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Driving Along the Road or Heading for the Village? Conceptual Differences Underlying Motion Event Encoding in French, German, and French–German L2 Users

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The typological contrast between verb- and satellite-framed languages (Talmy, 1985) has set the basis for many empirical studies on L2 acquisition. The current analysis goes beyond this typology by looking in detail at the conceptualization of the path of motion in a motion event. We take as a starting point the cognitive salience of specific elements of motion events that are relevant when conceptualizing space. When expressing direction in French, specific spatial relations involving the entity in motion (its alignment and its distance toward a [potential] endpoint) are relevant, given a variety of path verbs in the lexicon expressing this information (e.g., *se diriger vers*, *avancer* 'to direct oneself toward,' 'to advance'). This is not the case in German (manner verbs in the lexicon mainly). In German, spatial information is packaged in adjuncts and particles and the path of motion is typically structured via features of the ground (*entlanglaufen/fahren* 'to walk/drive along') or endpoints ('to walk/drive to/toward'). We investigate those fundamental differences in spatial conceptualization in French and German, as reflected in pre-articulatory patterns of attention allocation (measured with eye tracking) to moving entities and endpoints in motion scenes in an event description task. Our focus is on spatial conceptualization in an L2 (French L2 users of German), analyzing the extent to which these L2 users display target-like patterns or traces of L1 conceptualization transfer.

Findings show that, in line with directional concepts expressed in verbs, L1 French speakers allocate more attention to entities in motion and endpoints, before utterance onset, than L1 German speakers do. The L2 German speakers pattern with L1 German speakers in the use of manner verbs, but

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they have not fully acquired the spatial concepts and means that structure the path of motion in the L2. This is reflected in pre-articulatory attention allocation patterns, according to which the L2 speakers pattern with native speakers of their L1 (French). The findings show a continued deep entrenchment of L1-based processing patterns and spatial frames of reference when speakers prepare for speech in an L2.

Keywords: motion events; cross-linguistic analysis; eye tracking; language production; L2 acquisition; path of motion

HOW LANGUAGES DIFFER IN THEIR ENCODing of motion events has been studied extensively. Verb-framed languages lexicalize information on the path of motion in the verb, often leaving the manner of motion implicit, while satellite-framed languages encode manner of motion in the verb with information on the path in adjuncts. This typology, originally developed by Talmy (1985), has been elaborated further on the basis of studies of a wide range of languages, including those that encode path and manner in serial verb constructions (e.g., Chinese). The variety of patterns led Slobin (2004, 2006) to propose a gradual rather than a categorical model for the typology of motion events, defined as a cline of manner salience, allowing a classification of languages with respect to how motion events are encoded (see also Zlatev & Yangklang, 2004). Other authors have questioned the model's fundamentals and propose that these patterns of lexicalization can best be viewed as preferences, which may be accounted for by "the motion-independent morphological, lexical, and syntactic resources languages make available for encoding manner and path of motion" (Beavers, Levin, & Tham, 2010, p. 2). Although the dichotomy of verb- vs. satellite-framed has been called into question to varying degrees, questions relating to event conceptualization centre on the two basic notions of manner and path. Studies on motion event conceptualization and description in second language (L2) users as well as bilinguals have mainly focused on the acquisition of verb lexicalization patterns (e.g., Hendriks & Hickmann, 2015; Pavlenko & Volynsky, 2015).

A crucial issue that has not received much attention concerns the nature of the spatial concepts encoded in verbs, as opposed to adjuncts, and how they structure the path of motion in motion event conceptualization: The conceptual contrast centers on the fact that spatial concepts encoded in verbs typically relate to the features of the entity or figure moving through space, while those in adjuncts are derived from features of objects that form part of the ground through which a path is traced. In French, for example, concepts encoded in verbs may profile the orientation, proximity, or position of the moving entity with respect to a possible goal, as in the verb *se diriger vers x* ('to direct oneself,' that is, 'to head toward x') while the contours of the trajectory leading to a goal are left implicit (for details, see Carroll et al., 2012). Verbs of this kind are infrequent in languages that are not verb-framed, such as German. In these languages, spatial concepts used to describe the path traced through space are typically derived from ground objects and their features and expressed in adjuncts (i.e., prepositions, particles; *um die Ecke* 'around the corner'; *über eine Brücke* 'over a bridge'; *zu einem Dorf* 'toward a village'). Placed in the context of the language and cognition debate, in which the analysis of motion events plays a central role, these contrasts open a new window on linguistic structure and processes of conceptualization in a speaker's native or second language. Studies to date that have investigated motion events as a test case for language-on-cognition effects (e.g., Gennari et al., 2002; Papafragou, Hulbert, & Trueswell, 2008) have taken the notions of *manner* and *path* as a starting point in testing the role of linguistic and, possibly, cognitive diversity. However, as mentioned, path is a complex concept composed of a number of fine-grained conceptual categories that are derived from different ontological domains, for example, an entity in motion and objects that make up the ground. The semantic system of each language draws on these conceptual categories to different degrees. This is the point of departure of the present study.

Previous studies have focused on L2 users' patterns in event description, and this has allowed researchers to hypothesize on the roots of differences that may be relevant in event conceptualization—the early phases of sentence planning processes. Some have used measures of online attention allocation (eye tracking) to investigate which information sources in a visual scene of a (motion) event draw the attention of different groups of speakers (e.g., Flecken, 2011; Papafragou et al., 2008; von Stutterheim & Carroll, 2006). In addition to detailed analyses of the information encoded in descriptions, the present study focuses on the time course of eye movement patterns during a description task, in relation to stimulus onset and utterance onset, in order to shed light on when potential differences in attention patterns arise, between L1 and L2 users of typologically different languages. The underlying assumption is that, in addition to retrieving names for participants in an event (formulation processes at phrase level; lexical retrieval/grammatical and phonological encoding, cf. Bock & Levelt, 1994), a speaker will have to assess which spatial concepts and associated linguistic forms are appropriate in structuring the path of motion drawn through space. In line with earlier work on what Slobin has termed *thinking for speaking*, we assume that speakers develop principles of conceptualization in the course of L1 acquisition (Slobin, 1996), that is, ways of attending to and speaking about events that are in line with the conceptual distinctions that the language of the speaker profiles. Language users draw on these (L1-based) principles automatically when processing information for verbalization. We therefore expect cross-linguistic differences (French vs. German) in attention allocation before utterance onset that correlate with the specific spatial concepts that are encoded by grammaticalized categories and structures in the lexicon (such as path versus manner verbs). In the given case it means that for French speakers the moving entity is a highly salient and core source of information from which the spatial conceptualization of a motion event is derived. In conceptualizing events in L2 German, the same principles are hypothesized to play a role; they may affect how L2 users visually process the information to be verbalized, regardless of the specific linguistic material (specific verb or adjunct type) that is eventually selected for encoding.

Eye tracking thus serves as a method for gaining insights into processing patterns during the planning of complex linguistic material, such as an event description. This is of particular interest for the investigation of advanced L2 users with respect to the question of conceptual or conceptualization transfer (cf. Jarvis & Pavlenko, 2008). In the present study, the following questions will be addressed:

RQ. Do advanced L2 users of German (with French as their mother tongue) display attention patterns that are rooted in L1-based spatial concepts used to structure the path of motion? Or, alternatively, do they display target-language patterns or L2-specific patterns in viewing and describing the scenes?

Comparative analyses center on the role of the moving entity and associated concepts in French, which is different in German.

BACKGROUND

The Cross-Linguistic Study of Motion Events

Studies on motion events under a cross-linguistic and typological perspective are legion. As already mentioned, the main line of research follows Talmy's typology, analyzing languages of the world on the basis of the bi-partite distinction between verb-framed and satellite-framed languages (Talmy, 2000). A more differentiated picture is obtained by recent work drawing on Slobin's suggestion of a typology of motion events based on the concept of manner (or path) salience (Hickmann & Robert, 2006; Slobin, 2004, 2006). Further progress was made by closer comparisons of languages within one typological class evidencing a high degree of diversity in the means used (see also Pavlenko & Volynsky, 2015). These comparisons yielded differentiated patterns at the conceptual level, in line with the way in which core distinctions are expressed in and distributed across linguistic forms (cf. Loucks & Pederson, 2011; Pourcel & Kopecka, 2005; Slobin, 2006). In these studies, the focus of investigation lies on the language-specific mapping of spatial concepts onto different structural devices (verbs, prepositions, adverbs, particles). Spatial concepts such as path, location, and boundary crossing are treated as basic elements of a universal ontological inventory forming the general *tertium comparationis* for studying cross-linguistic differences. In this study we go beyond this approach by looking at the conceptual basis for the selection of a particular spatial category (within the realm of *path of motion*) in motion event description. Furthermore, we analyze not only the outcome of the selection process, but also shed light on the process itself by analyzing pre-articulatory attention patterns.

Empirical investigations of the conceptualization of motion events have drawn on a number of different methods. Some studies have used categorization tasks to test a potential language bias in motion event nonverbal classification preferences (Athanasopoulos & Bylund, 2013; Papafragou & Selimis, 2010; Soroli & Hickmann, 2010). Results show language effects on categorization if language is somehow involved explicitly or implicitly, no effects in tasks that were designed to suppress language involvement as much as possible, and no effect when lexical interference paradigms were used in which subjects had to repeat strings of digits or syllables aloud while viewing the stimuli (Athanasopoulos & Bylund, 2013; Papafragou, Massey, & Gleitman, 2002). This multifaceted picture opens up research questions regarding the extent and context of effects of language on cognition (Athanasopoulos & Bylund, 2013). Another method used for testing language effects on motion event cognition are memory tasks (Gennari et al., 2002; Marian & Fausey, 2006; Papafragou et al., 2002). Focus is again placed on the implications of manner vs. path salience for memory of relevant features of motion events. Results show inconclusive evidence with language effects appearing under specific conditions.

So far, few studies have applied eye tracking as a method to tap into processes of conceptualization under a cross-linguistic perspective (Flecken, von Stutterheim, & Carroll, 2014; Papafragou et al., 2008; Soroli & Hickmann, 2010; von Stutterheim et al., 2012; von Stutterheim & Carroll, 2006). In a study with English and Greek native speakers, Papafragou et al. (2008) found that language-specific requirements in encoding specific concepts affected processes of attention allocation in a language production task. However, in a situation in which subjects were only given an offline memory task (nonverbal condition), eye movements did not reflect language patterns. They interpreted these findings in support of a universalist position, which claims that there is a nonverbal level of universal principles of event perception and cognition. This might be called into question given the fact that the subjects knew they would be given a memory task afterwards, in other words, it did not reflect a condition in which people "inspect the world freely" (Papafragou et al., 2008, p. 179). Rather, attention will be distributed across the whole scene on the assumption that it is affected by very specific (task-related) goals.

