is the top of the hill, this is the bottom of the hill. He starts here, and he finishes here. So what did he do?

**EVENT 9** as above, *mutatis mutandis*  
**(into cave)**  
**prompts:** ☐ saru-san wa sonomama dookutsu no soto ni imasu ka? So dewa nai desu ne. Saru-san wa do shimasu ka?  
 does he stay outside the cave? no...what does he do?

**EVENT 12** koko ga dokutsu desu ne. kore ga raion de, kore ga saru-san desu ne. saru-san wa dokutsu de raion ni aimashita ne. sorekara saru-san wa KOKO DE nani o shimasu ka?  
**(out of cave)** here's the cave, see? this is the lion, and this is the monkey, see? the monkey met the lion in the cave, didn't he, so what does the monkey do HERE?  
**prompt:** ☐ saru-san wa sonomama dookutsu no soto ni imasu ka? So de wa nai desu ne. Saru-san wa do shimasu ka?  
 does he stay outside the cave? no...what does he do?

**NB. Intial questions for the 'repeated' events 13 – 18 were of the form:**

koko de wa?  
 and what does he do HERE? [experimenter points to picture]

**EVENT 19** saru-san no ie wa ki no ue ni arimasu, ne? Saru-san wa ie ni modoru tame ni, do shimasu ka?  
**(up tree)**

his house is right at the top of the tree, remember? so to get back to his house what must he do?

**prompt:**

☐ *koko wa ki no shita desu ne. koko wa ki no ue desu. Hajime koko de, owari wa koko desu ne. Sorekara saru-san wa nani o shimashita ka?*

this is the bottom of the tree, and this is the top of the tree. He starts here, and he finishes here. So what did he do?

## Appendix D

Experiment II: Protocols and pretest materials:  
Teaching Toto to speak

## (i) English protocol and pretest materials

*Now I'm going to show you something fun. [SHOW ROBOT]. I've made a robot. He's called 'Toto'. Let's play a game with Toto and some sweets. [SHOW SWEETS] I'm teaching Toto how to talk. Toto, say hello... he's a bit shy... say hello... [Toto: 'HELLO'] Sometimes, Toto speaks well, he speaks properly; but sometimes he makes mistakes, and he talks funny. So now we'll play a game and you can help Toto learn to speak properly. Toto loves these colourful sweets but he doesn't really like this black liquorice as much. If Toto gets the words right, you can give him a colourful sweet, in this box here. [PUT SWEET IN 1st BOX] If he says something wrong, you have to give him some liquorice, in this box here [PUT SWEET IN 2nd BOX]. Do you understand? Right, let's try...*

Q1: *What's your name?*

A1: *My name's Toto*

Q2: *Are you wearing a hat?*

A2: *Yes, I'm wearing a hat*

Q3: *Are you wearing any shoes?*

A3: *\*Yes, I some shoes am wearing* (\*word order: OV instead of VO)

Q4: *Do you like to eat sweets?*

A4: *\*Yes, I like to sweet* (verbalization error)

*Toto, look at the book [SHOW BOOK COVER]*

Q5: *Is there a monkey in this picture?*

A5: *Yes, there's a monkey in the picture*

Q6: *Are his eyes closed?*

A6: *\*No they isn't closed; they is open* (\*AGR: PL subject, SG verb)  
[AGR]

Q7: *Are the monkey's teeth white?*

A7: *\*Yes, the monkey has teeth white* (\*word order: N^Adj instead of Adj^N)  
[N^A]

Q8: *Do monkeys like to eat bananas?*

A8: *Yes, monkeys like to eat bananas!*

*Now Toto's going to look at the book and tell us the story*

## (ii) French protocol and pretest materials

*Maintenant je vais te montrer quelque chose. [SHOW ROBOT] J'ai construit un robot. Il s'appelle 'Toto le robot'. On va jouer un jeu avec Toto et des bonbons. [SHOW SWEETS] Toto ne parle pas très bien le français. Je lui apprend à parler. Dis bonjour, Toto!...C'est un robot très timide....Dis bonjour! [Toto: 'BONJOUR'] Quelque fois, Toto parle très bien, il parle en bon français. Mais parfois il dit des choses bizarre, il parle en mauvais français. Maintenant, on va jouer le jeu ensemble; on va aider Toto à parler correctement. Est-ce que tu peut m'aider? Toto aime bien les bonbons colorés, mais il n'aime pas trop le réglisse noire. Si Toto dit quelque chose correctement, tu peux lui donner un bonbon de couleur, dans cette boîte là [PUT SWEET IN 1st BOX]; s'il dit quelque chose de bizarre, tu dois lui donner un bonbon à la réglisse, dans cette boîte là [PUT SWEET IN 2nd BOX]. Tu as bien compris? On va essayer....*

