Spatial encoding in English and French:
Typological constraints on second language acquisition and aphasia

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Abstract: Languages show differences in how they encode motion in discourse: V-framed languages lexicalize Path in the verb, leaving Manner peripheral or implicit; S-framed languages lexicalize Manner together with Path adjuncts. The present study investigates the extent to which such typological constraints affect second language learners’ verbalizations (English learners of French) and aphasic speakers’ symptomatology (English and French agrammatics) - who typically show dissociations between lexical and syntactic knowledge - in comparison to controls (English and French native speakers), as well as the relative role of language-independent factors (level of acquisition/syndromes) involved. Despite some similarities between learners and speakers with aphasia due to language-independent factors, the findings suggest typologically constrained verbalizations in all groups as well as diverging strategies that reflect distinct underlying conceptualization processes.

Key words: spatial language, second language acquisition, agrammatism, typological constraints, compensatory (language-specific/language-independent) strategies

1. Introduction
Spatial language is fundamental to every aspect of human life. We use spatial language to localize objects in a house, to perform a displacement, to find one’s way across town, to find information in a map, to give directions, or even to imagine scenes in a dream while sleeping (Levinson, 2003). Given this universal importance of space, spatial cognition has traditionally been viewed as independent, intuitive and universal to all humans (Chomsky, 1965), and this general preconception has led some researchers to consider variations in spatial language and its links to cognition as impossible (Morton, 1979; Fodor, 1983), unlikely (Spelke, 2003), or superfluous (Papafragou, et al., 2002). Thus, contemporary linguistic theory has been mainly preoccupied with accounting for fully fluent (‘ideal’) adult speakers by looking for universals that guide language faculty and performance and by extending findings concerning universality to second language acquisition and language loss inquiries. Current psycholinguistic work, however, recognizes some interface between spatial cognition and the linguistic system in order to enable us to talk about space (Landau & Jackendoff, 1993). This therefore underlines the need to account for linguistic diversity and typological variability (Evans & Levinson, 2009) in order to better understand the multitude and nature of interfering factors as well as their impact on conceptualization processes in normal and pathological states, from both L1 and L2 perspectives.
More specifically, in the domain of space, encoding a motion event emerges as one of the earliest aspects of language acquisition. A large number of studies in this area reveal an extensive scope of variation across languages, which has considerable implications for how spatial thought, spatial conceptualization and spatial language usage emerge in humans in the context of first language (L1) acquisition (Bowerman & Choi, 2001; Hickmann et al., 2009 among many others). This increasing pace of research on L1 has provided a very interesting context to pursue questioning about the impact of linguistic properties on conceptualization processes as well as on second language (L2) acquisition contexts (Cadierno & Lund, 2004; Carroll, et al., 2000; Flecken, 2011; Hendriks, Hickmann, & Demagny, 2008; von Stutterheim & Lambert, 2005 among others).

This line of research has revived the ‘linguistic relativity’ hypothesis – initially put forward by Boas, Sapir and Whorf at the beginning of the 20th century – and has turned scientific attention to a more cross-linguistic perspective, aiming at identifying variation across the languages of the world and their possible effects on behavior (cf. Lucy, 1992; Slobin 1996 among others). Slobin’s proposal that the lexicalization patterns of languages have cognitive implications for the speakers, led him to formulate his thinking for speaking hypothesis. He suggests that, when communicating, speakers construe situations in terms of those particular features that are linguistically available and thus privileged in their own language. In other words, in the domain of space, speakers of different languages do not attend to all the aspects of motion to an equal degree (e.g., Manner, Path, Endpoints) because their languages do not make these facets of motion equally salient. By extension, when learning a second language or re-learning an L1, the speaker is required to re-acquire the ability to think (or re-think) for speaking in order to re-organize his/her linguistic expression in a new way. This could account for some of the considerable difficulties reported by learners as well as by people whose access to their native language patterns is impaired as a result of brain lesions – an issue which is of growing interest in the literature (see Dipper, Black & Bryan 2005, Black & Chiat 2000, Marshall & Cairns 2005, Marshall 2009). In this view, learning or re-learning spatial language must imply parallel or similar patterns for the acquisition of new linguistic means, as well as a specific way of re-thinking for the purposes of communication in both normal and pathological contexts.

The present paper will therefore focus on the productions of adult learners of a second language who are confronted with typologically different languages and on the productions of adult agrammatic speakers who demonstrate dissociations between lexical and grammatical knowledge in their native language. Our aim is to identify the evolutionary encoding processes as these speakers learn or re-learn to express motion and/or think or re-think for speaking about motion. We focus mainly on whether learning as a process implies the development of parallel or similar strategies between second language users and agrammatic speakers, the activation or the re-activation of linguistic patterns
linked to the expression of motion, and the plasticity for generation of a specific way of event re-conceptualization.

