

THE MANY WAYS TO EXPLORE SPACE: THE ACQUISITION OF MOTION ENCODING STRATEGIES BY ENGLISH-PORTUGUESE BILINGUALS

by

JEAN COSTA SILVA

(Under the Direction of Vera Lee-Schoenfeld and Paula Mellom)

ABSTRACT

In this dissertation, I investigate how late bilinguals of English and Brazilian Portuguese (BP), two typologically distinct languages, encode motion in writing and speech. English, a satellite-framed language, encodes Manner in the verb and Path in satellites, while BP, a verb-framed language, places Path in the verb and Manner in optional structures. I examine how these typological distinctions shape motion encoding in late bilinguals, exploring the emergence of L2 lexicalization patterns and bidirectional transfer effects.

This dissertation presents the results of three studies. Study 1 uses acceptability judgments from 192 participants to evaluate preferences for Manner+Path, Path+Manner[PP], and Path+Manner[AC] structures. Results reveal typological constraints influence L1 speakers, with L2 learners showing proficiency-dependent alignment to monolingual preferences, laying the groundwork for production-focused research. Study 2 examines written production in 90 participants using video game clips as stimuli, enabling the analysis of continuous motion and boundary-crossing events. Findings highlight how L2 patterns emerge gradually, with English speakers adopting BP's Path-encoding earlier than BP speakers incorporate English's Manner-encoding. The innovative use of dynamic stimuli overcomes limitations of static image-based studies, offering a richer analysis of overt and implied motion. Study 3 investigates spoken production from 50 participants through simultaneous and delayed elicitation, comparing spontaneous and planned descriptions. It explores how bilinguals encode boundary-crossing constraints and reveals proficiency-driven shifts in encoding strategies, with Advanced learners demonstrating greater alignment

with L2 norms. Bidirectional transfer is evident, as L2 acquisition reshapes L1 patterns, particularly in Path elaboration.

This dissertation contributes to Second Language Acquisition and Cognitive Linguistics by providing a large-scale, empirical analysis of BP-English bilinguals. It identifies cognitively demanding lexicalization patterns and pedagogical strategies to foster L2 mental representations. Findings challenge deterministic views of critical periods for L2 learning and advance understanding of how typology, proficiency, and modality shape bilingual cognition and linguistic performance.

INDEX WORDS: [language acquisition, second language acquisition, motion encoding, Brazilian Portuguese, English, cognitive linguistics]

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B.A., Federal University of Minas Gerais, Brazil, 2013.

A Dissertation Submitted to the Graduate Faculty of the
University of Georgia in Partial Fulfillment of the Requirements for the
Degree.

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2025

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May 2025

DEDICATION

To me. I deserve this.

ACKNOWLEDGMENTS

This dissertation comprises not only my work over the past three years, but also the invaluable contributions, guidance, and support of so many remarkable people. My gratitude goes far beyond what these pages can capture.

First and foremost, my deepest thanks go to Vera Lee-Schoenfeld. From our initial conversation after the Seminar on Language Acquisition to collaborating on countless projects, Vera has been an incredible mentor, co-author, and source of personal and academic inspiration. Her warmth, humor, and brilliance made this journey enjoyable and fulfilling. Thank you for supporting my ideas - especially the creation of the Second Language Acquisition Lab - and believing in my vision.

To my co-chair, Paula Mellom: thank you for welcoming me even before I arrived at the University of Georgia and helping me transition from Brazil. Your kindness and encouragement have been invaluable, both academically and personally. I am forever grateful for our conversations about language and culture that inspired so many pages of this work.

I am deeply appreciative of my committee members, Pilar Chamorro and Victoria Hasko. Pilar's mentorship, humor, and willingness to help me find my path meant the world to me. From writing my very first paper to navigating the job market, her understanding of bridging academia and society helped shape my own view of who I want to be as a professional. Victoria's encouragement and expertise in Cognitive Linguistics and Second Language Acquisition inspired me and gave me confidence in my work. I could not have wished for a more supportive committee.

To Chad Howe, Keith Langston, and Amy Smoler: thank you for championing my endeavors. Their guidance was pivotal in helping me secure opportunities and resources to focus on my research and dissertation. As a first-generation, international student, their support was especially meaningful because it allowed me to aim higher and go beyond.

I would also like to acknowledge several professors whose influence shaped my work and this dissertation. Thank you to Linda Harklau for building the foundation of my knowledge in Second Language Acquisition and for connect-

ing me with some many wonderful researchers. To Jorge Derpic, for broadening my perspective on decoloniality and education. To Keisha Shelton, for easing my transition to graduate teaching. To Carolina Acosta-Alzuru, for exemplifying passionate teaching and community engagement. To Cris Lira, for her mentorship, career advice and kindness. To Dave Chiesa, for teaching me rigor in research and for always motivating me. Each of them contributed in ways that shaped my academic journey.

This dissertation would not have been possible without the unwavering support of friends. To Dominique LaBarrie, thank you for your advice and insights during our fellowship at CLASE. Melissa de Sá, Mariana Quintela, Ana Luiza Costa Silva, Maria Aparecida Costa, and Victor Hugo, your help with participant recruitment across continents was crucial. Luis Gonçalves, thank you for facilitating data collection in Vermont. Shulin Zhang, your expertise in data analysis and R was a lifesaver — thank you for sharing your knowledge and friendship.

I owe my start in this journey to Susan Quinlan and Jared Klein, who encouraged me to pursue a PhD when I doubted myself. Camila Livio, Rafael Silva, and Juliano Saccomani, thank you for helping me prepare my application materials and for believing in me. You were my mentors and I would not be have done this without you. To Larissa Goulart, Mauricio Souza Neto, and Sabrina Melien, friends from my Fulbright days: you inspired me to aim higher. To Michel do Carmo, for our multiple conversations on research ethics and impact, and for your constant support.

To my cohort - Michael Wolfman, Devon Fischer, and Donnie Dunagan - thank you for your camaraderie, humor, and kindness during these years. To Shana Scucchi and Caroline Schneider, your passion for second language acquisition was contagious and motivating. To Seaira Lett and Chris Washburn, my PhD siblings: thank you for not only rooting for me, but walking through every stage of the process by my side. I cannot put into words how much our time together means to me.

Outside academia, my support network was indispensable. To my family, especially my sister Ana Luiza Costa Silva: thank you for grounding me and reminding me of my goals. To my roommate and friend, Jay Dowdy, who made sure I took breaks to enjoy life. To my Canadian family, Mari Aquino and Gabi Mariano, for offering sweet escapes when life got overwhelming. To Fernanda Castro, for the laughter and memes that kept me going.

Lastly, I extend my gratitude to the institutions that supported me financially and academically. The Goizueta Foundation and the Center for Latino Achievement and Success in Education made it possible to begin my PhD abroad.

Thank you to the Graduate School, and the Willson Center for Humanities and Arts, the Portuguese Flagship Program, and, the Writing Intensive Program for the opportunities to teach and do research while at UGA. To the Department of Linguistics, thank you for everything - our small, yet, very committed group means the world to me.

This dissertation is the result of a collective effort, and I am forever grateful to each of you for your part in it.

So much universe, and so little time.
- Terry Pratchett

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CHAPTER I

COGNITIVE LINGUISTICS AND SECOND LANGUAGE ACQUISITION

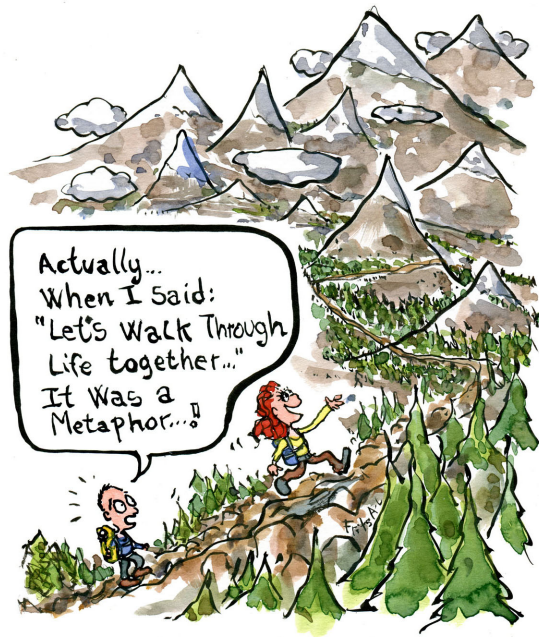


Figure 1.1: Walking through life (Illustration by Frits Ahlefeldt)

I would like to start this dissertation by drawing our attention to Figure 1.1. In the image, a couple hikes up the mountain through the woods and towards snow-covered cliffs. There is, however, a twist. the man explains that

when he told the woman he wanted to walk through life together, he meant metaphorically, not literally. We can interpret that he wanted to be together, but not necessarily go on an adventure in the wild. This comedic image points at something far more complex and intriguing than the drama of a couple that experienced miscommunication. It serves as an example of how we frame the abstractedness of reality and of our experiences through **conceptual metaphors** and how those metaphors are not universally understood.

As we will see in the following chapters, the works I present here focus heavily on the development of the linguistic skills for the descriptions of motion in a second language and how this development may affect our relationship with the world. Metaphors play a significant role in the study of motion by shaping how we conceptualize and describe movement in both physical and abstract terms. Motion metaphors are often used to map physical experiences of movement onto more abstract domains, such as time, progress, or emotional states. For example, expressions like "moving forward in life" or "falling into despair" use the conceptual framework of physical motion to describe non-physical phenomena. In studies of motion events, metaphors influence how speakers of different languages encode and interpret Manner (how motion occurs) and Path (the trajectory of motion). For instance, in English, which has a strong Manner bias, metaphors like "running out of time" reflect the tendency to encode detailed information about how motion occurs. Conversely, languages like Portuguese, with a greater focus on Path, might emphasize trajectory-related metaphors such as "passing through difficulties." These differences underscore how metaphors are deeply rooted in linguistic and cultural patterns, shaping how individuals think about and describe motion.

Metaphors are fundamental for the field of Cognitive Linguistics, which is one of the foundations upon which I build my work (the second one is, naturally, Second Language Acquisition). Therefore, I would like to preface this dissertation introducing key concepts about Cognitive Linguistics and its relation to Second Language Acquisition, not only to lay the groundwork for the chapters that follow, but also to take a theoretical stance.

1.1 Cognitive Linguistics

Cognitive Linguistics (CL) emerged in the 1970s, influenced by theories and findings from other cognitive sciences, especially cognitive psychology (Evans et al., 2007). The field is grounded in the idea that language is a reflection of general cognitive processes: therefore, language is not an abstract, isolated structure, but it is deeply intertwined with human thought and experience (Lakoff

and Johnson, 1980). The foundational premise is that linguistic knowledge is part of a broader cognitive architecture, and language is shaped by how we perceive, conceptualize, and interact with the world (Fillmore, 1975; Lakoff and Thompson, 1975).

As CL does not constitute a single theory, it is best described as a movement or an enterprise tied together by a set of core commitments and guiding principles (Evans et al., 2007). The first of these, referred to as the **Generalization Commitment**, is that research in the field aims to identify principles that apply to all aspects of human language (Lakoff, 1990). In a sense, it echoes the standard commitment in science: one according to which scientists seek the broadest generalizations possible. Arguably contrasting with Saussure’s structuralism or Chomsky’s formalism – which separate language faculty into areas (i.e., phonology, syntax, semantics, pragmatics etc.), CL investigates generalizations across the areas, often not treating them as notionally distinct (Evans and Green, 2018; Evans et al., 2007; Langacker, 1986, 1987).¹ The Generalization Commitment, therefore, represents a commitment not to assume that the various aspects of linguistic knowledge are produced in encapsulated modules in the mind, and to investigating how these aspects emerge from a common set of human cognitive abilities (Evans et al., 2007; Lakoff, 1990). The second commitment, the **Cognitive Commitment**, seeks a characterization of the general principles of language according to what we know about the mind and the brain (Lakoff, 1990). To do so, we draw from other subfields, like Cognitive Sciences, Psychology, Artificial Intelligence, Philosophy etc., making CL a fundamentally interdisciplinary field. The Cognitive Commitment holds that whatever principle of linguistic structure is proposed needs to reflect what we know about human cognition, rather than rely on formalisms or economy of representation (Evans et al., 2007; Lakoff, 1990).²

The Cognitive Linguistics enterprise can be roughly divided into two main areas of research: **Cognitive Semantics** and **Cognitive (Approaches) to Grammar**.

1.1.1 Cognitive Semantics

Cognitive semantics focuses on the relationship between experience, the conceptual system, and semantic structure encoded by language (Evans et al., 2007; Lakoff and Johnson, 1980; Talmy, 1985). This consists of work on *conceptual structure* (knowledge presentation) and *conceptualization* (meaning construction). It proposes modeling the mind in relation to the investigation of linguistic semantics. Evans et al. (2007) list four guiding principles that underscore the area. These principles are broad enough to encompass researchers with differ-

¹ This is particularly important for this dissertation as I treat syntax and semantics as intertwined. This can be observed in 3 where I analyze syntactic structure and semantic typology simultaneously.

² In my work, I am interested in the abstract aspect of human cognition (the mind), rather than the concrete part (the brain).

ent foci and interests while still fitting nicely under the umbrella of Cognitive Linguistics.

Conceptual structure is embodied

The principle states that our experience is structured, at least in part, by the nature of our bodies and neurological organization (Evans et al., 2007). The concepts one can access and the nature of how we perceive reality are nested inside our function of embodiment. This leads a reflexive relation: humans can talk about what they perceive and conceive, and they can only perceive and conceive because of their embodied experience (Evans et al., 2007). An example of this is color. Humans have a visual system with three types of photoreceptors. The same is not true of others animals: squirrels and rabbits have two, but goldfish and pigeons have four (Varela et al., 1991). Because of that, different animals have different range of colors available in the spectrum. Our bodies determine our visual experience.

Semantic structure is conceptual structure

The principle that semantic structure is conceptual structure emphasizes that language does not directly refer to real-world entities but instead to the mental representations of those entities in the speaker's mind (Evans et al., 2007). Linguistic meaning is inherently tied to the conceptualizations that speakers construct, rather than to the objects or phenomena themselves. For instance, the meaning of a word like "dog" is not the animal itself but the mental schema or prototype of "dog" that a speaker associates with the word. The principle further suggests that linguistic expressions serve as prompts for constructing meaning, rather than as fixed representations of reality. Understanding a linguistic unit requires knowledge of the broader conceptual frame it activates (Fillmore, 1975).

Meaning representation is encyclopaedic

In a way, the second and third principles are connected. By arguing that meaning representation is encyclopaedic, we propose that lexical concepts do not represent nicely packaged bundles of meaning, but points of access to much vaster repositories of knowledge that relate to concepts or conceptual domains (Langacker, 1986). We can take as an example the adjective "bright". In itself, it is just a prompt for meaning construction (Evans et al., 2007). When combined with different nouns (for example, a "bright room", a "bright student", or "bright

colors"), it selects one meaning from a range of options ("well-lit", "intelligent", "vivid or vibrant") that is appropriate to the context of the utterance.

Meaning construction is conceptualization

The principle that meaning construction is conceptualization asserts that words and linguistic expressions are not repositories of fixed meanings but prompts for dynamic meaning-making processes (Evans et al., 2007). Language serves as a tool to guide the speaker or listener toward constructing meaning, with the actual meaning emerging as a product of cognitive and contextual processes. In this view, meaning is not pre-encoded in language but arises through the **act of conceptualization**. Therefore, meaning is a process.

One of the most influential theoretical approaches in Cognitive Semantics is George Lakoff and Mark Johnson's **Conceptual Metaphor Theory**, first introduced in their seminal work *Metaphors We Live By* (1980). This theory challenges the traditional view that metaphors are merely linguistic devices used in literature, reanalyzing metaphor as a fundamental mechanism of human cognition. According to Lakoff and Johnson (1980), metaphors enable people to understand abstract concepts by mapping them onto more concrete, embodied experiences. This cognitive process is central to how humans conceptualize and make sense of their world. For example, metaphors like ARGUMENT IS WAR or TIME IS MONEY illustrate how abstract domains (target domain) are understood through more tangible, physical domains (source domain) (Lakoff and Johnson, 1980). In the ARGUMENT IS WAR metaphor, the abstract concept of an argument is conceptualized in terms of physical conflict, leading us to use phrases like "attack someone's position" or "win the argument." Similarly, TIME IS MONEY leads to expressions like "spending time" or "saving time." In the context of this dissertation, we have PROGRESS IS MOVING FORWARD, which inspires phrases like "move forward with the project" or "take a step back"; CHANGING IS MOVEMENT with generates expressions like "climbing up the ladder" (in one's career); or ACHIEVING A GOAL IS ARRIVING AT A DESTINATION, expressions like "reach one's goals" or "estar no caminho para o sucesso" [Portuguese] ("be on the way up"). These metaphors reveal how deeply ingrained they are in our cognition, shaping not only language but also thought and behavior. Conceptual metaphors are not isolated linguistic phenomena but reflect broader cognitive structures. They reveal how humans organize and process their knowledge about the world, grounded in physical and social experiences (Lakoff, 1993). As such, Conceptual Metaphor Theory

has had a profound impact on our understanding of language, thought, and how abstract ideas are communicated through everyday language.

A second important approach from Cognitive Semantics is the idea of **Cognitive Lexical Semantics**. Significantly influenced by Lakoff's work, it posits that words function as conceptual categories that exhibit typicality effects (Brugman, 1988; Evans et al., 2007). According to this view, words are not rigidly defined by strict rules but represent radial categories where meanings are structured around a prototype. These meanings, or senses, are interconnected by convention rather than predictable generation, leading to complex networks of related meanings within the mental lexicon (Brugman, 1988). Brugman (1988) illustrates the approach with the preposition "over". The preposition has multiple distinct but related senses, forming a polysemous category. The spatial meaning of over in a sentence like "The picture is *over* the mantelpiece" is typically seen as the prototypical sense. In contrast, non-spatial uses, such as "Jane has a strange power *over* him," are considered peripheral. These peripheral meanings derive metaphorically from the more central spatial sense, reflecting the idea that language is shaped by embodied experiences (Brugman, 1988; Evans et al., 2007). This framework has been instrumental in advancing the field of cognitive lexical semantics, emphasizing the dynamic and context-sensitive nature of word meaning.