Now I'm going to show you something. [SHOW ROBOT]. I've made a robot. He's called 'Toto the Robot'. We're going to play a game with Toto and some sweets. [SHOW SWEETS] Toto doesn't speak French very well. I'm teaching him to speak. Say hello, Toto....He's a very shy robot....Say hello! [Toto: 'HELLO'] Sometimes, Toto does speak well, he says things right [lit: 'speaks in good French']. But sometimes he talks funny, he says things wrong [lit: 'speaks in bad French']. Now we're going to play the game together; we're going to help Toto to speak properly. Will you help me? Toto loves colourful sweets but he doesn't really like black liquorice. If Toto says something properly, you can give him a colourful sweet, in this box here [PUT SWEET IN 1st BOX]; if he says something funny, you have to give him a liquorice, in this box here [PUT SWEET IN 2nd BOX]. Do you understand? Let's try...

Q1: *Comment tu t'appelles?*

how you yourself call  
'What's your name?'

A1: *Je m'appelle Toto.*

I myself call Toto  
'My name's Toto.'

Q2: *Est-ce tu porte une casquette?*

is it that you wear a cap  
'Are you wearing a cap?'

A2: *Oui, je porte une casquette.*

yes, I wear a cap  
'Yes, I'm wearing a cap.'

Q3: *Est-ce que tu as deux chaussures?*

is it that you have two shoes  
'Do you have two shoes?'

A3: *\*Oui, j'avons deux chaussures.*

yes, I (1SG) have (1PL) two shoes  
'Yes, I have two shoes.'

(\*AGR: 1SG pronoun, 1PL verb)

- Q4: *Est-ce que tu aimes manger les bonbons?*  
 is it that you like eat the sweets  
 'Do you like to eat sweets?'  
 A4: \**Oui, j'aime les bonbons manger* (\*word order: OV instead of VO)  
 yes, I like the sweets eat  
 'Yes I like to eat sweets'

*Toto, regarde le singe* [SHOW BOOK COVER]  
 Toto, look at the monkey.

- Q5: *Les oreilles du singe sont grandes ou petites?*  
 the ears of-the monkey are big or small  
 'Are the monkey's ears big or small?'  
 A5: *Les oreilles du singe sont tres grandes.*  
 the ears of-the monkey are very big  
 'The monkey's ears are very big.'
- Q6: *Est-ce que ses yeux sont ouverts?*  
 is it that his eyes are open  
 'Are his eyes open?'  
 A6: \**Les yeux sont du singe ouverts.* (\*V raised to split the subject DP)  
 the eyes are of-the monkey open  
 'The monkeys eyes are open.'
- Q7: *Est-ce qu'il a deux bouches?*  
 is it that he has two mouths  
 'Does he have two mouths?'  
 A7: \**Non, le singe ne pas a deux bouches.* (\*tensed V fails to raise)  
 no, the monkey NEG not has two mouths  
 'No, the monkey doesn't have two mouths.'
- Q8: *Est-ce que les singes aiment manger les bananes?*  
 is it that the monkeys like eat the bananas  
 'Do monkeys like to eat bananas?'  
 A8: *Oui, les singes aiment manger les bananes.*  
 yes, the monkeys like eat the bananas  
 'Yes, monkeys like to eat bananas.'

*Maintenant Toto va regarder le livre et nous raconter l'histoire.*  
 Now Toto is going to look at the book and tell us the story.

## (ii) Japanese protocol and pretest materials

*Dewa, korekara iimono o misemasu ne. [SHOW ROBOT] Jitsu wa robotto o tsukurimashita. Namae wa Toto to iimasu. Korekara kyandē o tsukatte Toto to gēmu o shite asobimashō. [SHOW SWEETS] Toto wa boku ga tsukutta n desu kedo, jitsu wa boku wa ima Toto ni kotoba o oshiete iru n desu. Toto-kun! Aisatsu shinasai... choto hazukashi... aisatsu shinasai... [Toto: 'KONNICHIWA'] Toto wa ima kotoba no benkyō o shiteimasu. Umaku, jōzu ni hanaseru toki mo aru n desu kedo, tokidoki machigaete, henna hanashikata o shite shimau tokimo arimasu. Soredewa, kyō no gēmu wa nan desu kedo, Toto no kotoba no benkyō o o-tetsudai shitekudasai. Toto wa kirei na amai kyandē ga daisukide, kono kuroi ame ga amari suki dewa arimasen. Moshi Toto ga jōzu ni hanaseta toki wa, kochi no hako ni kireina kyandē o agete kudasai. [PUT SWEET IN 1st BOX] Demo moshi Toto ga henna hanashikata o shita toki wa, kawarini kuroi ame o kochi no hako ni irete ne. [PUT SWEET IN 2nd BOX] Ii desu ka? Ja, yatte mimashō.*

