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Spatial Feature Assembly in First and Second Language Acquisition

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Abstract: In recent minimalist approaches to acquisition, there has been an increasing emphasis on the importance of the lexicon in accounts of syntactic variation. This paper extends the view of lexical feature assembly and reassembly articulated by Lardiere into the open-class lexicon and into the realm of motion events. An original L1 experiment reveals that variation in the syntax of motion events within French at all stages of development is of the same ilk as variation across languages, and is illuminated by a feature-based analysis. Implications are drawn out for L2 acquisition, in terms of lexical transfer and feature reassembly.

Keywords: language acquisition, lexical semantics, Minimalist Program, motion events, prepositions, semantic features

1. INTRODUCTION

The emphasis in the Minimalist Program on the importance of lexical features in explaining syntactic variation (Chomsky, 1995; Kayne, 2005) has the potential to contribute significantly to our understanding of how languages vary in their encoding of motion events. The feature-based approach advanced here complements cognitive linguistic work on motion events in that it seeks to answer a different set of questions concerning spatial language. Cognitive linguistic approaches, which predominate in linguistic research on motion events, generally examine how speakers put language to use in given contexts, rather than what speakers know with respect to the possibilities and limitations of their grammar.

Slobin (2004) is quite clear on this point when he states that '... we can build upon [Talmy's] insights in working towards *typologies of language use*' (p. 253, italics in the original). The designs and conclusions of such work speak to issues of cognitive preferences for particular conceptualizations of

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events, rather than what are possible and impossible products of particular grammars. On the other hand, the focus of generative approaches has always been on the nature of the constraints on our creative capacity for language. To this end, the grammaticality of a sequence (i.e., whether it may or may not be generated by the system) is of more import than its frequency, its context, or the reasons for its choice. As such, generative linguistic investigations of motion events have been less concerned with the larger issues of event construal and rhetorical style, and more focused on the narrow issue of what may be legitimately generated by the grammar.[1]

Where languages differ formally in this regard is arguably not in broad generalizations of how they encode motion or location in verbs or adpositions according to 'verb-framed' or 'satellite-framed' perspectives (Slobin, 1996; Talmy, 1985, 1991), but rather in how particular predicates differ in terms of the lexical semantic features they bear. Viewing variation in terms of lexical features requires a reassessment of previous generative research on motion events, which has assumed parametric differences in spatial encoding at the level of language-particular grammars (Afarli, 2007; Inagaki, 2001; Snyder, 2001; Zubizarreta & Oh, 2007). On the other hand, it is commensurate with more recent cognitive semantic and typological work.

Research on motion events conducted within a cognitive linguistic framework, exemplified in the edited volumes by Strömqvist and Verhoeven (2004) and Han and Cadierno (2010), has generally moved away from the notion of a binary typology found in earlier work by Talmy (1991) and Berman and Slobin (1994), which originally inspired generative accounts of formal parameterization. A minimalist feature-based account of variation, while directly contradicting previous parametric accounts, may be seen as complementary to the newer cognitive linguistic perspective of a cline of variation in this domain (as elucidated by Slobin, 2004).

The shift away from a parameter-based account of formal aspects of variation brings research on spatial language in line with the general perspective on feature-based acquisition advanced by Lardiere (2000, 2008, 2009). On this approach, acquisition is understood in terms of feature assembly, and in the case of second language acquisition, in terms of feature reassembly. In pursuing this type of analysis, much of what constitutes spatial cognition is outside the scope of inquiry. Just as other perceptual domains such as color, temperature and smell appear to have no grammatical reflexes, much visuospatial information is invisible to syntax. As Jackendoff (1990, pp. 34, 88–89) has pointed out, the differences in spatial trajectories encoded in verbs with

[1] As Chomsky (1957: 13) stated: 'The fundamental aim in the linguistic analysis of a language L is to separate the *grammatical* sequences which are the sentences of L from the *ungrammatical* sentences which are not the sentences of L and to study the structure of the grammatical sequences. The grammar of L will thus be a device that generates all of the grammatical sequences of L and none of the ungrammatical ones.'

identical syntactic properties such as *throw*, *toss* and *lob* are best understood as being outside of the language faculty proper. Of principal concern are those aspects of spatial cognition that may be grammaticalized as lexical features with relevance for syntactic interaction.

An approach to the semantics of motion events in terms of features is of course contentious given the checkered history of semantic features in syntax since Katz and Fodor (1963), but refinements in theories of lexical semantics make for an elegant feature-based solution to linguistic representation in this domain, with insights to be gleaned into the workings of both first language (L1) and second language (L2) acquisition. In the following section, theoretical background is provided for this general perspective, which is then extended to motion events in particular.

With the relevant assumptions in place, experimental data from a comparative L1 acquisition project are discussed with particular reference to French, which contradict the notion that a language must belong to one of two types in terms of its encoding of motion events. These data support a feature-based analysis, with lexical variation in the same language being of the same ilk as variation across languages. As an addendum to this investigation, implications for second language acquisition are drawn out, involving very different predictions for patterns of L2 acquisition than previous accounts that have postulated parameter settings at the whole language level. It is argued that both in L1 and L2 research on motion events, the parameter-setting model should be abandoned in favor of a model of feature assembly.

