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

David Stringer

Part II

Experimentation

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Submitted in partial fulfilment of the degree of Doctor of Philosophy

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Abbreviations used in glosses

ACC   accusative case marker

ASP   aspect (used for the various forms of the Japanese light verb *shimau* (*chau*), 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 *avoir* 'have' and *être* 'be' in their auxiliary function)

DAT   dative case

EXC   exclamative

GEN   genitive case

HON   honorific

INT   intentional morpheme, used to gloss the Japanese suffix -*yō*, 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 *of,* French *de*, and Japanese *no*; or alternatively to gloss French *en* in cases of ambiguity between cause (*by* doing something) and correlation (*while* 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$_{LOC}$ 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 *te iru* construction, which in the elicted 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): *dōkutsu no naka e hashitte, ōmu-san o oikakete ikimasu* - 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 *on*-phrase (e.g. *On running into the cave, he goes chasing after the parrot*), but is often translated with the connective *and* (as in this example). The event in the *te*-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 -*ing*, for ease of comprehension.)

TITLE   used to gloss Japanese -*san* (Mr., Mrs., Miss., etc.)

TOP   topic marker

PART II

EXPERIMENTATION

Chapter 4

Experiment I methodology:

A monkey, a parrot and a banana

4.1   Preamble to PART II

In order to study the knowledge underlying the predication of PATH, and in order to construct a theory of how such knowledge is acquired, two experiments were designed to elicit fresh evidence from children and adults. From one perspective, the findings provide evidence concerning the accuracy of Talmy's (1985, 1991) binary typological classification as applied to these languages. However, in contrast to previous investigations, notably the Frog Story studies (Berman and Slobin, 1994; Ohara, 2000; Özçalışkan, 2002; Slobin, 1996; Strömqvist and Verhoeven, 2004a; etc.), whose main goal was to explore Talmy's typology in terms of the 'rhetorical styles' of speakers (Slobin, 2004: 248), the main purpose of these new experiments was to investigate the combinatorial possibilities and computational boundaries of the grammar. The results bear on the two hypotheses laid out in Chapter 2: they provide an empirical basis for selecting between formalization in terms of the whole-language approach characteristic of P&P theory, and the strong lexicalist approach which eschews whole-language analysis in this domain. This said, in the absence of previous experiments with similar focus, the analysis was as much inductive as deductive; the project was not only a test between hypotheses, but empirical fieldwork conducted with a view to providing data specifically relevant to the syntax of motion events at different ages of acquisition. These data serve as scaffolding for the development of theoretical architecture.

The first experiment built on the technique of the Frog Story studies (Berman and Slobin, 1994), with several notable departures from previous materials and methodology, in order to furnish three sets of comparable data from English, French and Japanese test subjects. Details of the methodology of Experiment I are provided in this chapter, many of which are also relevant to the second experiment. The results of Experiment 1 are presented in two separate chapters. The results bearing directly on the typological classification are given in Chapter 5: first by a detailed response breakdown for each language, and then by crosslinguistic comparison. Results bearing on shared aspects of categorization and syntax are given in Chapter 6, organized by topic. However, it is in the nature of elicited production that whilst the data reveal what participants can say, the absence of particular forms does not confirm their ungrammaticality. Chapters 7 and 8 respectively describe the methodology and results of Experiment II, which attempted to probe children's and adults' knowledge of ungrammaticality of particular forms. Discussion of the theoretical implications of the results of Experiments I and II is reserved for Part III.

4.2 Methodological background: The elicited production technique

The experimental technique employed in the Frog Story research (see Section 1.4) furnishes data which have been termed 'elicited narrative production' (Strömqvist and Verhoeven, 2004b). The aim of such a procedure is primarily to elicit *narratives*, in order to reveal aspects of rhetorical style. Children and adults in various languages groups are given free rein to create personal oral narratives on the basis of the same picture sequence, focussing on whatever is of interest to them in each picture. The picture-story book was not purpose-designed, but was a carefully chosen popular children's book, *Frog where are you?* (Mayer, 1969), which is replete with motion

events.[1] Whilst the Frog Story methodology has proven very successful in enabling detailed analysis of rhetorical styles in child and adult speech, and in particular languages, the narrower focus of this inquiry required a more constrained approach to elicitation. Before discussing the details of the materials, it is worth pausing to consider the rationale behind the choice of the elicited production technique, as applied to the investigation of particular lexical and syntactic forms.

In an insightful exposition of elicited production, Thornton (1996: 78-79) lists three relevant advantages of this methodology. First, one advantage of production data in general is that they illustrate children's grammar more directly than 'yes–no' or 'true-false' judgements, which require the experimenter to take extra precautions to ensure that children's responses accurately correspond to metalinguistic judgements.[2] As Thornton (1996: 78) puts it, 'It is highly unlikely that a child could put words together in a particular way accidentally. The consistent appearance of a particular sentence type in a child's speech is strong evidence that the sentence is generated by the child's grammar'. A second advantage is that it enables the experimenter to control the meaning that is intended by the targeted utterance, as the visual aids used in the experiment can be used to eliminate certain ambiguities. The problem of interpreting children's intending meanings is a serious one for many types of spontaneous production studies. For example, if one found the utterance 'He jumped in the puddle' in a transcript of spontaneous production data, one could not be sure whether the intended interpretation was locational or directional (in the absence of additional commentary). However, if this were an experimental response to a picture

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[1] The pictures from Mayer (1969) are reproduced in the appendices of Berman and Slobin (1994) and (Strömqvist and Verhoeven, 2004a).
[2] This is partly due to the 'positive response bias': both children and adults generally favour positive responses (Wason, 1961) and most such experiments involve a pretest to counter this. Subjects may also confuse the concept of 'grammatical' with 'unusual' or 'difficult to process': see Chomsky (1965), on the difference between 'acceptability' and 'grammaticality'.

in which a dog leaps from a wall into a puddle, the directional interpretation would be clear. A third advantage of elicited production is that it makes possible the creation of a reliable data sample of the targeted lexical items (LIs) or syntactic structures from just one experimental session, at one particular moment in the child's development. In order to obtain a similar range and quantity of relevant utterances from spontaneous speech data, one would have to trawl though files covering months or even years, with great variation between subjects (see Thornton, 1996, for further discussion).

The elicited production technique has many variants, but most involve using role-play, puppets or other props to create felicitous conditions for children to produce the targeted utterances in an enjoyable, playful environment, where the emphasis is on meaningful interaction rather than musing about linguistic forms. The child must feel at ease with both the activity and the other people involved. This is always true in developmental research, but is especially relevant to elicited production sessions, because success depends upon the active participation of the children: they are being asked not only to nod or to press a button, but to talk. If children feel truly comfortable in the experimental situation, this makes it possible for them to have fun, as well as maintain attention for the duration of the activity.

Examples of successful application of the elicited production technique include three well-known studies of the acquisition of the syntax of question formation: Bellugi's (1971) investigation of auxiliary inversion in negative questions; Crain and Nakayama's (1987) experiments on structure dependence in grammar formation; and Thornton's (1990) work on long-distance *wh*-questions. In Bellugi's (1971) study of negative question formation, one experimenter played the role of an 'old lady' puppet, and dialogues like the following were created.

Experimenter:	Adam, ask the old lady why she can't sit down.
Adam:	Old Lady, why you can't sit down?
Old Lady:	You haven't given me a chair.

Note the lack of subject-auxiliary inversion in the elicited *wh*-question. Such responses facilitated study of the interaction between subject-auxiliary inversion and negation in progressive stages of the development of question formation, as a number of utterances could be collected from each child at a single stage of development.

Crain and Nakayama (1987) investigated whether children ever generate linguistic rules based on linear principles, or whether they possess the knowledge that syntactic transformations are based on hierarchical structure. In particular, several types of yes-no questions commonly heard in the input such as 'Can you swim?' or 'Is he happy?' might plausibly lead children to a linear transformation hypothesis, e.g. 'move the first verb-like element to the front of the sentence'. The experimenters created scenarios to elicit questions from children in which the auxiliary must precede the syntactic subject, in cases where there is a subject-internal relative clause, itself containing an auxiliary. The child was shown picture-cards, and was asked to put questions to a toy figure (Jabba the Hut, from *Star Wars*) about the pictures. A typical dialogue runs as follows.

Experimenter:	Ask Jabba if the boy who is watching Mickey Mouse is happy.
Child:	Is the boy who is watching Mickey Mouse ___ happy?
(Not attested:	*Is the boy who ___ watching Mickey Mouse is happy?)

In this way, children between 3 and 5 years old produced many examples of a type of utterance which is extremely scarce in spontaneous production data, and revealed that a linear hypothesis of question-formation was never entertained; rather, the knowledge that this rule of grammar is dependent on hierarchical structure appears to be present at all stages of development in the age-range.[3]

Finally, in Thornton's (1990) extensive study of long-distance questions, the procedure for object extraction questions was as follows. A puppet, called Ratty, was introduced to the child. Ratty was too shy to talk to grown-ups, so the child was asked to encourage him to take part in a guessing game. Ratty covered his eyes, while the experimenter and the child figured out the answers to the game in advance. There were three characters, each of whom liked a different kind of food. Cookie Monster liked cookies, a baby liked milk, and a Ninja Turtle liked pizza. The child was then asked to find out if Ratty knew what foods the characters liked. An example of ensuing dialogue is given below.

Experimenter: …Now let's find out if Ratty knows all those things. Let's do Cookie Monster first. We know that Cookie Monster eats <whispered> cookies, but ask the rat what *he* thinks.

Child: What do you think Cookie Monster eats?

This ingenious experiment revealed that even though long-distance questions are virtually unattested in the spontaneous speech of young children, they can be elicited from children as young as 2 years 6 months old. In addition, the data revealed consistent errors which bear on issues of theoretical syntax. For example, medial *wh-*

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[3] The results were somewhat more complicated, leading to further experimentation before confirmation of the principle of structure dependence, but my concern here is only with general experimental technique.

phrases in utterances such as *What do you think what Cookie Monster eats?* were attested in precisely the position predicted by a transformational account of question formation.

Other areas in which elicited production techniques have been successfully applied include inflectional morphology (Berko, 1958), relative clauses (Hamburger and Crain, 1982; Labelle, 1990), passives (Pinker, Lebeaux and Frost, 1987), *wanna*-contraction (Thornton, 1990), locatives (Gropen, Pinker, Hollander and Goldberg, 1991), negative polarity items (O'Leary and Crain, 1994) and universal quantification (Crain, Thornton, Boster, Conway, Lillo-Martin and Woodams, 1996).

Where the above types of elicitation studies differ methodologically from the Frog Story research is principally in the more rigorous targeting of particular lexical and syntactic types. If children are shown pictorial stimuli rich in possible interpretations, and are then given great freedom in their responses as they create their own stories, they are bound to differ in which aspects of the narrative they choose to talk about. To complicate matters, *Frog, Where Are You?* has two protagonists, a boy and a dog, who often engage in different activities on the same page, as they interact with other characters on their quest to find a runaway pet frog. On one page, an owl appears in a hole in a tree which the boy had been climbing, and the boy is on the ground, presumably having fallen from the tree, whilst the dog runs past chased by a swarm of bees whose hive he has disturbed. This kind of stimulus produces responses that are not always directly comparable in terms of the expression of particular syntactic or semantic types. Either different events can be described, or the same event can be described in different ways. For example, if the owl is described as 'flying out' from the hole, this is an expression of PATH, but if the owl is described as 'appearing' in the hole, this has no PATH component. Presumably, speakers in any

language are able to describe the image of the owl in the hole in terms of an activity predicate, or an achievement predicate, or even a stative predicate. The fact that some speakers produce PATH responses, whilst others conceptualize the situation in other ways, allows for comparison in terms of the preferences of speakers in the linguistic encoding of events, but it does not facilitate direct comparisons of lexical or syntactic forms.

This point is not intended as criticism of the original Frog Story design as such. When an investigation focuses on issues such as rhetorical style, the psychological salience of particular event types (i.e. whether subjects focus on the MANNER or the PATH of motion), or attention to locational background, then elicited narrative production is an effective technique (see Section 1.4, and Slobin, 1996, 2004). However, the much narrower scope of this thesis necessitated the creation of a purpose-designed set of test materials. An original picture-book was created with an emphasis on eliciting an unambiguous description of a particular trajectory from each pictorial stimulus. Thus Experiment I combines (i) the Frog Story research idea of using a picture-story depicting a journey filled with different types of motion events, with (ii) the more rigorous targeting of response types in the tradition of generative work on the acquisition of syntax. The results provide a data set not only amenable to analysis in terms of type frequency, but also providing a directly comparable, comprehensive set of PATH responses from each test subject, with a view to deeper examination of the possibilities of PATH expression in each language.

4.3 Props and procedure

4.3.1 The Monkey Book

In designing a wordless picture-book for the elicited production experiment, efforts were made to create (i) characters, (ii) a plot, and (iii) a book format that would be as culturally neutral as possible, with techniques and scenarios familiar to the children from books in their native countries. As for the characters, the original intention had been to adapt familiar figures from some world-famous television programme, cartoon series, or animated film, but an informal survey of parents and bookshops in England, France and Japan indicated that there were no universal characters equally familiar to 3-year-olds, 7-year-olds and adults in the three countries. However, animals are common protagonists in child literature all over the world, and stories with animals also permit a neutral backdrop with abstracted natural features. Whilst some indigenous animals are less familiar in the other countries, children's books tend to have a common stock of fauna independent of the local environment.[4] Eventually, a monkey, a parrot and a lion were sketched as the protagonists of the story.

Next we turn to consideration of the plot. The purpose-designed narrative runs as follows: a monkey sits in a tree-house about to eat his banana; a parrot swoops in, steals the banana, and flies off. The monkey chases the parrot, determined to retrieve his banana. Their chase takes the monkey through several different spatial environments. On each page relevant to the analysis, he follows a particular trajectory (e.g. 'down', 'under', 'over', etc.), varying with the obstacles he encounters, and he exhibits a particular manner of motion (e.g. he 'slides' down a tree-trunk, 'runs' under a bridge, 'jumps' over a rock etc.). The monkey follows the parrot into a cave, where

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[4] Thus children's minds provide an environment for roaming populations of lions, tigers, bears, elephants, crocodiles, giraffes, hippos, monkeys, snakes, penguins and parrots, despite the absence of (most of) these creatures in the neighbourhood shrubbery.

they encounter a lion. The lion chases them out of the cave, after which the parrot drops the banana and flies away. The monkey recovers it, then retraces his steps back home as fast as he can, going through all the motions a second time, before eating his banana in peace.

An attempt was made to create a real narrative, rather than simply a succession of unconnected images illustrating different types of motion event, in order to avoid young children's loss of interest. In preparation, a study was made of published books for pre-readers and early readers containing journeys of one sort or another. In many representative examples of this type of children's book, the child's interest is maintained because the protagonist has clearly understandable motivation for continuing a journey, going over or under or through various obstacles until arriving at a goal, which is always present in the mind of the child. In the British children's book *Balloon* (Alborough, 1998), the goal is actually visible on each page: a boy's balloon is blown away by the wind as he plays in a park, whereupon the boy, his mother, and his dog set off in pursuit. Throughout their adventures, the brightly-coloured balloon is always somewhere just out of reach. This visual narrative technique was adapted for the experimental book design; the banana was visually present at each stage of the first half of the journey (clutched in the parrot's claws), and the monkey's house was visible throughout the second half of the journey, so that young test subjects never lost sight of the goal at any stage of the story.

A further plot technique was adapted from a classic of American children's literature, *Bears in the Night* (Berenstain and Berenstain, 1971). In this story, seven teddy bears live in a tree (with doors and windows). It is night-time, and they are all in bed when they hear a strange noise coming from outside. They tip-toe across the floor, climb out of the window, and embark on an adventure which involves them going

over a wall, around a lake, through some woods, etc. At the top of a hill, they get a fright when they meet a big owl, who is the source of the noise. They then run back home as fast as they can, before ending up safely back in bed. This concept of the return journey was adapted for the experimental materials, as the protagonist retracing his steps allows for a second response to each motion event. This has two advantages: firstly, in the case of unsuccessful elicitation first time around, it provides a second opportunity for elicitation; and secondly, two responses to the same motion event, separated by a time interval with talk of other events, creates a greater chance of lexical and syntactic variation in the same speaker's responses, adding to the breadth of the investigation. The concept of a shock leading to the return home was also incorporated into the new materials. The element of urgency provides motivation for the protagonist to negotiate obstacles at speed in different ways, sliding, running and jumping as he goes.

In order to facilitate the data analysis, the elicitation sequence was numbered as shown in Table 4.1, and these numbers may be used to help link utterances to stimuli. They will prove useful both in cases of ambiguity and where the distinction between outward journey stimuli and return journey stimuli is an issue (responses to the same event type on the outward and return journey are generally conflated, but occasionally need to be disentangled because of the difference in pictorial stimuli). As can be seen from the table, Scenes 2-9 and 12-19 were those designed to produce utterances for analysis. Most types of geometric PATH response were elicited from more than one pictorial stimulus: *going down* in Scenes 2, 8, and 14; *going under* (i.e. under something and out the other side) in Scenes 3 and 18; *going over* (i.e. over a 3-D object) in Scenes 4 and 17; *going through* (i.e. in and out to the other side) in

Scenes 5 and 16; *going across* in Scenes 6 and 15; *going up* in Scenes 7, 13 and 19;

going in in Scene 9; and *going out* in Scene 12.[5]

Table 4.1. *Elicitation sequence for the Monkey Book.*

Scene	Scene Name	PATH	MANNER
1	the treehouse scene		
2	the tree-sliding scene	down	sliding
3	the (first) bridge scene	under	running
4	the (first) rock scene	over	jumping
5	the (first) hollow trunk scene	through	crawling
6	the (first) river scene	across	swimming
7	the (first) uphill scene	up	climbing
8	the (first) downhill scene	down	rolling (falling)
9	the cave entrance scene	in	running
10	the dark cave scene		
11	the chasing out scene		
12	the cave exit scene	out	running
13	the (second) uphill scene	up	climbing
14	the (second) downhill scene	down	rolling (falling)
15	the (second) river scene	across	swimming
16	the (second) hollow trunk scene	through	crawling
17	the (second) rock scene	over	jumping
18	the (second) bridge scene	under	running
19	the tree-climbing scene	up	climbing
20	the banana reward scene		

A final consideration was the book format. The two principal issues were

binding and page layout. To avoid confusion as to whether the pages should turn left-

to-right as in all English and French children's books, or right-to-left as in most (but

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[5] Scene 11 was originally intended to stimulate responses with resultative PPs, as the lion chases the monkey and the parrot out of the cave. However, several complications led to this scene being discounted from the analysis. First, the single-frame image was inadequate for the elicitation of PATH responses in this context. As all three animals are already outside the cave, the GROUND was most naturally mentioned in locational adjuncts. Second, I had initially assumed that English *chase* and French *pursuivre* were broadly equivalent. However, *pursuivre* turns out to be more like English *pursue*. English *chase* and *pursue* differ from each other at least in the following way: In *chase*^PP$_{LOC}$, the location is only necessarily predicated of the object, whilst in *pursue*^PP$_{LOC}$, the location is predicated of both participants. Compare *I chased the thief out of the house (and bolted the door behind him)* - i.e. I was never out of the house - vs. *I pursued the thief out of the house (*and bolted the door behind him)* - i.e. the pursuing necessarily continued into the street. Such complications led to the conclusion that the realm of resultatives was best left for an independent, more targeted investigation.

not all) Japanese children's books, the book was designed so that the binding was at the top and the pages could be flipped over from front to back. The action on each page proceeds from left to right as the monkey chases the parrot, and right to left when he runs back home. Pages targeting motion events are divided into two or three cartoon frames, as is standard in many published children's picture-books. However, the return journey is represented all on one page, with multiple images of the monkey. This was in order to counterbalance any possible unwanted 'frame effects' (see Section 6.11), and to have two different types of pictorial stimuli for each type of PATH. Each page of the picture book is A4 size, in a horizontal layout, brightly coloured, and laminated to allow for handling by many young children and to prevent damage at the hands of the over-curious.

NB. A smaller, monochrome sketch version of the Monkey Book is provided in Appendix A.

4.3.2   Elicitation procedure

Experiment 1 made use of a simple and relatively straightforward elicitation procedure. The picture-story book was presented to the participants, who were asked to say what happens on each page. In order to avoid the possibility of younger subjects focussing on one frame (showing part of the event) rather than the page (showing the whole event), new pages were at first covered with a blank piece of paper. When subjects were asked what was happening on the new page, the paper was simultaneously drawn across in the direction of the action, revealing the whole event.

An informal survey of teachers' reading styles in England, France and Japan had indicated that oral narratives based on such materials are usually in the present

tense, so the experimenters' descriptions and questions were duly formulated in this way, either using the simple present, or the present progressive. The experimenter introduced each page by describing the location, in order to encourage subjects to focus on trajectory rather than locational setting.[6] Subjects were then asked to describe the monkey's actions. For example, the rock scene was introduced in English as follows:

'and now look, he's running along, and there's a rock in the middle of the path. So what does the little monkey do?'

If subjects did not describe the path followed by the monkey (but rather described the MANNER or commented on the monkey's emotions), a prompting strategy was adopted to elicit appropriate responses. The use of prompts was a major departure from research in the Frog Story tradition. Such a strategy would be disastrous for the investigation of rhetorical styles, because of frequent interruptions in the storytelling, and the discounting of first responses in such instances. However, this form of elicitation made possible the systematic targeting of particular lexical and syntactic types, so that each pictorial stimulus produced at least one example of PATH predication from each test subject. Each experiment was recorded on micro-cassette, all responses related to the materials were transcribed, and 1608 examples of PATH predication were selected for analysis.

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[6] As discussed in Section 1.4, Slobin's (1996) study of Frog Stories uncovered a locational bias in motion event descriptions in Spanish.

4.3.3 Prompting strategy and materials

It was clearly imperative that no PATH predicates were used by either the experimenter in giving the prompts, or by the research assistant in encouraging the children. In order to maintain consistency in the prompting strategy, and to ensure that PATH predicates were never used in the prompts themselves, a fixed set of prompting materials was prepared for each language. These materials were delivered in the following way:

(i)   If the subject did not produce a PATH response, the experimenter began working through the following series of prompts.

(a) The first prompt in response to an utterance expressing only MANNER was simply 'Where? (Can you tell me more?)'.

(b) The second prompt in English and French involved repetition of child's first response, in cases where the child had only encoded the MANNER of motion, e.g. Child: 'He runs'; Experimenter: 'Yes, he runs...*where*?'. This was not possible in Japanese, because in sentential contexts, the word *doko* 'where' requires a locative P of the type under investigation (e.g. the P_{LOC} *ni* or the P_{PLACE} *de*). For example:

Experimenter: Doko ni hashitte iru no?

where P_{LOC} run-TE be Q

'Where is he running (to)?'

An example such as this already encodes PATH and encourages a response with the P$_{LOC}$ *ni*. However, an alternative strategy was adopted when context permitted: as Japanese is an OV language, it was possible to prompt using the GROUND object, which left the test subject free to continue with either a simple PATH verb, or a PATH verb and PP, or a deitic verb plus a MANNER verb plus a PP, as in the following examples:

Experimenter:	Dōkutsu…
	'Cave..'
Child:	…ni haitta
	…P$_{LOC}$ entered
	'He went into […the cave].'

or

…no naka ni haitta

…GEN inside P$_{LOC}$ entered

'He went inside […the cave].'

or

…no naka ni hashitte itta

…GEN inside P$_{LOC}$ run-TE went

'He ran inside the cave.'

(c) Prompt (a) in all languages, and prompt (b) in English and French, occasionally produced responses that were likely to be locational adjunts (e.g. *in the river*, *on the hill*). In that case for the next prompt, the experimenter indicated the trajectory on the page by moving his finger

from the start point to the end point, while saying, e.g. 'He starts here, and he ends up here, so what does he do?'

(d) For the final prompt, as a variation on (c), elements of the scene were mentioned, and the tense was shifted to the past, e.g. 'He started here, at the bottom of the hill, and he ended up here, at the top of the hill. So what did he do?'

(ii) If the subject produced a PATH response without indicating the MANNER of motion, one prompt was supplied to elicit a response with both elements (such as 'How? or 'In what way?'). However, expression of MANNER was considered a subsidiary area of investigation, so if this prompt failed, the experimenter moved on to the next scene.

(iii) If the subject produced a PATH response with no MANNER, but seemed shy or nervous and participation may have been threatened by over-prompting, the experimenter moved on to the next scene.

(iv) If the subject produced a PATH response also indicating the MANNER of motion, the experimenter immediately moved on to the next scene.

Prompting was required in many sessions with 3 and 4 year-old subjects, occasionally with older children, and rarely with adults.

N.B. Complete sets of prompting materials for English, French and Japanese are reproduced in Appendix C.

4.4   General issues of utterance selection

Precise characterizations of lexical and syntactic types are given in the introductions to each set of results in Chapters 5 and 6. However, all analyses were based on the same set of 1608 examples of PATH predication, and this section attempts to clarify two general issues pertaining to this selection process.

First, clauses with directional interpretation, rather than utterances containing PATH predicates, were the basis for all calculations. In a hypothetical example, if a child were to say, 'He jumps in, and crosses the river, then crawls on top of the grassy bank', this is one utterance, but would be counted as three examples of PATH predication. The first [*jumps in*] has MANNER in V and geometric PATH in P, the second [*crosses* DP] has MANNER in V, and the third [*crawls on top of* DP] has MANNER in V and the trajectory in a PP with a locative P, *on*, and a locative N, *top*. All these types are relevant to the issue of what is a possible product of the child's grammar, and so all are separately included in the data set. Thus the data set is not strictly a set of utterances, but a set of syntactic clauses with directional interpretation culled from a set of utterances. However, such examples were in the minority, as usually one example of PATH predication corresponded to one utterance.

Moreover, although this pattern of one instance of PATH predication per utterance held for the vast majority of examples, occasionally, when prompting failed, an utterance was bare of PATH predicates and had to be discounted. This means that if an analysis were to be carried out on this data set comparing responses to individual stimuli, the weights of utterances would be slightly skewed (some containing more than one instance of PATH predication, others containing none). However, the analyses in this investigation are at a more abstract level, being concerned with the

expression of PATH in, for example, V or PP, or P or N within PP, *across stimulus types*, therefore limited variation in utterance types does not pose a problem.

The second general issue of utterance selection is what counted as an instance of PATH predication. This study focuses on the expression of PATH in particular spatial configurations rather than movement in general, which led to the exclusion from the data set of utterances with directional interpretation but no geometric context. The focus throughout was not just on how *direction* was linguistically encoded, but more specifically how the *geometry* of directed motion was lexically and syntactically expressed. Utterances that did not indicate the geometry of the motion event (going *in*, *out, across, up, down* etc.) were all discounted, even if simple directional predication was attested, as was occasionally the case with deictic PATH verbs (e.g. *come, go*) or directional MANNER verbs (e.g. *run, swim*). This distinction is a departure from most previous research.

Following the earlier Frog Story investigations (e.g. Berman and Slobin, 1994; Slobin, 1996), it is well-known that in (some) V-framed languages, deictic verbs expressing the notions 'come' and 'go' freely combine with locative PPs, in a way that (some) MANNER verbs do not. This has led most researchers to lump together deictic PATH verbs with geometric PATH verbs (this distinction was explained in Section 3.4). In the following examples, both (4.2) and (4.3) might be considered examples of V-framed grammar.

(4.1)   *Sophie a marché de l'autre côté de la rue.   (*on directional reading)

Sophie AUX walked P$_{LOC}$ the other side of the street

'Sophie walked across the street.'

(4.2)   Sophie est allé de l'autre côté de la rue.

        Sophie AUX went P$_{LOC}$ the other side of the street

        'Sophie went across the street.'

(4.3)   Sophie a traversé la rue.

        Sophie AUX crossed the street

        'Sophie crossed the street.'

However, this conflation of deictic and geometric PATH verbs fails to recognize that all the information on the trajectory in (4.2) is in the PP. All the verb indicates is that there is motion in some (unspecified) direction. In contradictory fashion, while examples such as (4.2) are treated as representative of V-framed grammar, intransitive expressions such as (4.4) in English are considered typical examples of S-framed grammar.

(4.4)   Sophie went across.

In the latter case, it is usually said the PATH is in the 'satellite' (Talmy, 1985: 102-107; Berman and Slobin, 1994: 156-159), the verb presumably being some sort of semantically bleached predicate. The French example (4.2) and the English example (4.4) are here respectively treated as cases of geometric PATH in PP and in intransitive P, and are to be contrasted with the expression of the trajectory in V.

       Another discrepancy in the unified treatment of deictic and geometric PATH verbs is that deictic PATH verbs cannot be distinguished from all MANNER verbs on the basis of paradigms such as examples (4.1), (4.2) and (4.3). If the verb *marcher*

'walk' is replaced with the verb *courir* 'run' in example (4.1), the result is perfectly grammatical in colloquial French.

(4.5) Sophie a couru de l'autre côté de la rue.

Sophie AUX ran P$_{LOC}$ the other side of the street

'Sophie ran across the street.'

The difference in grammaticality here appears to lie with the verbs *marcher* and *courir*, rather than the difference between MANNER verbs and PATH verbs in general.

Deictic and geometric PATH verbs are further distinguished by their behaviour in certain languages in respect of their co-occurrence with MANNER verbs, and with each other. In English, deictic verbs are found in combination with MANNER verbs, with strict ordering restrictions:

(4.6) a. Sally came flying out of the clouds.

b. *Sally flew coming out of the clouds.

(4.7) a. Billy went sailing over the horizon.

b. *Billy sailed going over the horizon.

However, geometric PATH verbs cannot perform this function in English, whether or not the goal is marked with a P.

(4.8) *Sally crossed flying (over) the Channel.

(compare: Sally flew across the Channel.)

(4.9)   *Billy passed sailing (by) the Cape.

(compare: Billy sailed past the Cape.)

In Japanese, deictic and geometric PATH verbs often co-occur, in which case the deictic verb is the main predicate: it is clause-final and carries tense (as is the case with the same construction in Korean, according to Choi and Bowerman (1991)). This can be seen in the following examples.

(4.10)   Osamu wa suberidai o orite kita.

Osamu TOP slide ACC descending came

'Osamu came down the slide.' (literally: came descending the slide)

(4.11)   Naeko wa tonneru ni haitte itta.

Naeko TOP tunnel P_{LOC} entering went

'Naeko went into the tunnel.' (literally: went entering the tunnel)

The ordering within this verb complex is fixed, and the interpretation is that the activities (e.g. 'coming' and 'moving downward') are simultaneous.[7]

For these reasons, in the elicited production experiment, deictic and geometric PATH verbs were distinguished throughout. That is, responses such as 'He's coming', or 'There he goes', whilst expressing direction, were not selected for analysis because they do not encode the trajectory. If a deictic PATH verb was found with a locative PP

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[7] This type of co-occurrence is impossible in English or French.
(i)   *Jamie came descending the helter-skelter.
(ii)   *Yves est venue en descendant le toboggan.
         Yves AUX came P descending the slide
         'Yves came down the slide'

in an unambiguously directional context (e.g. 'He goes through the tree-trunk'), the utterance was selected on the basis of the PP.

Similarly, responses with intransitive directional MANNER verbs, such as 'He's swimming (in the river)', or 'He's running (on the grass)', could also be argued to encode PATH, but they were discounted for the same reason. Again, utterances with such verbs were only selected if geometric PATH was expressed in PP. The table below shows the total numbers of utterances selected from children and adults in the three languages.

Table 4.2. *Experiment 1: Total numbers of selected instances of PATH predication.*

Language Group	Age Group	Selected instances of PATH predication
French	children (3-7)	407
	adults	117
	all	524
Japanese	children (3-7)	432
	adults	82
	all	514
English	children (3-7)	469
	adults	101
	all	570
All 3 Languages	children (3-7)	1308
	adults	300
	all	1608

4.5   General issues of coding and transcription

In this section, I discuss the coding system for reference to individual test subjects, and the presentational form of examples from the data. As indicated above, more specific issues of coding, such as which verbs were counted as geometric PATH verbs, or in which environments words like *inside* were considered to be N or P, are dealt with in the introductions to the relevant sets of results, in Chapters 5 and 6.

Each participant was assigned a reference code, which is to be read as follows: a capital letter (E = English; F = French; J = Japanese), followed by a number (age in years), followed by a lower-case letter (to differentiate within age groups: a, b, c etc. from youngest to oldest). Thus J3a is the youngest Japanese 3-year-old. The group of Japanese 3-year-olds as a whole is referred to as Group J3. Adults were also assigned reference codes, to be read as follows: A capital letter for the language group, as before (E = English; F = French; J = Japanese), followed by a capital A (for Adult), followed by a lower-case letter (to differentiate within the group). Thus FAg is a French adult, and is also the seventh (in this case the oldest) in that age group. The group of French adults as a whole is referred to as Group FA. This system was designed not only to preserve anonymity, but also to enable understanding of the source of each utterance cited in the course of analysis.

The utterances of test subjects are presented in angled brackets, with information in the following order: first, the individual subject code; second, the scene number in square brackets (explained in Section 4.3.1, Table 4.1); and third, the utterance in italics. Consider, for example, the utterance below.

(4.12) <E4e [3]: *runs under it*>

This is the response of an English 4-year-old to the pictorial stimulus of Scene 3 (the first bridge scene). Within utterances, commas indicate brief pauses as in standard use, and dots (…) indicate longer pauses with no intervening prompts. In the following utterance, a French 6-year-old, in describing the tree-climbing scene at the end of the story, probably pauses to consider the trajectory (just *up*, or *up into*?) and /or the goal

(*the tree, a house*, or *a hut?*). However, there were no intervening prompts, so this is treated as a single utterance.

(4.13) <F6d [19]: *il grimpe…dans sa cabane*>

he climbs-up…in his hut

'He climbs up into his tree-house'[8]

If dots are used at the beginning or the end of an utterance, this indicates that I have omitted irrelevant material (either a prelude with no PATHs, or another instance of PATH that was separately coded); dots at the end may also indicate an unfinished utterance. In cases in which the subject continued an utterance on the basis of a prompt, the prompt is in square brackets, as seen in the example below from a Japanese 6-year-old, describing the cave entrance scene.

(4.14) <J6g [9]: [dookutsu…] *no naka e hashitte, oomu-san o oikakete ikimasu*>

[cave…] GEN inside to run-TE, parrot-HON ACC chase-TE go

'He runs inside [the cave], and goes chasing after the parrot.'

With the general coding system in place for participants and utterances, we may now turn to the details of the three populations of test subjects, and their exact experimental environments.

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[8] The trajectory is translated as *up into* because, as we shall see in Chapter 5, French *grimper*, unlike English *climb*, necessarily incorporates upward motion.

4.6   Test subjects and settings

In this section, I provide details of the participants and the experimental locations for Experiment I in England, France and Japan. A total of 95 English, French and Japanese monolingual[9] test subjects successfully participated in this experiment. In each language, the children were divided into 5 age groups from 3 to 7 years, and there was a sixth group with adult test subjects. There were on average 5 participants in each age group.

The children were tested at school[10] in a quiet room in the presence of one experimenter and one research assistant known to the child (school teachers in England and France; a school teacher and a school teaching assistant / mother in Japan). The research assistant provided encouragement when necessary, while respecting the prompting system of the experimenter. Adults were tested with just the experimenter present. As indicated below, settings varied minimally from place to place, but the important features of experimental layout remained the same. Written permission of all parents and the school authorities was requested and obtained in advance of school visits. All participation was voluntary, and the few who did not wish to speak were allowed to look at the book or to play with toys the experimenter had brought along.

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[9] All children were completely monolingual, having never been exposed to a second language. This was also the case for the English adults. Some French adults and all Japanese adults had studied English at school, but none were above beginner-level. The most important criterion was that no test subject's first language should be subject to influence from a second language, and this was unequivocally the case for all subjects.

[10] With four exceptions, who were tested at the home of a school teaching assistant / mother: see Section 4.6.3.

4.6.1 English subjects and settings

Participants: 27 English children and 6 English adults successfully participated in Experiment I. One 3-year-old subject remained silent, and was not included in the final grouping.

Table 4.3. *Experiment 1: Numbers of English test subjects by age group.*

Experiment 1: English Test Subjects						
Age Groups	E3	E4	E5	E6	E7	EA	Total
No. of participants	7	5	5	5	5	6	33

Locations and Dates: Children were tested at the University of Durham Day Nursery, Durham, and St. Mary's R.C. Infant and Primary School, Sunderland, in nearby cities in the north-east of England. 3- to 4-year-olds (E3a – E4c) were tested at the nursery, whilst two 4-year-olds and the older children (E4d – E7e) were tested at St. Mary's. At the nursery, a children's table and chairs were set up in a small indoor play area familiar to the children; and at St. Mary's, the room used for the experiment was a small library classroom. Adults were tested at their homes. The experiments were conducted at St. Mary's, Wednesday, 20 – Friday, 22 March 2002; at Durham University Nursery, Tuesday, 16 – Wednesday, 17 April 2002; and with the adults Saturday, 23 – Sunday, 24 March 2002.

Further Comments: Both children and adults were monolingual. The children comprised 12 boys and 15 girls. The adults included 2 sets of sisters (EAa, EAb; EAc, EAd), and two married couples (EAc, EAe; EAd, EAf).

N.B. See Appendix B (i) for a complete list of English participants.

4.6.2 French subjects and settings

Participants: 24 French children and 7 French adults successfully participated in Experiment I. Three child test subjects, all 3 years old, were excluded from the final grouping: one was silent, and two were talkative but did not produce utterances with paths.[11]

Table 4.4. *Experiment 1: Numbers of French test subjects by age group.*

Experiment 1: French Test Subjects						
Age Groups	F3	F4	F5	F6	F7	FA	Total
No. of participants	5	5	4	5	5	7	31

Locations and Dates: Children were tested at the Ecole Publique Maternelle / Primaire La Chapelle des Fougeretz, an infant and primary school in a small town near Rennes, in Brittany, France. 3- to 5-year-olds (F3a – F5d) were tested at the infant school, whilst 6- and 7-year-olds (F6a – F7e) were tested at the primary school. The rooms used for the experiment were in both cases small library classrooms familiar to the children. Adults were tested at their homes. The experiments were conducted Monday 12 - Friday 16 November 2001.

Further Comments: No test subject spoke any Breton; no child spoke any English, and any knowledge of English (among the adults) was highly restricted. The children comprised 13 boys and 11 girls. The adults were mostly female, and included two sets of sisters (FAa, FAd; FAb, FAc), one brother and sister (FAf, Fag), and one married couple (FAe, FAf).

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[11] Of these two, one produced only utterances with MANNER (despite prompting), and the other spoke only of personal associations (she had a monkey at home who also had a funny face; she too liked to run, jump and splash; and she liked bananas as well).

N.B. See Appendix B (ii) for a complete list of French participants.

4.6.3 Japanese subjects and settings

Participants: 26 Japanese children and 5 Japanese adults successfully participated in Experiment I. Eight child test subjects were excluded from the final grouping, of whom six were silent, and two were talkative but did not produce utterances with paths. These children included six 3 year-olds, one 4 year-old and one 6 year-old. The fact that they had never met a foreigner before may have contributed to the shyness of the quiet children.

Table 4.5. *Experiment 1: Numbers of Japanese test subjects by age group.*

Experiment 1: Japanese Test Subjects						
Age Groups	J3	J4	J5	J6	J7	JA	Total
No. of participants	5	5	5	7	4	5	31

Locations and Dates: Children were tested at Asagaya Higashi Nursery School in Tokyo, at Kobayashi Nursery School in Gose City, Nara Prefecture, and at the home of a school teaching assistant in Tokyo. 3- to 5-year-olds (J3a - J5d) were tested at Asagaya Higashi, one 5-year-old and the 6-year-olds were tested at Kobayashi (J5e - J6g), and the 7-year-olds were tested at the teaching assistant's home. At Asagaya Higashi the room used was a playroom with *tatami* flooring (straw matting), so the experiment was conducted on a low table with the participants sitting on floor cushions; at Kobayashi, a school classroom was used with a children's table and chairs; and at the teaching assistant's home, a low table and floor cushions were set up in a playroom. Such minor variations in setting were considered irrelevant to the maintenance of experimental conditions. Adults were tested at Mie University. The

experiments were conducted with the children Monday, 3 December – Friday, 14 December 2001, and with the adults on Sunday, 16 December 2002.

Further comments: No child had studied any English, and knowledge of English among the adults was again highly restricted. There were some small dialectal differences between Kobayashi in the Kansai region, and Asagaya Higashi in the Kanto region (see Section 5.2.1 for discussion of a dialectal instance of PATH and MANNER conflation in the same verb). The nurseries had children aged 0-6 yrs, but were in different in character. Kobayashi is very small (23 children), and very rural (in the mountains of Nara), whilst Asagaya Higashi is fairly large (over 100 children) and very urban (in central Tokyo). The children comprised 13 boys and 13 girls. The adults were all university students.

N.B. See Appendix B (iii) for a complete list of Japanese participants.

Chapter 5

Experiment I results:

Structural variation and Talmy's typology

5.1 Organization of the results of Experiment I

The overall presentation of the results of Experiment 1 is organized by topic, rather than by language or age group. Descriptions of specific language and age group findings are given within topic-based sub-sections. The first issue is that aspect of PATH lexicalization most relevant to Talmy's typology, namely whether trajectories are encoded in V or in PP, and this is given full treatment in the present chapter. The results bearing on this particular dichotomy are broken down in terms of pattern frequencies in individual test subjects by age group, then by age groups in a single language, and finally, in Section 5.2.4, by language groups. However, the more detailed discussion of syntactic variation following each set of typological results makes no attempt to quantify the frequency of these more specific response types. As made clear in Sections 1.5 and 1.6, the main focus of this investigation is not on 'most typical means of expression' but on what may or may not be generated by the grammar. The following chapter presents further findings with regard to the expression of trajectories in the three languages, but with a shift in emphasis, from what differentiates the languages to what they share in terms of categories, features, and syntax. The presentation of the results is largely descriptive: more detailed theoretical analysis of the findings is elaborated in Part III.

Throughout this thesis, the general order of presentation of linguistic data is English, French and Japanese. However, within each results sub-section, the order of

languages discussed varies according to the topic. For example, the first set of results, concerning the expression of trajectories in V or PP, is mostly clearly presented in the order Japanese, French, English, in order to highlight the discovery of a significant contrast between Japanese and French; on the other hand, the results dealing with the splitting of complex trajectories are more easily understood if the English data are presented first, as these are the clearest instantiation of the claim. The respective orders of presentation are transparently laid out in each section.

5.2 PP [PATH] in the absence of geometric V [PATH]

This first set of results provides evidence concerning the proposed distinction between S-framed and V-framed languages, and is relevant both for the accuracy of the typological claim concerning rhetorical styles and speaker preferences, and the issue of whether the typological distinction may be formalized as a parameter. Utterances were subject to systematic rules of selection and coding. Rather than give the figures for instances of the expression of PATH in V, which would subsume V with direct object (e.g. *cross the river*), V with PP (e.g. *cross to the other side of the river*), compound V with both PATH and MANNER components (e.g. French *dégringoler* 'tumble-down'), or combinations such as locative PP with geometric V [PATH] supported by deictic V [PATH] (Japanese *dōkutsu no naka ni haitte itta* – cave GEN inside P_{LOC} entering went – 'He went into the cave'), I have chosen instead to present the proportions of instances of PP [PATH] in the absence of geometric V [PATH], as this most unambiguously reveals examples of the 'S-framed type'. This removes the complication of the expression of PATH in both V *and* PP.