1.1.2 Cognitive (Approaches to) Grammar

Cognitive (approaches) to grammar focuses on modeling the language system (i.e., the mental 'grammar') (Evans et al., 2007; Goldberg, 1995, 2006). It draws from the work in cognitive semantics as it considers meaning essential for language. This reinforces how the two main areas are tightly connected and collaborate to better understand lexical semantics and grammatical organization. Cognitive linguists approach grammar with varied interests. Some focus on uncovering cognitive mechanisms and principles that explain grammatical properties, as seen in Ronald Langacker's detailed Cognitive Grammar and Leonard Talmy's Typology. Others focus on identifying and defining linguistic units, known as *construction grammars* (Fillmore, 1982; Fillmore and Kay, 1993; Fillmore et al., 1988; Goldberg, 1995, 2006). Additionally, some cognitive linguists explore grammaticalization, the process where open-class elements become closed-class elements (Evans et al., 2007). Despite these different areas of study, they share common assumptions, particularly the idea that cognitive approaches to grammar are grounded in cognitive semantics (Evans et al., 2007; Talmy, 1985). These approaches aim to model linguistic knowledge (grammar) in line with cognitive semantics' principles. There are two guiding principles.

The first principle, named the **Symbolic Thesis** in cognitive linguistics, holds that the fundamental unit of grammar is a form-meaning pairing, known as a **symbolic unit**. This idea, rooted in Ferdinand de Saussure's theory of language, suggests that language operates as a symbolic system, where the linguistic sign consists of a relationship between a concept (the signified) and an acoustic signal (the signifier). In Ronald Langacker's **Cognitive Grammar**, these form-meaning pairings have two poles: the **semantic pole** (representing meaning) and the **phonological pole** (representing sound) (Langacker, 1987). This duality reflects how language connects mental concepts with linguistic expressions. Unlike traditional formal linguistic models that often separate grammar from meaning, the symbolic thesis argues that meaning is intrinsic to all grammatical structures (Croft, 2004; Evans et al., 2007; Langacker, 1987). This perspective allows for a broader understanding of language, encompassing everything from individual words (like *cat*) to complex grammatical constructions (like the passive voice or ditransitive constructions). The symbolic nature of grammar implies that grammatical forms, like lexical items, carry schematic meaning (Langacker, 1987). Thus, Cognitive (Approaches to) Grammar and semantics are intertwined, emphasizing the interdependence of form and meaning.

The second principle, referred to as the **Usage-Based Thesis**, suggests that a speaker's mental grammar – their knowledge of language – develops through the abstraction of symbolic units from actual instances of language use (Langacker, 1987). In this view, grammatical structures are not pre-existing rules: they emerge from repeated exposure to language in context. This means that language knowledge is built from experience, as speakers encounter and process language in various real-life situations. A key implication of the usage-based thesis is the rejection of a strict divide between language competence (knowing the rules of language) and language performance (using language) (Croft, 2004; Evans et al., 2007). Unlike traditional generative grammar, which separates these two aspects, the usage-based approach argues that knowing a language is inherently tied to knowing how it is used in context. Thus, competence and performance are seen as intertwined.

Within Cognitive (Approaches to) Grammar, there are three major approaches that are of particular importance for this dissertation:

Talmy's Grammatical vs Lexical Sub-Systems Approach

Leonard Talmy's approach to grammar emphasizes the distinction between two subsystems of linguistic expression: the grammatical (closed-class) and lexical (open-class) elements (Talmy, 2000). These two subsystems encode different aspects of human conceptualization. The closed-class elements (like pronouns

³ In the context of spatial relationships, Euclidean geometry refers to precise, mathematical spatial constructs, such as points, lines, angles, and shapes, defined in a rigid and measurable way. For example, a Euclidean analysis would focus on exact distances, angles, and coordinate positions to describe space. A typological analysis, in contrast, focuses on the categorical, qualitative patterns in how languages encode spatial and conceptual relationships. Talmy's approach examines how different languages express spatial relationships (e.g., "on," "in," "near") or motion events (e.g., Path and Manner of motion) using generalizable patterns rather than precise geometric definitions. For a detailed explanation, see Talmy (2000).

and conjunctions), provide a structural or schematic framework, while the open-class elements (such as nouns and verbs) convey rich, detailed conceptual content (Evans et al., 2007; Talmy, 2000). Talmy argues that the closed-class system is semantically restricted, focusing on abstract concepts like number or distance. For instance, while many languages have nominal inflections for number (e.g., plural "-s" in English), no language uses grammatical affixes for more specific concepts like color (e.g., "redness"). Talmy analyzes these properties as typological, rather than Euclidean.³ In contrast, the open-class system is unrestricted and adaptable to a vast range of human experiences. Talmy's model aims to map out the closed-class subsystem, identifying categories like *configuration*, *attentional*, *perspectival*, and *force-dynamics systems*, which govern how structural meaning is encoded (Evans et al., 2007; Talmy, 2000). This approach reveals how the grammatical subsystem provides a skeleton onto which the rich content of the lexical subsystem is layered, enabling complex conceptual expression. Talmy introduced the notion of **Cognitive Typology**, which describes how different languages emphasize particular aspects of motion events and illustrates how language encodes cognitive representations and how speakers of different languages may focus on distinct aspects of a scene. This will be discussed in Chapter 3.

Cognitive Grammar

Langacker first introduced Cognitive Grammar in his seminal work *Foundations of Cognitive Grammar* (1987), presenting it as a comprehensive alternative to Generative Grammar. Unlike traditional approaches that treat syntax as a set of formal rules separate from meaning to an extent, Cognitive Grammar argues that all linguistic knowledge is inherently symbolic, connecting forms (phonological structures) with meanings (semantic structures) (Langacker, 1987). A fundamental principle of Cognitive Grammar is that grammar is not an autonomous module of the mind but rather a reflection of more general cognitive abilities, such as perception, categorization, and memory. Langacker posits that linguistic units, whether words, phrases, or complex sentences, are stored as **symbolic assemblies** – pairings of form and meaning – based on speakers' repeated experiences with language. These symbolic assemblies are organized into networks that reflect how humans categorize the world and their experiences. Langacker (1987) emphasizes that speakers learn and generalize linguistic patterns from actual language use, with frequent constructions becoming more entrenched in the mental lexicon.

Cognitive Grammar also relies on the notion of **construal**, which explains how speakers can structure and present the same situation in different ways

depending on linguistic choices (Langacker, 1987). For example, the choice between an active and passive sentence reflects different construals of the same event. By linking grammar to cognitive and perceptual processes, Cognitive Grammar provides a more unified and psychologically realistic account of linguistic competence (Evans et al., 2007). As the studies presented in this dissertation investigate the acquisition of cognitive typology in the elaboration of manner and path of motion, the notions of Usage-Based and Cognitive Grammar are essential. The underlining argument made here is that learners will (or will not) develop the linguistic patterns to describe motion in space by exposure and practice – and these processes will affect the way they think for speaking (see Chapter 2).

Cognitive Approaches to Grammaticalization

Cognitive Approaches to Grammaticalization focus on how elements of language change over time, particularly the gradual evolution of open-class lexical items (like nouns and verbs) into grammatical or closed-class elements (such as prepositions, conjunctions, or auxiliary verbs) (Heine and Kuteva, 2002; Traugott, 2004). Grammaticalization, which is also, a central topic in historical linguistics, examines how this process occurs across languages and sheds light on the broader patterns of language evolution. Cognitive linguistic models of grammaticalization emphasize the role of human cognition in this process, arguing that language change is influenced by the ways in which speakers conceptualize and use linguistic structures (Traugott, 2004).

As described in Heine et al. (1991), Sweetser (1991), and Traugott (2004), cognitive factors such as metaphor, metonymy, as well as the tendency to use more concrete, contextually rich expressions to convey abstract ideas play a pivotal role in grammaticalization. Take for instance the Portuguese verb *sair* ‘exit’ in the expression *sair correndo* ‘exit running’ – which will be discussed in Chapter 3. Although at a first glance the expression may be interpreted (at least in Talmyan terms) as a Path verb (*sair*) followed by a Manner adverbial clause (*correndo*), I argue that the main verb has undergone grammaticalization and is now interpreted as an “immediate” or “seemingly surprising” action. This process is also an example of how grammaticalization reflects cognitive processes: the original Path verb is now part of a Manner expression and Path is encoded in a preposition.

1.2 CL and First Language Acquisition

Cognitive Linguistics suggests that first language acquisition is rooted in general cognitive mechanisms such as categorization, pattern recognition, and analogy (Tomasello, 2005). This perspective has significant implications for how we understand both first language (L1) and second language (L2) acquisition processes. In the domain of first language acquisition, Cognitive Linguistics emphasizes the role of usage-based models, which argue that children learn language through repeated exposure to language in context, recognizing patterns and extracting linguistic structures from usage (Ellis, 2002; Tomasello, 2005). This usage-based approach contrasts with generative models, where language acquisition is thought to involve principles and parameters based on an innate universal grammar and specific parameter settings based on exposure (Chomsky, 1981). In CL, language learning is seen as gradual, incremental, and driven by cognitive processes like analogy and schema-building (Bybee, 2006; Tomasello, 2018). Cognitive models focus on how children generalize from experience, building linguistic knowledge through meaningful interaction.

Interdisciplinary in nature, CL borrows from cognitive psychology to explain L1 acquisition. For instance, it draws from Eleanor Rosch's prototype theory (Rosch, 1975; Rosch and Mervis, 1975) to explain how children form categories based on the most typical or salient instances. According to the prototype theory, categories are not defined by a strict set of necessary and sufficient features, but rather by typical examples, or prototypes, that represent the most central or "best" instances of a category (Rosch, 1975; Rosch and Mervis, 1975). Therefore, language learners build conceptual networks of meaning rooted in prototypes, which are reflected in linguistic categories. For instance, the acquisition of polysemy — words with multiple meanings — can be understood as a process of recognizing conceptual shifts, as children map multiple meanings onto a core conceptual schema.

Another important concept is the notion of embodiment (Lakoff and Johnson, 1980), which has implications for how children acquire meaning. Since much of early language learning is tied to sensorimotor experiences, CL explains that children's physical interactions with their environment provide a foundational basis for their linguistic development. For example, motion verbs and spatial prepositions are learned in tandem with the child's growing understanding of their own movement and spatial orientation (Grigoroglou and Ganea, 2022).

1.3 CL and Second Language Acquisition

One of the central ideas in Cognitive Linguistics applied to Second Language Acquisition (SLA) is that second language learners must navigate new conceptualizations and categorization processes in the target language, which may differ significantly from those in their first language (Ellis and Robinson, 2008; Pavlenko and Volynsky, 2015; Slobin, 1996). This shift requires learners to reconceptualize certain aspects of experience according to the cognitive models that underlie the target language (Ellis and Robinson, 2008). Cognitive Linguistics suggests that learners do not simply acquire new vocabulary or grammatical rules; they must also adjust their underlying conceptual structure to accommodate how the new language encodes meaning (Ellis and Robinson, 2008). This means that learning a second language involves not just grammatical learning but also cognitive restructuring.

Cognitive restructuring is also observed in conceptual metaphors and conceptual transfer. L2 learners must become adept at recognizing and using the target language's conceptual metaphors, which may differ from those in their L1. For example, speakers of Amharic, an Ethiopian language that conceptualizes time as in *AN OBJECT YOU CARRY* need to conceptualize it as *TIME IS MONEY* in English to have a better grasp of expressions like "spend time" or "save time" effectively. Since metaphors are deeply embedded in everyday language use, mastering them results in reaching higher levels of proficiency (Cadierno, 2008; Ellis and Cadierno, 2009). Cognitive Linguistics provides tools for analyzing these transfer effects and understanding the challenges learners face when conceptual structures do not align between languages.

Cognitive Linguistics also emphasizes the importance of **input** in SLA: learners develop fluency by encountering and internalizing linguistic constructions through repeated exposure. This aligns with the Usage-Based approach, which suggests that frequent exposure to specific language forms in context allows learners to form the conceptual and linguistic links necessary for successful communication in the L2 (Ellis, 2002; Ellis and Cadierno, 2009). Learners' proficiency is shaped by the frequency and saliency of constructions they encounter, leading to the gradual build-up of a cognitive network of linguistic knowledge.

1.4 Usage-Based Theory and Language Acquisition

The Usage-Based Theory posits that additional language learning is driven by exposure to meaningful language input and the frequency with which linguistic structures are encountered (Ellis, 2008; Ellis and Cadierno, 2009). This theory aligns with broader cognitive linguistic perspectives, which view language as a function of general cognitive processes like pattern recognition, memory, and attention, rather than an innate, domain-specific grammar module. Key proponents of UBT argue that speakers acquire language by extracting patterns from repeated exposure to language use in context, with learning being gradual and usage-driven (Tomasello, 2005).

According to UBT, language is understood as a **dynamic system**, with learners building their linguistic knowledge through **chunking** – the process of grouping words or morphemes that frequently appear together into larger, retrievable units (Ellis, 2002). These units then serve as the basis for more complex constructions, allowing speakers to generalize and produce new sentences. Usage-based theorists emphasize that repeated exposure to specific constructions (e.g., “going to” for future intent) allows learners to develop mental representations of these patterns, which become accessible for language use.⁴ Therefore, **frequency** plays a key role in implicit language acquisition, where learners gradually develop sensitivity to the statistical properties of language, such as the likelihood of certain words or structures following one another (Ellis, 2002). Speakers are more likely to internalize high-frequency structures, which helps explain why some constructions are acquired earlier than others in both L1 and L2 contexts.

⁴ It is important to note that “repeated exposure” here refers to contact with the language in multiple, meaningful contexts. This fosters an environment for pattern finding and contextualized use. In no way do I suggest “drills” that are devoid of meaningfulness for additional language acquisition.

1.4.1 Differences between L1 and L2 acquisition in UBT

According to UBT, the acquisition of both L1 and L2 depends heavily on exposure to language input and its usage in meaningful contexts. L1 acquisition occurs in highly interactive and socially rich environments, where language is embedded in emotional bonding, play, and meaningful communication (Tomasello, 2003). This context supports the natural development of both linguistic and pragmatic skills. Through frequent exposure, they begin to implicitly extract patterns, build constructions from smaller linguistic units, such as words and phrases, and gradually develop abstract schemas, such as subject-verb-object patterns (Goldberg, 2006). Overgeneralization errors (e.g., “goed” instead of “went”) reflect this schema-building process (Tomasello, 2003).

In contrast, L2 learners often acquire language in more decontextualized settings, such as classrooms, where social and pragmatic aspects are less salient (DeKeyser, 2000). This can result in gaps in pragmatic competence, such as difficulties with idiomatic expressions or cultural nuances (Taguchi, 2011). As input is less abundant, L2 learners tend to rely on explicit instruction and conscious strategies to acquire grammar and vocabulary (DeKeyser, 2000). This top-down approach to learning may affect their ability to generalize (Ellis and Cadierno, 2009) and lead to rigid linguistic production (DeKeyser, 2000). Besides that, the less abundant input also affects the acquisition of idiomatic expressions and less frequently used forms (Wulff, 2010). L2 learners also bring their existing L1 knowledge into the process. This results in **transfer**, where patterns and constructions from the L1 influence L2 learning (Odlin, 1989). L1 transfer can facilitate learning when the two languages share similar structures but can also lead to errors or non-native-like patterns when there are significant differences (Ellis, 2002).

In conclusion, the Usage-Based Theory in SLA bridges cognition and language learning and underscores the importance of input frequency, meaningful interaction, and pattern recognition (Elliott and Yountchi, 2009; Ellis, 2002; Ellis and Robinson, 2008; Tomasello, 2005). It shifts the focus from abstract grammatical rules to the tangible and observable aspects of language use in real-life contexts, providing a more flexible and empirically grounded framework for understanding how languages are learned.

1.5 Framing this Dissertation

The application of Cognitive Linguistics to Second Language Acquisition is crucial as it provides a comprehensive, cognitively grounded framework for understanding the intricacies of learning an additional language. While traditional SLA theories have often focused on formal aspects of language, such as syntax or phonology, Cognitive Linguistics emphasizes the conceptual and usage-based nature of language. This approach recognizes that language learning involves more than acquiring discrete units of grammar or vocabulary; it also involves reshaping cognitive patterns to align with the linguistic structures of the target language. Moreover, Cognitive Linguistics helps explain why learners often struggle with certain aspects of an L2 — they are not simply making errors but are often grappling with deeply ingrained conceptual frameworks from their L1. This insight highlights the importance of conceptual restructuring in L2 learning, which can lead to more effective teaching methods that focus on helping learners bridge conceptual gaps between their L1 and L2. Ultimately, the

integration of Cognitive Linguistics into SLA research provides a richer understanding of what it means to learn a second language, emphasizing the dynamic interaction between language, thought, and experience.

This dissertation brings together these two subfields to provide a comprehensive analysis of the acquisition of English and Portuguese as additional languages. This work reports the results of experiments focused on the acquisition of lexicalization patterns of motion encoding from speakers of a V-framing language learning an S-framed one and vice-versa. The core questions, which will be discussed in the following chapters, aim at analyzing the effects of crosslinguistic influence and bidirectional transfer in the process of cognitive restructuring.

