The Modern Language Journal

Motion Encoding in Russian and English: Moving Beyond Talmy's Typology

ANETA PAVLENKO
Temple University
College of Education
Department of Teaching and Learning
451 Ritter Hall
Philadelphia, PA 19122
Email: apavlenk@temple.edu

MARIA VOLYNSKY
Drexel University
Department of English and Philosophy
5059 MacAlister Hall
Philadelphia, PA 19104
Email: mv396@drexel.edu

The aim of the present study is twofold. One, we will show that Talmy's (1985, 1991, 2000) motion typology that groups Russian and English together as satellite-framed languages may be justified on linguistic grounds but is inadequate from a psycholinguistic point of view. Two, we will argue that the shortcomings of the typology may account for inconclusive findings in research on language effects in motion cognition. The study examined lexicalization of motion in narratives elicited with the use of a picture book *Frog, where are you?* (Mayer, 1969) from L1 speakers of Russian ($n = 31$), L1 speakers of English ($n = 38$), and Russian–English bilinguals ($n = 30$). All bilinguals told the story twice, once in each language, and were subdivided into early, childhood, and late bilinguals in order to control for combined effects of the Age of Arrival (AoA) and Length of Residence (LoR) in the L2 context on L2 performance. Quantitative and qualitative analyses of the four motion verb corpora (L1 Russian, L1 English, Bilingual L1 Russian, Bilingual L2 English) revealed that L1 Russian speakers segment motion events in a more fine-grained way and encode the manner, directionality, and spatiotemporal contours of motion events significantly more frequently than speakers of L1 English. Bilinguals followed language-specific lexicalization patterns in both languages but late bilinguals displayed reduced lexical diversity in L2 English. These findings were linked to differences in obligatoriness, boundedness, and complexity of encoding of motion components in the two languages. We argue that these dimensions of motion encoding can be productively explored in instructional contexts and in future studies of language and motion cognition that go beyond Talmy's typology.

Keywords: Russian; motion lexicon; manner encoding

WE LIVE IN A DYNAMIC WORLD WHERE WE constantly attend to our own motion trajectories (*Do I turn right here or keep going straight?*) and to other animate and inanimate entities moving through time and space (*When is my package from Amazon going to arrive?*). But do we all talk about motion in the same way and attend to the same aspects of motion events? If not, are some of the differences linked to linguistic encoding of motion? To answer these questions, studies of motion in language and cognition commonly draw on the work of Talmy (1985, 1991, 2000) and Slobin (1996a, 1996b, 2004a, 2004b, 2006) that differentiate between languages based on two aspects of encoding of motion components: the locus of encoding (main verb vs. satellite) and the frequency of encoding (high vs. low).[1] In what follows, we will compare two languages that have traditionally been grouped together in this typology, English and Russian, and show that the typology does not adequately account for cross-linguistic differences in motion encoding between speakers of L1 Russian and L1 English. Then, we will examine the implications of these

The Modern Language Journal, 99, Supplement, (2015)
DOI: 10.1111/modl.12177
0026-7902/15/32–48 $1.50/0

differences for motion encoding in the two languages of Russian–English bilinguals.

MOVING BEYOND TALMY'S TYPOLOGY

Talmy's (1985, 1991, 2000) typology categorizes languages based on mappings between surface structures and the following *meaning components*, which are seen as universal: (a) *figure*, or the moving object (*My Amazon package is arriving today*), (b) *ground*, or the reference-point object with respect to which the figure moves, that is, the source, goal, or location of motion (*The mail truck is approaching my building*), (c) *path*, or the course followed by the figure with respect to the ground (*The mailman is walking into the building*), and (d) *motion*, which includes manner and/or cause, that is, self-propelled vs. caused motion (*The mailman is walking up the stairs with my package*) (for other components, see Talmy, 1985, 2000).

Based on the surface encoding (*lexicalization*) of these components, Talmy (1985) divided languages into three groups. The first group, *satellite-framed languages* (S-languages), includes Finno–Ugric, Germanic, Sino–Tibetan, and Slavic languages that encode manner of motion in the main verb and path in the satellites. Talmy's (1985, 2000) definition of satellites includes prefixes and particles (e.g., *run out*) and excludes prepositional phrases (e.g., *run out of the house*), but some other researchers include prepositions as well (e.g., Regier & Zheng, 2007). The second group, *verb-framed languages* (V-languages), includes Romance, Semitic, Turkic, and sign languages that rely on inherently directional (bare) motion verbs to encode path and make the marking of manner optional (e.g., the French verb *descendre* 'descend') (e.g., Strömqvist & Verhoeven, 2004). To achieve elaboration similar to that in S-languages, speakers of V-languages combine bare motion verbs with other verbs, adverbs, and additional clauses (e.g., in French *descendre les degrés quatre à quatre* 'to descend the stairs two at a time'). The third group involves languages, such as Atsugewi and Navajo, that conflate motion with figure, as in the English *to rain* or *to spit*. This group, however, is usually ignored in present-day research that reduces the typology to the S/V dichotomy.

The type of encoding is linked, in Talmy's (1985, 2000) view, to information salience in sentence processing: The encoding of motion components in the main verb places the meaning in the background (e.g., *I drove to New York*), while other types of encoding place the same meaning in the foreground (e.g., *I went to New York by car*). Slobin's (2006) *manner salience hypothesis* makes an opposite—and a more general—argument regarding the links between motion lexicalization and cognitive processing: In this view, S-languages, which encode manner in the main verb and rely on finite, high-frequency verbs, draw attention to manner, while V-languages, which encode path in the main verb and manner in nonfinite verbs and low-frequency lexical items, phrases, or clauses, reduce the salience of manner and draw attention to path. The degree of manner salience, in this view, is determined by the size and diversity of the manner lexicon in the given language and the frequency of manner encoding in descriptions of motion events, with regular and frequent encoding heightening attention to this component.

Cross-linguistic research suggests that the language one speaks does make a difference: All children begin at a default starting point, paying equal amount of attention to manner and path, yet by the age of 3 they begin to display language-specific patterns of lexicalization of motion events (Allen et al., 2007; Maguire et al., 2010). Empirical studies show that children and adults speaking S-languages, such as English, German, Icelandic, or Swedish, encode manner more frequently, use a wider range of manner verbs, and are more likely to interpret novel verbs as manner verbs than speakers of V-languages, such as Greek, Italian, Japanese, or Spanish (Berman & Slobin, 1994; Brown & Gullberg, 2008; Cardini, 2008, 2010; Filipović, 2011; Maguire et al., 2010; Papafragou & Selimis, 2010; Strömqvist & Verhoeven, 2004).

In bilinguals who speak languages that belong to different categories, lexicalization of motion events in the first language (L1) may influence lexicalization in the second language (L2). Thus, L1 speakers of V-languages (Japanese, Spanish) learning L2 S-languages (Danish, English) were shown to encode manner less frequently in L2 speech than L1 speakers of Danish and English (Brown & Gullberg, 2008; Cadierno, 2010; Filipović, 2011), while L1 speakers of an S-language (English) learning an L2 V-language (Spanish) displayed L1 influence and difficulties in learning target-like lexicalization of manner in the L2 (Larrañaga et al., 2011). Studies with Japanese–English (Brown & Gullberg, 2008, 2010, 2011), Spanish–English (Hohenstein, Eisenberg, & Naigles, 2006), and Turkish–German bilinguals (Daller, Treffers–Daller, & Furman, 2011) also documented bidirectional influence, suggesting that at higher levels of L2 proficiency, acquisition of an S-language may increase the salience of

manner for lexicalization purposes in both the L2 and L1.

The findings of these studies are commonly interpreted as support for Slobin's (2006) manner salience hypothesis and as evidence that the frequency and type of motion encoding affect the salience of manner for speaking purposes. Does this mean, however, that speakers of S-languages pay more attention to the manner of motion than speakers of V-languages who do not encode manner on a regular basis? This question is addressed in studies that use nonverbal tasks, such as recognition and similarity judgments, to determine whether speakers of S- and V-languages differ in their attention to and memory for manner and path of motion. The results so far have been mixed and inconsistent: Some studies found no differences between speakers of S-language English and speakers of V-languages Italian, Spanish, and Greek (Cardini, 2010; Loucks & Pederson, 2011; Papafragou, Massey, & Gleitman, 2002), while others found that speakers of S-language English pay more attention to manner than speakers of V-languages Japanese, Spanish, and Greek, but only in some conditions (Filipović, 2011; Finkbeiner et al., 2002; Gennari et al., 2002; Papafragou, Hulbert, & Trueswell, 2008; Papafragou & Selimis, 2010).

The most comprehensive study to date was conducted by Bohnemeyer, Eisenbeiss, and Narasimhan (2006), who elicited data from speakers of 12 V-languages, 4 S-languages, and 1 serial-verb language, and found a high degree of intra-typological variation in participants' reliance on manner and path in similarity judgments of motion events. As a group, speakers of S-languages did not differ in manner preference from speakers of V-languages, with the exception of speakers of S-language Polish who displayed the highest manner bias (85%) among all participants, a finding we will return to later.