I categorize all PPs with directional interpretation as PP [PATH], whether or not the overt head P is inherently directional. Recall that many Ps have both locative

and directional interpretations, depending on context. I assume that in directional contexts the feature [PATH] is present in the structure, and postpone justification for this analysis until Chapter 11. Thus typical kinds of utterances included as examples of S-framed grammar, here characterized as PP [PATH] in the absence of geometric V [PATH], include the following:

(i)   V [MANNER] with the trajectory in a simple PP: [P [DP]]

      e.g. he scrambles up the hill

(ii)   V [MANNER] with the trajectory in a PP with a locative N (e.g. *on top*)

      e.g. he crawls on top of the hill

(iii)   V [MANNER] with the trajectory in a PP with a locative DP (e.g. *to the top*)

      e.g. he runs to the top of the hill

(iv)   Deictic P [PATH] with the trajectory in P or PP

      e.g. he goes up

      e.g. he goes up the hill

One type of grammatical utterance that slips through the net is when a MANNER verb assigns accusative case to the GROUND object, leading to unambiguous PATH interpretation. For example, the Japanese sentence *kawa o oyogu* – river ACC swim – 'He swims (across) the river' contains neither geometric V [PATH] nor a locative PP, yet in this context the meaning is unambiguously that he swims from one side to the other. Similarly accusative case may be assigned to a locative N such as

'top', 'bottom', or 'inside', e.g. *tsutsu no naka o hashiru* – tube GEN inside ACC run –
'He runs through the tree-trunk', and in these cases too the meaning is unambiguous.
These utterances are coded neither as PATH in V nor as PATH in PP. Their existence
means that one cannot assume that if a certain percentage of utterances are classified
as S-framed, then the remaining utterances are all V-framed, even though this is true
in the majority of cases.

A few 'corresponding' verbs were assigned different codings in different
languages. As noted briefly in Section 4.5, fn. 8, the verb *climb* in English may be
used as a MANNER verb without obligatory conflation of direction, but Japanese
noboru 'climb-up' and French *grimper* 'climb-up' may only be used in upward
contexts. *Noboru* and *grimper* cannot be used to translate the activity of a
mountaineer climbing across a ledge, or Santa Claus climbing down the chimney. In
Japanese and French, you can 'climb' up a ladder but you cannot 'climb' down. Thus
noboru and *grimper* were coded as PATH verbs (conflating PATH and MANNER), but I
have coded English *climb* as a MANNER verb, as used in these utterances. Transitive
examples such as *climb the hill* are here treated on a par with other cases of V
[MANNER] with direct objects, such as *jump the fence, swim the river,* and *walk the
road to Santiago* (for relevant examples see the subsections below; further discussion
of this issue follows in Section 6.5).

Similar issues arise for verbs approximating the English verb *fall*, which can
be used with a number of different PP [PATH] (*fall across, fall into, fall over*).
'Falling' in all three languages arguably involves a PATH component, namely
downward motion, which may or may not be combined with a locative PP for further
elaboration of the trajectory (ie. you can fall 'in', 'on', or 'across' something in all
three languages, but you cannot fall 'up' anything). However, utterances with the

English phrasal verb *fall over* were discounted, because it was considered that this does not express a trajectory. Japanese distinguishes between *ochiru / okkochiru* 'fall' and *korobu* 'fall over'. Utterances with *korobu* 'fall over' were also discounted for lack of a trajectory. To clarify this matter further, consider the following examples in English and Japanese.

(5.1)   The soldier fell (*over) from the aeroplane to the ground.

(5.2)   Gunjin wa hikoki kara jimen made {ochita / *koronda}.

solidier TOP aeroplane from ground until (fell / fell over)

'The soldier {fell /*fell over} from the aeroplane to the ground.'

English *fall over* and Japanese *korobu* 'fall over', unlike *fall* and *ochiru* 'fall' do not support path elaboration. French *tomber* 'fall' serves both functions, however, leading to ambiguity in the intransitive case.

(5.3)   Le soldat est tombé de l'avion jusqu'à la terre.

the soldier AUX fell from the-aeroplane until P_{LOC} the ground

'The soldier fell from the aeroplane to the ground.'

(5.4)   Le soldat est tombé.

the soldier AUX fell

'The soldier {fell / fell over}.'

Thus utterances with Japanese *korobu* 'fall over', French intransitive *tomber* 'fall (over)', and English *fall over* led to the adoption of the prompting strategy. Three such discounted examples are given below, all drawn from the first downhill scene.

(5.6)   <J3c [8]:   *subette koronda>*   (discounted)

slipping fell-over

'He slipped over.'

(5.7)   <FAe [8]:   *il tombe>*   (discounted)

he falls

'He {falls / falls over}.'

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

Another problem for coding was verbs such as Japanese *nigeru* 'flee', French *s'enfuir* 'flee' and English *run away*.[1] Rather like the deictic PATH verbs *come* and *go*, the examples were only counted if the trajectory was elaborated in the PP. For example, the following pair of utterances were elicited one after the other, both describing the cave exit scene. The first was discounted, and the second was included in the data set, coded as PP [PATH] in the absence of geometric V [PATH].

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[1] I use the word *flee* in glossing *nigeru* and *s'enfuir*, as it is more semantically accurate than *run away* (no running need be involved); however, this word is virtually obsolete in colloquial British English, and so is not given as the equivalent English translation. A hypothetical child utterance such as 'It's a great game. We ring the doorbell, and then we flee' sounds very much like a badly translated foreign film subtitle.

(5.9) <J5c [12]: *raion-san ga oidashita kara...nigeta>* (discounted)

lion-TITLE NOM chase-out because...fled

'The lion chased him out, so he ran away.'

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

outside P$_{LOC}$ fled

'He ran outside.'

Following these clarifications, it should be stressed that such problematic examples were exceptions rather than the norm, and most of the coding was relatively straightforward.

The Japanese, French and English results are respectively presented in chart form, with actual numbers of examples as well as the percentages that serve as a basis of comparison. Within each language, the charts are given in order of age group: first the individual results of the 3 year-olds, then the 4 year-olds etc; the final chart is a comparison of the mean averages of the age groups. There follows a verbal summary of the results, with examples.

5.2.1 Japanese results
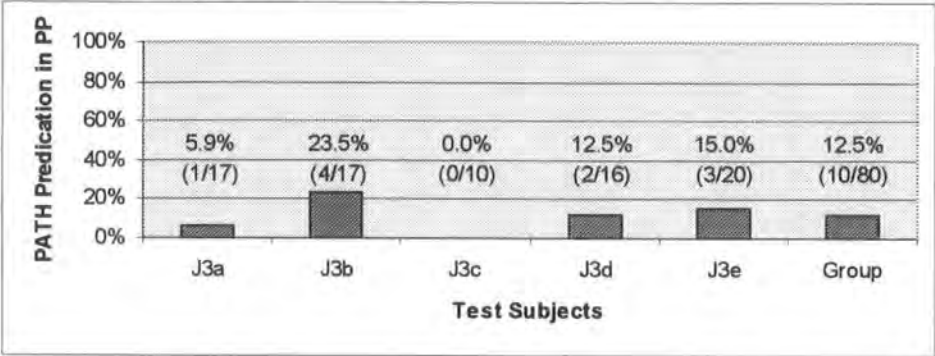
Figure 5.1. *Group J3. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
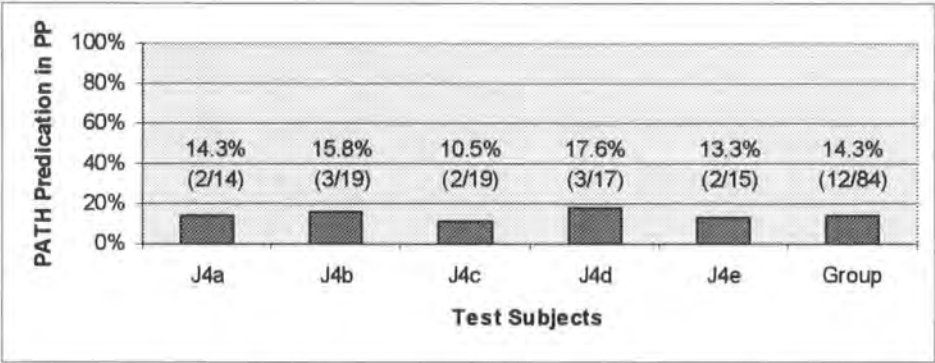
Figure 5.2. *Group J4. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
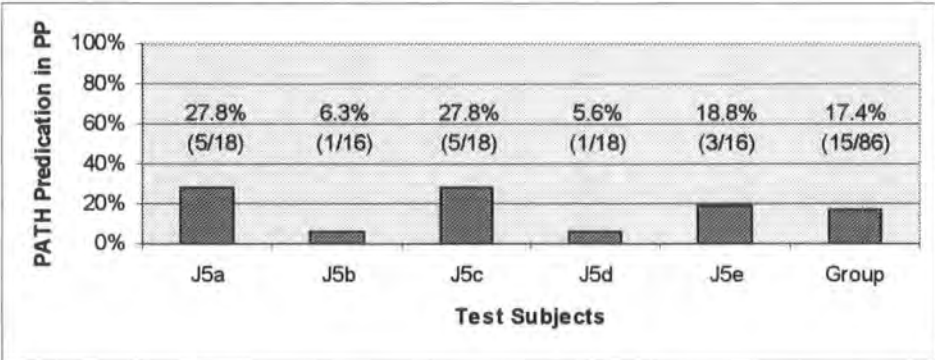
Figure 5.3. *Group J5. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
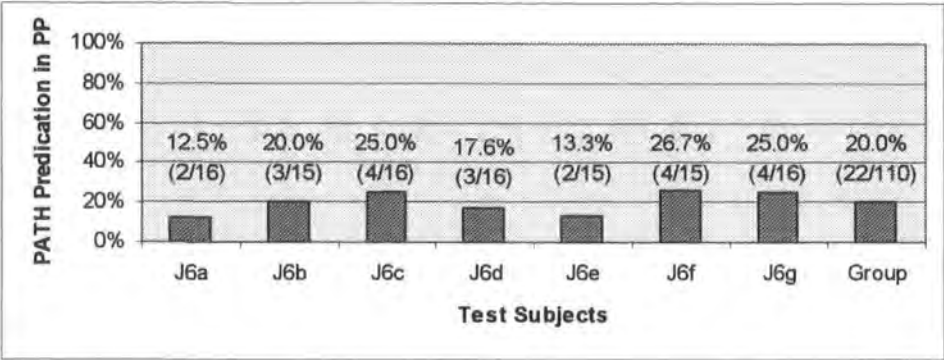
Figure 5.4. *Group J6. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
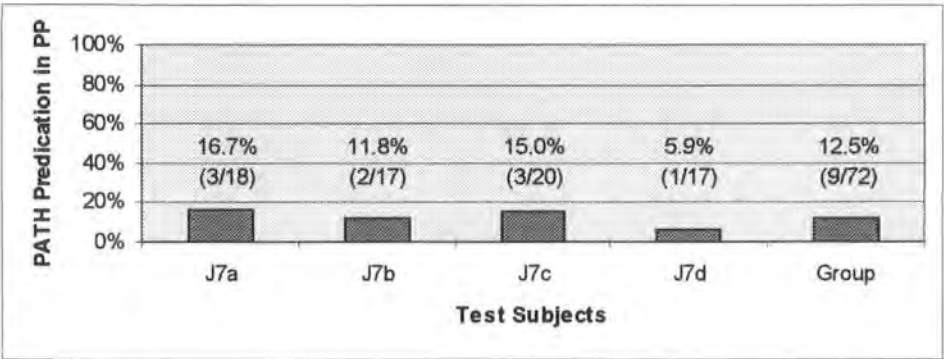
Figure 5.5. *Group J7. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
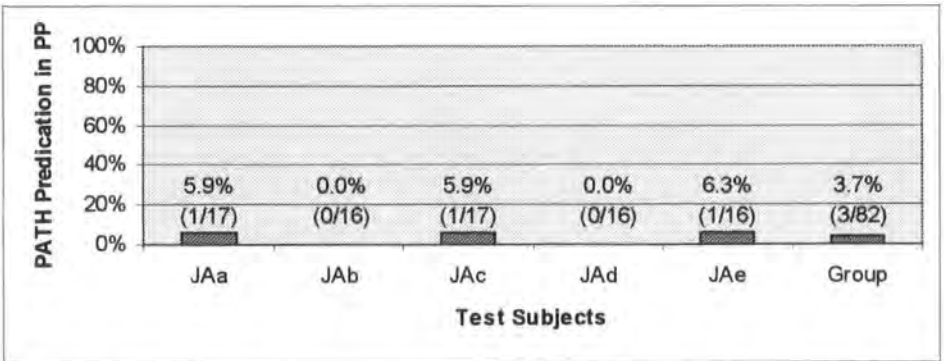
Figure 5.6. *Group JA. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
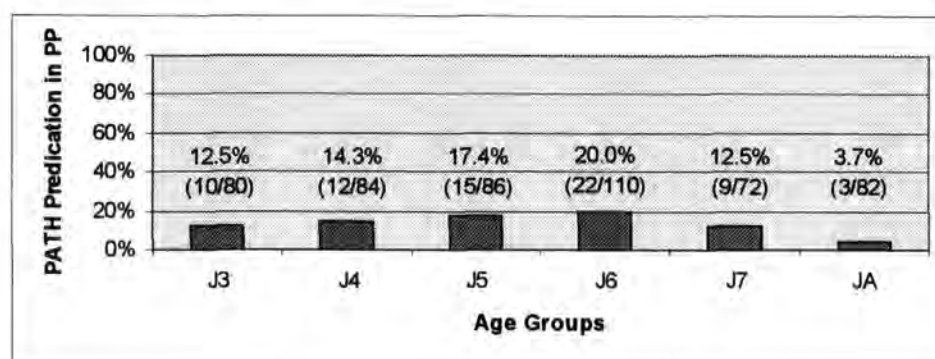
Figure 5.7. *Japanese responses by age group. Experiment I: Mean for each age group of instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication. Actual numbers are shown in parentheses.*

As can be clearly seen from Figure 5.7, there was no significant development in preferences for the expression of PATH in PP from the 3-year-olds to the 7-year-olds. In fact the youngest and the oldest group of children had exactly the same proportion of instances of PP [PATH] in the absence of geometric V [PATH]: both 12.5% (10/80 examples in Group J3, and 9/72 examples in Group J7). The adults had a markedly lower number of such utterances: only 3.7% (3/82). However, it is important to note that the 68 examples of this type found in the child data were all considered fully grammatical by adult informants in this particular respect (although they did contain other types of error, such as lack of topic marking, vocabulary errors, and substitution of *de* (P$_{LOC}$) for *ni* (P$_{LOC}$)). It is likely that the low instance of this lexicalization pattern in the adult responses was at least in part due to the fact that their speech was much less colloquial than that of the children under the same experimental conditions. The use of a geometric V [PATH] to express trajectory is considered stylistically superior to spelling out the spatial geometry only in PP. In other words, these figures are indeed a reflection of rhetorical style rather than grammaticality.

The overall results of the Japanese data confirm the predictions of Talmy's typology: Japanese speakers overwhelmingly prefer to encode PATH in V rather than

in PP (here referring to Postpositional Phrases). In fact, one 3-year-old (J3c) and two

adults (JAb, JAd) produced geometric V [PATH] in *all* their responses, with one

exception conforming to neither type.[2] The individuals with the highest numbers of

PP [PATH] in the absence of geometric V [PATH] were two 5-year-olds, J5a and J5c

(both at 27.8%), closely followed by three 6-year-olds (J6f at 26.7%, J6c and J6g both

at 25%). The mean average of instances of PP [PATH] in the absence of geometric V

[PATH] across the Japanese children was 15.7% (68/432). The remainder of instances

of PATH predication were almost invariably cases of geometric V [PATH], with few

exceptions.

A very important caveat to this observation of V-framed preference is that the

Japanese examples characterized as such reveal a great deal of lexical and syntactic

variation. Perhaps surprisingly, such variation was attested in all age groups, though

in differing degrees. The remainder of this section provides an overview of the

combinatorial possibilities attested in the data, considering expression of trajectories

in three general structural types: (i) only in V [PATH]; (ii) in both V [PATH] and PP

[PATH]; and finally (iii) only in PP [PATH].

In the simplest case, the trajectory was expressed in a single word, in the form

of an intransitive V [PATH]. This was a common response for the younger test

subjects, and much less common for the older children and adults, as might be

expected.[3] Typical examples are given below.

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[2] The exception being a case where a MANNER verb assigns accusative case to a GROUND object: <JAb [17]: *iwa o jampu shite...*> - rock ACC jump do-TE – 'He jumps (over) the rock, and...'). Such cases are discussed below.

[3] Many of the 3- and 4-year-olds were shy; however, shyness cannot account for the one-word responses of one 4-year-old, J4b, who responded to each stimulus by jumping up from his seat, yelling out a one-word answer, and then bursting out laughing. In contrast, some 3- and 4-year-olds were quite garrulous, and as pointed out above, the *range* of response types was constant across age groups, so the prevalence of one-word responses in younger test subjects can be put down to extra-linguistic factors.

(5.11) <J3b [5]:   *haitta*>

entered

'He went in.'

(5.12) <J5e [12]:   *deta*>

came-out[4]

'He came out.'

(5.13) <J6b [5]:   *kuguru*>

go-via-under

'He goes under it.'[5]

One structural type quite common in all age groups involved a 'basic' V [PATH] assigning accusative case to the GROUND object (with or without the addition of a MANNER adjunct), e.g.

(5.14) <J3c [18]:   *hashi o kugutteru*>

bridge ACC go-via-under-PROG

'He's going under the bridge.'

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[4] I gloss *deru* as 'come-out' in this context, although the deictic meaning is not in the verb. This is nevertheless more accurate than *leave*, which is the opposite of *arrive*, and is not generally considered to express a trajectory. In any case, *deru* expresses movement out of a 3D space, whilst *leave* has no such obligatory 3D geometry. *Deru* is occasionally attested in the data in combination with deictics, which creates gloss problems (come-out-went? go-out-came?). In such cases I use 'exit' in the gloss, even though *exit* does not express the same range of use (??*It's time you exited the bath*; ??*I'm just going to exit for some bread*). As made clear in Chapter 3, glosses are just a guide.

[5] The deictic problem in the above footnote also applies to verbs such as *kuguru* for which there is no single LI approximation in English. I generally gloss this as 'go-via-under', rather than 'come-via-under' though there is no deixis in the verb. As mentioned in Section 3.3, *kuguru* means 'go under and come out the other side', never 'go under and stay there', and this verb was occasionally used for the hollow trunk scene across the age range, either by itself or in verbal compounds, as discussed below. It was also used by some test subjects for the cave entrance scene. This verb is often used of gateways with crossbeams and arched entrances (there must be something to go *under*), and may sometimes by translated into English by 'go through'.

(5.15) <J6a [19]:   *...ki o agaru>*[6]

...tree ACC go-up

'...he goes up the tree.'

(5.16) <J5c [6]:   *oyoide kawa o wataru>*

swimming river ACC cross

'He swims across the river.'

(5.17) <J6g [17]:   *tonde ishi o koeta>*

leaping rock ACC go-over

'He jumps over the rock.'

(5.18) <J7d [14]:   *o-saru-san wa oka o oriru>*

HON-monkey-TITLE TOP hill ACC go-up

'The monkey goes up the hill.'

Another structure is exemplified below, in which there is a deictic V [PATH] carrying tense, a geometric V [PATH], and accusative case is assigned to the GROUND object.

(5.19) <J3d [19]:   *kaidan o nobotte iku>*

stairs ACC climbing go

'He climbs up the stairs.'

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[6] Whilst this general structure is accepted by adults, the verb *noboru* 'climb-up' is much preferred to *agaru* 'go-up' when physical effort is involved.

(5.20) <J6d [5]:   *ki o tōtte…kore o tōtte itta>*

                          tree ACC go-via-TE…this ACC go-via-TE went

                          'He went through the tree and…he went through this.'

(5.21) <J6f [18]:   *hashi o kugutte ikimashita>*

                          bridge ACC go-via-under-TE went

                          'He went under the bridge.'

Note that in the absence of geometric V [PATH], the deictic verb cannot assign case to the direct object.

(5.22) *Kaidan o iku

                stairs ACC go

                'He goes the stairs.'

I therefore assume that in cases such as (5.19 – 5.21), geometric V [PATH] is not merely an adjunct, but that the combination of geometric V [PATH] and deictic V [PATH] constitutes a complex predicate. A further variation involved the assignment of accusative case not to the GROUND object itself but to a locative N lexicalizing geometric properties of the GROUND object, such as *naka* 'inside', *ue* 'top', or *shita* 'bottom'[7] e.g.

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[7] The very fact that accusative case can be assigned to these elements is one reason I categorize them as N [LOC], despite the fact that they are often treated as lexical P in the literature (e.g. Watanabe, 1993). It is also the case that these elements cannot directly select nominal complements, and they have structural commonalities with similar N elements in French and English, as we shall see in Section 6.2. A more detailed theoretical treatment of such elements is pursued in Section 11.3.

(5.23) <J3c [16]:   *ki no naka o tōtte itta no>*

tree GEN inside ACC go-via-TE went PART

'He went through the tree.'

(5.24) <J7b [19]:   *ki no ue o noborimasu>*

tree GEN top ACC climb

'He climbs up to the top of the tree.'

(5.25) <JAa [3]:   *hashi no shita o kugurimashita>*

bridge GEN underneath ACC go-via-under-PST

'He went under the bridge.'

Not only 'basic' motion verbs were categorized as geometric V [PATH]. Two
types of more semantically complex predicates were also labelled as such. First, some
verbs were considered to conflate both geometric PATH and MANNER in a single
lexical entry. [8] As discussed above, *noboru* 'climb' and *ochiru / okkochiru* [9] 'fall' are
such verbs, obligatorily conflating upward and downward motion respectively, even if
these concepts are not specified in PP, as shown in the following examples, where
both are used with *ni* (P$_{LOC}$).

(5.26) <J5d [19]:   *...ki ni nobotta no>*

...tree P$_{LOC}$ climbed PART

'...He climbed up into the tree.'

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[8] This is contrary to standard assumptions in work on Japanese lexical semantics. It is generally said
that Japanese verbs cannot conflate both PATH and MANNER (Yoneyama, 1986; Tsujimura, 2002).
See Section 6.5 for further discussion.
[9] According to my informants, these words have the same meaning. *Okkochiru* 'fall' is one of several
'child words' in the data, i.e. words used by children, and by adults talking to children.

(5.27) <J4c [6]:   *jabun-jabun-tte kawa ni okkochita>*

ONOM-TE river P_{LOC} fell

'He fell spashing into the river.'

However, the most common forms of semantically complex verbal predicates were compounds. Verbal compounding is very productive in Japanese, and V [PATH] was in many cases fused with other verb-types to create complex PATH predicates. The examples below may be described as V [PATH] fusing with V [CHANGE-of-STATE].

(5.28) a. <J6a [3]:   *hashi no shita o kugurinukeru>*

tree GEN bottom ACC go-via-under-emerge

'He's going through the tree.'

(*kuguru* 'go-via-under' + *nuku* 'emerge')

(5.29) <JAc [16]:   *ki no tsutsu o tōrinukete...>*

tree GEN tube ACC go-via-emerge-TE...

'He goes through the tree-trunk and...

(*tōru* 'go-via' + *nuku* 'emerge')

The most common type of compounding in the data involved the fusion of V [MANNER] and V [PATH], as in the following examples.

(5.30) <J4d [17]:   *ishi o tobikoeta>*

stone ACC jump-go-over

'He jumped over the stone.'

(*tobu* 'jump' + *koeru* 'go-over')[10]

(5.31) <JAc [2]:   *mazu, suberidai o suberiorimasu>*

first, slide ACC sliding-go-down

'First, he slides down the slide.'

(*suberu* 'slide' + *oriru* 'go-down')

(5.32) <J7a [13/14]:   *oka o nobotte kara, korogariochita>*

hill ACC climbed-TE from, roll-fell

'After climbing the hill, he tumbled down.'

(*korogaru* 'roll' + *ochiru* 'fall')

These utterances all demonstrate what is generally assumed to be a productive type of syntactic compounding for so-called Group 1 verbs in Japanese, with the stem ending in *i* (see e.g. Kageyama, 1996; Koizumi, 1995), but there were also a few examples of non-productive compounds that I assume to be fixed lexical items (LIs). For example, whilst the verb *korogariochiru* 'roll-fall' / 'tumble down' (*korogaru* 'roll' + *ochiru* 'fall') in (5.32) is the result of a productive operation, there exists an alternative form,

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[10] *Tobu* 'jump' is classed as a MANNER verb because, perhaps contrary to intuition, it does not necessarily entail upward motion. The compound *tobioriru* means 'jump down', and the compound *tobikomu* means 'jump in', and neither necessarily predicate upward motion. In English too, *jumping* out of an aeroplane, for example, does not have to involve upward motion at any stage. Thus although upward motion is often inferred with these verbs, it is not encoded.

korogeochiru 'roll-fall' which appears to be a fixed LI, used both intransitively (5.33) and transitively with the GROUND object (5.34).[11]

(5.33) <J7b [8]:   *oka kara oriyō to shite, korogeochita*>

                 hill from go-down-INT COMP do-TE, roll-fell

                 'He wanted to go down from the hill; he fell and rolled down.'

(5.34) JAd [8]:   *oka o korogeochita*>

                 hill ACC roll-fell

                 'He fell and rolled down the hill / He tumbled down the hill.'

All the cases discussed so far involve geometric V [PATH] in the absence of PP [PATH]. We now turn to the second general structural type: the expression of PATH in *both* V and PP. Although they are considered V-framed utterances by definition, as PATH is in the main verb, they might be distinguished from cases where the trajectory is expressed *only* in V. I consider that the complement is a PP [PATH] in two cases: if the GROUND is followed by a postposition rather than accusative case, as exemplified in (5.35-5.36), and if a locative N ('top', 'bottom') is followed by a postposition, as in (5.37-5.38).

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[11] There is a Group 2 verb *korogeru* which is a variant of *korogaru*, and is certainly the historical stem of this compound. Aside from *korogeochiru*, there are also the forms *korogeoriru* 'roll-down' (*korogeru* 'roll' + *oriru* 'go-down'), and *korogemawaru* 'roll around in cirlces' (*korogeru* 'roll' + *mawaru* 'go-around'). It is possible that for some Japanese speakers the verb *korogeru* survives in modern use, perhaps dialectally, allowing for an analysis of *korogeochiru* in terms of productive compounding; however, although listed in dictionaries, it was not recognized as an independent form by my adult informants in Nara, Mie and Tokyo. It seems that common compounds formed from this verb have proved more robust than the verb itself, and thus the stem survives as a historical relic. I thus analyze *korgeochiru* as an independent lexical item, with conflation of PATH and MANNER components. It is important to note that despite the fact verb suffix alternations with -*aru* and -*eru* are often cases of the transitivity alternation in Japanese, this is *not* so here. The transitive form of *korogaru* with a FIGURE object (e.g 'roll the ball') is *korogasu*.

(5.35) <J7b [8]:   *oka kara oriyō to shite...>*

hill from go-down-INT COMP do-TE...

'He wanted to go down from the hill...'

(5.36) <J4c [9]:   *dōkutsu ni haitta>*

cave P$_{LOC}$ entered

'He went into the cave.'

(5.37) <J5d [9]:   *dōkutsu no naka ni haittetteru no>*

cave GEN inside P$_{LOC}$ enter-TE-go-PROG PART

'He's going inside the cave.'

(5.38) <J6e [16]:   *naka kara soto e deta...ki no naka kara soto e deta>*

inside from outside to came-out...tree GEN inside from outside

to came-out

'He came out from inside...he came out from inside the tree.'

An interesting variation on this pattern was found in one utterance where a directional PP was selected by a V [MANNER, PATH], with a similar meaning to *korogeochiru* 'roll-fall' in (5.33-5.34) (although corresponding more exactly to *korogeoriru* 'roll-go-down'). This example, from a child from Nara Prefecture, is unique in the data in that it is the *only* case of a PATH predicate that is strictly dialectal (non-standard Japanese). The verb *makureru* obligatorily conflates the concepts of 'rolling' and

'downward motion', and is found in Yamato-ben, the dialect spoken south of Nara City.[12]

(5.39) <J6g [14]:   *shita e makuretemasu*>

down to roll-down-PROG

'He's rolling down to the bottom.'

Sometimes with the same combination of verb and GROUND object or locative N, there appears to be a choice between accusative marking or PP-selection, as can be shown with paired examples from the tree-climbing scene and the cave exit scene.

(5.40) <J7d [19]:   *ki o noboru*>

tree ACC climb

'He climbs the tree.'

(5.41) <JAe [19]:   *ki ni noborimasu*>[13]

tree P_{LOC} climb-PROG

'He's climbing the tree.'

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[12] Following informal investigation of the geographical boundaries of the use of this LI, it appears to be limited to the southern part of the Yamato Plain and the mountains to the South (the dialects Asuka-ben, Yoshino-ben, Dorogawa-ben). It was not recognized by informants from either Nara City or Osaka. It is dropping out of use: the child who used it lives with his grandparents, and it is likely that he acquired this LI from them rather than his (young) parents. On asking local adult informants for examples of the use of *makureru*, I was given the following scenarios: 'When you park your car on a slope, and forget to put the handbrake on....*makureru*; when you are carrying a basket of persimmons in the mountains, and one drops out...*makureru*'. This LI seems a more useful coinage for mountainfolk than lowlanders. However, we shall see that similar conflation patterns occur in standard French and standard English.

[13] Note that a locational reading - 'He's climbing in the tree' – is not possible here (locational adjuncts to activity verbs are marked with *de* (P_{PLACE}), not *ni* (P_{LOC}). A similar pair may be constructed in French: *grimper l'arbre* 'climb the tree'; and *'grimper à l'arbre'* – 'climb P_{LOC} the tree', which in this case is ambiguous between PLACE and PATH readings. This is perhaps the inverse of another response found in all three languages, translatable as: 'he rolls (down) from the hill', with the hill marked by a P [SOURCE]. The climbing occurs only while the monkey is on the tree, yet the tree is the goal; the rolling occurs only while the monkey is on the hill, yet the hill is the source. In both scenarios, the 'the tree' and 'the hill' appear to refer to 'the top' of the object.

(5.42) <J7a [12/13]: *saru wa dōkutsu o dete oka o nobottetta*>

        monkey TOP cave ACC leave-TE hill ACC climb-TE-went

        'The monkey came out of the cave and climbed up the hill.'

(5.43) <J5a [12]: *dōkutsu kara saru-san ga dete ne, 'kowai yo!'-te dete kita*>

        cave from monkey-HON NOM came-out EXC, scary EXC-TE

        come- out-TE came

        'The monkey came out of the cave, see, he came out saying

        "It's really scary!" '

Finally, we turn to the third main category of utterances: those in which the trajectory was expressed in PP [PATH] in the absence of geometric V [PATH]. In both the typological and generative literature, this general configuration is often assumed to be ungrammatical in Japanese (or escapes comment altogether). However, it will prove important in subsequent discussion, so multiple examples are given below. There are basically three types of such utterances: (i) those in which V [MANNER] is merged with a PP (with or without onomatopoeia); (ii) those in which a deictic V [PATH] is merged with a PP (with or without V [MANNER] or onomatopoeia); and (iii) those in which onomatopoeia carried by a light verb is directly merged with a PP. The first type may be illustrated with three examples, each involving the postpositions *e* 'to', *kara*, 'from' and *ni* (P$_{LOC}$).

Examples with 'e':

(5.44) <J3d [12]:   *soto e hashitta>*

outside to ran

'He ran outside.'

(5.45) <J6g [9]:   [*dōkutsu...*] *no naka e hashitte, omu-san o oikakete ikimasu>*

[cave...] GEN inside to run-TE, parrot-HON ACC chasing go

'He runs in [the cave], and goes chasing after the parrot.'

(5.46) <J5b [12]:   *kusa no ippai aru toko, yama no chikaku e hashitta>*

grass GEN lots be place, mountain GEN near to ran

'He ran to the place near the mountain, where there's lots of

grass.'

Examples with 'kara':

(5.47) <J3a [2]:   *ishi kara subetteru>*

stone from slide-PROG

'He slides (down) from the stone.'

(5.48) <J6d [14]:   *yama no ue kara korogatta>*

mountain GEN top from rolled

'He rolled from the top of the mountain.'

(5.49) <J6c [2]:   *ue kara subetteru>*

top from slide-PROG

'He slides (down) from the top.'

Examples with 'ni':

(5.50) <J3e: *ishi ni jampu shita>*

rock P$_{LOC}$ jump did

'He jumped onto the rock.'

(5.51) <J6b: *hidari ni tobu>*

left P$_{LOC}$ leap

'He leaps to the left.'

(5.52) <J5d [4]:   *ishi no ue ni jampu shiyō to shiten no>*[14]

stone GEN top P$_{LOC}$ jump do-INT COMP do-TE-PROG-PART

'He's trying do a jump onto the rock.'

The second type, making use of deictic V [PATH], is more common than the first, and

is considered stylistically superior.[15]

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[14] This is a heavily contracted form:
      shite iru no → shiteru no → shiten no
      do-TE PROG PART → do-TE-PROG PART → do-TE-PROG PART
[15] That is, if one takes a sentence such as *Eki ni hashitta* – station P$_{LOC}$ ran – 'He ran to the station', which is attested in colloquial speech, it is considered to 'improve' with a deictic, i.e. *Eki ni hashitte itta* - station P$_{LOC}$ runnning went – 'He went running to the station'.

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

                   bottom P$_{LOC}$ sliding went

                   'He went sliding down.'

(5.54) <J6d [13]:   *yama no ue ni itte…>*

                   mountain GEN P$_{LOC}$ went and…

                   'He went to the top of the mountain and…'

(5.55) <J7b [6]:   *o-saru-san wa oyoide mukō gishi made itta >*

                   HON-monkey-TITLE swimming other-side until went

                   'The monkey went swimming to the other side.'

(5.56) <JAa [12]:   *oka no hōkō e hashitte iku>*

                   hill GEN direction to running go

                   'He goes running towards the hill.'

(5.57) <JAe [2]:   *suberidai de subette shita made ikimasu>*

                   slide P$_{PLACE}$ sliding bottom until went

                   'He went down, sliding on the slide.'

The third type, merging onomatopoeia carried by a light verb directly with PP [PATH], whilst not ungrammatical, is typical of child speech.

(5.58) <J3b [17]:   *ishi no ue kara piyon-te shiteru>*

stone GEN top from ONOM-TE do-PROG

'He's going 'weee!' from the top of the rock.'

(5.59) <J4d [14]:   *...koko kara koron-koron-koron-tte nachatta>*[16]

...here from ONOM-TE get-ASP-PAST

'...from here he goes 'twirly whirly whirly'.'

Whilst this pattern was occasionally found with *kara* 'from' (P$_{PATH}$), it was never found with *ni* (P$_{LOC}$), which I later argue to be theoretically significant, as in the absence of an inherent PATH feature, only a certain class of directional V [MANNER] can coerce a PATH interpretation when merged with P [LOC] (see Sections 6.6, 10.3, 10.6 and 11.5.3 for discussion). If onomatopoeia was merged with PP, the host predicate inevitably carried the feature [PATH], e.g.

(5.60) <J4b [16]:   *tsutsu ni haitte, koko ni shuu-to kuru>*

tube P$_{LOC}$ entering, here P$_{LOC}$ ONOM-PART come

'He goes into the trunk, and comes 'whoosh!' over here.'

(5.61) <J4c [6]:   *jabun-jabun-tte kawa ni okkochita>*

ONOM-TE river P$_{LOC}$ fell

'He fell splashing into the river.'

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[16] The verb *naru* is often translated as 'get' or 'become', but here and elsewhere in the data, it often corresponds to the English use of *go* in cases such as 'The car went 'Bang!', and as used in the previous example.

Before bringing to a close the description of trajectory in PP [PATH] in the absence of geometric V [PATH], the problematic case of *nigeru* 'flee' deserves a mention. As discussed above, this was classified as a MANNER verb, as it places no restrictions on the type of PATH specified by its complement. The complement can be GOAL as well as SOURCE, as shown below.

(5.62) <J3b [13]:   *o-saru-san oka no ue ni nigeteru*>

HON-monkey-TITLE hill GEN top P$_{LOC}$ flee-PROG

'The monkey is running away to the top of the hill.'

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

outside P$_{LOC}$ flee-PST

'He ran outside.'

(5.64) <J6b [12]:   *dōkutsu no soto e nigete iku*>

cave GEN outside to fleeing go

'He's running away out of the cave.'

As a postscript to this subsection, I give some examples of the utterance-type in which V [MANNER] (either with or without a deictic V [PATH]) assigns accusative case to the direct object, thus creating as structure that falls on neither side of the typological dichotomy (as pointed out in the introduction to Section 5.2).

(5.65) <J4e [6]:   *kawa o oyoide kita*>

river ACC swimming came

'He came swimming across the river.'

(5.66) <J5e [6]:   *kawa o oyoida*>[17]

river ACC swam

'He swam across the river.'

(5.67) <J4a [3]:   *hashi no shita o hashiteru*>

bridge GEN underneath ACC run-PROG

'He's running under the bridge.'

(5.68) <J5c [4]:   *ishi no ue o tobu*>

stone GEN top ACC leap

'He leaps over the rock.'

(5.69) <J7c [14]:   *saru-san wa oka o korogatte itta*>

monkey-TITLE TOP hill ACC rolling went

'The monkey rolled down the hill.'

In such cases, I take precise trajectories (i.e. 'across to the other side', 'under and out the other side', 'over to the other side', 'down to the bottom') to be inferred rather than encoded in either lexicon or syntax (see Section 6.4 for further discussion).

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[17] Whilst (5.66) is fully grammatical, note with reference to example (5.65) that deictic V [PATH] alone cannot assign case here e.g. *Kawa o kita* – river ACC came – 'He came the river'.

This descriptive summary of the Japanese results has shown that whilst Talmy's typology was very much confirmed in terms of general speaker preferences, Japanese grammar encompasses a wide variation in the expression of spatial trajectories, including those of the opposite typological conflation pattern. The range of variation in Japanese, in the order presented, serves a comparative purpose as the other two sets of data may be examined in the light of these findings. We now turn to consideration of the French results.

5.2.2 French results
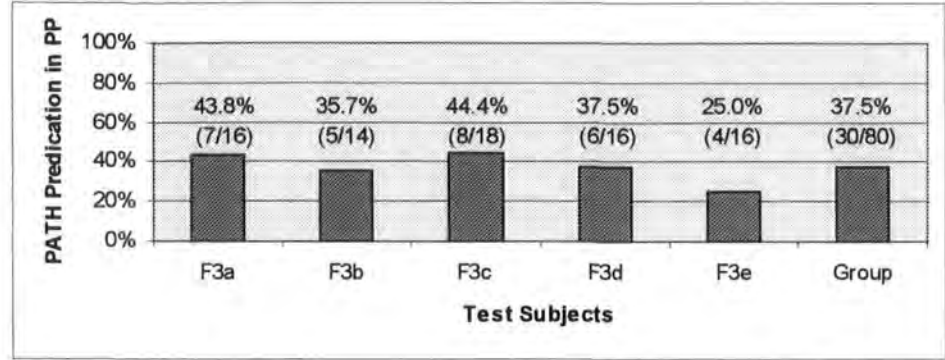
Figure 5.8. *Group F3. Experiment 1: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
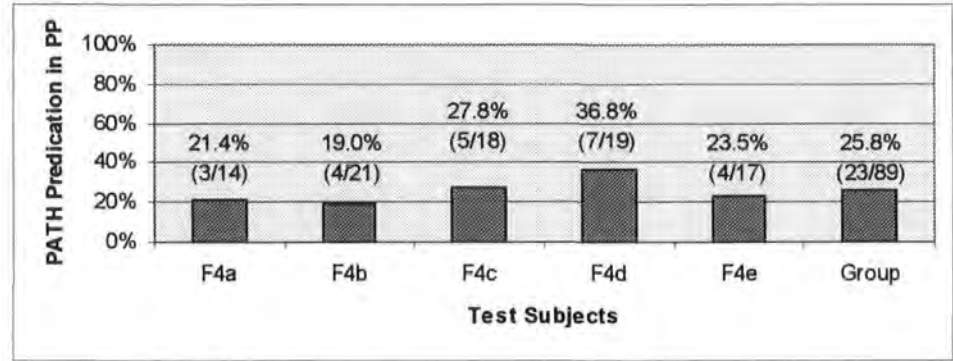
Figure 5.9. *Group F4. Experiment 1: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
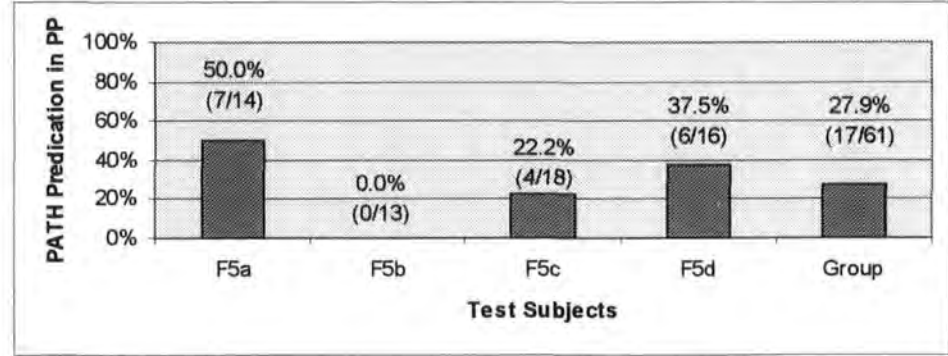
Figure 5.10. *Group F5. Experiment 1: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
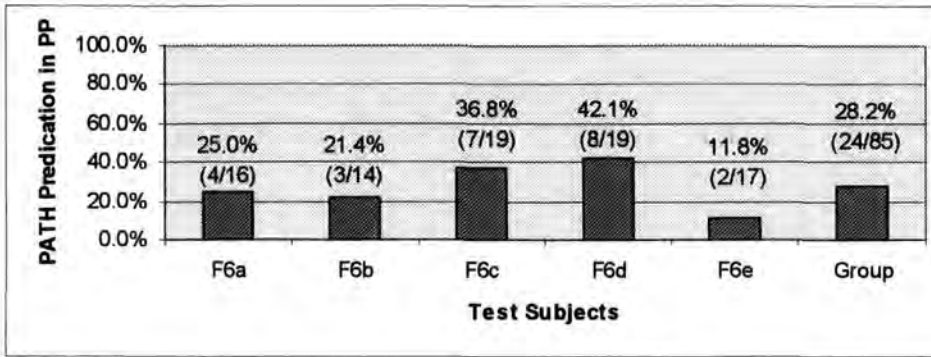
Figure 5.11. *Group F6. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
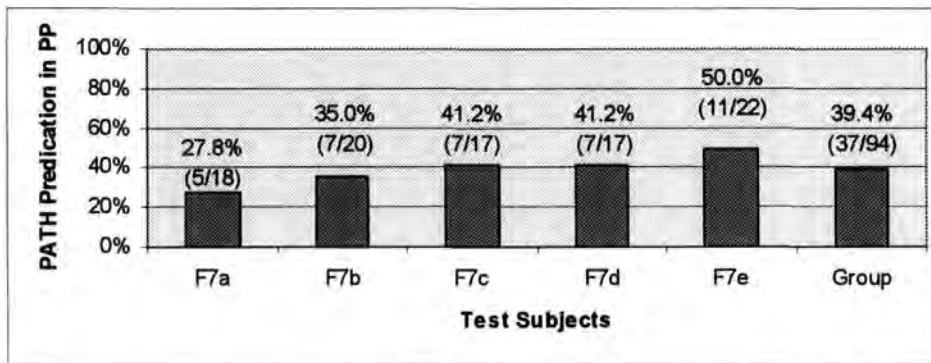
Figure 5.12. *Group F7. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
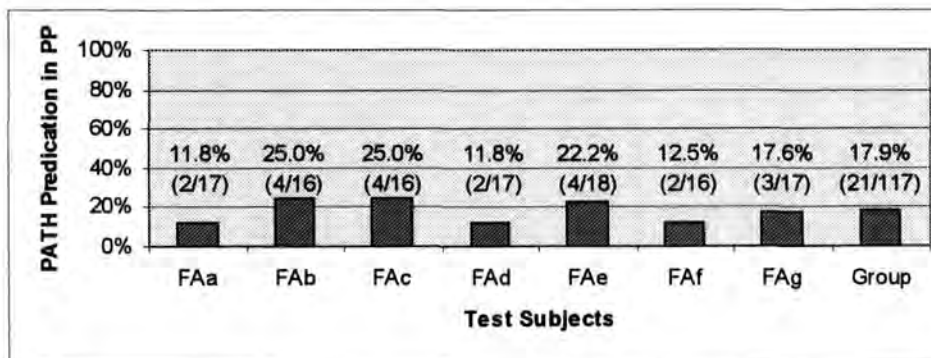
Figure 5.13. *Group FA. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
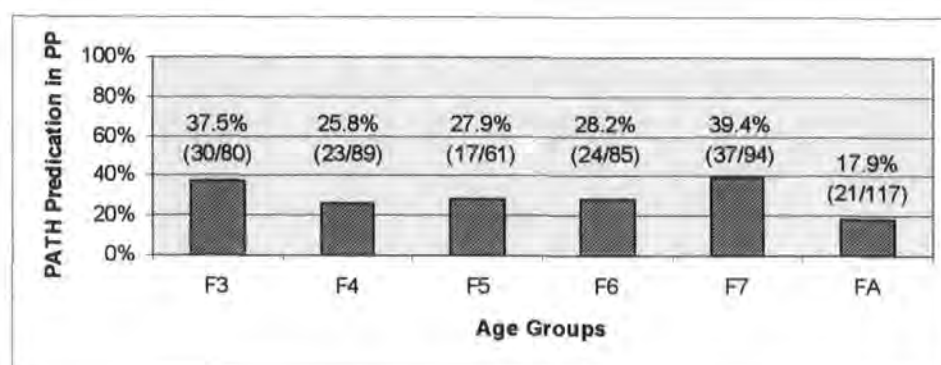
Figure 5.14. *French responses by age group. Experiment I: Mean for each age group of instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication. Actual numbers are shown in parentheses.*

Just as in the case of the Japanese results, the French responses show no developmental changes in preferences for the expression of PP [PATH] in the absence of geometric V [PATH] from the 3- year-olds to the 7-year-olds. As shown in Figure 5.14 above, the average preference levels of Group F3 and Group F7 were almost identical: 35.7% (30/80) and 39.4% (37/94), respectively. Again, rather like in the Japanese experiment, the adults produced a lower number of such utterances (17.9%: 21/117), though less markedly so, and I suggest that this may be for the same reason. Given that adult informants judged the child utterances to be grammatical in this respect, the adults can be said to have differed in stylistic preference, adopting a slightly more formal register and adhering to more prescriptive standards under the same experimental conditions. In terms of what is possible in the grammar and what is not, there appears to be continuity between children and adults.