1.1 Spatial language and typological variation

From a typological viewpoint, motion events have received more attention than almost any other type of event. The reason is undoubtedly Talmy’s (2000) proposal that languages fall into two types depending on their *lexicalization patterns*: that is, the general view that “particular meaning components are regularly associated with particular morphemes in different languages” (2000, Vol. 2: 24). This view has led to a ‘conflational’ *event integration* typology in linguistics, which emphasizes one particular spatial semantic category, *Path*, and the investigation of the morphosyntactic categories that are responsible for its realization. Such a *function-to-form* approach demonstrates that languages characteristically realize *Path* either in the verb root or in a preposition (which Talmy generalizes to any adnominal category) and/or with a Satellite (a grammatical category of any constituent other than a noun-phrase or prepositional phrase complement that is in a sister relation to the verb root). More specifically, following this *event integration* criterion, Talmy proposes a distinction between two types of languages: *satellite-framed* and *verb-framed* languages (e.g., Germanic vs. Romance languages). In this framework, such integration patterns point out specific lexicalization constructions for describing motion events that are classified according to whether they realize *Path* in a verb or in a satellite (or even in both loci): “Path appears in the verb root in *Verb-framed* languages” such as French, “and it appears in the satellite in *satellite-framed* languages such as English […].” (Talmy, 2000: 117-8).¹

Consequently, and for the languages studied in this paper, when expressing motion, a *satellite-framed* language such as English lexicalizes the *Manner* of motion in the verb (e.g. *to run, to crawl*), using satellites (e.g., particles such as *into, across* etc.) to express *Path* information within one compact structure, as illustrated in (1):

(1) a.  

*He is running into the house*.

(English *S*-framed pattern)

Figure  

\begin{array}{c}
\text{Manner} \\
\hline \\
\text{Path} \\
\hline \\
\text{Ground}
\end{array}

b.  

*The baby crawled across the street, all the way to the other side*.

(French *V*-framed pattern)

Figure  

\begin{array}{c}
\text{Manner} \\
\hline \\
\text{Path} \\
\hline \\
\text{Path} \\
\hline \\
\text{Path}
\end{array}

In contrast, a *verb-framed* language such as French, lexicalizes *Path* in the verb, leaving *Manner* information implicit or placing it at the periphery of the sentence, for instance by means of gerunds or of adverbials, as illustrated in examples in (2):

(2) a.  

*Il entre dans la maison* (*en courant*).

(French *V*-framed pattern)

Figure  

\begin{array}{c}
\text{Path} \\
\hline \\
\text{Ground} \\
\hline \\
\text{Manner}
\end{array}

¹ Note that not all languages can be easily classified accordingly to this typology. Some languages seem to show more complex systems of conflation, possibly indicating the need for accounting for more than two categories, or the need for a continuum-conception of their linguistic status (e.g., Italian, Greek, Mandarin Chinese).
Lit. ‘He is entering at the house by running.’

b. \[\text{Le bébé traverse la rue à quatre pattes}\].

Figure Path Ground Manner

Lit. ‘The baby is crossing the street on all fours.’

Slobin (1996) further probed the cognitive implications of such differences and put forward his thinking for speaking hypothesis mentioned above. According to this hypothesis, speakers of different languages attend to different components of motion events (Path, Manner, Figure, Ground) because their languages do not make these components equally salient. He goes further, underlining that speakers differentially attend to two types of components: (1) those that can be perceived and are objectively always present in the event (e.g., Path) and which have consequences for dealing with the external world; and (2) those that are linguistically subjective and relevant to the event, but cannot be interpreted as easily from the perceived event (e.g., distinctions pertaining to Manner, Aspect, Definiteness). Thus, although Talmy’s classification concerns first and foremost the expression of Path (as the most objective/universal component), the locus of other relevant components such as Manner seems to have a great impact on how the information is packaged. In French, for example, Path is mainly expressed in the verb while Manner may not be expressed at all, or, when expressed, it may be frequently placed outside the main clause in subordinate constructions, as in (2a). In contrast, in English, where Path is expressed typically in satellites, the verb remains available for the expression of Manner, privileging the packaging of multiple components in one single and compact structure, as in (1b).²

In summary, variation may reflect not only the lexicalization or the Path integration pattern of a particular language. The locus where semantic components are realized, the ease with which multiple types of spatial information can be expressed simultaneously (density), as well as the stacking (architecture) of such information in simple, complex, main or subordinate clauses may be some of the features that differentiate spatial language and that will concern us in this paper.

1.2 Variation and implications for L1/L2 language acquisition and re-conceptualization

Recent experimental research in this domain suggests that such language-specific properties constrain not only how speakers organize motion components in discourse (Talmy 2000; Slobin 1996; Hickmann et al. 2009), but also affect the very basis of encoding, conceptualization. There is general agreement as to the fundamental components which constitute the language production apparatus. According to Levelt’s model (1993), speaking involves three main levels of activity: (a) the conceptualization level, concerning the decision about what to say; (b) the formulation level involving

² In the examples, main clauses are noted in brackets and subordinate clauses in parentheses.
decisions about how to say it; and (c) the articulation level, the procedure of actually saying it. If we assume that conceptualizing an event has an influence on the way we formulate and articulate language, and that our spatial conceptualization is universally fundamental to our survival, then one would expect that all human beings have very similar spatial concepts in their minds. Given this assumption, languages of the world should all act in a similar way or show no specific impact on the formulation of spatial information. In this respect, and first from the L1 acquisition perspective, no language effects should be found in the development of infant spatial language, and analogously no language effects should be found in the processes involving the acquisition of a second language or the re-learning of the native language in cases of pathology.