This dissertation is organized as follows:

Chapter 2 focuses on the theoretical underpinnings for my work, with a particular focus on human cognition. I discuss issues of linguistic relativism, the Thinking for Speaking Hypothesis in First Language and Second Language Acquisition.

Chapter 3 provides a review of the literature centered on the semantics of motion. Besides addressing essential typological issues, I also discuss the categorization of English and Brazilian Portuguese. In this chapter, I report on studies investigating the development of motion in the L2 and introduce some of the gaps that I fill with my work.

Chapter 4 reports on a study investigating the effects of L2 proficiency on how English-Portuguese late bilinguals provide acceptability ratings of v-framed and s-framed lexicalization patterns.

Chapter 5 presents the results of an investigation of L2 written production. I report on an investigation of learner description of dynamic, self-propelled motion in their L2 collected via writing.

Chapter 6 presents a study on the effects of L2 proficiency and boundary and non-boundary-crossing environments via delayed and simultaneous elicitation of oral descriptions of motion. I analyze the effects of proficiency in both transfer from the L1 to the L2 and from the L2 to the L1.

Chapter 7 discusses the results of the empirical studies and offers directions for future work.

CHAPTER 2

FROM LINGUISTIC RELATIVISM TO THINKING-FOR-SPEAKING

It is virtually impossible to introduce the topic of **Linguistic Relativity** in a conversation without immediately hearing the remark that "Eskimos" have over 100 words for snow.⁵ Naturally, I would not blame the layman for enthusiastically sharing such an interesting, yet widely exaggerated, fun fact with the table. Ever since the idea of Linguistic Relativity was introduced in the early 19th century – and here I must mention Wilhelm von Humboldt, Johann Gottfried Herder, Harry Hoijer, Leo Weisgerbe, and Benjamin Lee Whorf, who contributed to the hypothesis, even if indirectly, as well as Franz Boas and Edward Sapir, who are often misquoted in relation to it (Ghillebaert, 2021; Slobin, 1996) – there have been multiple studies on how the "Eskimo" people perceive and describe snow (Cichocki and Kilarski, 2010; Martin, 1986; Regier et al., 2016; Robson, 2013). The chain of reaction started with a misunderstanding of Whorf's work, who argued that the plenitude of "Eskimo" words for snow did not indicate a poverty of the English lexicon. This misunderstanding fed the idea was that since the Inuit languages have many different words for snow, they may perceive and categorize snow in ways that speakers of languages with fewer snow-related terms (like English) might not. This fostered an inaccurate representation of thought and language: one in which the language we speak influences the way we perceive and think about the world. This view was widely adopted by radical relativists and racist anthropologists to perpetuate linguistic prejudice (Cichocki and Kilarski, 2010).

As we will see in this chapter, studies like those about the descriptions of snow point to something much more intriguing than ice vocabulary, but not as

⁵ I use here the term "Eskimo" within quotation marks to encompass the Yup'ik, and Iñupiaq, Inuktitut and Kalaallisut (Inuit) languages, following Cichocki and Kilarski (2010). This strategy is adopted to stress how several accounts use the term incorrectly and do not differentiate the groups.

complex as the inferences that have been made about the thinking of Eskimos over the decades. So, I would like to share a reversal I found in my studies on how our white western view of reality frames the world (Figure 2.1).

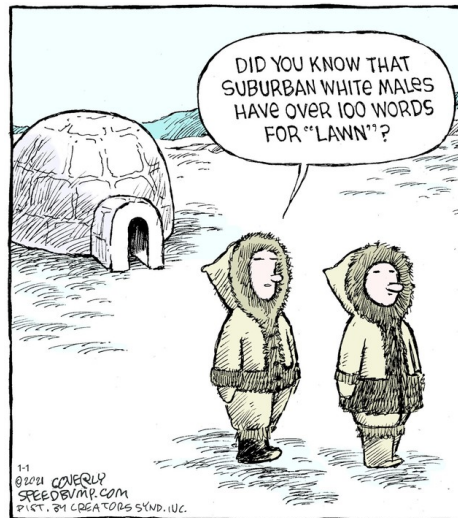


Figure 2.1: A twist in the Eskimo misconception

In Figure 1, we see two "Eskimos" sharing the misconception that suburban white males have over 100 words for "lawn". The characters contrapose the stereotype we created about our friends from the north, by spinning it on us, English speakers most likely living in the Global North. The point the comic is making is rather clear: our perception of the world is a complex subject and we cannot fully grasp other people's perceptions without careful and verifiable analysis. The minute we overgeneralize our argument about one's perception of reality, grammar, and lexicon, we need to assume that the same can be said about our own.

My intent in introducing this image is not simply to be jocose, but to propose reflection on how we frame language and cultures – which is a constant in this entire dissertation. I would like to, then, make three essential disclaimers:

1. By spinning the narrative on us, the comic strip invites us to consider how we perceive reality. Reality is, in my view, and in the view of many others (Lakoff and Johnson, 1980; Langacker, 1988), conceptualized through **metaphors**. As Lakoff and Johnson (1980) propose, "our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature" (p.3). This means that we draw from one thing to understand and experience another (Lakoff and Johnson, 1980). Conceptual metaphors shape not only our communication, but also the

way we think and act. This assumption is one of the tenets of Cognitive Linguistics that has made its way into Second Language Acquisition (SLA) - as we saw in Chapter 1. This is the foundation of my first disclaimer: if we consider that humans conceptualize reality through conceptual metaphors, we can easily assume that different communities will employ different metaphors to interact with and describe the world. These are based on their experience with the world, which differs based on a multitude of factors (geographical, biological etc.). As the work presented in this dissertation lies at the intersection of Cognitive Linguistics and SLA, this is an important statement to make as these fundamentals guide most of the work presented in the following pages.

2. For my second disclaimer, I would like to openly state that the data presented in this study in no way suggest that a language or a group of people are superior or inferior to another. As I mentioned earlier, speakers of different languages interact with the world differently, and this interaction is often mediated by languages with different lexicon and syntax. One language having a feature or not does not make it *more* or *less* than another. The work presented here contrasts two typologically distinct languages: English and Brazilian Portuguese. These languages are bound to different sociocultural and historical contexts and hold vastly different statuses. English is currently considered the *lingua franca*, and it is widely spoken in the Global North. Brazilian Portuguese, on the contrary, is mostly connected with Brazil, a representative of the Global South. These two countries and their people are shaped by very distinct histories and deal with the different effects of coloniality.⁶ Therefore, it is important to acknowledge early on that the populations included in the studies presented in the following pages are compared and contrasted in a manner that does not place one in lower status than the other.
3. For my third and final disclaimer, I would like to state I find it problematic that many of the studies on the Yup'ik, and Iñupiaq, Inuktitut and Kalaallisut languages overgeneralize them as *Eskimo*, a term that fosters the idea of a monolithic community. This is, in no way, true, and neither is the homogeneity of the groups I am investigating in this study. Brazilian speakers of Portuguese as a first language consist of linguistically and culturally diverse communities of speakers within a common tongue (often defined as such for institutional reasons). The same is true of Canadian and US American speakers of English as their first language. I attempt to isolate and highlight the differences between the commu-

⁶ As defined in Quijano (2000), coloniality refers to the psychological, cultural, epistemic, and structural effects that outlast the process of colonization. They refer to the lasting Eurocentric way of thinking: its linear projection of history, racial societal structures, and measurements of development (Costa-Silva, 2024).

nities whenever possible. However, I acknowledge that some layers of intricacies may escape my observations.

Having made these disclaimers, I would like to, once again, turn our attention to Figure 2.1. As Cichocki and Kilarski (2010) show, "Eskimos" have words to describe snow based on their interaction with the geographical space (for instance, *snow on the floor* or *snow on a surface*); however, that does not imply that they see snow differently or are able to see snow in ways that other humans cannot. This issue in particular will be addressed in this chapter. If we take Figure 2.1 as a starting point, we can analyze our descriptions of *grass*. In American English, for instance, we distinguish *lawn* (the area in front of or behind a house as well as grass that is grown on a commercial or residential area) from *grass* (the plant itself). In Brazilian Portuguese, there is a distinction between *mato* (the plant or what is commonly found in the wilderness, "tall grass") and *grama* (the grass grown on a commercial and residential area). Our first intuition may be to match the pairs *lawn/grama* and *grass/mato*; however, I would argue that Portuguese does not have a specific word for *lawn*. *Grama* is most often used to refer to *grass* (consider, for instance, how the expression "The *grass* is always greener on the other side." "A *grama* do vizinho é sempre mais verde") while *mato* refers solely to "tall grass". The reason for this mismatch may be architectural. I would argue that most (but not all) Brazilian houses do not have a *lawn*.

The lexical items I presented do not suggest, by any means, that Brazilians cannot distinguish *lawn* from *grass* or that English speakers cannot tell *mato* apart from *grass*. What they point at is that language can act as a mediator between thought and reality – this is what we will see in the following section.

2.1 Thinking-for-Speaking

Popularly known as the Sapir-Whorf Hypothesis, Linguistic Relativity is the hypothesis that language determines speakers' thoughts as well as their perception of reality (Cadierno, 2017; Slobin, 1996; Stam, 2010). As first argued by Whorf (2012), not only does language influence thought, but its habitual linguistic patterns causes speakers to perceive and think differently about their surrounding world. These are not limited to grammatical patterns, but also the analogies and metaphors that are shaped by the language and culture of speakers (Stam, 2010).

The hypothesis is based on two basic premises: (i) there are fundamental differences between the semantic structures of human languages; (ii) these semantic structures determine, or at least influence, non-cognitive factors of the

speaker, especially pertaining to their perception, categorization, and recalling of reality (Cadierno, 2017; Gumperz and Levinson, 1991). Therefore, as Slobin (1996) puts it, children who learn distinct languages with different conceptual structures suffer from pervasive cognitive effects imposed by language.

The strong interpretation of the hypothesis argues that speakers only have access to concepts that are encoded in their language (Cadierno, 2017; Lucy, 1992, 1996). However, evidence for such a strong claim about human cognition has often been discredited in the literature (Cadierno, 2017; Slobin, 1996). While it does seem that speakers of different languages perceive the world differently, the difference is often traced back to the abstract planning stages of speech, which are influenced by the grammar and lexicon of the speakers' mother tongue (Danhier and Mertins, 2016; Slobin, 1996, 2004). This indicates that the subject acts, at least to a certain extent, "in ways which are driven by the conceptual categories of their mother tongue" (Danhier and Mertins, 2016, p.58). This approach to the hypothesis, considered a weak interpretation of linguistic relativity, claims that the language influence over thought and world view is present, but not decisively.

The weak interpretation of linguistic relativity is rooted in the idea that language does not determine our thoughts, that thinking is completely possible without the aid of language, and that language assists, in fact, in the habitual classification of the world into meaningful categories (Lucy, 1997). Bylund and Athanasopoulos (2014a) add that these ideas are not far from Whorf's initial proposal, who never proposed that language determines thought and who recognized that thought exists without language, and certainly not far from Sapir's work, which has been vastly misinterpreted (Slobin, 1996; Stam, 2010).

Some studies on the weak view cover topics from the perception of color in different languages (Athanasopoulos, 2009) to the descriptions of objects (Pavlenko and Malt, 2011). Others came to address issues of lexical and grammaticalized concepts of space and time (Alloway and Corley, 2004; Pavlenko and Driagina, 2006), which alongside temporality, have been proven to differ across typologically distinct languages (Stam, 2010). Space is of particular interest for many reasons. First, a spatial representation of any kind must be encoded as 2D or 3D (Danhier and Mertins, 2016). However, encoding requires a reduction of dimensions as language, with the exception of sign language, is one-dimensional and linear (Danhier and Mertins, 2016). This means that when a speaker translates their experience with space into a language, they need to reduce the number of dimensions they perceive and describe. This process is referred to as **linearization** (Danhier and Mertins, 2016).

Linearization is shaped by two principles. The first one, referred to as Principle of Natural (or Chronological) Order states the situations and events will normally be reported in the order of occurrence (Danhier and Mertins, 2016). The second one, called the Principle of Topological Order, establishes that events, as well as the affairs surrounding them, will be reported from the one occurring closest to the beginning of the route, following the circumstances occurring subsequently, away from the starting point, and finishing at the final goal (Danhier and Mertins, 2016). Space and time are fixed in route directions and the deictic anchoring is placed in the “imaginary walker” (Danhier and Mertins, 2016). Therefore, speakers need to (i) **select** the relevant information from memory, (ii) **linearize** it in an ordered sequence, and (iii) **formulate** them linguistically (Danhier and Mertins, 2016).

That the formulation process is language-dependent is incontrovertible. The question that cognitive linguists try to answer is whether the processes of selection and linearization are also affected by language (Danhier and Mertins, 2016). These two processes, in particular, are nested under the umbrella of **conceptualization**, or conceptual planning, alongside the processes of **segmentation** and **selection**, stages of **macroplanning** in which the speakers are deciding what to say (Danhier and Mertins, 2016). Contrastingly, structuring and linearization are referred to as stages of **microplanning** in which the speaker has already decided what to say. The conceptualization structure, including all the stages mentioned above, is illustrated in Figure 2.2.

The common assumption is that microplanning is language specific due to the fact that speakers need to consider lexical and grammatical categories that are obligatory and available in their language (Danhier and Mertins, 2016). However, what the weak interpretation of the Sapir-Whorf Hypothesis proposes is that language influences, at least to a certain extent, the stages of macroplanning. This interpretation corresponds to the **Thinking-for-speaking Hypothesis**.

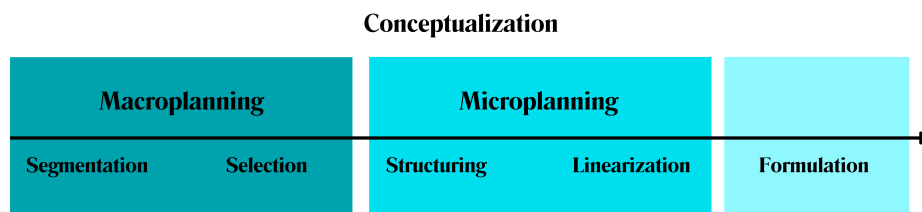


Figure 2.2: Conceptualization Structure

The Thinking-for-speaking Hypothesis was first proposed by Slobin (1996) and sees language as a mechanism that drives speakers’ attention to specific perceptual attributes of reality (Athanasopoulos, 2009; A. Brown and Gullberg,

2010, 2011; Ellis and Robinson, 2008; Slobin, 1996). This suggests that the structure of a speaker's language channels their attention to specific aspects of the world and the experience around them (Cadierno, 2017; Slobin, 1996, 2004).

By proposing a shift away from abstract entities such as **thought** and **language** and towards activities, like **thinking** and **speaking**, Slobin (1996) places importance on the mental processes which take place *during* the act of formulating an utterance. Slobin (1996) argues that there is a specific type of thinking that is performed in the process of speaking, and that this thinking is intimately tied to language. In existential terms, the world does not present situations that need to be encoded in language – what happens is that we fit our thoughts into linguistic frames of the language in our repertoire. In other words, experiences are filtered through language. As we carry out this process of filtering, we perform the activity of thinking-for-speaking.

Slobin (1996) gives a few examples to illustrate thinking-for-speaking. Take, for instance, the image below:



Figure 2.3: Man in hospital (Canva, Open Access)

As English speakers, we can describe what we see by saying “The man is sick”. In the Siouan language, however, a speaker needs to encode in the grammatical structure whether the man is in motion or at rest. In the Kwakiutl, a speaker needs to describe whether the man is visible or not visible to the speaker. In Portuguese, a speaker needs to encode whether the sickness is temporary or permanent. Another example is how English describes an event as “She went to work” or “She has gone to work”. Nothing in our sensorimotor interactions

with reality changes when you choose one over the other. These distinctions are only learned because of language and are not used anywhere else outside language. These are, as Slobin puts it, categories of thinking for speaking.

Humans, and animals alike, experience sequences of events similarly. However, language requires us to categorize events as temporary or permanent, ongoing or completed, and so on (Slobin, 1996). Therefore, it is language that directs us to attend to specific details of reality. Grammatical structures, then, serve the purpose of marking these distinctions which are only relevant to discourse (Slobin, 1996). The relationship between language and cognition is, therefore, cyclical as they retro-feed each other. First, speakers' experiences may or may not be encoded in the lexico-grammatical categories of a language. Second, speakers subconsciously attend to the aspects of their experience which their language has linguistic mechanisms to express. Finally, this results in specific grammatical structures and rhetorical styles adopted by speakers, which form patterns (Cadierno, 2017; Slobin, 1996).

2.2 Thinking-for-speaking in a first language

A relatively large body of work shows that the language might provide some degree of input to cognition (Allen et al., 2007; Cadierno, 2017; Grigoroglou and Ganea, 2022; Hasko, 2009; Slobin, 1996; Stam, 2010). As languages display typological differences in a multitude of linguistic traits, speakers of different languages have different patterns of thinking-for-speaking (Cadierno, 2017; Slobin, 1996; Stam, 2010). These patterns are not only observable in spoken and signed language, but also in gestures (Stam, 2010).

Multiple studies show that the effects of language in the process of thinking-for-speaking emerge early in childhood (Chen, 2022; Choi and Bowerman, 1991; Oh, 2003; Özçalışkan and Slobin, 1999; Papafragou et al., 2002, among many others). The lexicon and grammatical constructions that children acquire provide them with both a framework for the expression of thought, events and feelings, and “guide their expression as they engage in the online thinking process related to speaking” (Stam, 2010, p. 61). Slobin (1996) analyzes the development of descriptions of movement and aspect in the speech of English, Spanish, Hebrew, and German children, and finds that, by the age of three or four, children acquiring a specific language will be showing language-specific ways of thinking while verbalizing events (Allen et al., 2007; Slobin, 1996). This will become more prominent at around the age of nine, when they begin to demonstrate a more stereotyped and consistent structure with their native language patterns – which may be because of schooling (Slobin, 1996).