However, unlike the Japanese responses, the French results are much harder to accommodate in a binary S-framed / V-framed typology. Whilst it is true that the typological prediction holds if interpreted very loosely (i.e. most French speakers encode trajectories in geometric V [PATH] most of the time), there remains a striking contrast with Japanese. As discussed in more detail in Section 5.2.4, in respect of PP

[PATH] in the absence of geometric V [PATH], the average group responses of the Japanese children range from 12.5% to 20%, whilst the average group responses of the French children range from 25.8% to 39.4%; in other words, the Japanese and French groups have discrete response ranges. In this light, French appears to be harder to categorize as a V-framed language in terms of speaker preferences (the original focus of the typology), and the possibility of restating the typology in terms of a formal parameter thus seems more remote. There was considerable variation in the sets of individual responses. The individuals with the lowest proportions of PP [PATH] in the absence of geometric V [PATH] were J5b at 0%, and F6e and FAa both at 11.8%, whilst those with the highest proportions were F3c at 44.4%, and F5a and F7e, both at 50%. The mean average of instances of PP [PATH] in the absence of geometric V [PATH] across the French children was 32.2% (131/407).

There was also considerable lexical and syntactic variation in all age groups. As we shall see, verbal predication is much less complex in French than in Japanese in respect of argument structure (no compounding, no complex predicates with deictics, no V [MANNER] assigning accusative case to GROUND objects, nor onomatopoeia carried on light verbs assigning case to GROUND objects), but PP structure exhibits more variation in French than in Japanese (co-occurrence of P [PATH] and P [LOC] above the GROUND object, locative N used with or without the definite article, and intransitive PP in 'satellite' position). The remainder of this section provides an overview of the combinatorial possibilities attested in the data, considering expression of trajectories in three general structural types, as in the previous section: (i) only in V [PATH]; (ii) in both V [PATH] and PP [PATH]; and finally (iii) only in PP [PATH].

The most economical expression of trajectory was in intransitive responses with geometric V [PATH], as can be shown with examples from the uphill scene, the tree-sliding scene, and the river scene.

(5.70)   <F3a [7]:   *il monte*>

he goes-up

'He goes up.'

(5.71)   <F4e [2]:   *il descend*>

he goes-down

'He goes down.'

(5.72)   <F7c [6]:   *il traverse*>

he crosses

'He goes across.'

There were also several instances of geometric V [PATH] assigning accusative case to GROUND objects. Case is not directly visible on full NPs in French, though I follow the standard assumption in generative syntax that case is covertly present (accusative case does show up overtly if the GROUND object is pronominalized). Geometric V [PATH] with direct object was attested in the context of three particular trajectories, as shown in the following examples.

(5.73) <F4d [2]:   *il descend l'arbre>*

he goes-down the-tree

'He goes down the tree.'

(5.74) <F5a [13]:   *il monte la colline>*

he goes-up the hill

'He goes up the hill.'

(5.75) <F6a [6]:   *il traverse la rivière>*

he crosses the river

'He crosses the river.'

That there were far fewer examples of this structure in French than in Japanese is certainly in part due to the fact that several common Japanese LIs expressing trajectories correspond to either lexical gaps or low-frequency LIs in French, with the concept being expressed periphrastically through combinations of V and P, as illustrated in Table 5.1.

Table 5.1. *Examples of Japanese V [PATH] corresponding to lexical gaps in (colloquial) French.*

Japanese	French
moguru 'go-under (and stay there)'	*aller en dessous* go P_{LOC} underneath 'go-under (and stay there)'
kuguru 'go-under (and out the other side)'	*passer en dessous* go-via P_{LOC} underneath 'go-under (and out the other side)'
koeru 'go-over'	*passer par-dessus* go-via via above 'go over'

There appear to be no French equivalents to the first two Japanese verbs, and although *koeru* 'go-over' may sometimes be translated quite accurately by *franchir* 'cross-over', this is not so in all contexts.[18] Overwhelmingly, French responses to the rock scene in the Monkey Book express MANNER in the main verb (*sauter* 'jump'), and PATH in the PP (e.g. *par-dessus* - via-above – 'over'; *au dessus* – P_{LOC}–the above – 'over', etc.), a pattern to be discussed in detail below.

The Japanese data allowed other variations on V [PATH] assigning accusative case, such as (i) complex predicates with both geometric and deictic V [PATH]; (ii) V [PATH] assigning accusative case to locative N; (iii) and compound verbs, but these appear to be impossible in French. Respective hypothetical examples are shown below.

(5.76) *Il est venue en descendant la colline   (*on the intended reading)

       he AUX came P coming-down the hill

       'He came down the the hill.'

(5.77) *Il a passé le dessus du rocher[19]   (*on the intended reading)

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[18] Examples such as *franchir une montagne* – cross-over a mountain - 'cross over a mountain', and *franchir la ligne d'arrivée* – cross-over the line of-arrival - 'cross the finishing line' are quite common, but in the context of jumping over an obstacle, frequency of use evaporates. It may be that *franchir* requires contact with a surface (VIA-on rather than VIA-above), although here too there are (perhaps metaphorical) exceptions. In any case, one cannot ever replace *sauter par-dessus* 'jump over' with a single LI in French.

[19] The most plausible auxiliary here is *avoir* 'have' rather than *être* 'be'. Geometric PATH verbs take *avoir* 'have' with a direct object in the absence of a PP. There may be an idiomatic exception to the rule of no accusative case with locative N, as seen in the following example:

<FAg [19]:   *il grimpe le long du tronc pour arriver à sa maison*>
                 he climbs the length of-the trunk in-order-to arrive PLOC his house
                 'He climbs along the trunk to get to his house.'

The phrase *au long de* - P_{LOC}–the length of - 'along' is also possible. With just the article, it looks as if this may be accusative, but contrary to expectations the GROUND object need not be wholly affected (in French you can 'run the length of a river' without running the whole length); an alternative analysis is that this phrase is an adjunct.

he AUX passed the above of-the rock

'He went over the rock.'

(5.78) *Il a nagetraversé la rivière.

he AUX swim-crossed the river

'He swam across the river.'

Despite the lack of verbal compounding, French does exemplify the other means of expressing PATH and MANNER in a single predicate: lexical conflation. The following utterances show geometric V [PATH, MANNER] assigning accusative case to direct objects.

(5.79) <F6e [19]:   *il grimpe l'arbre pour aller dans sa maison>*

he climbs-up the-tree in-order-to go in his house

'He climbs up the tree to go into his house.'

(5.80) <FAd [14]:   *il dévale la colline en roulant>*

he hurtles-down the hill P rolling

'He hurtles down the hill.'

We now turn to the second general structural type, in which PATH is expressed in *both* geometric V and PP. This structural type was extremely common in French, and represents the most typical means of expressing trajectories in this data set. In the first examples of this type, geometric V [PATH] was merged with a 'simple' PP

containing only P plus GROUND object, and the same spatial geometry was encoded in V and P.

(5.81) <F3b [9]:   *il rentre dans la caverne>*

he enters in the cave

'He goes into the cave.'

(5.82) <F5b [12]:   *il sort de la caverne>*

he leaves from the cave

'He comes out of the cave.'

(5.83) <FAf [16]:   *il repasse par le tronc d'arbre>*

he again-goes-via via the trunk of the tree

'He goes through the tree-trunk again.'

As can be seen in the utterances cited below, the preposition may not only express the trajectory encoded in the verb, but may elaborate on that trajectory.

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

he goes-up in his house

'He goes up into his house.'

(5.85) <F4b [13]:   *il monte sur la colline>*

he goes-up on the hill

'He goes up onto the hill.'

(5.86) <F7a [2]:   *il a voulu rattraper sa banane, alors il est descendu de sa*

                          maison en glissant sur les fesses>

                          he AUX wanted get-back his banana, so he AUX went-down

                          from his house P sliding on the buttocks

                          'He wanted to get his banana back, so he slid down from his

                          house on his bum.'

(5.87) <F7c [3]:   *là il passe sous un pont>*

                          there he goes-via under a bridge

                          'There, he goes under a bridge (and out the other side).'

(5.88) <F4a [5]:   *il passe dans le tronc d'arbre>*

                          he goes-via in the trunk of the tree

                          'He goes through the tree-trunk.'

This kind of elaboration of trajectory in the PP is also attested with geometric V [PATH, MANNER].

(5.89) <F6d [19]:   *il grimpe...dans sa cabane>*

                          he climbs-up...in his hut

                          'He climbs up into his tree-house.'

(5.90) <F6b [6]:   *il plonge dans la rivière>*

                          he dives-down in the river

                          'He dives down into the river.'

Another variation on the expression of PATH in both geometric V and PP is found in cases where the PP contains a locative N specifying geometric properties of the GROUND. Examples of this category in French include *haut* 'top', *bas* 'bottom', *dessus* 'above', *dessous* 'underneath', *travers* 'crosswise' etc. These locative N are somewhat difficult to pin down, as they appear in various syntactic configurations, and unlike their Japanese counterparts are sometimes categorially indeterminate between N and P. At this juncture I shall assume that locative N is a valid syntactic entity in French, with status determined entirely by syntactic environment. Thus a word such as *dessous* is considered a P when it used as in intransitive adverbial e.g. *être dessous* 'be underneath', or when it directly selects a GROUND object e.g. *dessous le pont* – underneath the rock - 'underneath the bridge'. However, it is considered a locative N when it is dominated by a DP and / or fails to directly assign case, thus necessitating the grammatical P *de* to mark the GROUND object.. e.g. *le dessous des pieds* – the underneath of-the feet - 'the souls of one's feet'; *le dessous des bras* – the underneath of-the arms - 'the underside of one's arms'; *une jupe au dessous du genou* – a skirt P_{LOC}–the underneath of-the knee – 'a skirt below the knees'; *en dessous du pont* – P_{LOC} underneath of-the bridge – 'under the bridge'. Further discussion is reserved for Section 6.2.

Thus *dessous* 'underneath' and *bas* 'bottom' in (5.91) and (5.92) are characterized as locative N due to the presence of *de*, which intervenes between the locative N and the GROUND object; and *haut* 'top' in (5.93) is categorized as such as it is dominated by D, as well as requiring *de* for indirect merger with the GROUND object.

(5.91) <F5b [3]:   *il passe en dessous du pont>*

                   he goes-via P_{LOC} underneath of-the bridge

                   'He goes under the bridge (and out the other side).'

(5.92) <FAe [14]:   *il dégringole en bas de la colline>*[20]

                   he tumbles-down P_{LOC} bottom of the hill

                   'He tumbles down to the bottom of the hill.'

(5.93) <FAg [7]:   *il grimpe sur le haut de la colline>*

                   he climbs on the top of the hill

                   'He climbs onto the top of the hill.'

Yet another variation on the combination of geometric V [PATH] with PP [PATH] is found in cases where the verb is followed by what are here treated as intransitive PP, elsewhere in the literature described as adverbial PP, or verb particles, or satellite phrases (for justification of the intransitive PP analysis, see Section 9.2). Unlike in Japanese, French P may appear without the GROUND object, as in the following instances.

(5.94) <F4e [16]:   *il rentre dedans>*

                   he enters inside

                   'He goes in.'

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[20] *Dégringoler* 'tumble down' in (5.92) differs from *dévaler* 'hurtle down' in (5.80) in that the former requires an animate subject and specifies a tumbling motion, whilst the latter does not place restrictions on the subject or the manner of motion, indicating only downward motion at speed. Thus *dévaler*, but not *dégringoler*, can be used to describe, say, a runaway train hurtling down a slope.

(5.95) <F5c [16]:   *il passe dedans*>

he goes-via inside

'He goes through.'

(5.96) <F7d [8]:   *il tombe en bas*>

he falls P$_{LOC}$ bottom

'He falls {down / to the bottom}'

There are also cases in which the path is expressed by means of two prepositions: in such cases, P [PATH] always precedes P [PLACE], e.g.

(5.97) <F3b [5]:   *il passe par dedans*>

he goes-via via inside

'He goes through.'

The following paradigm, drawn from the data, exemplifies the range of possibilities with *passer* 'go-via' and *dessous* 'underneath', in the absence of an overt GROUND.

(5.98) <F3a [18]:   *il passe dessous*>

he goes-via underneath

'He goes under it (and out the other side).'

(5.99) <F6a [3]:   *il passe par dessous*>

he goes-via via-underneath

'He goes under it (and out the other side).'

(5.100) <F7a [3]:   *il passe en dessous>*

he goes-via P_{LOC} underneath

'He goes under it (and out the other side).'

(5.101) <F6a [3]:   *il passe par en dessous>*

he goes-via via P_{LOC} underneath

'He goes under it (and out the other side).'

Again P [PATH] precedes P [PLACE]: the ordering of *par* 'via' and *en* 'P_{LOC}' in example (5.101) is fixed. *Dessous* is classed as P in examples (5.98-5.99), by the criteria of *de*–insertion when these examples are transitivized (*Il passe dessous {*du / le} pont* – he goes-via underneath {of-the / the} bridge – 'He goes under the bridge'[21]; *Il passe par dessous {*du / le} pont* - he goes-via via-underneath {of-the / the} bridge – 'He goes under the bridge'). By the same criteria, *dessous* is classed as a locative N in examples (5.100-5.101) (*Il passe en dessous {du / *le} pont* – he goes-via underneath {of-the / the} bridge – 'He goes under the bridge').[22] Categorial status in (5.101) is assumed on the basis of (5.100). A transitive variation on (5.101) sounds contrived and unacceptable, and the grammaticality is unclear. Note that another common, and much more concise, variation is *Il passe sous le pont* – he goes-via

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[21] Some speakers freely allow *{aller / passer} dessous le pont*, whilst others strongly prefer *sous* in this context. However, it remains the case that *{aller / passer} dessous du pont* is ungrammatical for all speakers. It is this contrast which is the issue. Despite unclear judgements from informants, *dessous* as a straightforward preposition is attested throughout the age range in this data, as well as in dictionary definitions and examples, e.g. *Il a tiré un livre de dessous la pile* - he AUX pulled-out a book from underneath the pile - 'He took a book from the bottom of the pile' (Rey, 1988). The latter appears to be a straightforward case of P [PATH] preceding P [PLACE].

[22] This is, if truth be told, a hard one to call. Whilst most adult and child responses with *en dessous* in a transitive context contained *de*, and whilst all adult informants insisted that *de* was obligatory in this context, several speakers allowed direct selection of the GROUND object, e.g. <F7d [3]: *il passe en dessous le pont>*, making *en-dessous* a complex preposition (rather than P^N[LOC]) by definition in the grammars of these speakers.

under the bridge - 'He goes under the bridge'. However, the other transitive examples were all, in fact, attested in the data.

As a final note on the combination of geometric V [PATH] and PP [PATH], like in Japanese there appears to be a choice in some cases between the assignment of accusative case and PP-selection, given the same combination of verb and GROUND object, as shown in this pair of examples from the tree-climbing scene.

(5.102) <FAc [19]: *il monte l'arbre et il rentre dans sa maison*>

                he goes-up the-tree and he enters in his house

                'He goes up the tree and into his house.'

(5.103) <FAf [19]: *il remonte à l'arbre...*>

                he again-goes-up P_{LOC} the tree

                'He goes up the tree again...'

This is also the case with V [PATH, MANNER]: *grimper l'arbre* – climb the-tree – 'climb the tree' and *grimper à l'arbre* – climb P_{LOC} the-tree – 'climb the tree' are equally acceptable in the same context.

Finally, we consider instances of PP [PATH] in the absence of geometric V [PATH]. Recall that according to typological predications, this configuration should be rare or non-existent in a strict V-framed language. Yet it occurred in 32.2% (131/407) of all French child utterances, 17.9 % (21/117) of adult utterances, and up to 50% in individual subject responses. Indeed, these figures emerged despite that fact that several MANNER verbs were excluded, being coded as [PATH, MANNER] and counted as geometric PATH predicates, e.g. *grimper* 'climb-up', *dégringoler* 'tumble-down,

dévaler 'hurtle-down', *plonger* 'dive-down', *tomber* 'fall'. Two main types of such utterances will be exemplified: (i) V [MANNER] with PP [PATH], and (ii) deictic V [PATH] with the trajectory spelled out in PP (with or without an adjunct V [MANNER]).

As with the Japanese examples, V [MANNER] with directional PP is often supposed ungrammatical or ignored by prescriptive grammars, yet it is consistently attested in colloquial speech. Thus multiple instances are cited below, grouped by the trajectories they describe, and although this structure was found in all age groups, examples are generally taken from older children and adults, to show that this is not restricted to the younger children.

DOWN:

(5.104) <FAb [14]:   *il a roulé en bas de la montagne*>

                 he AUX rolled P_{LOC} bottom of the mountain

                 'He rolled down the mountain.'

(5.105) <FAc [2]:   *il glisse en bas de l'arbre*>

                 he slides P_{LOC} bottom of the-tree

                 'He slides down the tree.'

IN:

(5.106) <F7c [9]:   *il continue à le poursuivre, il court dans la caverne*>

                 he continues to him pursue, he runs in the cave

                 'He keeps chasing him, he runs into the cave.'

(5.107) <FAe [16]:   *il rampe dans le tronc d'arbre...et il ressort*>

he crawls in the trunk of-tree...and he again-leaves

'He crawls into the tree-trunk...and he comes out again.'

OUT / FROM:

(5.108) <F7c [2]:   *il glisse de son tronc d'arbre et comme c'est à moitié un*

toboggan...donc il descend pour aller plus vite>

he slides from his trunk of-tree and as it-is P half a slide...so he

goes-down in-order-to go more quickly

'He slides (down) from his tree-trunk and as it's a bit like a

(playground) slide...so he goes down (like that) to go faster.'

(5.109) <FAe [2]:   *il a glissé de sa cabane [...] pour aller vers le bas de l'arbre*>

he AUX slid from his hut [...] in-order-to go towards the

bottom of the-tree

'He slid from his tree-house [...] to go down the tree.'

OVER:

(5.110) <F6e [4]:   *il s'envole...non...il saute par dessus le rocher*>

he REFL-flies-away...no...he jumps via-above the rock

'He flies away...no...he jumps over the rock.'

(5.111) <FAb [4]:   *il saute au dessus du rocher>*

he jumps P_{LOC}-the above of-the rock

'He jumps over the rock.'

UNDER:

(5.112) <F5d [18]:   *il court en dessous>*[23]

he runs P_{LOC} underneath

'He runs under it.'

(5.113) <FAc [18]:   *il court sous le pont>*

he runs under the bridge

'He runs under the bridge.'

ACROSS:

(5.114) <F7d [15]:   *il nage de l'autre côté>*

he swims P_{LOC} the-other side

'He swims across.'

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[23] Adult informants agreed that, on reflection, the preferred interpretation of forms such as (5.112) and (5.113) is that the monkey ran under the bridge and stayed there, rather than coming out the other side, i.e. the PP standardly receives a goal interpretation. In order to ensure the interpretation of 'to the other side', forms such as *passer* 'go-via' or *par dessous* 'via-underneath' must be used. However, the cited forms were attested throughout the age range.

(5.115) <FAf [6]:   *il nage à travers la rivère>*[24]

he swims P_{LOC} crosswise the river

'He swims {across / through} the river.'

The other two trajectories examined in this investigation, UP and THROUGH, were expressed either with V [PATH] or V [PATH, MANNER] (UP: *monter* 'go-up', *grimper* 'climb-up'; THROUGH: *passer* 'go-via', *traverser* 'go-across'), and in addition THROUGH was often split into sub-events (going inside, and/or being inside, and/or coming out again: see Section 6.7 for discussion).

As alluded to earlier, it is worth noting that in the rock scene, V [MANNER] plus PP was by far the preferred means of expressing the trajectory. The verb *sauter* 'jump' was used with a PP [PATH] in 45/45 responses in the child data, and 13/14 responses in the adult data. The exception was <FAf [17]: *il passe par dessus le rocher>* - he goes-via via-above the rock - 'He goes over the rock'. There were no instances of this trajectory expressed entirely in geometric V [PATH].

We now turn to the second type of utterance classed as PP [PATH] in the absence of geometric V [PATH], in which the trajectory is spelled out in a PP supported not by a V [MANNER], but by a deictic V [PATH] ('come', 'go'). The following are representative responses, including three contextually different utterances with *aller dans* 'go in(to)', as this was by far the most common example of this type.

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[24] This response was unusual, but is apparently grammatical. As discussed in Section 3. 2, *à travers* means 'through' or 'across' with the sense of an obstacle having been overcome, or a medium traversed, a sense noted in standard dictionary definitions. For example, one can say *à travers la foule* - P_{LOC} crosswise the crowd - 'through the crowd'. Thus the intended nuance appears to be 'through the water, with difficulty'. The same speaker appeared to reject this same form in the same context, however, in a comment made during Experiment II (see Section 8.2.2).

(5.116) <F7e [8]:   *il va en bas>*

he goes P_{LOC} bottom

'He goes down.'

(5.117) <F4d [3]:   *il court...et il va sous le pont>*

he runs...and he goes under the bridge

'He runs...and he goes under the bridge.'

(5.118) <F7d [6]:   *il nage pour aller de l'autre côté>*

he swims in-order-to go P_{LOC} the-other side

'He swims to get across.'

(5.119) <F7d [9]:   *il va dans la caverne>*

he goes in the cave

'He goes into the cave.'

(5.120) <F6d [6]:   *il va dans l'eau et il nage...>*

he goes in the-water and he swims

'He goes into the water and he swims...'

(5.121) <F7e [16]:   *il va dedans et il ressort>*

he goes inside and he again-leaves

'He goes inside and he comes out again.'

Other examples of PP [PATH] in the absence of geometric V [PATH] may be given to illustrate the phenomenon of co-occurrence of *jusque* 'as far as / until' and P [LOC], invariably in that order. *Jusque* might be analysed as another example of P [PATH] dominating P [PLACE], with the same function as English *to*, although its status is controversial (see Section 6.3 and 11.5.1 for further discussion).

(5.122) <FAb [2]:   *il glisse jusqu'en bas de l'arbre>*

he slides until-P$_{LOC}$ bottom of the-tree

'He slides to the bottom of the tree.'

(5.123) <F3c [12]   *il court jusqu'à la colline>*

he runs until-P$_{LOC}$ the hill

'He runs to the hill.'

This use of *jusque*^PP is not restricted to PPs headed by *en* (P$_{LOC}$) and *à* (P$_{LOC}$), which lack 2D or 3D spatial geometry, but is also found with *dans* 'in'.

(5.124) <FAf [19]:   *il remonte à l'arbre jusque dans sa maison>*

he again-climbs P$_{LOC}$ the-tree until in his house

'He climbs back up the tree into his house.'

This descriptive summary of the French results casts doubt on the applicability of the S-framed / V-framed typology as applied to this language. Whilst it is true that approximately two-thirds of responses encoded geometric PATH in V, this usually involved the simultaneous expression of PATH in PP, and the other third of the

responses had no geometric V [PATH] at all. The fact that *grimper* 'climb', *tomber*
'fall' etc. were classed as V [PATH, MANNER] renders this interpretation even stronger:
if they had been classified as V [MANNER], the results as a whole would have
appeared more 'S-framed'. At best this is a very weak confirmation of V-framed
preference in French. As for the possibility of recasting the typology in terms of a
parameter reflecting grammatical possibilities, the range of lexical and syntactic
variation attested constitute a formidable hurdle for the Path Parameter Hypothesis.
We now turn to consideration of the English results.

5.2.3   English results
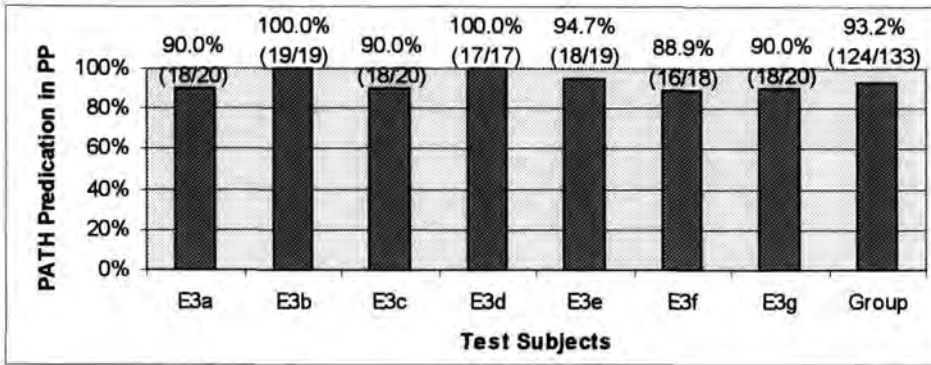
Figure 5.15. *Group E3. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
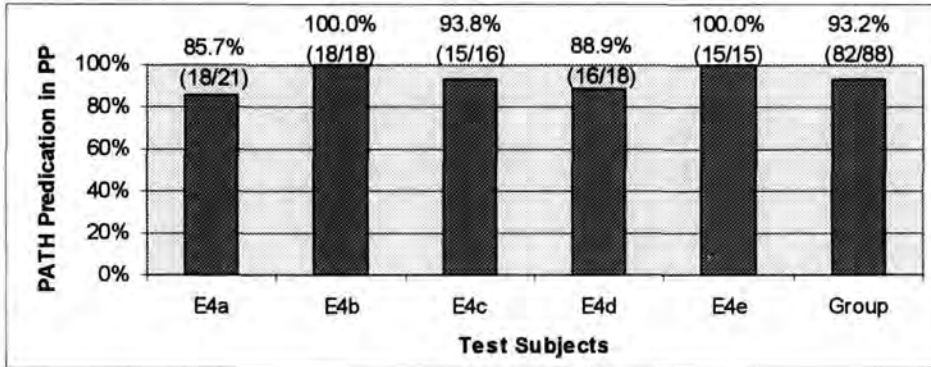
Figure 5.16. *Group E4. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
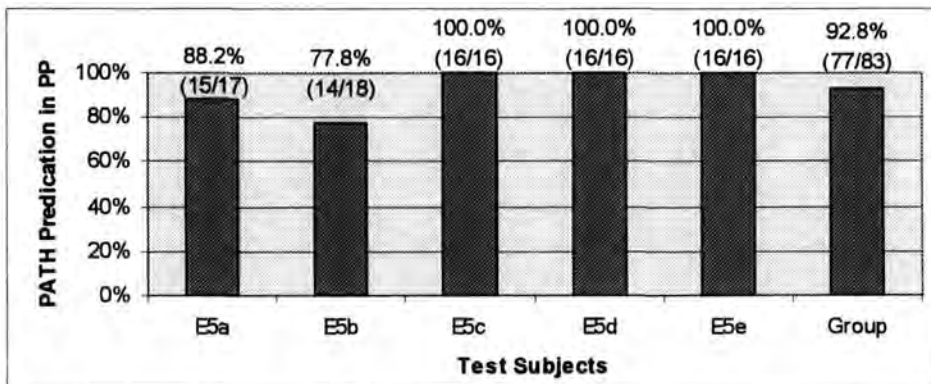
Figure 5.17. *Group E5. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
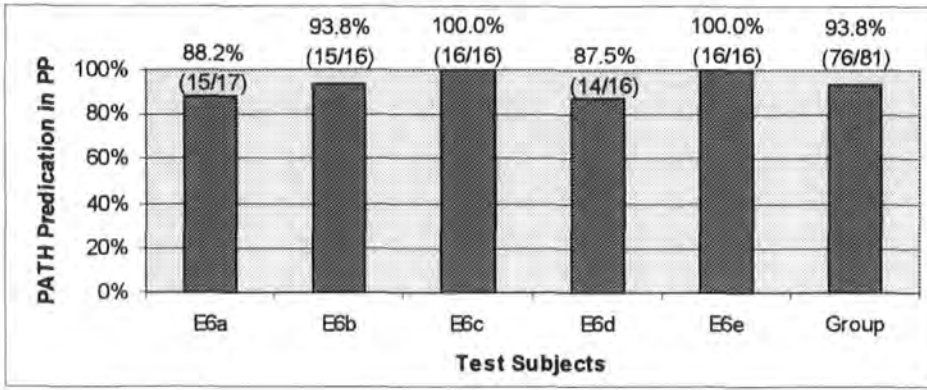
Figure 5.18. *Group E6. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
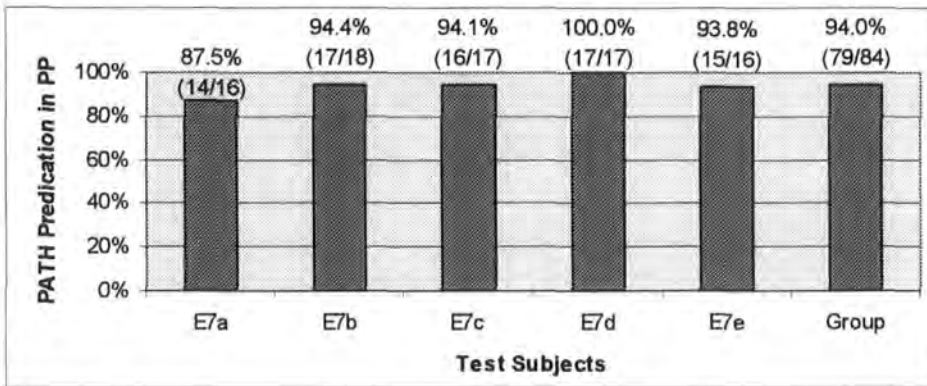
Figure 5.19. *Group E7. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
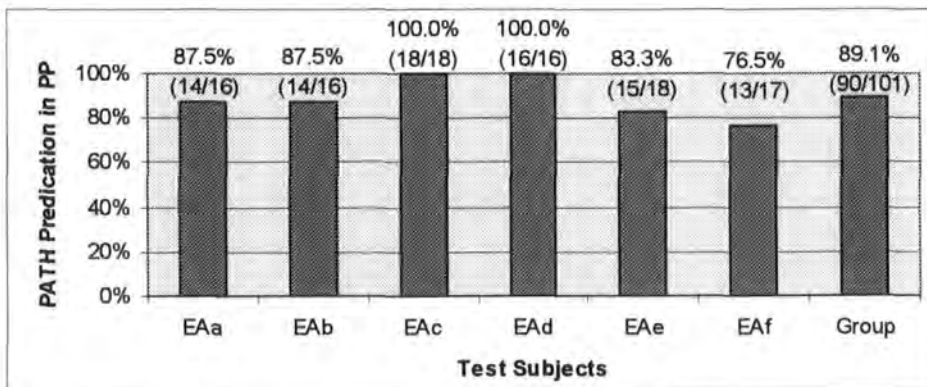
Figure 5.20. *Group EA. Experiment I: Instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of PATH predication by each individual test subject. Actual numbers are shown in parentheses.*
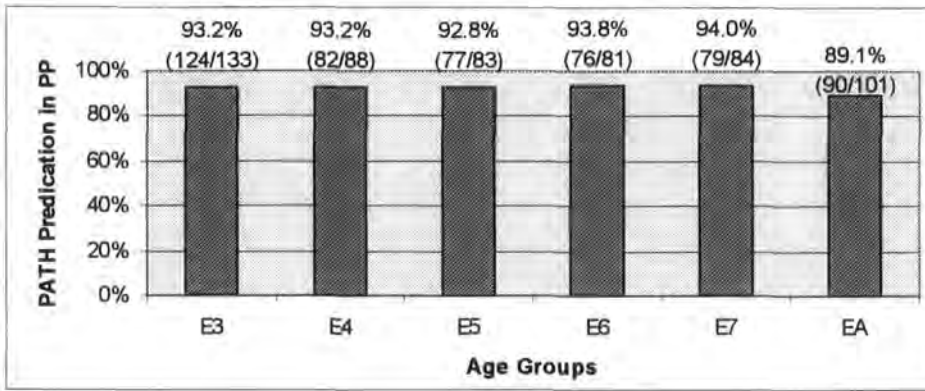
Figure 5.21. *English responses by age group. Experiment I: Mean for each age group of instances of PP [PATH] in the absence of geometric V [PATH], over the total number of instances of* PATH *predication. Actual numbers are shown in parentheses.*

Echoing the lack of developmental change in the previous two studies with respect to lexicalization preferences, the English results show near-identical levels of preference for PP [PATH] in the absence of geometric V [PATH] in all age groups. As shown in Figure 5.21 above, the range of averages by age group was very tight indeed, from 89.1% (90/101) in Group EA to 94% (79/84) in Group E7. As such, these results overwhelmingly confirm Talmy's (1985; 1991; 2000b) typological predictions for English. The range of individual variation was also relatively narrow, so much so that each individual speaker's rhetorical style could plausibly be assigned the label 'S-framed'. The individuals with the lowest proportions of PP [PATH] in the absence of geometric V [PATH] were EAf at 76.5% (13/17) and E5b at 77.8% (14/18), whilst those with the highest proportions were E3b, E3d, E4b, E4e, E5c, E5d, E5e, E6c, E6e, E7d, EAc and EAd, all at 100%. The mean average of instances of PP [PATH] in the absence of geometric V [PATH] across the English children was 93.4% (438/469).

The expression of trajectories in the English elicited production data will now be described in the terms of the same general structural types used in the previous

sections: (i) only in V [PATH]; (ii) in both V [PATH] and PP [PATH]; and finally (iii) only in PP [PATH].

First, let us consider structures involving geometric V [PATH] without PP [PATH]. The simplest expression of trajectory in both the Japanese and French data was in the form of intransitive V [PATH]. In all 570 instances of PATH predication in English, there were no examples of this type.[25] Another common means of expressing trajectory in Japanese and French was transitive geometric V [PATH]. In the English data, only one verb, *cross*, was used in this way, and in only 1/54 of the child responses to the river scene.[26]

(5.125) <E5b [15]:   *he crosses the river*>

The same verb was found in the same transitive structure in 3/12 adult responses to the river scene (EAb, EAe, EAf).

Another configuration of geometric V [PATH] without PP that was attested in the Japanese data appears to be impossible in English: the combination of geometric V [PATH] with deictic V [PATH] to form a complex predicate. Thus the constructed example in (5.126) is completely ungrammatical, and this is so for all combinations of this type (i.e. with predicates such as *enter, leave, ascend, descend* etc.).

(5.126) *He went crossing the river.

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[25] It should be clear, however, that at least for the adult subjects, this finding is relevant only to speaker preferences and the predictions of Talmy's typology, and not to the issue of grammatical possibilities. The verbs *enter* and *cross*, for example, could have been found in this form.

[26] Again, this is not an indicator of grammaticality: *enter, scale, traverse* etc. all select direct objects.

Unlike in Japanese, but as in French, there was no productive verbal compounding; however, in all three languages several verbs were classed as conflating both PATH and MANNER in a single LI. Whilst in Japanese and French such verbs (e.g. Japanese *noboru* 'climb-up', *korogeochiru* 'fall-down'; French *grimper* 'climb-up', *dégringoler* 'tumble-down') are able to assign accusative case, English verbs of this type obilgatorily select a PP [PATH], and so are considered in the context of that configuration.

The second general structural type to be discussed is the expression of trajectory in both V [PATH] and PP [PATH]. As we have seen, there was only one 'basic' geometric V [PATH] in the data, *cross*, and all four instances involved direct selection of the GROUND object. However, as in Japanese and French, there appears to be a choice in some cases as to whether a geometric V [PATH] directly assigns accusative case or selects a PP, and this is true of English *cross*. Given the paucity of geometric V [PATH] in the English data it is unsurprising that such a pair of examples could not be found, but note the following constructed example.

(5.127) He crossed (over) the river.

Such choice in complement selection varies from verb to verb in each language, and is a clear case of lexical rather than typological variation.

There were three verbs classed as V [PATH, MANNER] which combined with PP [PATH] to express the trajectory: *fall*, *topple*, and *tumble*.[27] The verb *fall* was found most often with the P *down*, but also with *off*, and *in* e.g.

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[27] The categorization of *tumble* as P [PATH, MANNER] is tentative. It is not absolutely clear whether a downward PATH is encoded, or whether it is implied. When considering possible trajectories, *tumble* at first appears to have the same restriction as *fall* – it is possible in any direction but up, and always involves a final downward motion. You can *stumble* without falling, but you cannot *tumble* without

(5.128) <E6a [8]: *he falls down the hill>*

(5.129) <E4d [8]: *he falls off the hill and does a twirly thing...gets twirled over,*

just like we do in P.E.>

(5.130) <E4a [15]: *falls in the river...and then he gets out>*

In the first example, the verb and the preposition encode the same spatial geometry; in

the other two examples, the trajectory is elaborated by the preposition: *off* and *in*

indicate SOURCE and GOAL geometry, with the concept of DOWN expressed solely in

the verb (cf. French examples 5.81-5.90). The verb *topple* appeared in responses to

the river scene, e.g. (5.131), and the downhill scene, e.g. (5.132).

(5.131) <E3a [15]: *topples back in>*

(5.132) <E6a [8]: *he topples off the hill>*

The verb *tumble* appeared several times, always with the P *down*, e.g.

(5.133) <E3c [14]: *tumbles down>*

(5.134) <E6b [14]: *he tumbles down the hill>*

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falling. However, odd examples raise the possibility that this is really just a MANNER verb, and our knowledge of the world (i.e. what happens when one loses control of balance) allows us to infer downward motion. For example, in old black-and-white Western movies, *tumbleweed* always seems to be *tumbling* about the dust plains without falling anywhere. It is possible that PATH conflation is optional.

We now turn to the most pervasive general structural type for the expression of trajectories in English: PP [PATH] in the absence of geometric V [PATH]. The most common structure of this type was the merging of V [MANNER] with PP [PATH]. In its simplest form, this involved a single intransitive P.[28] Typical responses are given below.

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

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

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

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

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

The last example is taken from the hollow trunk scene, in which the monkey goes down on all fours and scrambles through the tree-trunk. This use of *climb* cannot be translated by the standard Japanese and French equivalents *noboru* and *grimper*. As discussed in the introduction to Section 5.2, these latter verbs obligatorily specify upward motion, and are classed as V [PATH, MANNNER], whilst English *climb* is classed as V [MANNER].

These intransitive P structures are not as common in the data as one might have expected: most responses that did not spell out a full DP for the GROUND object

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[28] Justification for the treatment of such elements in French and English as intransitive P, rather than separate categories such as 'satellites' or 'particles', will be given in Section 9.2.1.

used pronominal *it* instead. Note that the prepositions in the above examples may all

be followed by a pronominal with the exception of *out*. More typical responses with V

[MANNER] and transitive PP [PATH] are exemplified below.

(5.140) <EAc [13]:   *...scrambles up the hill...*>

(5.141) <E6c [14]:   *he rolls down the hill*>

(5.142) <E5b [9]:   *he runs inside the cave*>

(5.143) <E4d [16]:   *he climbs out of it*>

(5.144) <E5d [4]:   *he jumped over the rock*>

(5.145) <E4b [3]:   *he runs under the bridge*>

(5.146) <E7d [15]:   *swims across the little river*>

(5.147) <E6e [16]:   *crawls through the tree-trunk*>

The second main type of response coded as PP [PATH] in the absence of

geometric V [PATH] involved deictic V [PATH]. This pattern was also prevalent in the

English data. Note that if these utterances were classified as V-framed, with direction

inherent to the main verb, the English results would be not so overwhelmingly

supportive of typological predictions. However, as discussed in Section 4.4, despite

the fact that deictic and geometric V [PATH] are often grouped together (e.g. Levin, 1993; Slobin, 1996), the distinction between them is considered fundamental to this analysis, and the examples below are all considered representative of 'S-framed' syntax.

(5.148) <E4b [7]:   *he went up the hill*>

(5.149) <EAf [2]   *the monkey…realizes it can't fly like the parrot, so it comes down the side of the trunk, like a helter-skelter type thing…*>

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

(5.151) <E3d [17]:   *goes over the rock*>

(5.152) <E5a [18]:   *goes under the bridge*>

(5.153) <E6e [15]:   *goes across the river*>

(5.154) <E7a [5]:   *he goes through the tree-trunk*>

As we have seen, in Japanese a deictic V [PATH] may merge with V [MANNER] to form a complex predicate, either assigning accusative case to the GROUND object, or selecting a PP. The former structure, with a direct object, is not possible in English, but the latter structure represents one possible analysis of the following English utterance.

(5.155) <EAc [12]:   *he comes running out of the cave>*

At first glance it is unclear whether this is really a complex predicate, or whether *running* is simply an adjunct: this structure is subject to further testing in Experiment II and further analysis in Section 11.5.2.

Just as in Japanese, a third category emerged within the general structure PP [PATH] in the absence of geometric V [PATH], in which onomatopoeia was used instead of standard V [MANNER]. In Japanese, we saw that onomatopoeia was carried on light verbs e.g. *piyon-te suru* 'go weee / whoosh', *koron-tte naru* 'go twirly-whirly / round and round' (cf. examples (5.58) and (5.59)). In English, however, onomatopoeia was directly lexicalized in the main predicate, e.g.

(5.156) <E3b [15]:   *he splashes into the river>*

(5.157) <E3c [17]:   *he boings over>*

As with Japanese, such onomatopoeic forms cannot combine with certain classes of P [LOC], such as *in* and *on*, and retain a directional interpretation. However, other classes of V [MANNER] did merge with such prepositions with a directional interpretation, e.g.

(5.158) <E6a [9]:   *he runs in the cave>*

(5.159) <E4d [16]:   *he climbs in it ...he climbs out of it>*

(5.160) <E3g [4]:   *he jumps on the rock>*

Therefore only certain classes of motion predicates are able to coerce a directional

reading with this type of preposition (see Section 11.5.2 for discussion).

The examples given thus far have all been structurally simple on the PP side of

the merger (at least on the surface): they have not specified geometric properties of

the GROUND in N [LOC], and have spelled out trajectories either through P alone or

through the combination of P and the GROUND object. However, more complex PPs

were scattered throughout the transcripts, some with binary combinations of P, some

with N [LOC], some with prepositional modifiers, and others with more elaborate

concatenations of trajectories.

The French data contained several examples containing both P [PATH] and P

[PLACE], in strict hierarchical order. The following English examples are arguably of

the same type.