With respect to first language acquisition, some evidence does indeed show that children have an extensive amount of knowledge about space very early on in life, well before they start producing language (Mandler, 1998), and that children follow a very similar developmental course, for example when acquiring spatial prepositions, irrespective of their language (Johnston & Slobin, 1979). However, new experimental evidence increasingly reveals cross-linguistic differences in the developmental rhythms of infants during the acquisition of their native language (Bowerman & Choi, 2001; Choi & Bowerman, 1991 among others), further supporting the claim that children’s perceptual and cognitive behaviors are influenced by their surrounding language as early as the pre-linguistic period.

Despite numerous studies on first language acquisition, only few studies have investigated the performances of speakers in the domain of motion events in order to gain insights into the level of conceptualization underlying second language production. The question of whether language has a deep impact on the re-conceptualization process becomes strongly relevant when applied to second language learners. If spatial language and spatial representation are largely independent at the conceptual level, one would expect no difficulties for the learner of a second language to “overcome” the L1 system and adjust easily in the L2. Motion concepts, since acquired in a universal way, should be neutral and rather language-independent. If, however, language and thinking are actively involved during L1 acquisition, and if acquiring a second language requires both learning different linguistic spatial means and a different way of conceptually organizing them, then spatial conceptualization during second language acquisition should lead to some difficulty and reflect some of the features of L1. Although intuitively it seems obvious that such interference may be involved in L2 acquisition processes, transfer, interference and other similar phenomena have only been measured in isolation and at particular levels of language analysis (i.e., syntax, semantics, lexicon). It is only recently that researchers have investigated more systematically the impact that typological constraints of L1 can have on L2 and vice versa. Conceptualization and re-conceptualization have started to be central in recent investigations. Researchers further look to identify traces of coexistence of target-like patterns
(among two or more L1 or among L1, L2, L3 etc.), patterns of transfer, convergence, internalization, restructuration or attrition, and to identify the factors that may (co-)occur in such acquisitional contexts (cf. Jarvis & Pavlenko, 2008). More specifically, experimental studies based on event elicitation tasks show great variability in the performances of second language users. On one hand, studies by Cadierno (2008) have shown that Italian and Danish learners of Spanish produce target-like patterns in their verbal descriptions of motion events. Along the same lines, Hendriks, Hickmann & Demagny (2008) showed target-like patterns in the verbal descriptions of caused motion events produced by advanced English learners of French at different proficiency levels. In contrast, Schmiedtová and Sahonenko (2008) found that very advanced Czech and Russian learners of German produce non-target like patterns in their descriptions of goal-oriented motion events. Similarly, in studies by von Stutterheim and Carroll (2006) English learners of German seemed to use their native holistic perspective to the same extent as monolingual German speakers, while German learners of English mentioned fewer endpoints than monolingual English speakers. This suggests that second language learners of both German and English retain their native patterns in construing motion events, at least with respect to endpoints. Within this same framework, evidence from co-verbal gestures suggests bi-directional linguistic impact and transfer with respect to the Path and Manner components, as expressed in both spatial language and gestures (Hickmann, Hendriks & Gullberg, 2011).

1.3 Typological constraints and aphasic language
Recent experimental research in the domain of space suggests that language-specific properties not only constrain how native speakers and learners represent motion in discourse, but also have an impact on the symptomatology of aphasic speakers, who show – depending on their classification – lexical and/or syntactic dissociations in their verbalization (cf. Obler 1988; Nespoulous 1999).

From a universalist point of view, spatial language and spatial representations are independent. One would therefore expect no difficulties for agrammatic speakers in retrieving spatial concepts, but only a syndrome-related difficulty re-acquiring the linguistic patterns of their L1. Until recently, studies on aphasia dealt with simple verb/noun retrieval or functional word use, in order to establish some kind of form-to-function relation between the cortical structures and grammar of the aphasic speaker, often limited to a single language. For many years, researchers claimed that in aphasia, and more particularly in agrammatism, speakers have a general syntactic impairment (cf. among others Berndt & Caramazza, 1980; Caplan 1985), The CLAS-project (Menn & Obler, 1990) was the first to suggest that syntactic deficits in agrammatism may be dependent on language-specific properties. However, for at least another decade agrammatism continued to be treated as a global impairment of all functional elements (Grodzinsky, 2006) with little interest shown in the conceptualization processes of agrammatic speakers. Growing recent empirical evidence on agrammatic aphasia, however, has shown
that the deficit is much more fine-grained than had been thought, and that not all functional elements or grammatical structures are impaired in agrammatic speech.