These contradictory results gave rise to two alternative explanations. Some scholars argue that cross-linguistic differences in lexicalization of motion do not affect nonverbal motion cognition (e.g., Cardini, 2010; Papafragou et al., 2002). Others suggest that language effects in motion cognition are possible; yet the research to date has been constrained by the theoretical limitations of the manner salience hypothesis, methodological shortcomings of particular tasks, and the focus on a limited number of languages and a restricted range of manner and path contrasts (e.g., Bohnemeyer et al., 2006; Loucks & Pederson, 2011). We share these concerns and add a concern of our own, namely the treatment of bilinguals as representative speakers of their L1s in motion lexicon research (for an extended discussion, see Pavlenko, 2014). These concerns, however, are secondary compared to the key problem in the research to date, namely the limitations of Talmy's (1985, 1991, 2000) typology as a theoretical framework for research on motion language and cognition and the lack of a sound alternative framework.

In the past decade, several linguists have raised concerns about Talmy's (1985, 2000) typology: Some identified S-languages with low manner verb usage and V-languages with low path usage, such as Romansh, while others identified languages, such as Arrernte or Basque, that do not easily fit within S- and V-categories (e.g., Levinson & Wilkins, 2006; Strömqvist & Verhoeven, 2004). To address such concerns, Slobin (2004b, 2006) proposed a third category—*equipollently framed languages* (E-languages)—where path and manner have equal weight. Critics argue, however, that the third category does not address the key limitations of the typology, such as the focus on verbs and satellites at the expense of other forms that encode motion and the focus on figure, ground, path, and manner at the expense of components encoded in non-Indo-European languages: Tiriyó, for instance, encodes aquatic postpositions that mark movement into and out of liquid, while Arrernte contains an elaborate category of inflections for the encoding of associated motion (e.g., 'do __ act while moving past') (Beavers, Levin, & Tham, 2010; Levinson & Wilkins, 2006). The third category also does not address concerns raised by significant intra-typological differences within S- and V-language groups (Beavers et al., 2010; Bohnemeyer et al., 2006; Hasko & Perelmutter, 2010; Iakovleva, 2012).

Most importantly, as noted by both Bohnemeyer et al. (2006) and Loucks and Pederson (2011), a linguistic typology that maps universal motion components onto linguistic elements does not illuminate cognitive mechanisms that link grammatical status with cognitive phenomena, such as attention and memory biases. In the case of salience, Talmy (1985, 2000) and Slobin (2006) actually make incompatible assumptions about the effects of encoding: The former views encoding in the main verbs as backgrounding of motion components and the latter as heightening their salience. Slobin's (2006) manner salience hypothesis links linguistic forms and language effects through frequency but does not specify

what frequencies are necessary to shape language-specific patterns, what cognitive mechanisms govern the process, and how we can factor in high-frequency nonmanner verbs, such as the English *go*, *come*, and *get*.

In the absence of a much-needed conversation about the nature of language effects in motion cognition, empirical studies continue to treat English as a prototypical manner language and to rely on it as a stand-in, representative of other S-languages (e.g., Cardini, 2010; Filipović, 2011; Finkbeiner et al., 2002; Gennari et al., 2002; Hohenstein et al., 2006; Larrañaga et al., 2011; Loucks & Pederson, 2011; Papafragou et al., 2002, 2008; Papafragou & Selimis, 2010). The purpose of the present study is to ask whether we are justified in treating English as a canonical manner language and, if not, whether we can find productive ways to move beyond the frequency of manner encoding and Talmy's typology in understanding the relationship between language and cognition in the domain of motion.

VERBS OF MOTION IN RUSSIAN AND ENGLISH

To show that English cannot be unproblematically treated as a prototypical manner language and to put forth an alternative approach to the study of motion cognition, we will compare English and Russian on three dimensions of motion encoding linked to automaticity of cognitive processing: (a) obligatoriness of encoding of manner, directionality, and aspect, (b) boundedness of motion encoding, and (c) complexity of motion encoding.

The first of these, *obligatoriness*, involves the degree to which lexical or grammatical marking of a particular distinction is necessary in the language in question (Lucy, 1992, 1996). The effects of obligatoriness have been explored in the domain of number marking through triad categorization tasks, where participants have to decide on the similarity between simple objects and their shape and material alternates (Gathercole & Min, 1997; Imai & Gentner, 1997; Imai & Mazuka, 2003, 2007; Li, Dunham, & Carey, 2009; Lucy, 1992; Sera & Goodrich, 2010; Subrahmanyam & Chen, 2006). These studies reveal that speakers of the noun class languages English and Spanish, where plural is marked obligatorily on the majority of nouns, commonly group the items on the basis of shape. This grouping is interpreted as a language effect whereby the obligatory count/mass distinction draws attention to discreteness of entities. In contrast, speakers of classifier languages like Chinese, Japanese, Korean, and Yucatec, where plural is marked optionally on a small number of nouns, tend to group together entities similar in material, suggesting that the use of mass nouns accompanied by classifiers increases sensitivity to material or substance. Together, these findings suggest that obligatoriness of linguistic encoding may increase perceptual attention to the distinction in question and automaticity of its processing, with *automaticity* referring to fast, efficient, and stabilized patterns of processing (Segalowitz, 2010). But what do these findings mean for linguistic encoding of motion?

Despite the common perception of English as a manner language, manner encoding in English is, in fact, optional. English does not require its speakers to encode manner obligatorily—to discuss motion, English speakers can also appeal to high-frequency generics, such as *come*, *go*, and *get*, that cover a wide range of motion events (arriving, departing, entering, exiting, and moving up/down/across) (e.g., Hasko, 2010a; Iakovleva, 2012). In contrast, Russian does not have such wide-coverage generics—its few nonmanner motion verbs, such as the deictic verb *pribyt'* ('to arrive') or the vertical event verbs *podniat'sia* ('ascend') and *spustit'sia* ('to descend') refer to specific motion events, making manner encoding obligatory in most contexts.[2] As a consequence, in contexts where English speakers talk about *going* or *getting* somewhere, Russian speakers are required to differentiate between motion on foot (*idti/khodit'* 'to walk') and motion by means of transportation (*ekhat'/ezdit'* 'to ride, to drive'). The difference between the two languages, therefore, lies not in the number of manner or nonmanner verbs or the frequency of their use but in the scope of motion generics (wide in English, narrow in Russian) and, consequently, in the number and type of motion events that can be described with generics.

The impact of these differences on performance can be seen in Slobin's (2004a, 2006) study of narratives elicited by Mayer's (1969) book *Frog, where are you?*. In descriptions of the owl suddenly appearing from the hole in the tree, L1 speakers of Dutch, German, and English favored generic deictic path verbs, such as *come* or *appear*, using manner verbs, respectively, in 17%, 18%, and 32% of all descriptions. In contrast, L1 Russian speakers used manner verbs, such as *vyletela* ('out-flew'), 100% of the time. Hasko's (2010a) study extended these findings to other events in *Frog, where are you?*, showing that L1 English speakers were much more

likely to opt for nonmanner generics (29% of all motion verbs) than L1 speakers of Russian (11%).

Another obligatory, and this time grammaticized, distinction encoded in Russian is *directionality* of motion. This category does not appear in Talmy's (1985) typology and is absent in English, where bare motion verbs refer to motion proceeding in a single direction (e.g., *to walk*, *to run*). Russian grammaticizes directionality through stem variation in a closed class of high-frequency motion verbs, where each verb pair contains a *unidirectional verb* that refers to motion proceeding in a single direction (e.g., *ekhat'* 'to ride/drive in one direction') and a *multidirectional verb* that refers to motion proceeding in/from more than one direction, such as aimless movement, round trips, and habitual or repeated motion (e.g., *ezdit'* 'to ride/drive back and forth, repeatedly') (Zalizniak & Shmelev, 2000).

The third distinction obligatorily marked in Russian motion verbs is *aspect*. In English, aspect is a syntactic category that functions in combination with tense; it is not an intrinsic characteristic of verbs, nor is it marked in the infinitive. In Russian, aspect is a lexico-syntactic category, independent of tense, that characterizes all verb forms, including infinitives, imperatives, and participles. All Russian verbs belong to one of two aspectual categories: *imperfective*, which refers to the process, state, or habitual action, and *perfective*, which refers to achievement or accomplishment. Despite some overlap with English progressive and perfective aspects, these categories do not mirror them and do not correspond to tense–aspect combinations encoded in English (Hasko, 2010a; Pavlenko, 2010; Zalizniak & Shmelev, 2000).

The intersection of aspect and directionality adds another layer of complexity to the Russian motion verb system, because base imperfective verbs, which form directionality pairs (e.g., *bezhat'/begat'* 'to be running in a single direction'/'to run around or back and forth'), can be combined with different prefixes to form a variety of perfective verbs, such as ***po**bezhat'* ('to start running, to run somewhere'), ***za**bezhat'* ('to run in and out, to stop by') or ***v**bezhat'* ('to run in'). Since prefixes also mark other distinctions, the same prefix can create a perfective and an imperfective verb (e.g., ***s**bezhat'* 'to run down PERFECTIVE'), ***s**bégat'* ('to run somewhere and come back PERFECTIVE'), ***s**begát'* ('to be running down IMPERFECTIVE') (Hasko & Perelmutter, 2010).