2. SEMANTIC FEATURES AND SYNTACTIC VARIATION

In minimalist theory, syntactic, phonological and semantic features constitute the grammatically relevant elements within lexical items, and it is the presence or absence of such features that accounts for language variation, as parametric differences between languages are associated with features on heads (Chomsky, 1995; Hegarty, 2005; Travis, 2008). This recent focus on features can be seen as the logical endpoint of a gradual development in Principles and Parameters theory (Chomsky, 1981), as principles were narrowed further and further in scope in order to account for the richness of natural language data, and as predictions based on supposed parametric clusters of phenomena were not borne out in acquisition research (Guasti, 2002; Kayne, 2005). The general pattern of development has been from the notion of macro-parameters, applied at the level of whole languages, to micro-parameters, applied differentially across dialects, word classes, or even individual lexical items, resulting in an approach to language variation that is essentially lexicalist in nature.

The relevance of this theoretically significant shift in emphasis to the field of L2 acquisition is particularly well-articulated by Lardiere (2009). She discusses Kayne's (2005) observation that the English adverb *enough* follows adjectives (unlike *so*, *too, how*, etc.), whereas the 'equivalent' French

adverb *assez* precedes adjectives just like the others in the set; Kayne (2005, p. 5) notes that if the adverb *enough* has some feature that causes movement of the adjective to the left, this constitutes 'a reasonable enough parameter'. Lardiere (2009) maintains, reasonably enough, that the introduction of new microparameters to explain the difference in behavior of particular lexical items robs the idea of parameters of its original predictive power. The updated notion of this term is of little use either to the researcher searching for generalizations or to the language learner faced with the immensity of the task of acquisition.

A more profitable line of investigation might be to seek to understand the nature of the constrained set of cognitive categories that are grammaticalized as features, and examine the principles by which they are assembled on lexical heads and interact with other elements in syntax. Much of the discussion concerning issues of representation and learnability has revolved around uninterpretable syntactic features, on the assumption that the most important differences between languages are in functional domains such as tense and aspect, or determiners and plurality. Although less attention has been paid to variation in the open-class lexicon, it is clear from work by Levin (1993), Jackendoff (1990), Pinker (1989), and others that initial syntactic representations are determined in large part by the lexical semantics of predicates, which are subject to considerable cross-linguistic variation. In line with the minimalist approach to lexical features, and in an extension of work by Emonds (1991, 2000), I argue that much of the variation in the syntax of motion events stems from the various ways in which grammatically relevant semantic features are assembled on lexical heads.

Feature-based approaches to argument structure remain anathema to many who specialize in lexical semantics, as more elaborate semantics structures have been argued to provide a more fine-grained and predictive account of the way the meaning of words determines initial syntactic representations (Jackendoff, 1990; Juffs, 1996; Levin & Rappaport Hovav, 2005; Pinker, 1989). However, an 'X-bar syntax' and 'X-bar semantics' running in parallel involve significant redundancy, and considerations of economy make it desirable to unite aspects of the two systems. Thus, while Jackendoff (1990) or Pinker (1989) might represent the causation of a change of state with a causation tier above an inchoative tier in semantic structure (simplified as [$_{\text{EVENT}}$ CAUSE [$_{\text{EVENT}}$ GO$_{\text{ident}}$ [$_{\text{PATH}}$ TO [$_{\text{PLACE}}$ AT [$_{\text{PROPERTY}}$ x]]]]], or [ACT(+effect) [GO [STATE]]], or some variant thereof), Hale and Keyser (1993) explicitly associate the layers of causation and change-of-state with a layered VP in syntax ([vP [VP]]), an account that is now widely accepted and presumed to hold in syntax irrespective of the validity of semantic structure theory.

In the same vein, it might be argued that other grammatically relevant aspects of semantic structures can be reconceptualized as part of the syntactic system. To date, one of the most thorough attempts to integrate lexical syntactic and lexical semantic information has been in the work of Emonds (1991, 2000). In order to illustrate the viability of such as feature-based system,

I now briefly summarize his treatment of one of the most studied complex semantic structures—that of the locative alternation—before applying this general approach to the specifics of the semantics of directed motion events.

In Pinker's (1989) variation on semantic structure theory, a verb such as *smear* has two linked lexical entries corresponding to the argument structures in sentences like *Sally smeared honey onto the bread* and *Sally smeared the bread with honey*. Complex semantic structures are generated for these variants, which may be paraphrased as (i) 'Sally acted on a semisolid, 3-dimensional substance, namely honey, causing it to go to, against and along a 2-dimensional solid, namely bread, in a 'smearing' manner and (ii) 'Sally acted on a 2-dimensional solid, namely bread, causing it to attain a property ('smeared'), by means of the event paraphrased in (i). In both variants, *honey* is the Figure and the *bread* is the Ground (the Figure by definition being the object moved or located in relation to a reference object, the Ground). In the first, the Figure is the direct object, and in the second, this role is played by the Ground.

In Pinker's (1989) representations, Figure and Ground interpretation falls out of the semantic structure, as the former is the entity of which the Path is predicated, and the latter the entity of which the Change-of-State is predicated. Emonds (1991, 2000) derives such interpretations using only interpretable features and general principles of syntactic interpretation. The simplicity of Emonds' representations is in stark contrast to such elaborate semantic structures, yet they are sufficient to generate the appropriate argument structures. Below are representations adapted from Emonds (1991, 2000) for the verbs *fill, pour* and *smear*.

(1) a. *fill* <V, [+LOC], __D, P[-LOC]>
b. *pour* <V, [+MANNER], __D, P[+LOC]>
c. *smear* <V, [+MANNER], (+LOC), __D, P (+LOC)>

On this account, the general spatial feature LOCATION (LOC) plays a crucial role in the identification of the Ground. The Ground object is specified not in terms of any inherent features (any DP can play this role), but through a general principle of interpretation. The principle of Ground Specification states that an object is interpreted as a Ground only if the predicate (either V or P) carries the LOC feature (Emonds, 2000, p. 63). For example, the verb *fill* invariably has LOC as an inherent feature, and obligatorily selects a Ground as direct object, e.g.,

(2) a. The girl [$_{V,LOC}$ filled] the glass [$_{P}$ with] juice;
b. *The girl filled juice into the glass.