(5.161) <E3e [4]:   [he jumps...] *from on top of the rock>*

(5.162) <E4a [6]:   *he gets to near the edge>*

As we shall see, this particular hierarchy has also been argued to hold for Japanese,

despite the lack of co-occurrence of P [PATH] and P [PLACE] (Ayano, 2001), and may

prove to be part of Universal Grammar.

In comparison with Japanese and French, English does not make much use of

spatial nouns in the expression of trajectories, but there were some exceptional cases.

The following examples include both N inside DP (5.163-166), and arguably one

functional N [LOC] of the type found in Japanese and French, in what appears to be a

bare NP environment (5.167).

(5.163) <E6e [14]:   *he rolls to the bottom*>

(5.164) <E4d [6]:   *...and then he swims to the other side*>

(5.165) <EAd [7]:   *he climbs to the top of the hill*>

(5.166) <E6e [7]:   *he climbs on the top of the hill*>

(5.167) <E4e [7]:   *climbs on top of the mountain*>

The bare N *top* in the last example differs from the DP *the top*, both in terms of its

referential properties (e.g. it must be conceptualized as an abstract space rather than a

concrete object) and in its syntax (e.g. it may not be pluralized in this abstract sense).

(see Section 6.2 for more detailed discussion). Other elements that can appear as bare

spatial N in English in the absence of an overt D are very few indeed: (in) *front* (of) is

one example, and another may be found in American English: (in) *back* (of), meaning

'behind'. Beyond the realm of physical motion, my impression is that several other

English nouns that appear in the same environment appear to represent metaphorical

motion or location e.g. (in) *sight* (of), (in) *earshot* (of), (in) *range* (of), (in) *lieu* (of)

etc., but this topic is outside the scope of this thesis (see Talmy (1996) for an

insightful discussion of metaphorical motion in general).

The modificational elements 'right' and 'straight' were found in several responses e.g.

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

(5.169) <EAf [9]:   *well!* [surprised tone] *he runs straight into the deep, dark cave!*

he hasn't got any brains...>

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

Jespersen (1992 [1924]) made the well-known observation that 'right' is restricted to modification of spatial and temporal P, and no other category; this form of modification will be used as one tool to identify the category P in subsequent theoretical discussion.

A number of prepositions appeared in an ambiguous position between the verb and a transitive PP. I shall later argue that these are in fact modifiers similar to *right* and *straight* in the previous examples (rather than verb particles or independent phrasal projections). Below are three such cases, each with a pair of examples from the data.

up:

(5.171) <E6e [7]:   *he's climbing up over the hill*>

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

down:

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

(5.174) <E7d [8]:   *he rolls down to the bottom*>

over:

(5.175) <E3c [6]:   *go over on the grass*>

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

Another similar example included *right*-modification in addition to the geometric modifier; in such cases the order appears to be fixed, with *right / straight* in the higher position.

through:

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

The most pervasive of such elements in the data is the prepositional modifier *back*. Examples are given below, showing concatenation with a range of prepositions.

back:

(5.178) <E7d [13]:   *climbs back up the hill*>

(5.179) <E3a [14]:   *he runs back down again*>

(5.180) <E3a [15₁]:   *topples back in*>

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

(5.182) <E4b [17]:   *jumps back over*>

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

(5.184) <EAd [18]:   *...and goes under the bridge and back to his house*>

(5.185) <EAf [18/19]: *then he goes under the bridge, then back up to his tree-house*>

This was never found in sense of 'backwards' (e.g. *He stepped back*), but always in the sense of '{to / into / onto} a previous location'. Unlike the other elements under consideration here, *back* is never found transitively in English: *He ran back *(to) his house*; **He swam back *(to) the other side of the river*, **He crawls back *(through) the tree-trunk*. However, this fact alone by no means indicates that *back* is something other than a preposition: some less controversial prepositions are clearly intransitive (e.g. *aside, together, overhead*), and as we shall see in Section 9.2, *back* in an intransitive context meets various test for prepositional status.

Full PPs were also concatenated in the English data, in what was at least in some cases an apparently non-hierarchical structure. Note that in the following pair of examples, the same PPs are given in opposite orders.

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

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

This type of free PP order has been previously noted in the literature (Jackendoff, 1973; Ross, 1995). One possible analysis is that these concatenated PPs are actually co-ordinate structures, structurally parallel to examples with overt conjunctions (aside from free phrasal order, each PP appears to be subject to Ross's (1967) 'co-ordinate structure constraint' on movement). However, PPs combined with overt conjunctions are often subject to fixed phrasal order constraints, in line with temporal event structure, as in the following examples.

(5.188) a. <E5b [16]: *he goes inside it and out the nother* [sic] *end*>

     b. *He goes out the other end and inside it.

(5.189) a. <EAe [18]: *then he runs under the bridge and up the path*>

     b. *He runs up the path and under the bridge.   (*on the same reading)

Matters are complicated when another P precedes a PP complex of this type, as it is unclear from a purely descriptive viewpoint without comprehensive syntactic testing whether this P modifies the first PP, or whether it modifies the conjoined PP complex

as a whole, whether is inside its own intransitive PP, or whether it is really a verb-particle, structurally independent of the following PPs, e.g.

(5.190) <E7d [2]:   *slides down off the tree and to the bottom of the tree trunk*>

Again, discussion of this issue will be postponed until Chapter 11.

Thus far this subsection has dealt with English structural forms falling either side of Talmy's typology; however, mention must now be made of a particular example of V [MANNER] directly assigning accusative case, which falls through the typological net. Recall that in the introduction to Section 5.2, I argued that transitive *climb* is a case of V [MANNER], on a par with other verbs of the same category in expressions such as *jump the fence, swim the river, walk the road to Santiago*, etc. Examples from the transcripts include the following.

(5.191) <E5a [19]:   *climb the tree*>

(5.192) <EAf [7]:   *he climbs the hill and gets to the top*>

In Section 6.5, I argue that this is a case of directional interpretation with PATH implied rather than encoded in the syntax, on a par with the many Japanese examples of this type.

In summary, the English results provide very strong confirmation of Talmy's (1985; 1991, 2000b) claims in respect of lexicalization preferences for this language. English speakers encoded trajectories in PP [PATH] in the absence of geometric V [PATH] in the vast majority of responses in all age groups, and across all individuals.

However, it is interesting to note that on comparing English with Japanese and French, despite the clear difference in rhetorical preferences and the distinct inventory of LIs, numerous commonalities in PATH predication have emerged (both in terms of shared categories and shared combinatorial principles). Such common aspects of grammar in the transcripts are discussed by topic in Chapter 7. We now turn to a specifically comparative analysis of the results in terms of the S-framed / V-framed distinction, and reflect on whether this is formalizable in terms of language-particular grammar settings, or whether the typology is best preserved as a statement of rhetorical tendencies.

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5.2.4 Comparative results
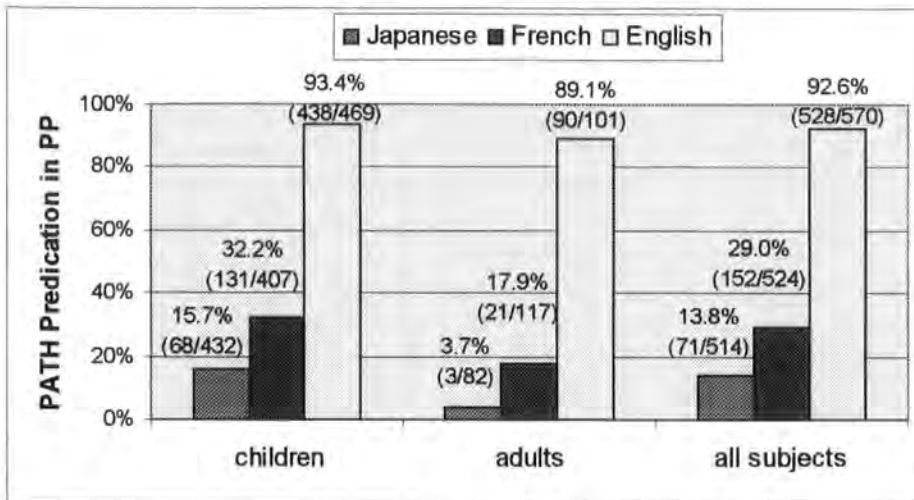
Figure 5.22. *Responses by language group. Experiment I: Mean for each language group of utterances with PP [PATH] in the absence of geometric V [PATH], over the total number of PATH utterances.*

The difference between Japanese and English in terms of Talmy's typological predictions is truly striking. As shown in Figure 5.22, the Japanese children encoded trajectories in PP [PATH] in the absence of geometric V [PATH] in only 15.7% (68/432) of all instances of PATH predication, whilst the English children did so in 93.4% (438/469) of cases. The Japanese adults performed even more strictly in accordance with predictions, following the 'S-framed' pattern in only 3.7% (3/82) of cases, whilst the English adults did so in 89.1% (90/101) of cases. PP [PATH] in the absence of geometric V [PATH] accounted for 13.8% (71/514) of all Japanese responses, and 92.6% (528/570) of all English responses.

However, perhaps the most interesting results were those of the French speakers. A perfunctory glance at the chart might give the impression that these results corroborate the claim that French may be characterized as a V-framed language: most speakers encode trajectories in geometric V [PATH] most of the time. Nevertheless, it is difficult to characterize French as having the same rhetorical

characteristics as Japanese in this regard. As shown in Figure 5.23 below, for PP [PATH] in the absence of geometric V [PATH], the average group responses of the Japanese children ranged from 12.5% to 20%, whilst the average group responses of the French children range from 25.8% to 39.4%; in other words, the Japanese and French child groups had discrete response ranges. The confidence intervals on the means in all three groups of children were non-overlapping (15.7% ± 3.4% for Japanese; 32.2% ± 4.5% for French; and 93.4% ± 2.3% for English).[29]
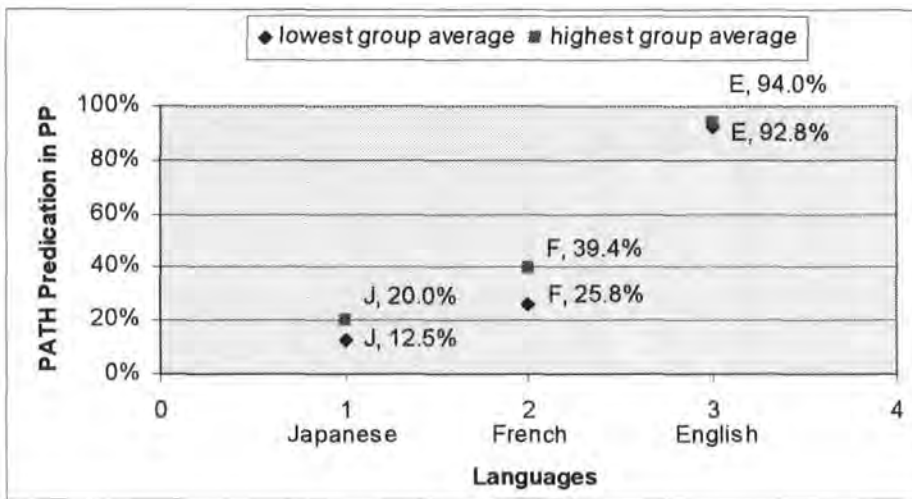
Figure 5.23. *All child test subjects. Experiment I: Response ranges for each language group of utterances with PP [PATH] in the absence of geometric V [PATH], over the total number of PATH utterances, from the lowest group average to the highest group average.*

As shown in Figure 5.24, again in respect of PP [PATH] in the absence of geometric V [PATH], even when the adult responses are factored in, Japanese and French participants had near-discrete response ranges across all age groups tested, Japanese from 3.7% to 20%, and French from 17.9% to 39.4%. Again, the confidence intervals on the means were non-overlapping for all groups (13.8% ± 3% for Japanese; 29% ± 3.9% for French; and 92.6% ± 2.2% for English).

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[29] 95% confidence intervals were calculated using the method of Agresti and Coull (1998).
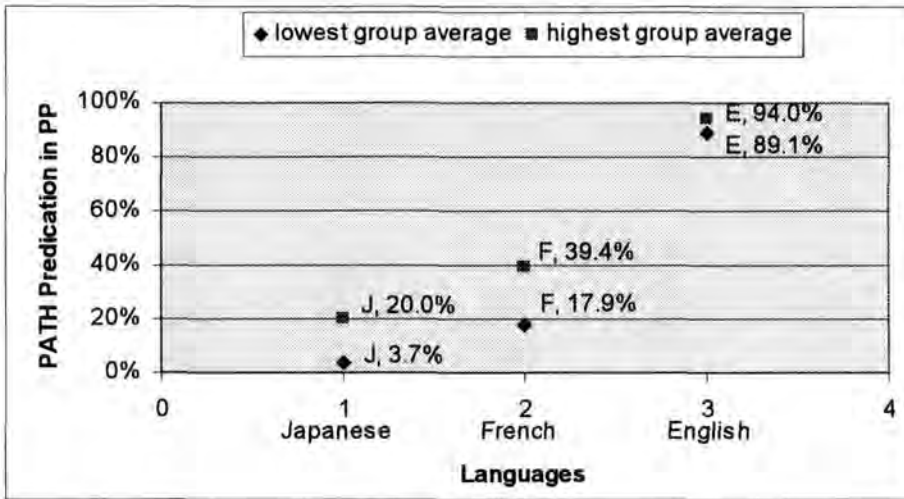
Figure 5.24. *All test subjects (children and adults). Experiment I: Response ranges for each language group of utterances with PP [PATH] in the absence of geometric V [PATH], over the total number of PATH utterances, from the lowest group average to the highest group average.*

As discussed at the beginning of Sections 5.2.1 and 5.2.2, I assume that the differences between adults and children in Japanese and French are due to pragmatic variables tied to the conditions of the experiment. It is nevertheless worthy of note that despite this complication, Japanese and French adults themselves also have non-overlapping confidence intervals (3.7% ± 5% for Japanese; 17.9% ± 7% for French).

The discrete response ranges for Japanese and French children from the 3-year-old to the 7-year-old groups obtain despite the fact that these results focus entirely on responses exemplifying PP [PATH] in the absence of geometric V [PATH]. Recall that contrary to Japanese V-framed utterances, most French responses encoded trajectory in *both* V and PP; as these responses were excluded from the count, trajectories were expressed in PP [PATH] in French even more often than indicated in these charts.

It was to be expected that individual transcripts would reveal greater variation than group averages. Nevertheless, even the differences between Japanese and French

individual results were considerable. Whilst the highest proportions of strict PP [PATH] utterances in individual Japanese transcripts were at 27.8% (J5a, J5c), 26.7% (J6f), and 25% (J6c, J6g), the highest proportions of such utterances in individual French transcripts were as much as 50% (F5a, F7e). As is clear from previous discussion, both these sets of figures are markedly lower than those of the English speakers: 12 out of 33 English test subjects encoded trajectory strictly in PP [PATH] in 100% of instances of PATH predication.

On comparing the combinatorial possibilities in evidence in each set of results, a very general descriptive generalization emerges concerning the relative use of V, N and P to express trajectories. In respect of geometric V [PATH] (e.g. 'enter', 'go-down', 'go-under') in this data set, the Japanese lexicon has many such LIs in common use, French has significantly fewer, and English very few indeed. In respect of N [LOC] (e.g. 'inside', 'bottom', 'underneath'), considering only those 'functional' cases without overt D, the Japanese lexicon has many such elements used in PPs, French somewhat fewer, and English hardly any. In respect of P [LOC] (e.g. 'in', 'down', 'under'), Japanese makes use of very few spatial postpositions, French has significantly more, and English has very many. These informally postulated lexicalization possibilities are represented in the table below.

Table 5.2. *Informal comparison of categorial lexicalization possibilities in for the expression of trajectories in V [PATH], N [LOC] and P [PATH] in Japanese, French and English.*

	Japanese	French	English
geometric V [PATH]	many	some	few
N [LOC]	many	some	few
P [PATH]	few	some	many

The main difference between these three languages in the expression of trajectories appears to correspond to the relative proportions of these types of category-feature combinations in each lexicon.[30] A language with many LIs specified as V [PATH] but few as P [PATH] is likely to be more 'V-framed' than a language with the reverse pattern of lexicalization. The mixed pattern observed in French is arguably a direct reflection of what happens to be available in the French lexicon. French does not exhibit as many geometric V [PATH] as Japanese (lacking equivalents for e.g. *moguru* 'go-under (and stay there)'; *kuguru* 'go-via-under'); but has significantly more than English, despite false appearances of lexical equivalence (additional LIs including e.g. *passer* 'go-via'; *sortir* 'go-out'). Likewise, French has fewer functional elements specified as N [LOC] than Japanese (lacking equivalents for e.g. *naka* 'inside'; *ushiro* 'behind'), but more than English (additional French examples including e.g. *bas* 'bottom'; *dessous* 'underneath'). Finally, French has many more locative Ps than Japanese (additional LIs including e.g. *dans* 'in', *sur* 'on'), but considerably fewer than English (lacking equivalents for e.g. *across, down*).

Thus in respect of Talmy's (1985, 1991, 2000b) typological predictions regarding speaker preferences, which are constrained by lexical resources, Japanese and English strongly emerge as respective paradigm examples of V-framed and S-framed languages, whilst French appears to be a mixed case.

We now turn to possible routes to formalization in the generative framework. In Sections 2.1.3 and 2.2.3, five criteria were set out to enable selection between the Path Parameter Hypothesis and the Lexicalist Path Hypothesis. The first three can now be addressed, based on the evidence of the elicited production data. First, French children and adults allow both types of PATH predication *in a single language* to the

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[30] Why such distributions exist in each language remains an open question, but it may well be partly a matter of historical accident. Such an account would seem inevitable for cases such as the incorporation of Latinate PATH verbs into English.

extent that this language cannot be adequately classified as S-framed or V-framed in anything but the most informal of characterizations; second, *all three languages* admit such internal variation (albeit to different degrees); and third, the syntax of argument structure of PATH predicates is not uniform, but varies from item to item (e.g. some V [PATH] must select a GROUND object, some may select an N [LOC] direct object, some select a particular P, some select a particular type of P). Thus far the findings favour the Lexicalist Path Hypothesis. The remaining two criteria (Is acquisition uniform or piecemeal? Do syntactic possibilities vary by language type, or is there a common syntax?) will be addressed as we proceed through the subsequent sets of results, organized by topic in Chapter 6.

As the analysis progresses, it circles closer to the conclusion that the original formulation of the typology was accurate in term of its descriptive perspective: these are indeed 'lexicalization patterns', no more, no less (Talmy, 1985). It is highly unlikely that such expressions of typological tendency could be formalized in terms of parameter theory. However, a second conclusion of more theoretical significance emerges from the same set of transcripts. Thus far the focus has been much more on differences between languages rather than what they have in common. One observation is so evident that it is easy to miss. All three languages canonically express trajectories using the same set of elements, which at first glance appear to be combined in the same way in each language. This suggests that while variation may be accounted for in terms of the inherent and selectional properties of LIs, certain aspects of grammar may be invariant. The new perspective on motion events advanced in this thesis is of lexical variation and a shared syntax.

Chapter 6

Experiment I results:

Commonalities in syntax and the spatial lexicon

6.1   Shared categories and shared combinatorial principles

The previous chapter examined Experiment I responses in terms of the predicted differences between languages, according to standard typological characterizations. However, it is surprising how much the three languages have in common. The same syntactic categories carrying the same computational semantic features were found to express trajectories in each language (geometric V [PATH], P [PATH], P [LOC], N [LOC]), and certain combinatorial possibilities and impossibilities are also common to the three languages. Such categories, features, and aspects of syntax are plausible candidates for Universal Grammar. This chapter addresses primarily those topics which reveal the commonalities rather than the differences between the three languages, and is organized as follows. First, I discuss PP-internal categories and combinations: (6.2) the role of locative nouns in the predication of trajectories; and (6.3) the internal structure of PP. Second, I consider the integration of MANNER into PATH predication: (6.4) the conflation of PATH and MANNER in a single verb; (6.5) direct-object selection by V [MANNER]; and (6.6) colloquial combinations of V [MANNER] and PP [LOC]. Third, I describe two developmental patterns in the acquisition of geometric P and V: (6.7) lexical errors in the acquisition of P [LOC] by younger test subjects; and (6.8) a progression from multiple to single predicates in the expression of complex trajectories. Fourth, as an additional observation, I provide a brief overview of (6.9) the lexicalization and incorporation into syntax of MANNER

expressed through onomatopoeia. The chapter concludes with a brief summary of the results of Experiment I, and a postscript on possible refinements for future methodology.

6.2   N [LOC] in PATH utterances

In the previous descriptive discussion of the English, French and Japanese transcripts, the category N [LOC] was adopted with a minimum of argumentation, to distinguish where necessary between different possibilities of case assignment or adpositional versus nominal complements. A comparative look at this element permits a more illuminating inspection of its syntactic properties, and makes possible a more thorough justification for its posited categorial status. In the French and English data descriptions, spatial nouns were exemplified both inside DP and in the absence of overt D. However, it is important that these two syntactic environments be clearly distinguished. As briefly mentioned in Section 5.2.3, bare N [LOC] differs from lexical spatial N inside DP, both in terms of its referential properties and its syntax. Consider the following variations on example (5.167), repeated here as (6.1).

(6.1)   <E4e [7]:   *climbs on top of the mountain*>

(6.2)   a. *He climbed on tops of the mountains.[1]

          b. *He climbed on snow-covered top of the mountain.

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[1] Another grammatical variation, *He climbed on tops of mountains*, may at first appear to contradict the bare N [LOC] claim. However, in this case *tops of mountains* is clearly a lexical DP, meaning the same as *mountain tops*, and is inside an adjunct PP. Directional interpretation is impossible, and the DP has full referential properties (see below for further discussion of this criterion).

(6.3)   a. He climbed on the tops of the mountains.

   b. He climbed on the snow-covered top of the mountain.

Example (6.2a) shows that the N *top* may not be pluralized in this context. Assuming that pluralization is enabled by means of a functional projection above N (see e.g. Ritter, 1995), this is evidence for a bare NP analysis. The contrast with example (6.3a) is clear: when there is overt D, demonstrating functional material above NP, pluralization is possible. Example (6.2b) demonstrates that the N *top* cannot undergo adjectival modification in this context; again, it is clear from (6.3b) that in the context of overt D, the expected nominal behaviour is restored. The reason that adjectival modification is impossible may be because bare N in this context lacks referential properties, again associated with the D projection. Ayano (2001: 67) gives the following contrast, exemplifying the N [LOC] *front*, perhaps the only other case of bare N [LOC] in standard British English.[2]

(6.4)   a. Bill stood in front of the bus.

   b. Bill sat in the (very) front of the bus.

In (6.4a) the N [LOC] *front* is an abstract spatial projection of the GROUND, but in (6.4b), the DP *the front* denotes a concrete part of the GROUND. Only in (6.4b) is Bill in the bus. This contrast is argued by Ayano (2001:67) to be precisely between 'locative (or non-referential) Ns and referential Ns'; as the locative N in (6.4a) is non-referential it is 'construed as part of the preposition complex'. This analysis concords with the structure I have been assuming throughout. I use the term N [LOC]

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[2] As noted in Section 5.2.3, American English also has *in back of*, meaning 'behind'.

exclusively to refer to these functional, non-referential, bare Ns inside PP, and I refer to other, lexical, referential Ns inside DP with the more generic term 'lexical spatial nouns'.

By the same criteria, French also has elements that appear both as N [LOC] and as lexical spatial nouns. For example the N *haut* 'top', behaves almost exactly like its English cousin, as shown in the following variations on the English examples above.

(6.5)   Il a grimpé en haut de la montagne.

he AUX climbed P_{LOC} top of the mountain

'He climbed on top of the mountain.'

(6.6)   a. *Il a grimpé en hauts des montagnes.

he AUX climbed P_{LOC} top-PL of-the-PL mountain-PL

'He climbed on tops of the mountains.'

b. *Il a grimpé en haut enneigé de la montagne.

he AUX climbed P_{LOC} top snow-covered of the mountain

'He climbed on snow-covered top of the mountain.'

(6.7)   a. Il a grimpé sur les hauts des montagnes.[3]

he AUX climbed on the-PL top-PL of-the-PL mountain-PL

'He climbed on the tops of the mountains.'

b. Il a grimpé sur le haut enneigé de la montagne.

he AUX climbed on the top snow-covered of the mountain

'He climbed on the snow-covered top of the mountain.'

---

[3] In general French speakers dislike this form, preferring to keep *haut* in the singular; however, some speakers accept it, and all informants agree that there is a definite grammaticality contrast with (6.6a).

Though Japanese has no overt D equivalent to those in the English and French examples, the Japanese N *ue* 'top' exhibits the same restrictions with regard to modification and thus is also lacking the referential properties associated with lexical N, as shown in (6.9a). Although this structure cannot be saved with an overt D in Japanese, a similar contrast can be shown by replacing the N [LOC] with a *bona fide* lexical N, such as *chōjō* 'summit', as shown in (6.9b).

(6.8)   Yama no ue ni nobotte itta.

mountain GEN top P_{LOC} climb-TE went

'He climbed on top of the mountain.'

(6.9)   a. *Yama no yuki no tsumotta ue ni nobotte itta.

mountain GEN snow GEN covered top P_{LOC} climb-TE went

'He climbed on snow-covered top of the mountain.'

   b. Yama no yuki no tsumotta chōjō ni nobotte itta.

mountain GEN snow GEN covered summit P_{LOC} climb-TE went

'He climbed on the snow-covered summit of the mountain.'

As previously discussed with reference to French *dessous* 'under' in Section 5.2.2, there are some N [LOC] that exhibit not only variation in their roles as functional or lexical N, but also demonstrate categorial ambiguity between N and P. The English P / N *(the) inside (of)* is another such example. Japanese N [LOC] are in fact traditionally analyzed as lexical P, although their nominal properties are occasionally acknowledged (e.g. Watanabe, 1993). I argue that such elements as appeared in the Japanese elicited production data are never P, but always N. Although overt D cannot

be utilized as a test of this as in the French examples, and although they cannot undergo modification like referential lexical N, two other types of evidence may be brought to bear on their categorial status: first, they can be directly assigned accusative case; and second, they cannot directly select a nominal argument. These characteristics are both illustrated in respect of the N [LOC] *shita* 'underneath' in example (5.25), repeated here as (6.10).

(6.10) <JAa [3]:   *hashi no shita o kugurimashita>*

                    bridge GEN underneath ACC go-via-under-PST

                    'He went under the bridge.'

The following table gives a selection of Japanese N [LOC] found in the transcripts, with approximate equivalents, and gaps showing lack of equivalents, in French and English.

Table 6.1. *Experiment I: Common Japanese N [LOC] found in transcripts, with French and English equivalents and lexical gaps.*

Japanese N [LOC]	French N [LOC]	English N [LOC]
ue 'top / above'	*haut* 'top'/ --------[4]	*top*
shita 'bottom / below'	*bas* 'bottom' / *dessous* 'below'	--------
naka 'inside'	*dedans* 'inside'	--------
soto 'outside'	*dehors* 'outside'	--------
mae 'front'	--------	*front*
ushiro 'behind'	--------	--------

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[4] The status of *dessus* 'above' is unclear in this regard. Unlike *dessous* 'below' it does not appear in the form *en-dessus de* - P_LOC above of - 'above', but always takes the form of an N inside a DP, e.g. *au dessus de Paris* - P_LOC-the above of Paris - 'above Paris'. However, in the PP *au dessus de*, it resists modification, e.g. *??au dessus pollué de Paris* - P_LOC-the above polluted of Paris - 'in the polluted sky above Paris'. Thus inside PP, it projects DP like a lexical spatial N, but resists modification like N [LOC].

In summary, the commonalities between N [LOC] in the three languages are as follows: they are found inside PP, and not inside DP; they cannot be pluralized; they are non-referential in that they cannot undergo adjectival modification; and they cannot directly select the GROUND object, but rely on insertion of a 'grammatical' P (English *of*, French *de*, Japanese *no*).

6.3   Invariant PP-internal word order

Recall that the computational semantic feature [LOC] (carried on lexical items (LIs) such as *in*, *under* and *behind*) subsumes the features [PATH] and [PLACE] (so that these LIs may have directional or locational interpretation depending on syntactic context). For the present discussion, I refer to P [PATH] and P [PLACE] in terms of interpretation, rather than as fixed lexical specifications. Consideration of the three data sets leads to the observation that the internal structure of PP exhibits a fixed categorial hierarchy. *Within a single PP*, whenever N [LOC] and P [PLACE] were both overt, P [PLACE] was higher, on standard syntactic assumptions. Whenever N [LOC] and P [PATH] were both overt, P [PATH] was higher. Whenever P [PLACE] and P [PATH] were both overt, P [PATH] was higher. And when all three elements were expressed, the hierarchy was P [PATH], then P [PLACE], then N [LOC]. Whenever transitive N [LOC] appears, a featureless P (English *of*, French *de*, Japanese *no*) appears between N [LOC] and DP, presumably for reasons of syntax. [5] This is

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[5] As is well-known, the category N cannot be used to directly predicate anything of its complement, and the insertion of a grammatical morpheme is common where such predication is required. The same semantic relationship might be said to obtain between *drink* and *mead* in the following two sentences.

(i)   He drinks mead.
(ii)   He is a drinker of mead.

Emonds (1985:Ch.4) argues that grammatical morphemes such as *of* are inserted late in the derivation (at PF), and do not contribute to semantic interpretation. Late insertion might also account for the impossibility of movement of such phrases.

exemplified using previously cited examples from each language. First, let us take the

English example (5.161) <E3e [4]: [he jumps...] *from on top of the rock*>.

(6.11)

```
                    PP_PATH
                   ╱      ╲
         P_PATH          PP_PLACE
         from           ╱       ╲
              P_PLACE          NP_LOC
              on              ╱      ╲
                      N_LOC          PP
                      top           ╱  ╲
                                 P       DP
                                 of     △
                                      the rock
```
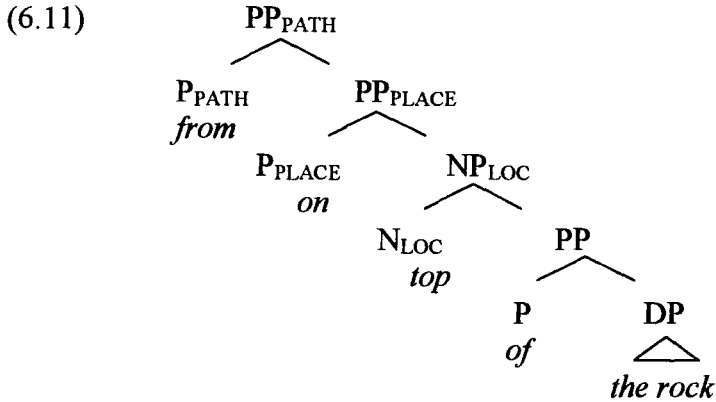
At first blush, the same structure might plausibly be postulated for the PP in the

French example (5.122) <FAb [2]: *il glisse jusqu'en bas de l'arbre*> - he slides until-

P_LOC bottom of the-tree - 'He slides to the bottom of the tree'.

(6.12)

```
                    PP_PATH
                   ╱      ╲
         P_PATH          PP_PLACE
         jusqu'         ╱       ╲
              P_PLACE          NP_LOC
              en              ╱      ╲
                      N_LOC          PP
                      bas           ╱  ╲
                                 P       DP
                                 de     △
                                      l'arbre
```
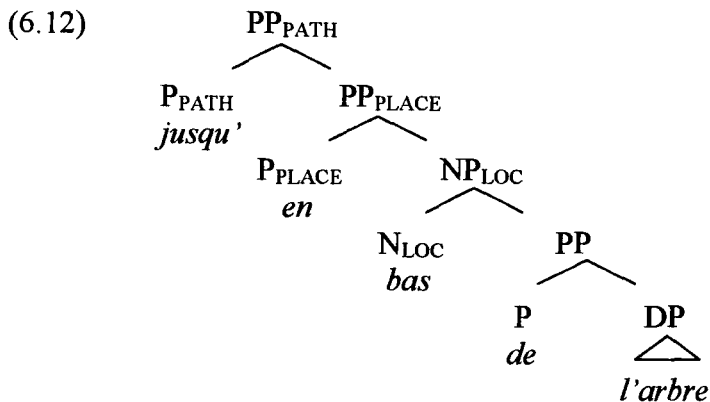
Prepositional combinations such as *jusqu'à* (until-P_LOC) and *jusqu'en* (until-P_LOC) are

standardly treated as directional when used in the spatial field, and are translated into

English as 'to' or 'as far as'. However, I shall argue in Chapter 11 that *jusque* is not

directional *per se*, but rather functions as an 'event-delimiter', although it occupies the

same position in the hierarchical structure (a functional P projection above P_PLACE). If

this more controversial example is discounted, then there is no utterance in the French data in which all the elements are overt. Partially filled examples from the French data include the following previously cited examples: (5.99) <F6a [3]: *il passe par dessous>* - he goes-via via-underneath - 'He goes under it (and out the other side)'; (5.100) <F7a [3]: *il passe en dessous>* - he goes-via P_{LOC} underneath - 'He goes under it (and out the other side)'; (5.101) <F6a [3]:*il passe par en dessous>* - he goes-via via P_{LOC} underneath - 'He goes under it (and out the other side)'; (5.91) <F5b [3]: *il passe en dessous du pont>* - he goes-via P_{LOC} underneath of-the bridge - 'He goes under the bridge (and out the other side).' These can be accommodated in the tree structure as follows.

(6.13)

```
                PP_PATH
               /\
        P_PATH      PP_PLACE
          |        /\
          |    P_PLACE    NP_LOC
          |       |      /\
          |       |   N_LOC    PP
          |       |     |     /\
          |       |     |    P    DP
          |       |     |    |    △
          |       |     |    |    |
         par  dessous⁶  |    |    |
                 en  dessous |    |
         par     en  dessous |    |
                 en  dessous du  pont
```
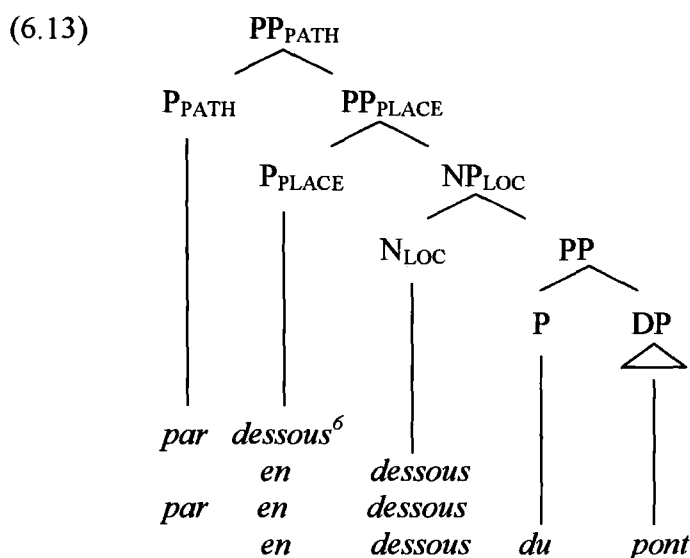
Finally, Japanese differs in two ways from the English and French examples. First, as discussed in Chapter 2, head directionality is reversed so that by comparison the PP-structure is a mirror-image. Second, no two postpositions may co-occur in the spatial domain. The two examples below illustrate the hierarchy first with an inherently locational P in the lower PP, with an empty directional P in the higher

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[6] For discussion of the categorial ambiguity of *dessous* 'underneath', see Section 5.2.2.

projection, and then the reverse: inherently directional P, in the higher projection, with an empty locative in the lower PP. The first example is from (5.37) <J5d [9]: *dōkutsu no naka ni haittetteru no>* - cave GEN inside P$_{LOC}$ enter-TE-go-PROG PART - 'He's going inside the cave'; and the second is from (5.48) <J6d [14]: *yama no ue kara korogatta>* mountain GEN top from rolled - 'He rolled from the top of the mountain'.

(6.14)

```
                              PPPATH
                             /\
                    PPPLACE      PPATH
                   /\             Ø
            NPLOC      PPLACE
           /\           ni
      PP       NLOC
     /\        naka
   DP    P
   △     no
 dōkutsu
```

(6.15)

```
                              PPPATH
                             /\
                    PPPLACE      PPATH
                   /\             kara
            NPLOC      PPLACE
           /\           Ø
      PP       NLOC
     /\         ue
   DP    P
   △     no
  yama
```
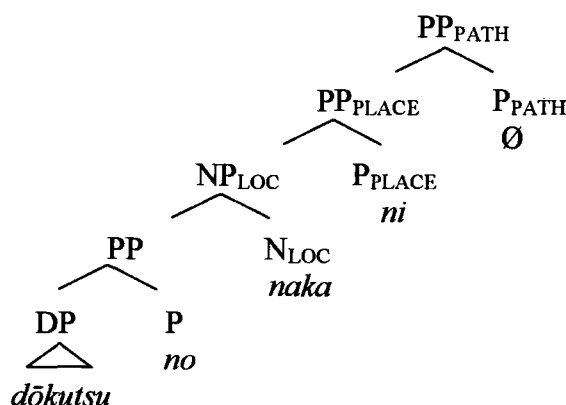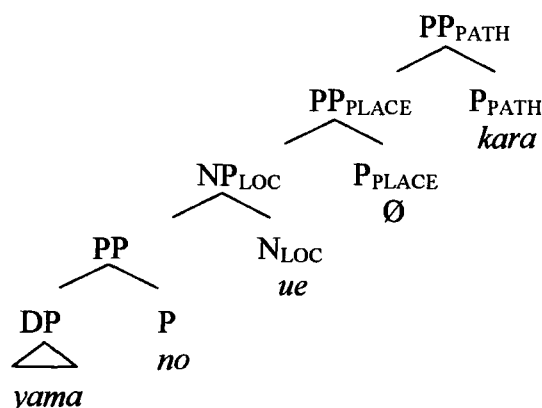
More rigorous theoretical analysis will be pursued in Chapter 11, where evidence is taken from beyond the data set in each language, and from beyond the languages studied, in the postulation of this structure as part of Universal Grammar. However, at this point it should be noted that, assuming the 'Continuity Hypothesis', it is to be predicted that posited universal structures will be present and inviolable at all stages

of acquisition. Thus we should never find structures in violation of the hierarchy [$_{PP,}$ $_{PATH}$ α [$_{PP, PLACE}$ β [$_{NP, LOC}$ γ [$_{PP}$ δ]]]], that is to say, examples such as the following:

(6.16) a. *on from* top of the rock   *[P_{PLACE} [P_{PATH}]]

    b. *from *top on* of the rock   *[N_{LOC} [P_{PLACE}]]

      (context: from on top of the rock)

(6.17) a. *en jusque* bas de l'arbre   *[P_{PLACE} [P_{PATH}]]

      P_{LOC} until bottom of the-tree

    b. *jusque *bas en* de l'arbre   *[N_{LOC} [P_{PLACE}]]

      until bottom P_{LOC} of the-tree

      (context: to the bottom of the tree)

(6.18) *dōkutsu no *ni naka*[7]   *[N_{LOC} [P_{PLACE}]]

    cave GEN P_{LOC} inside

    (context: into the cave)

In 1608 recorded utterances of path predication, such errors were never attested. That this is so in each language and in all age groups lends support to the notion that these aspects of phrase structure are part of Universal Grammar.

6.4   Conflation of PATH and MANNER in a single verb

As noted in Section 5.2.1, verbal compounds in Japanese can productively combine PATH and MANNER. Although this is not an option in English or French, in each

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[7] *[P_{PLACE} [P_{PATH}]] in Japanese is out in any case due to the independent restriction on co-occurring postpositions mentioned earlier.

language there do appear to be morphosyntactically simplex predicates conflating these elements, stored as a single LI. Certain MANNER verbs appear to specify either motion upward or motion downward as an obligatory part of the trajectory. V [MANNER] with obligatory upward motion include French *grimper* 'climb' and Japanese *noboru* 'climb' (but not English *climb*); V [MANNER] with downward motion include English *fall, topple*, and *tumble*; French *tomber* 'fall', *dégringoler* 'tumble down', and *dévaler* 'hurtle down'; and Japanese *ochiru* 'fall', and *okkochiru* 'fall'. More controversial examples in the Japanese data include *korogeochiru* 'roll-fall' (which as argued earlier is a memorized LI for those speakers who have only *korogaru* 'roll' and not *korogeru* 'roll' in their lexicon) and *makureru* 'roll-down' (in the Yamato dialect but not in standard Japanese).

The conflation of PATH and MANNER in a single verb is a relatively uncommon form of LI, and all the relevant examples from the elicited production data have been discussed in the language-specific results sections (5.2.1, 5.2.2, 5.2.3). Nevertheless, from a comparative perspective, it is clear that the same phenomenon obtains in each language.

6.5   V [MANNER] with direct objects

As noted earlier, one configuration that does not fit into the typology at all is when V [MANNER] selects a direct object. On examining the elicited production data, various patterns of possibility emerge with regard to the assignment by V [MANNER] of accusative case (ACC) to GROUND objects and locative N. Sometimes a generalization can be made at the level of a whole language, but more often the differences appear to be stated at the level of the individual lexical item. In the following comparison,

Japanese, English and French are examined in that order, reflecting the relative pervasiveness of the phenomenon.

First, the Japanese transcripts reveal V [MANNER], in the form of a simple predicate such as *oyogu* 'swim' or *hashiru* 'run', assigning ACC to the direct object (e.g. (5.66), (5.67)). They also show V [MANNER] assigning ACC as part of a complex predicate with a deictic verb, in which it cannot be the deictic verb that assigns case, as discussed earlier (Section 5.2.1). Examples include *oyoide kuru* 'come swimming' and *korogatte iku* 'go rolling' (e.g. (5.65), (5.69)). In addition, ACC appears to be productively assigned to locative N in Japanese, in complexes such as *hashi no shita o* - bridge GEN underneath ACC 'the underneath of the bridge', and *ishi no ue o* - stone GEN top ACC - 'the {top / above} of the rock' (e.g. (5.67), (5.68)). It is worth noting that although this *o* is sometimes treated as a locative case-marker in traditional grammars, a locational reading of *kawa o oyogu* – river ACC swim – 'He swims (across) the river' is impossible if one bounds the event with a time phrase such as *go fun kan de* 'in five minutes'.

The English transcripts show no such structures with N [LOC], and hypothetical examples are clearly ungrammatical, whether the spatial noun is inside a DP or not, with the possible exception of *inside / outside* in the absence of DP e.g.

(6.19) He jumps {*top of the rock / *the top of the rock}.

(6.20) He crawls (*the) inside (of) the tree-trunk.

However, there are several examples in which the verb *climb* assigns ACC to a GROUND object such as *tree* or *hill* (e.g. (5.191), (5.192)). I take this to be on a par

with the Japanese examples discussed above, involving *oyogu* 'swim' and *hashiru* 'run'. In the introduction to Section 5.2, I argued that *climb* is V [MANNER], not V [PATH], due to its lack of obligatory specification of direction; as such it differs significantly from its Japanese and French counterparts (*noboru* 'climb' and *grimper* 'climb'), which cannot be used to translate *climb* in any direction other than 'up'.

One view often espoused in the literature is that there are two separate LIs corresponding to the phonological form *climb*. Jackendoff (1990: 76-77) has a variation on this analysis in which a single LI has two mutually exclusive conceptual structures: simplifying somewhat, one means 'move with difficulty (using one's arms and legs)' and the other means 'go to the top of'. On the present analysis, only the first meaning is grammatically encoded, whilst the second meaning may be inferred on the basis of two factors: our knowledge of the world, and the 'principle of object affectedness' (Gropen et al., 1991). The latter states that direct objects are wholly affected by the action of the verb, unlike indirect objects inside PPs. Thus if a soldier shoots someone, he hits the target, but if he shoots *at* the person, maybe he hits the target, maybe he doesn't. Similarly in the locative alternation, if a mechanic sprays a car with paint, the whole car is covered, but if he sprays paint *onto* the car, maybe it is covered, or maybe it was just a little paint on one side.