These verbs also illustrate the second major difference between English and Russian, in the *compactness* and *boundedness* of motion encoding.[3] Talmy's (1985) typology treats bounded and unbounded morphemes equally as satellites, yet from a psycholinguistic point of view boundedness does make a difference: In the process of making interlingual identifications, L2 learners systematically distinguish between bounded and unbounded morphemes (Jarvis & Odlin, 2000; Jarvis & Pavlenko, 2008). This means that the first impulse of an L1 English speaker translating *ran down* into L2 Russian would be to match the English morphemes with their Russian counterparts *bezhala* ('ran, was running') and *vniz* ('down') and not with the prefixed verb ***s**bezhala* ('down-ran'). The prefixed perfective verbs, like ***s**bezhala* ('ran down'), ***po**bezhala* ('started running'), ***za**bezhala* ('ran in and out'), or ***u**bezhala* ('ran away'), may have to be acquired as individual items. The mapping is further complicated by the fact that information encoded in English particles may be encoded in Russian both in the prefixes and in the prepositions (e.g., ***s**bezhala **v**niz* 'down-ran in-down'). The learner's task is particularly challenging because motion encoding in Russian is simultaneously more compact (i.e., encoded through bounded morphemes) and more distributed than it is in English. In English, the key aspects of motion are encoded in verb stems and particles (as well as prepositions), while in Russian the information is distributed between the stems, prefixes, suffixes, inflections, and particles (as well as prepositions).

Last but not least, the number of distinctions obligatorily marked in Russian motion verbs (e.g., manner, directionality, aspect, number, gender) also results in much greater *complexity*, seen in greater informational load carried by individual Russian motion verbs. This means that in the lexicalization of motion events, L1 Russian speakers are required to pay simultaneous attention to several types of information that are not obligatorily encoded in English, most notably manner, directionality, and temporal contours of motion events (aspect).

The next question to ask is whether these differences in obligatory attention foci have cognitive consequences for the L2 learning process. Do they shape different tasks for L1 English learners of L2 Russian and L1 Russian learners of L2 English and different patterns of cross-linguistic influence?

MOTION LEXICONS OF RUSSIAN–ENGLISH AND ENGLISH–RUSSIAN BILINGUALS

Teachers of Russian as a second or foreign language are fully aware of the challenges presented by the Russian motion lexicon to

speakers of non-Slavic languages. In the English-speaking world, these difficulties gave rise to a whole industry of websites and textbooks dedicated solely to Russian motion verbs (e.g., Alexandrova & Watt, 2013; Mahota, 1996; Muravyova, 1986; Polivin, 2010). Yet, despite this increased attention, studies show that the L2 Russian motion lexicon remains a challenge for L1 English speakers.

Hasko (2009, 2010b) compared Frog story narratives elicited from speakers of L1 Russian ($n = 30$) with narratives elicited from American L2 learners of Russian ($n = 30$). The learners had studied Russian, on average, for about 5 years and were enrolled in advanced-level Russian courses in an intensive summer immersion program, based on rigorous placement tests, including a simulated Oral Proficiency Test. Nevertheless, their narratives revealed a high percentage of errors in motion encoding, lower lexical diversity in the motion lexicon, and insufficient encoding of manner and directionality, compared to L1 Russian speakers.

Among the key errors were two types of L1 semantic transfer. The first type stems from incorrect interlingual identifications between English generics, such as *go*, and manner-specific Russian verbs, such as *idti* ('to walk'). One participant stated, for instance, *Sova prishla i mnogo pchel prishli* ('The owl walked-in and many bees walked-in PL'). The learner was familiar with the verb *letet'* ('to fly') yet in online narration the motion event triggered the generic English *come*, linked, incorrectly, to the manner-specific Russian *idti*. This pattern suggests that the L2 learners still treat manner of motion as optional and that Russian verbs do not trigger the same mental imagery in L1 and L2 Russian speakers.

The second type of transfer stems from incorrect identifications between inherently unidirectional English motion verbs and multidirectional Russian verbs. Thus, another participant stated *Liagushka polzala iz banki* ('[The] frog was crawling around out [of] [the] jar'). *Polzala* ('was crawling around PAST IMPERFECTIVE FEMININE') is an inappropriate choice for a single finite motion event, more appropriately described with *vypolzla* or *vylezla* ('crawled-out'/'climbed-out PAST PERFECTIVE FEMININE'). This pattern of interlingual identifications reveals that the learner has not internalized the distinctions in terms of directionality and aspect (and associated mental imagery) and focused only on motion components encoded in English, treating members of directional and aspectual verb pairs as equivalents of a single English verb.

Gor et al. (2009) compared perception and production of Russian motion verbs in American learners of L2 Russian ($n = 36$) with that in L1 Russian speakers ($n = 10$) and early bilingual heritage speakers of Russian in the United States ($n = 24$). They found that neither L2 learners nor early bilinguals achieved nativelike mastery of the Russian motion lexicon. In the verb and sentence completion tasks, early bilinguals outperformed L2 learners with similar levels of proficiency (likely, as a result of more extensive input) but on the grammaticality judgment task early bilinguals were more willing to accept incorrect substitutions of multidirectional verbs with unidirectional ones (likely, as a result of insufficient grammar instruction).

Similar difficulties have been documented by Polinsky (2008), who found that early bilinguals no longer perceived L1 Russian verbs as perfective or imperfective—instead, following the constraints of English, they retained only one member of each aspectual pair, which they treated as lexical items without specified aspectual value. In Pavlenko's (2010) study, narratives by four early Russian–English bilinguals displayed simplification of aspect, directionality, and manner distinctions, interpreted as incomplete acquisition. Some instances also revealed L2 English influence on L1 Russian: Under the influence of the English *go*, for instance, speakers extended the L1 Russian verb *idti* ('to walk') to references to riding/driving, climbing, crawling, and flying, thus patterning with L1 English speakers learning L2 Russian. In contrast, 70 Russian–English bilinguals who arrived in the United States after the age of 14 did not differ from L1 Russian speakers in Russia in terms of accuracy and lexical diversity of the L1 motion lexicon.

Now, what about L1 Russian learners of L2 English? Iakovleva (2012) examined descriptions of motion in short animated clips in a population that mirrored that in Hasko's (2009, 2010b) study, namely L1 Russian learners of L2 English in a classroom context in Russia. The study compared descriptions of voluntary motion along three paths (up, down, across) by L1 Russian speakers ($n = 12$), L1 English speakers ($n = 17$), and L1 Russian learners of L2 English ($n = 12$) at intermediate and advanced levels of proficiency, with ages of L2 acquisition between 5 and 11 years. Comparative corpus analysis demonstrated that L1 English speakers relied on the canonical S-language pattern (i.e., encoding manner in verbs and path in satellites) in all three tasks, while L1 Russian speakers

displayed three different patterns: S-framing for motion across, conflation of manner and path for motion up, and V-framing, that is, reliance on generics, for downward motion. These findings confirm that the typological profile of Russian is highly complex and variable and that it does not easily fit in the traditional S-language category. L1 Russian learners of L2 English were mostly target-like, especially in descriptions of up- and across-events, suggesting that the lesser complexity of the English motion system facilitates acquisition and constrains negative transfer. At the same time, they still displayed subtle traces of L1 influence, in terms of types of information encoded. For instance, one participant produced a sentence *A girl is crossing the lake on skates or she is crossing the lake by skating*. The participant's attempt to specify the manner of motion in both clauses reveals that their performance is still shaped by the automatic habit to encode information about manner.

Together, these findings suggest that differences in obligatoriness, boundedness, and complexity of motion components shape different tasks for speakers of Russian and English learning each other's languages. L1 English speakers learning L2 Russian have to learn to pay more attention to manner, aspect, and directionality in order to make their encoding automatic. They also have to restructure linguistic patterns of motion encoding, learning to encode multiple new types of information in a more distributed way, through prefixes, verb stems, suffixes, inflections, and prepositions. In contrast, L1 Russian speakers learning L2 English begin by relying on their automatic attention biases and learn to pay less attention to manner and directionality and to encode path information through particles and prepositions. What we do not know yet is how the two motion lexicons interact in bilingual speakers, because the studies to date have focused on a single language of bilingual speakers, either L1 (e.g., Pavlenko, 2010) or L2 (e.g., Hasko, 2009, 2010b; Iakovleva, 2012). In what follows, we expand this line of research and examine lexicalization of motion in both languages of Russian–English bilinguals.

RESEARCH DESIGN

Research Questions

Based on the findings to date, we have articulated four research questions for our study:[4]

RQ1. What are the similarities and differences between L1 speakers of Russian and English in lexicalization of motion in the context of elicited narratives?

RQ2. What are the similarities and differences between the motion lexicon of L1 English speakers and the L2 English motion lexicon of Russian–English bilinguals?

RQ3. What are the similarities and differences between the motion lexicon of L1 Russian speakers and the L1 Russian motion lexicon of Russian–English bilinguals?