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

(3) a. The girl [$_{V}$ poured] juice [$_{P,LOC}$ into] the glass
b. *The girl poured the glass with juice.

The principle of Ground specification can also be seen at work in the locative alternation. *Smear* is specified as a verb which may optionally carry the LOC feature, and which selects a preposition (projecting PP), which in turn may also optionally carry this feature. It is elsewhere specified as an extra-lexical principle that LOC may be carried *either* on V *or* on P, but not on both. Thus if the verb carries the feature, then the preposition does not, e.g.,

(4) Sally [$_{V,LOC}$ smeared] the bread [$_{P}$ with] honey.

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

(5) Sally [$_{V}$ smeared] honey [$_{P,LOC}$ onto] the bread.

In comparison with Pinker's (1989) lexical entries, Emonds' (1991, 2000) representations may seem somewhat underspecified. For example, there is a complicated semantic substructure for the PATH in the locational event paraphrased above as "to, against and along a 2-dimensional solid," which has no parallel in Emonds' representations. However, two points can be made with respect to this underspecification. First, underdetermination is a positive aspect of the feature-based approach, as it allows for the proper integration of individual context into specific meanings (a concern given detailed expression in Pustejovsky, 1995).[2]

Second, the fundamentals of Emonds' lexical entry for *smear* can remain intact as long as the locative P selected by V has an additional interpretable feature such as CONTACT (e.g. *on*, *onto*, *along*, *against*) which would be enough to accurately characterize selectional restrictions. Another possible example of necessary specification present in Pinker's system but absent in Emonds' is the substructure indicating the Change-of-State of the bread. A more parsimonious solution might be to invoke a general principle stating that all direct objects are affected by inherent properties of the verb that selects them: Gropen et al.'s (1991) 'Principle of Object Affectedness' is a suitable candidate. The system of combination of lexical semantic elements is thus syntax itself, with residual aspects of meaning derived from general interpretive principles.

3. SPATIAL FEATURES IN MOTION EVENTS: PRINCIPLES WITHOUT PARAMETERS

The computational semantic features generally considered relevant to motion events include: MOTION, MANNER, LOC, PATH, and PLACE (for discussion see Jackendoff, 1990; Pinker, 1989; Talmy, 1985). On the account

[2]Thanks to an anonymous reviewer for highlighting this issue.

assumed here, LOC is a general spatial feature, as discussed above, subsuming the more specific categories of PATH (directed motion of the moving object) and PLACE (location of the event/state). Prepositions may carry either the general spatial feature LOC, as in (6), in which case locational or directional interpretation depends in part upon the verb, or they may carry the specific features PATH (7) or PLACE (8).

(6) a. *in*, P [LOC]
b. The fish wriggled in the pool. (P, LOC → PLACE / *PATH)
c. The fish went in the pool. (P, LOC → *PLACE / PATH)
(7) a. *to*, P [PATH]
b. The fish wriggled to the pool. (P, PATH)
c. The fish went to the pool. (P, PATH)
(8) a. *at*, P [PLACE]
b. The fish wriggled at the pool. (P, PLACE)
c. *The fish went at the pool. (P, PLACE)

Verbs that merge with PPs often specify whether the head P is locational or directional. For example, the verb *dart* selects an obligatory PATH complement, while the verb *fidget* cannot do so, although it may take a locational adjunct.

(9) The chipmunk darted {into / out of / away from / *near / *beside / *within} the hole.
(10) The chipmunk fidgeted {*into / *out of / *away from / near / beside / within} the hole.

Given the impressive body of research devoted to the typological differences in the expression of motion events across languages, one might assume that this is one area in which a syntactic parametric difference is to be found. Proposals for a more general, syntactic constraint generally build upon Talmy's (1985, 1991) observation that 'V(verb)-framed' languages, such as those in the Romance, Altaic, Semitic and Polynesian families, usually encode PATH in V, while 'S(atellite)-framed' languages, such as those in the Indo-European family (apart from Romance), usually do so in adpositions, affixes or particles, here all considered to be instances of the category P. This distinction is exemplified next in the verb-framed French example and its satellite-framed English translation.

(11) Les enfants sont rentrés dans l'école en courant. (V, PATH / P, LOC)
the children AUX entered in the school by running
'The children ran into the school.' (V, MANNER / P, PATH)

Several researchers have proposed that Talmy's binary typology might be stated formally in terms of a syntactic operation that languages either permit or disallow, e.g. Levin and Rapoport's (1988) principle of 'lexical subordination'; Jackendoff's (1990) GO-adjunct rule; Snyder's (1995) null telic morpheme, linked to a more general Compound Parameter, and Inagaki's (2001) parameterized PATH conflation. In one recent proposal, Zubizarreta and Oh (2007) suggest that Germanic and Romance are indeed "fundamentally different" (p. 127) from each other in this regard, and argue, in an extension of the Compound Parameter, that Germanic patterns with serial verb languages, such that directional Manner verbs are actually serial verb constructions with an (invisible) light verb.