Now I'm going to show you something fun. [SHOW ROBOT]. I've made a robot. He's called 'Toto'. Let's play a game with Toto and some sweets. [SHOW SWEETS] Now that I've built Toto, I'm teaching him how to speak. Toto, say hello... he's a bit shy... say hello... [Toto: 'HELLO'] So now Toto's learning how to speak. Sometimes, Toto speaks well, he speaks properly; but sometimes he makes mistakes, and he talks funny. So what's today's game? Please help Toto learn to speak properly. Toto loves these colourful sweets but he doesn't like these black sweets so much. If Toto says something properly, you can give him a colourful sweet, in this box here. [PUT SWEET IN 1st BOX] If he says something funny, you have to give him a black sweet, in this box here [PUT SWEET IN 2nd BOX]. Do you understand? Right, let's try...

Q1: *Namae wa nan to iu no?*  
name TOP what called Q  
'What's your name?'

A1: *Boku no namae wa Toto desu.*  
I GEN name TOP Toto is  
'My name's Toto.'

Q2: *Toto-kun wa bōshi o kabutteimasu ka?*  
Toto DIM TOP cap ACC wearing Q  
'Are you wearing a cap?'

A2: *Hai, bōshi o kabutteimasu.*  
yes, cap ACC wearing  
'Yes, I'm wearing a cap.'

Q3: *Toto-kun wa gin iro no kutsu o haiteimasu ka?*  
Toto DIM TOP silver colour GEN shoes ACC wearing Q?  
'Are you wearing silver shoes?'

A3: *\*Hai, kutsu no gin-iro o haiteimasu.* (\*word order in N-N compounds)  
yes, shoes GEN silver-colour ACC wearing  
'Yes, I'm wearing silver shoes'

- Q4: *Toto-kun wa kyandē ga suki-desu ka?*  
 Toto DIM TOP sweets NOM like Q  
 ‘Do you like to eat sweets?’
- A4: *\*Hai, kyandē ga sukimasu.* (\*verbalization error)  
 yes, sweets NOM like  
 ‘Yes I like to eat sweets.’

*Toto-kun, hon o mite kudasai* [SHOW BOOK COVER]  
 Toto, look at the book

- Q5: *Kono e ni, saru-san ga imasu ka?*  
 this picture in, monkey-HON NOM be Q  
 ‘Is there a monkey in this picture?’
- A5: *Hai, saru-san ga imasu.*  
 yes, monkey-HON NOM be  
 ‘Yes, there’s a monkey.’
- Q6: *Saru-san no me wa aiteimasu ka?*  
 monkey-HON GEN eyes TOP open Q  
 ‘Are his eyes open?’
- A6: *\*Saru-san wa no me aiteimasu.* (\*TOP marks modifier not head)  
 monkey-HON TOP GEN eyes open  
 ‘The monkey’s eyes are open.’
- Q7: *Saru-san wa nikoniko shiteimasu ka?*  
 Monkey-HON smile doing Q  
 ‘Is the monkey smiling?’
- A7: *\*Hai, saru-san ni nikoniko shiteimasu.* (\*ACC rather than TOPIC marker)  
 Yes, monkey-HON ACC smile doing  
 ‘Yes, the monkey is smiling.’
- Q8: *Saru-san wa banana ga suki-desu ka?*  
 monkey-HON bananas NOM like Q  
 ‘Do monkeys like to eat bananas?’
- A8: *Hai, saru-san wa banana ga suki-da yo.*  
 yes, monkey-HON TOP bananas NOM like EXCL  
 ‘Yes, monkeys do like to eat bananas.’

*Toto-kun, korekara e o mite o-hanashi o oshiete kudasai ne. Gambatte kudasai ne.*  
 Toto, so now please look at the pictures and tell us the story OK? Do your best.