Similar studies focused on space and on the lexicalization of semantic elements of motion events and their expression in discourse (Choi and Bowerman, 1991; Oh, 2003; Özçalışkan and Slobin, 1999; Papafragou et al., 2002). Findings show that children between 19 months and 12 years old follow language-specific patterns, which occur independent of their specific age (Allen et al., 2007). Focusing on space, in particular, Grigoroglou et al. (2019) analyzed children's acquisition of *front* and *back*. They found that both English and Greek speakers develop comprehension of the spatial locatives between the ages of 3 and 4 and that the emergence of spatial terms does not only index semantic development but may also be connected to pragmatic factors. For instance, Greek 3 and 4-year-olds and English 3-year-olds showed a preference for *back* while English 4-year-olds, exhibited preference for *front*. These results were motivated by the pragmatic relevance of informing the position of the figure: describing what cannot be easily seen seemed more relevant to discourse than what can be seen. What their research shows is that the acquisition of spatial locatives follows a consistent, and potentially universal, order: *back* is acquired before *front* (Grigoroglou et al., 2019).

Papafragou and Grigoroglou (2019) show that both mature and young learners use conceptual representations to structure incoming experience, and that learners are sensitive to event boundedness in non-linguistic tasks. As temporal event structure is shown to be preverbal message content, we can conclude that boundedness is another piece of evidence for thinking-for-speaking (Papafragou and Grigoroglou, 2019).

2.3 Thinking-for-speaking in a second language

As we posit that the acquisition of L1 patterns of thinking-for-speaking occurs in early childhood (Pavlenko and Volynsky, 2015; Slobin, 1991, 1996, 2004), we are faced with questions pertaining to the acquisition of additional languages. What would thinking-for-speaking look like in L2 acquisition? Can L2 patterns of thinking-for-speaking be acquired later in life? Slobin (1996) suggests that the investigation of thinking-for-speaking in the L2 is of vital importance for the field. As the patterns that children acquire in childhood are resistant to restructuring in late second language acquisition (Slobin, 1996), analyzing the challenging areas for mastering the additional language can help us define what the patterns are in the learner's L1 (Stam, 2010). Slobin (1996) argues that L2 acquisition of these patterns causes learners to determine what must be attended to and expressed in the L2.

The process of thinking-for-speaking has been referred to in the SLA literature as **alternative ways of thinking-for-speaking** or **rethinking-for-speaking** (Cadierno, 2004, 2008; Cadierno and Ruiz, 2006; Ellis and Robinson, 2008). It suggests that when the L2 patterns of thinking-for-speaking are different from the speaker's L1, learners need to acquire new patterns to reach higher levels of L2 proficiency (Stam, 1998, 2010). The sub-field is concerned with several questions pertaining to how thinking for speaking relates to second language acquisition. Stam (2015) ponders whether late learners can acquire the thinking-for-speaking patterns in the language at all and whether continuous exposure to the language has an effect. Cadierno, 2017 adds that the study of alternative ways of thinking-for-speaking should also be concerned with whether there is L1 influence in the process, and whether bidirectional transfer occurs. These questions are illustrated by multiple studies (Athanasopoulos et al., 2015; A. Brown and Gullberg, 2010, 2011; Bylund and Athanasopoulos, 2014a; Cadierno and Ruiz, 2006; Hasko, 2009; Pavlenko and Volynsky, 2015).

For late bilinguals, in particular, rethinking-for-speaking entails the restructuring of cognitive aspects of learning, constant monitoring, and the competition between L1 and L2 systems during perception and production (Putnam, 2019; Selinker and Gass, 2008). Kellerman (1995) suggests that, unless the development is mediated, adult second language learners may not be completely aware of what these patterns look like and may learn L2 linguistic forms, but use them from an L1 perspective. As Putnam, 2019 puts it, this clash between L1 and L2 systems often leads to more gradient representations in the bilingual speaker who may opt for a linguistic form that is neither typical of their L1s nor their L2s.

Several studies tried to assess the acquisition of L2 patterns, with a particular focus on speech (Stam, 2015). Some results were somewhat mixed, showing that acquiring the L2 thinking-for-speaking patterns is a challenging task, especially when typologically distinct languages are considered (Gagarina, 2009; Hasko, 2009; Nogueira, 2009a). A. Brown and Gullberg (2008, 2010, 2011, 2013) carried out extensive work on the acquisition of L2 Japanese and L2 English and found bidirectional influence for intermediate and advanced learners, showing that the patterns of L1 thinking-for-speaking patterns affect the L2 ones, and vice-versa. Ozyurek (2002) found that Turkish learners of English as an additional language followed thinking-for-speaking patterns of their L1. Cadierno (2004) shows that the influence of the learner's L1 thinking-for-speaking patterns in their L2 occurs regardless of the typological directionality. In studies on the acquisition of motion, which are particularly relevant to this dissertation, speakers of s-framed languages (those that encode Manner of Motion in the main verb

and Path of Motion in a satellite – see Chapters 2 and 3 for a detailed discussion on the phenomena) are shown to use adverbs redundantly in their v-framed (those that encode Path of Motion in the main verb and Manner of Motion adverbially L2s). They also demonstrate difficulty in describing motion events that express crossing a boundary (Cadierno, 2004). When the opposite is observed (i.e., speakers of a v-framed language acquiring an s-framed L2), students demonstrate difficulty in verbalizing trajectory dynamically and using locative expressions (usually prepositional phrases), as well as difficulty in employing a wide range of Manner verbs. More advanced L2 learners are able to develop appropriate patterns of thinking for speaking in the L2, but this does not occur in the same way in all aspects of a motion event (Cadierno, 2004). In an investigation on the locus of difficulty for Russian learners, Hasko (2009) concluded that the choice of contextually appropriate encoding of Manner of motion was a problem that persisted through learners' narratives. Focusing on gestures and how they accompany descriptions of motion, Kellerman and Hoof (2003) and Negueruela et al. (2004) show that L1 Spanish speakers' gestures indicated that they were still thinking-for-speaking in their L1 Spanish when narrating in L2 English.

Some authors suggest that late bilinguals do acquire the thinking-for-speaking patterns of their L2. Stam (1998, 2006) and Stam and McCafferty (2009) show that when L2 English learners narrated in English, they showed mixed L1 and L2 patterns of thinking-for-speaking. These results reflect their interlanguage development and indicate an improvement overall. Cadierno and Ruiz (2006) compare the expression of Path and Manner of Motion by Danish learners of Spanish, Italian learners of Spanish, and Spanish native speakers. Despite the expectation that Danish learners would show a higher degree of Path and Manner elaboration (after all, Danish is an s-framed language, which allows more Manner and Path descriptions per clause - as we will see in Chapter 3), the results showed a limited influence of the L1 thinking-for-speaking patterns on the speech of advanced learners. This is particularly encouraging when we consider that Danish is the only typologically different language in the group as for the syntactic structures used to describe motion events. Lewis (2012) investigated L1 English speakers learning Spanish while studying abroad and showed that learners were able to demonstrate L2 patterns in their descriptions of path after only 6 months of immersion. Their findings suggest that learners can acquire their L2 patterns of thinking-for-speaking, but do not clarify to what extent (Lewis, 2012).

The following chapter is dedicated to the **description and acquisition of motion**. As discussed in this section, **Motion** has received special attention

in the literature due to the variation observed in how speakers of different languages perceive and describe motion events. In the next pages, I will introduce the typological categorizations of languages based on their patterns of lexicalization as proposed in the field of Cognitive Linguistics. I will also discuss the implications of the typological distinctions for human cognition and second language acquisition.

CHAPTER 3

DESCRIBING MOTION EVENTS



Frits Ahlefeldt

Figure 3.1: Hiking Boardwalk (Frits Ahlefeldt)

Consider the image above. If asked to describe what you see, you might feel tempted to say "The boy is walking on the boardwalk". You may also say "The boy is walking across the boardwalk" or even "The boy is crossing the boardwalk". As we saw in Chapter 2, when we describe a motion event, we make choices. We decide what to encode in the language and what to leave out. The language we speak plays a fundamental role in how we make the choices. In this chapter, we will analyze the most famous proposals to categorize descriptions of motion across languages and see how it affects our process of language acquisition.

3.1 Typological Accounts of Motion Encoding

3.1.1 The Talmyan Typology

One of the most prominent works in Cognitive Semantics is Leonard Talmy's typology of motion-event languages (Talmy, 1985, 1991, 2000). The typology is an attempt to describe how languages structure the domain of Space and investigate the general nature of cognitive representation (Batoréo, 2017). It proposes that there are underlying universal semantic elements that pertain to how humans conceptualize space. These are mapped onto surface structures of linguistic nature – like verbs, adpositions, subordinate clauses, etc. (Talmy, 1985; Slobin, 2004; Pavlenko and Volynsky, 2015). In essence, Talmy's work focuses on how abstract, universally shared mental representations of space are "translated" into language-specific forms.

Talmy identified six components that are predominantly observed across languages (Talmy, 1985, 1991, 2000). These components form the basis of motion events in his framework:

- **Figure:** The object that moves or is located with respect to another object. The Figure can be animate or inanimate and is typically expressed by a nominal element, such as a Noun Phrase (NP) or Determiner Phrase (DP).

Example: *The bus is approaching the school.*

- **Ground:** The reference point relative to which the Figure's motion or location is described. Like the Figure, the Ground is typically represented as a nominal element (NP or DP).

Example: *The bus is approaching the school.*

- **Path:** The trajectory or spatial relation followed or described by the Figure in relation to the Ground. Path is encoded linguistically in the verb, prepositions, postpositions, or satellites (e.g., "into," "toward") depending on the language.

Example: *The child walks into the classroom.*

- **Motion:** The occurrence of movement or the existence of a stationary relationship between the Figure and Ground. Motion can involve either self-propelled motion (e.g., walking, flying) or caused motion (e.g., pushing an object).

Example: *The child walks into the classroom.*

- **Manner:** How the motion occurs, specifying the mode or type of movement. Manner can include "walking", "running", "swimming", or even specific cultural or contextual descriptors (e.g., limping, gliding).

Example: *The child runs into the classroom.*

- **Cause:** The reason or force behind the motion, indicating whether the motion is self-initiated or externally caused. Cause is often represented in the verb or by additional elements, depending on the language.

Example: *The wind blew the leaves across the yard.*

These six components collectively describe how motion events are conceptualized and linguistically expressed. Different languages map these components onto their grammatical structures in varied ways, leading to the typological distinctions observed in Talmy's framework (Pavlenko and Volynsky, 2015; Slobin, 2004; Talmy, 1985, 1991, 2000). Based on these distinctions, Talmy proposed the categorization of language families into two groups: satellite-framing (s-framed) and verb-framing languages (v-framed).

Satellite-framing languages are those that adopt a *conflated* strategy, in which Manner of Motion is encoded in the main verb and Path of Motion in a satellite:

1. Thomas **walked**_[Manner] *into the kitchen*_[Path].

These satellites are periphrastic, but directly associated with the verb. They may consist of particles (such as English prepositions) or affixes (such as Russian prefixes) (Hasko, 2009; Lewandowski, 2021). Because of their morphosyntactic structures, multiple satellites can be added to a single verb, in a process referred to as **Path stacking** (Slobin, 2004):

2. Thomas **ran**_[Manner] *out of the building*_[Path], *through the field*_[Path], and *into his house*_[Path].

Because of the structural availability, English allows for more detailed descriptions of Paths within a single clause. Multiple languages are categorized into this group: most Indo-European (except for Romance languages), Hungarian, and Chinese.

Verb-framing languages, contrastingly, favor a *separated* strategy, often expressing Path in the main verb, and Manner in an additional subordinated clause (Hasko, 2009; Lewandowski, 2021; Slobin, 2004). Therefore, in these languages, the predicate consists of a motion verb that predominantly expresses Path, and Manner encoding is mostly adverbial and optional (Hasko, 2009; Slobin, 2004). Consider the example from Portuguese:

3. *Pedro **saiu**_[Path] de casa correndo_[Manner].*
 Pedro exit.PST.3SG from house.SG run.GER
 ‘Pedro left his house running.’

In verb-framing languages, speakers opt for a lexicalization pattern that requires few Path verbs with generic meanings (e.g., *sair* ‘to exit’, *entrar* ‘to enter’ in Portuguese). Due to their use of generic Path verbs and optionality of Manner, V-framing languages seem to treat the elaboration of Path and Manner as a narrative luxury, i.e., Manner will be encoded when speakers choose to do so (Slobin, 2004). These languages also do not allow Path stacking within the same clause:

4. *Pedro **saiu**_[Path] de casa e **cruzou**_[Path] o campo.*
 Pedro exit.PST.3SG from house.SG and cross.PST.3SG DEF.M field.SG
 ‘Pedro left his house and crossed the field.’

Instead, each Path information is encoded in a single clause that is connected to an overall narrative via conjunctions. Prototypical examples of V-languages are Romance Languages (Spanish, French, Italian and Portuguese), Hebrew and Turkish.

Interestingly, however, V-languages like Portuguese allow for Manner and Path to be elaborated in the same clause if Manner is not verbal:

5. *Pedro **saiu**_[Path] de casa de bicicleta*_[Manner].
 Pedro exit.PST.3SG from home.SG by bicycle.SG
 ‘Pedro leaves his house by bicycle.’

In (5), the Manner of motion is encoded in a Manner Prepositional Phrase that is an adjunct to the main verb. This phenomenon, which is also observable in English, is investigated in Chapter 4.

Not only do these typological distinctions reflect different processes of thinking-for-speaking, but they also have an effect on vocabulary size. Languages like German and English, for instance, which place significantly more importance on Manner descriptions, incorporate rich and diverse Manner verbs into their expressions of motion (e.g., run, sprint, glide, trudge). They boast a much larger inventory, often exceeding 150 Manner verbs (Slobin, 2004), allowing for a more direct and nuanced expression of motion details without reliance on additional modifiers (Gagarina, 2009; Hasko, 2009; Slobin, 2004). In contrast, languages such as Spanish, Hebrew, and Turkish often prioritize describing other aspects of motion events, such as the protagonists, objects involved, and the endstates or outcomes of motion. Consequently, they tend to have a more limited repertoire of intransitive Manner verbs, with no more than about 75 regularly used

verbs for expressing motion (Slobin, 2004). These verbs are often supplemented with additional linguistic elements, such as adverbials or subordinate clauses, to convey Manner details. This disparity underscores a broader cross-linguistic difference in how languages structure their lexicons to meet communicative needs.

Issues with a binary typology

Although expression of movement in space is a universal, there is significant variation in how languages encode motion (Hasko, 2009). This means that while the underlying semantic elements are somewhat agreed upon (the number of elements changes in the literature but range between 4-6, as seen in Pavlenko and Volynsky (2015) and Talmy (1985, 1991, 2000)), there is extensive subsequent work that shows that Talmy's typology cannot be applied universally (H. J. Batoréo and Ferrari, 2016; Gagarina, 2009; Lewandowski, 2021; Pavlenko and Volynsky, 2015; Slobin, 2004). For instance, Arrernte (a language in the Arandic language group, spoken in parts of the Northern Territory, Australia) places significant cultural emphasis on journeys, leading to a strong focus on Path over Manner. Similarly, Yucatec Maya reflects spatial orientation priorities, often omitting Manner in everyday discourse unless it is highly relevant. As Bohne-meyer et al. (2007) note, speakers of Yucatec Maya prioritize the destination or trajectory of motion, such as describing "going to the store," rather than the specific manner of movement.

In Japanese, a verb-framed language, verbs such as *hairu* 'enter' prioritize Path, with Manner expressed only when necessary, often through adverbials. This typological preference emphasizes outcomes and destinations in narratives (Matsumoto, 2018). Similarly, Tzeltal, another Mayan language, encodes detailed spatial orientation using absolute references like "upslope" or "downslope," focusing on trajectories and landscape features over Manner (P. Brown, 2006). The Western Apache language highlights a cultural connection to place, embedding detailed Path descriptions tied to landmarks of collective memory. As Basso (1996) illustrates, this reinforces cultural storytelling practices and further challenges Talmy's typology by showing how motion expressions intertwine with cultural and geographic specificity. Moreover, Jahai (the language of Semang hunter-gatherers found in Perak and Kelantan, Malaysia and parts of Thailand) encodes motion verbs that systematically reflect both Path and terrain features, such as "move up a hillside" or "move along a ridge" (Burenhult and Purves, 2018). This fine-grained relationship between motion encoding and topography lies outside the scope of Talmy's binary classification, demonstrating the need for broader, more flexible frameworks.

Hasko (2009), Pavlenko and Volynsky (2015), and Slobin (2004) argue that Talmy's typology provides a strong starting point, but does not address the differences in the surface structures of languages, especially within the same group. In her comprehensive work on Brazilian and European Portuguese, H. J. Batoréo and Ferrari (2016) reaches a similar conclusion, stating that Talmy's theory may not be cohesive or finished, but creates multiple possibilities for further investigation. Most subsequent work suggests more comprehensive approaches are necessary to fully capture the diversity of motion encoding across the world's languages. I will describe and discuss some of these approaches below.

3.1.2 *Spin* and *Run* verbs

Levin and Rappaport Hovav (1992) propose that Manner verbs can be categorized into two types based on their syntactic and semantic behavior: **spin verbs** and **run verbs**. *Spin* verbs, such as *spin*, *roll*, and *slide*, are unaccusative and denote internally caused activities where the subject undergoes motion without external agency (e.g., *The ball spun*). These verbs often participate in inchoative/causative alternations (e.g., *The door slid open* vs *He slid the door open*), emphasizing the process or dynamics of the motion itself. In contrast, *run* verbs, such as *run*, *walk*, and *jump*, are unergative and denote self-propelled, agentive activities where the subject actively performs the motion (e.g., *She ran*). Unlike *spin* verbs, *run* verbs focus on volitional actions and are incompatible with causative constructions, reflecting their emphasis on agency and intentionality.