As such, Germanic permits verbal compounds allowing for S-framed conflation patterns while Romance does not. The present goal is not to dissect these particular accounts of how languages supposedly divide into two types with regard to the syntax of motion. Irrespective of the particular proposal, for such accounts to hold it must be the case that the language 'as a whole' conforms to V-framed or S-framed grammar. However, it is maintained here that all languages allow both V-framed and S-framed syntax, the differences being only in terms of the frequencies of verbs and adpositions carrying the relevant features. As an example, let us consider the case of French.

Zubizarreta and Oh (2007) maintain that French is a good example of a V-framed language, stating that the merging a Manner V with PP on a directional interpretation in this language is 'quasi-nonexistent' (p. 2), 'except for some rare cases' (p. 167). However, in contrast to this claim, close inspection of the French lexicon reveals that whether a Manner V may be merged with a PP on a directional interpretation depends on what features are instantiated on the particular Manner V, what features are realized on the particular P, and how these interact when merged in syntax. For example, French Manner V may be divided into two general types: Path-incorporating (e.g., *courir* 'run', *glisser* 'slide', *nager* 'swim', *rouler* 'roll', *sauter* 'jump', *tomber* 'fall'), and non-Path-incorporating (e.g. *boiter* 'limp', *chanceler* 'wobble', *danser* 'dance', *gigoter* 'wriggle', *marcher* 'walk', *ramper* 'crawl'). Only the former, not the latter may merge with a P carrying the feature LOC on a directional interpretation, as shown below.

(12) Gildas a {couru / nagé / glissé / *boité / *dansé / *rampé} à la plage.
Gildas AUX {ran / swam / slid / limped / danced / crawled} P[LOC] the beach.
Gildas {ran / swam / slid / limped / danced / crawled} to the beach.'

This distinction between Path-incorporating and non-Path-incorporating verbs is not explanatory with respect to the observed patterns, as it is circular: such verbs are identified precisely by their environments. However, it remains a descriptive generalization which appears to apply crosslinguis-

tically. A question for further research is why analogous verbs may be classified differently in different languages. For example, while the same general classification obtains in Italian (Folli, 2001; Zubizarreta & Oh, 2007), certain 'equivalents' behave differently. According to Folli (2001), the Itailian analogues of 'swim' cannot take directional PPs, while 'crawl' and 'hop' can take directional PPs (all in contrast to French).

On the PP side of the combination, French spatial prepositions carry two of the three features discussed earlier (no preposition carries the PLACE feature in this language). For example, *à* 'at/to' is a P [LOC]: it has the feature LOC, allowing either locational or directional interpretation depending on the verb. In contrast, *vers* 'towards' is a P [PATH]: it carries the PATH feature and disallows strict locational interpretation. If a non-Path-incorporating Manner V merges with a P [LOC], as in (13), no directional interpretation is possible. However, if the same verb merges with a P [PATH], as in (14), the directional interpretation is again possible.

(13) *Le sauveteur a dansé à la plage.
The lifeguard AUX danced P[LOC] the beach.
'The lifeguard danced to the beach.'
(*on a directional interpretation. OK on the locational adjunct reading: 'at the beach')

(14) Le sauveteur a dansé vers la plage.
The lifeguard AUX danced towards the beach.
The lifeguard danced towards the beach.

That French is a V-framed language in Talmy's (1985, 1991) original sense is not challenged by these data, as the original typological claim was stated in terms of general frequencies and 'characteristic' expression (Talmy, 1985, p. 62). Whether or not such combinatorial possibilities are used in speech depends on a range of factors. Crosslinguistically, some languages may have more verbs that inherently carry the feature LOC (English *cross*, French *descendre* 'go down'), and some may have more prepositions that do so (English *in*, French *sous* 'under'). Some languages may have more Path-incorporating verbs (English *run*, French *sauter* 'jump'), and some may have particular prepositions carrying a PATH feature allowing them to merge with non-Path-incorporating verbs (English *to*, French *vers* 'towards').

This view is commensurate with that expressed by Beavers, Levin and Tham (2010), who argue that the syntax of motion events in a particular language is determined by motion-independent grammatical resources in the language: syntactic (serialization, adjunction, subordination), morphological (case, affixation possibilities), and lexical (location and result adpositions, event delimiters, particles, compounding). One important lexical factor is the existence of Path verbs that can express trajectories more succinctly. Thus when expressing the crossing of a road, speakers can choose between the phrase *traverser la rue* 'cross the road', using a single verb to express

the spatial trajectory (henceforth a 'geometric Path verb') and the more periphrastic *aller de l'autre côté de la rue* 'go P [LOC] the-other side of the road', using a deictic Path verb without any geometric information, such that the trajectory is encoded entirely in the PP.

Another related factor is the existence of lexical gaps. For example, there is no French verb 'to go under,' so when translating Japanese verbs such as *kuguru* 'go under and out the other side' or *moguru* 'go under and stay there,' French must resort to expressing the 'under' part of the trajectory in the PP (in the first case, *passer en dessous* 'pass P [LOC] underneath,' and in the second case, *aller en dessous* 'go P [LOC] underneath'). Thus where the lexical gap is a verb, French will translate verb-framed expressions with satellite-framed grammar. But despite important differences in lexical frequencies, giving rise to typologies of characteristic use, combinations of such elements respect universal syntactic principles.

Such variation in syntactic possibilities in a single language renders unlikely a formalization of Talmy's typology in terms of syntactic parameterization at the whole-language level along the lines of Zubizarreta and Oh (2007). However, the above argumentation depends on an acceptance of these types of combination in colloquial speech. The strong tradition of prescriptive grammar in France occasionally results in researchers rejecting (based on either intuition or the judgments of informants) combinations that are well-attested in daily language. The reality of such forms in French will be made apparent in the discussion of elicited production data in the following section.