RQ4. What, if any, role is played by the combined effects of the Age of Arrival (AoA) and the Length of Residence (LoR) in the L2 context in the acquisition of L2 English motion lexicon and the maintenance of the L1 Russian motion lexicon by Russian–English bilinguals?

Participants

Ninety-nine participants took part in the study: (1) L1 speakers of Russian ($n = 31$) were undergraduates at Tomsk State University, Russia; Russian was their native and dominant language, yet they also had some (instructed) knowledge of English and a few reported some knowledge of other languages (Buriat, French, German, Japanese, Kazakh), (2) L1 speakers of English ($n = 38$) were undergraduates at Temple University, Philadelphia; English was their native and dominant language and all reported low levels of competence in foreign languages (French, German, Italian, Japanese, Latin, Spanish), (3) Russian–English bilinguals (REB) were undergraduate ($n = 24$) and graduate students ($n = 6$) at Bryn Mawr College, Chestnut Hill College, and Temple University, Philadelphia; some had limited competence in languages other than English and Russian. Clearly, the majority of our L1 speakers are not monolingual under a strict definition and our bilinguals could be considered multilingual, yet we do not see the L2 or L3 as a confounding variable, because of low levels of foreign language competence and because these L2s and L3s were mainly V-languages that do not require obligatory encoding of either manner or directionality and thus could not enhance sensitivity to these distinctions. All groups included male and female participants but we made no attempt to control for or to investigate the effects of gender, because previous studies on lexicalization of motion, as already discussed, have not identified any gender effects in this area of the lexicon.

As seen in Table 1, bilingual participants were subdivided into three groups based on the AoA and LoR in the L2 context: (1) 10 early bilinguals,

TABLE 1
Study Participants

Participant Group	Age (Years) at Time of Testing	Age (Years) of Arrival in L2 Context (AoA)	Length (Years) of Residence in L2 Context (LoR)	Proficiency
L1 Russian Speakers ($n=31$)	20.7 (19–23)			
L1 English Speakers ($n=38$)	19.6 (18–22)			
Russian–English Bilinguals ($n=30$)	22.0 (18–32)			
Early Russian–English Bilinguals ($n=10$)	21.3 (18–32)	3.3 (0–6)	17.9 (14–28)	Russian: 4.4 English: 7.0
Childhood Russian–English Bilinguals ($n=10$)	19.6 (18–26)	9.2 (7–13)	10.5 (8–14)	Russian: 5.2 English: 6.8
Late Russian–English Bilinguals ($n=10$)	25.1 (19–31)	19.5 (14–29)	5.5 (2–12)	Russian: 6.7 English: 5.6

Note. Proficiency based on self-ratings using a scale from 0 to 7, with 0 meaning 'not at all' and 7 'native or native-like' (ranges in parentheses).

(2) 10 childhood bilinguals, and (3) 10 late bilinguals. While combining the two variables does not allow us to attribute the effects unambiguously to one or the other, this seemed like the only reasonable approach given the fact that participants who arrived youngest had also been in the United States longest. One of the early bilinguals was born in the United States, and the rest of the early and childhood bilinguals arrived in the United States as members of Russian-speaking immigrant families from Russia (8), Ukraine (5), Moldova (2), Belarus (1), Georgia (1), Latvia (1), or Uzbekistan (1). They used Russian at home with family members and, in a few cases, with friends and colleagues at work. All attended secondary school in the United States and used English for interactional and educational purposes. The key differences between these two subgroups were in the AoA and the LoR (Table 1) and in the self-reported levels of proficiency in the two languages (Table 2).

Late bilinguals differed from the other two groups in their learning trajectory, interactional contexts, and self-reported proficiencies. All ten came from Russian-speaking families in Belarus (4), Kazakhstan (2), Russia (2), or Ukraine (2), four arrived in the United States as immigrants, four as students, and two as green-card holders. Most had been exposed to English prior to their arrival through secondary school and college-level instruction; consequently, their actual age of L2 acquisition is earlier than the AoA adopted here, yet we decided to keep the definition of the AoA consistent for all three groups because we had no means to control for the quality and type of English instruction prior to their arrival in the United States. All reported using Russian to talk to family members and Russian-speaking friends and for leisure activities (books, TV, movies, internet). They also regularly used English for everyday interaction, education, and work.

Methods and Procedures

Narratives were elicited from all participants individually with the use of the book *Frog, where are you?* (Mayer, 1969), selected because it facilitated comparisons with other Russian–English Frog story corpora (e.g., Hasko, 2009, 2010a, 2010b). The participants were asked to describe, picture by picture, what they saw happening in the book. Narratives of bilingual participants were elicited twice, once in each language, with elicitation conducted in separate sessions, with a minimum

TABLE 2
Self-Reported Levels of Russian and English Proficiency

	Speaking		Listening		Reading		Writing	
Participants	Russian	English	Russian	English	Russian	English	Russian	English
Early Bilinguals	5.0	7.0	6.3	7.0	3.3	7.0	2.9	7.0
Childhood Bilinguals	5.8	6.8	6.5	6.9	4.6	6.9	4.0	6.5
Late Bilinguals	6.9	5.3	7.0	5.8	6.5	5.9	6.4	5.3

Note. Ratings based on a 0 to 7 Likert scale with 0 meaning 'not at all' and 7 'native or native-like' (ranges in parentheses).

interval of 2 weeks and a maximum of 2 years. In each group, five randomly selected participants first performed the task in Russian and the other five in English. The task was performed in the context of a larger study where participants also performed other tasks, such as naming and typicality judgments of drinking containers. Sociodemographic data were collected via a written language background questionnaire and a tape-recorded semi-structured language learning history interview. The interviews were conducted in the language of subsequent narrative elicitation, in order to ensure the activation of the language in question.

Data Analysis

All narratives were transcribed in the language of the telling by one of the two authors and cross-checked by the other. We then created corpora containing *voluntary motion verbs* that referred to the figure changing position or location. Consistent with this definition, we included English phrasal verbs (e.g., *sit down*, *stand up*) and Russian perfective verbs (e.g., *sest'* 'to sit down,' *vstat'* 'to stand up') and excluded verbs referring to caused motion, English action verbs, and Russian imperfective verbs (e.g., to sit/*sidet'*, to stand/*stoiat'*) because they involve no change in position. Only verbs on which both researchers agreed were included in the analysis.

Next, all of the verbs in the respective corpora were divided into types, counted as tokens, and categorized in terms of manner, path, and, in Russian, directionality. In Russian, perfective and imperfective verbs and verbs with different affixes were counted as separate types, even if they had the same verb root, because they referred to different types of motion, so that ***pri***bezhat' ('to arrive by running'), ***vy***bezhat' ('to run out [with a possibility of return]') and ***u***bezhat' ('to run away') would be counted as different verbs. The same approach was adopted in English where phrasal verbs with the same root and different particles were counted as different verbs (e.g., *get* ***in***, *get* ***out***). Once again, all categorization was based on consensus between the two researchers.

Quantitative analyses, based on type and token frequencies, compared four corpora—L1 Russian, L1 English, Bilingual L1 Russian, and Bilingual L2 English—on lexical diversity, type of path encoding, and the frequency of motion verb use and manner encoding. Throughout, we used an independent samples *t*-test to compare L1 Russian and L1 English corpora; one-way ANOVAs for three-way comparisons among L1 Russian, L1 English, and Bilingual L1 Russian (or L2 English), and a paired samples *t*-test for REB (Russian–English Bilingual) corpora. To examine differences between the three REB groups (early, childhood, and late bilinguals), we used Kruskall–Wallis tests with a Bonferroni correction.

To examine lexical diversity, we have adopted Dugast's Uber formula, which is better suited for relatively small samples with narratives of different length (Jarvis, 2002):

$$\text{Uber } index = U = \frac{(\log tokens)2}{(\log tokens - \log types)}$$

Log, here, stands for logarithm, which is a quantity representing the power to which a fixed number (the base) must be raised to produce a given number. In this formula, the squared logarithm of all the verbs produced by a participant is divided by the difference of the logarithm of all the words and logarithm of the word types produced by a participant. Logarithms are used for maximum-likelihood estimation to find a nonlinear relationship between variables. To carry out the analysis, we calculated the total number of motion verbs (tokens) used by each participant. Then, we calculated the number of types of motion verbs used by each participant. After tabulating the total number of tokens and types of motion verbs in each narrative, the total number of tokens and types was calculated for each group of the participants and then the Uber index was calculated for each participant and the formula was applied to determine whether there were statistically significant differences in lexical diversity among the four groups.

Qualitative analyses involved two steps. First, we identified lexical errors and deviations from standard Russian and English usage in the REB corpora: Instances counted as errors or deviations only if the two researchers were in agreement and if no L1 speaker made the same lexical choice in the same context. Next, we identified instances of cross-linguistic influence, that is, lexicalization choices that differed from those made by L1 speakers of the language in question and patterned with those made by the speakers of the other language.