While their model provides valuable insights into the syntactic and semantic distinctions between Manner verbs, it has notable shortcomings. First, their binary categorization of Manner verbs into *spin* and *run* verbs overlooks a continuum of motion verbs that exhibit mixed or context-dependent behavior, such as *float* or *stagger*, which can encode both internal causation and volitional agency (Croft, 2012). Second, the model does not adequately address crosslinguistic variation, as some languages may encode motion differently or lack direct equivalents for English unaccusative and unergative constructions (Talmy, 2000). Finally, the model focuses primarily on lexical and syntactic behavior, without integrating pragmatic and discourse factors that influence verb usage, such as speaker intent or contextual salience (Goldberg, 1995). These limitations suggest a need for a more flexible, crosslinguistically robust framework.

3.1.3 The Boundary-Crossing Constraint

The boundary-crossing constraint was introduced by Aske (1989) and later expanded upon by Slobin (1996, 2004). The constraint specifically restricts the use

of Manner verbs as the main verb in motion events involving telic paths—paths that have a clear endpoint (e.g., crossing a boundary such as a door or threshold). S-framed languages do not seem to have this constraint. Consider the scene below:



Figure 3.2: People crossing a physical boundary

English (and other s-framed languages) allow Manner elaboration in the main verb when describing the event:

6. Thomas **walked**_[Manner] *into the room*_[Path].

The act of crossing the physical boundary is encoded via the preposition (*into*) and Manner is still salient enough to be mapped onto the verb. In fact, the description of crossing can be nearly completely ignored as in:

7. Thomas **walked**_[Manner] *in the room*_[Path].

Sentence (7) is ambiguous potentially meaning that a man walks inside a room (from a point to another without leaving the room) or that the man walks from the outside to the inside of the room without any clear indication of a boundary being crossed. This is not to say that English does not allow the description of crossing:

8. Thomas *entered*_[Path] the room.

In (8), Path information takes precedence (is mapped onto the verb) and the Manner information is not conveyed. As we will see in the first experiment in this dissertation, English speakers accept structures like (9) below:

9. Thomas *entered*_[Path] the room **walking**_[Manner].

However, the structure is still significantly less acceptable compared to other encoding strategies permitted in the language.

Portuguese (and other v-framed languages), however, exhibit the boundary-crossing constraint, not allowing the elaboration of Manner in the verb in these contexts:

10. */? *Pedro **andou***_[Manner] *para dentro da* *sala*_[Path].
Pedro walk.PST.3SG to inside of.DEF.F room.SG
'Pedro walked into the room.'
11. *Pedro **entrou***_[Path] *na* *sala*.
Pedro enter.PST.3SG in.DEF.F room.SG
'Pedro entered the room.'

As we will see in the experiment in Chapter 4, sentences like (10) are mostly rated as unacceptable. This is because v-framed languages prioritize goal-oriented motion by encoding Path in the main verb, leaving no grammatical space to lexically encode Manner within the same construction (Aske, 1989). This restriction contrasts with atelic or non-boundary-crossing Paths, where Manner verbs are permitted without conflicting with Path encoding. What languages seem to differ in, however, is whether the motion event includes crossing a horizontal or a vertical boundary (Slobin and Hoiting, 1994):

12. *Pedro **pulou***_[Manner] *na* *piscina* _[Path].
Pedro jump.PST.3SG in.DEF.F pool.SG
'Pedro jumped in the pool.'
13. */? *Pedro **pulou***_[Manner] *para dentro da* *sala*_[Path].
Pedro jump.PST.3SG to inside of.DEF.F room.SG
'Pedro jumped into the room.'

Sentence (12) illustrates an instance of vertical crossing while (13) suggests a horizontal boundary. The difference seems to indicate that, whenever there is vertical crossing, the motion event conveys a sense of immediacy and Manner of motion is salient (Slobin, 2004; Slobin and Hoiting, 1994). For instance, if one is jumping into a pool, the act of jumping is too important to be ignored. However, whenever the boundary is horizontal, the Manner does not take precedence over Path as there is less immediacy (Slobin and Hoiting, 1994). In fact, immediacy seems to be a strong enough factor, as in:

14. * *Pedro dançou*_[Manner] *para dentro da* *sala*_[Path].
 Pedro dance.PST.3SG to inside of.DEF.F room.SG
 ‘Pedro danced into the room.’

Although (13) renders a degree of acceptability, (14) is ungrammatical in Portuguese. The acceptability of (13) may emerge based on the moment of utterance, for instance, in case the observer watches the man jump into the room in an unexpected move. That is not observed in (14).

The existence of a boundary-crossing constraint is well attested and has been studied extensively in various languages and contexts. To name a few, more recent studies, Tutton (2009) investigates the use of the preposition *in* to express boundary-crossing events in English, a deviation from the typical use of *into*. The study reveals that *in* is employed for boundary-crossing when the Ground (reference entity) is conceptualized as a container with clear boundaries (e.g., *He walked in the room*). Pragmatic context often clarifies boundary-crossing when *in* is used ambiguously. Calle Bocanegra (2024) revisits the boundary-crossing constraint in Spanish, analyzing its application across regional varieties. The study confirms that Spanish typically uses Path verbs for boundary-crossing events, relegating Manner to adjuncts. However, exceptions to the constraint emerge, particularly in rapid or vertical motion events, and some regional varieties show greater flexibility in combining manner verbs with path expressions (Calle Bocanegra, 2024). Bodean-Vozian and Cincilei (2015) analyze the role of boundary-crossing as a typological criterion for encoding Path in motion events. The study confirms that verb-framed languages, such as Spanish and Romanian, prioritize path encoding in the main verb, often subordinating manner, particularly in boundary-crossing contexts. In a different approach, Wessel-Tolvig (2015) examines how gestures complement speech to reveal conceptualization of boundary-crossing events in Italian, a v-framed language. While Italian prioritizes Path over manner in verbal descriptions of motion events, co-speech gestures often express both Manner and Path, enriching boundary-crossing narratives.

There is also significant crosslinguistic work. Özçalışkan (2015) reveals that cultural and spatial contexts influence event descriptions, with Turkish speakers emphasizing enclosure and boundary properties more than English speakers. Danhier and Mertins (2016) examine how German and Spanish speakers encode boundary-crossing events in route directions, highlighting typological differences in information structuring. Boundary-crossing is more salient in Spanish route descriptions, often resulting in greater granularity. Cifuentes-Férez and Molés-Cases (2020) investigate typological influences on the translation of boundary-crossing events in German and Spanish. Their results indicate that Spanish shows a more salient constraint and preferred Path verbs whenever a boundary was crossed.

3.1.4 Manner Salience

In his early work, Slobin (2004) recognizes the potential of Talmy's work for lexicalization patterns, but adds that it fails to account for morphosyntactic, psycholinguistic and pragmatic factors. First, catering to the less-commonly investigated languages not included in the original typology, he introduces the category of **equipollently-framed languages** (or serial-verb languages). In these languages, both Manner and Path are expressed by elements that have equal force or significance and share equivalent grammatical forms (Slobin, 2004). See Table 3.1 for a detailed description.

In his revised typology, Slobin (2004) argues that Manner of motion is far too important for humans to ignore, as it often conveys crucial information about events, intentions, and the dynamics of interactions. He suggests that while languages vary in how readily and explicitly they encode Manner, speakers of all languages will describe Manner when it is contextually significant or essential for the narrative or discourse. Therefore, it is intertwined with pragmatics. For example, when distinguishing between two events or emphasizing a character's emotional or physical state, speakers naturally incorporate Manner details to provide clarity, vividness, or dramatic effect. He proposes that the amount of variability within the groups foregrounds the shortcomings of a binary typology and suggests that languages might be, instead, ranked on a cline of Manner salience (H. J. Batoréo and Ferrari, 2016; Hasko, 2009; Pavlenko and Volynsky, 2015; Slobin, 2004). Based on a rich body of work (including Bondarchuk and Derwing (2009a), Cadierno (2017), Hasko (2009), Lewandowski (2021), Pavlenko and Volynsky (2015), and Slobin (2004)), we can visualize a cline like the one in Figure 3.3.

The cline in Figure 3.3 is not perfect, but it does offer an insight into intratypological variation. For instance, studies comparing Germanic and Slavic

Table 3.1: Typology of motion event expression across languages.

Language Type	Preferred Means of Expression	Typical Construction Type	Languages
V-framing languages	Path is expressed by a verb with subordinate expression of Manner	Path verb + subordinate Manner (adverbial clause or prepositional phrase)	Romance, Semitic, Turkic, Basque, Japanese, Korean
S-framing languages	Path is expressed by a non-verbal element associated with a Manner verb	Manner verb + Path satellite (particle or prefix)	Germanic, Slavic, Finno-Ugric
Equipollently-framing languages	Path and Manner are expressed by equivalent grammatical forms	Manner verb + Path verb (serial-verb languages)	Niger-Congo, Hmong-Mien, Sino-Tibetan
		[Manner + Path] verb (bipartite-verb languages)	Algonquian, Athabaskan, Hokan, Klamath-Takelman
		Manner preverb + Path preverb + verb	Jaminjung languages

- **Boundary-Crossing Constraints:** as discussed in Aske (1989) and Slobin (2004).
- **Number of Path Segments Per Clause:** whether languages allow multiple Path components in a single sentence.
- **Diversity and Frequency of Manner Verbs:** how often Manner verbs appear and how much lexical diversity can be observed in their use.
- **Event Granularity Across Clauses:** level of detail or specificity with which events are encoded across different clauses.

- **Expression of Scene Setting:** how languages describe and establish the contextual background or environment for an event or action.

Zlatev et al. (2021) reiterate the importance of considering multiple factors in motion-event encoding. By analyzing Swedish, French, Thai and Telugu, they argued for a **post-Talmyan** motion event typology that emphasizes the complexity and multidimensional nature of linguistic patterns. Based on their findings, they argue that a binary category does not account for the languages and call for at least four distinct language types (Zlatev et al., 2021). They do not, however, propose a framework or parameters to define the groups.

3.1.6 Manner and Directionality

Lewandowski and Mateu (2020) argue that there are remaining questions about intratypological and intralinguistic variability. Differently from Slobin and his proposal of a cline of Manner salience, they propose that **directionality** plays an important role. Verbs that express motion cannot be divided into two strictly delimited subclasses (Path vs. Manner verbs), but should instead be arranged on a scale with different degrees of directionality (Lewandowski and Mateu, 2020). For instance, verbs like "dance" and "float" clearly convey Manner information, but others like "run" and "jump" carry both Manner and directionality. Therefore, they make up a category that should be treated as *Directional Manner verbs*. On the contrary, other verbs like "roar", "rumble" and "whistle" can specify Manner but do not inherently lexicalize motion, being labeled *Nonmotional Manner verbs*. Their proposal can be seen in Figure 3.4

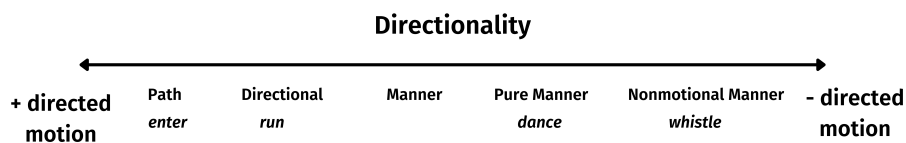


Figure 3.4: Cline of Directionality (Lewandowski and Mateu, 2020, p.7)

For the authors, a typology focused on verb-construction mappings is more adequate than a binary typology. While the idea of mappings is, in essence, directly related to the issues of Cognitive Semantics, I find the overall categorization problematic for a few reasons. First, classifying "roar", "rumble", and "whistle" as Nonmotional Manner is not quite accurate. Consider sentence (15):

15. Thomas **whistled**_[Manner] *out*_[Path] a sad note.

Upon reading (15), we can easily interpret that the prepositional phrase encodes Path information and that the verb encodes Manner. Within the same clause, it is undeniable that there is movement of air from the chest to the outside world. Second, their proposal does not account for verbs like "climb" and "scale", which encode both Manner and Path information, but are still significantly different from other directional verbs, like "run". These, for instance, are better explained as Manner-Path verbs, as they encode both scalar change (Path) and Manner of motion (Egan, 2015). Finally, while *run* does indicate directionality, it also adds Manner of motion (as often listed in the other frameworks). The verb *go* seems to be a better example of the category, as it is a purely directional verb.

3.1.7 Framing this Dissertation

There are multiple ways to analyze the semantics of motion, yet it seems that a few points are widely agreed upon. First, although languages can be categorized as verb- or satellite-framed, their typological affiliation is often determined by the most frequently used encoding strategy rather than the strict adhesion to a single pattern (Lewandowski, 2021; Meirelles and Cançado, 2017; Pavlenko and Volynsky, 2015). Second, as Slobin (2004) points out, speakers prioritize *processing efficiency*, foregrounding only information that is cognitively necessary. This is supported by Wessel-Tolvig (2015), who argue that motion typology is less about what speakers *can* or *cannot* do with language and more about what they *choose* to do, reflecting dynamic and evolving linguistic preferences. Finally, lexicalization patterns do not shape thought but, as we saw in the previous chapter, become ingrained through usage, reinforcing typological profiles over time (Slobin, 2004). Therefore, they form habitual classifications of the world that simply direct one's attention to certain aspects of an event and that can be changed in the process of additional language acquisition.

Regardless of their position on a spectrum of Manner salience, there is significant evidence that English and Brazilian Portuguese are typologically distant from each other (Almeida, 2002; H. Batoréo, 2014; H. J. Batoréo and Ferrari, 2016; H. J. Batoréo, 2014). Most researchers agree that, despite the other possible encoding strategies, English is a prototypical s-framed language (Treffers-Daller and Calude, 2015). Studies on European and Brazilian Portuguese (as well as Spanish) show that there is also a significant difference between how the three languages encode motion (Almeida, 2002; H. Batoréo, 2014; H. J. Batoréo and Ferrari, 2016; H. J. Batoréo, 2014). Brazilian Portuguese is located further on the verb-framing end, followed by Spanish and European Portuguese (see Figure

3.3). This alone makes a case for the typological investigation of Portuguese (especially Brazilian Portuguese) in relation to other Romance Languages.

There are a few typological considerations that need to be clarified. First, as previously mentioned, English and Portuguese do allow a lexicalization pattern in which Path is encoded in the verb and Manner is encoded in an adverbial phrase within the same clause (e.g., *Thomas left school **by bike***). This phenomenon is investigated in the first experiment (Chapter 4) which compares the acceptability of the structure by both languages. In the second and third experiments (Chapters 5 and 6), its occurrence is coded as Manner Adverbials and is accounted for in the calculations of Manner Bias.

Second, Brazilian Portuguese allows structures such as (16):

16. *Pedro saiu correndo da sala.*
 Pedro exit.PST.3SG walk.PROG from.DEF.F room.SG
 ‘Pedro left the room walking.’

The sentence in example (16) can be interpreted in two possible ways: (i) Pedro may have *literally* left the room and he was running while doing so, or (ii) Pedro **dashed out of** the room. According to the first interpretation, Pedro crossed a physical boundary and, as seen in the literature, this imposes a constraint in which the Path of Motion takes precedence (in the main verb, *sair* ‘exit’) and the Manner of Motion is encoded in an optional Manner adverbial clause (*correndo* ‘running’). As for the second interpretation, the construction *sair correndo* is idiomatic and indicates that the action begins *abruptly* or *unexpectedly*. The verb *sair* ‘exit’ is part of a lexicalized structure and does not carry Path information in itself.⁷ A possible way to test whether the interpretation is literal or idiomatic is to move the Manner adverbial clause to the end of the sentence:

17. *Pedro saiu da sala correndo.*
 Pedro exit.PST.3SG from.DEF.F room.SG run.PROG
 ‘Pedro ran/dashed around the room.’

Whenever the movement has occurred, the most common interpretation is literal, as in (17). In Experiments 2 (Chapter 5) and 3 (Chapter 6), I coded the participants’ data having this parameter in mind. Whenever a sentence with the verb *sair* ‘exit’ showed constituent movement, it was coded as literal; therefore, the verb was tagged for Path and the adverbial clause for Manner. If the movement had not occurred, I based coding on pragmatics and intonation: the metaphorical interpretation requires rising intonation when uttering the Manner adverbial clause.

⁷ As it is traditional in Cognitive Linguistics, I adopt the term *lexicalization* to refer to when a concept, idea, or meaning becomes encoded in a single word or fixed expression in a language. While lexicalized constructions may overlap with idiomatic expressions, their meanings tend to be compositional and predictable. Idioms can be lexicalized (as they become fixed expressions in a language), but not all lexicalized items are idiomatic. See Lehmann (2002) for a detailed discussion.

A final typological consideration concerns the verbs with prefixes. As in the case of French (Hickmann et al., 2009), Portuguese has a few verbal prefixes that function as satellites. A particular example observed in the study is the verb *sobrevoar* ‘fly over’. As the satellite is prefixed to the verb, the verb was coded as Manner-Path, much like “climb” and “scale”. I could potentially interpret it as an example of an s-framed structure (since satellites may be prefixes). However, I believe speakers interpret them as a single unit: a verb that encodes both Path and Manner of Motion.

3.2 The Development of Motion Descriptions in Language Acquisition

3.2.1 Motion Elaboration in the L1

Research on the acquisition of motion events in first-language (L1) development reveals that children exhibit both universal tendencies and language-specific adaptations from an early age.⁸ Typological factors play a significant role in shaping how speakers organize and verbalize motion across languages, with cross-linguistic research showing distinct developmental trajectories. For instance, Hickmann et al. (2009) emphasize that by the age of three, children begin to organize verbal representations in ways that align with the typological patterns of their native language. Pavlenko and Volynsky (2015) similarly point out that all children start from a default point, paying equal attention to both Manner and Path. However, by age three, language-specific patterns of lexicalization become evident, reflecting the influence of the linguistic environment.