It is only with systematic cross-linguistic studies that aphasiology started to take typological factors into account (Bates et al., 1991; Slobin, 1991). Recent cross-linguistic evidence in agrammatism has shown, for example, that the structure of one’s native language determines what types of errors, omissions and/or substitutions may occur, and that the reasons for such occurrences may be due to a multitude of factors (Paradis, 2001). Moreover, verbal morphology is selectively vulnerable amongst brain-damaged speakers and, despite the many language-independent factors (e.g. syndrome-related factors) that can influence sparing or impairment, language-specific properties seem to play an important role in this domain. Given the fact that agrammatism is broadly characterized by the reduced use of free and bound inflectional morphology, lack of grammatical agreement, reduction in the use of complex structures, and use of telegraphic speech (Thompson, Shapiro, & Roberts, 1993), one may expect that some of these manifestations will be more or less salient depending on the structural properties of specific languages. Thus, speakers of typologically different languages are found to exhibit symptoms that vary according to the parametric differences of their native language. For instance, evidence from agrammatic speakers’ productions in Farsi and English (Nilipour & Paradis 1995) has shown that the structures of Farsi may be quantitatively more vulnerable with respect to verb morphology compared with English speakers’ productions. Other studies on aphasic discourse show that speakers with agrammatism tend to resort to whatever devices are available in their language, with a preference for over-simplification of their production in order to deal with structural complexity (Jarema, 1985) and produce forms that occasionally resemble those of infants (Laka & Erriondo Korostola, 2001) and second language users (Ahlsén, 2005).

Although some agrammatic speakers are found to be insensitive to grammatical information, they remain sensitive to semantic information (Schneider & Thompson, 2003). Such information is found to be more easily available and resistant depending on the extent to which it is present in the structure of each language, as well as on the frequency of its use (Centeno & Obler, 2001). Specific studies on verbs, which specify arguments and are semantically complex elements, report individuals with agrammatic aphasia who have particular difficulties producing motion verbs when naming and generating sentences (Miceli, Silveri, Villa, & Caramazza, 1984). In comparison, when verbs are actually produced, agrammatic speakers tend to over-rely on semantically light/neutral verbs requiring simple argument structures (Thompson, Lange, Schneider, & Shapiro, 1997).

Despite numerous available studies of agrammatism, few previous studies have yet systematically examined verbalizations about spatial information and, more specifically, encoding patterns in agrammatic discourse, from a cross-linguistic perspective (apart from our own work as published in
Soroli, 2011; Soroli, Sahraoui, Sacchett, 2011). Research to date on aphasic speakers’ productions has provided no clues as to how speakers of typologically different languages organize and encode different types of information in discourse (e.g., Manner, Path, Location). One question to be addressed in the current study is the extent to which agrammatic speakers’ construals are constrained by language-specific properties. For aphasic speakers, one would predict that their difficulties in retrieving motion verbs, for instance, may reflect either a general disorder of the thinking for speaking process – at the level of conceptualization of spatial information (Levelt, Roelofs & Meyer, 1999) – and/or a simple difficulty in retrieving the word form at the level of verbal formulation. More specifically, for agrammatics, problems in verb retrieval and event description have been attributed to a difficulty in construing events in a language-relevant manner (Marshall, Pring & Chiat 1993, Dean & Black, 2005; Cairns, Marshall, Cairns & Dipper, 2007, Sacchett & Black 2011). Moreover, some recent studies that investigate the encoding strategies of agrammatic and anomic speakers of typologically different languages (English and French) as compared to those of homologue control groups, from both a cross-language and cross-syndrome perspective (Soroli, Hickmann & Sahraoui, 2011), show that syndrome related factors may be the source for similarities in the verbalizations of motion events within specific types of aphasia, however, speakers with different syndromes also show similarities in their lexicalization patterns following to a large extent the properties of their native language. As a result, and given the number of conflicting variables in pathological patterns, such deficits may be especially problematic for people who present dissociations at the lexical and syntactic levels and would therefore seem to be highly relevant in relation to the specificity of conceptualization processes.

In summary, the central questions here are: a) whether learning a second language involves learning a second way of thinking, and b) whether losing (access to) one’s first language results in a more universal way of re-thinking space. In Slobin’s framework, if thinking for speaking is an integral part of language production, one may wonder what happens when speakers learn a second language in which space is not organized in the same way as in their first language. Likewise, what happens when speakers lose the acquired L1 pattern in which space was organized in a specific way? Intuitively, it seems that linguistic encoding should reflect directly the objective reality which we perceive in a specific motion event. Given the fact that languages provide strikingly different linguistic means to express a specific spatial concept, speakers with or without aphasia should be equally sensitive to event construals and distinct language mechanisms, since they are both arguably in an acquisitional situation. From a more general perspective, there are metric and visual details in this physical reality of motion that are all present for all speakers but not present in all languages. If reality is not all represented mentally in thought, then how do we construct spatial representations? Are our conceptualizations based on what our language is designed for, or on what our linguistic environment exposes us to? Do we adopt encoding strategies depending on the properties of the learning pattern of
our language? If, on the other hand, reality, as we perceive it, is all represented in our brains, then physical details and constructing a cognitive representation of them should work independently of language. Thus, when acquiring a new system, or when re-acquiring a system following impairment, no language-specific encoding differences should be expected.