RESULTS

Lexical Diversity of the Motion Lexicons and Frequency of Motion Verb Use

In the analysis of motion verb use, independent samples *t*-tests showed that L1 Russian speakers

TABLE 3
Verbs of Motion in Russian and English Narratives

	Corpus Size and Mean Narrative Length	Verbs of Motion (Proportion)	Verbs of Motion (Types)	Manner Encoding in the Motion Corpus	Path Encoding in the Motion Corpus (Path Segments)
L1 Russian ($n=31$)	15,239	719 (4.7%)	136	694 (96.5%)	
	Mean = 491.6	Mean = 23.2		Mean = 22.4	Mean = 29.6
	$SD=173.9$	$SD=7.1$		$SD=7.0$	$SD=10.0$
L1 English ($n=38$)	19,430	624 (3.2%)	87	407 (65.2%)	
	Mean = 511.3	Mean = 16.4		Mean = 10.7	Mean = 12.9
	$SD=241.0$	$SD=6.3$		$SD=4.2$	$SD=6.0$
REB L1 Russian ($n=30$)	11,264	545 (4.8%)	96	537 (98.5%)	
	Mean = 375.4	Mean = 18.2		Mean = 17.9	Mean = 24.3
	$SD=187.3$	$SD=8.0$		$SD=7.9$	$SD=11.0$
REB L2 English ($n=30$)	15,896	505 (3.2%)	66	315 (62.4%)	
	Mean = 529.9	Mean = 16.8		Mean = 10.5	Mean = 14.3
	$SD=218.6$	$SD=7.9$		$SD=5.4$	$SD=7.0$

used significantly more motion verbs ($M=23.2$) than L1 English speakers ($M=16.4$) ($t[67]=4.2$, $p<.000$, $r^2=.20$), as well as more motion verb types (136 vs. 87), displaying significantly higher lexical diversity of the motion lexicon ($M=15.8$) than L1 English speakers ($M=11.7$) ($t[66]=2.4$, $p<.05$). These findings, summarized in Table 3, are consistent those obtained by Hasko (2010a) in a comparative analysis of L1 Russian and L1 English Frog story corpora.

One-way ANOVAs indicated significant differences in the number of motion verbs among L1 Russian, L1 English, and REB L1 Russian corpora ($F[2,96]=8.1$, $p<.05$, $\eta^2=.14$) and among L1 Russian, L1 English, and REB L2 English corpora ($F[2,96]=9.3$, $p<.05$, $\eta^2=.16$). Tukey's HSD post hoc analyses revealed that bilinguals performed similarly to L1 English speakers and differed from L1 Russian speakers both in L1 Russian and L2 English ($p<0.5$). A paired t-test found no significant differences in the number of motion verbs used by bilinguals in L1 Russian ($M=18.2$, $SD=8.0$) and L2 English ($M=16.8$, $SD=7.9$).

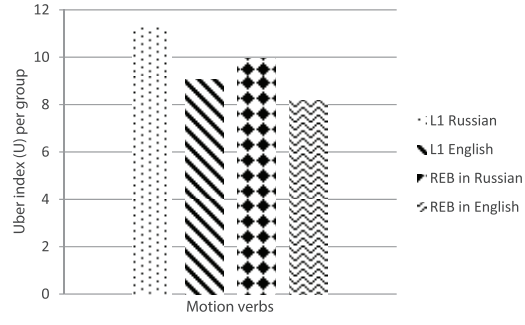
A similar pattern was identified in the analysis of lexical diversity (see Figure 1). One-way ANOVAs revealed statistically significant differences in comparisons of L1 Russian, L1 English, and REB L1 Russian corpora ($F=7.5$, $p=.001$) and of L1 Russian, L1 English, and REB L2 English corpora ($F=11.0$, $p=.000$), with the post hoc analysis showing that L1 Russian speakers had a significantly higher Uber index of lexical diversity ($U=11.3$) than L1 English speakers ($U=9.1$) and bilinguals in L1 Russian ($U=9.9$) and L2 English ($U=8.2$). No differences were found between bilinguals' L1 and L2 corpora and the L1 English corpus, nor were there any significant differences in lexical diversity between bilinguals' L1 and L2 corpora ($t[29]=.62$, $p>.05$).

These findings are interesting because they show that, in the context of significant differences between L1 Russian and L1 English speakers, bilinguals display a pattern of convergence in their two languages that is proceeding in the direction of L2 English, as seen in the decrease in lexical diversity and the types of motion verbs in the L1 Russian lexicon.

Manner Encoding

In the analysis of manner encoding, independent samples t-tests revealed that L1 Russian speakers used a significantly higher percentage of manner verbs (96.5%) than L1 English speakers

FIGURE 1
Lexical Diversity of Motion Vocabulary in the Four Corpora



(65.2%) ($t[67] = 12.3$, $p < .001$) and significantly more manner verbs per narrative ($M = 22.4$) than L1 English speakers ($M = 10.7$) ($t[67] = -11.70$, $p < .05$, $r^2 = .52$). L1 English narratives contained several high-frequency nonmanner verbs, such as *come*, *go*, *get*, and *escape*, while L1 Russian narratives contained only one verb that could be interpreted as a nonmanner motion verb, *ostanovit'sia* ('to stop'). L1 Russian-speaking narrators also made more distinctions in terms of manner, using 129 types of manner verbs as compared to 62 types in the L1 English corpus. An independent samples *t*-test showed that L1 Russian narratives displayed significantly higher diversity of manner verbs ($M = 15.9$, $SD = 4.5$) than L1 English narratives ($M = 7.7$, $SD = 3,0$) ($t[67] = -9.0$, $p < .05$, $r^2 = .54$). These findings—consistent with the findings of Hasko (2010a) and Iakovleva (2012)—suggest that L1 Russian speakers encode manner more frequently and make more fine-grained distinctions in this domain than L1 speakers of English.

One-way ANOVAs indicated a significant difference in the number of manner verbs among L1 English, L1 Russian, and REB L2 English corpora ($F[2,96] = 47.8$, $p < .05$, $\eta^2 = .49$) and among L1 English, L1 Russian, and REB L1 Russian corpora ($F[2,96] = 29.6$, $p < .05$, $\eta^2 = .38$). A post hoc analysis showed that bilinguals speaking L1 Russian and L2 English used significantly fewer manner verbs than L1 Russian speakers; no differences were found between L1 English speakers and bilinguals speaking L2 English. The obligatoriness of manner encoding in L1 Russian was maintained in the bilingual corpus (98.5%) but it was not transferred to L2 English, where the frequency of manner encoding approximated that of L1 English speakers (62.4% vs 65.2%). A paired samples *t*-test revealed a significant difference in the number of manner verbs used in the L1 Russian ($M = 17.9$, $SD = 7.9$) and the L2 English ($M = 10.5$, $SD = 5.4$) ($t[29] = 5.8$, $p = .000$) of bilingual speakers. In terms of the types of manner verbs, one-way ANOVAs indicated differences among L1 English, L1 Russian, and REB L2 English corpora ($F[2,96] = 63.3$, $p < .05$, $\eta^2 = .56$) and among L1 English, L1 Russian, and REB L1 Russian corpora ($F[2,96] = 30.9$, $p < .05$, $\eta^2 = .39$). Post hoc Tukey's HSD tests revealed significant differences between all corpora except for L1 English and L2 English. The L1 Russian lexicon of bilingual speakers displayed a significantly higher diversity of manner verbs ($M = 11.4$, $SD = 5.4$; 93 types) than L2 English ($M = 6.6$, $SD = 3.1$; 40 types) ($t[29] = 4.6$, $p = .000$).

Qualitative analyses of manner encoding revealed no influence of L1 Russian on L2 English. L2 English influence on L1 Russian was found in semantic extensions and attrition of category boundaries and obligatory distinctions. Most prominently, under the influence of the generic English *go*, five of the ten early bilinguals extended manner verbs *idti/khodit'* ('to walk') and their derivatives to climbing, flying, jumping, and crawling as in the following example:

EXAMPLE 1

маленькое	животное	выходит	из	дырку
malen'koe	*zhivotnoe*	*vykhodit*	*iz*	*dyrku*
(a) small	animal	out-walks	from	(the) hole

'A small animal is walking out of the hole.'
(an appropriate lexical choice here is *vylezaet* ['out-climbs'/'crawls out'])

Together, these findings show that the L1 Russian of bilingual speakers displays lower frequency and reduced lexical diversity of the manner lexicon, situated in between diversity levels displayed by L1 speakers of Russian and English. The obligatory encoding of manner in bilinguals' L1 Russian remains automatic but some high-frequency Russian manner verbs are incorrectly assigned the meanings of English generics. In L2 English, bilinguals display lower sensitivity to manner, following the L1 English pattern.

Path and Directionality Encoding

An analysis of path segments (path verbs, satellites, adverbs, prepositions) demonstrated that L1 English speakers tended to encode path through one-segment clauses (87%), while L1 Russian speakers employed more two-segment path clauses (55%), which is consistent with the higher complexity and distributed nature of motion encoding in Russian. The independent samples *t*-test showed that L1 Russian speakers used a significantly higher number of path segments per narrative ($M = 29.6$) than L1 English speakers ($M = 12.9$) ($t[67] = -8.5$, $p < .05$, $r^2 = .52$). Replicating the findings of Hasko's (2010a) study, these differences suggest that L1 Russian speakers attend to both manner and path of motion to a greater degree than L1 English speakers.