A different position is advocated by von Stutterheim et al. (2012), who investigated motion event descriptions of native speakers of seven languages, focusing on the effect of grammatical aspect on motion event construal. They found language-specific patterns of conceptualization (phasal decomposition versus holistic perspective-taking), as reflected in the information selected and the perspective chosen in the utterances produced, correlating with the attention allocated to endpoints of motion events. They argued that these results could be best accounted for by a psycholinguistic model in which "conceptual categories encoded in the grammar of a language play an active role in the cognitive filter set up during attention allocation and information selection when talking about events" (p. 863). In a follow-up study, Flecken et al. (2014) designed a nonverbal task in which participants (German and Arabic native speakers) watched short video clips of motion events. They were asked to carry out an auditory task unrelated to the content of the video clips during which their visual attention was recorded. Patterns of attention reflected those found in an event description task and were thus language-specific. The authors interpreted this as pointing to an effect of a core grammatical category (aspect) on cognitive processing, assuming that language-specific principles of attending to and describing events mediate between the external world and mental representations thereof. Soroli and Hickmann (2010) examined native speakers of French and English, also using eye tracking. In line with verb lexicalization patterns, participants' predominant focus of attention was either on manner or on path components of visual stimuli (event scenes), but only for specific scene types. In their conclusion the authors supported a moderate version of the linguistic relativity hypothesis which claims that language affects parts of the cognitive system but this effect can be modulated and is restricted by contextual factors.

Summing up, results converge in reporting language effects on cognition whenever a task required the explicit or implicit involvement of language. However, with respect to nonverbal event construal, findings are less consistent. It remains a matter of debate how strongly, and under what conditions, language patterns may shape processes of event apprehension and conceptualization. Looking at L2 learners is one way to gain insight into the level of cognitive entrenchment of language-specific conceptual categories: The aim of the present study is therefore to look at cognitive processing during language production.

Eye Tracking in Language Production

Eye tracking measurements are particularly useful for gaining insights into processes of conceptualization in that they open a window on possible stages of conceptualization. Attention allocation in this process reflects the selective extraction of information from the external world, which correlates with cognitive processes operating on specific components of the outer world that are fixated (cf. Just & Carpenter, 1976, cited in Griffin & Spieler, 2006).

Most of the research on the interplay between visual attention and linguistic processing in the context of language production has focused on single word utterances (e.g., simple nouns or noun phrases, as with object naming); only some studies investigate the production of longer sequences relating to object arrays or static scenes (e.g., Bock, Irwin, & Davidson, 2004; Bock et al., 2003; Brown–Schmidt & Tanenhaus, 2006). Few studies have looked at the conceptualization and construal of larger units (sentences) in particular event descriptions (Gleitman et al., 2007; Griffin & Bock, 2000). In object naming tasks, fixation time is correlated with the linguistic encoding of words. But in the planning of longer utterances the speaker has to generate a message, a conceptual representation of an event, for example, presumably before starting to linguistically encode the first word of the utterance (cf. Bock & Levelt, 1994). When speakers are asked to describe a scene, fixations after stimulus onset and before utterance onset reflect, at least to a certain extent, processes of message generation, as well as linguistic encoding of individual sentence elements. These insights are put to use in the present innovative study in which we analyze fixation patterns before speech onset in sentence production, in different groups of speakers. If different groups of speakers focus on different elements of the unfolding events, then we may assume that they follow different patterns in conceptualizing the situation (the *seeing for speaking* hypothesis; von Stutterheim et al., 2012). Extending the cross-linguistic study of visual attention in sentence production to advanced L2 users is particularly informative in that it allows us to disentangle potential conceptual or conceptualization transfer patterns at two levels: early and automatic event conceptualization patterns as reflected in early visual attention allocation (the process) and the information encoded in the event description (the product).

Motion Event Conceptualization in a Second Language

Motion events and their lexicalization have been a central topic in second language acquisition research (Cadierno, 2004; Cadierno & Ruiz, 2006; Hohenstein, Eisenberg, & Naigles, 2006; Schmiedtová, von Stutterheim, & Carroll, 2011). Recent studies also integrate research on gestures in L2 use (Brown, 2015). Cadierno and Ruiz's study (2006) examined L1 transfer in motion event descriptions in two groups of L2 users of Spanish (Danish or Italian as their native language). The two groups did not differ significantly in the encoding of manner vs. path information, contrary to the authors' hypotheses. In a follow-up study, Cadierno (2010) extended the language base by looking at Spanish, German, and Russian speakers learning Danish. Focus was placed on boundary-crossing events. In this context, L1 transfer was observed: German and Russian speakers, both L1 speakers of a satellite-framed language, used manner verbs and path satellites more frequently than Spanish native speakers. The author argued that this cannot be transfer at the level of linguistic form, since path information is expressed differently in German (particles/adverbs/prepositions) and Russian (prefixes). Rather, speakers select expressive devices in the target language according to the degree of cognitive salience of a specific conceptual category, thus revealing transfer at the conceptual level. Brown and Gullberg (2011) studied Japanese learners of English and found evidence of bi-directional cross-linguistic influence in motion event descriptions; already at early stages of acquisition, motion construal became multilingual in both languages, rather than monolingual.

In a recent study of motion event descriptions by French and English native speakers, and advanced French learners of English (Carroll et al., 2012), focus was placed on fine-grained analyses of the conceptual components of a motion event, focusing on the basis from which spatial concepts are derived (the entity in motion versus the ground), and the way in which relevant concepts cluster in verbs versus satellites (in line with the present study). Findings show that learners rely on patterns of motion event conceptualization of L1 French, with the moving entity as the main source in structuring the path of motion.

In general, most studies on the expression of motion events in a second language find evidence for conceptual or conceptualization transfer from the L1 (cf. Jarvis, 2007; Jarvis & Pavlenko, 2008; see also Daller, Treffers–Daller, & Furman, 2011), or convergence of L1 and L2 patterns of conceptualization (see Brown & Gullberg, 2013; overviews in Bylund, 2011; Schmiedtová et al., 2011). However, some studies report evidence for restructuring of native language patterns, showing effects of the L2 on performance in the L1 (see for example, Bylund 2009; Bylund & Jarvis, 2011), where exposure time and immersion in an L2 environment were identified as preconditions for conceptual restructuring (Athanasopoulos, 2011).

SPATIAL CONCEPTS AND DIRECTION OF ATTENTION WHEN STRUCTURING MOTION FOR VERBALIZATION

In the construal of motion events, spatial concepts associated with the moving entity, or objects that belong to the ground, form part of the spatial frames of reference used to structure the path of motion and thus to specify spatial information such as direction. Spatial frames of reference are relational systems that serve as search domains when locating entities in space, or describing the trajectory taken as they move through space. In static situations, that is, when speakers describe spatial configurations of objects, the concepts used to locate an object can draw on a reference point that is viewer-centered (x is to the left of y), or object-centered (x is on y), or geocentric (x is north of y). When an entity is in motion, on the other hand, we are dealing with its displacement over time and the task will relate to describing the trajectory or path taken between the place at which the event started, or was first observed, and its goal or endpoint. A motion event thus includes the moving entity (referred to as the *theme* [Gruber, 1965] or the *figure* [Talmy, 1985]) and the medium or ground, relative to which the entity moves. A motion event can be conceptualized as successive points of displacement, as changes of location of the moving entity (*la voiture roule sur la route* 'the car drives on the road') or as translational motion on an abstract continuous line or vector (*the car is driving along a road*; *the man is crossing the street*). Typical examples of spatial concepts used in describing the path of motion can be summarized in terms of the following conceptualizations of path: (a) as directed by taking into account the orientation of the moving entity with respect to an endpoint; this can be expressed by verbs such as *to approach x*, *to head for x*, *to advance toward x*, (b) with respect to spatial configurations given with the contours of the medium traversed; these contours are specified by forms such as *over*, *around*, *along*: They describe the course taken and the endpoint of the path is implicit, (c) by taking into account the position of the moving entity with respect to relevant contours of the medium traversed, as in verbs such as *to cross (a road)*, *to enter (a building)*; verbs of this kind draw on features, such as the boundaries, of the objects in question (the *sides* of the road, the *outer confines* of the building), (d) with respect to the point of view of the speaker establishing an external frame of reference. Deictic verbs such as *to go/to come*, or *gehen/kommen* in German combined with particles like *hin* and *her* ('thither, hither') or verbs such as *passer* ('to pass') in French, can be used to express deictically anchored directed motion.

It is important to note that verbs that express direction only (such as *to head for x*, *advance toward x*) do not draw on the features of the ground to shape the actual path taken; its actual contours are left implicit. Similarly, descriptions that relate exclusively to features of the ground do not express the actual direction, if there is no mention of an endpoint (a path going *along x* may continue with a section described as *back around y*, leaving the entire direction open).

The issue in focus in the present study concerns the nature of the spatial concepts expressed in verbs and adjuncts, and how they differ in French and German. We are interested in the role of these concepts in determining the allocation of attention when conceptualizing motion events for expression. In particular, we are interested in the extent to which L2 users have managed to acquire new frames of reference and patterns of conceptualization relating to motion and space. Our main focus of analysis is on the type of motion verbs produced, the nature of the spatial concepts they encode, and their implications for attention patterns at early phases of the planning process.

Spatial Concepts and Linguistic Form in French and German

Spatial Concepts in French. French, a verb-framed language, encodes path-related information in motion verbs. As previously mentioned, a path can be conceptualized as directed by taking into account the orientation of the moving entity with respect to an endpoint: Such verbs will be referred to as *entity-based verbs*. Examples in French are *se diriger vers x* 'to direct oneself toward,' 'to head for x,' *(s')avancer vers x* 'to advance toward x,' *(s')approcher (de)* + *x* 'to approach x.' The concepts expressed in such verbs are relational in that the (changing) positions of the entity in motion have to be related to a place viewed as a possible endpoint of the event. Features of the ground that the entity traverses are not required. Such verbs are appropriate for selection when motion event scenes show a clearly visible potential goal or endpoint of motion, and a (short) trajectory leading up to it. When such verbs are under consideration for selection during motion conceptualization, speakers will thus have to assess the position, orientation, and proximity of the moving entity in relation to a possible endpoint.