The present study aims to investigate how thinking about spatial relations or events, constructing representations about them, and developing strategies of encoding may be influenced by specific linguistic properties. More specifically, it aims to determine the respective role of typological (language-specific) vs. language-independent factors (e.g., level of acquisition for learners, syndrome-related factors for speakers with agrammatism), in accounting for similarities and differences in verbalizations during second language acquisition and following language impairment.

2. Method

2.1 Participants

Several groups of speakers were involved in the study. More specifically, 24 monolingual English and French control speakers (12 per language) and 24 low-intermediate and advanced English learners of French (12 per competence level) were tested and compared to two agrammatic monolingual speakers of English and French. All participants were asked to give written informed consent and to fill out a Sociolinguistic Questionnaire with the help of the investigator. The general inclusion criteria for monolingual participants were the following: (1) native, monolingual speakers of English or French; (2) right handed; (3) above 18 years of age; (4) report no known developmental disorder or deficit (other than agrammatism, when relevant). They all had been exposed to only one language since birth and had not learned any foreign language before at least age 10 (compulsory teaching at school). None had lived in a foreign country for more than six months. The two aphasics were both pre-morbidly right-handed, and they reported no other known disorders or deficits before stroke. All participants, with or without agrammatism, had normal or corrected-to-normal vision and hearing.

Participants with agrammatism were identified using a diagnostic battery prior to testing, administered by a speech and language therapist. Classical language tests most commonly used for assessment in each country were the following: in France tests included the Boston Diagnostic Aphasia Examination (BDAE, French version, Mazaux & Orgogozo, 1982), the Montreal-Toulouse Test for Aphasia (MT86, Nespoulous, et al., 1986), and the Oral Denomination Test (DO80, Deloche & Hannequin, 1997); in the United Kingdom they were the BDAE (English version, Goodglass & Kaplan, 1972), the Western Aphasia Battery (WAB, Kertesz, 1982), and the Verb and Sentence Test (VAST, Bastiaanse, Edwards & Rispens, 2002). Eligibility criteria for participants with agrammatism were: (1) a stroke-caused

An aphasial-friendly Information sheet and Consent form were provided for the two aphasic participants.
aphasia with a left hemisphere lesion; (2) at least six months post-stroke. The two participants reported here presented good comprehension skills and non-fluent expressive aphasia, characterized by specific difficulties encoding syntax and morphology and limited ‘telegraphic’ speech.

All participants were recruited through contacts with universities in the two countries: France, and the United Kingdom. The two groups of (mostly American) English learners of French were people who had been studying and living in Paris for a period ranging between two months and approximately two years. They were all enrolled in the American University of Paris, and were learning French as a second language in that context (semi-guided learners). At the time of the testing, the learners were at two levels of proficiency: Low-Intermediate and Advanced.  

2.2 Experimental procedure and material

In order to measure the relative role of language-independent and language-specific factors, we compared how the above groups of speakers described motion events in a Production task involving a set of 12 stimuli depicting voluntary motion events. The stimuli consisted of short animated cartoons (see Figures 1 and 2), showing characters (humans and animals in diverse settings) performing displacements in different Manners (e.g., walking, swimming, climbing) along three types of Paths (up, down, across) (cf. Hickmann et al., 2009). Stimuli were shown on a 18.4” monitor of a laptop. The task required participants to watch the cartoons and, after each stimulus, to describe what had happened. Participant’s productions were audio recorded and transcribed for later analysis. The analyses examined what information (Path, Manner) was expressed in the utterances produced by the speakers, by what verbal means (verbs, adjuncts), and in what kinds of structures (simple, complex, main, subordinate clauses).

2.3 Data coding procedure and analysis

The data were transcribed in CHAT format (MacWhinney, 1995) and coded for semantic information, parts of speech, and utterance type. Data were coded with respect to information density (the quantity of the information expressed in the utterances), semantic focus (Manner and Path information as identified in all parts of speech), semantic locus (Manner and Path information as expressed in the main verbs and in other linguistic means), and global architecture (the complexity, subordination, number of clauses and the distribution of semantic information within and across responses).

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4 Levels of proficiency were determined on the basis of an independent in-house language test administered by the American University of Paris.
3. Results

We present below two types of analyses for native speakers, L2 learners and agrammatic speakers. The first analysis examines the semantic information selected by participants (focus) and the resulting number of components packaged in their responses (density). The cartoons used in the experimental task were meant to elicit two types of semantic information: either focus on Manner or Path, or focus on both semantic components. For the density analysis, participants’ responses were scored as either 2, when both Manner and Path were expressed in the utterance, or 1, when responses expressed only one type of information (either only Manner or only Path, but not both). Density was scored as 0 when no semantic component was expressed. Given previous studies, and the typological status of these languages, we expected native speakers of English to produce utterances of higher density than French native speakers.

In the second analysis, we examined information locus. This analysis focused on the particular means used to encode the spatial information in the response. A different locus was expected in the two languages. More specifically, we expected Path to be encoded by satellites in English but by verbs in French. Our main interest was to investigate whether findings for native monolingual controls follow expectations based on the literature and whether these findings influence the L2 learners’ and aphasic participants’ realizations of the target structures. More specifically, the discussion regarding the learners/re-learners focuses on the influence of lexicalization and thinking for speaking patterns of the source language on the expression of motion in a newly acquired or re-acquired system. For each analysis we first present the monolingual control data, then the L2 data and finally the aphasia data.