Bilinguals displayed language-specific patterns in both languages, favoring one-segment clauses in L2 English (86.7%) and two-segment path clauses (most commonly a prefix + preposition) in L1 Russian (56.4%). Examples of such two-segmented path clauses follow:

EXAMPLE 2

(a)	он [мальчик]	залез	на	камень
	on [mal'chik]	*zalez*	*na*	*kamen'*
	he [a boy]	up-climbed	on	(the) stone
	'He climbed on the stone.'			
(b)	мальчик	у бегает	от	филина
	mal'chik	*ubegaet*	*ot*	*filina*
	(the) boy (is)	away-running	from	(the) (eagle-)owl
	'A boy is running away from the owl.'			

One-way ANOVAs revealed significant differences in the number of path segments for both comparisons, L1 English, L1 Russian, and REB L2 English corpora ($F[2,96] = 45.9$, $p < .05$, $\eta^2 = .48$) and L1 English, L1 Russian, and REB L1 Russian corpora ($F[2,96] = 30.78$, $p < .05$, $\eta^2 = .39$). There were no differences between L1 Russian speakers and REB L1 Russian corpora nor between L1 English and REB L2 English. A paired *t*-test found a significant difference in path segments used in L1 Russian ($M = 24.3$) and L2 English ($M = 14.3$) ($t[29] = 5.47$, $p = .000$). These findings suggest that bilinguals maintain language-specific patterns of path encoding.

Since directionality is encoded in Russian but not in English, a comparison of usage of unidirectional and multidirectional verbs was carried out between L1 Russian and REB L1 Russian corpora. A comparison of the usage of unidirectional verbs by L1 Russian speakers ($M = 16.6$) and bilinguals in L1 Russian ($M = 13.7$) revealed no differences ($t[59] = 1.5$, $p = .92$), nor did the comparison of usage of multidirectional verbs in L1 Russian ($M = 6.7$) and REB L1 Russian ($M = 4.5$) ($t[59] = 1.8$, $p = .60$). Bilinguals also maintained the preference for unidirectional perfective verbs (59.9% of the L1 Russian corpus, 66.5% of the REB corpus). These quantitative patterns, however, do not tell us much about the accuracy of individual lexical choices. Qualitative analysis found that, to mark the beginning of an action, some bilinguals opted, incorrectly, for verbal constructions with multidirectional imperfective verbs:

EXAMPLE 3

они	будут летать	за	собакой
oni	*budut letat'*	*za*	*sobakoi*
they	will (be) flying (around)	after (the) dog, Dat	

'They will be flying after the dog.'
(an appropriate lexical choice here is *poletiat* ['will fly, in one direction'])

Together, these findings suggest that in L2 English bilinguals approximate L1 English patterns without displaying any L1 Russian influence, while in L1 Russian they maintain language-specific lexicalization of path and obligatory encoding of directionality, with some loss of lexical precision and/or L2 English influence.

AoA/LoR Effects on Bilinguals' Motion Lexicons

The previous analyses treat Russian–English bilinguals as a group, but we also wanted to examine potential differences among the three bilingual groups. Contrary to our expectations, a series of Kruskall–Wallis tests revealed that there were no significant differences among the three groups on any aspects of motion encoding in L1 Russian, even though the Uber index of lexical diversity was highest in late bilinguals. In L2 English, there was a statistically significant difference in lexical diversity ($\chi^2 = 10.6$, $p = 0.005$) between early and childhood bilinguals ($Z = -2.9$, $p = 0.004$), and early and late bilinguals ($\chi^2 = -2.7$, $p = 0.007$). Early bilinguals also used significantly more types of English manner verbs than late bilinguals ($\chi^2 = 7.6$, $p = 0.006$), a result that can be explained by differences in English proficiency, which, in turn, stem from the earlier AoA and the longer LoR in the United States. Qualitative analyses of deviations from standard usage revealed only 18 errors in the L2 English corpus, all of them produced by four late bilinguals. It appears that early, childhood, and the majority of late bilinguals have fully acquired English patterns of motion lexicalization. As a consequence, the discussion that follows will focus on motion encoding in the L1 Russian of bilingual speakers.

As seen in Table 4, the L1 Russian corpus contained 81 errors, produced by 26 participants (10 early bilinguals, 9 childhood bilinguals, 5 late bilinguals). These errors were divided into three categories, based on the aspects of motion events they involved: (a) aspect and directionality (39%), (b) manner (30%), and (c) path (31%).

The first category involved spatiotemporal contours encoded through aspect and directionality, with particular difficulties displayed in the use of prefixed perfective verbs to mark the beginning of action. We have already illustrated this pattern in Example 3, where the speaker used an auxiliary verb and a multidirectional imperfective verb instead of a perfective verb. Example 4 illustrates a different approach to the same lexicalization problem, namely a verbal

TABLE 4
Errors in the L1 Russian Motion Lexicon of Russian–English Bilinguals

Types of Errors	Early REB (# of cases)	Childhood REB (# of cases)	Late REB (# of cases)	Total
Aspect and Directionality	19	9	4	32 (39%)
Manner	14	9	1	24 (30%)
Path	10	8	7	25 (31%)
Total	43 (53%)	26 (32%)	12 (15%)	81

construction with the verb *nachat'* ('to start, to begin') and a multidirectional imperfective verb used, incorrectly, to mark the beginning of action:

EXAMPLE 4

олень	начал	скакать
olen'	*nachal*	*skakat'*
(the) deer	started	hopping/galloping

'The deer started to hop/gallop.'
(an appropriate lexical choice here is ***po**skakal* ['set off hopping'/'galloping'])

The second category of errors involved the loss of lexical precision in the marking of manner. In some contexts, participants extended the Russian verbs *idti/khodit'* ('to walk'/'to be walking') and their derivatives to other types of motion under the influence of the generic English *go*, as seen in Example (1). In other contexts, bilinguals extended the meanings of other Russian manner verbs to contexts to which they do not apply, as seen in Example 5:

EXAMPLE 5

мальчик	запрыгнул	на дерево
mal'chik	*zaprygnul*	*na derevo*
(the) boy	jumped	on (the) tree

'The boy jumped on the tree.'
(an appropriate lexical choice here is ***za**lez* ['climbed up'])

The third category of errors involved incorrect marking of path through prefixes and prepositions, as seen in Example 6:

EXAMPLE 6

собака	**у**пала	из	дома
sobaka	***u**pala*	*iz*	*doma*
(the) dog	down-fell	from	on (the) tree

'The dog fell down from the house.'
(an appropriate lexical choice here is ***vy**pala* ['out-fell'])

Both this and the previous examples show that while overall the L1 Russian motion lexicon remains stable, some participants are beginning to lose certain subtle distinctions, such as the distinction between ***u**past'* ('to fall down') and ***vy**past'* ('to fall out of an enclosed entity'). 53% of all the errors occur in early bilinguals but, given the fact that they differed from other groups in both AoA and LoR, we cannot attribute the findings to one or the other variable, only to their combined effect. In the absence of longitudinal data, it is also impossible to determine with certainty whether these errors reflect incomplete acquisition of the L1 Russian motion lexicon, L2 English influence on the previously acquired L1 Russian, attrition of the previously acquired L1 Russian distinctions, or a combination of all three.

DISCUSSION AND CONCLUSIONS

The findings of the present study show that L1 Russian speakers segment motion events in a more fine-grained way and pay greater attention to both path and manner of motion than L1 English speakers. More specifically, in Frog story narratives, L1 Russian speakers marked manner in a near-obligatory fashion, used significantly more types and tokens of motion verbs, and encoded more complex temporal contours (aspect) and locative trajectories (path and directionality) than speakers of L1 English. These differences, consistent with the findings of Hasko (2010a) and Iakovleva (2012), suggest that the reliance on English as a language of convenience in studies of motion language and cognition may have skewed the findings to date because English does not require obligatory manner encoding.

Following Lucy (1992, 1996), we find the difference between obligatory and optional encoding of manner important for research on language and cognition and L2 acquisition. If the encoding is optional, its frequency, be it in the lexicon or in speech, is a poor predictor of attention biases, not least because it may vary across contexts and tasks. Obligatory or near-

obligatory marking is a more stable predictor and we hypothesize that it is the near-obligatory marking of manner in Polish that accounts for the differences in attention to manner between speakers of Polish and speakers of other S-languages revealed by Bohnemeyer et al. (2006). This means that, as far as manner is concerned, studies of language effects in motion cognition may be more successful if they compared memory and attention for manner in speakers of languages with optional manner encoding, like French or Spanish, and speakers of languages with obligatory or near-obligatory manner encoding, like Polish or Russian.