4. SPATIAL FEATURES IN L1 ACQUISITION: THE CASE OF FRENCH

A series of experiments was designed to test between parametric accounts of Talmy's typology of the type discussed above (e.g., Levin & Rapoport, 1988; Jackendoff, 1990; Snyder, 1995; Inagaki, 2001; Zubizarreta & Oh, 2007), and an alternative lexicalist approach, in which all relevant aspects of Path predication are determined at the level of individual lexical items. It was unclear in advance of the experimentation whether children might all begin with a default lexicalization type, as tentatively suggested by Clark (1985), only later setting the target parameter, whether they would rigidly produce only the target type, or whether they would allow both V- and S-framed syntax. Moreover, given anecdotal reports of variation, it was unclear whether adults would perform quite as predicted. In previous work, I discussed findings from monolingual children and adult speakers of Japanese and English: even as strong examples of V-framed and S-framed languages respectively, both permit lexicalization patterns of the opposite type, which are in evidence throughout the process of L1 acquisition and in the adult grammar, and there was no evidence of any parameter-setting (Stringer, 2005,

2007). Drawing on data from the same series of experiments, the focus here is on French, which rather than being a good example of either type, is revealed to be a language which very clearly exhibits both V-framed and S-framed grammar as a function of the patterns of feature assembly on particular lexical items.

4.1. Participants and Location

There were 31 French participants, divided into 2 child age groups, in order to track any possible developmental patterns in terms of parameter-setting, and an adult control group. A pilot study indicated that 3;0 was the youngest age for successful participation. Group 1 consisted of 10 younger children aged 3;1 to 4;8 (mean: 3;11); Group 2 consisted of 14 younger children aged 5;0-7;8 (mean: 6;6), and Group 3 served as the adult control group, with 7 participants aged 25–61 years (mean: 39). The children were tested at school in a quiet room in the presence of the experimenter and one school teacher. The teacher provided encouragement when necessary, while respecting the prompting system of the experimenter. All participation was voluntary; the few who did not wish to speak played with toys the experimenter had brought along, and were not included in the study. Adults were tested in their home with just the experimenter present. All participants were residents of Brittany, France, and all were monolingual.

4.2. Materials and Protocol

Utterances with directional predicates were elicited using a purpose-designed picture-book, illustrating events in a narrative with both Manner and Path. The book contained a sequence of twenty scenes, four of which were included for narrative coherence, and sixteen of which were relevant to the analysis. The narrative followed a monkey as he moved through several different spatial environments. In the opening scene, he is sitting in his tree-house about to eat a banana; a parrot steals the banana and flies off, whereupon the monkey gives chase. In each scene relevant to the analysis, he follows a particular trajectory (e.g. ,'down,' 'under,' 'over,' etc.), varying with the obstacles he encounters, and he exhibits a particular manner of motion (e.g., he 'slides' down a tree-trunk, 'runs' under a bridge, 'jumps' over a rock, etc.). The monkey follows the parrot into a cave, where they encounter a lion. The lion chases them out of the cave, after which the parrot drops the banana and flies away. The monkey recovers it, then hurries home, going through all the motions a second time, before eating his banana. Examples of pictorial stimuli are given in the appendix.[3]

[3]The complete series of stimuli is available for download from the author's professional webpage: http://www.indiana.edu/~dsls/faculty/stringer.shtml

The experiment made use of a simple elicitation procedure. If subjects did not describe the Path followed by the monkey, but rather described the Manner ('he jumps') or commented on the monkey's emotions ('he's very cross'), a prompting strategy was adopted to elicit appropriate responses; no directional predicates of any type were used in the prompts.[4] This technique differed from much previous research on motion events which has focused on narrative strategies (e.g., the papers in Berman & Slobin, 1994; Strömqvist & Verhoeven, 2004). Such a prompting technique would be inappropriate for narrative research because of frequent interruptions in the storytelling. 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.

5. RESULTS AND ANALYSIS

A total of 524 examples of Path predication were elicited from the French participants: 407 were produced by the children, and 117 by the adults. These were analyzed in terms of three general categories: expression of Path (i) only in V [PATH] (subsuming intransitive V, transitive V, and conflation of both Path and Manner in V); (ii) in both V [PATH] and PP [PATH]; and (iii) only in PP [PATH]. Examples of the first type include (15) and (16); the second type is seen in (17) and (18).

(15) il monte (3-year-old)
he goes-up
'He goes up.'

(16) il monte la colline (5-year-old)
he goes-up the hill
'He goes up the hill.'

(17) il rentre dedans (4-year-old)
he enters inside
'He goes in.'

(18) là il passe sous un pont (3-year-old)
there he goes-via under a bridge
'There, he goes under a bridge (and out the other side).'

[4]Sample prompts for scene involving sliding down a diagonally positioned tree trunk: (1) *Regarde, le perroquet s'envole. Qu'est-ce qu'il fait le petit singe?* 'Look, the parrot is flying away. What does the little monkey do?'; (2) *[il glisse]: Oui, il glisse . . . ou?* '[he slides]: Yes, he slides . . . where?; (3) *[il descend]: Oui. Comment il descend?* '[he goes down]: Yes. How does he go down?; (4) *Il commence ici, en haut de l'arbre, et il finit ici, en bas de l'arbre. Alors qu'est-ce qu'il fait?* 'He starts here, at the top of the tree, and he ends up here, at the bottom of the tree. So what does he do?'