3.1 Information focus and number of components (density)

The results show crosslinguistic differences in the structures used by monolingual controls, characterised by more semantic density in English than in French. More specifically, English speakers produced almost twice as many utterances with maximal density, expressing both Manner and Path, as compared to French (Density 2: in English 83% vs. 42% in French), as illustrated in (3). Their utterances were therefore much denser than those of French speakers, who mainly expressed one component in their utterances (Density 1 in French: 58% vs. 16% in English), mainly Path and only rarely encoding Manner, as illustrated in example (4a). Note that typically, when both Manner and Path were expressed in French utterances, speakers often did so using subordinate clauses (4b).

(3) The boy swam across the river
Manner Path

(4) a. [La chenille monte jusqu’en haut de la tige]
Figure Path Path-goal Location
‘the caterpillar ascends till the top of the stem’.

b. [Le bébé traverse la route] (en marchant à quatre pattes).
L2 learners and the two participants with aphasia expressed overall less information than monolingual controls. More specifically, L2 learners produced idiosyncratic morphology and non-target-like structures that showed some influence of their L1. This decreased with proficiency, however, as in examples (5a) and (5b). Nevertheless, learners respected to some degree the typical pattern of the target language (French) in which Path is more prominent than Manner, but they did so using non-target-like syntactic structures.

(5) a. [...] [il faire du jogging] [et traverser une rue]. (Low-Intermediate)
   ‘he jog and cross a road’.

b. [...] [elle fait d(e) le patinage] [et elle traverse un lac gelé]. (Advanced)
   ‘she does skating and she crosses a frozen lake.

With respect to the aphasia data, the French speaker with agrammatism produced mainly utterances of low density (61%), with a main preference for Path, as illustrated in (6), a substantial number of zero-density utterances (28%), and only few utterances of higher density – Path and Manner conflation (11%). For the English speaker with agrammatism, the information focus pattern more closely resembled the French control pattern than the English one. He expressed mostly one component (78%), surprisingly focusing mainly on Path, as in (7). He produced only few utterances with no components at all (6%), yet retained to some extent some double Manner-Path conflation (16%).

(6) [C’est une porte et euh... la fille], (qui va faire en avant). (French agrammatic)
   ‘It’s a door and the girl, who is going to do forward’

(7) [Cross a tracks] (English agrammatic)

3.2 Semantic locus

Further analyses examined information locus in order to determine the specific linguistic devices that were used to encode the relevant semantic components of motion (Manner, Path). These analyses distinguish information that was expressed in the verb roots (hereafter “Verb”) vs. in other devices including particles, adverbials, PPs, and other relevant subordinate clauses (hereafter “Other”).

As predicted, French monolingual controls followed the typical Verb-framed pattern of their language and primarily encoded Path (P) in the verb stem. In French other linguistic devices were rarely used, but when they occurred, they typically encoded Manner (M) or Path, rather than the two semantic components simultaneously (PM). In contrast, following the typical satellite-framed pattern, the English control speakers used compact syntactic structures systematically encoding Manner in the
verb stem and *Path* in the periphery using other linguistic devices. Figure 2 shows the conflation types expressed in the verb and in the other linguistic devices by the French and English speakers.

Figure 3 shows the second language learners’ data, which reveal very systematic to less systematic encoding systems for each type of conflation and locus. As one would expect in such a verb-framed target language, verbs mainly lexicalized *Path* information for both low (80%) and advanced (70%) learners of French. However, very few verbs encoded both *Manner* and *Path* (possible in French with specific verbs such as *grimper*) for both low and advanced level learners, and only 10% and 14% respectively of verbs encoded *Manner* alone (typical in their native language). Semantic encoding of spatial components in other linguistic devices was even less frequent, with rare occurrences of utterances combining both *Path* and *Manner* information.

More specifically, low-level learners mainly provided *Manner* information in a prepositional construction, intending to indicate instruments but making non-target-like errors, as in example (8). In some cases, they encoded *Manner* using non-target-like subordinating constructions, as illustrated in (9). At the advanced-level, more target-like subordinate clauses were used, as well as prepositional phrases introducing objects as instruments with the use of target-like prepositions. In most of these cases, *Path* preceded *Manner* as the verb typically precedes prepositional phrases in French. Interestingly, however, in some cases learners actually pre-posed *Manner* information, inventing rather native-like patterns, as illustrated in (10), where *Manner* is placed before *Path*.

(8) *Le femme traverse les rails dans le bicyclette*.  
‘The woman crosses the tracks in a bicycle’.

(9) *Il traverse le rivièrê* (*par glisser sur le glace*).  
‘he crosses the river by sliding on the ice’.

(10) *Une femme dans un vélo a croisé des rails du train*.  
‘A woman in a bike crossed the tracks of the train’.