The progression toward adult-like representations develops rapidly. Hickmann et al. (2009) observe that children’s speech and gestures are largely aligned with adult patterns by the age of four, though their ability to produce semantically rich and syntactically complex descriptions evolves over time. Ochsensbauer and Hickmann (2010) found that younger children, particularly those between three and six years old, rely on simpler constructions such as particles. Older children and adults, in contrast, produce more semantically dense and syntactically sophisticated descriptions, reflecting both cognitive and linguistic growth (Ochsensbauer and Hickmann, 2010). Interestingly, young children often encode either Manner or Path but not both, as shown by Hendriks et al. (2022). This trend aligns with the developmental progression noted in Gagarina (2009), who explains that children initially acquire motion expressions by using unmarked or generalized forms, often overextending their meanings before learning the restrictions imposed by the target language. Adults, by compari-

⁸ Several of these studies were introduced in Chapter 2 as references to Thinking-for-Speaking in the L1. Instead of restating them here, I am simply addressing a handful that make specific statements about the acquisition of motion.

son, tend to use a restricted and regularized set of meanings and forms from the outset (Gagarina, 2009).

Despite these developmental challenges, verbs of motion (VoM) do not appear to pose greater difficulties for children than other types of verbs (Gagarina, 2009). Furthermore, Ochsensbauer and Hickmann (2010) highlight that as children age, they develop an increased ability to use spatial anchoring and integrate complex structures into their motion descriptions, reflecting a broader interplay between cognitive and linguistic development. Thus, while motion acquisition begins with universal tendencies, typological and linguistic factors shape how children develop language-specific patterns of motion encoding.

Research on overall L1 cognition highlights the interplay between universal cognitive tendencies and language-specific influences in the development of spatial language. Hendriks et al. (2022) suggest that while general cognitive determinants may shape the acquisition of spatial language, language-specific features significantly influence its development. Beavers et al. (2010) propose that a universal bias toward morphosyntactically simpler structures reflects ease of processing, explaining intra-typological preferences for certain encoding strategies. However, Engemann (2023) notes that children are also capable of transferring and using more complex structures, challenging the assumption that universal simplicity always dominates. This indicates a nuanced interaction between cognitive constraints and linguistic complexity in early language development.

3.2.2 The Challenges of Acquiring a Typologically Different Language as an L2

Typological differences between L1 and L2 require learners to adapt to new ways of categorizing and expressing motion, which can vary significantly depending on the direction of the shift between language types. The transition from an s-framed to a v-framed language tends to be easier for learners than the reverse (Cadierno, 2004, 2017; Cadierno and Ruiz, 2006; Hasko, 2009; Lewandowski, 2021; Pavlenko and Volynsky, 2015) s-framed to v-framed learners adapt by reducing their use of Manner verbs and adhering to boundary-crossing constraints, as described in Madlener-Charpentier and Liste Lamas (2022). Lewandowski (2021) found that learners shifting from S- to V-languages often achieve productions that match monolingual speakers of the L2, particularly at advanced proficiency levels. This is no surprise when we consider vocabulary acquisition. In many cases, s-framed languages may have twice as many motion verbs as v-framed ones (Slobin, 2004), meaning that v- to s-framed learners but not s- to v-framed learners need to acquire not only new terms, but also the syntactic

structure required to employ them in the description of motion events. These learners must learn to move Path information from the verb to satellites and integrate a new component, Manner, into their descriptions of motion. This additional cognitive and linguistic restructuring makes the process more complex, though effects diminish with higher proficiency (Lewandowski, 2021).

Typological differences in Path encoding further complicate L2 acquisition. For instance, German learners of Spanish struggled to simplify the conceptual content of motion events, as German typically encodes multiple Path segments, whereas Spanish adheres to boundary-crossing constraints, offering fewer options for expressing Path distinctions (Lewandowski, 2022; Liste Lamas, 2016). Similarly, Pavlenko and Volynsky (2015) observed that late Russian-English bilinguals retained obligatory distinctions from their L1, demonstrating the resistance of specific L1 encoding patterns to crosslinguistic influence from the L2. Early bilinguals showed reduced lexical diversity and occasional errors in motion encoding, reflecting ongoing difficulty in fully internalizing L2 patterns.

Ibarretxe-Antuñano et al. (2016) emphasized that the acquisition process can be particularly demanding not only when moving from a general system to a more specific one but also vice versa. For instance, learners transitioning from verb-framed to satellite-framed languages must learn to articulate trajectory dynamically while maintaining native-like semantic distinctions. Despite these challenges, learners demonstrate sensitivity to both lexical and syntactic aspects of verb meaning, as Montrul (2001) highlighted. This sensitivity may stem from biological predispositions or progressive inductive learning mechanisms, though this remains an open question. Ultimately, while proficiency mitigates many L2 acquisition difficulties, typological contrasts between languages demand considerable cognitive and linguistic adaptation from learners.

3.2.3 Crosslinguistic Transfer from the L1

Crosslinguistic transfer refers to the influence that a learner's first language (L1) exerts on the acquisition of a second language (L2) (Ortega, 2014). This influence can manifest as either **facilitation**, when similarities between L1 and L2 lead to *positive transfer*, or **interference**, when structural differences result in *negative transfer* (Odlin, 1989). The process is not random but selective, often impacting specific linguistic areas such as phonology, syntax, and lexicon (Ellis and Robinson, 2008). In essence, transfer is dynamic and influenced by the learner's proficiency level, learning context, and the typological relationship between the languages involved (Gass and Mackey, 2006). Typological similarity, which is one of the points investigated in this dissertation, plays a significant role, as learners of closely related languages are more likely to experience facilita-

tive transfer compared to those learning typologically distant languages (Jarvis and Pavlenko, 2008a).

Treffers-Daller and Tidball (2015) identify four primary types of *crosslinguistic transfer*:

1. **Transfer**: learners replicate L1 patterns in the L2;
2. **Restructuring**: learners adapt to L2 patterns that differ from their L1;
3. **Creative or hybrid use**: patterns align with neither language;
4. **Convergence**: patterns reflect a blend of L1 and L2 norms.

The studies that compose this dissertation are particularly interested in transfer, restructuring and convergence, as I assess the effects of language proficiency on the development of motion descriptions in the L2 and the effects of bidirectional transfer (i.e., how a learner's L2 begins to change their L1).

Research shows that learners transfer various aspects of motion descriptions from their L1, influencing their ability to adopt target-like L2 patterns. Wang and Wei (2021) found that English-Cantonese bilinguals demonstrated patterns similar to English monolinguals, indicating cognitive restructuring toward the L2. Muñoz and Cadierno (2019) observed heavy L1 influence in Spanish speakers, particularly in their limited use of path verbs and reliance on simplified descriptions of motion events, though upper-intermediate learners exhibited increased use of path verbs. Similarly, Larrañaga et al. (2012) found that while Spanish speakers transferred the degree of path elaboration from their L1 to the L2, they struggled more with overgeneralization than undergeneralization. This suggests that while some learners adapt to L2 norms, others retain entrenched L1 patterns.

Li et al. (2014) noted that while L2 learners could develop target-like motion patterns, some L1-specific tendencies persisted, particularly in grammatical distinctions absent in the L1. Hasko (2009) reported that even advanced L2 learners of Russian struggled with the fine-grained variability in path encoding, a hallmark of Russian motion descriptions, while intermediate learners succeeded in adopting simpler systems. Egan and Graedler (2015) demonstrated how typological differences influence motion event descriptions in translations, with English and Norwegian exhibiting higher similarity due to their shared focus on Manner. In contrast, French translations dropped Manner coding frequently and displayed more double coding of Path, reflecting its verb-framed typology (Egan and Graedler, 2015).

Certain aspects of motion event encoding, however, are more susceptible to transfer from the L1. Li et al. (2014) observed that basic "go" and "come"

constructions formed the core of learners' L2 motion inventories, with less frequent use of other verbs. Ibarretxe-Antuñano et al. (2016) found that learners often failed to adopt the semantic distinctions and verbs necessary for expressing alternative ways of thinking-for-speaking in the L2. Alghamdi (2019) noted that Arab EFL learners relied on path verbs and alternative constructions rather than manner verbs, reflecting their L1 influence. Even advanced learners struggled to acquire target-like patterns, highlighting the persistence of L1 cognitive constraints.

Overall, findings support the idea of **bilingual multicompetence**, as proposed by Grosjean (1982) and Cook (1992). Bilinguals approach motion descriptions with integrated competencies shaped by their dual language systems, rather than replicating monolingual norms. This provides yet another example to the growing field of bilingual language acquisition that bilinguals develop unique linguistic systems that are not equivalent to those of monolingual speakers (Cadierno et al., 2023).

3.2.4 Predictors for the Acquisition of L2 Motion Description Patterns

The acquisition of motion description patterns in a second language (L2) has been shown to be influenced by various factors. In this section, I outline a few:

- **Length of Residence (LOR)** emerges as a critical predictor in L2 motion pattern acquisition. Park (2020) found that the duration of immersion significantly modulates the development of motion encoding, with greater exposure (e.g., 3-8 years) correlating with more target-like patterns. Learners with extended immersion periods show greater sensitivity to L2-specific constraints, such as encoding Manner in satellites for satellite-framed languages. Similarly, Larrañaga et al. (2012) observed that only advanced learners encode Manner in satellites, indicating that awareness of such constraints develops over time with increased proficiency and exposure.
- **Proficiency** also plays a pivotal role. Park (2020) identified L2 proficiency as a significant modulator of motion description development, with higher proficiency learners producing more accurate L2 motion patterns. Treffers-Daller and Calude (2015) found that advanced learners matched monolinguals in their frequency of motion verb usage. High-frequency verbs were acquired and used more readily than low-frequency ones, highlighting the impact of lexical familiarity on L2 production.

The number of hours spent learning the language was also a key predictor, underscoring the importance of sustained engagement for developing native-like motion descriptions.

- **Language background** and **context** have nuanced effects. While Bondarchuk and Derwing (2009b) found that L1 background played a minor role, Wang and Wei (2021) demonstrated that the amount of English use influenced bilinguals' preference for Manner encoding. However, immediate effects of language immersion were not observed, suggesting a long-term convergence of conceptual categories. Similarly, Stocker and Berthele (2020) noted that manipulating monolingual versus bilingual modes did not produce significant changes in motion event descriptions, contradicting earlier studies and suggesting that long-term immersion and use outweigh situational context in shaping motion patterns.

3.2.5 Psycholinguistic Methods to Investigate Motion

The picture book *Frog, Where Are You?* (Mayer, 1969) has been one of the most widely used tools in cross-linguistic studies of motion event descriptions (Berman and Slobin, 1994; Hickmann et al., 2009; Oliveira and Fernandes, 2022; Slobin, 2004, to name a few). This wordless storybook, depicting a young boy and his dog searching for a lost frog, presents a structured series of motion events that include actions such as climbing, jumping, running, and falling. Researchers have used *Frog, Where Are You?* to elicit narrative descriptions across different languages, allowing for cross-linguistic comparisons of how motion events are encoded, particularly in terms of Manner and Path (Berman and Slobin, 1994; Verhoeven and Strömquist, 2004).

Although *Frog, Where Are You?* has been instrumental in advancing research on motion descriptions, it is not without shortcomings. One significant limitation is that the narrative structure may unintentionally constrain participants' responses by presenting pre-determined actions and events. This could limit the natural variability of motion event descriptions, as participants are required to describe specific actions rather than freely selecting events and Manner/Path combinations (Verhoeven and Strömquist, 2004). Furthermore, *Frog, Where Are You?* has a linear plot, which may not fully capture the complexity of motion events in dynamic contexts or provide enough instances of boundary-crossing actions to examine the boundary-crossing constraint in v-framed languages (Cadierno, 2010). This reliance on a single narrative source also poses challenges for capturing spontaneous, unstructured language use, as participants might approach the task with narrative conventions rather than



Figure 3.5: A frame from Mayer (1969)

natural speech patterns (Lewandowski, 2021). On top of that, the book presents static images which means motion is inferred. Thus, it is difficult to determine whether participants are inferring - rather than describing - motion. (Lewandowski, 2021).

In response to the limitations of traditional narrative tools, the investigation of motion event descriptions has been relying more and more on psycholinguistic methods. I list a few below.

Acceptability Judgments

Acceptability judgment tasks involve presenting participants with sentences or phrases describing motion events and asking them to rate or judge the grammaticality, naturalness, or preference for each description. This method allows researchers to assess subtle language-specific preferences, for instance, whether speakers prefer certain syntactic structures over others, which provides an insight into lexicalization patterns. In studies with language learners, this method has been useful in detecting shifts in motion event encoding preferences as learners become more proficient in their second language (Busso and Romagno, 2021; Coventry et al., 2010; Goschler et al., 2020; Manzanares and López, 2008). However, acceptability judgments can sometimes fail to capture actual language use, as participants may judge constructions based on idealized grammar or prescriptive norms rather than reflecting authentic language production (Bylund and

Athanasopoulos, 2014a). Besides that, acceptability ratings are not considered natural linguistic behavior (Goschler et al., 2020).

Written Tasks

Written elicitation tasks involve providing participants with prompts or visual stimuli and asking them to describe the depicted motion events in writing. These tasks allow for greater control over the linguistic input and can be tailored to include specific types of motion events, such as those involving boundary crossing or different Manners of motion (A. Brown and Gullberg, 2008).

Written tasks are advantageous in that they allow researchers to analyze specific lexical and syntactic choices made by speakers of different languages. For example, researchers might prompt participants with a picture of a person climbing a hill and examine whether English speakers use a Manner verb like “climb” compared to Portuguese speakers who might use a Path verb (e.g., *subir* ‘ascend’). Besides that, researchers can create a corpus of learner writing that may also be used for other purposes. A limitation of this approach, however, is that it does not capture the real-time processing associated with motion descriptions, and participants may engage in more reflective or elaborate language than they would in spontaneous speech. Besides that, writing tends to follow prescriptive norms, which may influence results.

Spoken Tasks

Spoken elicitation tasks involve presenting visual or verbal prompts and recording participants’ spoken responses. These tasks are closer to natural language use and are particularly effective for capturing spontaneous motion descriptions. Spoken tasks are valuable for observing how speakers handle Manner and Path information in real-time, allowing for a more authentic representation of language production (Navarro and Nicoladis, 2005). For instance, in studies where participants view video clips of different types of motion events, researchers can analyze their choice of verbs, adverbial phrases, and syntactic structures in encoding Manner and Path (Lewandowski, 2021). However, spoken tasks are also constrained by factors like speech disfluencies and individual variability in speaking styles, which may introduce noise into the data (A. Brown and Gullberg, 2008).

Eye-Tracking

Eye-tracking is an innovative method that allows researchers to examine the cognitive processes underlying motion event descriptions by recording participants’

eye movements as they view visual stimuli. Eye-tracking studies offer a window into how speakers allocate attention to different aspects of a motion event, such as the agent, Manner of movement, or Path (Hohenstein et al., 2006). For instance, an eye-tracking study might present participants with a video of a person running into a building and track whether English speakers fixate longer on the Manner (e.g., “running”) compared to Portuguese speakers, who might focus more on the Path or boundary-crossing aspect of the action. Studies have found that eye-tracking can reveal differences in attention allocation even before participants verbalize their descriptions, suggesting that language-specific patterns in motion encoding may influence visual attention (Bylund and Athanasopoulos, 2014b).

Eye-tracking is particularly useful for studying L2 learners as it provides real-time evidence of whether their visual attention aligns more closely with their L1 or L2 encoding strategies. For instance, an English speaker learning Spanish might initially focus on Manner information but gradually shift attention to Path, reflecting a cognitive adaptation to Spanish’s v-framed structure. Although eye-tracking provides rich data on cognitive processes, it requires specialized equipment and can be challenging to analyze due to the vast amount of data generated.

3.2.6 Framing this Dissertation

Some questions about the acquisition of thinking-for-speaking patterns in the L2 remain unanswered, especially pertaining to the effects of age of onset, the amount of exposure, or the types of instruction (Cadierno, 2017; Stam, 2015). Cadierno (2017) points out that, while a significant body of research has focused on the acquisition of s-framed languages, there is still little work on the acquisition of v-framed languages. In her comprehensive review of the field, she showed that most of the available work has focused on Intermediate and Advanced learners and that data from Elementary learners is scarce.

The dissertation reports on my investigation of how bilingual speakers of Brazilian Portuguese and English acquire motion encoding lexicalization patterns in their additional language. Studying how L1 Portuguese speakers acquire motion encoding patterns in L2 English, and how L1 English speakers acquire these patterns in L2 Portuguese, is essential for multiple reasons:

1. As discussed in the previous chapter, despite the significant differences between the motion encoding strategies employed by English and Portuguese speakers, the body of work on the dyad is very limited. The few existing acquisition studies only investigate the acquisition of English

as an L2 by L1-Portuguese speakers (Oliveira and Fernandes, 2022) and involve small sample sizes ($n < 10$), limiting the generalizability of findings and underscoring the need for larger-scale research (Nogueira, 2009b). There is little work on Elementary and Advanced English learners, and there is a major scarcity of studies focusing on the acquisition of Portuguese as a foreign language in general (Mengali (2020)).