Similarly in Japanese, on the present analysis, if you 'swim a river', 'jump a rock', 'roll a hill', or 'run the underneath of a bridge', then the principle of object affectedness tells us that the river, the rock, the hill and the area underneath the bridge must be completely affected, and our knowledge of the world does the rest. Despite the apparent productivity in Japanese, this phenomenon seems much more restricted in English. However, when instances of this construction are considered, there is evidence that inference plays a role. For example, it is a much-repeated story in my

family that my grandfather *swam the River Tyne* when he was a boy. The grandchildren have always understood this in the same way: that he swam from one side to the other (which was, in fact, the case). However, another extremely unlikely but possible interpretation is as follows: in the context of say, an annual competition in which very fit young lads swim the length of the river from source to mouth, maybe he swam end-to-end rather than side-to-side. The point is that this possible interpretation is immediately rejected because of its unlikelihood, not because there is conceptual semantic machinery stating that transitive *swim* means TO THE OTHER SIDE. Such an analysis fits in with other uses of transitive *swim*: if one swims four lengths at the pool, it does not mean TO THE OTHER SIDE of four lengths, but it does necessarily entail that all four lengths were completely swum, i.e. object afffectedness holds as expected. Again, it is not true that a horse has *jumped a fence* if it gets stuck on top, and it is not true that you have *walked the road to Santiago* if you walked half-way and then returned home.

To return to the verb *climb*, Jackendoff (1990: 76) points out that the transitive case specifies TO THE TOP OF (it is a bounded PATH), whilst the PP-complement case does not necessarily entail reaching the top (i.e. it is an unbounded PATH). This difference in interpretation comes for free if one adopts the principle of object affectedness, rendering the TO THE TOP OF encoding unnecessary.

I assume that when things without arms and legs are said to *climb*, such as snakes, cars, aeroplanes, shadows and mushroom clouds, these are all cases of metaphorical extension, leaving us with a single LI. Assuming two (or more) LIs for *climb* is an approach which has its merits, but parsimony favours the unitary analysis, with differences in interpretation falling out from general pragmatic interpretive principles.

Whilst the Japanese transcripts have several verbs and object-types exemplifying this phenomenon, and the English one verb with many examples, the French data show no such structures (recall that *grimper* 'climb' is coded as V [PATH, MANNER]. Hypothetical French examples based on Japanese structures are clearly ungrammatical, e.g.

(6.21) a. *Le singe a nagé la rivière.

    the monkey AUX swum the river

    'The monkey swam across the river.'

    b. *Le singe a couru le dessous du pont.

    the monkey AUX ran the underneath of-the bridge

    'The monkey ran under the bridge.'

However, in very restricted, perhaps idiomatic contexts, V [MANNER] can also be found to assign ACC in French, e.g.

(6.22) a. Manaudou a nagé {deux longueurs / un cènt metres}.

    Manaudou AUX swum {two lengths / a one-hundred metres}

    'Manaudou swam {two lengths / 100 metres}.'

    b. L'étudiant a sauté la barrière.

    the-student jumped the barrier

    'The student jumped over the barrier.'

Note that (6.22a) is acceptable whilst (6.21a) is not. A full account of the possibilities and impossibilities in each language is outside the scope of this study, but again we

see that the same grammatical machinery is in place in each language, with differences in the degree of its implementation. The phenomenon of V [MANNER] assigning accusative case to the GROUND is attested frequently in Japanese, infrequently in English, and very rarely in French.

6.6   Colloquial combinations of V [MANNER] and PP [LOC]

According to prescriptive grammars and certain influential judgements in the linguistics literature, V [MANNER] cannot merge with PP [LOC] with a directional interpretation in French or Japanese, and examples with this structure should not exist in the data. However, V [MANNER] ^ PP [LOC] was found in each language. The view taken here is that that such structures in French and Japanese have the same status as English sentences such as *Paddy fell in the hole* and *Mary ran on the pitch* (which prescriptive grammarians and schoolteachers insist are out due to the lack of overt directional predicates, i.e. *into* and *onto*). I conducted an informal survey of a dozen informants from Australia, New Zealand, Canada, the US East and West Coasts, as well as some British compatriots, and concluded that these forms are integral to the grammatical system of the colloquial language everywhere. Examples of this type in English, French and Japanese are given below.

(6.23) a. <E4a [15]: *falls in the river...and then he gets out*>

       b. <E4d [9]:   *he runs in the cave*>

       c. <E6e [7]:   *he climbs on the top of the hill*>

(6.24) a. <F3a [9]:   *il court dans le trou>*

he runs in the hole

'He runs in the hole.'

b. <F5a [3]:   *il court sous le pont>*

he runs under the bridge

'He runs under the bridge.'

c. <F7d [15]:   *il nage de l'autre côté>*

he swims P_{place} the other side

'He swims across.'

(6.25) a. <J3e [17:   *ishi ni jampu shita...kō yatte...>*

rock P_{LOC} jump did...like-this do-TE...

'He jumped onto the rock...he went like this...'

b. <J5c [12]:   *soto ni nigeta>*

outside P_{LOC} fled

'He ran away outside.'

c. <J6b [17]:   *hidari ni tobu>*

left P_{LOC} leaps

'He leaps to the left.'

The Japanese data require further comment. First, note that Japanese has arguably only one P [LOC], *ni*, that can be used in directional contexts (*e* 'to' is strictly P [PATH]). Second, as pointed out in Section 5.2.1, whilst sentences such as *eki ni hashitta* - station P_{LOC} ran - 'He ran to the station' are certainly attested in colloquial speech, these are considerably 'improved' with a deictic, e.g. *eki ni hashitte itta* -

station P$_{LOC}$ run-TE went'. However, the fact that some Japanese linguists completely disallow this colloquial form is, I believe, essentially a prescriptive judgement.[8]

Such structures respect strict constraints on verb type. In English, only those V [MANNER] that select directional complements (*run, jump, roll, slide, swim*, etc.) allow merger with *in* and *on* for this interpretation, and never predicates such as *dance, twist,* or *wiggle*, as discussed in more detail in Chapter 11. Non-directional V [MANNER] manner verbs were never attested with locational P in any language. English examples such as <E3e: *he jumps in the river*> were typical, yet non-directional manner verbs invariably merged with overt PP [PATH] e.g. <E3b: *he splashes into the river*>; in Japanese, onomatopoeia conformed to the same constraint, only merging with overt V [PATH] e.g. <J3b: *ishi no ue kara piyon-tte shita*> - rock GEN top from whoosh! did - 'he whooshed from the top of the rock'. Such restrictions highlight the fact that this aspect of colloquial speech in French and Japanese is just as grammatically determined as more prescriptive means of PATH predication, and contribute to the impression that the same syntactic principles are in operation in each language.

6.7   Lexical errors in the acquisition of P [LOC]

Whilst combinatorial possibilities and impossibilities are arguably identical across the age ranges, there were in each set of transcripts examples of children making lexical errors in their use of P [LOC]. In the English data, these took the form of what might

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[8] Although not a native speaker, whilst living and working in Japan I have had ample time to convince myself that such forms are attested in colloquial speech, even without 'deictic improvement'. These utterances are in informal register: if one concocts artificial test sentences with more formal vocabulary, they are rejected by all speakers. Despite their colloquial validity, these utterances remain controversial for Japanese grammarians. Sentences of the type *eki ni hashitta* - station P$_{LOC}$ ran - 'He ran to the station' are given a '?' by Ikegami (1981: 263) and Kizu (1996: 194), a '*' by Takezawa (1993: 59) and Tsujimura (1994: 341), and a '?*' by Inagaki (2002: 191). This summary is due to Inagaki (2002: 1991).

be called 'geometric mapping errors'; that is, children selected the right category of P, but an LI with the wrong geometric specifications. As noted earlier in Section 2.2.3.2, this is a phenomenon perhaps first brought to the attention of acquisitionists in general by Clark (1973), who noted that in child English, the prepositions *on* and *under* are sometimes used as synonyms of adult *in*, and *under* is sometimes found as a synonym of *on*. Sure enough, several English test subjects used *under* in contexts where adults invariably used *in*. The clearest of these contexts is the cave entrance scene, which prompted the following responses from Group E3 subjects.

(6.26) <E3c [9]:   *run under>*

(6.27) <E3d [9]:   *go under it>*

(6.28) <E3f [9]:   *he runs under the cave>*

The responses of the older children and adults invariably used *in / into* in this context. Whilst this case seems fairly clear, with a clean break between very young and other test subjects, the analysis in terms of 'geometric mapping errors' is not the only interpretation here. If these children conceptualize (some) entrances as 'archways', then the term *under* is contextually appropriate in terms of the adult LI.

Another set of examples involved the hollow trunk scene. Whilst adults tended to say that the monkey crawled 'through the trunk', and older children that he crawled 'in and out of the trunk', several younger children said that he crawled 'under and out of the trunk', as shown below.

(6.29) <E3b [5]:   *crawls under it…gets out*>

(6.30) <E3f [16]:   *he goes under it…gets out again*>

(6.31) <E4b [16]:   *crawls under the tree-trunk*>

There was less of a developmental break with the use of *under* in this last context, with examples persisting until Group E7. However, they were entirely absent from the adult data, in which 100% (12/12) responses to this stimuli used the P *through* (most used only *through*, although EAf used both *in* and *through*, and EAc used both *through* and *out*).

In an unexpected usage, eight English children used *through* instead of *in / into* in the context of the monkey running into the cave e.g.

(6.32) <E4e [9]:   *runs through the cave*>

(6.33) <E5d [9]:   *goes through the cave*>

(6.34) <E6d [9]:   *run through it […through the cave?] yeah*>

Again, although there were no adult responses of this type, it not absolutely certain that this is a mapping error, because it is conceivable that the cave was conceptualized as an arch or gateway. This is surely the likely conceptualization in the following response, with *through* modifying *into*:

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

In line with Clark's (1973a) observations, the above examples are all suggestive of geometric mapping errors, but the evidence is inconclusive, and pursuit of this issue would require an independent investigation.

In the French data, several children failed to distinguish between the differing use of prepositions and verbs to express the concepts of TO and VIA. For example, in the context of the monkey jumping over the rock, the concept of VIA must be expressed in the P *par* 'via' in adult French (or in a verb such as *passer* 'go-via'). With a V [MANNER] and simple P$_{LOC}$, the PP will be interpreted either as LOCATION or GOAL, but not as a place of transversal. However, F3c used both forms indiscriminately in his two descriptions of the rock scene.

(6.36) a. <F3c [4]:   *il saute au dessus du rocher>*   (*on VIA interpretation)

                          he jumps P$_{LOC}$ above of-the rock

                          'He jumps above the rock.'

         b. <F3c [17]: *il saute par-dessus le rocher>*

                          he jumps via-above the rock

                          'He jumps over the rock.'

Similarly, in twice describing the monkey running under the bridge, F3d made what is arguably the same error, but this time with verbs rather than prepositions. When the verb *passer* 'go-via' is combined with P$_{LOC}$, the PP is interpreted as a place of transversal, but if the verb used is *aller* 'go', the PP is interpreted as a GOAL.

(6.37) a. <F3d [18]: *il va en dessous*>   (*on VIA interpretation)

           he goes P_{LOC} underneath

           'He goes under the bridge (and stays there).'

     b. <F3d [3]: *il passe en dessous*>

           he goes-via P_{LOC} underneath

           'He goes under the bridge (and out the other side).'

Other children made similar errors with both P and V. It is possible that in such cases, French children initially assume that *en* (P_{LOC}) may support a VIA interpretation, like English *under*, and face an unlearning problem. However, whilst these examples are suggestive of lexical inaccuracies, an alternative explanation is that children are simply conceptualizing the scene in a different way. Thus perhaps in (6.36a) and (6.37a), the children are focussing on the first stage of each event, and are not trying to express the whole event. Despite precautions to avoid this (see Section 4.3.2), it cannot be excluded as a possibility. As with the English examples above, the evidence for lexical errors in this regard remains suggestive, but is not conclusive.

     Japanese spatial postpositions are very few in number, and only five were attested in these transcripts: *kara* 'from'; *e* 'to'; *made* 'until / as far as'; *ni* (P_{LOC}); and *de* (P_{PLACE}). The first three were consistently used as in adult language. The last two, however, were occasionally confused by the younger children. As an illustration of adult uses of *ni* and *de*, the following three constructed examples may be compared.

(6.38) Kaeru wa sono ike *ni* {iru / sunde iru}.

       frog TOP that pond P_{LOC} {is / live-TE PROG}

       'A frog {is / lives} in that pond.'

(6.39) Kaeru wa sono ike *ni* {haitte iru / jampu suru}.

     frog TOP that pond P_{LOC} {enter-TE PROG / jump do}

     'A frog {is going into / is jumping into} that pond.'

(6.40) Kaeru wa sono ike *de* {naite iru / jampu suru}.

     frog TOP that pond P_{LOC} {'cry' PROG / live-PROG}

     'A frog {is croaking / is jumping} in that pond.'

In (6.38), *ni* marks the locational complement to stative verbs; in (6.39), *ni* marks the directional complement to activity verbs; and in (6.40), *de* marks the locational adjunct to activity verbs.

A few responses from younger test subjects in Groups J3 and J4 have *de* where adults would use either *ni* (marking the GOAL) or accusative *o* (marking the place of transversal). In the following examples, the glosses of these items are in terms of the adult grammar, not the child grammar.

(6.41) <J3b [14]:   *oka no shita de korogatte itta>*

             hill GEN bottom P_{PLACE} rolling went

             'He went rolling to the bottom of the hill.'

             (*de should be *ni* / *e*)

(6.42) <J4d [5]:   *ki no tsutsu no naka de tōtta>*

             tree GEN tube GEN inside P_{PLACE} went-via

             'He went through the tree-trunk.'

             (*de should be accusative *o*)

The first response (one of several of this type) arguably reveals feature underspecification for *de*; perhaps the children have associated with the LI *de* the more general feature [LOC] rather than the more specific feature [PLACE], which is in fact the adult representation. Recall that elements carrying the inherent feature [LOC] may receive a PATH or PLACE interpretation depending on syntactic context, whilst elements carrying the inherent features [PATH] and [PLACE] are restricted to these interpretations.

As for the second example, a plausible hypothesis is that this child has *de* as P [LOC] rather than as P [PLACE] in her grammar. In that case, whilst this sentence is ungrammatical in terms of Japanese adult grammar, it would be grammatical in terms of feature translation in French grammar: the French verb *passer* 'go-via' may be used with a P [LOC] (*passer dans le tronc d'arbre* - go-via in the trunk of-tree - 'go through the tree-trunk'), whilst the Japanese verb *tōru* 'go-via' must assign accusative case to the GROUND object in the adult grammar. Such variation can only be captured in terms of lexical idiosyncrasies: in order to converge on the adult grammar in this case, this child does not have to set a language-wide parameter but must learn the selectional specifications of a particular subset of predicates. The generalization appears to be that in Japanese, all verbs of transversal (e.g. *tōru* 'go-via', *kuguru* 'go under (and out the other side)', *wataru* 'cross', *yokogiru* 'cross') must obligatorily assign accusative case to the GROUND.[9]

As discussed in Section 5.2.1, *ni* (P_{LOC}) is found marking the location in the context of climbing up the tree or the hill, in which case the interpretation seems to be *to the top of* the GROUND object; this was argued to be parallel to the use of *kara*

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[9] Apparent exceptions to this are sentences such as *kawa no mukō-gishi ni watatta* – river GEN opposite-bank P_{LOC} crossed – 'He crossed to the opposite riverbank.' However, it is unclear whether this is really a complement. Compare *kawa o watatta mukō-gishi ni* – river ACC crossed opposite-bank P_{LOC} – 'He crossed the river to the opposite bank'.

'from' in the context of climbing down the tree and rolling down the hill, in which case the interpretation again seems to be *from the top of* the GROUND object. However, certain uses of *ni* were clearly non-adult like, with *de* required by the target grammar. These examples were discounted for lack of PATH predication.

(6.43) <J3c [2]:   *ki no ue ni subetta>*   (discounted)

          tree GEN top P_{LOC} slid

          'He slid on the top (surface) of the tree.'

(6.44) <J4b [6]:   *...kawa ni oyoide...>*   (discounted)

          ...river P_{LOC} swim-TE...

          '...he swam in the river, and...'

Such errors in the acquisition of P [LOC] in the three languages appear to be independent of notions of whole-language typologies or parameter settings, and typical of lexical acquisition. Just as with uncontroversially open-class V and N, the lexical representation of P seems subject to semantic fine-tuning in the course of development.

Thus far only Ps expressing relatively 'basic' spatial notions have been examined. However, one of the most interesting findings in respect of the lexicon concerns the expression in a single LI (P or V) of the trajectories THROUGH and ACROSS, which are arguably semantically complex. Children's encodings of these notions in all three languages showed systematic patterns of development, as we shall see below.

6.8   THROUGH and ACROSS: The splitting of complex trajectories

6.8.1   The problem of predicates of traversal

Children's expressions of the trajectories THROUGH and ACROSS in English, French and Japanese furnished a strong and unexpected developmental pattern that merits discussion. The elicited production data reveal that such predicates of 'traversal' present a particular lexicalization difficulty in the early stages of acquisition, regardless of expression in V or PP. The 3- and 4-year-olds consistently split the complex trajectories of these predicates, expressing either one sub-event or a combination of sub-events, whilst the older children and adults consistently lexicalized the whole trajectory in V or PP (English: *through, across; cross*; French: *traverser* 'cross'; *(aller) de l'autre côté* '(go) to the other side'; Japanese *wataru* 'cross', *yokogiru* 'cross', *kuguru* 'go under (and out the other side)', *mukōgishi made* 'to the other side', or alternatively, in a V^P combination such as French *passer dans* 'go-via in' (= 'go through'). This was in stark contrast to the lack of such a developmental pattern for trajectories such as UP, DOWN, IN and OUT, which were invariably expressed in a single V, P, or V^P combination, by all participants in all age groups. This unexpected finding remains in need of more targeted investigation, and presentation of phenomenon is here limited to a descriptive treatment, followed by discussion of two possible routes toward an explanatory account.

What younger test subjects did is best illustrated by example. The following are sample responses in each language to the hollow trunk scene (THROUGH) and the river scene (ACROSS), by the two extremes: 3-year-olds and adults.

English: Examples of split and whole trajectories:

(i) THROUGH

(6.45) a. < E3a [5]:   *he goes in it...he comes out>*

(split into 2 sub-events)

b. <E3d 16]:   *goes under the trunk>*

(only 1 sub-event)

c. <EAa [5]:   *he crawls through it>*

(whole trajectory lexicalized in P)

(ii) ACROSS

(6.46) a. <E3f [6]:   *he gets in the water...swims...gets out>*

(split into 3 sub-events)

b. <E3b [6]:   *he splashes into it and then gets out>*

(split into 2 sub-events)

c. <EAb [6]:   *he swims across the river>*

(whole trajectory lexicalized in P)

French: Examples of split and whole trajectories:

(i) THROUGH

(6.47) a. <F3a [5]:   *il va dans le tronc d'arbre et il sort>*

he goes in the trunk of-tree and he comes-out

'He goes into the tree trunk and he comes out.'

(split into 2 sub-events)

b. <F3b [16]: *il rentre dedans>*

he enters inside

'He goes inside.'

(only 1 sub-event)

c. <FAf [5]: *il passe dans le tronc d'arbre>*

he goes-via in the trunk of-tree

'He goes through the tree trunk.'

(whole trajectory expressed in V^P)

(ii) ACROSS

(6.48) a. <F3c [6]: *il va dans la rivière, il nage, il ressort de la rivière ...>*

he goes in the river, he swims, he again-gets-out of the river

'He goes into the river, he swims, he gets out of the river again.'

(split into 3 sub-events)

b. < F3b [15]: *il va dans la rivière>*

he goes in the river

'He goes into the river.'

(only 1 sub-event)

c. <FAb [6]: *il traverse la rivière en nageant>*

he crosses the river P swimming

'He swims across the river.'

(whole trajectory lexicalized in V)

Japanese: Examples of split and whole trajectories:

(i) THROUGH

(6.49) a. <J3e [5]: *koko ni hairu sore de dete kuru>*

　　　　　　　here P$_{LOC}$ enter that by exit-come

　　　　　　　'He goes in here, so he comes out.'

　　　　　　　(split into 2 sub-events)

　　　　b. <J3e [16]: *ki o mogutte koo yatte...>*[10]

　　　　　　　tree ACC go-under-TE like this do-TE

　　　　　　　'He goes under the tree, he goes like this.'

　　　　　　　(only 1 sub-event)

　　　　c. <JAb [5]: *tsutsu no naka o kugutteimasu>*[11]

　　　　　　　tube GEN inside ACC go-via-under-PROG

　　　　　　　'He's going through the trunk.'

　　　　　　　(whole trajectory lexicalized in V)

(ii) ACROSS

(6.50) a. <J3d [6]: *jabun-tte haitte ne sorekara deta>*

　　　　　　　splash-TE enter-TE PART after-that got-out

　　　　　　　'He went in with a splash, and after that he got out.'

　　　　　　　(split into 2 sub-events)

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[10] Use of the accusative is childlike in this context. Like *hairu* 'enter', *moguru* 'go-under (and stay there)' subcategorizes *ni* (P$_{LOC}$) in the adult grammar.

[11] As discussed earlier, *moguru* means 'go under' with a GOAL interpretation, and is therefore only 1 sub-event; whilst *kuguru* means 'go under and out the other side', and therefore lexicalizes the whole trajectory.

b. <J3b [15]: *kawa ni zapon-te haichatta>*

   river PLOC splash-TE enter-ASP-PST

   'He splashed into the river.'

   (only 1 sub-event)

c. <JAd [6]: *kawa o oyoide watatte imasu>*

   river ACC swim-TE cross TE PROG

   'He's swimming across the river.'

   (whole trajectory lexicalized in V)

In each language there was a development from the younger children's multiple predicate strategy to the adults' consistent expression of the whole trajectory in a single predicate (or V^P combination). The results were crystal clear in English, and whilst there were exceptions in particular French and Japanese age groups, the developmental trend remains unmistakable in each language. The following charts illustrate changing proportions of three patterns of expression in each language: (i) the expression of the whole trajectory (in V, P or V^PP); (ii) the splitting of the trajectory into sub-events expressed in separate syntactic clauses; and (ii) the expression of only one sub-event. [12] Precise percentages by age group are given separately (for readability) in the tables accompanying the charts.

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[12] Note that if a P or V meaning e.g. 'through' or 'go-through' was in one clause, but extra clauses were added, this was counted as a whole trajectory (e.g. <EAc [5]: *he crawls through the tree-trunk and emerges from the other side shaking his fist at the parrot>*.
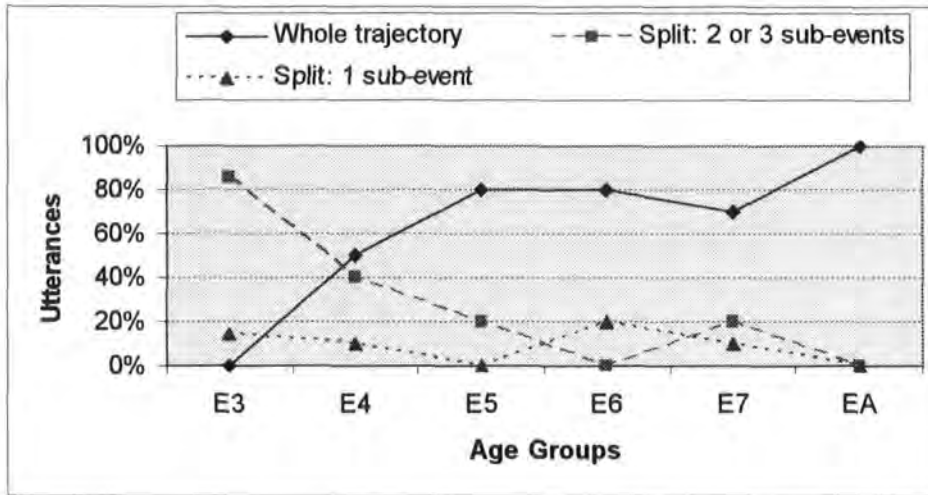
Figure 6.1. *English responses by age group. Experiment 1: Splitting* THROUGH. *Proportions of utterances expressing (i) a whole trajectory in a single predicate or V^P combination; or a split trajectory with (ii) 2 or 3 sub-events or (iii) 1 sub-event.*

Table 6.2. *Precise figures for Figure 6.1.*

	E3	E4	E5	E6	E7	EA
Whole trajectory	0.0%	50.0%	80.0%	80.0%	70.0%	100.0%
Split: 2 or 3 sub-events	85.7%	40.0%	20.0%	0.0%	20.0%	0.0%
Split: 1 sub-event	14.3%	10.0%	0.0%	20.0%	10.0%	0.0%
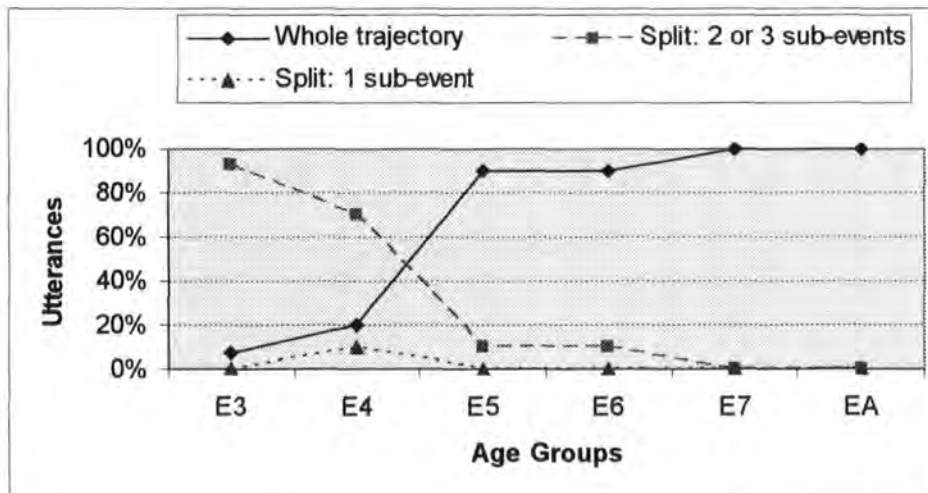
Figure 6.2. *English responses by age group. Experiment 1: Splitting* ACROSS. *Proportions of utterances expressing (i) a whole trajectory in a single predicate or V^P combination; or a split trajectory with (ii) 2 or 3 sub-events or (iii) 1 sub-event.*

Table 6.3. *Precise figures for Figure 6.2.*

	E3	E4	E5	E6	E7	EA
Whole trajectory	7.1%	20.0%	90.0%	90.0%	100.0%	100.0%
Split: 2 or 3 sub-events	92.9%	70.0%	10.0%	10.0%	0.0%	0.0%
Split: 1 sub-event	0.0%	10.0%	0.0%	0.0%	0.0%	0.0%
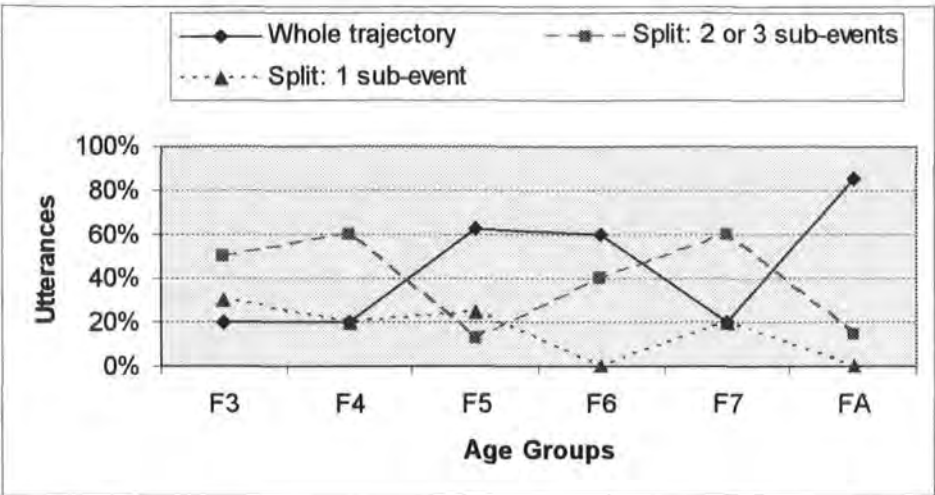
Figure 6.3. *French responses by age group. Experiment 1: Splitting* THROUGH. *Proportions of utterances expressing (i) a whole trajectory in a single predicate or V^P combination; or a split trajectory with (ii) 2 or 3 sub-events or (iii) 1 sub-event.*

Table 6.4. *Precise figures for Figure 6.3.*

	F3	F4	F5	F6	F7	FA
Whole trajectory	20.0%	20.0%	62.5%	60.0%	20.0%	85.7%
Split: 2 or 3 sub-events	50.0%	60.0%	12.5%	40.0%	60.0%	14.3%
Split: 1 sub-event	30.0%	20.0%	25.0%	0.0%	20.0%	0.0%
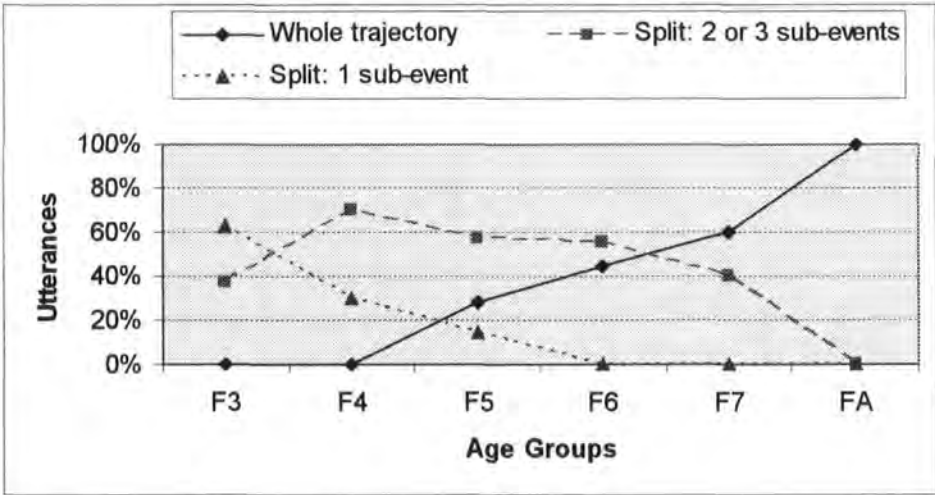
Figure 6.4. *French responses by age group. Experiment 1: Splitting* ACROSS. *Proportions of utterances expressing (i) a whole trajectory in a single predicate or V^P combination; or a split trajectory with (ii) 2 or 3 sub-events or (iii) 1 sub-event.*

Table 6.5. *Precise figures for Figure 6.4.*

	F3	F4	F5	F6	F7	FA
Whole trajectory	0.0%	0.0%	26.6%	44.4%	60.0%	100.0%
Split: 2 or 3 sub-events	37.5%	70.0%	57.1%	55.6%	40.0%	0.0%
Split: 1 sub-event	62.5%	30.0%	14.3%	0.0%	0.0%	0.0%
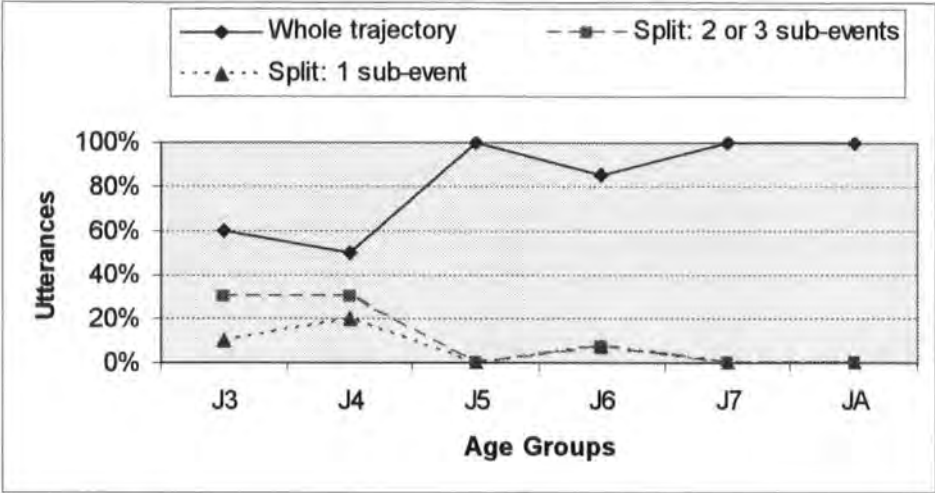
Figure 6.5. *Japanese responses by age group. Experiment I: Splitting* THROUGH. *Proportions of utterances expressing (i) a whole trajectory in a single predicate or V^P combination; or a split trajectory with (ii) 2 or 3 sub-events or (iii) 1 sub-event.*

Table 6.6. *Precise figures for Figure 6.5.*

	J3	J4	J5	J6	J7	JA
Whole trajectory	60.0%	50.0%	100.0%	85.7%	100.0%	100.0%
Split: 2 or 3 sub-events	30.0%	30.0%	0.0%	7.1%	0.0%	0.0%
Split: 1 sub-event	10.0%	20.0%	0.0%	7.1%	0.0%	0.0%
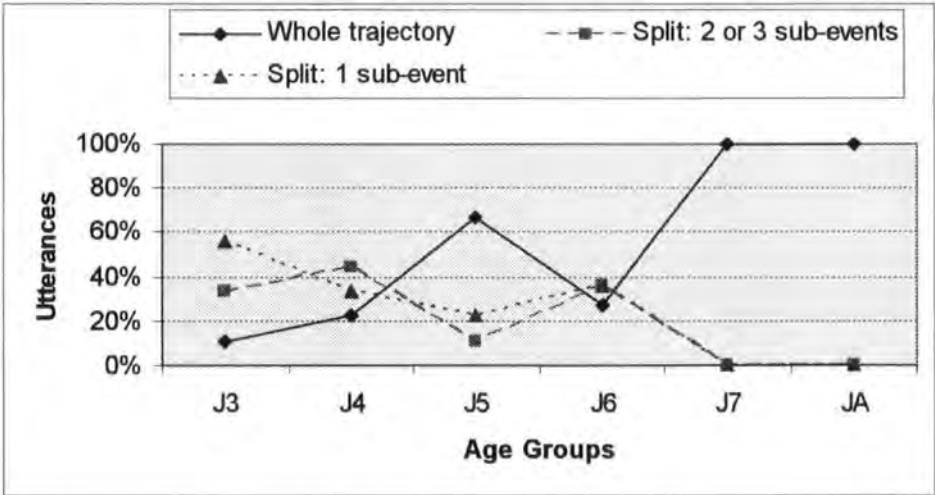
Figure 6.6. *Japanese responses by age group. Experiment I: Splitting* ACROSS. *Proportions of utterances expressing (i) a whole trajectory in a single predicate or V^P combination; or a split trajectory with (ii) 2 or 3 sub-events or (iii) 1 sub-event.*

Table 6.7. *Precise figures for Figure 6.6.*

	J3	J4	J5	J6	J7	JA
Whole trajectory	11.1%	22.2%	66.7%	27.3%	100.0%	100.0%
Split: 2 or 3 sub-events	33.3%	44.4%	11.1%	36.4%	0.0%	0.0%
Split: 1 sub-event	55.6%	33.3%	22.2%	36.4%	0.0%	0.0%

As shown in Figures 6.1 and 6.2, the English responses in both the THROUGH and ACROSS conditions reveal a gradual progression from the multiple predicate strategy to the expression of trajectories in a single LI: *through* (P); *across* (P); or *cross* (V).

The French results depicted in Figures 6.3 and 6.4 show an extremely similar development, with the exception of Group F7 responses to the THROUGH condition, in which the whole trajectory was lexicalized in only 20% of cases. There is no ready answer for why this was the case. The other French age groups developed the same pattern in both conditions, towards expression in a single LI or a V^PP combination: *à travers* 'through' (P); *traverser* 'cross' (V); *passer {dans / à l'intérieur de}* 'go-via {in / P_{LOC} the inside of}' (V^PP).

The Japanese results show a similar progression, with two age groups bucking the trend, each in one condition only. As shown in Figures 6.5, whilst the overall pattern for the THROUGH condition is the same as in English and French, Group J3 had a relatively high rate of whole-trajectory expression, at 60%. Figure 6.6. clearly shows a dip as Group J6 lexicalized the whole trajectory in the ACROSS condition in only 27.3% of cases. Again, I have no account for these exceptions. As in English and French, the overall development in Japanese was toward expression of the whole trajectory in a single syntactic clause, either in a simple LI or compound LI: *kuguru* 'go-via-under' (V); *wataru* 'cross' (V); *tōrinukeru* 'go-via-emerge' (V-V compound); *kugurinukeru* 'go-via-under-emerge' (V-V compound). [13]

6.8.2 Methodological concerns and caveats on analysis

A natural question arises in respect of the methodology. Test materials with multiple cartoon frames might in other circumstances be held responsible for the linguistic

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[13] As noted in the previous sub-section, verbs of traversal in Japanese always assign accusative case: there are no V^PP combinations for THROUGH and ACROSS conditions.

fragmentation into subevents. However, two considerations render this an unlikely source of explanation.

Firstly, *all* the motion events were represented in two or three cartoon frames on the monkey's outward journey, yet the elicited production data revealed consistent decomposition into sub-events only with THROUGH and ACROSS, and never with UP, DOWN, IN or OUT.[14] Whilst utterances such as <E3e: *climb up the tree-trunk*> were typical of all age groups, responses such as 'The monkey goes onto the tree, then climbs up, then gets to the top' were not attested in any age group. A typical response by young French participants to the tree-trunk scene was <F3a: *il monte*> - he goes-up - 'he goes up', and a typical Japanese response was <J3a: *nobotteru*> - climb-TE-PROG - 'he's climbing up'.

Secondly, as indicated earlier, there were two pictorial stimuli for each trajectory: the outward journey was in cartoon-frame format, but the return journey was all on one page, precisely to control for unwanted framed effects. However, there was no discernable effect on responses by the difference in stimulus: whether the motion event was presented in the form of split images or whether it was shown in a single image, younger subjects split the trajectory, whilst older children and adults were holistic.

Before considering ways in which to pursue a theoretical account of these findings, a pair of caveats is in order. It must be borne in mind that when a child uses a particular preposition in an appropriate context, it does not follow that the child has acquired an adult-like semantic representation of that preposition. As mentioned in Section 6.6, the prepositions *on* and *under* are sometimes used as synonyms of adult *in*, and *under* is sometimes found as a synonym of *on* (Clark, 1973a). The above

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[14] A similar case could also be made for *under* and *over*, although the results were less pronounced.

charts therefore reflect appropriate usage of LIs such as *through* and *across*, but do not preclude inappropriate usage elsewhere. It should also be noted that it is possible to split up such complex trajectories in the adult language: this phenomenon is therefore not *exclusive* to child language. However, the fact remains that whilst decomposition into sub-events is theoretically possible in the adult language, it only occurs in the child data, and, moreover, it does so with remarkable consistency across participants and across languages.

6.8.3 Interpretation #1: Lexical semantic complexity and delays in acquisition

The first theoretical interpretation of these findings to be considered is that predicates of traversal require more complex semantic representations than those expressing 'simpler' trajectories, and that this additional complexity is directly linked to the relative delay in acquisition. Whilst I am convinced that the link between semantic complexity and developmental delay remains a viable proposition in certain areas of acquisition, I argue that it is ultimately inapplicable in this particular case.

The most influential proposal in this vein was set out by Clark (1973b) as the 'semantic feature hypothesis', and was systematically investigated during the 1970s, with results that were at best inconclusive. The original hypothesis assumed that conceptual primitives were definitional in nature, complex concepts being the sum of their parts, and suggested that '*words* expressing complex concepts will be learned later than the *words* expressing the primitive components of their definitions' (Carey, 1982: 350). However, subsequent studies could find no unequivocal correlations between purported complexity and order of acquisition (see Carey, 1982, for an insightful and mostly negative review of studies investigating comparative spatial

adjectives).[15] Nonetheless, criticisms of the early semantic feature hypothesis are essentially criticisms of a definitional theory of meaning, one which is almost totally rejected in modern work on lexical semantics. Semantic features play a positive role in many theories of concepts that are not definitional (such as Rosch's (1975, 1978) cluster concept theory). It is generally accepted that the meaning of an LI goes way beyond the sum of those aspects that play a role in syntax (see Levin, 1993). In addition, recent work does not assume any direct link between primitive combinatorial concepts and *words*: elements such as SOURCE, MANNER, and CHANGE-OF-STATE are thought to be relevant to children's syntax despite not being part of children's vocabulary. Many of the original criticisms of the proposed link between semantic decomposition and order of acquisition are blunted when one drops the idea of a definitional theory of meaning and focuses only on syntactically relevant features.[16]

At first blush, it appears plausible that predicates such as English *through* or *across* (and their approximations in French and Japanese) might be analysed as having relatively complex lexical semantic representations. For example, in one of the earliest (and still one of the most thorough) attempts to characterize the semantics of English prepositions, Gruber (1976: 12-14) argues that *through* may be decomposed as follows:

(6.51) *through*: (ALL THE WAY) FROM ONE END TO THE OTHER IN

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[15] Comparative spatial adjectives are elements such as *big, little*; *tall, short*; *deep*, and *shallow*. The continuum sense of tall (how tall?) is not learned before contrastive sense (John is tall), though according to the theories of the time, it supposedly has fewer features: [adj], [comp], and [height], but not [+pole] (i.e. greater than the standard) (Carey, 1982). Negative spatial adjectives do *seem* to be learned later than their positive counterparts (e.g. Bartlett, 1976) when tested with comparative arrays, but this also correlates with slower *adult* reaction times (Clark, Carpenter and Just, 1973). When children or adults are asked to provide simple opposites, there is no difference in either acquisition or reaction time (Clark, 1972).

[16] The issue of the co-opting of concepts by the language faculty is dealt with in more detail in Stringer (2003a).

He notes that the object of the preposition *through* must have an inside, and that in a semantic derivation, the GROUND object starts as the object of a deep preposition IN. Whilst I do not assume such a derivational analysis, it seems true that there is an entailment relation between the English prepositions *through* and *in*. The alternatives in example (6.52a) below entail that the corresponding alternatives in (6.52b) are also true.

(6.52)   a.   Tim went through {Paris / the tunnel / the doorway}.

  b.   At some point, Tim was in {Paris / the tunnel / the doorway}.

Note that the last example of a GROUND object has no inside, as such: *through* can also be used to express a path from one side of a 2-dimensional plane to the other. Thus *in* expresses a more general sense of containment, construable by a frame as well as an enclosure.

Gruber proposes that *across* has a similar representation, with ON replacing IN, as *across* describes 'a transition of position on a surface' (Gruber, 1976: 27). However, as can be seen in the examples below, this proposed entailment prediction is only sometimes, not always, borne out.

(6.53)   a.   Julie went across {the road / the bridge / the grass}.

  b.   At some point, Julie was on {the road /the bridge / the grass}.

(6.54)   a.   Julie {ran across the hall / flew across Paris in an aeroplane / cruised across the Atlantic in a submarine}.

  b.   At some point, Julie was {*on the hall / *on Paris / *on the Atlantic}.

Gruber's (1976) analysis of these prepositions contrasts with his use of IN, ON, UP, DOWN, which are treated as computational primitives (in the sense of Carey, 1982: 350-351) in lexical representations.[17]

However, in another treatment in the same tradition of analysis, Talmy (2000a: 248-252) elaborates representations that do not set predicates of traversal apart in their grain of lexical semantic complexity. The following examples correspond to the relevant senses of the predicates in my elicited production experiment: respectively, bounded paths *through a hollow tree trunk, across a river, in(to) a cave* and *up a tree*:[18]

(6.55) *through*: ALENGTH an $_B$EXTENT$_S$ that IS$_{LOC}$ INSIDE, PARALLEL-TO, and COTERMINOUS-WITH [a BOUNDED CYLINDER] IN an $_B$EXTENT$_T$

(6.56) *across*: ALENGTH an $_B$EXTENT$_S$ that IS$_{LOC}$ ON and COTERMINOUS-WITH [a BOUNDED PLANE] IN an $_B$EXTENT$_T$

(6.57) *in(to)*: TO a POINT$_S$ that IS OF the INSIDE OF [AN ENCLOSURE]

(6.58) *up*: UP ALENGTH an $_B$EXTENT$_S$ that IS$_{LOC}$ VERTICAL and IS$_{LOC}$ ON, PARALLEL-TO, and COTERMINOUS-WITH [a VERTICAL BOUNDED LINE] IN an $_B$EXTENT$_T$

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[17] Gruber (1976: 12) makes clear that further analysis might prove such elements to be subject to further decomposition, in which case they may be read in his analysis as 'abbreviations'.