With respect to the aphasia data, as shown in Figure 4, the French agrammatic speaker overall followed the native pattern of his language, mostly expressing *Path* in his utterances in peripheral devices (14%) but mainly in verbs (47%), when not omitting them (83% omission of semantic information in other devices and 25% of omission in verbs). Additionally, he often omitted verb morphology, opting for infinitive forms, simple future constructions and use of light-verbs (see example (6) above).
The English speaker with agrammatism, as shown in Figure 5, followed overall the native pattern of his language, with 45% Manner verbs and 50% Path adjuncts, encoding both components in a systematic way. However, Path was also found to be lexicalized in verbs more often than in controls’ utterances (27% vs. 6%), showing a more general distribution of spatial information in his utterances.

Finally, specific comparisons between L2 learners and aphasic speakers revealed differences in the compensatory strategies used, but also some similarities in their productions. Firstly, L2 learners seemed to rely on a “disjoint” distribution of information across separate clauses, as illustrated in example (9) above, together with some attempts to subordinate some spatial information by means of different subordinate markers in order to better reproduce the target-like French pattern (e.g., pour V ‘in order to V’; pendant que V ‘while Ving’; en V-ant ‘V-ing’). This resulted in some very idiosyncratic productions, as in (11) below, where their native language (English) guided them to follow a Manner-first order for encoding information. In contrast, the two agrammatic speakers relied more on adjuncts to replace their extensive verbal omissions, which in turn depended on the language properties of their native language and their specific difficulty in accessing lexicalized information (Path in French, Manner in English) as illustrated in (12a) and (12b). Secondly, L2 learners’ productions involved target-like expressions of motion, with satellites such as jusqu’à ‘until/up to’ and d’un côté à l’autre ‘from one side to the other’, as in (13), apparently very similar to the French agrammatic speaker’s idiosyncratic constructions, as in examples (12a) and (14).

(11) [Il nage (en traversant le la fleuve)] (=traverser en nageant) (Advanced learner)
He swims crossing the river.

(12) a. [C’est un homme] (qui ...c’est euh droite gauche) (=traverser) (French agrammatic)
b. Down ... caterpillar (=crawl down) (English agrammatic)

(13) [la fille patine de le côté droite à le côté gauche] (=traverser) (Low-level learner)
‘The girl skates from the right side to the left side’

(14) [il va ... faire euh dans le chemin extérieur] (=sortir) (French agrammatic)
‘He is going … to do in the exterior path’

4. Discussion
We started this paper by asking a number of questions regarding the relation between spatial language and conceptualization, arguing that, if the two are largely independent, one should expect second language learners and people with aphasia to find it easy to shake off earlier acquired linguistic
systems and to adapt to a new way of thinking about space. If, however, language and conceptualization are intricately related during L1 acquisition, one would expect some of the spatial representations of the adult speaker to mirror the features of his native language, and thus lead to specific ways of conceptualizing space and some difficulty in fully accessing new linguistic means to describe space.

The findings presented in this paper seem to show similarities as well as interesting variations in the ways spatial information is organized across populations. Firstly, as expected, responses were of higher density in English as compared to French control native speakers. Furthermore, the patterns identified mostly confirm previous typological literature. However, they also show some more complex results with respect to L2 learners’ and aphasic speakers’ behavior. More specifically, the English control native speakers did indeed express Manner in the verb and Path in satellites, whereas French controls showed a general preference for Path encoding. As hypothesized at the beginning of this paper, English learners of French as well as French and English re-learners (agrammatic speakers) are faced with a number of challenges, due to having learnt a specific way of focusing on spatial components and to specific thinking for speaking processes they acquired with their native language. When representing motion in a language, one needs, minimally, a lexicon to express a variety of Manners and Paths. However, our L2 learners and speakers with aphasia clearly had insufficient and/or restricted access to lexical items which would allow them to express the required Manner in events, such as French verbs equivalent to riding a bicycle (cf. examples (8) and (10) above), or Paths such as the French verbs traverser/sortir (see examples (11)-(14)). Additionally, French control native speakers most frequently resorted to a complex system of clauses in order to express both Path and Manner information (Path in main clauses and Manner in subordinates). Such constructions involve the acquisition of appropriate markings of subordination, (e.g., marking of gerunds, use of appropriate verbal forms and connectives). The data showed that choosing between an inflected form and an infinitival form, or selecting the appropriate connective (pour, par, en) are not obvious tasks for the L2 learner (e.g., il court *par glisser vs. pour glisser) or for the agrammatic speaker (*a door walking). However, our main interest in this paper was not to investigate the linguistic means per se, but rather to test the use of the available linguistic means and the development of compensatory strategies during the organization of spatial information and the conceptualization for formulation.