Yet the reliance on the S/V dichotomy is only one of the limitations in the study of language effects in motion cognition and L2 acquisition. The second and more serious limitation, in our view, is the focus on universal motion components that are so salient in visual perception that neither attention nor memory are likely to be significantly mediated by language. A more promising line of inquiry in the study of motion cognition and L2 acquisition involves language-specific motion components, such as directionality in Russian or associated motion in Arrernte. Undoubtedly, these components can be expressed in other languages through a variety of means; yet, as argued by Lucy (1992, 1996), what matters most in the study of language effects on cognition is not what can be expressed but what must be expressed. Thus, future studies could productively examine whether L1 Russian speakers perceive unidirectional and multidirectional motion events as categorically distinct, remember locative trajectories better than speakers of languages that do not encode directionality, or display better memory for motion events in general, as a result of the greater complexity in the semantic domain of motion and automaticity of its obligatory distinctions.

While we do not know yet whether obligatoriness and complexity of encoding influence nonverbal cognition, we do know that they affect L2 learning outcomes on two levels: cognitive (meaning components) and linguistic (surface encoding). American learners of L2 Russian faced with the requirement to automatically mark manner, aspect, and directionality of motion display both linguistic difficulties (in mapping unbounded particles, in a distributed manner, onto bounded and unbounded morphemes) and cognitive difficulties (in increasing attention to distinctions that have to be marked automatically and linking motion verbs with the appropriate mental imagery [Hasko, 2009, 2010b]). Erroneous interlingual identifications of Russian manner verbs, such as *idti* ('to walk'), with English generics, such as *to go*, reveal disregard for the manner of motion and thus L1 transfer that is conceptual, rather than linguistic, in nature.

A different situation obtains with L1 Russian learners of L2 English. While our analyses revealed differences in lexical diversity of the L2 lexicon among the three bilingual subgroups, they did not identify any constraints placed by L1 Russian on acquisition of the L2 English motion lexicon. Russian–English bilinguals patterned with L1 English speakers in the frequency of motion verb use and manner encoding and in the preference for one-segment clauses in encoding of path. The lack of L1 Russian influence on L2 English motion lexicon is not surprising because the relationship between the two languages offers no opportunities for negative L1 transfer: English encodes fewer motion components than Russian, does not mark them obligatorily, and has unbounded morphemes that learners can identify with Russian prepositions. As a consequence, our bilingual participants have learned to parse motion events in a more holistic manner and to decrease attention to manner, appealing to generic verbs.

In L1 Russian, all three groups of Russian–English bilinguals maintained the obligatory focus on manner and directionality and the preference for two-segment path encoding and unidirectional perfective verbs. Replicating the results of Pavlenko's (2010) study conducted with different elicitation stimuli, these findings raise an intriguing possibility that automaticity of processing of obligatory distinctions makes them less susceptible to L2 influence and attrition effects in late bilinguals. At the same time, early bilinguals used fewer motion verbs, displayed lower lexical diversity than L1 Russian speakers, and made a variety of errors.

Now, what, if any, relevance do these findings have for the foreign language classroom? While studies of bilingualism in naturalistic settings can only indirectly inform us about foreign language teaching and learning, the findings of our study would not surprise any language instructor—teachers of Russian know perfectly well that Russian motion verbs are difficult to learn and teachers of English know just as well that they need to push their students beyond the generic *come* and *go* to the riches of the English phrasal verb system. The contribution of our study, as we see it, is in highlighting the links among motion encoding, attention, and cognition and in

emphasizing the fact that the difficulties students experience are not simply linguistic but also conceptual and attentional. Russian requires L1 English speakers to pay simultaneous attention to a variety of aspects of motion and to make new obligatory distinctions, be it more generally, in terms of aspect and directionality, or more specifically, in terms of individual motion events, such as falling down (e.g., ***u****past'* 'fall down' vs ***vy****past'* 'fall down out of an entity'). In turn, English may not require L1 Russian speakers to acquire new distinctions but it requires them to decrease attention to some of the distinctions encoded in Russian, to restructure some of conceptual groupings formed through L1 Russian, and to learn to encode locative trajectories through unbounded satellites.

We argue that, to help learners of both L2 Russian and L2 English, instruction cannot be limited to decontextualized form-focused exercises, such as descriptions or fill-in-the-blanks. Rather, the focus of instruction needs to shift to conceptual distinctions—the information load carried by individual forms and mappings between these forms and their dynamic multimodal representations—with clips and videos replacing static textbook pictures (for an extended version of this argument and sample exercises, see Pavlenko & Driagina, 2009). In the L2 Russian classroom, for instance, attention exercises could require students to watch short video clips, to attend to the key aspects of motion events that need to be encoded, and to reflect on these aspects. Comprehension exercises might require students to explain why characters in short stories or video clips opted for particular lexical choices and to decode information contained in single motion verbs, such as *prikhodil* ('came'), which captures a motion event, where a single male came for a visit on foot and already left. Production exercises need to place the forms in meaningful discursive and narrative contexts relevant to and engaging for the learners, rather than in endless series of actions performed by cartoon characters, common for Russian motion verb materials. Some tasks may ask learners to describe a particular video clip and to compare their own lexical choices with those of L1 Russian speakers (e.g., Pavlenko & Driagina, 2009), while others could focus on miscommunication that stems from selection of inappropriate prefixes or particles and the lack of lexical precision. The key to teaching motion vocabulary, as we see it, is in placing it in the meaningful and dynamic context that facilitates cognitive restructuring, development of appropriate mental imagery, and integration of linguistic forms and multi-modal conceptual representations.

ACKNOWLEDGMENTS

We thank the editors and the two anonymous reviewers for their insightful and helpful comments on the original version of this manuscript. All remaining errors and inconsistencies are our own.

NOTES

[1] For alternative approaches, see Bohnemeyer and Pederson (2011), Bylund (2011), and Gullberg (2011).

[2] Throughout, our transliteration of Russian words follows the Library of Congress conventions.

[3] Our use of the term 'boundedness' is limited to morphological boundedness and does not extend to event boundedness, that is spatial or temporal aspects of motion events.

[4] The study is based on the dissertation by the second author, which was part of a larger study carried out by the first author, in collaboration with the second author and Drs. Victoria Hasko, Barbara Malt, and Nina Vyatkina.

REFERENCES

Alexandrova, N., & Watt, A. (2013). *Russian step by step verbs of motion*. Create Space Independent Publishing Platform.

Allen, S., Özyürek, A., Kita, S., Brown, A., Furman, R., Ishizuka, T., & Fujii, M. (2007). Language-specific and universal influences in children's syntactic packaging of manner and path: A comparison of English, Japanese, and Turkish. *Cognition, 102*, 16–48.

Beavers, J., Levin, B., & Tham, S. (2010). The typology of motion expressions revisited. *Journal of Linguistics, 46*, 331–377.

Berman, R., & Slobin, D. (1994). *Relating events in narrative: A cross-linguistic developmental study*. Hillsdale, NJ: Lawrence Erlbaum.

Bohnemeyer, J., Eisenbeiss, S., & Narasimhan, B. (2006). Ways to go: Methodological considerations in Whorfian studies on motion events. *Essex Research Reports in Linguistics, 50*, 1–20.

Bohnemeyer, J., & Pederson, E. (Eds.). (2011). *Event representation in language and cognition*. Cambridge: Cambridge University Press.

Brown, A., & Gullberg, M. (2008). Bidirectional cross-linguistic influence in L1–L2 encoding of manner in speech and gesture: A study of Japanese speakers of English. *Studies in Second Language Acquisition, 30*, 225–251.

Brown, A., & Gullberg, M. (2010). Changes in encoding of path of motion in a first language during acquisition of a second language. *Cognitive Linguistics, 21*, 263–286.

Brown, A., & Gullberg, M. (2011). Bidirectional cross-linguistic influence in event conceptualization? Expressions of path among Japanese learners of English. *Bilingualism: Language and Cognition, 14*, 79–94.

Bylund, E. (2011). Language-specific patterns in event conceptualization: Insights from bilingualism. In A. Pavlenko (Ed.), *Thinking and speaking in two languages* (pp. 108–142). Bristol, UK: Multilingual Matters.

Cadierno, T. (2010). Motion in Danish as a second language: Does the learner's L1 make a difference? In Z. Han & T. Cadierno (Eds.), *Linguistic relativity in SLA: Thinking for speaking* (pp. 1–33). Bristol, UK: Multilingual Matters.

Cardini, F. (2008). Manner of motion saliency: An inquiry into Italian. *Cognitive Linguistics, 19*, 533–570.

Cardini, F. (2010). Evidence against Whorfian effects in motion conceptualization. *Journal of Pragmatics, 42*, 1442–1459.

Daller, M., Treffers–Daller, J., & Furman, R. (2011). Transfer of conceptualization patterns in bilinguals: The construal of motion events in Turkish and German. *Bilingualism: Language and Cognition, 14*, 95–119.

Filipović, L. (2011). Speaking and remembering in one or two languages: Bilingual vs. monolingual lexicalization and memory for motion events. *International Journal of Bilingualism, 15*, 466–485.

Finkbeiner, M., Nicol, J., Greth, D., & Nakamura, K. (2002). The role of language in memory for actions. *Journal of Psycholinguistic Research, 31*, 447–457.