[18] In these examples, $_B$EXTENT$_{S/T}$ specifies a bounded extent of space or time, and POINT$_S$ specifies an unextended point of space.

Whilst the representations of Gruber (1976) might lead one to expect the kind of developmental differences attested in the experiment, those of Talmy (2000a) do not make such a strong distinction between types of directional predicate (although note that TO and IN(SIDE) appear as primitives inside the complex representation of *into*, and UP appears inside the representation of *up*, whilst THROUGH is never a primitive). The predictions of such accounts in the tradition of cognitive semantics are less than clear in respect of the question of relative complexity. In contrast, there is a strong convergence in research in the generative paradigm, from both the perspectives of lexical semantics and syntax, which indicates that linguistic complexity is not a relevant factor in distinguishing between the two types of directional predicates.

6.8.4 Interpretation #2: Complexity in the spatial representations of trajectories

More constrained lexicalist accounts in the tradition of generative grammar, which restrict the set of semantic components to those with observable syntactic effects, often posit that the various directional predicates discussed above have, in fact, exactly the same degree of linguistic complexity. For example, Jackendoff (1990: 45-47) suggests that English *into* corresponds to the structure in (6.59), and extrapolating from his analysis of the verb *climb* (op.cit. 76-79), I assume that the appropriate representation of the relevant sense of *up* in this framework is as in (6.60).

(6.59) [Path TO ([Place IN ([Thing __])])]

(6.60) [Path TO ([Place TOP-OF ([Thing __])])]

As for predicates of traversal, the intended sense of *through* is represented as follows (op.cit. 47, 72-74).

(6.61) [Path VIA ([Place IN ([Thing __])])]

This representation also provides the required entailment relations discussed above. Although a detailed analysis of *across* is not given in Jackendoff (1990), the various senses and their entailment relations can be easily captured by altering the Place-functions in the argument structure, and allowing different mappings to the phonological representation for the different senses of the predicate, e.g.

(6.62) [Path VIA ([Place ON ([Thing __])])]

   (e.g. *run across the bridge*)

(6.63) [Path VIA ([Place IN ([Thing __])])]

   (e.g. *float across the hall*)

(6.64) [Path VIA ([Place OVER ([Thing __])])]

   (e.g. *fly across the city*)

Moreover, there is accumulating evidence that, independent of the status of such conceptual structures in a given linguistic theory, the [PATH [PLACE]] configuration is part of syntactic structure. I shall argue that a syntactic, layered PP structure may be used to account for the predication of direction in both adpositional phrases and in locative case systems, but I postpone detailed discussion until Chapter 11. Suffice to

say at this point that generative treatments of directional PPs, both semantic and syntactic, converge on the hypothesis that the various types of directional P may all be represented with the same two-tiered structure, with direction taking scope over location, and the relevant difference between predicates of traversal and other directional predicates lies not in their linguistic complexity.[19]

It seems plausible to posit that what distinguishes predicates of traversal (both V and P) from other directional predicates might lie in non-linguistic mental representations of these concepts. Differences between the meanings of items in the mental lexicon clearly go beyond those aspects that are relevant to syntax. A more viable approach might be to extend to the domain of basic trajectories a theory of spatial representations that has already been convincingly applied in other areas of perceptual cognition, specifically capturing differences between related solid objects, and related manners of motion.

As for solid objects, previous attempts to encode differences between concept-pairs such as *chair* and *stool*, or *duck* and *goose* by respectively positing linguistic features such as [±has a back] or as [±has a long neck] (along the lines of Katz, 1972), have generally been abandoned. Jackendoff has repeatedly argued that such information should be represented in an independent module of spatial representations (e.g. Jackendoff, 1987; 1990; 1997; 2002). Specifically, what is required is the kind of mental faculty proposed in work on visual cognition by Marr (1982), and elaborated by Biederman (1987). Marr's (1982) '3D model structure' is not simply a mental hologram, but an encoding of the geometric systems of spatial axes by which we

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[19] Superficially, it might appear that frequency in the input should play a determining role. If it could be shown that the predicates expressing paths of traversal in each language (both Vs and Ps) are significantly less frequent in the input than all other directional predicates, it might be that this lack of sufficient exposure is responsible for the patterns observed in the data. However, given what is known about how children can 'fast map' new words with limited exposure (Carey, 1978; Bloom, 2000), and given that the multiple predicate strategy persists until age 5 or 6, this seems an unpromising suggestion, and one I shall not pursue here.

organize our perceptions of objects; it represents the decomposition of objects into parts, and expresses the relations between these parts. It is not restricted to immobile objects, but can represent ranges of angles of attachment of parts, and other such parameters of variation. It is in this module of spatial representations that non-linguistic differences between these types of concept-pairs may be elaborated.[20]

Though it originated as a theory of object representation, Marr and Vaina (1982) advocate an extension of the 3D model to actions such as throwing and saluting. Jackendoff (1990: 34, 88-89) builds on this proposal by suggesting that this extended, animated 3D model may be precisely where differences between MANNER-of-MOTION verbs are articulated. For example, the differences in MANNER within the following sets of English verbs are conceptually significant but have no syntactic effects.

(6.65) a. throw, lob, toss

b. run, jog, lope

c. wiggle, spin, twist

The 'quasi-geometrical' format of spatial representations appears much better suited to capture such distinctions than the 'essentially algebraic' formats of syntax and conceptual structure (Jackendoff, 1990: 88). I suggest that predicates expressing trajectories such as *out*, *under* and *through* seem similarly ill-suited to differentiation in terms of linguistic features alone, and geometric distinctions between such concepts

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[20] The 3D model cannot be restricted to visual information. In their study on the acquisition of language by blind children, Landau and Gleitman (1985) stress the uncontroversial point that shape and location may be understood through touch as well as vision, and Landau and Jackendoff (1993) argue that proprioception must also be involved in constructing a mental representation of the body in physical space, as we reach for objects and navigate potential obstacles. Such a system of spatial representations cannot therefore be a 'Fodorian module' in a strict sense, in that it is necessarily multimodal (Fodor, 1983; Landau and Jackendoff, 1993; Jackendoff, 1997).

are necessary in any case. Assuming that the differences in meaning are more precisely differences in spatial representations allows for a rephrasing of the question of whether predicates of traversal have additional representational complexity: not in terms of features but in terms of representational geometry.

That the holistic conceptualization of events of traversal is more complicated than that of 'simpler' trajectories must necessarily be treated speculatively within the confines of the present work. However, it does seem plausible that that going to a place and stopping (either *at*, or *on* or *in* it), or starting from a place and leaving (either *from*, or *off* or *out* of it), are more basic kinds of representation. A combination of the two types of trajectory is necessary in order to derive a holistic, rather than a composite, journey to the far side. The data from Experiment 1 provide groundwork for the hypothesis that children initially rely on composite spatial representations for such trajectories, as reflected in the multiple predicate strategy. Needless to say, a more targeted study would be required to fully investigate these impressionistic but intriguing patterns in lexical development.

6.9 An additional observation: Systematic expression of MANNER with onomatopoeia

There were no onomatopoeic expressions inside syntactic structure in the French data, although there were some excited noises made in isolation. The English data had very few examples, but interestingly, they were all expressed in the same way: lexicalized in the main verb with PATH expressed in a directional preposition e.g. *splash into*, *boing over* (examples (5.156), (5.157)).[21] Directional interpretation in these cases is

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[21] In case of doubt that *splash* is an example of onomatopoeia, note the variants I found whilst researching children's picture-books in preparation for designing the Monkey Book: *splish*, *splash*, *splosh* and *sploosh*. (in order of magnitude).

determined solely by the preposition. Onomatopoeia is also very commonly expressed in English with the support of light verbs (e.g. *he went weee! down the slide*), and in adjuncts (e.g. *she landed with a bang*), though not in these transcriptions.

As has often been observed in the literature (Küntai and Nakamura, 2004; Ono, 1994; Slobin, 2004; Tsujimura, 2002), Japanese child language and child-directed adult language makes much use of onomatopoeia or 'mimetic expressions' to express MANNER in motion events (among many other things). These expressions become less pervasive in both child speech and caretaker speech as children grow up, although some remain reasonably common in informal adult speech. In the elicited production data, these were all integrated into syntax not through verbalization as in the English examples, but through expression as adjuncts followed by the -TE or -TO suffix. In directional contexts, they were supported by (i) deictic or geometric PATH predicates such as *iku* 'go' or *oriru* 'go-down'; (ii) light verbs such as *suru* 'do' or *naru* 'go / get', or V [MANNER], in both cases merged with the directional P *kara* 'from'; or (iii) V [MANNER], which assigned accusative case to the direct object. In non-directional contexts, they were always supported by light verbs. Examples showing how these may be integrated into syntax in directional contexts are given below.

Onomatopoeia and V [PATH]:

(6.66) <J3d [6]:   *jabun-te haitte ne sorekara deta>*

splash-TE entered PART then go-out

'He splashed in and then he got out.'

(6.67) <J5a [2]:   *saru-san kokkara oriyo-to shite, kyu-te kochi e ichatta*

monkey-TITLE from-here go-down-INT-PART-TO do-TE,

squeak-TE here to go-ASP-PST

'The monkey wanted to go down, so he went 'weee' to here.

*Onomatopoeia with P [PATH] and a light verb (*suru *'do' and* naru *'go / get'):*

(6.68) <J3b [4]:   *ishi no ue kara piyon-tte shita>*

stone GEN top from boing-TE did

'He boinged from the top of the rock.'

(6.69) <J4d [14]:   *koko kara koron-koron-koron-tte nachatta>*

here from bumpety-bump-TE go-ASP-PST

'From here he went bumpety-bumpety-bump.'

Onomatopoeia with P [PATH] and V [MANNER]:

(6.70) <J4d [8]:   *o-yama kara kuru-kuru-tte korogachatta>*

HON-mountain from roly-poly-TE roll-ASP-PST

'He roly-polied down the mountain.'

Onomatopeia with V [MANNER] and direct object:

(6.71) <J4e [4]:   *ishi o piyon-tte tonjatta*>

               stone ACC boing-TE leap-ASP-PST

               'He boinged over the stone.'

Some younger test subjects used onomatopoeic expressions in almost every utterance. A sample of such expressions from the elicited production data is given below, with the relevant MANNER contexts.

Table 6.8. *Experiment I: Onomatopoeia and 'mimetic' expressions in the Japanese transcripts, with context of use and some English equivalents.*

Onomatopoeia	Context of use
piyon piyuu	jumping (boing)
bochaan zapon pasha-pasha / basha-basha jabun pacha-pacha	splashing (splash)
shuu suru-suru shii bii	sliding (whoosh)
don	bumping (bump)
dokan	crashing (bang)
koro-koro / goro-goro kuru-kuru / guru-guru	rolling (whirly-whirly)
koron koron	tumbling down (bumpety-bump)
biyun piyuu	dashing (whoosh)
korori	falling over (kerplunk)
pata-pata	flapping (flap)
tsururi	slipping (slip)
kyu	squeaking (eek /wee)
gyu	squeezing / squashing (squash)

One descriptive generalization emerging from the transcripts is that onomatopoeic verbs such as English *splash* and Japanese *jabun-te suru* 'do a splash' are never

attested in directional contexts without an unambiguously directional P. That is, when combined respectively with English *into* or Japanaese *kara* 'from', a directional interpretation is possible, but when combined with English *in* or Japanese *ni* (P_LOC), only a locational reading is available in English, and the resultant Japanese structure is out for an independent reason (locational adjuncts to activity verbs must be marked with *de* (P_PLACE), not *ni* (P_LOC)). Grammatical cases include the English examples (5.156-5.157) and the Japanese examples (5.60-5.61) in Chapter 5. Ungrammatical examples are easily constructed:

(6.72) *He splashes in the river.   (*on PATH interpretation)

(6.73) *He boings on the rock.   (*on PATH interpretation)

(6.74) *Dokutsi no naka ni biyon-tte suru.

cave GEN inside P_LOC whoosh-TE do

'He whooshes into the cave.'

(6.75) *Kawa ni pasha-pasha-te nachatta.

river P_LOC splash-TE go-ASP-PST

'He splashed into the river.'

It appears that when V and PP are merged, PATH interpretation is only possible if the feature PATH is carried on V, or on P, or when a subset of 'directional' MANNER verbs including *run, swim, slide* and *roll* somehow coerce a PATH interpretation from the locative PP. This idea will be further pursued in Chapter 11.

6.10   Result Summary: Experiment I

In summary, there were two main types of findings: first, those relevant to Talmy's binary typology and the possibility of its formalization in the P&P framework, characterizing the degree of variation between and within languages; and second, those which reveal underlying lexical and syntactic commonalties. The main prediction of the typological work undertaken by Talmy (1985, 1991), Berman and Slobin (1994) and others, couched in generative terminology of syntactic categories, was simply that English test subjects should lexicalize geometric PATH in PP, whilst the Japanese and French subjects should overwhelmingly prefer expression of PATH in V. In the elicited production experiment, this prediction was borne out emphatically for English and Japanese, but the French results were quite mixed, with all age groups expressing trajectories strictly in PP to a considerable degree (with even more combining V *and* PP to the same end).

In respect of formalization along the lines of the P&P model, this particular aspect of language variation resists a binary account at the whole-language level, and favours the Lexicalist Path Hypothesis, whose predictions (Section 2.2.3.3) are met in full:

(i)   Both types of PATH predication exist in a single language (French) in such as way that the language cannot be clearly characterized as S-framed or V-framed.

(ii)   All three languages admit S-framed and V-framed argument structures (to differing degrees).

(iii) PATH verb syntax is not homogenous, but varies from predicate to predicate, (both across and within languages).

(iv) There is no evidence for a language-wide switch to a PATH parameter setting; nor that selectional properties of predicate types are there from the beginning; rather, acquisition of V and P proceeds item by item, perhaps in some cases by classes of items (see Section 6.6).

(v) In general, the syntax of motion events in the three languages does not vary by language-type: rather, the various aspects of crosslinguistic variation may be accounted for in the representations of LIs, such that there remains a common syntax in all three languages, in terms of shared categories, shared features, and layered PP structure.[22]

Perhaps the most intriguing aspect of the findings was how much English, French and Japanese have in common, despite differences in rhetorical style. Trajectories were expressed using the same syntactic categories and computational semantic features in each language: geometric V [PATH], P [PATH], P [LOC], N [LOC] and 'functional' P. PP-internal categories were found in the same strict hierarchy of combination in each language e.g. [p, PATH *from* [p, PLACE *on* [N, LOC *top* [p *of*]]]]. V [MANNER] may directly select the GROUND object in each language, with PATH interpretation inferentially determined. Each language has examples of PATH and MANNER conflated in a single predicate, although this was found only for upward and downward motion. Contrary to previous assumptions, it was also found that V [MANNER] ^ PP [LOC] proved to be

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[22] Leaving aside certain phenomena such as V-V compounding and the assignment of ACC to N [LOC] in Japanese.

a colloquially acceptable combination in directional contexts. Acquisition appeared to proceed in the same general way in each language, with a complete absence of errors in phrasal categorial combination, but inaccurate representations in the course of acquiring particular P [LOC]. Another common phenomenon was the splitting of the conceptually complex trajectories THROUGH and ACROSS by young children into multiple predicates. The acquistion of LIs such as *through, across, traverser* 'cross', *kuguru* 'go-via-under', and *wataru* 'cross' was shown to require more detailed investigation.

The targeting of specific examples of PATH predication by the elicited production technique in Experiment I provided ample evidence to justify the above conclusions. However, this experimental technique suffers from a flaw in that whilst it shows what is *in* the grammar, it cannot conclusively prove that something is *outside* the grammar. The fact that a particular structure is not exemplified in the data does not means that it does not exist (although its existence becomes less likely as the size of the data set increases). According to the mantra oft-repeated in certain acquisitionist circles, 'absence of evidence is not evidence of absence.' Therefore a second experiment was designed for the purpose of specifically testing knowledge of ungrammaticality, and it is to this that we now turn in Chapters 7 and 8.

6.11 Postscript: Reflections on picture-book methodology

Overall, the design of the Monkey Book was a success in that it fulfilled its function in the elicitation of PATH predicates in all age groups, and many test subjects and other children seemed to enjoy the pictures in themselves (which gave great satisfaction to the experimenter – no point in false modesty here). Some advantages of this particular form of stimulus became more apparent as the experimentation

progressed. All children were familiar with the medium, so all felt free to touch it and look closely at the pictures. Lamination of the pages proved to be a very good idea, and ensured their survival (occasionally a page was twisted out of its binding, but that was easily fixed). The book was ultimately portable and lightweight, requiring a minimum of set-up, which was important as the particular rooms used for experimentation were not always arranged in advance (a degree of flexibility was required on my part for multiple school visits).

However, this medium had certain disadvantages, some small, some more serious, the experience of which suggested improvements for future research of this type. First, two or three utterances revealed that some younger test subjects misunderstood drawing conventions used to indicate movement. For example, on viewing the first downhill scene, in which the monkey's rolling movements are represented by loops drawn behind him, one subject responded as follows:

(6.76) <F4b [14]:   *il fait des boucles pour descendre>*

                he makes of-the curls in-order-to come down

                'He makes curls to come down.'

In another example of the same type, the page representing the whole return journey indicates the monkeys' movement with little red arrows. The youngest French test subject's first response was:

(6.77) <F3a [13]:   *il tire des flèches>*

                he shoots of-the arrows

                'He's shooting arrows.'

A potentially more problematic misunderstanding in respect of experimental goals is what I call the 'cartoon frame problem'. All adults and older children understood without question the nature of the frame sequence. However, one or two younger children did misinterpret the sequence in one way or another. For example, E5e at first thought that the different representations of the monkey and the objects he overcomes were different monkeys and different objects, as shown below.

(6.78) <E5e [4]:   *he has to jump over them* [he has to jump over what?]

the rocks>

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

look! there's another monkey>

In the opposite case, two test subjects thought that two frames were in fact one, so that as the monkey crawled through the tree trunk, his body appeared elongated e.g.

(6.80) <J4c [5]:   *kyu-tte o-shiri o sa gyu-tte hipparu n da ... ... derarenai ... demo*

shippo ga derarenai ... ashi ga derarenai ... ashi ga nukenai>

squeak!-TE HON-bottom ACC INTJ stretch!-TE pull PART

be...come-out-PASS-NEG...but tail NOM come-out-PASS-NEG...

leg NOM come-out-PASS-NEG...leg NOM emerge-NEG

'Eeee! His bottom, like, stretches...it can't come out...but his

tail can't come out...his leg can't come out...his leg can't get

through.'

Such misconceptions were small in number and easily rectified; the experiment proceeded normally after the penny dropped. However, the cartoon frame problem raises the issue of how certain the experimenter can be that young children view one page as depicting a whole trajectory, as intended. In particular, the finding that younger children consistently split complex trajectories such as THROUGH and ACROSS into separate syntactic segments becomes less sound, as there is always the chance that some responses were an artefact of the frame problem. In reality, this is highly unlikely to be the case for two reasons. First, the responses to THROUGH and ACROSS were so striking precisely because of their contrast with other trajectories such as IN, OUT, UP and DOWN, which were also portrayed in multiple frames, but which were consistently expressed in single predicates (or V^P combinations): in response to the downhill scene, no subject said the equivalent of 'He falls over, and then he rolls down, and then he gets to the bottom of the hill'. Second, the return home was depicted on a single page in anticipation of such effects, precisely as a counterbalance to the multiple frame images, yet THROUGH and ACROSS trajectories were split regardless of their depiction in one frame or multiple frames. However, the concern remains.

One solution might be the use of video clips: one could film a colleague or friend who does all the rolling and sliding and jumping into rivers (for an interesting and less dangerous adaptation of this idea, see Pourcel, 2002). Another possible solution, with fewer safety concerns, would be to animate the various sequences using computer graphics and present them successively on a computer screen (for an example of this methodology, see Sugisaki and Isobe, 2000).

Despite the above disadvantages, the advantages of the picture-book methodology remain (the familiarity of the medium, portability, reliability,

'touchability', etc.), and very few test subjects showed any signs of difficulty. After all, the younger children use such books in school on a daily basis. The choice between mediums will always depend on the precise nature of the particular experiment. For all the issues investigated in this study, the above concerns notwithstanding, the picture-book proved a reliable and successful tool for the elicitation of PATH predicates.

Chapter 7

Experiment II methodology:

Toto the Robot

7.1 Knowledge of ungrammaticality and the limits of production data

Elicited production data have one considerable advantage over grammaticality judgement data in the investigation of first language acquisition, in that they are more reliable in the search for what *is* grammatical (at any particular stage of development). If a specific form is systematically attested in speech, it is almost certainly a product of the grammar, as it is improbable that a set of children could all produce the same form by accident (as noted in Section 4.2, following the observations of Thornton, 1996: 78). By contrast, a simple binary response of the form yes-no / right-wrong / grammatical-ungrammatical does not necessarily point directly to knowledge of grammaticality, as it could be a response based on acceptability (Is it easy to understand? Does it sound good?), or a response based on what the child perceives to be the expectations of the experimenter (What does he want me to say? Will I still get a sweetie?). In addition, it is well-understood that in such circumstances, when in doubt, children (and adults) have a tendency to say 'yes', a phenomenon known as the 'positive response bias' (Wason, 1961), which must be countered by the methodology in some way. There is also necessarily a dividing line somewhere in early childhood between those who are conceptually capable of making metalinguistic judgements and those who are not, and this developmental divide certainly varies from child to child to some degree. Such considerations make it necessary to take extra precautions to

attempt to ensure that such judgements truly reflect grammatical knowledge and not one of an indefinite number of variables.

Nonetheless, judgement elicitation has one great advantage over elicited production, in that this process is the closest one can get to determining what is *not* a possible sentence of the grammar. Whilst transcripts of productive speech can tell us a great deal about children's grammars, they can never provide conclusive evidence of knowledge of ungrammaticality. If a particular structure is hypothesized to be impossible, the prediction is that it will be absent from any given transcript of production data. If the structure is in fact unattested, this keeps the hypothesis alive. However, a whole host of fully grammatical structures will also be absent from the data. As is often heard on the acquisition circuit, 'absence of evidence is not evidence of absence', i.e. the lack of utterances exemplifying a particular structure in one corpus does not prove that the structure does not exist as a potential form.[1] For this reason, in conjunction with Experiment I, a second experiment was designed in order to elicit grammaticality judgements from the same test subjects.

7.2   Experiment II as a dependent investigation

Experiments I and II were conducted together as part of a single inquiry into PATH predication. Each test subject proceeded without pause from the first experiment to the second, so the test materials used for grammaticality judgements were based on prior expectations of the nature of the grammars of the participants, rather than drawing on the results of the first experiment. The primary focus was on elicited

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[1] I accept this argument to a point, but I do not, so to say, swallow it hook, line and sinker. Absence of evidence does play an important role in the process of linguistic as well as general scientific discovery. To say that in theory a particular combination of elements should never exist is to state a strong, falsifiable hypothesis, presuming that relevant data continues to be available. The greater the amount of data subjected to scrutiny, the more likely the hypothesis is to be true. This logic is inherent to the study of implicational universals in language (e.g. Greenberg, 1963; Comrie, 1981), and the predictions of parameter theory (e.g. Ouhalla, 1991; Baker, 2001).

production, given the paucity of data from previous studies specifically relevant to the issues under investigation (the Frog Story research notwithstanding, due to its emphasis on rhetorical style in narratives). Experiment II was conceived as an extension of Experiment I, using exactly the same pictorial stimuli. As a dependent investigation, it had the advantage of being able to broaden the scope of the primary experiment, but it also suffered from certain disadvantages.

First, the fact that exactly the same pictorial stimuli were used allows for direct comparison between what children say and what they allow, holding constant the variables of contextual interpretation. However, had a separate set of stimulus materials been designed, this would have permitted a more rigorous distribution of types and tokens, considerably facilitating the analysis. This, however, would constitute an independent experiment, outside the scope of the current study.

Second, extending the investigation to include grammaticality judgements in the same session was a way of maximizing experimental opportunity, given practical constraints of time and financial resources. Given the demanding nature of the fieldwork (six schools, three countries, two continents), a decision was made to make the most of the 30-minute attention span most young children can manage for a particular session of fun and games. Had it been possible to arrange a considerable time lag between the two experiments, two aspects of the test materials would certainly have been altered, in the light of the findings of Experiment I. One is that the principal targeted sentence type in the French version of Experiment II (V [MANNER] ^ PP [PATH]) was assumed to be ungrammatical in adult French, on the basis of previous research, and the earlier judgements of informants. However, this particular form was attested throughout the age range in Experiment I, and consciously judged grammatical by adult informants in Experiment II, pointing to an error in the

preparatory elicitation of judgements and trial-run, which failed to ensure a distinction between 'prescriptive' and 'colloquial' judgements. Although these standard (but erroneous) expectations of grammaticality judgements had a negative effect on preparation of the French test materials, the problem of too many positive responses was rectified for the Japanese and English versions of the experiment. That this revision was possible is due to the assumption, argued for in Chapter 3, that there is no Universal Lexicon, and that the three versions of Experiment II were not one experiment but in fact three different experiments on three different lexicons, with comparable results. Because each set of language-specific materials built slightly on the experience of previous experiments in the other languages, the materials and results are all presented in the order that the experiments were conducted: French, then Japanese, then English.

The other aspect of Experiment II that would have differed given a time lag between the two experiments is obviously the incorporation into the test materials of issues raised by the first set of findings. For example, the fixed internal hierarchy of PP described in Section 6.3 was an independent discovery, only later to be related to work by van Riemsdijk (1990), Koopman (2000), and Ayano (2001) on the same phenomenon. That no violations of the hypothesized PP structure were attested is extremely suggestive, but children's knowledge of ungrammaticality in this regard requires further investigation.

Nevertheless, Experiment II did succeed in broadening the scope of the study; it managed to provide clear answers to several questions, and raised its own set of issues for future inquiry. Before giving details of the original methodology and props used in Experiment II, I provide a brief review of previous approaches to the

elicitation of metalinguistic judgements from children, in order to clarify some of the choices made in task, material, and prop design.

7.3 Methodological background: Judgements of grammaticality and reference in first language acquisition

Grammaticality judgements are at the heart of mainstream generative research, whose stated aims have always included an understanding of the boundaries of what constitutes a possible human language (as discussed in Section 1.6). Most syntactic data used in generative argumentation derive from native-speaker judgements, either gleaned introspectively, or by informally asking friends and colleagues. Whilst this practice is occasionally subject to criticism, especially by those whose focus is on language use rather than mental representation, Chomsky (1965: 18-24) has convincingly argued for the validity of introspective judgements, and it remains the preferred mode of assessing the status of a given form in adult grammars. However, it is a contentious issue whether 3-, 4- or 5-year-old children have the ability to respond accurately to direct questions about metalinguistic knowledge. Some have argued that children must be 6 or 7 years old, in the concrete operational stage of cognitive development, before such judgements can be reliable (Hakes, 1980; van Kleek, 1982), but several studies give reason to believe that it is possible to elicit consistent judgements from 4-year-olds, and even 3-year-olds, but not younger than 3 (de Villiers and de Villiers, 1974; Stromswold, 1990). That children do have such an ability is a view defended by McDaniel and Cairns (1996), who argue that young children can give judgements as least as reliably as adults, although they also say that that 10-25% of 3- to 5-year-olds must nevertheless be excluded due to lack of understanding of the task.

One of the keys to successfully eliciting judgements from children is to remove from them the burden of having to think up an appropriate context. Props such as puppets who act out scenarios can be most useful in this regard. One example of this use of props runs as follows, where the issue under investigation is whether children allow *that* at the beginning of an embedded clause:

(7.1)   [There are two puppets, named Bert and Grover].

'Suppose Bert is eating some cookies [experimenter makes Bert eat cookies], or at least that's what Grover thinks [experimenter holds out Grover]. Is this the right way to say it?: "Grover thinks that Bert is eating some cookies." '

(adapted from McDaniel and Cairns, 1996: 243)

In this way, the test subject may consider the grammaticality judgement directly, without having to invent possible scenarios.

Some experimenters have noticed that in addition to the general positive response bias mentioned in Section 7.1, which applies to participants of all ages when in doubt, very young children are sometimes less willing to say 'no', or 'wrong' to an adult experimenter. This phenomenon may be countered by having a puppet actually present the test sentences (e.g. de Villiers and de Villiers, 1974; Stromswold, 1990). As a further variation on the use of 'puppet as experimenter', some researchers have chosen to remove from young children the burden of having to give an oral response at all; instead, they may indicate a positive or negative judgement by interacting with the puppet in some way. For example, Gordon (1981, 1982) and Hochberg (1986) had the children reward a puppet who 'said it right'. Although the use of puppets removes

the concern of unwillingness to contradict an adult, the general positive response bias remains a concern with such methodology. In order to redress the balance, Crain and McKee (1985) adopted a technique in which participants could not only reward a puppet, but 'punish' it too. The topic of the experiment was constraints on the interpretation of backwards anaphora. Toy animal figures were used to act out scenarios in a variation of previous experimentation by Tavakolian (1977), after which came an original methodological twist. A celebrity puppet, Kermit the Frog, commented on the action, to be either rewarded or punished for the truth-value of his responses. Kermit produced sentences such as the following, in which the co-reference (shown by indices) was unambiguous in context.

(7.2)   When he$_i$ stole the chickens, the lion$_i$ was in the box.

(7.3)   *He$_i$ ate the hamburger when the smurf$_i$ was inside the fence.

(Crain and McKee, 1985)

If children thought that what Kermit said was true, they could feed him a cookie, but if not, they fed him a rag. In this way, Crain and McKee (1985) provided convincing evidence that 2- to 5- year-old children allow backward anaphora only when a specific structural condition obtains (the preceding pronoun does not c-command its controlling DP), as predicted by a proposed principle of Universal Grammar, namely Principle C of Binding Theory (Chomsky, 1981).

The technique of rewarding or punishing a puppet is fun for the children and can make them more engaged in the activity, whilst removing the fear of contradicting

an adult, and more generally discouraging a positive response bias. However, there are still a lot of variables. Some children will perform as intended, but others may wish to reward the puppet in the same way they want to please an adult; others may want to punish the puppet because they find it hilarious. Clearly, the humour inherent in such a strategy must be controlled, otherwise a 'negative response bias' could be created. Such issues make a practice session and/or pretest an absolute prerequisite for such experimentation.

In the pre-experimental stage, it is crucial to make both children and adults understand that they are supposed to be judging form rather than content. For example, if participants are shown a picture of a smiling girl about to eat a yellow cake, and are presented with the test sentence *She the yellow cake likes*, we can rest assured on the basis of word-order studies (see Section 2.1.3.1) that even young subjects who accept this utterance are making a judgement of content in terms of truth value and not one of grammaticality. Conversely, if participants reject a sentence of the type *She likes the yellow cake* it is likely that there is a content problem. On being asked why such a sentence is wrong, subjects may say that it looks more like a biscuit than a cake, or that she isn't smiling but pulling a funny face. In such cases, subjects can be taught through practice to understand that they must judge *how* the experimenter or puppet is speaking, and they don't have to agree with *what* is said. Careful design of the materials can help eliminate such problems.

In respect of the battery of test sentences, all grammaticality judgement experiments with children require fillers of some sort, alongside the targeted test sentences. As McDaniel and Cairns (1996: 247-248) point out, fillers serve several different functions. They provide a break in the pattern of test sentences themselves; they may serve to break a fixed response pattern, after a succession of positive or

negative responses (though this cannot be known for sure in advance); they can give the subject a rest of sorts (an easy judgement after a number of harder ones); and they can serve as a check to see if the subject is paying attention.

As for the specific form of questions when eliciting judgements from younger children, some leeway is required in respect of the actual terms used, as what is most important is the clarity of a positive or negative judgement. The experimenter may ask if the sentence is {good / right} or {bad / wrong}, or if a character {says it properly / well / right}, of if he says it in a {funny / silly} way. Such choices depend partly on aspects of the experiment itself: the expression 'in a funny way' may be ambiguous if the sentence is spoken by a puppet or even an experimenter with an unusual voice. Other factors include the currency of certain lexical items or expressions in the particular dialect community. As we shall see, in the English version of Experiment II, one of several terms used (I hedged my bets) was to speak 'properly', which was fine for British children, but would have been perhaps less appropriate in other English-speaking countries or regions. When it came to translation of the experimental materials into French and Japanese, needless to say even greater variation was involved.

The appropriate response to all such questions is a one-word answer (i.e. 'right', 'wrong' etc) or a single action (granting a reward or punishment). This is usually sufficient for the purposes of analysis, although in the case of a negative response it is possible with some children to ask what the right answer should be, depending on the precise nature of the experiment.

The delivery of questions is also an important methodological issue. Most grammaticality judgement tasks involve the reading out of test sentences by the experimenter(s). Such direct presentation can on occasion lead to differences in

prosody or stress in the delivery of a sentence between one test subject and another, or between one experimenter and another across sessions. For example, Fraser, Bellugi and Brown (1963) used a picture-selection task to test children's sensitivity to the singular/plural distinction, using the sentences below.

(7.4)   a. The deer is eating.

   b. The deer are eating.

(Fraser, Bellugi and Brown, 1963)

As Gerken and Shady (1996) point out, if an experimenter unconsciously stresses the word *are* in the latter example, this could serve as a cue for selection of the picture with more than one deer. This kind of unconscious cueing finds a direct parallel in sentences with PATH predication involving adpositions that are ambiguous between locational and directional interpretation. In an informal preparatory study with native English speakers, I found that whilst all accepted *in* and *on* in directional contexts in colloquial speech, they rejected such utterances when a slight pause was introduced between the verb and the preposition, as indicated below with a comma.

(7.5)   a. The kids ran in the hall.   (on directional reading)

   b. The fan jumped on the stage.

(7.6)   a. The kids ran, in the hall.   (*on directional reading)

   b. The fan jumped, on the stage.

One way around this problem is to make sure the same person delivers the same test sentences in the same way. Another is to allow sufficient training time for research assistants so that individual voice remains the only variable. A third way, pursued in Experiment II, is to pre-record the test sentences. This eliminates almost all variables in delivery style, but requires a ruse to make the activity more interactive; I shall return to this issue in the next section.

A final consideration is that grammaticality judgements may be divided into three types, although the distinction is occasionally blurred: (i) judgements of well-formedness; (ii) judgements of interpretation; and (iii) judgements of truth-value (see Gordon, 1996; McDaniel and Cairns, 1996). The following respective examples illustrate the three types of judgement.

(7.7)   Test sentence: *How many did Georgie Porgie kiss girls?*

Judgement of well-formedness: ill-formed (in all contexts).

(7.8)   Test sentence: *Georgie Porgie kissed himself on the arm.*

Judgement of interpretation: the word *himself* must refer to Georgie Porgie.

(7.9)   Test sentence: *Georgie Porgie kissed all the girls with freckles.*

Scenario: e.g. Puppets acting out the sentence.

Judgement of truth value: true ('yes', 'right') or false ('no', 'wrong').

The first sentence (7.7) is a pure well-formedness judgement. This particular combination of words is unacceptable in any context. The grammaticality of the second sentence (7.8) is dependent on the reference of the word *himself*. This

observation alone is a judgement of interpretation. However, as pointed out by McDaniel and Cairns (1996: 234), judgements of well-formedness and interpretation may be one and the same thing if referential information is included in the judgement, e.g.

(7.10) Test sentence: *Georgie Porgie kissed himself on the arm.*

Judgement of well-formedness *and* interpretation: This is well-formed if *himself* refers only to Georgie Porgie, and ill-formed if it refers to someone else.

As such, grammaticality depends on the matching of the sentence with a context, to form a pair, and it is this pair that is subject to judgement.

The third example (7.9) is of a type sometimes considered to be something other than a grammaticality judgement, as indicating the truth value of an utterance does not require conscious assessment of the form of the test sentence. For example Gordon (1996: 212) describes the lack of assessment in terms of right / wrong as a 'fundamental difference' between grammaticality and truth-value tasks. However, as with judgements of grammaticality and reference, the form of the utterance and the situation constitute a pair, and the judgement of truth-value is applied to that pair. As such, an impossible pairing of a form and a situation indicates that the subject finds the sentence ill-formed on that particular interpretation. The examples cited above from Crain and McKee (1985) are a case in point. If a sentence with backwards anaphora is judged 'false' in the relevant context, this can be taken to be a judgement of ungrammaticality. Thus, whilst judgements of grammaticality and judgements of

truth-value may sometimes be distinct, I consider the line between them to be blurred at least in some cases.

There are dozens if not hundreds of small decisions to be made in the design of most grammaticality judgement experiments, and here I have attempted only to highlight some key points. Drawing on the above discussion, Experiment II may be generally characterized as follows. It was a grammaticality judgement test, in which pre-recorded utterances were delivered by a puppet, with the scenarios provided so that participants did not have to concoct their own context. Children were asked if the puppet said it right or said it wrong, and responded by means of the reward / punishment technique. Before the experiment proper, all subjects participated in a pretest, which served two functions: training (so that form not content was the basis for judgement) and screening (so that children who did not understand, or who were too tired or shy, could be excluded as test subjects). The test sentences were used to elicit two types of judgements: both judgements of well-formedness that were not dependent on context, and judgements of well-formedness and interpretation that depended on matching form and context.

Precise details of the props and the procedure used in the three pretests and the three versions of Experiment II are given in the following section. The actual test materials are presented in Chapter 8, immediately preceding the results, in order to facilitate comparison between tests sentences and judgements.

7.4   Props and procedure

7.4.1   Toto the robot

Experiments I and II were conducted by a single experimenter, with the extremely valuable help of research assistants in each of the three countries. However, it was decided to have neither the experimenter nor the research assistants directly deliver the test sentences. The decision to use a puppet for this purpose was based on three considerations: first, the greater willingness on the part of children to interact with and contradict a puppet rather than any adult, as discussed in the previous sub-section; second, the fact that, whilst the research assistants were all known to the children beforehand, the degree of familiarity varied from child to child, so some shyness in interaction was anticipated; and finally, for an independent reason, it was decided to pre-record all test sentences, and a puppet was considered to be the best conduit for their delivery (children are often understandably bored by and suspicious of a simple tape-recorder).

The decision to pre-record all test sentences in advance stemmed from the absolute necessity of ensuring uniform delivery. As mentioned in the previous section, subtle differences in stress and prosody can have negative effects on elicitation of certain judgements, and the assistants who recorded the test sentences required several trials before a successful recording could be obtained. The most difficult sentences to read were not those which were ambiguous between locational and directional readings (as exemplified earlier in (7.6), (7.7)), but those which were strictly ill-formed for adults on the intended interpretation, leading to prosodic confusion. Given such considerations, the option of having the research assistants deliver the sentences was rejected, due to the limited amount of available training time with the assistants

(2-3 days) prior to experimentation in each country. Particular examples of problematic sentences will be discussed as the test materials are presented.

As the children interacted with the puppet, it was necessary for the recording equipment controls to be flexible. Anticipating the need to stop the tape on occasions in unobtrusive fashion (i.e. without having to signal to some helper at the controls behind a curtain), a simple battery-operated hand-held tape recorder inside the puppet was settled on as the most versatile solution.

Once it was decided to have a puppet deliver pre-recorded test sentences, the quest for the puppet was undertaken, leading to months of trial and error as numerous options were tested and cast aside. The original concept was a friendly-looking hand puppet or cuddly toy, large enough to accommodate the tape-recorder (perhaps with some stuffing removed) but not so large as to scare younger test subjects. However, most of the proto-props did not allow enough sound to escape, or muffled the recording to an unacceptable degree. An additional concern was that the metallic clicking and whirring of a tape recorder does not sound particularly natural coming out of the mouth of a baby dinosaur or giant rabbit.

This latter consideration led to the solution. The final choice of puppet was a robot in the form of a metallic little boy. The robot was in fact a large, hollow plastic container for toy building blocks, in the form of a boy with a builder's hat with bolts on the sides and a chunky belt, measuring 45 x 25 x 20cm. Once emptied of its contents, a hole was cut in the back to allow the tape-recorder to be held inside. After numerous craft paints refused to bond with the plastic, the figure was eventually successfully sprayed with several coats of car bumper touch-up paint, which was

CFC-free (ozone-friendly), and water-based (child-friendly).[2] With a metallic silver face and body, and a metallic gold hat and belt, he finally took on the appearance of a real robot.[3]

The name 'Toto' was suggested by a native French speaker with advanced knowledge of Japanese and English (my wife) as being cute, yet boyish, and suitable for use with the three sets of test subjects. The only previous instance of this name in English that I am aware of is for Dorothy's dog in the film *The Wizard of Oz*. Japanese informants agreed that it sounded like a good name for a boy robot, and it stuck.[4]

Toto's voice was another factor to be considered. A synthesized flat-prosodic robot voice would have interfered with the test materials. A deep, male voice or an over-excited child's voice might have alarmed or distracted some of the younger children. Again, it was important that the robot seem cute, boyish and friendly. An informal survey of boy characters in American cartoons revealed that several are voiced by women.[5] Toto's utterances were eventually all pre-recorded by female native speakers of French, Japanese, and English.

Toto was introduced to the children as being very 'shy'. This strategy had a number of advantages. First, his conversational ability was limited to the recording, so

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[2] The main advantages of this paint were that it bonded so well to plastic and was child-friendly; the main disadvantage was that rather than make the robot more durable (like a car bumper), it in fact made him more fragile. The reason was that while this paint is extremely well-wearing on solid plastic car bumpers, the toy figure was made of thin plastic, and flexible to a degree. Thus, if prodded or pushed or dropped, the paint was liable to crack. Thus the robot travelled the world in bubble-wrap.

[3] I later discovered that this was not the first time a robot had been used to elicit judgements, although the nature of the robot and the task were quite distinct. Gerken and McIntosh (1993) created sentences with a DECTalk Speech Synthesizer, played through a speaker placed next to a robot, as part of a picture-selection task (children had to point to one of four pictures after hearing the utterance). Their rationale for this approach was precisely to control for unintentional prosodic differences in delivery of test items.

[4] To my horror, on arriving in Japan, I realized that almost every lavatory and urinal in the entire country has the brand name TOTO written on it. Fortunately, the pronunciation is different, and as the experiments was conducted orally, no one made the connection (I checked after all the experimentation was complete). The first vowel in the robot's name is short (the cuteness comes from reduplication), whilst the first vowel in the company name is long.

[5] Even that most boyish of boys, Bart Simpson, is a woman behind the scenes.

he could not start chatting to the children. His shyness, as well as his being a robot, helped account for his lack of verbal charm. Second, some younger children may have recognized in Toto a shared emotion, given their own shyness. Third, the idea of verbal shyness seemed to correspond with his attempts to learn language, sometimes getting it wrong. The idea of shyness as a puppet characteristic is discussed by Thornton (1996: 82-83), who mentions other, more interactive applications of this trait, such as the increased willingness of the children to deal with the puppet given that it doesn't want to talk to adults.[6]

In his finished state, Toto the Robot proved very convincing to the 3-year-old test subjects. When he introduced himself, they all without exception spontaneously replied 'Hello'.

7.4.2 Experimental procedure

The setting for Experiment II was the same as for Experiment I. During the first experiment, Toto and the other props for the second experiment were all hidden from view, in order to avoid distraction, and to have a surprise with which to reawaken interest and curiosity after the first experiment. The experimenter placed Toto on the table, making sure the hand-held tape-recorder in his back was carefully hidden from view, together with two silver boxes, and a large golden box filled with two types of sweets: rainbow-coloured boiled sweets, and black liquorice.[7] The children were told that they were going to 'play a game' with the robot and the sweets.

The subsequent protocol may be summarized as follows: the experimenter has built the robot at home, and is now teaching it how to speak. Sometimes Toto can

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[6] Successful puppets mentioned by Thornton (1996: 82-83) include a snail which occasionally withdraws into its shell, and a newborn dinosaur that has just broken out of its egg.