With respect to information focus, many of the utterances identified in the L2 learners’ and aphasic speakers’ data showed diminished expression of semantic components, with Path as the most frequently expressed information. This may result from the fact that Path is the most basic and universal component for motion, and thus becomes the most efficient way to describe motion economically, especially when access to lexical resources is limited.
With respect to the locus of information, two patterns occurred, depending on whether responses expressed the Path component alone (most frequent cases) or Manner and Path together (infrequent cases). In the majority of cases, L2 learners and aphasic speakers expressed only Path, with the former encoding this information in the verb, and the latter encoding it in adjuncts. However, depending on the native language, the realization of this pattern was different. For instance, English learners of French had a tendency to put Manner-first, when they expressed Manner information together with Path in French. On the other hand, the French agrammatic speaker relied on the only semantic information lexicalized in his language, Path – which is also the more semantically universal among all components. However, given his difficulties retrieving specific motion (Path) verbs he mainly used light (semantically unmarked) verbs together with Path adjuncts (droite-gauche), possibly in order to avoid any semantic or morphological complexity. Likewise, the English agrammatic speaker generally focused on what is universally encoded in all languages (Path) and thus produced mainly Path particles, Path adverbials, Path verbs or other peripheral (more complex) devices (e.g. prepositional phrases), or preferred light verbs together with Path peripheral devices. Occasionally, he kept the native structure (Manner verb together with Path in the periphery of the verbal network).

This leads us to the conclusion that thinking for speaking is not entirely imposed by one’s native language, but that language properties may provide the learner with an additional array of organizational options to choose from in order to better represent space in discourse and may privilege the development of certain strategies more than others. For example, similarities between the learners and aphasic speakers’ discourse (i.e., morpho-syntactic simplifications) may be due to strategies that emerge from the need to reduce cognitive cost when processing linguistic information - as also suggested by Sahraoui and Nespoulous (2012) who also make the link between second language acquisition performance (i.e., the “basic variety” in Klein & Perdue’s view, 1997) and agrammatic utterances (i.e., the “ellipsis hypothesis” in Kolk’s view, 2006). Consequently, either some parts of conceptualization are language-independent, allowing all speakers and learners to identify the semantic components that should or could be expressed in the description of a given motion event and together with language-specific filters lead speakers to pass to the formulation level and decide what information is most appropriate for such a task, or all conceptualization is language-specific and only at the formulation level speakers have to adapt their L1-construals to specific, newly-acquired or re-acquired, lemmas and lexemes. In either case, linguistic properties do not seem to fully constrain speakers’ internal event conceptualization. Languages introduce a great deal of variation in terms of available and typical linguistic means for spatial descriptions, which, together with other acquisitional and/or syndrome-related factors lead speakers to behave in similar intra-population ways, influence the relative salience of incoming information and its relative focus for purposes of communication.

5. Concluding remarks
The research question behind the present investigation was to compare conceptualization patterns in monolingual native speakers and in people who have to deal with a new or different linguistic system (either to learn or to re-learn it). The answer is not straightforward. In addition to previous evidence from normal child language acquisition and adult second language production in the spatial domain and across languages, evidence from aphasia seems to open new perspectives for the study of the interactions between spatial language and spatial conceptualization. It particular, allows us to consider in a parallel way acquisition issues with respect to interfering typological factors. As shown, language properties seem to strongly constrain verbalizations in all populations tested. In addition, despite some diverging strategies that may reflect different processes underlying verbal representations between second language learners and speakers with agrammatism, some similarities are also attested especially between speakers of the same target language.

The findings of the analyses reveal that the picture is not simple. The evidence shows differences between second language learners and native monolingual speakers, and such differences seem to lie in an incomplete awareness of the implications of certain aspects of the grammar for the entire syntactic and semantic structure of the spatial discourse. This means that, although learners and agrammatic speakers are not always aware of the implications the grammatical features they are about to learn or re-learn may have when using them, and although the determination of the planning principles in the organization of spatial information is not always successful, they do develop parallel compensatory or adaptive strategies and re-organize their spatial conceptual universe in a certain plastic way in order to achieve communication successfully. Such findings suggest that the interface of syntactic, semantic and pragmatic spatial knowledge constitutes a complex picture for second language acquisition and language pathology. Thus, describing spatial motion events is clearly not an easy task for people who learn or re-learn a linguistic system.

REFERENCES


RESUME (français)

Les langues présentent des variations considérables quant à la façon dont elles lexicalisent ou grammaticalisent l’information relative au mouvement. Les langues à cadrage satellitaire lexicalisent la Manière du mouvement dans la racine verbale et expriment la Trajectoire dans des satellites; en revanche, les langues à cadrage verbal lexicalisent la Trajectoire et laissent la Manière implicite ou périphérique. La présente étude examine l’impact des propriétés générales (acquisition/syndrome) et spécifiques aux deux langues (typologiques), l’anglais et le français, sur les processus d’encodage verbal d’apprenants d’une langue seconde (locuteurs anglophones apprenants le français) et de locuteurs présentant une dissociation entre les capacités de traitement lexical et syntaxique (agrammatiques), en comparaison avec des locuteurs contrôles. Les résultats montrent que malgré des similarités notables dues à des facteurs généraux, les propriétés typologiques des langues ont un impact sur les processus de (re)structuration du langage spatial ainsi que sur les processus de (re)conceptualisation sous-jacents.
FIGURES

Figure 1. Examples of ‘across’ and ‘upward’ motion

Figure 2. Information locus and conflation types in English and French native responses

Figure 3. Information locus and conflation types in Low and Advanced English learners of French

Figure 4. Information locus and conflation types in French speaker with agrammatism and controls

Figure 5. Information locus and conflation types in English speaker with agrammatism and controls