2. The theoretical work shows that Brazilian Portuguese and European Portuguese use significantly different lexicalization patterns to describe motion (H. Batoréo, 2014; H. J. Batoréo and Ferrari, 2016). This means that the intralinguistic variability calls for work on the acquisition of both separately (to my knowledge, no work on the development of L2 motion description by European Portuguese learners of English is available, which indicates another research gap that is beyond the scope of this dissertation). This difference alone shows that findings also cannot rely on the results reported for Spanish, despite the similarity between the languages in other linguistic aspects (e.g., lexicon and word order).
3. The practical importance of this research is underscored by Portuguese's designation as a critical language in the United States. Programs like the Critical Language Initiative and the Flagship Program identify Portuguese as a language of strategic importance, yet research on its acquisition and pedagogy remains limited (U.S. Department of Education, 2021). Likewise, English is an official language in Brazil, taught from 6-12 and in hundreds of language centers. The relevance of the English language for the global scenario goes without saying.
4. Finally, the studies in this dissertation help advance the field of Thinking-for-Speaking in the L2 and Cognitive Semantics in general, by including a large amount of data from Elementary level learners. As pointed out in Cadierno (2017) and Muñoz and Cadierno (2019), this is an observable gap in the field (not exclusive of the Portuguese-English dyad) and the findings presented here help us understand how learners begin to acquire L2 patterns in the first years of instruction.

By addressing these research gaps, this dissertation will advance theoretical insights into crosslinguistic motion encoding, inform pedagogical strategies for teaching English to Portuguese speakers as well as Portuguese to English speakers, and contribute to the broader understanding of second language acquisition processes.

The work presented here covers three experiments:

Experiment 1: *Preference patterns for describing motion*

The first experiment (Chapter 4) was exploratory in nature. By creating stimuli to collect acceptability judgments, I examined whether L1 speakers of English and Brazilian Portuguese perceive differences between three motion encoding patterns: Manner verb+Path satellite (Manner+Path), Path verb+ Manner in a prepositional phrase (V+PP), and Path verb+ Manner in an adverbial clause (V+AC). Due to the online nature of the data collection process, it features a large population size. One hundred and ninety-two participants consisting of English and BP monolinguals as well as late English-BP bilinguals, provided acceptability ratings of the three structures in each language. This work, which focuses on acceptability rather than production, showed that the difference between the languages and the effects of L2 proficiency made the dyad worth investigating in production studies as well.⁹

⁹ This first experiment was a Qualifying Paper for my Doctoral Degree. It has been accepted for publication and is currently in-print in *Bilingualism: Language and Cognition*.

Experiment 2: *Patterns in describing motion in written production*

The second experiment examines how and when L2 motion encoding lexicalization patterns emerge in late bilinguals' written production. The aim of the experiment is to identify at what stage of L2 language proficiency bilingual Brazilian Portuguese and North American English speakers begin to describe motion events in ways that approximate those of monolingual speakers, if at all. Written production was chosen for two main reasons. First, writing allows a certain degree of control and planning as opposed to speaking, which is mostly spontaneous and often unplanned, and thus, riddled with production errors (Hyland, 2019; Lewandowski, 2021). The writing task allowed me to measure the production of motion encoding patterns in a semi-controlled, reasonably-sized task. Second, a writing corpus is a rich tool to investigate patterns in usage, especially lexical and syntactic structures (Römer and Berger, 2019; Stefanowitsch, 2020). As data collection was carried out via the internet, the study allowed access to a larger pool of participants across North and South America (n=90).

This study also innovates in the data collection method by using clips from a video game in which the player sees the scenes from the perspective of the main character. The motivation for the use of video game clips to investigate the production of motion encoding lexicalization patterns is multifold. As seen in Lewandowski (2021), most of the previous work on the acquisition of motion encoding consists of speakers retelling stories from children's books.¹⁰

Although this method has been proven efficient, the use of static images may conflate **overt** Manner of motion (instances in which Manner is overtly

¹⁰ This screenshot is used under the doctrine of fair use for educational and non-commercial purposes.



Figure 3.6: Screenshot from *The Legend of Zelda: Breath of the Wild* (Nintendo, 2017).

expressed, as in *Thomas glided across the river* and **implied** Manner of motion (examples in which Manner is implied due to the encoding of Path in the satellite, as in *Thomas whispered into her ear* (Lewandowski, 2021). The distinction is particularly important for s-framed languages which allows the encoding of both. The use of static images also has trouble assessing boundary-crossing events, capturing only 65 percent accuracy in the results (Naigles et al., 1998). Additionally, the use of videos provides **continuous input** of motion (the participant sees the entire motion as it unfolds) as opposed to **fragmented** or **inferred** motion as in static images (Lewandowski and Mateu, 2020).

Experiment 3: Patterns in describing motion in spoken production

The third experiment investigated how L2 lexicalization patterns emerge in late bilinguals' spoken production. As in the previous experiments, it aims to identify whether, if at all, late bilinguals' spoken elaboration of motion events approximated monolingual speakers. Most of the design emulates the one proposed for Experiment 2, in which videos are used to elicit narratives.

The experiment diverges from previous work in a few essential points. First, it looks into both *simultaneous* and *delayed* storytelling. As seen in Lewandowski and Mateu, 2020, most of the previous work relies on delayed storytelling, which allows participants time to look at a frame and organize their ideas before describing each motion event (i.e., a **recall task**). While delayed storytelling

gives us an insight into how speakers perceive motion, it may not be an adequate representation of L2 cognition as learners have time to choose from their linguistic repertoire (Lewandowski and Mateu, 2020). A potential strategy to tackle this issue suggested by Lewandowski (2021) is to have participants narrate stories as they unfold – for instance, describing what they see as the videos play (i.e., a **commentary task**). This allows a more spontaneous elicitation of narratives and a better representation of their cognition. Another difference is that Experiment 3 analyzes the acquisition of the boundary-crossing constraint, which is observed in Portuguese, but not in English. The scenes selected for the study are balanced so that participants report on events in which the video character crosses a physical boundary (e.g., *enter a room*) or moves within a space in which no boundary is crossed. This allows an assessment of the acquisition of the constraint across proficiency levels. Finally, this study also collects data from bilingual participants in their L1 as well as in their L2. By collecting data in both languages, I was able to identify the effects of **bidirectional transfer** and assess whether their L2 system begins to influence that of their L1.

The following chapters report on the three experiments.

CHAPTER 4

L₂ PROFICIENCY AND THE ACCEPTABILITY OF MOTION ENCODING STRATEGIES

4.1 The present study

This investigation focuses on the acquisition of English as an additional language by L₁ Brazilian Portuguese speakers as well as Portuguese as an additional language by L₁ English speakers.

Participants were asked to rate sets of sentences in which Manner of motion is encoded by employing the canonical s-framed structure: (i) Manner + Path (*The woman **walks** into the room*), as well as two prototypical v-framed construction types: (ii) Path Verb + Manner Adverbial Clause (*The woman enters the kitchen **walking***) and (iii) Path Verb + Manner Adverbial Prepositional Phrase (*The woman enters the kitchen **on foot***.) The choice for a novel model of employing an acceptability judgment task followed Hwang (2023), who argues that the use of carefully-controlled stimuli (i.e., short sentences that focus on the object of interest) imposes less cognitive burden on participants, as opposed to written or oral production tasks.

This study aimed to answer three questions – one of a typological focus and two centered on bilingual development:

RQ1. Considering that both English and Brazilian Portuguese allow descriptions of motion in which a Path verb and an optional Manner prepositional phrase, how does this structure rank compared to the canonical structures of each language?

RQ2. At what stage of second language development (Elementary, Intermediate, Advanced) do L₁ English L₂ learners of Portuguese (as a v-framed

language) begin to rate motion encoding structures as acceptable as monolingual L1 Portuguese speakers do?

RQ3. At what stage of second language development (Elementary, Intermediate, Advanced) do L1 Portuguese L2 learners of English (as a v-framed language) begin to rate motion encoding structures as acceptable as monolingual L1 English speakers do?

For RQ1, I anticipate that Portuguese speakers will consider the Path verb + Manner prepositional phrase more acceptable than the prototypical Path verb + Manner adverbial clause. This will occur due to the lower complexity of a Manner prepositional phrase compared to an adverbial clause, which entails the assignment of an argument structure (Chomsky, 1957). I also anticipate that English speakers will consider Path verb + Manner prepositional phrase more acceptable than Path verb + Manner adverbial clause for a similar reason, but will rank it as less acceptable than the canonical Manner verb + Path satellite constructions.

For RQ2 and RQ3, I expect that learners at earlier stages will demonstrate higher acceptability of sentences that reflect the thinking-for-speaking strategies of their L1 (Cadierno, 2004, 2017). I also expect that this should change over time and late bilingual speakers will begin to assign higher ratings to sentences that show the pattern of thinking-for-speaking of their L2 as early as at the Intermediate level (Cadierno and Ruiz, 2006). However, I expect that learners of Portuguese as an L2 will consider Path verb + Manner prepositional phrase less acceptable than monolingual speakers of Portuguese do due to the permissibility of the structure in both languages, but the preference for v-framing in Portuguese. Learners of English as an L2 will consider Path verb + Manner adverbial clause more acceptable than monolingual speakers of English do due to the grammaticality of the structure in English, despite v-framing being less preferable.

Because Manner encoding in the verb results in a larger verb lexicon in s-framed languages (Slobin, 2004), learners of L2 English will consider S-framing structures acceptable relatively early due to the salience of elaborate description of Manner in the L2. Contrastingly, learners of L2 Portuguese will consider v-framing structures less acceptable also relatively early because of the low occurrence of Manner verbs in the language.

4.1.1 Participants

Two hundred and eight participants were recruited via social media announcements as well as collaborations with higher education institutions in Brazil, Canada, and the United States. To participate, individuals needed to be at least

18 years old. Participants consisted of monolingual speakers of Brazilian Portuguese (n=20), monolingual speakers of English (n=31), L2 English learners whose first language was Brazilian Portuguese (n=88), and L2 Portuguese learners whose first language was English (n=69). The study collected informed consent from participants prior to its start.

To isolate the effects of L3 transfer on the learners' English and Portuguese, I excluded from the data L2 English learners who reported an Intermediate level in another s-framed language as well as L2 Portuguese learners who reported the same level in another v-framed language. L2 learners also rated ungrammatical sentences (i.e., sentences that violated the target language syntax) on a scale from 1-6. Participants who assigned 4 or higher to any of the sentences were also removed from the study. No L1 speaker rated any of the ungrammatical sentences as acceptable. Finally, I also removed incomplete responses from the data.

This procedure left us with one hundred and seventy six participants. The first group (n=27) consisted of monolingual L1 speakers of English ('L1 English') aged between 18-63. The second group (n=19) was made up of monolingual L1 speakers of Portuguese ('L1 Portuguese') aged between 22-58. The third group (n=73) consisted of L2 English speakers whose L1 is Brazilian Portuguese ('L2 English'). These participants' age ranged between 18-39, they had an average of 13.07 years learning the L2, and an average age of onset of 19.87. The fourth group (n=57) consisted of L2 Brazilian Portuguese speakers whose L1 is English ('L2 Portuguese'). Their age range was between 18-55, they had an average of 1.8 years learning their L2, and an average age of onset of 1.80. While both groups' average age of onset was early adulthood, the amount of time spent learning their L2 varied significantly.

See Table 4.1 for background information on participants.

4.1.2 Proficiency measurements

L2 English and L2 Portuguese learners took a self-reported proficiency test designed at the Michigan State University. The administration of a self-reported exam follows recent trends in the field: they are adequate for low-stakes L2-proficiency measurements because of their low cost and they make intuitive sense to learners (Winke et al., 2023). The exam is aligned with the American Council on the Teaching of Foreign Languages (ACTFL) standards for language learning and places test-takers in one of five bands: (i) Level 1: Novice Low to Novice High, (ii) Level 2: Novice High to Intermediate Mid, (iii) Level 3: Intermediate Mid to Advanced Low, (iv) Level 4: Intermediate High to Advanced Mid, (v) Level 5: Advanced Mid to Superior. The self-reported profi-

Table 4.1: Background information of participants

Group	Age of Testing	Age of Onset	Year Learning L2
L1 English (n=27)	34.48 (SD=12.92; range=18-63)	NA	NA
L1 Portuguese (n=19)	36.11 (SD=10.76; range=22-58)	NA	NA
L2 English (n=73)	32.95 (SD=11.39; range=18-39)	19.87 (SD=12.22; range=4-60)	13.07 (SD=11.22; range=0.08-45)
L2 Portuguese (n=57)	20.81 (SD=5.27; range=18-55)	19.00 (SD=2.61; range=13-32)	1.80 (SD=4.30; range=0.08-30)

ciency test is divided into five sections. In each section, participants rated ten language-related Can-Do statements according to their perceived language skills (e.g., *I cannot do this yet, with much help, with little help, I can do it well*). Participants were also asked to rate whether the skills described were important to them. The test performs conservative scoring: each set of 10 statements has 10 possible points, with one point awarded if the person selected the highest ability level (mastery, a “4”) on the Likert-scale (Tigchelaar et al., 2017). A participant who scored 8 out of 10 on a set was able to advance to the next set. There was a total of 5 sets: one for each of the test levels. The conservative approach was adopted to prevent over-assignment in the higher levels (Tigchelaar et al., 2017).

To add another layer of validity to their self-reported results, I analyzed whether there was a correlation between the self-reported proficiency exam and participants’ years learning the L2. I expected a positive correlation between the factors. The Kendall rank correlation test showed a strong positive correlation ($t=0.64$, $Z=7.65$, $p<.001$) for L2 English learners and a moderate positive correlation for L2 Portuguese learners ($t=0.52$, $Z=5.03$, $p<.001$). This means that their proficiency assessment is coherent with the length of exposure.

Participants’ proficiency levels can be seen in Table 4.2.

As the self-reported proficiency exam places learners in one of five levels – which would result in many small subgroups – I decided to conflate the five test levels into three bands: Elementary, Intermediate, and Advanced. My aim was to find an adequate scope that was neither too broad to generalize or too

Table 4.2: Participants' Distribution Based on Proficiency Levels

Group	Age at Testing	Age of Onset	Years Learning L2
L2 English Elementary (n=33)	31.27 (SD=11.82; range=18-70)	26.87 (SD=12.17; range=13-60)	4.40 (SD=3.72; range=0.08-15)
L2 English Intermediate (n=15)	35.47 (SD=13.12; range=18-57)	16.34 (SD=16.34; range=4-44)	19.5 (SD=19.5; range=4-43.7)
L2 English Advanced (n=25)	33.64 (SD=9.12; range=23-58)	12.96 (SD=7.16; range=4-43)	20.67 (SD=8.24; range=10-45)
L2 Portuguese Elementary (n=43)	19.86 (SD=2.58; range=18-33)	19.29 (SD=2.56; range=17.5-32)	0.59 (SD=0.42; range=0.08-1.5)
L2 Portuguese Intermediate (n=10)	24.20 (SD=10.47; range=19-55)	19.07 (SD=2.11; range=17.5-25)	5.12 (SD=8.53; range=0.91-30)
L2 Portuguese Advanced (n=4)	22.25 (SD=3.36; range=18-26)	15.73 (SD=2.09; range=13.5-18)	6.52 (SD=3.89; range=1.6-12)

narrow for patterns to be identified. First, I correlated the ACTFL levels with the Common European Framework of Reference (CEFR) bands. I noted that the one CEFR band ranged over one or two ACTFL levels, i.e., both test levels 1 and 2 fit within the CEFR's "Basic User" (Elementary); similarly, levels 3 and 4 were equivalent to the CEFR's "Independent User" (Intermediate). Level 5 corresponded to the CEFR's "Proficient User" (Advanced). This system allowed us to reduce the number of subgroups from 5 to 3.

4.1.3 Methods

The decision to use for an acceptability judgment task was motivated by multiple factors. First, as seen in Hwang (2023), they are more sensitive to nuances of grammar and impose less cognitive burden on learners. Second, they have a high potential to assess specific target structures (Grey and Tagarelli, 2018). Third, they are easy and efficient to administer, as they can be applied via the internet. Acceptability judgments are also helpful for late bilingual learners who may demonstrate understanding of an L2 semantic feature, yet not have under-

gone the process of automatization (i.e., the conscious, controlled processing of declarative knowledge in natural speech) (Hasko, 2009; Selinker and Gass, 2008).

Participants were asked to rate 75 sentences on a 1-6 Likert scale. They were instructed to select 1 for sentences they deemed “not acceptable” and 6 for those they considered “completely acceptable”. A six-point Likert scale was selected to avoid the selection of a middle point and invite participants to consider the items of measurement – as argued for by Chomeya, 2010. The 75 sentences were distributed as: 24 target structures and 48 distractors – a format similar to the one used by Hwang (2023), as well as 3 extra ungrammatical sentences (sentences that violated subject-verb agreement and word order) to add another layer of validity to their proficiency measurement results. L2 participants who rated ungrammatical sentences with a 4 or higher were excluded from the study. No L1 participant rated an ungrammatical sentence with a score higher than a 1.

The target structures were elaborated following Gagarina (2009)’s list of common Manner verbs. I analyzed their absolute frequency in the *Contemporary Corpus of American English* (COCA) and selected the top 4 most frequent verbs: “walk”, “swim”, “drive”, “fly”. For each of these structures, I collected two sentences from COCA which I manipulated to display the Path verb and Manner prepositional phrase as well as Path verb and Manner adverbial clause structures:

- 4 (a) I **walk** into the kitchen and ask him for the phone. [Manner verb + Path satellite]
- (b) I enter the kitchen **walking** and ask him for the phone. [Path verb + Manner adverbial clause]
- (c) I enter the kitchen **on foot** and ask him for the phone. [Path verb + Manner prepositional phrase]

Brazilian Portuguese sentences underwent the opposite process. To determine the corpus for the BP analysis, I searched for constructions that were structurally opposite from the English patterns (Path+Manner vs Manner+Path). I ran these in the *NOW: Corpus do Português* and located samples that also displayed high absolute frequency in Brazilian Portuguese. This allowed us to find direct correspondents in both languages. The BP constructions consisted of *entrar* ‘to enter/walk in(to)’, *atravessar* ‘to cross’, *levar* ‘to take/drive’ and *viajar* ‘to travel/fly’. These sentences were also manipulated from their canonical Path verb + Manner adverbial clause or Path verb + Manner prepositional phrase to the Manner verb + Path satellite construction:

- 5 (a) *Ronaldo entrou na cozinha **andando**.* [Path verb + Manner adverbial clause]

'Ronaldo entered the kitchen walking.'