[7] British English: 'sweets'; American English: 'candy'. The actual sweets were French 'berlingots' and Spanish liquorice.

speak 'properly' and 'get the words right', but sometimes he 'makes mistakes', 'talks funny', and 'gets the words mixed up'. Toto likes all kinds of sweets. He really loves the brightly-coloured sweets, but he doesn't like liquorice as much. The children are asked if they can help the experimenter teach Toto how to speak better, by playing this special game. If he says something properly, they can choose a colourful sweet from the big, golden box in the middle, and place it the small, silver box on the left, but if he makes a mistake, they take a liquorice from the same big box, which they place in the small, silver box on the right. Toto is then shown the Monkey Book, and is asked to respond to a series of questions. On each response the children must give him one type of sweet.

The pretest was devised mainly to exclude from the analysis children who did not grasp the concept of grammaticality, or who did not grasp the rules of the game. Children who for example always replied positively, or always replied negatively, or who replied randomly, or who could not distinguish between judgements of form and content, were excluded. In the pretest, Toto's utterances consist of 4 clearly grammatical and 4 clearly ungrammatical sentences; the first 4 are responses to questions about himself, and the second 4 are all to do with the monkey whose face is on the cover of the Monkey Book. In the experiment proper, Toto describes what the monkey is doing on each page of the storybook, much as the children themselves did earlier.

Toto repeated each test sentence twice, in order to provide a second hearing if necessary. These utterances were separated on the tape by a 4-second interval. During this break, the experimenter would stop the tape for a length of time determined by the response. If test subjects needed to hear it a second time, the tape was simply started again. If subjects successfully responded first time, they were thanked for

helping Toto, and Toto was told 'Well done! Say it again', or 'That wasn't very good, Toto…try again'. The strategy of utterance repetition allowed the experimenter to avoid having to constantly rewind, which would have burst the bubble of those who thought Toto was a real robot, and seriously interrupted the rhythm of the session.

When liquorice was given, children were asked to say what he should have said, allowing for greater feedback on what exactly they considered ungrammatical, and as a safeguard against responses judging content rather than form. This was a crucial part of the pretest. For example, French Pretest Question 5 asked Toto if the monkey's ears were big or little, and Toto replied grammatically, saying they were very big. F3c, however, gave him some liquorice, and on being asked why, replied that his ears weren't so big for a monkey. Instruction on form versus content was given, and this subject had no further problems. Once subjects had passed the pretest, however, this feedback question was given only when it was thought possible (in most cases but not all), depending on levels of shyness or fatigue on the part of the children. A possible methodological concern is that this strategy entailed that not all test subjects were treated equally. However, I consider this concern to be unwarranted. As McDaniel and Cairns (1996: 249) point out in response to considerations of 'the rigid rule (taught in all psychology classes) that every subject should be treated the same', 'We feel that the true desideratum should be that every subject should give, as nearly as possible, equally reliable data'.

The entire session (pretest and experiment) was recorded on micro-cassette, which served as the basis for the creation of transcripts showing binary responses and all other relevant child utterances. At the end of the sessions with a particular grouping of children (i.e. one year group, or one entire school group), the children were shown how Toto worked, and both participants and non-participants were given

a long-awaited sweet (not those used in the experiments), on approval of the school headmistress.

NB. The exact protocols and pretest materials for Experiment II in given for each language with full translations in Appendix D.

7.4.3   Scoring grammaticality

Given the relatively small number of test subjects in each version of the experiment (6 groups with an average of 5 participants per group), it was necessary throughout to relate the assessment of grammaticality to the performances of individual subjects. For example, if one individual in a group of five rejects an apparently grammatical sentence for some unknown reason (perhaps a real judgement, perhaps just 'noise'), this reduces the mean acceptance rate of the group to just 80%. As another example, if one group, say five 6-year-olds, all reject a sentence for some unknown reason (maybe something to do with something they have just studied in class), but everyone else in the experiment accepts the item, then this results in an overall acceptance rate of, to take the French case, just 83.33%., despite a 100% acceptance rate in all other groups. It is therefore clear that with these numbers of test subjects, reference must always be made to individual responses; however, as a general, violable criterion, I will proceed on the assumption that a sentence has been judged grammatical by an age group or a language group if accepted at a rate of over 80%. By using the inverse criterion, I take an acceptance rate of less than 20% for a particular item to indicate a clear case of ungrammaticality.

Applying these criteria across all tokens of a particular sentence type is unsound, however, as the sentence types are realized in non-homogenous tokens. For

example, the verbs *run, walk, dance* and *float* are all V [MANNER] but they share

only some, not all syntactic properties (see Section 8.1 for further discussion). There

is always the chance that one or two tokens will be systematically rejected in the

particular syntactic environment of the test sentence, which once more indicates the

need for a specific rather than general utterance analysis. The figures of 80% and 20%

are set only as general guidelines, prompting closer inspection of results that fall

between these levels.

7.5 Test subjects and settings

As indicated earlier, Experiment II was conducted immediately following Experiment

I, with the same test subjects, with the same coding system, in the same conditions, in

the same locations as reported in Sections 4.5 and 4.6. However, six of those who

participated in Experiment I were excluded from Experiment II following the pretest,

as they were unable to give reliable judgements: F4d, J3a, J4b, J6d, E3a, and E3f. Of

these, F4d, J4b, J6d, E3a, and E3f were all excluded on the basis of the pretest alone;

J3A was borderline in the pretest, but was allowed to continue to the main test

materials. However, she then clearly adopted a guessing strategy, continually

changing responses and checking for the experimenter's reaction, so her transcript

was discounted. Thus while a total of 95 children and adults participated in

Experiment 1, 89 participated in Experiment II: 30 French subjects, 28 Japanese

subjects, and 31 English subjects. The coding system for reference to individual test

subjects remained the same as described in Section 4.5. The precise numbers of

French, Japanese and English participants in Experiment II are provided by age group

in the tables below.

Table 7.1. *Experiment II: Numbers of French test subjects by age group.*

Experiment II: French Test Subjects						
Age Groups	F3	F4	F5	F6	F7	FA	Total
No. of participants	5	4	4	5	5	7	30

Table 7.2. *Experiment II: Numbers of Japanese test subjects by age group.*

Experiment II: Japanese Test Subjects						
Age Groups	J3	J4	J5	J6	J7	JA	Total
No. of participants	4	4	5	6	4	5	28

Table 7.3. *Experiment II: Numbers of English test subjects by age group.*

Experiment II: English Test Subjects						
Age Groups	E3	E4	E5	E6	E7	EA	Total
No. of participants	5	5	5	5	5	6	31

NB. See Appendix B for a complete list of test subjects.

In this chapter, I have described the rationale behind extending the primary investigation of elicited production to encompass a dependent investigation, for the purpose of shedding more light on children's knowledge of ungrammaticality. The particular props used and the experimental procedure have been explained, as has the need for a pretest in order to train as well as screen participants. Following successful completion of the pretest, the activity continued without pause into the experimental stage. The materials, results and analyses are now presented language by language, in order of testing.

Chapter 8

Experiment II results: Knowing syntax and learning the lexicon

8.1 Organization of the results of Experiment II

Rather than relegate the lists of test sentences to an appendix, I have included them in this section, immediately prior to each set of results. The rationale for this is as follows. One fundamental difference between materials testing general, extra-lexical syntactic principles on one hand, and lexically specified syntactic configurations on the other, is that the former can be easily and comprehensively summarized by type, whilst the latter necessarily contain idiosyncrasies that complicate such summarization. For example, for many purposes, English *run, walk, dance,* and *float* may all be characterized as V [MANNER], and the combination of V[MANNER]^PP[LOC] could be described as a single sentence type. All these predicates can take a directional complement such as *under the bridge* (PP$_{\text{PATH}}$), which distinguishes them from predicates such as *shiver* or *whisper*. However, one computational semantic feature is not enough to characterize the complete range of syntactic behaviour for any given verb, just as the set of semantic features will never be enough to characterize the conceptual representation of the predicate. For example, all four of the above V [MANNER] can merge with *under* (P$_{\text{LOC}}$) on a directional interpretation, but only the first two can merge with *on* (P$_{\text{LOC}}$) on the same interpretation in colloquial English.

(8.1)   a. The substitute ran on the pitch.   (OK on PATH reading)

      b. The fan walked on the stage.   (OK on PATH reading)

    c. The children danced on the patio.   (*on PATH reading)

    d. The leaves floated on the lake.   (*on PATH reading)

This is not only due to the class of predicate, but to the properties of the specific preposition (after all, all are OK with *under*). Therefore it is a convenient abstraction to say that most V [MANNER] may merge with most PP [LOC] with directional interpretation in English, but this is clearly insufficient as a full characterization of test sentence type, due to the lexical properties of particular sub-classes of V [MANNER] and particular P [LOC].

    The introduction to each particular-language version of the experiment does in fact provide a breakdown of the test sentences by type, in a theory-specific way, but in order to maximize transparency, as befits a lexically oriented investigation, the test sentences are reproduced in full prior to each set of results, allowing close assessment of the materials. The test battery is immediately followed by the relevant table of individual grammaticality judgements, with no intervening text. This juxtaposition facilitates direct reference between materials and judgements. The results are in sets of 20 (one grammaticality judgement for each scene of the Monkey Book), and in order to understand each particular judgement, the corresponding test sentence must be consulted. Language-specific results are presented in chronological order of experimentation: French, Japanese, then English.

8.2   French test materials and results

8.2.1   French test materials

As mentioned in Section 7.2, the French test sentences primarily targeted a sentence type, characterized as V [MANNER] ^ PP [PATH], that is standardly assumed to be

ungrammatical in the adult language, something that is flatly contradicted by the experimental findings. This aspect of the findings deserves advanced mention as it explains the lack of variation in French responses, but will be addressed more fully following presentation of the results. The form V [MANNER] ^ PP [LOC] was targeted because although it is widely reported to be ungrammatical, I had heard many examples of this in child speech, but all the evidence was anecdotal. The questions I was primarily concerned with were how children converged on an adult grammar in which, on previous assumptions, such sentences were rejected. I anticipated one of two things: either a sudden shift in grammaticality judgement at a certain age, or a gradual cline of increased rejection. This sentence type accounted for 10 of the 20 test sentences (No.s 2, 3, 4, 5, 7, 8, 9, 12, 15 and 19), and is presented in terms of three subtypes: (i) with P [LOC] (i.e. those that can appear in both locational and directional contexts); (ii) with P [PATH] (i.e. those which can only appear in directional contexts); and (iii) where V conflates both PATH and MANNER.

Other sentence types targeted in supplementary fashion were a resultative PP structure, which was discounted from analysis in both experiments for reasons given earlier (see Section 4.3.1, fn.5), and inherently directed motion V with a non-volitional adjunct. The latter was an attempt at clarification of whether this characterization really holds for V [PATH] in French, and whether or not it might be possible to posit [VOLITION] as a computational semantic feature along the lines of [PATH] and [PLACE]. Levin (1993: 263) identifies a class of 'inherently directed motion verbs' in English, including *descend, enter, tumble*, etc. but whilst some of these require a volitional AGENT to 'direct' the motion, others appear to allow a non-volitional subject (e.g. **the rocks descended the mountain*, but *the rain entered the tent, the wolf tumbled down the well*). The French verb *descendre* 'go-down' in the

adult grammar appears to be volitional, so that e.g. the trajectory of rocks falling down a mountain cannot be expressed with this verb. There are apparently exceptional cases such as the following:

(8.2)   Le soleil descend sur l'horizon.

the sun go-down on the horizon

'The sun is going down onto the horizon.'

(Rey, 1993: my gloss and translation)

However, most informants agree that this is a case of personification. If this explanation seems far-fetched, compare the following sentence which illustrates the most typical expression for the setting of the sun in French.

(8.3)   Le soleil se couche.

the sun REFL go-to-bed

The sun is setting (lit: the sun is going to bed).

Test sentence (14) was thus included not to test a hypothesis, but as a supplementary item to shed a little more light on the role of volition in constraining the expression of motion events in child and adult grammars.

In addition to the targeted sentences, there were 3 pure fillers (no motion events), and 5 unquestionably grammatical PATH utterances of the prescriptive variety. The breakdown of targeted sentences into types and tokens is summarized in

Table 8.1., and the non-targeted sentence types in Table 8.2, with the actual test sentence numbers indicated in parentheses.

Table 8.1. *Experiment II: French. Targeted sentence types and numbers of tokens. In the tokens column, actual test sentence numbers are given in parentheses.*

Sentence types		No. of tokens (12)
(i)	V [MANNER]^PP [PATH]	10 tokens
Subtypes:	V [MANNER] with overt P [LOC]	6 tokens (2, 3, 8, 9, 12, 15)
	V [MANNER] with overt P [PATH]	2 tokens (4, 5)
	V [PATH, MANNER] with overt P [LOC]	2 tokens (7, 19)
(ii)	V [PATH, VOLITION]^adjunct [-VOLITION] (inherently directed motion V with a non-volitional adjunct)	1 token (14)
*(iii)	*Resultative PP (*discounted)	1 token (11)

Table 8.2. *Experiment II: French. Fillers and prescriptively grammatical PATH utterances.*

Sentence types		No. of tokens (8)
(i)	Sentences without motion events	3 tokens (1, 10, 20)
(ii)	V [PATH]	5 tokens
Subtypes:	V [PATH] ^ DP	2 tokens (6, 13)
	V [PATH] ^ PP	3 tokens (16, 17, 18)

What follows is a listing of the French test sentences, with details of each targeted sentence type to the right of the example. This metalinguistic information is given in the following order: (i) on the top line, the hypothesized syntactic structure of the PP complement, and in (14), the feature specifications of the adjunct; (ii) on the second

line, the hypothesized feature specification of P; and (iii) on the third line, the relevant feature specifications of V. Targeted test sentence numbers are underlined.

Note that the translations for hypothetically ungrammatical test sentences are not intended to be the closest rendering of an ungrammatical form, but rather the intended meaning should the subjects judge it to be grammatical.

As indicated earlier, the test sentences are immediately followed by the results with no intervening text. The results themselves are displayed in three forms: first, the individual binary responses in table form, which enable inspection of individual test subject performances; second, the group results in table form, which enable comparison by age in percentage terms; and finally the responses of all subjects in chart form, to illustrate the overall response patterns of the French language group.

French test sentences:

1   *Le perroquet vole la banane au singe et sort par la fenêtre.*
the parrot steals the banana P-the monkey and goes-out via the window
'The parrot steals the banana from the monkey and goes out of the window.'

2   *Le singe glisse en bas de l'arbre.*   [P$_{PATH}$ Ø [P$_{PLACE}$ [N$_{LOC}$ [P [DP]]]]]
the monkey slides P$_{LOC}$ bottom of the-tree   *en*, P [LOC]
'The monkey slides down the tree.'   *glisser*, V [MANNER]

3   *Le singe court sous le pont.*   [P$_{PATH}$ Ø [P$_{PLACE}$ [DP]]]
the monkey runs under the bridge   *sous*, P [LOC]
'The monkey runs under the bridge.'   *courir*, V [MANNER]

4   *Le singe saute par-dessus le rocher.*   [P$_{PATH}$ [P$_{PLACE}$ [DP]]]
the monkey jumps via-above the rock   *par-dessus*, P [PATH]
'The monkey jumps over the rock.'   *sauter*, V [MANNER]

5   *Le singe marche à quatre pattes par le tronc de l'arbre.*   [P$_{PATH}$ [P$_{PLACE}$ Ø [DP]]]
the monkey walks on four legs via the trunk of the tree   *par*, P [PATH]
'The monkey crawls through the tree-trunk.'   *marcher*, V [MANNER]

6   *Le singe traverse la rivière en nageant.*
the monkey crosses the river by swimming
'The monkey swims across the river.'

7   *Le singe grimpe en haut de la colline.*   [P$_{PATH}$ Ø [P$_{PLACE}$ [N$_{LOC}$ [P [DP]]]]]
the monkey climbs P$_{LOC}$ top of the hill   *en*, P [LOC]
'The monkey climbs up the hill.'   *grimper*, V [PATH, MANNER]

8   *Le singe roule en bas de la colline.*   [P$_{PATH}$ Ø [P$_{PLACE}$ [N$_{LOC}$ [P [DP]]]]]
the monkey rolls P$_{LOC}$ bottom of the hill   *en*, P [LOC]
'The monkey rolls down the hill.'   *rouler*, V [MANNER]

9   *Le singe court dans une caverne.*   [P$_{PATH}$ Ø [P$_{PLACE}$ [DP]]]
the monkey runs in a cave   *dans*, P, [LOC]
'The monkey runs into a cave.'   *courir*, V [MANNER]

10   *Le singe et le perroquet voient un gros lion.*
the monkey and the parrot see a big lion
'The monkey and the parrot see a big lion.'

11   *Le lion les poursuit en dehors de la caverne.*   RESULTATIVE PP
the lion them chases P$_{LOC}$ outside of the cave   (*discounted)
'The lion chases them out of the cave.'

12   *Le singe court en dehors de la caverne.*   [P$_{PATH}$ Ø [P$_{PLACE}$ [N$_{LOC}$ [P [DP]]]]
the monkey runs P$_{LOC}$ outside of the cave   *en*, P [LOC]
'The monkey runs out of the cave.'   *courir*, V [MANNER]

13   *Il monte la colline.*
      he goes-up the hill
      'He climbs the hill.'

<u>14</u>   *Il descend la colline en tombant.*   adjunct V [MANNER, -VOLITION]
      he goes-down the hill by falling
      'He falls down the hill.'   *descendre,* V [PATH, +VOLITION]

<u>15</u>   *Il nage en travers de la rivière.*   [V [P$_{PATH}$ Ø [P$_{PLACE}$ [N$_{LOC}$ [P [DP]]]]]]
      he swims P$_{LOC}$ across of the river   *en,* P [LOC]
      'He swims across the river.'   *nager,* V [MANNER]

16   *Il passe par le tronc de l'arbre à quatre pattes.*
      he passes via the trunk of the tree on four legs
      'He crawls through the tree-trunk.'

17   *Il passe par-dessus le rocher en sautant.*
      He passes via-over the rock by jumping
      'He jumps over the rock.'

18   *Il passe sous le pont en courant.*
      he passes under the bridge by running
      'He runs under the bridge.'

<u>19</u>   *Il grimpe en haut de l'arbre.*   [P$_{PATH}$ Ø [P$_{PLACE}$ [N$_{LOC}$ [P [DP]]]]]
      he climbs P$_{LOC}$ top of the tree   *en,* P [LOC]
      'He climbs up the tree.'   *grimper,* V [MANNER, PATH]

20   *Le singe mange sa banane.*
      the monkey eats his banana
      'The monkey eats his banana.'

8.2.2 French results

Table 8.3. *French individual results. Experiment II: Grammaticality judgements.*
o = *acceptable;* * = *unacceptable;* ? = *don't know / confused / mixed responses.*
(Subjects excluded following pretest: F4d.)

INDIVIDUAL TEST SUBJECTS

TEST SENTENCES	F3 a b c d e	F4 a b c e	F5 a b c d	F6 a b c d e	F7 a b c d e	FA a b c d e f g
1	o o o o o	o o o o	o o o o	o o o o o	o o o o o	o o o o o o o
2	* o * o o	o o o o	o o o *	o o o * o	o o o o o	o o o o o o o
3	o o * * o	o o o o	o o * o	o o o o o	o o o o o	o o o o o o o
4	o o o o o	o o o o	o o o o	o o o o o	o o o o o	o o o o o o o
5	o o * o o	o o o o	o o o o	o o o ? o	o o o o *	* o * o * o *
6	o o o o o	o o o o	o o o o	o o o o o	o o o o o	o o o o o o o
7	o o * o o	o o o o	o o o o	o o o o o	o o o o o	o o o o o o o
8	o * o o o	o o o o	o o o o	* o o * ?	o o o o o	o o o o o o o
9	* * * o o	o o o o	o o o o	o o o o o	o o o o o	* o o o o o o
10	o o o o o	o o o o	o o o o	o o o o o	o o o o o	o o o o o o o
11	* o * o o	o o * o	o o o o	* o * * o	o o o o o	o o * o o o o
12	o * * o o	* o o o	o o o o	o o o o o	o o o o o	o o o o * o o
13	o o * o o	o o o o	o o o o	o o o o o	o o o ? o	o o o o o o o
14	o * * o o	* * o o	* o o o	* ? o ? ?	? o o ? ?	* o * o o o o
15	o * * o *	o o o o	* * o o	* o o ? *	* o * o ?	* * * * * * *
16	o * o o o	o o o o	o o o o	o o o o o	o o o o o	o o o o o * o
17	o * o o o	* o o o	o o * o	* o o * o	o o o o o	o o o o o o o
18	o o * * o	* o o o	o o o o	o o o o o	o o o o o	o o o o o o o
19	o * * o o	o o o o	o o o o	o o o o ?	o o o o o	o o o o o o o
20	o o o o o	o o o o	o o o o	o o o o o	o o o o o	o o o o o o o

Table 8.4. *French Group Results. Experiment II: Percentages of positive responses to each question by age group, and mean averages assigning equal weight to (i) groups; and (ii) individuals.*

	F3	F4	AGE GROUPS F5	F6	F7	FA	MEAN (groups)	MEAN (individuals)	
TEST SENTENCES									
1	100	100	100	100	100	100	100	100	(30/30)
2	60	100	75	80	100	100	85.8	86.7	(26/30)
3	60	100	75	100	100	100	89.2	90	(27/30)
4	100	100	100	100	100	100	100	100	(30/30)
5	80	100	100	80	80	42.9	80.5	76.7	(23/30)
6	100	100	100	100	100	100	100	100	(30/30)
7	80	100	100	100	100	100	96.7	96.7	(29/30)
8	80	100	100	40	100	100	86.7	86.7	(26/30)
9	40	100	100	100	100	85.7	87.6	86.7	(26/30)
10	100	100	100	100	100	100	100	100	(30/30)
11	60	75	100	40	100	85.7	76.8	76.7	(23/30)
12	60	75	100	100	100	85.7	86.8	86.7	(26/30)
13	80	100	100	100	80	100	93.3	93.3	(28/30)
14	60	50	75	20	40	71.4	52.7	53.3	(16/30)
15	40	75	50	40	40	0	40.8	36.7	(11/30)
16	80	100	100	100	100	85.7	94.3	93.3	(28/30)
17	80	75	75	60	100	100	81.7	83.3	(25/30)
18	60	75	100	100	100	100	89.2	90	(27/30)
19	60	100	100	80	100	100	90	90	(27/30)
20	100	100	100	100	100	100	100	100	(30/30)
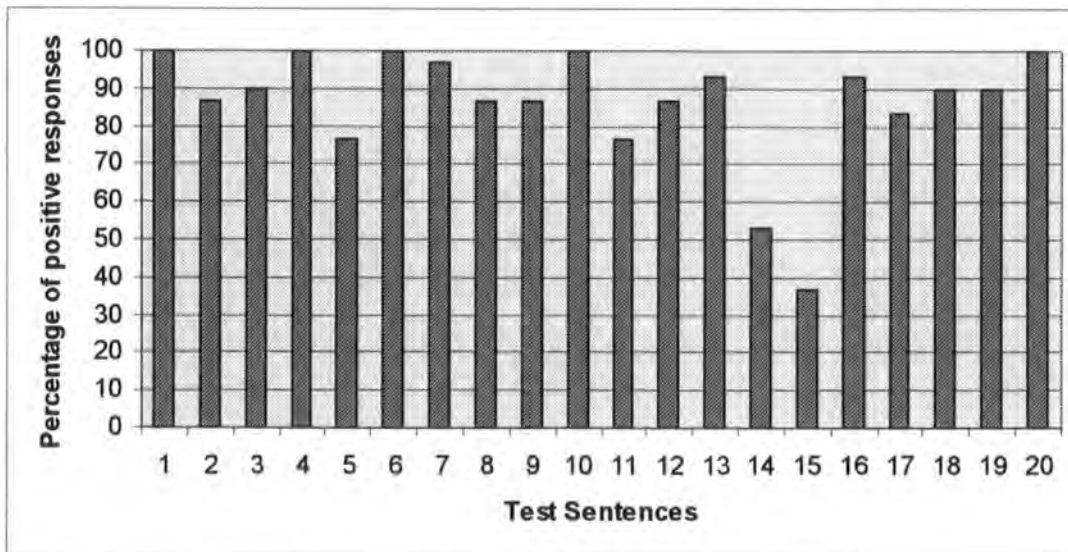
Figure 8.1. *All French test subjects. Experiment II: Percentage of positive responses to each test sentence in grammaticality judgement task.*

As is immediately apparent from Figure 8.1, the unexpected wholesale acceptance of the form V [MANNER] ^ PP [LOC] resulted in an unfortunate predominance of positive responses in the French experiment. However, this in itself remains an interesting finding. The type in question is exemplified in tokens such as the following, which in Talmy's (1985) terminology, are typical of S-framed syntax:

(8.4)   Toto: French Test Sentence No.8.

   Le singe roule en bas de la colline.   V [MANNER] ^ PP [LOC]

   the monkey rolls P_{LOC} bottom of the hill

   'The monkey rolls down the hill.'

It is a standard assumption in the literature on PATH predication that French is a 'prototypical verb-framed language' (Ibarretxe-Antunano, 2004: 94), and that PP [LOC] may only combine with V [MANNER] as a locational adjunct. Thus in the sentence above, only the locational reading should be possible (i.e. the bottom of the hill was the place where he rolled). A directional interpretation prescriptively requires lexicalization of PATH in the verb, e.g.

(8.5)   Le singe descend la colline en roulant.

   the monkey goes-down the hill by rolling

   'The monkey rolls down the hill.'

This judgement is found not only in previous theoretical treatments (going back at least as far as Mounin, 1963), but in standard prescriptive textbooks. Whilst the experiment was in preparation, the initial judgements of my informants appeared to

confirm this assessment, and even in a trial run of the experiment, conducted in England with French friends before the experiment proper, such sentences were rejected. I can only conclude that it was a serious mistake to have linguistically aware, non-naïve test subjects in the trial. Following experimentation, all informants now agree that despite the fact that such structures sit ill with prescriptive grammar, they are *bona fide* grammatical forms in colloquial French.

Test sentence (8) was judged grammatical in a directional context by 86.7% of subjects, with acceptance amongst 4-year-olds, 5-year-olds, 7-year-olds and adults reaching 100%. As shown in Table 8.3, it was rejected only by one 3-year-old (F3b) who had a somewhat idiosyncratic response pattern, and by two 6-year-olds (F6a and F6d), with one other 6-year-old giving a confused response (F6e). F6a rejected it due to lexical misunderstanding of the verb *rouler* 'roll': he said that you can't say 'roll' "parce qu'il n'a pas de roues" (because he hasn't got any wheels).

This very high acceptance rate held for almost all tokens of V [MANNER] ^ PP [LOC]. As shown in Table 8.4, the mean acceptance rates across all participants for the 10 test sentences of this type were respectively (2) 86.7%, (3) 90%, (4) 100%, (5) 76.7%, (7) 96.7%, (8) 86.7%, (9) 86.7%, (12) 86.7%, (15) 36.7%, and (19) 90%.

However, as discussed in Section 8.1, verbs or adpositions placed in a single class according to one set of criteria do not always behave identically across all syntactic environments. Examples of this type that merit further discussion include (5) and (15), whose lower acceptance rates failed to meet the general grammaticality criteria laid out in Section 7.4.3. Sentence (5) is repeated below for reference.

(8.6)   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.'

As shown in Tables 8.3 and 8.4, this sentence had a high acceptance rate by children from the 3-year-olds right up to the 7-year-olds, but had a much lower acceptance rate in the adult group (42.7%, or 3/7). That any adult accepted this sentence is surprising, because judgements involving the verb *marcher* with PP [LOC] in bounded directional contexts are often strongly negative. For example, while (8.7) is easily accepted in colloquial contexts, (8.8) provokes definite rejection.

(8.7)   Comme il pleuvait, il a couru à la gare.

       as it rain-PST-CONT, he AUX ran P_{LOC} the station

       'As it was raining, he ran to the station.'

(8.8)   *Comme il faisait beau, il a marché à la gare.

       as it do-PST-CONT fine, he AUX walked P_{LOC} the station

       'As the weather was fine, he walked to the station.'

It is difficult to concoct a convincing account of the syntactic behaviour of *marcher* that goes beyond lexical idiosyncrasy; at most it might be argued that it belongs to a very small sub-class of MANNER verbs that can never take bounded directional complements (perhaps including *boîter* 'limp'). Consider the following example,

whose positive readings are again examples of colloquial rather than prescriptive French.

(8.9)   L'alpiniste a {couru / roulé / glissé / *marché / *boîté} en bas de la colline.

The mountaineer AUX {ran / rolled / slid / walked / limped} P$_{LOC}$ bottom of the hill

'The mountaineer {ran / rolled / slid / walked / limped} down the hill.'

However, other judgements appear to contradict the generalization. For example, a mother can tell her toddler:

(8.10) a. Marche pas dans le trou!

walk-IMP not in the hole

'Don't walk into the hole!'

b. Marche pas dans les flaques d'eau!

walk-IMP not in the pools of-water

'Don't step in the puddles!'

In these cases *marcher* appears to behave like any other directional V [MANNER].

The other example of this sentence type with considerable negative rating was test sentence (15), which is repeated below. This was accepted by about half the children, with a relatively even spread of responses from Groups F3 to F7, but was rejected unanimously by the adults.

(8.11) Toto: French Test Sentence No.15.

Il nage en travers de la rivière.

he swims P$_{LOC}$ crosswise of the river

'He swims across the river.'

Some differences between *traverser* 'cross', *à travers de* 'through (a medium, or an obstacle)', and *en travers de* '(positioned) crosswise' were previously discussed in Section 3.2, and illustrated in Figure 3.1. It was hypothesized that younger children might accept the PATH reading here because the semantic distinctions are subtle, and acquisition of adpositions requires a slow sifting of elements until the target representation is precise. However no developmental pattern can be discerned from the individual results in Table 8.1, with the same mixture of acceptance and rejection persisting until Group F7. Some comments by individual test subjects are worth mentioning. One 3-year-old, F3e, showed no confusion. "C'est bizzare!" (That's weird!) was her assessment. Several provided a grammatical version with *traverser* 'cross', such as F5a: "Il traverse la rivière" (He crosses the river), which confirmed their understanding of the task. One adult, FAf, who had himself produced an usual response to the same stimulus in Experiment I,[1] appeared to reject not only Toto's utterance with *en travers de* '(positioned) crosswise', but also his own original response from Experiment I, with *à travers de* 'through (a medium, or an obstacle)'. His comment on what an appropriate form might be runs as follows: "Il nage à travers la rivière...mmm...pas sûr non plus....il nage en traversant la rivière..." (He swims

---

[1] For quick reference, his response, previously given in example (5.115), was as follows:

(i) <FAf [6]: *il nage à travers la rivière*>
  he swims P$_{LOC}$ crosswise the river
  'He swims {across / through} the river.'

For discussion see Section 5.2.2, fn. 24.

through the river...hmm...not sure about that either...he swims while crossing the river). Note that the non-targeted test sentence (6) with *traverser* 'cross' (V$_{PATH}$) was accepted by 100% of test subjects, as expected.

Thus with the exception of sentences (5) and (15), judged as either dubious or ungrammatical due to the lexical properties of *marcher* 'walk' and *en travers de* '(positioned) crosswise', the combination V [MANNER] ^ PP [LOC] was systematically judged grammatical in colloquial French.

The other test sentence type, involving *descendre* 'go-down' V [PATH, VOLITION] with a non-volitional adjunct, comprised only one token (due to its supplementary status), in the form of test sentence (14), repeated below.

(8.12) Toto: French Test Sentence No.14

Il descend la colline en tombant.

he goes-down the hill by falling

'He falls down the hill.'

This sentence was judged to be of dubious grammaticality throughout the age range, group acceptance responses being from 20 - 75%. Given the certainty of negative responses in informal judgements obtained from informants before the experiment, the most surprising result was the relatively high acceptance rate by adults (71.5%, or 5/7). Within adult subjects, acceptance or rejection was clear-cut in most test subjects. FAc insisted after the experiment that this example was really strange, and impossible in adult French, whilst FAd fully accepted it and insisted that her judgement was clear. Both subjects are university-educated and in professions in which their use of language is valued (FAc being a logistics specialist, and FAd being a lawyer). Even

stranger was that, within the two pairs of sisters in the adult group, each sister had a different judgement (again, this was double-checked after the experiment, with no change of opinion on their part). Table 8.3 shows that there was no developmental progression in the child responses; across the age range about half accepted it and half gave negative or confused responses. The evidence is insufficient to warrant the proposal of [±VOLITION] as a computational semantic feature of the same status as [PATH] or [PLACE]. Thus this particular type of syntactic combination, which was included as a curiosity, remains as such.

In summary, the results of the French version of Experiment II were categorical in their demonstration of the grammaticality of the general form V [MANNER] ^ PP [PATH] in colloquial French, thus confirming this interpretation of the elicited production data of Experiment I. We now turn to the Japanese version of the experiment.

8.3   Japanese test materials and results

8.3.1   Japanese test materials

In designing the Japanese test materials, a conscious attempt was made to not to repeat the predominantly positive response pattern of the French results. Again, the primary concern was the combination of V [MANNER] with PP [PATH] in which the P is specified as [LOC] (i.e. it may support locational or directional interpretation depending on the verb); but of the few spatial Ps in Japanese, only one fits that specification in the adult grammar: *ni*. As mentioned earlier, *ni* may be translated as 'at / in / on / to / into / onto', and is glossed throughout this thesis simply as P_{LOC} (see Section 3.1 for detailed discussion). The fact that the combination of this element with V [MANNER] was already verified as a possibility in colloquial grammar by adult

informants led to the adoption of a different but related target of investigation, the more restrictive feature [PLACE]. The Japanese P *de* may be translated as 'at / in / on', and is glossed throughout simply as P_{PLACE}. In the adult grammar PPs headed by *de* are never interpreted as directional. As explained and exemplified in Section 6.6, this postposition specifically marks locational adjuncts to activity verbs. However, as noted in the same section, a few responses from younger test subjects in Groups J3 and J4 have *de* where adults would use either *ni / e* (marking the GOAL) or accusative *o* (marking the place of transversal). The two examples cited earlier as (6.37) and 6.38) are repeated below for convenience.

(8.13) <J3b [14]:   *oka no shita de korogatte itta*>

hill GEN bottom P_{PLACE} rolling went

'He went rolling to the bottom of the hill.'

(**de* should be *ni / e*)

(8.14) <J4d [5]:   *ki no tsutsu no naka de tōtta*>

tree GEN tube GEN inside P_{PLACE} went-via

'He went through the tree-trunk.'

(**de* should be accusative *o*)

Experiment II was conducted in advance of such information, however, and the principal question was whether children would ever accept such utterances. If yes, the subsequent issue was to determine insofar as possible the developmental course at the end of which these utterance-types were rejected.

Another issue chosen for investigation was the structural hierarchy within complex predicates with deictics. The question was whether children possess the relevant syntactic knowledge at all stages of acquisition, or whether they allow hierarchy violations at some stage. Recall that in combinations such as (5.65), repeated here as (8.15), the V [MANNER] is not an adjunct: although the deictic *kuru* 'come' carries tense, it cannot assign accusative case as a simple predicate, whilst the V [MANNER] *oyogu* 'swim' does have this property, hence I assume that here case is assigned by the complex predicate.

(8.15) <J4e [6]:   *kawa o oyoide kita>*

river ACC swim-TE came

'He came swimming across the river.'

The hierarchy in such complex predicates is absolutely fixed in the adult grammar, and example (8.16) is uncontroversially ungrammatical in the absence of pauses in the delivery (such cases are discussed below).

(8.16) *Kawa o kite oyoida.

river ACC come-TE swam

'He swam across the river.'

Designing appropriate test sentences, however, required the avoidance of a particular complication: the Japanese *te*-form can be ambiguous in certain contexts, with the difference in meaning resolved prosodically. The examples below may be used to illustrate the issues.

(8.17) Saru wa ki ni itte, noborimasu.

    monkey TOP tree P_{LOC} go-TE, climbs

    'The monkey goes to the tree, and climbs up.'

(8.18) Saru-san wa ki ni nobotte ikimasu.

    monkey-TOP tree P_{LOC} climb-TE go, entered

    'The monkey goes climbing up the tree.'

There are important differences of stress and prosody between the two examples. In (8.17), (i) the *te*-form usually receives heavy stress, and (ii) it is usually followed by a pause. In (8.18) these elements are uttered as a single unit. In (8.17), the *te*-form functions as a complementizer demarcating a subordinate clause. The sentence could be ponderously translated as 'On arriving at the tree, the monkey climbed up', but this type of sentence is more usually translated with the connectives *and* or *then*. The event in the *te*-clause occurs before the other event in the matrix clause. In (8.18), however, the two activities ('going' and climbing') are simultaneous. They are not two sub-events, but different aspects of the same event. Only this last case do I consider to be a complex predicate.

    In order to derive an ungrammatical test sentence with reversed hierarchy in a complex predicate, such phonological considerations must be taken into account. The test sentence based on the second tree-climbing scene is given below.

(8.19) Toto: Japanese Test Sentence No.19

Ki no ue ni [itte noborimasu]

tree GEN top P$_{LOC}$ go-TE climb

'He goes climbing up the tree' (lit: he climbs going up the tree)

The use of *ki no ue* 'top of the tree' rather than just *ki* 'tree' made the consecutive reading very unlikely, but not impossible (it is only available if 'top' is interpreted as 'where the leaves are' or something similar). In order for this to be an authentic example of reverse deictic hierarchy, the elements in square brackets must be pronounced as a single unit, as in the grammatical example (8.18). Native-speaking research assistants found it very hard to deliver this ungrammatical sentence without adding stress and inserting a pause; in this and other situations where consistency of delivery was an absolute necessity, Toto was in his element.

The hierarchy reversal is not always ambiguous, however. In the following sentence, only the complex predicate reading is available.

(8.20) Toto: Japanese test sentence No. 15

*Kawa no mukō ni [itte oyogimasu]

river GEN other-side P$_{LOC}$ go-TE swim

'He swims going across the river'

It cannot be the case that the monkey crosses the river and then swims, so this sentence is ungrammatical regardless of pronunciation.

Other sentence types targeted in supplementary fashion included one item with a resultative PP, which was discounted as before (see Section 8.2.1 and Section 4.3.1,

fn.5). Another item involved an instance of *ni* (P$_{LOC}$) used in the context of VIA. As discussed in Section 6.6, all verbs specifying the GROUND as a place of transversal must directly assign accusative case. A final targeted test sentence, characterized as V [PATH, VOLITION] ^ adjunct [-VOLITION], mirrored the French test sentence in which an inherently directed motion verb (in this case *oriru* 'go-down') is modified by a non-volitional adjunct (in this case involving *korobu* 'fall-over').

In addition to the targeted sentences, there were pure fillers (no motion events) for the same 3 scenes as in the French version, and 6 unquestionably grammatical PATH utterances of the prescriptive variety. Of these, 3 were standard complex predicates with deictics (to counter the 3 ungrammatical examples), and 3 were cases of V [MANNER] assigning ACC to N [LOC]. The breakdown of targeted sentences into types and tokens is summarized in Table 8.5., and the non-targeted sentence types in Table 8.6, with the actual test sentence numbers indicated in parentheses.

Table 8.5. *Experiment II: Japanese. Targeted sentence types and numbers of tokens. In the tokens column, actual test sentence numbers are given in parentheses.*

	Sentence type	No. of tokens (11)
(i)	*de*, P [PLACE] with directional interpretation	4 tokens (2, 9, 12, 13)
(ii)	*ni*, P [LOC] instead of accusative *o* on VIA interpretation	2 tokens (3, 5)
(iii)	Reversal of hierarchy in complex PATH predicates: V [DEIXIS] ^ {V [PATH] / V [MANNER]}	3 tokens (8, 15, 19)
(iv)	V [PATH, VOLITION]^adjunct [-VOLITION] (inherently directed motion V with a non-volitional adjunct)	1 token (14)
*(v)	*Resultative PP (*discounted)	1 token (11)

Table 8.6. *Experiment II: Japanese. Fillers and prescriptively grammatical PATH utterances.*

	Sentence type	No. of tokens (9)
(i)	Sentences without motion events	3 tokens (1, 10, 20)
(ii)	Standard hierarchy in complex PATH predicates: {V [PATH] / V [MANNER]} ^ V [DEIXIS]	3 tokens (6, 7, 17)
(iii)	V [MANNER] assigns ACC to N [LOC]	3 tokens (4, 16, 18)

There now follows a listing of the Japanese test sentences, with details of each relevant sentence type to the right of the example. Again, this metalinguistic information is given in the following order: (i) on the top line, the hypothesized syntactic structure under investigation, i.e. PP complements, accusative DP complements, V-V compounds, and in (14), the feature specifications of the adjunct; (ii) on the second line, where pertinent, the hypothesized feature specification of P; and (iii) on the third line, the relevant feature specifications of V. Targeted test sentence numbers are underlined.

As for the translations, the same caveat is carried over from the French materials: they represent the intended meaning should the subjects judge the sentence to be grammatical. This can be confusing when the original utterance has a real alternative meaning, which is not translated. For example, [(2) *Saru-san wa ki no shita de suberimasu* - monkey-HON TOP tree GEN bottom P$_{PLACE}$ slide] could be translated as 'The monkey is sliding at the bottom of the tree', in which the PP is a locational adjunct. However, this interpretation is incompatible with the pictorial context. This sentence is actually translated as 'The monkey slides down the tree', an interpretation of this form which is impossible in the adult grammar, but the only

interpretation compatible with the context. If child test subjects allow this sentence, it means they allow *de* to have a directional interpretation.

To repeat for the sake of clarity, the test sentences are immediately followed by the results with no intervening text. The results themselves are displayed in three forms: first, the individual binary responses in table form, which enable inspection of individual test subject performances; second, the group results in table form, which enable comparison by age in percentage terms; and finally the responses of all subjects in chart form, to illustrate the overall response patterns of the Japanese language group.

Japanese test sentences:

1   *Ōmu-san wa saru-san kara banana o totte, mado kara dete shimaimasu.*
parrot-TITLE TOP monkey-TITLE from banana ACC take-TE, window from go-out-TE ASP
'The parrot takes the banana from the monkey and goes out of the window.'

2   *Saru-san wa ki no shita de suberimasu.*   [[[[[DP] P] N$_{LOC}$] P$_{PLACE}$] Ø P$_{PATH}$]
monkey-HON TOP tree GEN bottom P$_{PLACE}$ slide   *de*, P [PLACE]
'The monkey slides down the tree.'   *suberu*, V [MANNER]

3   *Saru-san wa hashi no shita ni hashirimasu.*   [[[[[DP] P] N$_{LOC}$] Ø P$_{PLACE}$] P$_{PATH}$]
monkey-TITLE TOP bridge GEN underneath P$_{LOC}$ run   *ni*, P [LOC] (*VIA)
'The monkey runs under the bridge.'   *hashiru*, V [MANNER]

4   *Saru-san wa ishi no ue o jampu shimasu.*
monkey-TITLE TOP rock GEN top ACC jump do
'The monkey jumps over the rock.

5   *Saru-san wa ki no tsutsu no naka ni haihai*   [[[[[DP] P] N$_{LOC}$] Ø P$_{PLACE}$] P$_{PATH}$]
shimasu.
monkey-TITLE TOP tree GEN tube GEN inside   *ni*, P [LOC] (*VIA)
P$_{LOC}$ crawl do
'The monkey crawls through the tree-trunk.'   *haihai suru*, N^V [MANNER]

6   *Saru-san wa kawa o oyoide [watatte ikimasu].*
monkey-TITLE TOP river ACC swim-TE cross-TE go
'The monkey goes swimming across the river.'

7   *Saru-san wa oka no ue ni [nobotte ikimasu].*
monkey-TITLE TOP hill GEN top P$_{LOC}$ climb-TE go
'The monkey goes climbing up the hill.'