Gathercole V., & Min, H. (1997). Word meaning biases or language-specific effects: Evidence from English, Spanish, and Korean. *First Language, 17*, 31–56.

Gennari, S., Sloman, S., Malt, B., & Fitch, T. (2002). Motion events in language and cognition. *Cognition, 83*, 49–79.

Gor, K., Cook, S., Malyushenkova, V., & Vdovina, T. (2009). Verbs of motion in highly proficient learners and heritage speakers of Russian. *Slavic and Eastern European Journal, 53*, 386–408.

Gullberg, M. (2011). Thinking, speaking, and gesturing about motion in more than one language. In A. Pavlenko (Ed.), *Thinking and speaking in two languages* (pp. 143–169). Bristol, UK: Multilingual Matters.

Hasko, V. (2009). The locus of difficulties in the acquisition of Russian verbs of motion by highly proficient learners. *Slavic and Eastern European Journal, 53*, 360–385.

Hasko, V. (2010a). Semantic composition of motion verbs in Russian and English: The case of intra-typological variability. In V. Hasko & R. Perelmutter (Eds.), *New approaches to Slavic verbs of motion* (pp. 197–224). Philadelphia/Amsterdam: John Benjamins.

Hasko, V. (2010b). The role of thinking for speaking in adult L2 speech: The case of (non) unidirectionality encoding by American learners of Russian. In Z. Han & T. Cadierno (Eds.), *Linguistic relativity in SLA: Thinking for speaking* (pp. 34–58). Bristol, UK: Multilingual Matters.

Hasko, V., & Perelmutter, R. (Eds.). (2010). *New approaches to Slavic verbs of motion*. Philadelphia/Amsterdam: John Benjamins.

Hohenstein, J., Eisenberg, A., & Naigles, L. (2006). Is he floating across or crossing afloat? Cross-influence of L1 and L2 in Spanish–English bilingual adults. *Bilingualism: Language and Cognition, 9*, 249–261.

Iakovleva, T. (2012). Typological constraints in foreign language acquisition: The expression of voluntary motion by upper intermediate and advanced Russian learners of English. *Language, Interaction, and Acquisition, 3*, 231–260.

Imai, M., & Gentner, D. (1997). A cross-linguistic study of early word meaning: Universal ontology and linguistic influence. *Cognition, 62*, 169–200.

Imai, M., & Mazuka, R. (2003). Reevaluating linguistic relativity: Language-specific categories and the role of universal ontological knowledge in the construal of individuation. In D. Gentner & S. Goldin–Meadow (Eds.), *Language in mind: Advances in the study of language and thought* (pp. 429–464). Cambridge, MA: The MIT Press.

Imai, M., & Mazuka, R. (2007). Language-relative construal of individuation constrained by universal ontology: Revisiting language universals and linguistic relativity. *Cognitive Science, 31*, 385–413.

Jarvis, S. (2002). Short texts, best-fitting curves and new measures of lexical diversity. *Language Testing, 19*(1), 57–84.

Jarvis, S., & Odlin, T. (2000). Morphological type, spatial reference, and language transfer. *Studies in Second Language Acquisition, 22*, 535–556.

Jarvis, S., & Pavlenko, A. (2008). *Cross-linguistic influence in language and cognition*. New York/London: Routledge.

Larrañaga, P., Treffers–Daller, J., Tidball, F., & Ortega, M. (2011). L1 transfer in the acquisition of manner and path in Spanish by native speakers of English. *International Journal of Bilingualism, 16*, 117–138.

Levinson, S., & Wilkins, D. (Eds.). (2006). *Grammars of space: Explorations in cognitive diversity*. Cambridge: Cambridge University Press.

Li, P., Dunham, Y., & Carey, S. (2009). Of substance: The nature of language effects on entity construal. *Cognitive Psychology, 58*, 487–524.

Loucks, J., & Pederson, E. (2011). Linguistic and non-linguistic categorization of complex motion events. In J. Bohnemeyer & E. Pederson (Eds.), *Event representation in language and cognition* (pp. 108–133). Cambridge: Cambridge University Press.

Lucy, J. (1992). *Grammatical categories and cognition: A case study of the linguistic relativity hypothesis*. Cambridge: Cambridge University Press.

Lucy, J. (1996). The scope of linguistic relativity: An analysis and review of empirical research. In J. Gumperz & S. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 37–69). Cambridge: Cambridge University Press.

Maguire, M., Hirsh–Pasek, K., Michnick Golinkoff, R., Imai, M., Haryu, E., Vanegas, S., Okada, H., Pulverman, R., & Sanchez–Davis, B. (2010). A developmental shift from similar to language-specific strategies in verb acquisition: A comparison of English, Spanish, and Japanese. *Cognition, 114*, 299–319.

Mahota, W. (1996). *Russian motion verbs for intermediate students*. New Haven, CT: Yale University Press.

Mayer, M. (1969). *Frog, where are you?* New York: Dial.

Muravyova, L. (1986). *Verbs of motion in Russian* (5th ed.). Moscow: Russky Yazyk Publishers.

Papafragou, A., Hulbert, J., & Trueswell, J. (2008). Does language guide event perception? Evidence from eye movements. *Cognition, 108*, 155–184.

Papafragou, A., Massey, C., & Gleitman, L. (2002). Shake, rattle, 'n roll: The representation of motion in language and cognition. *Cognition, 84*, 289–219.

Papafragou, A., & Selimis, S. (2010). Event categorization and language: A cross-linguistic study of motion. *Language and Cognitive Processes, 25*, 224–260.

Pavlenko, A. (2010). Verbs of motion in L1 Russian of Russian–English bilinguals. *Bilingualism: Language and Cognition, 13*, 49–62.

Pavlenko, A. (2014). *The bilingual mind and what it tells us about language and thought*. Cambridge: Cambridge University Press.

Pavlenko, A., & Driagina, V. (2009). *Advancing in Russian through narration*. University Park, PA: CALPER Publications.

Polinsky, M. (2008). Heritage language narratives. In D. Brinton, O. Kagan, & S. Bauckus (Eds.), *Heritage language education: A new field emerging* (pp. 149–164). New York: Routledge.

Polivin, A. (2010). *Russian verbs of motion: The workbook*. Create Space Independent Publishing Platform.

Regier, T., & Zheng, M. (2007). Attention to endpoints: A cross-linguistic constraint on spatial meaning. *Cognitive Science, 31*, 705–719.

Segalowitz, N. (2010). *Cognitive bases of second language fluency*. New York/London: Routledge.

Sera, M., & Goodrich, W. (2010). Who thinks that a piece of furniture refers to a broken couch? Count–mass constructions and individuation in English and Spanish. *Cognitive Linguistics, 21*, 419–442.

Slobin, D. (1996a). From "thought and language" to "thinking for speaking." In J. Gumperz & S. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 70–114). Cambridge: Cambridge University Press.

Slobin, D. (1996b). Two ways to travel: Verbs of motion in English and Spanish. In M. Shibatani & S. Thompson (Eds.), *Grammatical constructions: Their form and meaning* (pp. 195–219). Oxford, UK: Clarendon Press.

Slobin, D. (2004a). How people move: Discourse effects of linguistic typology. In C. Moder & A. Martinovic–Zic (Eds.), *Discourse across languages and cultures* (pp. 195–210). Philadelphia/Amsterdam: John Benjamins.

Slobin, D. (2004b). The many ways to search for a frog: Linguistic typology and the expression of motion events. In S. Strömqvist & L. Verhoeven (Eds.), *Relating events in narrative: Typological and contextual perspectives* (pp. 219–257). Mahwah, NJ: Lawrence Erlbaum.

Slobin, D. (2006). What makes manner of motion salient? Explorations in linguistic typology, discourse, and cognition. In M. Hickmann & S. Robert (Eds.), *Space in languages: Linguistic systems and cognitive categories* (pp. 59–81). Philadelphia/Amsterdam: John Benjamins.

Strömqvist, S., & Verhoeven, L. (Eds.). (2004). *Relating events in narrative: Typological and contextual perspectives*. Mahwah, NJ: Lawrence Erlbaum.

Subrahmanyam, K., & Chen, H. (2006). A cross-linguistic study of children's noun learning: The case of object and substance words. *First Language, 26*, 141–160.

Talmy, L. (1985). Lexicalization patterns: Semantic structure in lexical forms. In T. Shopen (Ed.), *Language typology and syntactic description. Vol. 3 Grammatical categories and the lexicon* (pp. 57–149). Cambridge: Cambridge University Press.

Talmy, L. (1991). Path to realization: A typology of event conflation. In *Proceedings of the Seventeenth Annual Meeting of the Berkeley Linguistics Society* (pp. 480–519). Berkeley, CA: Berkeley Linguistics Society.

Talmy, L. (2000). *Toward a cognitive semantics*. Cambridge, MA: The MIT Press.

Zalizniak, A., & Shmelev, A. [Зализняк, А., & Шмелев, А.]. (2000). *Введение в русскуюаспектологию* [Introduction to the study of Russian aspect]. Moscow: Iazyki russkoi kul'tury.