For motion event scenes that profile a long trajectory, with a potential goal or endpoint that is not highly salient and at a distance from the entity in motion (a village or building in the distance), verbs in French that are used in this context have ground-based components: *traverser* 'to cross' (the path taken by the entity is seen to begin at a place bounded with discernible sides, and leading from one side to another, for example, a square, field, bridge); *passer* 'to pass by,' *monter* 'to ascend,' *descendre* 'to descend.' The spatial concepts expressed in these verbs are entity-based and include features of the ground. We refer to these as *entity-+ ground-based verbs.*

French speakers also have the option of selecting verbs expressing the manner of motion of an entity, for example, *rouler* 'to drive,' *marcher* 'to walk.' We assume that an event description that centers on a manner verb will require less direction of attention to the moving entity compared to verbs that express directional concepts (*entity* [+ *ground*]*-based verbs*). If a manner verb is used, information on the path or place of motion has to be expressed through other sentential elements, such as adjuncts or verb particles. These can express information concerning the location, contours of the ground traversed, and/or the endpoint of motion.

As for the use of spatial adjuncts in motion event descriptions, previous work shows how native speakers of French, when using manner verbs, do not typically structure the path of motion by adding information with respect to features of the ground, although forms are available, for example, *le long de* 'along,' *autour de* 'around.' Rather, if manner of motion is encoded in the main verb, speakers are more likely to express the location of the entity in motion (as in Example 1, taken from Carroll et al., 2012) or to give no information on the path (zero adjunct).

EXAMPLE 1. Motion Event Description in French

Une femme marche <u>sur une route</u>
'A woman walks on a road.'

Spatial Concepts in German. German, a satellite-framed language, mainly encodes manner of motion in motion verbs. To express directional information, speakers use prepositions, particles, and case markers (accusative, dative case), which can be used to refer to endpoints (either as being endpoint-oriented, as in Examples 2 and 3, or as showing a boundary-crossing event, as in Examples 4–6), features of the ground, or locations.

EXAMPLE 2. Preposition *zu* ('to') Plus Dative Case

Eine Frau läuft <u>zur</u> (dat.) *Bushaltestelle*
'A woman walks to the bus stop.'

EXAMPLE 3. Preposition *in* ('in') Plus Accusative Case

Er läuft <u>in</u> die (acc.) *Stadt*
'He walks in (the direction of) the town.'

EXAMPLE 4. Particles *hin* ('thither') or *her* ('hither') in Conjunction with a Preposition

Ein Auto fährt über eine Straße <u>in</u> einen Ort <u>rein</u> (particle)
'A car drives along a road into a village hither-in.'

EXAMPLE 5. Prepositions and Particles such as *entlang* ('along'), *um* ('around'), *über* ('over')

Ein Auto fährt eine Straße <u>entlang</u> (particle)
'A car drives along a road.'

EXAMPLE 6. Location (Motion Within a Place) Plus Dative Case

Ein Mann läuft <u>im</u> (dat.) Park
'A man walks in the park.'

Path verbs such as *sich nähern* ('to approach'), *passieren* ('to pass') exist in the German language, but they display very low lemma-frequencies in German language use in general. The different ways in which prepositions and particles combine in German when describing motion events are detailed in Carroll (2000).

EXPERIMENT: REGISTRATION OF EYE MOVEMENTS DURING EVENT DESCRIPTION

The present study analyzes descriptions of motion events, elicited with dynamic live-recorded video clips as stimuli. The motion events depict entities (persons or vehicles) on their way from one place to another. We distinguish between two types of motion event stimuli according to length of the trajectory depicted and salience of endpoints.

This experimental manipulation tests potential effects of endpoint versus trajectory salience in motion event scenes, on (linguistic) event conceptualization: For stimuli depicting events with a high degree of endpoint salience and a short trajectory toward the endpoint, we expect a high degree of directionality in spatial concepts, as expressed in motion verbs in French, or through adjuncts (prepositional phrases and verb particles) in German. With the option of using verbs expressing path-related information, such as direction, in French, speakers need to draw on features of the moving entity and its relation to and alignment with the (potential) endpoint: As mentioned previously, there are several options in the verbal lexicon expressing specific spatial relations between the moving entity and endpoint (is the entity advancing toward the goal or approaching the endpoint?—the latter expressing a shorter distance between endpoint and entity). Selection of the verb that covers the spatial configuration in the scene appropriately will, we hypothesize, require an enhanced degree of attention allocated to relevant aspects in the scene, that is, the moving entity and the endpoint. By contrast, German speakers will use the verb to refer to manner of motion and adjuncts or verb particles to refer to the endpoint (to/toward a building, for example). There is, then, no need to register the exact spatial relation between the moving entity and the potential endpoint.

The second set of stimuli depicts motion events with no evident endpoint, but shows long trajectories that profile features of the ground (*around*, *along*, *down*, *over*). For these events, we expect German speakers to draw on features of the ground to structure the path of motion. For the L1 French and French L2 German speakers, the hypothesis for allocation of attention is based on linguistic descriptions by L1 French and French L2 English speakers when describing a similar set of motion events (Carroll et al., 2012). With clips showing long trajectories, these groups mainly used manner verbs and described the events in terms of the location of the entity (*entity moves located on x*); they did not relate to features of the ground to structure the trajectory. We hypothesize that if the present sample of L1 French speakers also express the same spatial relation, specification of the location of the entity in motion will require allocation of attention to the entity, but will not involve attention to features of the ground.

During stimulus display, and thus during speech preparation and articulation, we record gaze allocation patterns by means of the eye tracking methodology in two areas of interest. Gaze patterns are time-locked to stimulus onset, as well as utterance onset, and the analyses will only focus on the time course of attention allocation before utterance onset, allowing us to address potential group differences related to early phases in sentence planning, that is, potentially related to the conceptualization of the event in the scene. The analyses take specific time windows along this pre-articulatory phase into account in order to pinpoint when exactly during language planning group differences may emerge; they can thus be considered exploratory in nature.

Our hypotheses with respect to language differences relate to different underlying conceptual domains relevant for verb selection. Given that a verb is the central part of a description of an event, as it expresses dynamicity, thus distinguishing events from states, we expect speakers to attend to visual information sources that are relevant for verb selection early on in the sentence planning process: In French, spatial concepts in expressing directionality are encoded in the verb and associated with the moving entity and its (spatial) relation to a potential goal; this is not the case in German, which mainly encodes manner of motion in the verb. We are thus interested in potential language differences in the pre-articulatory phase in sentence production, related to event conceptualization centered around the information expressed in verbal material. We assume that if spatial concepts associated with the moving entity are relevant in structuring the path of motion, the entity will draw more attention than necessary to identify the type of entity (person, vehicle) for linguistic encoding. Native French speakers would thus attend to the moving entity more than German native speakers, who have to extract information on the contours of the ground independent from the moving entity, in both stimulus types. Specifically, we expect an early increased allocation of attention to moving entities and their spatial orientation (toward an endpoint, for example) in French speakers. For the L2 users, specifically, given the lack of such spatial concepts in German as their L2, and thus a hypothetically lower degree of relevance of the entity for the conceptualization of space and motion, we investigate whether their attention patterns may reflect (partial) L1 conceptualization patterns, or potentially, (partial) adherence to L2-specific patterns.

Participants

Sixty speakers took part in the experiment ($N = 20$ for each group, L1 French, L1 German, and French L2 speakers of German). All participants had comparable socioeconomic backgrounds and were age- and gender-matched (university students, aged between 19 and 28; gender was counterbalanced).

The L1 German speakers were students at Heidelberg University, Germany, and were recorded there. Language background was evaluated by means of a questionnaire, and none of the participants reported intermediate to advanced knowledge of a Romance language. Because we wanted the monolingual subjects to be as monolingual as possible, the L1 French data were collected at University of Paris 8 in France by a very advanced L2 user of French; the monolingual French speakers were students who had no knowledge of German. The French L2 users of German had all started learning German after the age of 10 and were studying at Heidelberg University in Germany. They had qualified for an advanced course program in German, which requires a minimum German proficiency level of C1 as defined in the Common European Framework of Reference (CEFR) for languages (Council of Europe, 2001). Much of their daily communication (at university, jobs, among peers) was in German. All speakers were thus highly proficient speakers of German, and all had a large degree of exposure to German. Table 1 gives an overview of the language background details of the L2 participants. All participants received a small monetary compensation for participation.

Materials

The stimuli used were dynamic video clips showing different events ($N = 57$), of which 20 involved motion events ($N = 20$). The other events were considered filler items and showed causative events (an agent performing an action on an object), states (an object displayed against a specific background), or activities (a person performing sports, for example). All scenes were filmed and cut by the project group using Adobe Premiere. The critical motion event video clips were divided in two categories.

Type A stimuli ($N = 10$) consisted of scenes showing motion events with a short trajectory, which is passed by the entity in motion on its way toward the goal, and an evident goal or endpoint. The entity in motion does not reach the endpoint during stimulus display (see example stimulus in Figure 1).

Type B stimuli ($N = 10$) consisted of scenes showing motion events with a long trajectory that profile different features of the ground (for example, entity moving *along*, *over* x). There are in each case potential endpoint objects at a distance (e.g., a building in the distance), but they are not highly evident, in contrast to Type A stimuli (see Figure 2).

Each video clip lasted 6 seconds, and events of different types appeared in pseudo-randomized order with an inter-stimulus interval of 8 seconds, during which a blank screen with a focus point was shown. This ensured sufficient time for participants to describe the events. There were four pseudo-randomized lists of stimuli, and participants within each participant group were assigned to a list on an equal basis. Each recording was preceded by a training session with six items presenting different event types. During and after the training items, the participant had the opportunity to ask questions and the experimenter was able to give feedback.