It is the third type that is the focus of the present analysis, as it is this configuration that is allegedly not possible in French (Zubizarreta & Oh, 2007). Cases of inherent P [PATH] and cases of P [LOC → PATH] with Manner verbs were conflated, as both involve satellite-framed grammar in the relevant sense. The pattern of trajectories being expressed *only* in PP [PATH] may be observed in the following examples, two from each age group.

(19) il saute par dessus le rocher (3-year-old)
he jumps VIA above the rock
'He jumps over the rock.'

(20) il court en dessous le pont (4 year-old)
he runs P[LOC] underneath the bridge
'He runs under the bridge.'

(21) il est en train de grimper dans sa maison (5-year-old)
he is in process of climb in his house
'Now he's climbing into his house' [context: tree house]

(22) il nage de l'autre côté (7-year-old)
he swims P[LOC] the other side
'He swims across.'

(23) il a roulé en bas de la montagne (adult)
he AUX rolled P[LOC] bottom of the mountain
'He rolled down the mountain.'

(24) il court sous le pont (adult)
he runs under the bridge
'He runs under the bridge.'[5]

The results show that Group 1 (aged 3–4) expressed trajectories only in PP [PATH] 31.50% of the time ($SD = 9.29\%$, 95% CI = 25.74 to 37.25); Group 2 (aged 5–7) did so 31.57% of the time ($SD = 14.37$, 95% CI = 24.04 to 39.10); and Group 3 (adults) did so 17.99% of the time ($SD = 6.10$, 95% CI = 13.45–22.51), as shown in Figure 1. A one-way ANOVA revealed a significant difference between the adults and children, $F(2, 28) = 3.34$, $MSE = 131.65$, $p = .035$. The confidence intervals show that there is not a significant difference between the two groups of children. In addition, pairwise comparisons were obtained by means of Tukey tests, which showed that that Groups 2 and 3 were significantly different from each other ($p = .042$), but Groups 1 and 3 were only marginally different

[5]Note that the data in (19-24) call into question a widely accepted constraint in V-framed languages, namely that Manner V may merge with unbounded, but not bounded Paths (Aske, 1989; Slobin & Hoiting, 1994). In contrast to my earlier argumentation for this analysis (Stringer, 2002), data from both children and adults appear to disconfirm the prediction, both in French and in Japanese (Stringer, 2005, 2007).

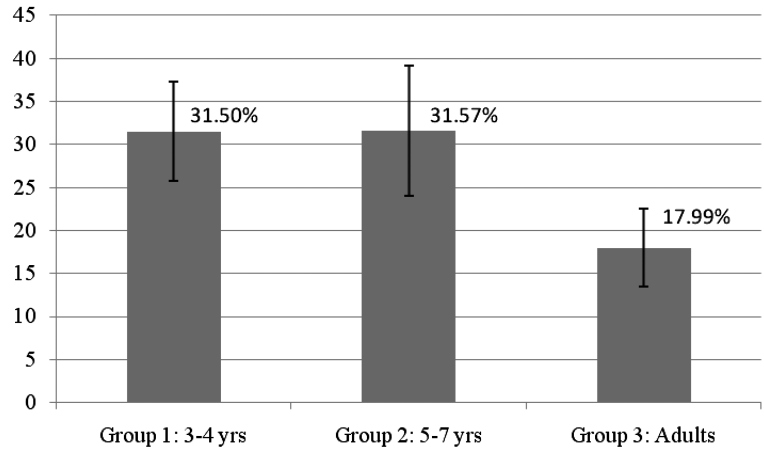

Figure 1. Means for each age group of instances of PP [PATH] in the absence of geometric V [PATH], over the number of instances of PATH predication.

($p = .06$). Again, there was no difference between the two groups of children. Of most importance to the argumentation of this study, however, is that all 3 age groups have rates significantly greater than 0, which would be the expected proportion on the assumption that such forms are essentially nonexistent.

The proportions reported in Figure 1 are the means based on a subject level analysis rather than a token level analysis, so as to give equal weight to the individuals in each group. The proportions based on a token level analysis, together with raw scores, are as follows: Group 1, 31.36% (53/169); Group 2, 32.5% (78/240); Group 3, 17.94% (21/117). It is noteworthy that the adults produced a lower number of such utterances. In follow-up interviews with all seven of the adult participants, the adults were asked to comment qualitatively on samples of child utterances for each combination of Manner and Path. As expected, there were nonadult-like forms in the child utterances, such as lexical errors with prepositions (25) and verbs (26).

(25) il saute à l'autre côté du rocher (7-year-old)
he jumps P[LOC] the other side of-the rock
'He jumps over the rock'
(*à* → *de* in adult French)

(26) il reva dans sa maison (6-year-old)
he re-goes in his house
'He goes back into his house'
(*reva* 're-goes' → *rentre* 're-enter /go back' in adult French)

However, the adults judged the children's utterances to be acceptable in the relevant respect: that is, in terms of V [MANNER] combining with PP

[PATH]. Thus the adult-child difference is likely to be one of style rather than grammar, the adults adopting a more formal register and adhering to more prescriptive standards under the same experimental conditions. Despite the significant difference in stylistic preference, there appears to be continuity between children and adults in terms of what constitutes a possible expression, which is the issue at stake. Recall that the adults themselves used such configurations in almost one fifth of their utterances.