8   *Saru-san wa oka no shita ni [itte korogarimasu].*   [[V$_{PATH, DEIXIS}$] V$_{MANNER}$]
monkey-TITLE TOP hill GEN bottom P$_{LOC}$ go-TE roll
'The monkey goes rolling down the hill.'   *iku*, V [PATH, DEIXIS]

9   *Saru-san wa dōkutsu no naka de hashirimasu.*   [[[[[DP] P] N$_{LOC}$] P$_{LOC}$] Ø P$_{PATH}$]
monkey-TITLE TOP cave GEN inside P$_{PLACE}$ run   *de*, P [PLACE]
'The monkey runs into a cave.'   *hashiru*, V [MANNER]

10   *Nanto dōkutsu no naka ni wa ōkii raion ga imasu.*
EXCL cave GEN inside P$_{LOC}$ TOP big lion NOM be
'Oh! In the cave there is a big lion.

11   *Raion wa saru-san to ōmu-san o dōkutsu no soto de*   RESULTATIVE PP
oikakemasu.   (*discounted)
lion TOP monkey-TITLE and parrot-TITLE ACC cave GEN
outside P$_{PLACE}$ chase
'The lion chases the monkey and the parrot out of the cave.'

12   *Saru-san wa dōkutsu no soto de hashirimasu.*   [[[[[DP] P] N$_{LOC}$] P$_{PLACE}$] Ø P$_{PATH}$]
monkey-TITLE TOP cave GEN outside P$_{PLACE}$ run   *de*, P [PLACE]
'The monkey runs out of the cave.'   *hashiru*, V [MANNER]

13   *Oka no ue de noborimasu.*   [[[[[DP] P] N$_{LOC}$] P$_{PLACE}$] Ø P$_{PATH}$]
hill GEN top P$_{PLACE}$ climb   *de*, P [PLACE]
'He climbs the hill.'   *noboru*, V [MANNER]

14   *Oka no shita ni koronde orimasu.*   adjunct V [MANNER, -VOLITION]
hill GEN bottom P$_{LOC}$ fall-over-TE go-down
'He falls down the hill.'   *oriru*, V [PATH, VOLITION]

15   *Kawa no mukō ni [itte oyogimasu].*   [[V$_{PATH, DEIXIS}$] V$_{MANNER}$]
river GEN other-side P$_{LOC}$ go-TE swim
'He swims going across the river.'   *iku*, V [PATH, DEIXIS]

16   *Ki no tsutsu no naka o haihai shimasu.*
tree GEN tube GEN inside ACC crawl do
'He crawls through the tree-trunk.'

17   *Ishi o [tobikoete ikimasu].*
rock ACC jump-go-over-TE go
'He jumps over the rock.'

18   *Hashi no shita o hashirimasu.*
bridge GEN underneath ACC run
'He runs under the bridge.'

19   *Ki no ue ni [itte noborimasu].*   [[V$_{PATH, DEIXIS}$] V$_{PATH, MANNER}$]
tree GEN top P$_{LOC}$ go-TE climb
'He climbs up the tree.'   *iku*, V [PATH, DEIXIS]

20   *Saru-san wa banana o tabemasu.*
monkey-TITLE TOP banana ACC eat
'The monkey eats his banana.'

8.3.2 Japanese results

Table 8.7. *Japanese individual results. Experiment II: Grammaticality judgements*
*o = acceptable; * = unacceptable; ? = don't know / confused / mixed responses.*
(Subjects excluded following pretest: J3a, J4b, J6d.)

INDIVIDUAL TEST SUBJECTS

TEST SENTENCES	J3 b c d e	J4 a c d e	J5 a b c d e	J6 a b c e f g	J7 a b c d	JA a b c d e
1	o o o o	o o ? o	o o o o *	o o o o o o	o o o o	o o o o o
2	* o * o	* * * o	o * * * *	* * * * * *	* * * *	* * * * *
3	o o o o	o o o o	o * o * *	o * o o o *	* * o *	* * * * *
4	o o o o	o o * o	o o o o o	o o o o o o	o o o o	o o o o o
5	o o o o	o o o o	o o * * *	o * o o o *	o * o o	* * * * *
6	o o o o	o o o o	o o o o o	o o o o o o	o o o o	o o o o o
7	o o o o	o o o o	o o o o o	o o * o o o	o o o o	o o o o o
8	* * * *	? * * o	o * * * *	* * * * * *	o * * *	* * * * *
9	* o o o	o * * *	o * * * o	o * o o o o	* * * *	* * * * *
10	o o o o	o o o o	o o o o o	o o o o o o	o o o o	o o o o o
11	* o * o	o * o o	o ? * o o	o o o o * *	o o * o	* * * ? o
12	* o o o	o o * *	o o ? o o	o o o o o o	o o o o	o o * o o
13	* o * *	* * * o	* * * * *	* * o * * *	* * * *	* * * * *
14	* * * o	* * * o	* * o * o	* o o o o o	* * * *	* o * * o
15	* * * o	* * * *	o * * * *	* * * * * *	* * * *	* * * * *
16	o o o o	o o o o	o o o * o	o o o o o *	o o o o	o o o o o
17	o o o o	o o o o	o o o o o	o * o o o *	o o o o	o o o o o
18	o o o o	o o o o	o o o * o	o o o o o o	o o o *	o o o o o
19	? * ? *	* * * *	o * * o *	* * * * * *	* * * *	* * * * *
20	o o o o	o o o o	o o o o o	o o o o o o	o o o o	o o o o o

Table 8.8. *Japanese Group Results. Experiment II: Percentages of positive responses to each question by age group, and mean averages assigning equal weight to (i) groups; and (ii) individuals.*

			AGE GROUPS				MEAN	MEAN	
	J3	J4	J5	J6	J7	JA	(groups)	(individuals	
TEST SENTENCES									
1	100	75	80	100	100	100	92.5	92.9	(26/28)
2	50	25	20	0	0	0	15.8	14.3	(4/28)
3	100	100	40	66.7	25	0	55.3	53.6	(15/28)
4	100	75	100	100	100	100	95.8	96.4	(27/28)
5	100	100	40	66.7	75	0	63.6	60.7	(17/28)
6	100	100	100	100	100	100	100	100	(28/28)
7	100	100	100	83.3	100	100	97.2	96.4	(27/28)
8	0	25	20	0	25	0	11.7	10.7	(3/28)
9	75	25	40	83.3	0	0	37.2	39.3	(11/28)
10	100	100	100	100	100	100	100	100	(28/28)
11	50	75	60	66.7	75	20	57.8	57.1	(16/28)
12	75	50	80	100	100	80	80.8	82.1	(23/28)
13	25	25	0	16.7	0	0	11.1	10.7	(3/28)
14	25	25	40	83.3	0	40	35.6	39.3	(11/28)
15	25	0	20	0	0	0	7.5	7.1	(2/28)
16	100	100	80	83.3	100	100	93.9	92.7	(26/28)
17	100	100	100	66.7	100	100	94.4	92.7	(26/28)
18	100	100	80	100	75	100	92.5	92.7	(26/28)
19	0	0	40	0	0	0	6.7	7.1	(2/28)
20	100	100	100	100	100	100	100	100	(28/28)
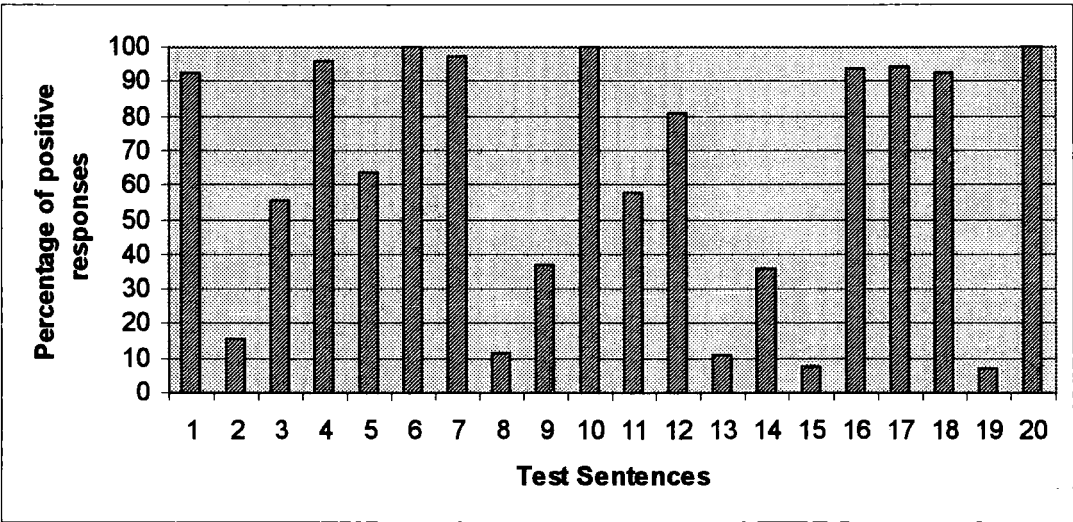
Figure 8.2. *All Japanese test subjects. Experiment II: Percentage of positive responses to each test sentence in grammaticality judgement task.*

Adult responses to 3 out of 4 test sentences with *de* (P [PLACE]) in directional

contexts (items 2, 9, and 13) were crystal clear. Example (2) is repeated below for

convenience.

(8.21) Toto: Japanese Test Sentence No.2

Saru-san wa ki no shita de suberimasu.

monkey-HON TOP tree GEN bottom P$_{PLACE}$ slide

'The monkey slides down the tree.'

(*de with GOAL interpretation)

As shown in Tables 8.7 and 8.8, Sentences (2), (9), and (13) had a rejection rate of

100% in the adult group. The exception was sentence (12), which was accepted by

80% (4/5) of the adults. This points to an error in the pictorial stimulus, since despite

efforts to create a purely directional context as the monkey runs out of the cave, the

long-shot view of the return journey permits a locational interpretation of the GROUND

in this scene, i.e. he is running, and 'outside the cave' is where the activity takes place.

I therefore discount this set of responses in the Japanese data, on the grounds of this

methodological flaw.

As for the child responses, by age 7, *de* with directional interpretation is

rejected at a rate of 100%. Sentence (2) was accepted by 4 young test subjects but by

no one over the age of J5a, the youngest 5-year-old. Sentence (9) had sporadic

acceptance at a rate of 57.9% (11/19) across Groups J3 and J6, whilst (13) was

accepted only by 1 3-year-old, 1 4-year-old, and 1 6-year-old. Some young test

subjects did show clear understanding of the relevant semantic distinction. For the

cave entrance scene, the youngest subject, J3b, suggested the correction: "Dōkutsu no

naka **ni** hairimasu" (cave GEN inside P$_{LOC}$ enter - 'he runs *into* the cave'), with stress on *ni* (P$_{LOC}$).

These results fit well with the general conclusions of Experiment I regarding the acquisition of spatial adpositions, reported in Section 6.6: the grammatically relevant semantic properties of lexical items can take time to acquire, and such variation is clearly indicative of lexical learning rather than any developmental change in the syntactic principles of argument structure.

Turning to test sentences (3) and (5), in which *ni* (P$_{LOC}$) has a VIA interpretation, a similar pattern of gradual acquisition emerges. Sentence (3) is repeated below.

(8.22) Toto: Japanese Test Sentence No. 3

Saru-san wa hashi no shita ni hashirimasu.

monkey-TITLE TOP bridge GEN underneath P$_{LOC}$ run

'The monkey runs under the bridge.'

(*ni with VIA interpretation)

Analysis of Table 8.7 reveals that the VIA interpretation in sentence (3) was accepted by 100% of the 3- and 4-year-olds, 46.7% (7/15) of the 5- to 7-year-olds (only 1/4 7-year-olds), and 0% of the adults. The VIA interpretation in sentence (5) was accepted by 100% of 3- and 4-year-olds, 60% (9/15) of 5-to-7-year-olds, and 0% of adults. These findings indicate a definite developmental progression, and are very suggestive of the gradual clines seen in the acquisition of predicates expressing THROUGH reported in Section 6.7. That consciousness of the nature of the error is emerging in the older children is clear from comments and suggestions following rejection of the

test sentences by 5- and 6- year-old children, e.g. J5b suggested "kugatte ikimasu" (go-via-under-TE go -'he goes under (and out the other side)'); and J6g suggested: "hashi no shita o hashirimasu" (bridge GEN underneath ACC run - 'he runs under the bridge (and out the other side)'. Note J6g's correct substitution of *ni* (P_{LOC}) by *o* (ACC). This response pattern supports the arguments given in Section 6.7, that errors in the expression of this type of trajectory are indicative of the conceptual complexity of PATHS of traversal, rather than any development in knowledge of syntactic structure.

This view of gradual lexical acquisition and fixed knowledge of syntax is bolstered by the responses to a clear example of knowledge of syntactic structure: namely, the hierarchy of predicates in verb complexes with deictics (test sentences 8, 15, and 19). Responses to these targeted sentences may be compared with those to sentences with the canonical hierarchy (6, 7, and 17). A glance at Figure 8.2 reveals that the difference, across all ages, is categorical. In the adult group, these sets of sentences were accepted at rates of 0%, and 100%, respectively. Across all subjects, for the inverse hierarchy, the respective acceptance rates were 10.7% (3/28), 7.1% (2/28), and 7.1% (2/28), and for the canonical hierarchy, 100% (28/28), 96.4% (27/28) and 92.7% (26/28), and within each age group any acceptance of the inverse hierarchy was exceptional. These exceptions were almost certainly just noise. For example, as shown in Table 8.7, the only subject to systematically accept this sentence type was J5a, but at least for (19) his comments reveal that he phonologically restructured the utterance. On giving a positive response, he repeated the sentence, but automatically stressed the *te*-form and inserted a pause, indicating that this was not the complex predicate interpretation (as discussed above). Thus knowledge of this

aspect of syntactic structure is available to children at all stages of development within the age range.

Sentence (14), characterized as V [PATH, VOLITION]^adjunct [-VOLITION], in which an inherently directed motion verb (*oriru* 'go down') is combined with a non-volitional adjunct (*korobu* 'fall over'), produced results which mirrored the French results for the corresponding item. Group acceptance ranges for the 3-to-5-years olds ranged from 25 to 75%. Group J6 generally accepted it, at a rate of 83.3%, whilst Group J7 unanimously rejected it. The adults' acceptance rate was 40% (2/5). The conclusion seems to be that, as with the analogous French example, the evidence falls short of that required to serve in making a case for [±VOLITION] as a computational semantic feature. This combination prompts a mixture of acceptance and rejection, and has a status of dubious grammaticality.

That none of the grammaticality judgements reported above involve a negative response bias is evident on consideration of responses to the 3 fillers (1, 10, 20) and 6 standard forms (6, 7, 17; 4, 16, 18), which were all overwhelmingly accepted as grammatical.

To summarize, the Japanese results reveal a gradual rather than dramatic developmental pattern for the acquisition of the properties underlying structures with the postpositions *de* and *ni*, here respectively characterized as P [PLACE] and P [LOC]. Such a cline, together with considerable variation in individual subject responses, indicates a fundamentally lexical process of acquisition rather than acquisition of some language-specific principle. On the other hand, the knowledge of syntax underlying the strict hierarchical ordering of elements in complex predicates with deictics appears to be present in the grammars of even the youngest test subjects. With

awareness of this emerging difference in the findings between knowing syntax and learning the lexicon, we now turn to the English version of the experiment.

8.4 English test materials and results

8.4.1 English test materials

The theme of P [PLACE] with directional interpretation (a form ungrammatical by definition) was reprised in the English version of Experiment II. While it was always evident that English speakers of all ages allow V [MANNER] ^ PP [LOC] (the predominant form in the production data of Experiment I), the status for young children of directional utterances with P [PLACE] was not clear. The P [PLACE] *at*, *above* and *below* were not attested in directional contexts in the production data, but that does not prove their ungrammaticality in child language in such contexts. Another three elements characterized by prescriptive grammars as having the properties of P [PLACE] are *in*, *on* and *underneath* (the directional forms being *into* (P$_{PATH}$), *onto* (P$_{PATH}$), and *under* (P$_{LOC}$)). However, I treat these as a separate sub-class, because I have argued previously in discussion of Experiment I that the first two are actually P [LOC] in the colloquial grammars of adults throughout the English-speaking world (see Section 6.8), and I also characterize *underneath* in the same way. The latter does allow directional interpretation in colloquial speech, and unsurprisingly turns up in such contexts in the production data of Experiment I. There are 8 test sentences of this first general type (3, 7, 14, 17, 19, 9, 3, 18).

The second two types of targeted test sentence are variations on the internal structure of complex predicates, another theme carried over from the Japanese version of the experiment. English examples such as *come running (down the street)* and *go crawling (back to the boss)* arguably have such complex predicate status, an issue I

shall return to in Chapter 11. One utterance of this type in the production data of Experiment I was given previously as example (5.155), and is repeated below for quick reference.

(8.23) <EAc [12]:   *he comes running out of the cave*>

The question of children's adherence to the hierarchical internal structure of complex predicates with deictics is addressed in sentences (12) and (16).[2] One difference between Japanese and English adult grammars in this respect, however, is that geometric V [PATH] may enter into this type of combination in Japanese but not English. This observation was previously presented in Section 4.4 as one of several arguments for making a distinction between deictic and geometric V [PATH], using the following type of contrast.

(8.24) Billy went sailing over the horizon.

(8.25) *Sally crossed flying (over) the Channel.

This substitution of geometric V [PATH] for deictic V [PATH] is tested for acceptability in sentence (6).

The final targeted sentenced type was one in which V [MANNER] directly assigned case to the GROUND (sentences 4 and 5). In one instance, the GROUND object is presented as the syntactic direct object, and in the other a locative noun expressing the geometry of the GROUND is in this position. However, I treat them both alike here:

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[2] Note just as with the analogous Japanese test sentences, prosody is crucial. If a pause is inserted between the MANNER verb and the deictic in a test sentence such as (16) (*He crawls going through the tree-trunk*), it is rendered acceptable. Again, Toto ensured uniformity of delivery to all subjects.

the spatial noun is not N [LOC], but a lexical N inside a DP. As in the previous two versions of this experiment, the test item with the resultative PP was discounted (as mentioned in the two previous sub-sections and explained in Section 4.3.1, fn.5).

The non-targeted sentences included the same three 'pure' fillers (no motion events) as before, one instance of standard V [MANNER] ^ PP [LOC], and two standard instances of deictic complex predicates, to counter the targeted versions with reverse hierarchy. The breakdown of targeted sentences into types and tokens is summarized in Table 8.9., and the non-targeted sentence types in Table 8.10, with the actual test sentence numbers indicated in parentheses.

Table 8.9. *Experiment II: English. Targeted sentence types and numbers of tokens. In the tokens column, actual test sentence numbers are given in parentheses.*

Sentence types		No. of tokens (14)
(i)	P [PLACE] with directional interpretation	8 tokens
Subtypes:	P [PLACE] all registers (*at, above, below*) P [LOC] in colloquial register (*in, on, underneath*)	5 tokens (3, 7, 14, 17, 19) 3 tokens (9, 13, 18)
(ii)	Reversal of hierarchy in complex PATH predicates: V [MANNER] ^ V [DEIXIS]	2 tokens (12, 16)
(iii)	Geometric V [PATH] instead of V [DEIXIS] in complex predicates: V [PATH] ^ V [MANNER]	1 token (6)
(iv)	V [MANNER] assigns ACC to GROUND	2 tokens (4, 5)
*(v)	*Resultative PP (*discounted)	1 token (11)

Table 8.10. *Experiment II: English. Fillers and prescriptively grammatical PATH utterances.*

Sentence types		No. of tokens (6)
(i)	Sentences without motion events	3 tokens (1, 10, 20)
(ii)	V [MANNER] ^ PP [PATH]	1 token (2)
(iii)	Standard hierarchy in complex PATH predicates: V [DEIXIS] ^ V [MANNER]	2 tokens (8, 15)

A listing of English test sentences now follows, with details of each targeted sentence type to the right of the example. As before, this metalinguistic information is given in the following order: (i) on the top line, the hypothesized syntactic structure under investigation, i.e. PP complements, accusative DP complements, or complex predicate structure; (ii) on the second line, where relevant, the hypothesized feature specification of P; and (iii) on the third line, the relevant feature specifications of V. Targeted test sentence numbers are underlined.

The translations in the previous two versions of the experiment made clear the intended directional interpretation; here, one should simply assume the intended directional interpretation in all cases, as before. Thus, for example, in the case of sentence (14) *He rolls at the bottom of the hill*, the only interpretation in this particular context corresponds to an adult sentence of a form such as *He rolls to the bottom of the hill*. If children allow this test sentence, it means that they allow *at* to carry directional interpretation.

Again, the test sentences are immediately followed by the results with no intervening text, and the results are displayed in three forms: first, the individual binary responses in table form, to enable inspection of individual test subject performances; second, the group results in table form, to enable comparison by age in

percentage terms; and finally the responses of all subjects in chart form, to illustrate

the overall response patterns of the English language group.

English test sentences:

1   *The parrot takes the banana from the monkey and flies out of the window.*

2   *The monkey slides down the tree.*

<u>3</u>   *The monkey runs below the bridge.* $[P_{PATH}\ \emptyset\ [P_{PLACE}\ [DP]]]$
below, P [PLACE] (P [LOC]?)
run, V [MANNER]

<u>4</u>   *The monkey jumps the rock.* $ACC \rightarrow [DP]$
jump, V [MANNER]

<u>5</u>   *The monkey crawls the inside of the tree-trunk.* $ACC \rightarrow [N_{LOC}\ [DP]]$
crawl, V [MANNER]

<u>6</u>   *The monkey [crosses swimming] the river.* $[V_{PATH}\ [V_{MANNER}]]$
cross, V [PATH]

<u>7</u>   *The monkey climbs at the top of the hill.* $[P_{PATH}\ \emptyset\ [P_{PLACE}\ [DP]]]$
at, P [PLACE]
climb, V [MANNER]

8   *The monkey [comes rolling] down the hill.*

<u>9</u>   *The monkey runs in a cave.* $[P_{PATH}\ \emptyset\ [P_{LOC}\ [DP]]]$
in, P [LOC] (P [PLACE]?)
run, V [MANNER]

10   *The monkey and the parrot see a big lion.*

11   *The lion chases the monkey and the parrot out of the cave.*   RESULTATIVE PP
(*discounted)

<u>12</u>   *The monkey [runs coming] out of the cave.* $[V_{MANNER}\ [V_{PATH,\ DEIXIS}]]$
come, V [PATH, DEIXIS]

<u>13</u>   *He climbs on top of the hill.* $[P_{PATH}\ \emptyset\ [P_{PLACE}\ [N_{LOC}\ [P_{+F}\ [DP]]]]]$
on, P [LOC]
climb, V [MANNER]

<u>14</u>   *He rolls at the bottom of the hill.* $[P_{PATH}\ \emptyset\ [P_{PLACE}\ [DP]]]$
at, P [PLACE]
roll, V [MANNER]

15   *He [goes swimming] across the river.*

<u>16</u>   *He [crawls going] through the tree trunk* $[V_{MANNER}\ [\ V_{PATH,\ DEIXIS}]]$
go, V [PATH, DEIXIS]

17 *He jumps above the rock*

$$[\text{P}_{\text{PATH}} \, \varnothing \, [\text{P}_{\text{PLACE}} \, [\text{DP}]]]$$
above, P [PLACE] (P [LOC]?)
run, V [MANNER]

18 *He runs underneath the bridge*

$$[\text{P}_{\text{PATH}} \, \varnothing \, [\text{P}_{\text{PLACE}} \, [\text{DP}]]]$$
underneath, P [LOC] (P [PLACE]?)
run, V [MANNER]

19 *He climbs at the top of the tree*

$$[\text{P}_{\text{PATH}} \, \varnothing \, [\text{P}_{\text{PLACE}} \, [\text{DP}]]]$$
at, P [PLACE]
*climb*, V [MANNER]

20 *The monkey eats his banana*

8.4.2 English results

Table 8.11. *English individual results. Experiment II: Grammaticality judgements o = acceptable; * = unacceptable; ? = don't know / confused / mixed responses. (Subjects excluded following pretest: E3a, E3f.)*

INDIVIDUAL TEST SUBJECTS

	E3	E4	E5	E6	E7	EA
	b c d e g	a b c d e	a b c d e	a b c d e	a b c d e	a b c d e f

TEST SENTENCES

1	o o o o o	o o o o o	o o o o o	o o o o o	o o o o o	o o o o o o
2	o o o o o	o o o o o	o o o o o	o o o o o	o o o o o	o o o o o o
3	* * * * *	o * o * o	* * o * o	o o o o o	o * o o o	* * o o * o
4	* * * * *	* * * * o	* * * * o	* * * * *	* * * * *	* * o o * o
5	* * * * o	* * * * o	* * * o *	* o o * *	* * * o *	* * * * * *
6	* o * * *	* * * * *	* * * * *	* * * * *	* * * * *	* * * * * *
7	o o * o o	o * * o o	* o o o *	* * o o o	o * o o *	* * * * * *
8	* o o o o	o * o o o	o o o o o	o o o o o	o o o o o	o * o o o o
9	o o * o o	o * o o o	o o o o o	o o o o o	o o o o o	o * * o * *
10	o o o o o	o o o o o	o o o o o	o o o o o	o o o o o	o o o o o o
11	o o * o o	* * o o o	o o o o o	o o o o o	o o o o o	o o o o o o
12	* o * * *	* ? * * *	* * * * *	* * * * *	* * * * *	* * * * * *
13	* o * o o	* o * o o	* o o o *	* * o o o	o * o o o	* * * * * *
14	o o * * o	o * o o o	* o o o *	* * o o *	o * o * ?	* * * * * *
15	o o ? o o	o o o o o	o o o o o	o o o o o	o ? o o o	o o o o o o
16	* * * * *	* * * * *	* * * * *	* * * * *	* * * * *	* * * * * *
17	o o * * *	* ? o * o	o o o o *	* o o o o	o ? o o o	* * * o * o
18	o o o o o	o o o o o	o o o o o	o o o o o	o o o o o	o o * o o o
19	o o o * *	o * * o o	o o o o *	* * o o *	o * o * ?	* * * * * *
20	o o o o o	o o o o o	o o o o o	o o o o o	o o o o o	o o o o o o

Table 12. *English Group Results. Experiment II: Percentages of positive responses to each question by age group, and mean averages assigning equal weight to (i) groups; and (ii) individuals.*

	E3	E4	E5	E6	E7	EA	MEAN (groups)	MEAN (individuals)	
			AGE GROUPS						
TEST SENTENCES									
1	100	100	100	100	100	100	100	100	(31/31)
2	100	100	100	100	100	100	100	100	(31/31)
3	0	60	40	100	80	50	55	54.5	(17/31)
4	0	20	20	0	20	50	18.3	19.4	(6/31)
5	20	20	20	40	20	0	20	19.4	(6/31)
6	20	0	0	0	0	0	3.3	3.2	(1/31)
7	80	60	60	60	60	0	53.3	51.6	(16/31)
8	80	80	100	100	100	83.3	90.6	90.3	(28/31)
9	80	80	100	100	100	33.3	82.2	80.7	(25/31)
10	100	100	100	100	100	100	100	100	(31/31)
11	80	60	100	100	100	100	90	90.3	(28/31)
12	20	0	0	0	0	0	3.3	3.2	(1/31)
13	60	60	60	60	80	0	53.3	51.61	(16/31)
14	60	80	60	40	40	0	46.7	45.2	(14/31)
15	80	100	100	100	80	100	93.3	93.6	(29/31)
16	0	0	0	0	0	0	0	0	(0/31)
17	40	40	20	80	80	33.3	48.8	58.1	(18/31)
18	100	100	100	100	100	83.3	97.2	96.8	(30/31)
19	60	60	80	40	40	0	46.7	45.2	(14/31)
20	100	100	100	100	100	100	100	100	(31/31)
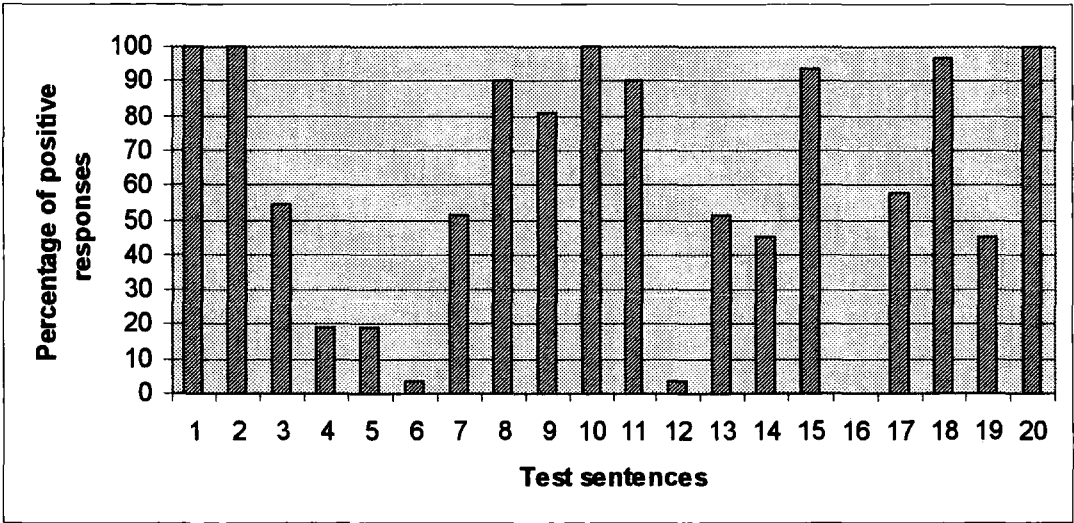
Figure 8.3. *All English test subjects. Experiment II: Percentage of positive responses to each test sentence in grammaticality judgement task.*

Prepositions characterized as P [PLACE] across speech registers comprised 3 tokens of *at* (7, 14, 19) and one each of *below* (3) and *above* (17). The sentence below exemplifies the materials for *at*.

(8.26) Toto: English Test Sentence No. 19.

The monkey climbs at the top of the tree.

Test sentences with *at* showed an extremely similar distribution of judgement types: they were roundly rejected in these directional contexts by the adults, all three tokens having an acceptance rate of 0% in Group EA. The children, however, had mixed responses, with no discernable developmental trend. Examination of Table 8.11 reveals that the acceptance rates for these three sentences across all child test subjects were as follows: sentence (7) 64% (16/25); sentence (14) 56% (14/25); and sentence (19) 56% (14/25). Interestingly, the judgements appear quite clear-cut, judging by test subject comments, apart from the oldest 7-year-old, E7e, who gave confused responses to (14) and (19) after rejecting (7). The 3- and 4-year-olds who rejected these sentences appeared to be doing so for the same reason as the adults. On rejecting (19) (repeated above in example 8.26), one 3-year-old, E3e, explained: "up the tree-trunk *first*", demonstrating a strictly locational understanding of *at*. Others suggested corrections in which they stressed the directional P. On rejecting (7), E4b proposed: "the monkey climbs *up* the hill"; and on rejecting (14), E3d offered the suggestion "rolls *down* the hill". However, the fact that more than half the child test subjects accepted directional *at* across the age range from 3 to 7 suggests once more that the fine-tuning of lexical semantic features can take several years.

Test sentences (3) and (17) were examples of *below* and *above* in directional contexts; the latter is repeated as example (8.27).

(8.27) Toto: English Test Sentence No.17.

He jumps above the rock

Adults were not categorical in their judgements of these items, although there was within-subject consistency in 5 out of 6 individuals. Group EA accepted sentences (3) and (17) at respective rates of 50% (3/6) and 33.3% (2/6). EAa changed her responses for both sentences, first accepting *below*, but then rejecting it and suggesting *under*; and first accepting *above*, then rejecting it and suggesting *over*. Both those who accepted and those who rejected the directional interpretation were often quite explicit about their choices immediately following their judgements. EAb justified rejection of *below* in the bridge scene by saying: " 'cause he's not standing still below the bridge…he runs through the bridge, he runs under the bridge"; and she explained her rejection of *above* in the rock scene by saying: "[above] suggests that he was jumping on top of the rock". On the other hand, in justifying her acceptance of *below*, EAd said: "the correct thing would be *under*, but it's possible. I think it's OK. [Are you sure?] Yes"; and in respect of the directional reading of *above*, she said, "Yes, because part of the time he is above the rock. He does jump above it".

My own judgements side with the nay-sayers here, but that there is some variation in adult lexical representations is clear. As can be seen in Table 8.11, the children's judgements were mixed throughout the age range, and inconsistent across the two tokens, with average acceptance rates of (3) and (17), respectively, at 56% (14/25) and 64% (16/25). The combined results of the adults and children in respect of

these two test items suggest that there is lexical-tuning, as individuals end up with consistent representations, but that the end results of this process may not be identical for all speakers: in some lexicons, *above* and *below* have the more general feature [LOC]; in others they have the more specific feature [PLACE].

The other sub-class of test sentence type (i) comprised tokens (9), (13), and (18) with the prepositions, *in*, *on* and *underneath*, which are sometimes treated as strictly locational (i.e. P$_{PLACE}$), but which I have characterized as P [LOC]. As an example, test sentence (9) is repeated below.

(8.28) Toto: English Test Sentence No.9.

The monkey runs in a cave

This sentence had a low acceptance rate amongst the adults: only 33.3% (2/6). However, several comments indicated that the rejection was based on prescriptive criteria, rather than an assessment of was is and is not possible in colloquial speech. EAf (a retired schoolteacher) said: "Well, you could get away with 'run in the cave', it could be acceptable, but grammatically it's wrong".[3] The judgements of children in this case were more lenient: only 2 rejections across the whole age range, with Groups E5, E6, and E7 accepting at 100%.

Sentence (13) with directional *on*, repeated below, produced a more mixed set of responses in general, and total rejection by the adults.

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[3] Although by rights, anecdotal evidence is inadmissible in this context, I should note that over the several years in took to carry out this project, I have heard every one of these informants use directional *in* in casual conversation.

(8.29) Toto: English Test Sentence No. 13.

He climbs on top of the hill.

However, adult comments following the negative judgements make it seem plausible that a directional reading with *on* is possible for (some of) these test subjects, and that there was a flaw with the pictorial stimulus. EAb said "No, he hasn't got to the top yet", which indicates that if the top of the hill had been reached in the image (this is from the long-shot picture of the return journey), a positive judgement would have been forthcoming. EAc made essentially the same comment: "Incorrect in this context...only OK if he ends up there...climbs up the hill, climbs to the top". EAe commented: "OK but not in this context...if his purpose was to end up on top of the hill it would be OK'. The children accepted this sentence at an average rate of 64% (16/25) across age groups, with no evidence of developmental change (there were 1 or 2 rejections in each group).

Test sentence (18), with *underneath* in a directional context, was accepted at a rate of 98.6% (only one rejection); as such this can safely be categorized as P [LOC] for these speakers.

The variation in lexical representations both across particular tokens of a single type, and across individual test subjects, is in marked contrast to the virtually uniform judgements concerning syntactic hierarchy in complex predicates (test sentence types (ii) and (iii)), across tokens and across individuals. A glance at Figure 8.3 reveals the dramatic contrast between the acceptance rates of test items (6), (12) and (16) (respectively 3.2%, 3.2%, and 0%), and the acceptance of the canonical examples (8) and (15) (respectively 90.3% and 93.6%). The only thing preventing a 0% acceptance rate for sentences (6) and (12) was an idiosyncratic response pattern

on the part of the second youngest subject, EAb. Test sentences (6) and (12) are repeated below, respectively illustrating (i) geometric V [PATH] instead of V [DEIXIS] in complex predicates; and (ii) a reversal of syntactic hierarchy in complex predicates with deictics. Square brackets indicate delivery as a prosodic unit.

(8.30) Toto: English Test Sentence No. 6.

The monkey [crosses swimming] the river.

(8.31) Toto: English Test Sentence No. 12.

The monkey [runs coming] out of the cave.

These sentence types are clearly ungrammatical throughout the age range, adding still further to the hypothesis that whilst the acquisition of the syntactically relevant properties of lexical items may take place piecemeal, over many years, the knowledge of how syntactic categories enter into combination in complex predication is present even in the youngest test subjects.

The final test sentence type was one in which V [MANNER] assigns accusative case to the GROUND (either the GROUND object itself, or a locative DP expressing geometric features of the GROUND). The relevant test sentences are again given below.

(8.32) Toto: English Test Sentence No. 4.

The monkey jumps the rock.

(8.33) Toto: English Test Sentence No. 5.

The monkey crawls the inside of the tree-trunk.

As discussed in Section 6.4, there are examples of V [MANNER] assigning accusative case to GROUND objects in English, e.g. *jump the fence, swim the River Tyne*, although this construction is not fully productive like in Japanese. The adults were split down the middle on acceptance of sentence (4). Those who rejected it all suggested *over the rock*, as expected. EAd confirmed that she was sure of its grammaticality, and EAf said: *"over* is more common, but yes, you can say that, there's nothing wrong with it. It's still acceptable". However, the children did not agree, rejecting it at a rate of 92%.

Sentence (5), in which accusative case is assigned to a locative noun spelling out the geometry of the GROUND, is ungrammatical in English, in contrast to its Japanese analogue. The adults all rejected sentence (5) with no qualms. The children rejected it at a rate of 76%, which is a reasonably sound judgement of ungrammaticality, but which still leaves 24% (6/25) accepting this form. The transcripts do not reveal any illuminating comments on these acceptances. One possibility is that they did not hear or subconsciously erased the determiner, which would in fact render the sentence grammatical. However, this is just speculation, and I have no more solid account of these exceptions.

In summary, the results of the English version of Experiment II mirror the Japanese findings in that there is a marked contrast between the gradual acquisition of the syntactic specifications of lexical items on one hand, and knowledge of combinatorial principles of syntax on the other. As for the former, consistency of lexical representation across tokens may take years to acquire, indicating case by case lexical acquisition before adult-like verbal and adpositional predicate classes emerge. As indicated by the responses to sentences with *above* and *below* in directional contexts, and those with *jump* assigning accusative case, even adult lexicons in the

same speech community may vary in their precise representations (one person's P_{LOC} is another's P_{PLACE}). As for syntax, children as young as 3 distinguish between deictic and geometric V [PATH] in complex predicates, and strictly observe the canonical hierarchy of combination in such structures, revealing consistent knowledge of syntactic categories and underlying principles of combination.

8.5   Result summary: Experiments I and II

As explained in Section 7.2, Experiment II was a dependent investigation. The pictorial sequence was designed for Experiment I, and the test materials were designed only to draw out some of the themes and cover some of the gaps in the primary experiment. For continuity, the principal conclusions of Experiment I may be very briefly resummarized as follows.

Firstly, Talmy's typology accurately describes Japanese and English, but French is a mixed language in terms of the 'framing' of motion events. Moreover, it is clear that such typological characterization can only be made in terms of use of language (what people usually say), not knowledge of language (what they can say). PATH may be expressed either in V or in PP, or in both, in each language. Frequency of type of expression, however, is likely to be determined in part by lexical resources.

Secondly, formalization of predicate-argument structure in motion events cannot be in terms of a binary parameter mirroring the suggested binary typology. Rather, the properties of individual lexical items (LIs) are pivotal, and the Lexicalist Path Hypothesis, stated in example (2.2) and repeated below, holds in full.

(8.34) *The Lexicalist Path Hypothesis (LPH)*. Variation in PATH predication, both across languages and within languages, is determined by inherent and contextual properties of LIs.

Thirdly, the commonalities of English, French and Japanese are as striking as their differences. The expression of trajectories is possible in all three languages with the same set of syntactic categories and computational semantic features, which combine according to the same (perhaps universal) syntactic principles.

A fourth and more tentative conclusion was that the conceptual complexity of THROUGH and ACROSS leads to a delay in the expression of these trajectories in a single syntactic clause (either in one LI or in a combination of LIs).

The results of Experiment II confirm and extend these conclusions in various ways. For example, whilst P [LOC] may carry directional interpretation, as shown in Experiment I, P [PLACE] cannot do so by definition in any adult language. However, the semantically similar locational adpositions Japanese *de* (P$_{PLACE}$) and English *at* (P$_{PLACE}$) revealed common error patterns in Experiment II: never fully accepted in directional contexts in any age group, with some young test subjects showing adult-like comprehension, but with sporadic acceptance in directional contexts until age 6 in Japanese and age 7 in English, indicating the feature [LOC] rather than [PLACE] for these subjects at this stage.

The ungrammatical use of Japanese *ni* (P$_{LOC}$) to mark a GROUND which is a place of traversal (THROUGH and ACROSS trajectories) followed a very similar cline to that found in Experiment I, as regards the expression of such trajectories in a single clause: 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. This could be taken to indicate a purely

conceptual development with a reflex in language, but it remains the case that verbs of traversal subcategorize direct objects in Japanese (but not in all languages); this is an aspect of Japanese lexical representations that children have to learn.

The findings in respect of *above* and *below* in English illustrate that the end product of lexical fine-tuning of spatial prepositions may not be the same for all speakers, even in the same speech community. Some may allow *above* and *below* to be used in directional contexts, others only have the strict locational interpretation. This finding should not come as a surprise to lexical semanticists, as predicate-argument structure in other areas of the grammar (e.g. datives, locatives etc.) is said to vary among speakers precisely because of variation in the representations of the predicate.[4]

The English prepositions *in, on* and *underneath* might be other cases of the same phenomenon, but I argue that the differences in judgements derive from difference in register, all being [LOC] in colloquial English. However, although post-judgement comments made by test subjects support this conclusion, the results of *in* and *on* are unclear on the matter. Directional *underneath*, however, was accepted across the board.

The French and Japanese test sentences investigating the combination of a volitional verb, with an Agent controlling the activity, and a non-volition adjunct (e.g. French *descendre la colline en tombant* – go-down the hill P falling – 'fall down the hill') produced results that were somewhat messy and inconclusive, such that this issue is best left for an independent, more targeted investigation.

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[4] Certain verbs of 'force-exertion' (Pinker, 1989: 111) for example, vary across dialect communities in their participation in the dative alternation. 'Push me that wheelbarrow!' which is apparently out in standard American English, can be heard on many a building site in Northern England, indicating incorporation of the semantics of 'transfer' into the LI.

The above findings all relate to lexical variation. However, perhaps the most stimulating conclusion of Experiment I was that all three languages appear to share fundamental aspects of syntax, in terms of categories, computational semantic features, and principles of combination. In a similar vein, Experiment II demonstrated conclusively that the hierarchical internal structure of complex predicates is fixed and inviolable at all tested stages of acquisition. 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*. At least this aspect of syntactic knowledge seems to be present from the beginning, and supports the view of uniform syntax developed in the discussion of Experiment I. The fact that these two experiments were part and parcel of the same investigation made it impossible to formulate hypotheses for Experiment II based on the findings of Experiment I, but several aspects of shared syntax present themselves as topics for future research, one of the most intriguing being whether children consider the internal structural hierarchy of PP, argued for in 6.3 and given in abstract form below, to be similarly inviolable (as suggested, though not proven, by the absence of any violations in the elicited production data).

(8.35) Hypothesized internal structure of PP:

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

Empirical (dis)confirmation of this structure as part of the machinery of Universal Grammar must be left for future investigation, although promising evidence from other languages will be examined in Chapter 11.

The idea that a common syntax might be parameterized has now been abandoned, as discussed in Section 6.10. The French responses to Experiment II confirm this decision beyond reasonable doubt: the 'S-framed' expression of V[MANNER] ^ PP [LOC] is fully grammatical in colloquial French (lexical idiosyncrasies of certain V and PP notwithstanding), so that English and French cannot be formally distinguished in terms of 'S-framed' and 'V-framed' syntax.

On the basis of Experiments I and II, an attempt can now be made to give a more thorough theoretical analysis of both lexical and syntactic issues in the expression of directed motion. In Part III, the terms in which the typology was coined are subject to re-examination, as it is not at all clear a priori that 'path' and 'satellite' have the same (if any) theoretical status in alternative frameworks. The lexical representational formalism employed in the descriptive chapters of Part II is compared to the equally descriptive semantic structure approach, and is given theoretical justification. Finally, a strong version of the Lexicalist Path Hypothesis is adopted: all variation in the expression of directional motion events, both within and between languages, stems from variation in the specifications of LIs. Moreover, as we shall see, fundamental aspects of the *syntax* of motion events need not be acquired at all: rather, they constitute part of Universal Grammar, and may themselves serve to guide the acquisition of the lexicon.