Procedure

Eye movements were recorded with a remote *Eye Follower* eye tracker (LC Technologies, Inc.) for binocular eye tracking. The system accommodated most natural head movements during normal computer operation. The sampling rate was 120 Hz. The TFT monitor was 20" and participants were seated approximately 60 to 70 cm from the screen. Calibration was carried out once for each participant before the experiment (tracking eye gaze on yellow dots on a black screen that appeared in identical order at specific

TABLE 1
Language Background of the French–L2 German Participants

	French–L2 German Participants
Age range (mean)	19–27 years (22.05)
Time spent learning and actively using German (mean)	2–13 years (8.42)
Length of residence in Germany (mean)	4–48 months (13.10)
Other languages	English (intermediate proficiency), Spanish (basic proficiency)

FIGURE 1
Screenshot of Type A Stimulus (Man Walking Toward a Car)

positions on the screen). The NYAN software was developed and adapted to the requirements of analyzing eye gaze in relation to dynamic visual input. NYAN recorded eye movement and speech data synchronously and time-locked.

Participants were given written instructions in their native or second language as follows: *You will see a set of 57 video clips showing everyday events which are not in any way connected to each other. Before each clip starts, a blank screen with a white focus point will appear. Please focus your gaze on this point. Your task is to tell "what is happening," and you may begin as soon as you recognize what is happening in the clip. It is not necessary to describe the video clips in detail (e.g., "the sky is blue"). Please focus on the event only.*

Each stimulus started playing automatically and remained on the screen for 6 seconds, after which a blank screen was shown for 8 seconds. There was no cue as to when participants should start speaking; this was left up to the participant. Following the eye tracking experiment, participants spent approximately 5 minutes filling out a questionnaire on their educational and linguistic backgrounds.

FIGURE 2
Screenshot of Type B Stimulus (Car Driving Around the Bend; Village/Church in the Distance)

Data Coding and Analysis

Language Data. The recorded language data (event descriptions) were transcribed by a native speaker or very advanced L2 user of German and French, and subsequently coded for a number of different categories. Utterances were segmented on the basis of finite verbs and each utterance was separately coded. Coding focused on information expressed in motion verbs, as well as other sentential material, that is, adjuncts and particles. As our focus is on descriptions of motion events, utterances that did not contain (motion) verbs were counted, but not further analyzed (e.g., *a woman in the countryside, a car on the road*). All transcripts and codings were checked by a second and third researcher. Table 2 displays the coding scheme.

Qualitative analyses provide a detailed picture of the information encoded in different elements of the motion event descriptions; quantitative analyses focus on the relative frequency of use of the main verb types (manner verbs, path verbs [entity (+ ground)-based verbs], deictic motion verbs) and adjunct types (location, features of the ground, direction/endpoint), in the three groups, by conducting ANOVAs on relative frequencies of encoding.

Eye Tracking Data. Fixations were registered in two pre-defined areas of interest for each stimulus, relating to the entity in motion and the potential endpoint object displayed in the videos (see Figure 3). The areas of interest were defined on a frame-by-frame-basis; whereas the latter area of interest remained fixed throughout the entire time the video was playing, the moving entity region was dynamic and changed over the course of stimulus presentation, following the trajectory taken by the entity and thus changing slightly in size over time. The spatial dimensions of the two areas of interest differed, given the use of naturalistic, live-recorded stimuli.

In order to capture attention allocation patterns over time, the occurrence and location of fixations were registered for each 60 ms time interval in four categories: fixation in moving entity region, fixation in endpoint region, fixation outside of these two AoIs, and no fixation registered. Analyses will only focus on fixations registered in the two relevant predefined areas of interest. Fixation patterns were time-locked to stimulus onset, capturing early attention patterns, but also to utterance onset, given our interest in pre-articulatory attention patterns particularly. In this regard, speech onset latencies for each participant on each trial were registered as well

TABLE 2
Coding Scheme of the Language Data

Verbs

Manner	Path: Entity	Path: Entity + Ground	Deictic	No Motion Verb
Marcher	*se diriger vers,(s') avancer*	*traverser*	*aller, venir*	'a lady in the park'
laufen	'to direct oneself toward'	*entrer*	*gehen, kommen*	
'to walk'	'to advance'	'to cross,' 'to enter'	'to go,' 'to come'	

Adjuncts

Location	Ground Contours	Endpoint	No Adjunct
Une voiture roule sur la route.	*Un homme marche le long de la route.*	*Un homme marche vers sa voiture.*	'a woman who walks'
Ein Auto fährt auf der Straße.	*Ein Mann läuft entlang eines Gebäudes.*	*Ein Mann läuft auf sein Auto zu.*	
'a car drives on a road'	'a man walks along by a building'	'a man walks toward his car'	

Particles (German)

Ground Axis	Ground Contours	Endpoint
Jemand läuft die Straße hinunter.	*Ein Auto fährt eine Straße entlang.*	*Ein Auto fährt über eine Straße in einen Ort hinein.*
'somebody walks thither-down the road'	'a car drives along a road'	'a car drives over the road into a village thither'

(using the NYAN software) (note that utterance onset latencies were not fixed but it was left to each participant to decide when to start articulating the sentence[1]). Table 3 shows average speech onset latencies for all three groups.

A one-way ANOVA on average speech onset latencies ($F[2,54] = 5.921$, $p < .05$) shows a significant group difference: The French monolingual speakers have earlier speech onset latencies than the German monolinguals and the French L2 users of German (Bonferroni-corrected post hoc tests: both comparisons $p < .05$).

FIGURE 3
Example Screenshot With Areas of Interest (AoI) (Moving Entity, Endpoint)

Drawing on earlier studies using eye tracking to gain insights into language planning processes beyond the word level (Bock et al., 2003; Griffin & Spieler, 2006), one could search for an explanation related to the planning of the first element of the sentence produced (the entity/subject in this case). The specific labels used to refer to the entity are highly frequent in both languages (e.g., *man*, *woman*, *car*), and the morphosyntactic form shows parallels in that both languages require an article, marked for gender, and the morphologically unmarked nominative case. We thus rule out an effect of differences related to formulation

TABLE 3
Average Speech Onset Latencies in all Groups

	Average SOT (ms)
Overall	2390 (*SD* 668)
German	2597 (*SD* 781)
French	2008 (*SD* 261)
French–L2 German	2596 (*SD* 701)

Note. SOT = speech onset time.

processes of the first mentioned referent as the cause for the group differences in speech onset latencies. The differences do not affect the nature of our analyses, given our interest in fixation patterns during the time span leading up to a specific point, no matter the absolute point in time.

Eye tracking analyses were conducted using ANOVAs on relative frequencies of fixations in the moving entity or endpoint area of interest, captured in consecutive 600 ms time windows (4 in the analyses on data time-locked to stimulus onset, and 3 in the analyses on data time-locked to utterance onset), for each stimulus type separately. Analyses covered group (3) by time window (4 or 3) ANOVAs, testing for main and interaction effects. In case of nonsignificant interactions, separate analyses per time window were still conducted, given our a priori interest in shedding light on when along the time course group effects may have emerged.[2,3]

RESULTS

Language Data

Stimuli Type A Verbs: Motion Events, Short Trajectory, Evident Goal. Table 4 shows the relative frequency of occurrence of the different verb types in each group. There is no significant difference between groups in the relative frequency of use of manner verbs ($F[2,54] = 0.075$, $p = .927$, ns), whereas groups do differ with respect to the use of path verbs, specifically, entity-based verbs: $F(2, 54) = 48.638$, $p < .001$ (Bonferroni-corrected post hoc tests: L1 French higher frequency than L1 and L2 German, both $p < .001$) as well as deictic verbs ($F[2,54] = 14.521$, $p < .001$). Bonferroni-corrected post hoc tests show that L1 German and L2 German use them more than L1 French speakers (both $p < .001$).

Stimuli Type B Verbs: Motion Events, Long Trajectory, Without Evident Goal. Table 5 shows the relative frequency of occurrence of the different verb types in each group. Here we find a significantly higher frequency of use of manner verbs in the L1 and L2German speakers ($F[2,54] = 14.035$, $p < .001$). The L1 French speakers display a higher frequency of entity- as well as entity + ground-based verbs, compared to the two groups of German speakers ($F[2,54] = 23.803$, $p < .001$). L1 and L2 German speakers use the verb listed under deictic (*gehen*; 'go on foot') more frequently than *aller* ('go') by French speakers ($F[2,54] = 5.138$, $p < .05$; post hoc comparisons L1 French–L1 German $p < .05$, L1 French–L2 German $p = .168$, ns).

Type A Adjuncts: Short Trajectory, Evident Goal. Table 6 shows the relative frequency of adjuncts

TABLE 4
Relative Frequencies of Verb Types: Type A Stimuli

		Path			
	Manner	Entity	Entity + Ground	Deictic	No (Motion) Verb
L1 French	97/200	60/200	38/200	5/200	0/200
	48.50%	30%	19%	2.50%	0
L1 German	96/180	0/180	7/180	75/180	2/180
	53.33%	0	3.89%	41.67%	1.11%
French–L2 German	103/190	0/190	7/190	58/190	22/190
	54.21%	0	3.68%	30.53%	11.58%

TABLE 5
Relative Frequencies of Verb Types: Type B Stimuli

		Path			
	Manner	Entity	Entity + Ground	Deictic	No (Motion) Verb
L1 French	100/200	20/200	51/200	2/200	27/200
	50%	10.00%	25.50%	1.00%	13.50%
L1 German	145/180	0/180	3/180	15/180	17/180
	80.56%	0	1.67%	8.33%	9.44%
French–L2 German	163/190	0/190	0/190	11/190	16/190
	85.79%	0	0	5.79%	8.42%

encoding different types of information in the three groups.[4] There is a significantly higher number of references to the location of the moving entity (e.g., *in the countryside*, *on the road*, *in the fields*, etc.) by the L1 French speakers, and also by the L2 German group ($F[2,54] = 9.396$, $p < .001$, post hoc comparisons L1 German–L1 French, L2 German both $p < .001$). Adjuncts describing features of the ground occur more frequently in the L1 German descriptions ($F[2,54] = 34.696$, $p < .001$, L1German–L1 French, L2 German both $p < .001$). There is a nonsignificant trend for a lower frequency of endpoint encoding by the L2 German speakers, compared to both other groups ($F[2,54] = 2.972$, $p = .060$, post hoc L2 German–L1 German: $p = .104$, L2 German–L1 French: $p = .135$).

Type B Adjuncts: Long Trajectory, Without Evident Goal. Table 7 shows the frequency of different adjuncts in the three groups. With stimuli showing a long trajectory and focusing features of the ground, event descriptions present the same patterns as Type A stimuli: The L1 French, as well as the L2 German speakers, specify the location of the moving entity only ($F[2,54] = 13.805$, $p < .001$), whereas there is a higher frequency of adjuncts encoding path information relating to features of the ground (e.g., *along the road*, *past the building*) in L1 German ($F[2,54] = 54.419$, $p < .001$). There is no group difference with respect to the endpoints encoded ($F[2,54] = 1.579$, $p = .216$, ns).