As indicated by the standard deviations reported above, there was considerable variation in individual responses. The individuals with the highest proportions of PP [PATH] in the absence of geometric V [PATH] were one 5-year-old and a 7-year-old both at 50%, and one 3-year-old at 44.4%; those with the lowest were one 5-year-old at 0%, and one 6-year-old and an adult both at 11.8%. In sum, the expression of trajectory by means of satellite-framed grammar occurred in 32.19% (131/407) of all French child utterances, 17.94 % (21/117) of adult utterances, and up to 50% in individual subject responses. Indeed, these figures emerged despite the fact that several MANNER verbs were excluded, being coded as [PATH, MANNER] and counted as geometric Path predicates (e.g., those Manner verbs that always necessarily entail downward motion in French, such as *plonger* 'dive', *dégringoler* 'tumble-down, *dévaler* 'hurtle-down', and *tomber* 'fall').

When the French results were compared as a whole with the results of previously reported experiments with English and Japanese participants in the same age ranges, so as to derive a general comparison between languages, confidence intervals on the means were non-overlapping (13.8% $\pm$ 3% for Japanese; 29% $\pm$ 3.9% for French; and 92.6% $\pm$ 2.2% for English, calculated using the method of Agresti & Coull, 1998), making it difficult to characterize French as either a Japanese-type or as an English-type language in this respect. The proportions of use, of course, are not really at issue for present purposes, as the question is whether or not such forms are a possible product of the grammar or not.

In contrast to Zubizarreta and Oh's (2007) characterization of French as a strictly verb-framed language, these results support an analysis in which variation in this domain is tied to the presence or absence of spatial features on particular lexical items, and bolster the claims in Stringer (2005, 2007) that such variation is to be expected cross-linguistically. In any language, any Manner V can merge with an inherently directional P, such as French *danser vers* 'dance towards'. Similarly, in any language, Path-incorporating Manner V such as French *courir* 'run,' *nager* 'swim', and *rouler* 'roll' may merge with general locative P (P [LOC]) with a directional interpretation. These principles of syntactic combination appear to be universal and in play from the onset of language development. In the French data, legitimate combinations were found through the age range tested, and illicit combinations (e.g., non-Path-incorporating V with P [LOC]) were unattested, suggesting continuity of knowledge in acquisition.

6. IMPLICATIONS FOR L2 RESEARCH

Given this feature-assembly account of the syntax of motion events in L1 acquisition, a brief note can be made on implications for generative L2 research in this domain. Whereas cognitive linguistic work on motion events (e.g., Cadierno & Robinson, 2009; Cadierno & Ruiz, 2006) points to difficulties in restructuring L1 thinking-for-speaking patterns, several generative researchers have gone further (and arguably too far) in suggesting that aspects of L2 argument structure may be impossible to acquire (Bley-Vroman & Yoshinaga, 1992; Bley-Vroman and Joo, 2001; Inagaki, 2001). Such proposals of an impasse in acquisition are tied to the kind of macro-parametric accounts of grammar that are eschewed on a feature-based approach. In the most influential generative L2 study of Talmy's typology, Inagaki (2001) argues that English allows both S-framed and V-framed grammar, while Japanese strictly allows only V-framed grammar, thus instantiating a subset problem of learnability. On this account, English learners of Japanese will allow sentences such as (27), and will never be exposed to positive evidence that could force them to restructure the grammar (see White, 2003, pp. 212–218 for discussion).

(27) *John ga gakko ni aruita.
John NOM school P[LOC] walked
'John walked to school.'

However, if the feature-based approach advocated here is correct, the implications point to a learnability problem of a very different nature. The French data show clearly that language-wide parameter settings cannot capture crosslinguistic variation in this domain. What these English-speaking learners of Japanese must come to know is not the simple setting of a parametric switch for the whole language, but the particular lexical semantics of all the verbs, adpositions and locative nouns that might be combined in the expression of motion events. As argued in Stringer (2007), L2 acceptance of sentences such as (27) may be indicative of a general process of *lexical* transfer, more detailed theoretical accounts of which are given in Sprouse (2006) and Stringer (2010). Learners assume that *aruku* exactly corresponds to English 'walk', and that *ni* exactly corresponds to English 'to'.

This is false in both cases. English *walk* is Path-incorporating <V, [MANNER] __ (PATH)>, and English *to* is inherently directional <P, [PATH]>, while Japanese *aruku* is non-Path incorporating <V, [MANNER]>, and *ni* is a general locative <P[LOC]> which is only directional when selected by particular verbs. As previously shown in example (6b), a non-Path-incorporating Manner V cannot merge with a P [LOC] on a directional interpretation. An alternative explanation for L2 acceptance of sentences like (27) may reside in patterns in the input. As we have seen, not all Manner V are

of the same type, so learners might be overgeneralizing based on those Manner V in the input which do legitimately combine with locative PPs on a directional interpretation. In the Japanese data reported in Stringer (2005, 2007), 68 combinations of this type were attested in production by monolingual speakers. Such verbs in Japanese include *hashiru* 'run', *oyogu* 'swim', *tobu* 'fly', as well as *korogaru* 'roll' in the example here.

(28) *yama no ue kara korogatta* (6-year-old)
mountain GEN top from rolled
'He rolled from the top of the mountain.'

Thus learners must acquire the knowledge that while Japanese verbs such as *korogaru* 'roll' and *suberu* 'slide', just like their English counterparts, have the inherent feature specification <V, [MANNER], __ (PATH)>, verbs such as *aruku* 'walk' and *hau* 'crawl' are non-Path-incorporating: <V, [MOTION], [MANNER]>. Moreover, they must learn that the postposition *ni* in (27) is a general locative adposition with the feature P [LOC]; while it is used to translate both English at <P [PLACE]> and to <P [PATH]>, it does not share their feature specification. Semantic features must be reassembled before learners understand how adpositions may be legitimately combined with different types of verbs (cf. examples 6–8). Two general implications of the feature-assembly approach for L2 acquisition are as follows: (i) the syntax of motion events is tied to acquisition of the lexicon; as such, mastery of these forms is likely to take many years; (ii) there is no formal parameter involved, and therefore no subset problem; contrary to previous claims, it should be possible for learners to fine-tune the meaning of L2 lexical items and successfully converge on the syntax of motion events in a new language.