Particles. With respect to particles, we find that L2German speakers use markedly fewer particles than L1 German speakers (Table 8). The numbers show that the learners have not acquired use of verb particles in German in the given context. Because of the low number of occurrence in the L2 data, this will not be analyzed further.

Eye Tracking Data. We compared the relative frequency of fixations in an area of interest, for specific time windows before utterance onset. The first analysis focuses on fixation patterns time-locked to stimulus onset, with the aim of looking at the early allocation of attention. The question we wanted to answer was this: Are there differences in attention allocated to the moving entity and the endpoint, from early on, shortly after the stimulus has started playing? If so, how soon after stimulus onset do language differences occur? We aim to shed light on attention patterns that potentially reflect conceptualization of the event as a whole (message generation), the process that precedes formulation processes of the first mentioned referent in the sentence.[5] We thus aim to identify relatively early attention patterns that could involve the conceptualization of the type of event, centered on the concepts relevant for the selection of the specific type of verb; we assume that these conceptual categories are crucial for construing the event's category, structure, and role configuration.

TABLE 6
Relative Frequencies of Adjunct Types: Type A Stimuli

	Location	Ground	Goal	No Adjunct
L1 French	90/277	31/277	120/277	36/277
	32.49%	11.19%	43.32%	13.00%
L1 German	26/249	107/249	107/249	9/249
	10.44%	42.90%	42.97%	3.61%
French–L2 German	80/221	22/221	77/221	42/221
	36.20%	9.95%	34.84%	19.00%

TABLE 7
Relative Frequencies of Adjunct Types: Type B Stimuli

	Location	Ground	Goal	No Adjunct
L1 French	96/225	30/225	34/225	62/225
	42.67%	13.33%	15.11%	27.56%
L1 German	22/236	157/236	45/236	11/236
	9.32%	66.53%	19.07%	4.66%
French–L2 German	118/191	0/191	27/191	45/191
	61.78%	0	14.14%	23.56%

TABLE 8
Relative Frequencies of Verb Particles

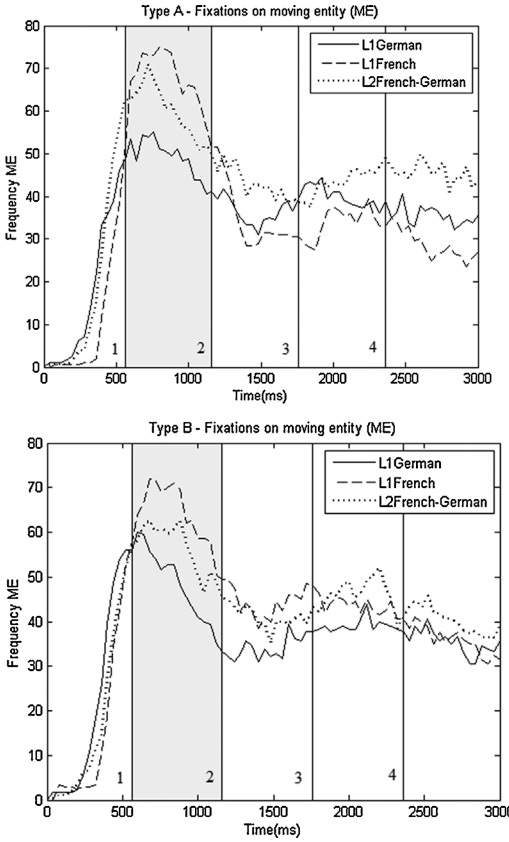
	Type A Stimuli	Type B Stimuli
L1 German	50/180	112/180
	27.78%	62.22%
French–L2 German	11/190	4/190
	5.79%	2.11%

The second analysis focuses on fixation patterns time-locked to utterance onset for each participant on each trial (overall average is plotted below) and analyzes gaze patterns during speech preparation specifically time-locked to the start of the sentence. Because we are dealing with naturalistic dynamic stimuli in which events unfold over time, it is not certain when formulation processes of individual clausal elements take place, in relation to utterance onset. The analyses of gaze allocation in the time span leading up to utterance onset are thus exploratory in nature—the main aim is the comparison between groups, assuming that all speakers need to go through all of the same processing steps related to sentence production, as outlined above. We cannot with certainty pinpoint the exact stage of conceptual processing which is reflected in fixation patterns at different windows along the time course.

Fixations on the Moving Entity. First, fixations in the moving entity region were analyzed in relation to stimulus onset for each stimulus type separately. Figure 4 shows the relative proportion of fixations in this AoI for each 60 ms time bin, for each group (per stimulus type). The data are plotted for about 3000 ms, as we are interested in the earliest time windows, approximately before average speech onset time (which is around 2390 ms).

Relative frequencies of fixations were captured in four consecutive 600 ms time windows, each of which gives the average of 15 time bins (window 1: 0–560 ms, window 2: 600–1160 ms, window 3: 1200–1760 ms, window 4: 1800–2360 ms). The size of these time windows is motivated by visual inspection of Figure 4, showing that these windows enable the analysis of the area of the peak of moving entity fixations, which surfaces roughly between 600 and 1200 ms, and which allows us to analyze potential group differences within this window of maximal entity fixations (time window 2, grey area). Furthermore, the four windows lead up to approximately average speech onset time. From visual inspection, one can see that the first window (the first 600 ms of stimulus display) contains an overall increase in moving entity fixations. We assume that this time span entails the phase for global gist extraction (event apprehension), which has been shown to take around 300 ms in a sentence production task (for descriptions of events in pictures, see Griffin & Bock, 2000) in which no or only one fixation is usually registered. It forms the basis for further linguistic processing. There are thus overall only few relevant data points in this time span.

FIGURE 4
Relative Frequency of Fixations on the Moving Entity (ME), Time Locked to Stimulus Onset: Type A (Above) and Type B Stimuli (Below)



Note. The four 600 ms time windows for the analyses are marked in the figures.

The basis for the analysis is moving entity fixations for each participant, for all Type A or Type B stimuli, in each 60 ms bin. These data points were averaged over 15 bins (600 ms windows). A group (3) × time window (4) univariate ANOVA for each stimulus type tested for main and interaction effects with respect to moving entity fixations.

For Type A stimuli we find a significant main effect of time window ($F[3,216] = 77.628$, $p < .001$), a significant group × time window interaction ($F[6,216] = 3.140$, $p < .05$), and a trend for a group effect ($F[2,216] = 2.683$, $p = .071$). Bonferroni-corrected post hoc tests show that all time windows significantly differ from each other, except for windows 3 and 4 (between 1200 and 2400 ms). To explore the interaction further, separate ANOVAs were carried out for each window. In time window 1 we find a significant group difference ($F[2,54] = 6.240$, $p < .05$): The L1 French speakers have a lower frequency of entity fixations than the L1 and L2 German speakers (both $p < .05$). In time window 2 (the peak bin), we find a group difference as well ($F[2,54] = 4.816$, $p < .05$); in this case, the L1 French speakers display a higher fixation frequency on the entity than the L1 German speakers ($p < .05$). This is not the case when compared to the L2 German speakers ($p = .579$), which do not differ from either group, and are thus, in between. In time window 3 and 4 there are no group differences (window 3: $F[2,54] = 1.295$, $p = .282$, ns; window 4: $F[2,54] = 1.931$, $p = .155$, ns).

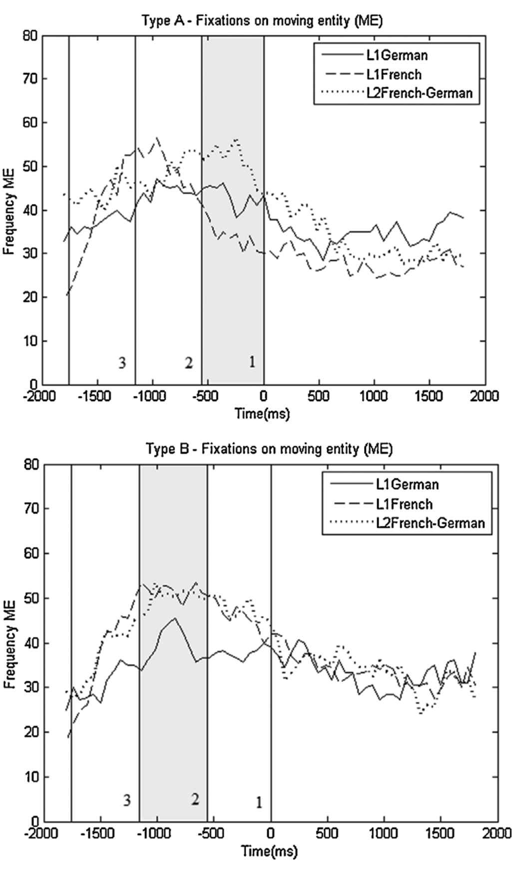
For Type B stimuli we again find a significant effect of time window ($F[3,216] = 57.726$, $p < .001$) and this time also a main effect of group ($F[2,216] = 3.253$, $p < .05$). The group × time window interaction shows a marginal trend ($F[6,216] = 1.885$, $p = .085$). Bonferroni-corrected post hoc tests again show differences between all time windows, except windows 3 and 4. With respect to group, we find a higher frequency of entity fixations in the L1 French group, compared to L1 German ($p < .05$), but not compared to the L2 German group ($p = .99$).

Given our a priori interest in pinpointing when group differences occur, separate analyses per time window were conducted. They revealed a group difference for window 1 ($F[2,54] = 3.520$, $p = .037$: L1 German displays more entity fixations than L1 French) and window 2, the peak bin ($F[2,54] = 3.673$, $p = .032$: L1 French displays more entity fixations than L1 German, but similar to L2 German), but not for window 3 ($F[2,54] = 1.672$, $p = .197$, ns) and 4 ($F[2,54] = 0.846$, $p = .435$, ns).

Figure 5 shows the same data, time-locked to utterance onset. This time, average fixation frequencies on the moving entity were analyzed in three 600 ms time windows,[6] from utterance onset back in time (window 1: 0/SOT to −560, window 2: −600 to −1160, window 3: −1200 to −1760). Here, again, the plotted relative fixation frequencies are very informative (Figure 5): The peak of entity fixation frequency occurs between 600 and 1200 ms before SOT, and even earlier for the L1 French group, starting already around 1400 ms before SOT. In order to capture this time window, 600 ms windows seem appropriate.

Initially, a univariate ANOVA on the overall average relative frequency of fixations in the moving entity region during the entire time span leading up to speech onset was conducted. For Type A, there was no significant group effect ($F[2,54] = 1.669$, $p = .198$, ns). However, for Type B stimuli, there was a trend for the L1 German speakers to have fewer entity fixations than L2 German and L1 French ($F[2,54] = 2.753$, $p = .073$, trend).

FIGURE 5
Relative Frequency of Fixations on the Moving Entity (ME), Time Locked to Utterance Onset (0): Type A (Above) and Type B Stimuli (Below)



Note. The three 600 ms time windows for the analyses are marked in the figures.

The next set of analyses focuses on the previously defined 3 time windows, by means of a group (3) × time window (3) univariate ANOVA for each stimulus type. For Type A stimuli, there was no significant difference between time windows ($F[2,216] = 2.363$, $p = .097$, ns), a marginal trend for a group effect ($F[2,216] = 2.528$, $p = .083$, trend; L2 German more entity fixations than L1 German and L1 French) and no interaction ($F[4,216] = 1.566$, $p = .186$, ns). Again, given our a priori interest in exploring when along the time course group differences may appear strongest, and given a marginal main effect of group, we analyzed time windows separately. In window 1, we find a significant group difference ($F[2,54] = 4.341$, $p < .05$), with post hoc tests showing a higher frequency of entity fixations in the L2 German group, compared to L1 French. In window 2 ($F[2,54] = 0.609$, $p = .548$, ns) and 3 ($F[2,54] = 0.718$, $p = .492$, ns) there are no group differences.

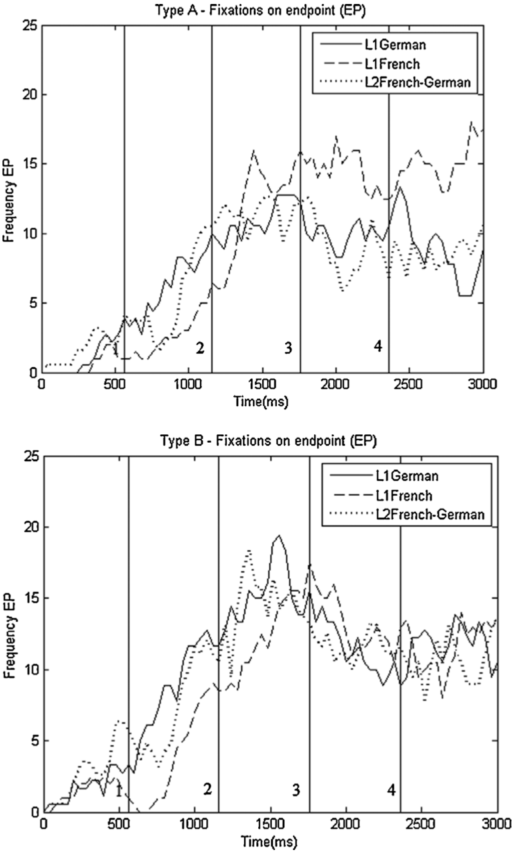
For Type B stimuli we find a significant difference between time windows ($F[2,216] = 8.436$, $p < .001$), with post hoc tests showing fewer entity fixations in window 3, compared to the two later windows. We also find a significant group effect ($F[2,216] = 5.144$, $p < .05$): The L1 German group displays fewer fixations on the entity than L2 German and L1 French. There was no significant interaction between these two factors ($F[4,216] = 0.202$, $p = .937$, ns). Given the exploratory nature of the time course analyses, again separate analyses per time window were conducted. They show no difference between groups in window 1 ($F[2,54] = 1.840$, $p = .169$, ns), and 3 ($F[2,54] = 0.701$, $p = .500$, ns), but a higher frequency of entity fixations in the L1 French group, compared to L1 German in time window 2 (the peak window for entity fixations) ($F[2,54] = 3.251$, $p < .05$). The L2 German speakers display a pattern similar to speakers of their mother tongue.

Fixations on the Endpoint. The data were first analyzed time-locked to stimulus onset in the four consecutive 600 ms bins (see Figure 6), by means of a group (3) × time window (4) univariate ANOVA for each stimulus type. For Type A, we find a main effect of time window ($F[3,216] = 39.279$, $p < .001$), no main effect of group ($F[2,216] = 0.228$, $p = .796$, ns), but a significant interaction ($F[6,216] = 2.252$, $p < .05$). Separate analyses per time window show no difference for window 1 ($F[2,54] = 2.347$, $p = .105$, ns), nor for window 2 ($F[2,54] = 2.233$, $p = .117$, ns) or window 3 ($F[2,54] = .106$, $p = .900$, ns). In window 4 we find a group difference ($F[2,54] = 3.220$, $p < .05$): The L1 French speakers fixate the endpoint more frequently than the L2 German speakers ($p = .060$, trend) (L1 German is in between).

For Type B stimuli, the group by time window ANOVA reveals only a significant effect of time window ($F[3,216] = 39.439$, $p < .001$), no effect of group ($F[2,216] = 1.266$, $p = .284$, ns), and no interaction between the two ($F[6,216] = 1.046$, $p = .397$, ns). Endpoint fixations for Type B stimuli were not further explored, as the stimulus type profiles the trajectory of motion, rather than endpoints.

For Type A stimuli we also inspected fixations in the endpoint region time-locked to utterance onset (Figure 7). As before, fixation frequencies were analysed in three time windows preceding utterance onset, by means of a group (3) × time window (3) univariate ANOVA. Results show an effect of time window ($F[2,162] = 6.440$, $p < .05$),

FIGURE 6
Relative Frequency of Fixations on the Endpoint (EP), Time Locked to Stimulus Onset: Type A (Above) and Type B Stimuli (Below)



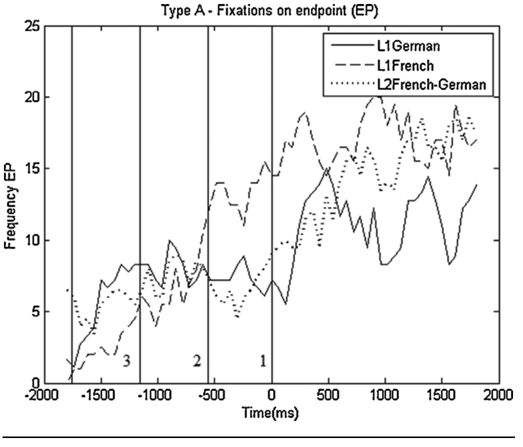
an interaction between time window and group ($F[4,162] = 4.016$, $p < .05$), but no main effect of group ($F[2,162] = 0.412$, $p = .663$, ns).

Separate analyses in each time window revealed a group difference in window 1 ($F[2,54] = 4.700$, $p < .05$). Bonferroni-corrected post hoc tests show a higher frequency of endpoint fixations in the L1 French group compared to L1 German and L2 German ($p < .05$). There are no group differences in window 2 ($F[2,54] = .296$, $p = .745$, ns) or window 3 ($F[2,54] = 1.970$, $p = .149$, ns). Visual inspection renders an increase in endpoint fixations in the L1 and L2 German speakers after utterance onset only.

DISCUSSION OF FINDINGS

We set out to explore potential differences in the cognitive salience of specific aspects of motion events, as related to different conceptual distinctions expressed in motion verbs. This was carried out by analyzing speech and fixation patterns in native speakers of German and French, and advanced French L2 users of German. The analyses of fixation patterns focus on the time span before utterance onset, tapping into utterance planning processes. The stimuli include two types of motion event videos, one in which endpoints are highly salient, and the trajectory traversed by a moving entity (person, vehicle) is rather short, though endpoints are never reached in the videos (Type A stimuli), and one in which the trajectory is long and features of the ground traversed are in focus, whereas endpoints are less salient (Type B stimuli).

FIGURE 7
Relative Frequency of Fixations on the Endpoint (EP), Time Locked to Utterance Onset: Type A Stimuli



In the analyses of the information encoded in the descriptions, we find comparable use of manner of motion verbs in all three groups, but use of entity-based and entity + ground-based verbs in L1 French. The L1 German speakers encode information on endpoints or features of the ground in adjuncts and particles ('a man walks to a car/along a road, past a building' — features of the ground). If the L1 French speakers use manner verbs, descriptions of the path are limited to the location of the entity. If entity-based path verbs are used, endpoints are mentioned in adjuncts. Interestingly, the L2 German speakers use manner verbs as well as *gehen* ('to go on foot'), reflecting target language patterns. However, they refer mainly to the location of the moving entity, a pattern which is atypical for German as they do not relate to the trajectory traversed by the entity in motion: In other words, they reflect their native language, French.

With respect to attention patterns, we find group differences for fixations on the moving entity for both stimulus types, and for fixations on the endpoint for Type A stimuli (showing more salient endpoints than Type B stimuli in general): Findings show an increased degree of attention allocated to the moving entity by the native French speakers, as well as the L2 users of German, relatively shortly after stimulus onset (between 600 and 1200 ms after the video starts playing), and also (in a second analysis), around a second before utterance onset. Furthermore, we find an increased degree of attention to endpoints by the L1 French speakers shortly before utterance onset. The L1 and L2 German speakers show an increase of fixations in this region after utterance onset only.

We view these findings as reflecting visual processing and scene evaluation related to event category identification and verb selection processes. As the language patterns show, in French, motion verbs can describe specific spatial relations between an entity in motion and a potential endpoint of the event. In German, on the other hand, speakers mainly use verbs that relate to the manner of motion and they rely on aspects of the event other than the moving entity to structure the path of motion; these concern either features of the ground (*an entity moving along x*), and/or endpoints (*walking toward, to,* or *into the place at the endpoint*). For Type A stimuli, speakers of both languages refer to endpoints (given the high degree of endpoint salience in the scenes). However, a crucial difference between French and German is that, in French, speakers require information with respect to the alignment and approximate spatial relation between the moving entity and an endpoint earlier, as this is relevant for verb selection and the concepts that verbs express. As we did not tease apart the data further, we do not know to what extent attention patterns in French are a result of the fact that there are basically two ways of conceptualizing motion events (path verb plus directional concept in other sentence material, or manner verb plus location information), or whether they reflect the actual selection of one specific verb type (and co-occurring use of adjuncts).