7. CONCLUSION

The increasing emphasis on the role of lexical features in minimalist accounts of syntactic variation, as elucidated by Lardiere (2009), makes possible a refreshing reanalysis of L1 and L2 acquisition of the syntax of motion events. The extension of this approach into the open-class lexicon in general and the realm of motion events in particular complements cognitive linguistic work in providing a formal account of which forms are possible and impossible in languages, without predicting the frequencies of particular event construals. It stands in contrast to parametric accounts that attempt to formally determine the difference between verb-framed and satellite-framed grammar at the level of whole languages.

Despite the claim made by Zubizarreta and Oh (2007) that French is a paradigm example of a V-framed language, in which the expression of

PATH only in PP is 'quasi-nonexistent' (p. 2), the French elicited production data reported here revealed satellite-framed grammar in 29% (152/524) of instances of Path predication, and in as many as 50% of utterances by individual subjects, with such forms in evidence throughout the age ranges tested. Variation was shown to be dependent on how particular spatial features are assembled on predicative heads in syntax, with the implication that both L1 and L2 development in this domain are not linked to the instantiation of macro-parameters, but to the learning of the lexicon. On this account, the acquisition of spatial predicates involves the assembly of lexical features drawn from a universal inventory, the conflation patterns of which determine combinatorial possibilities. Such possibilities appear to be part of children's linguistic knowledge from the earliest stages of production.

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APPENDIX

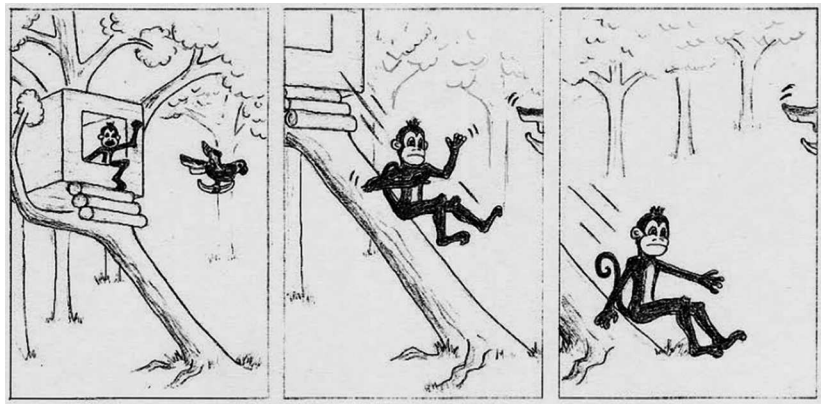

Figure A1. *Monkey Book*, Page 2: The tree-slide scene.

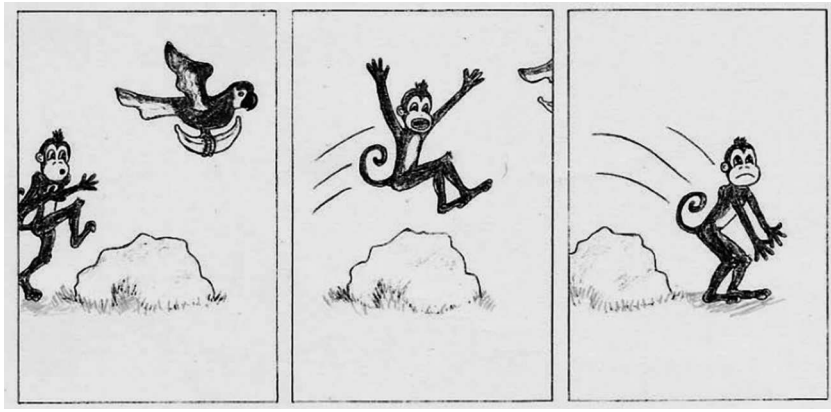

Figure A2. *Monkey Book*, Page 4: The rock scene.

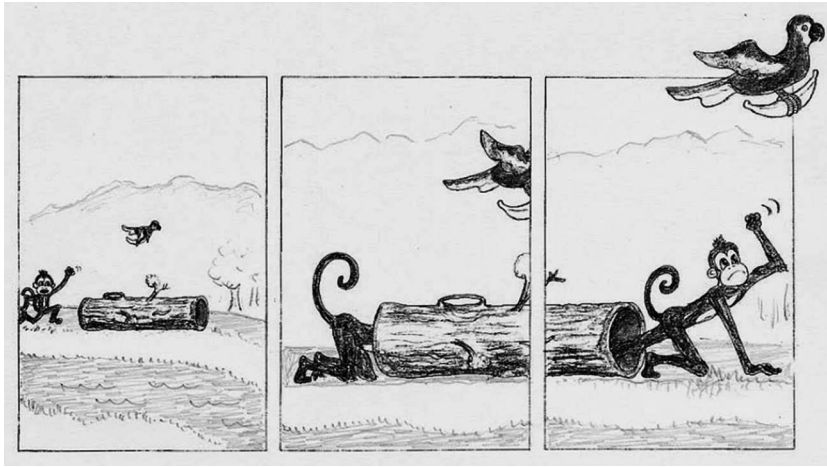

Figure A3. *Monkey Book*, Page 5: First hollow trunk scene.