In line with previous studies on gaze allocation during sentence production and event construal, the present study shows that the information encoded in verbs is central to the construal of events, and that the different types of information encoded in verbs (from a cross-linguistic perspective or when comparing task demands) may result in different early processing patterns (Griffin & Bock, 2000; Konopka, 2013; for the planning of multi-word utterances, see Griffin & Spieler, 2006). One must of course bear in mind that during the time span before utterance onset the noun phrase referring to the moving entity itself must also be conceptualized, as well as formulated (i.e., it must be grammatically and phonologically encoded), given its status as the first mentioned element (all sentences show SV word order). The plotted fixation frequencies do indeed show a peak of moving entity fixations in the time span before utterance onset: These may thus also reflect formulation processes, in conjunction with processing for verb selection. Speakers of German of course also need information with respect to the entity, namely, its manner of motion, as this is encoded in the sentence's main verb. Nevertheless, we find increased fixations on the moving entity during the first overall fixation peak in this region in the L1 French group, and the L2 German group, compared to the L1 German speakers. It is important to note that all speakers refer to the moving entity with similarly structured and frequent noun phrases showing no differences in complexity at clause level, thus cancelling out potential processing differences related to the retrieval of lexical information concerning the subject of the sentence.

For our highly proficient L2 users of German we find, at different levels of analysis, (partial) native language conceptualization transfer effects (cf. Jarvis & Pavlenko, 2008; in line with findings in, e.g., Benazzo et al., 2012; Carroll et al., 2012; Daller et al., 2011; Schmiedtová, 2013; see also the overview in Bylund, 2011). The transfer takes place at a conceptual level, as the patterns relate to subtle but (presumably) automatized patterns in attending to motion event scenes when preparing to speak about them, that is, event conceptualization patterns in one's native language. These patterns are visible even when the L2 users are performing the task in a language that does not have the options and the specific elaborate system which the native language (French) offers via verbs to express direction: In German, motion events of this type need to be described using manner of motion verbs. Furthermore, we find transfer at the level of information selection in the language data. The L2 German speakers do not structure the path of motion by focusing on contours of the ground, in contrast to native German speakers. In L1 German, manner of motion is encoded in the verb and the path of motion is conceptualized as translational motion on a course which explicitly leads the entity on a path shaped as *around*, *through*, *over*. When manner of motion is encoded in the verb in French the entity is simply located at a place (e.g., *x drives on a road*). The French L2 users of German display the same way of conceptualizing the path of motion in German, evidencing conceptualization transfer from their L1: The ground does not function in terms of a vector-like structure, but as presenting sets of locations that contain a moving entity as it moves through space (*to walk/drive on the road*), a conceptualization of space which differs in fundamental terms with conceptualizations on the basis of translational motion (Bohnemeyer, 2010; Jackendoff, 1996; Wunderlich & Herweg, 1991). Translational motion is directional and this concept does not strictly apply to manner of motion (e.g., *run*) as one can *run in place* without changing location, and it also does not apply to conceptualizations which involve a reference to manner of motion conjoined with reference to a location; on the other hand, adjuncts such as *along* do encode translational components of a motion event.[7] Event descriptions such as *a car is moving on the road* and *a car is moving along the road to a village* are thus not equal, as the underlying concepts belong to different frames of reference. This fundamental difference in structuring path was also observed in event descriptions of advanced L1 French learners of English, another satellite-framed language (Carroll et al., 2012).

With respect to the eye tracking data we find an L1 effect in those scenes in which endpoints are highly salient (Type A stimuli). In this context French speakers can use verbs that encode direction in relation to features of the entity (alignment with a potential endpoint), and they do so in more than 50% of their descriptions. Here, the L2 speakers allocate attention to the moving entity to a high degree, in line with the pattern obtained for the French L1 control group. Both findings reveal the extent to which the set of spatial concepts used to structure the path of motion in the L1 is active during language processing in the L2. The L2 users thus show L1-mediated conceptualization patterns that relate to the salience attributed to specific event elements, even when there is no direct locus for transfer of patterns in language use. The sample of L2 users tested displays a high proficiency in the L2, as well as a considerable amount of L2 exposure in daily life; their event descriptions evidence full mastery of linguistic forms in German. This, however, did not lead to acquisition of target-like motion event conceptualization patterns. Other studies have reported successful (partial) restructuring of L1 patterns for advanced L2 users (e.g., Bylund, 2009; Bylund & Jarvis, 2011). Those samples of speakers differed from the current sample in the length of residence and immersion in the L2 country. The present sample of L2 users was not exposed to a long period of immersion in the L2 speaking country, which is viewed as a relevant prerequisite for the potential restructuring of L1 patterns (see an overview in Athanasopoulos, 2011). This leads us to conclude that long-term experience in language use (and immersion) is crucial in mastering the L2 at all levels, including processes of conceptualization, and understanding language-specific ways of attending to and construing events (see e.g., Athanasopoulos et al., 2015; Bylund & Athanasopoulos, 2015). The findings thus pinpoint the role of attentional processes and the associated conceptualization patterns when processing information for expression as the crux for the learner in L2 acquisition, thus going beyond the acquisition of linguistic form alone (see also Flecken, von Stutterheim, & Carroll, 2013). This is something which, presumably, cannot be acquired through classroom teaching with relatively little L2 exposure.

IMPLICATIONS FOR L2 TEACHING

The acquisition of motion verbs and their appropriate use in an L2 is notoriously difficult, as shown in the present study. The learning problem does not lie in the verb itself, but in the identification and acquisition of how concepts cluster when interrelating conceptual building blocks in the domain of spatial cognition. Languages profile different ways of conceptualizing motion events in conjunction with the corresponding expressive devices; different conceptual categories are grammaticalized and different forms of lexical specification are available cross-linguistically. Here, at the level of form, we encounter only the first challenge for the learner: Conceptual categories expressed in the L2 have to be acquired, given the way they are linguistically represented and used in the L1, in contrast to the L2. For example, French learners of German need to become aware of the systematic dissociation of manner of motion and directed translational motion in French, which is not the case in German. In such cases, the learning process entails that learners look for a new segmentation of a given conceptual domain, or different weightings of familiar conceptual categories. French learners of German have no other option than to acquire motion verbs encoding manner; they thus, first of all, have to attribute a higher degree of salience or importance to this (familiar) concept in comparison to their L1 system. This does not automatically mean, however, that the learner gains insight into the L2-specific frames of reference or conceptual networks in which spatial concepts cluster together.

An important finding of the present study is that it demonstrates how spatial concepts cluster in French and German, and how this constrains or favors access to specific patterns of conceptualization, as in the case of manner of motion and location in French, in contrast to manner of motion which can conjoin with directionality in German. A sentence such as *das Auto fährt auf der Straße* ('the car drives on the road') is not equivalent to *la voiture roule sur la rue* ('the car drives on the road') in terms of implied or pragmatic meaning. In German, this sentence would imply that there are alternatives to driving 'on the road,' for example, 'driving off-road, in the fields.' In French, this is a typical conceptualization of a motion event of a specific type (i.e., those in our Type B stimuli: events that focus the trajectory of motion and have a low degree of goal-orientation). Such differences in core spatial domains and their implications for frames of reference are something a learner cannot easily unravel.

In the context of language teaching, such incompatibilities of L2 productions with the target language, as a consequence of the transfer of L1 patterns of conceptualization, is rarely an explicit topic of discussion. Teachers would generally refer to their intuition as native speakers, often without being able to pin down the problem. We believe that we are only at the beginning of the process of understanding the logic underlying language-specific patterns of conceptualization as activated when organizing information for expression. They apply to all contexts of language use, whether in expository, narrative, or descriptive tasks, and learning how to organize information for expression entails knowledge of how conceptual domains such as space, time, and entities are interlinked in context, based on the available grammaticalized and lexicalized categories. Although we are still a long way from designing constructive teaching material, the first important step is to increase awareness concerning this level of linguistic knowledge which to date has rarely been a component of teacher training.

CONCLUSIONS

The present study provides further evidence of how language-specific structures affect attentional processes (information selection and structuring) in language production (cf. von Stutterheim & Nüse, 2003; von Stutterheim et al., 2012), in the present case for fine-grained differential lexicalization patterns and their underlying spatial concepts when structuring a path of motion in event conceptualization. Spatial conceptualization in French differs in its fundamentals from that of German, given the roles of the core domains (moving entities, objects) around which they are organised. Attention patterns before utterance onset reflected differences in the cognitive salience attributed to core motion elements (entity in motion, endpoint), highlighted by the specific spatial repertoire available in the respective language system. The complex principles according to which motion events are structured in their spatial properties, and for which there is no evident single linguistic correlate, are therefore difficult to acquire. They are unconscious, automated, and can be applied to the linguistic means of a language system acquired later in life, as is the case in the present investigation of French L2 users of German. What could be interpreted as convergence at the level of the linguistic product may be, in fact, the result of the activation of L1 patterns at the level of message generation and conceptualization, preceding the selection of linguistic form.

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NOTES

[1] One participant in the L2 German group consistently started speaking only during the interstimulus interval, after the stimulus video had fully played and had then disappeared from the screen. This participant was not included in subsequent analyses; we are interested in pre-articulatory attention patterns, which relate to the planning of the utterance. Given that this participant waited for the end of the stimulus until he/she started articulating, we cannot with certainty say that fixation patterns related to sentence planning.

[2] Due to technical problems that occurred during the experiment (tracking loss), two participants from the L1 German group had to be excluded; this was true as well for an L2 German participant, due to extremely long speech onset latencies. All analyses as well as graphs thus involve 57 participants (L1 German $N = 18$, L1 French $N = 20$, L1 French–L2 German $N = 19$).

[3] All analyses in the present study were conducted on subject means only. The design concerns a relatively low number of items in each stimulus type, consisting of (dynamic) live-recorded video clips, leading automatically to a certain extent of between-item variability, especially in the analyses of gaze allocation. We find this a necessary concession for our purpose of investigating naturalistic spontaneous speech. The small number of items would furthermore make the by-item analyses low powered and difficult to conclude from. As we are dealing with a counterbalanced design (each participant in each group saw each stimulus), the by-subject analyses should not be overly influenced by item differences (the same item differences would have played a role in all speakers). At this point, we cannot with certainty say that the pattern of results obtained generalizes across items.

[4] The analyses of adjuncts and particles include in some cases more data points than the number of subjects × stimuli, given the possibility for speakers to include more than one adjunct (or adjunct plus particle) in their descriptions.

[5] In line with existing models, we assume incremental planning in sentence production (Bock & Levelt, 1994).

[6] For the analyses of fixation frequencies time-locked to utterance onset, we are mainly interested in what happens shortly before this event. Therefore, we include only three time windows leading up to speech onset for the analyses.

[7] Translational motion is determined by vectors which can be described for distance and direction in a categorical sense. In the case of manner of motion, distance and direction do not apply, in categorical terms, as one can *drive in a circle* or *fly in a circle*, *walk or run in in place* without actually going anywhere. Similarly, a change in place is not fully represented on the basis of a locative relation in conjunction with a manner verb: The event of *driving down a road* is simplified when represented as *driving on the road* (see, e.g., Jackendoff, 1996).

REFERENCES

Athanasopoulos, P. (2011). Cognitive restructuring in bilingualism. In A. Pavlenko (Ed.), *Thinking and speaking in two languages* (pp. 29–65). Bristol, UK: Multilingual Matters.

Athanasopoulos, P., & Bylund, E. (2013). Does grammatical aspect affect motion event cognition? A cross-linguistic comparison of English and Swedish speakers. *Cognitive Science*, *37*, 286–309.

Athanasopoulos, P., Damjanovic, L., Burnand, J., & Bylund, E. (2015). Learning to think in a second language: Effects of proficiency and length of exposure in English learners of German. *Modern Language Journal*, *99*, Supplement 2015, 138–153.

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

Benazzo, S., Andorno, C., Interlandi, G., & Patin, C. (2012). Perspective discursive et influence translinguistique: Exprimer le contraste d'entité en français et en italien L2. [Discourse perspective and cross-linguistic influence: The expression of entity contrast in French and Italian L2]. *Language, Interaction, & Acquisition*, *3*, 173–201.

Bock, K., & Levelt, W. (1994). Language production: Grammatical encoding. In M. A. Gernsbacher (Ed.), *Handbook of psycholinguistics* (pp. 945–984). London: Academic Press.

Bock, J. K., Irwin, D. E., & Davidson, D. J. (2004). Putting first things first. In J. M. Henderson & F. Ferreira (Eds.), *The interface of language, vision, and action: Eye movements and the visual world* (pp. 249–278). New York: Psychology Press.

Bock, K., Irwin, D., Davidson, D., & Levelt, W. (2003). Minding the clock. *Journal of Memory and Language*, *48*, 653–685.

Bohnemeyer, J. (2010). The language-specificity of conceptual structure: Path, fictive motion, and time relations. In B. Malt & P. Wolff (Eds.), *Words and the mind: How words capture human experience* (pp. 111–137). Oxford: Oxford University Press.

Brown, A. (2015). Universal development and L1–L2 convergence in bilingual construal of manner in speech and gesture in Mandarin, Japanese, and English. *Modern Language Journal*, *99*, Supplement 2015, 66–82.

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.

Brown, A., & Gullberg, M. (2013). L1–L2 convergence in clausal packaging in Japanese and English. *Bilingualism: Language and Cognition*, *16*, 477–494.

Brown–Schmidt, S., & Tanenhaus, M. K. (2006). Watching the eyes when talking about size: An investigation of message formulation and utterance planning. *Journal of Memory and Language*, *54*, 592–609.

Bylund, E. (2009). Effects of age of L2 acquisition on L1 event conceptualization patterns. *Bilingualism: Language and Cognition*, *12*, 305–322.

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.

Bylund, E., & Athanasopoulos, P. (2015). Televised Whorf: Cognitive restructuring in advanced foreign language learners as a function of audiovisual media exposure. *Modern Language Journal*, 99.

Bylund, E., & Jarvis, S. (2011). L2 effects on L1 event conceptualization. *Bilingualism: Language and Cognition*, *14*, 47–59.

Cadierno, T. (2004). Expressing motion events in a second language: A cognitive typological approach. In M. Achard & S. Niemeier (Eds.), *Cognitive linguistics, second language acquisition and foreign language pedagogy* (pp. 13–49). Berlin: Mouton de Gruyter.

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

Cadierno, T., & Ruiz, L. (2006). Motion events in Spanish L2 acquisition. *Annual Review of Cognitive Linguistics*, *4*, 183–216.

Carroll, M. (2000). Representing path in language production in English and German: Alternative perspectives on figure and ground. In C. Habel & C. von Stutterheim (Eds.), *Räumliche Konzepte und sprachliche Strukturen [Spatial concepts and linguistic structures]* (pp. 97–118). Tübingen, Germany: Niemeyer.

Carroll, M., Weimar, K., Flecken, M., Lambert, M., & von Stutterheim, C. (2012). Tracing trajectories: Motion event construal by advanced L2 French–English and L2 French–German speakers. *Language, Interaction, & Acquisition*, *3*, 202–230.

Council of Europe. (2001). *Common European Framework of Reference for languages: Learning, teaching and assessment*. Cambridge: Cambridge University Press.

Daller, M. H., 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.

Flecken, M. (2011). Event conceptualization by early bilinguals: Insights from linguistic and eye tracking data. *Bilingualism: Language & Cognition*, *14*, 61–77.

Flecken, M., von Stutterheim, C., & Carroll, M. (2013). Principles of information organization in L2 use: Complex patterns of conceptual transfer. *International Review of Applied Linguistics*, *51*, 229–242.

Flecken, M., von Stutterheim, C., & Carroll, M. (2014). Grammatical aspect influences motion event perception: Evidence from a cross-linguistic, non-verbal recognition task. *Language and Cognition*, *6*, 45–78.

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

Gleitman, L. R., January, D., Nappa, R., & Trueswell, J. C. (2007). On the give and take between event apprehension and utterance formulation. *Journal of Memory and Language*, *57*, 544–596.

Griffin, Z. M., & Bock, K. (2000). What the eyes say about speaking. *Psychological Science*, *11*, 274–279.

Griffin, Z. M., & Spieler, D. H. (2006). Observing the what and when of language production for different age groups by monitoring speakers' eye movements. *Brain and Language*, *99*, 272–288.

Gruber, J. (1965). *Studies in lexical relations.* (Unpublished doctoral dissertation). Massachusetts Institute of Technology, Boston, MA.

Hendriks, H., & Hickmann, M. (2015). Finding one's path into another language: On the expression of boundary crossing by English learners of French. *Modern Language Journal*, *99*, Supplement 2015, 14–31.

Hickmann, M., & Robert, S. (2006). *Space in languages: Linguistic systems and cognitive categories.* 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.

Jackendoff, R. (1996). The architecture of the linguistic–spatial interface. In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and space* (pp. 1–30). Cambridge, MA: Massachusetts Institute of Technology Press.

Jarvis, S. (2007). Theoretical and methodological issues in the investigation of conceptual transfer. *Vigo International Journal of Applied Linguistics*, *4*, 43–71.

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

Just, M. A., & Carpenter, P. A. (1976). Eye fixations and cognitive processes. *Cognitive Psychology*, *8*, 441–480.

Konopka, A. (2013, September). *Discourse changes the time course of sentence formulation.* Poster presented at the Architecture and Mechanisms of Language Processing conference, Marseille, France.

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

Marian, V., & Fausey, C. M. (2006). Language-dependent memory in bilingual learning. *Applied Cognitive Psychology*, *20*, 1–23.

Papafragou, A., Massey, C., & Gleitman, L. (2002). Shake, rattle, 'n roll: The representation of motion in thought and language. *Cognition*, *84*, 189–219.

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

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

Pavlenko, A., & Volynsky, M. (2015). Motion encoding in Russian and English: Moving beyond Talmy's typology. *Modern Language Journal*, *99*, Supplement 2015, 32–48.

Pourcel, S., & Kopecka, A. (2005). Motion expression in French: Typological diversity. *Durham and Newcastle Working Papers in Linguistics*, *11*, 139–153.

Schmiedtová, B. (2013). Traces of L1-patterns in the event construal of Czech advanced speakers of L2-English and L2-German. *International Review of Applied Linguistics*, *51*, 81–116.

Schmiedtová, B., von Stutterheim, C., & Carroll, M. (2011). Implications of language-specific patterns in event construal of advanced L2 speakers. In A. Pavlenko (Ed.), *Thinking and speaking in two languages* (pp. 66–107). Bristol, UK: Multilingual Matters.

Slobin, D. I. (1996). From thought and language to thinking for speaking. In J. Gumperz & S. Levinson (Eds.), *Rethinking linguistic relativity* (pp. 70–96). Cambridge: Cambridge University Press.

Slobin, D. I. (2004). 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.

Soroli, E., & Hickmann, M. (2010). Language and spatial representations in French and in English: Evidence from eye-movements. In G. Marotta, A. Lenci, L. Meini, & F. Rovai (Eds.), *Space in language* (pp. 581–597). Pisa, Italy: Editrice Testi Scientifici.

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. (2000). *Toward a cognitive semantics. Vol. II: Typology and process in concept structuring*. Cambridge, MA: The MIT Press.

von Stutterheim, C., Andermann, M., Carroll, M., Flecken, M., & Schmiedtová, B. (2012). How grammaticized concepts shape event conceptualization in language production: Insights from linguistic analysis, eye tracking data, and memory performance. *Linguistics*, *50*, 833–867.

von Stutterheim, C., & Carroll, M. (2006). The impact of grammatical temporal categories on ultimate attainment in L2 learning. In H. Byrnes, H. Weger–Guntharp, & K. Sprang (Eds.), *Educating for advanced foreign language capacities* (pp. 40–53). Washington, DC: Georgetown University Press.

von Stutterheim, C., & Nüse, R. (2003). Processes of conceptualisation in language production: Language-specific perspectives and event construal. *Linguistics, 41*, 851–881.

Wunderlich, D., & Herweg, M. (1991). Lokale und Direktionale [Locatives and directionality]. In A. von Stechow & D. Wunderlich (Eds.), *Semantik Ein internationales Handbuch der zeitgenössischenForschung* [Semantics. An international handbook of contemporary research] (pp. 758–785). Berlin/ New York: de Gruyter.

Zlatev, J., & Yangklang, P. (2004). A third way to travel: The place of Thai and serial verb languages in motion event typology. In S. Strömqvist & L. Verhoeven (Eds.), *Relating events in narrative: Typological and contextual perspectives* (pp. 159–190). Mahwah, NJ: Lawrence Erlbaum.