- (b) *Ronaldo **entrou** na cozinha a pé.* [Path verb + Manner prepositional phrase]

'Ronaldo entered the kitchen on foot.'

- (c) *Ronaldo **andou** para dentro da cozinha.* [Manner verb + Path satellite]

'Ronaldo walked into the kitchen.'

L1 speakers filled out a background questionnaire which collected information about their age, experiences abroad (visits and stays), proficiency in additional languages, and academic and professional background. The aim was to prevent that their knowledge of a foreign language of the opposite typological group of the tested language would have an effect on the results. It also served to determine whether they had spent a significant amount of time in a target-language speaking country. A period of more than 30 days was considered significant. L2 speakers completed a similar background questionnaire that also included questions about the amount of time spent learning the additional language, method of instruction, and age of onset. None of their answers to these questions excluded them from the study.

L1 participants completed an acceptability judgment task of sentences in their native language. The aim of this type of assessment was two-fold: (i) it provided us with a baseline against which bilingual ratings could be compared and (ii) it allowed us to assess the preference for Path verb and optional Manner prepositional phrases in relation to Path verb and optional Manner adverbial clause (structures that are licit in both languages). As this study focuses on unidirectional effects (i.e., the effects of the L1 in the L2 only), L2 participants completed the preference task in their additional language. To reduce the impact of low language proficiency in Elementary L2 speakers' results, glosses of less frequent words were provided to all L2 speakers.

4.1.4 Data Analysis

I ran two main types of analysis to the data: within-group and between-group comparisons. Within-group comparisons helped us establish a baseline in the languages that informed us (i) what acceptability ratings should be expected

from bilingual speakers in relation to monolingual speakers; (ii) whether speakers of each language displayed any preference between the two verb-framing structures (Path verb + Manner prepositional phrase or Path verb + Manner adverbial clause), which are acceptable in both BP and English.

To perform this analysis, I created a model for ordinal logistic regression (Cumulative Link Mixed Model fitted with the Laplace approximation) using the `clmm()` function from the ordinal package in the R software (R Core Team, 2021). My motivation for employing this type of regression was twofold. From a theoretical standpoint, as seen in Veríssimo (2021), it is inappropriate to assume that ordinal data shows equidistance between points – a requirement of metric methods such as ANOVA or linear regressions. From a practical perspective, ordinal logistic regressions demonstrate higher predictive power for models with ordinal data and multiple independent variables, as seen in Kissling (2018) and Tare et al. (2018).

I created a model with one dependent variable (*Ratings*), one fixed effect (*Pattern*) and two random effects (*Participant* and *Events*).¹¹ The patterns were coded as Manner+Path (sentences with a Manner verb followed by a Path satellite within the same clause), Path+Verb (sentences with a Path verb followed by a Manner subordinate adverbial clause), and Path+Prep (sentences with a Path verb followed by a Manner prepositional phrase, also within the same clause). My formula consisted of: *Ratings* ~ *Pattern* + (1| *Participant*) + (1| *Events*). I also ran the `emmeans()` function to contrast the variables.

Between-group analysis help us determine whether acceptability ratings change across proficiency levels, in particular, in relation to those provided by monolingual speakers. For this analysis, I created a second model for ordinal logistic regression (Cumulative Link Mixed Model fitted with the Laplace approximation) again using the `clmm()` function from the ordinal package in the R software R Core Team, 2021. My second model included one dependent variable (*Ratings*), one fixed effect (*Proficiency*) and two random effects (*Participant* and *Events*).¹² Proficiency included in the model consisted of Monolingual (L1 speakers), Elementary, Intermediate, and Advanced. My formula consisted of: *Ratings* ~ *Proficiency* + (1| *Participant*) + (1| *Events*). As in the first model, I ran the `emmeans()` function for contrast.

These approaches allowed us to test (i) whether L1 speakers demonstrate differences in their acceptability ratings of Path Verb + Manner prepositional phrase and Path Verb + Manner adverbial clause (RQ1), and (ii) whether L2 learners' acceptability ratings begin to converge with those of L1 speakers as they become more proficient in their L2 (RQ2 and RQ3).

¹¹ I included *Events* as a random variable to account for the difference in my data: some sentences consisted of one clause with one motion event while others consisted of two clauses with two motion events. No effects were found.

¹² As in the previous model, I included *Events* as a random variable, as suggested by one of the reviewers. No effects were found.

4.2 Results

The graphed results (Figure 4.1 and Figure 4.2) give us an overview of the tendencies in both L1 and L2 speakers' ratings across proficiency levels and pattern types. In 4.1, We can observe that Intermediate and Advanced learners as well as Monolinguals assign ratings to structures showing Manner in the main verb. Learners seem to show higher ratings for Path verbs and an even distribution of Manner in a prepositional phrase. For the sake of convenience, I refer to structures with Manner encoding in the verb and Path encoding in a satellite as **Manner-verb**, Path encoding in the verb and Manner encoding in a prepositional phrase as **Manner-prep**, and Path encoding in the verb and Manner encoding in an adverbial phrase as **Manner-AdvClause**. In 4.2, we see that learners show lower acceptability of structures using Path verbs compared to Monolinguals, but accept Manner in a prepositional phrase as much as a Monolinguals do.

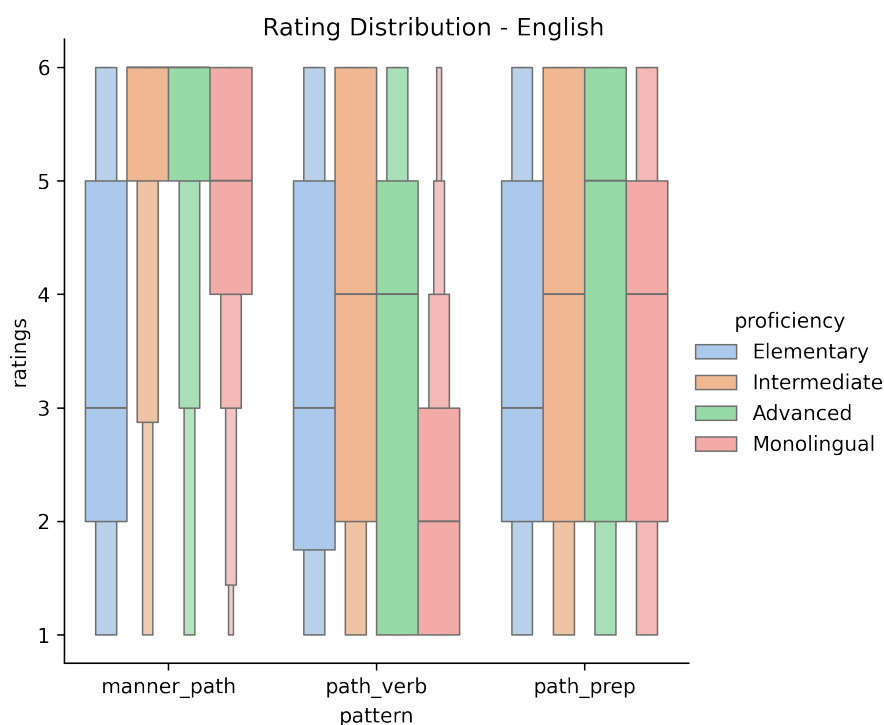


Figure 4.1: Ratings by English speakers

In this section, I present the results of both within- and between-group comparisons.

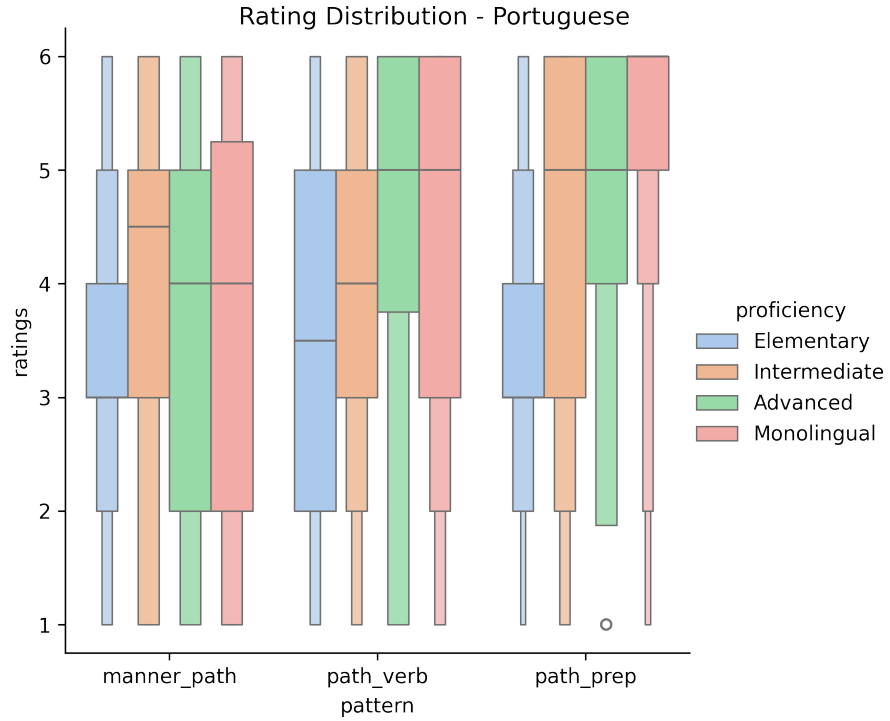


Figure 4.2: Ratings by Portuguese speakers

4.2.1 Within-group comparisons: monolinguals

The results of the ordinal logistic regression (Table 4.3) show that monolingual speakers of English ('L1 English') rated Manner-verb structures as more acceptable than both Manner-prep (OR= -0.44, $Z = -2.56$, $p = .02$) and Manner-AdvClause constructions. However, the difference in the acceptability ratings of Manner-verb and Manner-AdvClause structures was not statistically significant (OR= -0.18, $Z = -1.03$, $p = .55$). Similarly, there was no particular difference between their ratings for Manner-prep and Manner-AdvClause constructions (OR= -0.18, $Z = -1.03$, $p = .55$).

The results for monolingual speakers of Portuguese ('L1 Portuguese') show a lower acceptability of the Manner-verb structure compared to both Manner-prep (OR= -1.73, $Z = -7.57$, $p < .01$) and Manner-AdvClause (OR= -0.84, $Z = -3.98$, $p < .01$). There was also a higher acceptability of Manner-prep structure in relation to the Manner-AdvClause (OR= -0.89, $Z = 3.91$, $p < .01$). For both groups, the regression showed no effects of the Participant variable in the result (L1 English: [$s^2 = 1.741$, $SD = 1.32$], L1 Portuguese: [$s^2 = 0.33$, $SD = 0.58$]).

Table 4.3: Within-Group Comparison

Language	Proficiency	Contrast (Manner encoding)	Estimate	SE	Z-ratio	p-value
English	Ele	Main.verb – Preposition	0.46	0.16	2.85	0.01
		Main.verb – Adv.clause	0.63	0.16	3.92	0.00
		Preposition – Adv.clause	0.17	0.16	1.07	0.53
	Int	Main.verb – Preposition	1.80	0.26	6.78	<.01
		Main.verb – Adv.clause	3.19	0.29	11.00	<.01
		Preposition – Adv.clause	1.39	0.24	5.72	<.01
	Adv	Main.verb – Preposition	0.21	0.17	1.20	0.45
		Main.verb – Adv.clause	-0.00	0.18	-0.04	0.99
		Preposition – Adv.clause	-0.22	0.18	-1.23	0.43
	Mono	Main.verb – Preposition	-0.44	0.17	-2.56	0.02
		Main.verb – Adv.clause	-0.18	0.17	-1.03	0.55
		Preposition – Adv.clause	0.26	0.17	1.50	0.28
Portuguese	Ele	Main.verb – Preposition	1.15	0.14	7.90	<.01
		Main.verb – Adv.clause	1.31	0.14	8.91	<.01
		Preposition – Adv.clause	0.15	0.13	1.13	0.49
	Int	Main.verb – Preposition	1.18	0.29	3.95	<.01
		Main.verb – Adv.clause	2.61	0.33	7.87	<.01
		Preposition – Adv.clause	1.43	0.29	4.79	<.01
	Adv	Main.verb – Preposition	-1.05	0.47	-2.23	0.06
		Main.verb – Adv.clause	-0.43	0.46	-0.94	0.61
		Preposition – Adv.clause	0.62	0.45	1.35	0.36
	Mono	Main.verb – Preposition	-1.73	0.22	-7.57	<.01
		Main.verb – Adv.clause	-0.84	0.21	-3.98	<.01
		Preposition – Adv.clause	0.89	0.22	3.91	<.01

Overall, L1 English speakers displayed higher acceptability of structures in which Manner is encoded in the verb (s-framing strategy) compared to the ones in which Manner is encoded adverbially (v-framing strategy). However, there was no significant difference in their assessment of Manner encoding in adverbial clauses in relation to the other two strategies. L1 Portuguese speakers demonstrated a clear preference for the adverbial encodings of Manner (v-framing strategies) over the s-framing strategy, and rated the encoding via adverbial clause lower than the prepositional counterpart.

4.2.2 Within-group comparisons: bilinguals

Acceptability ratings by L2 English speakers

The results of the ordinal logistic regression for L2 English Elementary speakers (Table 4.3) showed that they consider Manner-verb constructions slightly more acceptable than Manner-preposition constructions ($OR = 0.46, Z = 2.58, p = .01$). Similar ratings are observed for Manner-AdvClauses over Manner-verb ($OR = 0.63, Z = 3.92, p = .00$). They did not, however, show any particular preference for Manner-prep over Manner-AdvClause constructions in their L2 ($OR = 0.17, Z = 1.07, p = .53$).

For L2 English Intermediate speakers, Manner-verb structures received a significantly higher acceptability rate than both Manner-prep ($OR = 1.80, Z = 6.78, p < .01$) and Manner-AdvClause ($OR = 3.19, Z = 11.00, p < .01$). They also demonstrated higher acceptability of Manner-prep over Manner-AdvClause ($OR = 1.39, Z = 5.27, p < .01$).

Acceptability ratings provided by L2 English advanced speakers, however, showed no particular preference for any of the structures, with Manner-verb and Manner-prep ($OR = 0.21, Z = 1.20, p = 0.45$), Manner-verb and Manner-AdvClause ($OR = 0.00, Z = -0.04, p = .99$), and Manner-prep and Manner-AdvClause ($OR = -0.22, Z = -1.23, p = .43$) yielding no significant difference. Participant variability had no effect for any of the groups (L2 English Elementary: [$s^2 = 1.16, SD = 1.07$], L2 English Intermediate: [$s^2 = 1.93, SD = 1.39$], L2 English Advanced: [$s^2 = 0.44, SD = 0.66$]).

Acceptability ratings by L2 BP speakers

The results of the ordinal logistic regression for L2 BP Elementary speakers (Table 4.3) showed a slightly lower acceptability of Manner-verb constructions over Manner-preposition constructions ($OR = 1.15, Z = 7.90, p < .01$). Higher ratings for Manner-verb over Manner-AdvClauses ($OR = 1.31, Z = 8.91, p < .01$)

are also observed. L2 BP Elementary speakers did not show, however, any significant difference in their ratings for Manner-prep and Manner-AdvClause constructions in Portuguese (OR= 0.15, $Z= 1.13$, $p=.49$).

L2 BP Intermediate speakers assigned slightly higher acceptability ratings to Manner-prep structures in comparison to Manner-AdvClause (OR= 1.43, $Z= 4.79$, $p<.01$) and Manner-verb (OR= 1.18, $Z= 3.95$, $p<.01$). Manner-verb constructions received higher ratings than Manner-AdvClause sentences (OR= 2.61, $Z= 7.87$, $p<.01$).

Similarly to the ratings by L2 English Advanced speakers, those provided by L2 BP Advanced speakers showed no particular preference for any of the structures, with Manner-verb and Manner-prep (OR= -1.05, $Z= -2.23$, $p=.06$), Manner-verb and Manner-AdvClause (OR= -0.43, $Z= -0.94$, $p=.61$), and Manner-prep and Manner-AdvClause (OR= 0.62, $Z= 1.35$, $p=.36$) yielding no significant difference. Participant variability also had no effect for any of the groups (L2 English Elementary: [$s^2= 0.53$, $SD= 0.73$], L2 English Intermediate: [$s^2= 1.37$, $SD= 1.17$], L2 English Elementary: [$s^2= 0.59$, $SD= 0.76$]).

4.2.3 Between-group comparisons

Manner encoded in the verb constructions

The distribution of L2 English speakers' ratings (Figure 4.1) showed differences among the levels tested, in particular, in relation to the ratings by L1 English speakers. The ordinal logistic regression (Table 4.4) showed that Elementary and Advanced speakers assigned similar acceptability ratings to Manner-verb constructions as those provided by L1 speakers (L2 English Elementary: [OR= -0.34, $Z= -0.91$, $p=.79$]; L2 English Advanced: [OR= 0.04, $Z= 0.11$, $p=.99$]). There was also no significant difference between the ratings of Elementary and Advanced speakers (OR= 0.39, $Z= 1.01$, $p=.73$). Interestingly, there were differences between the ratings of Intermediate and L1 speakers (OR= -1.88, $Z= 3.94$, $p<.01$) as well as Intermediate and Advanced speakers (OR= 1.93, $Z= 4.00$, $p<.01$).

The ordinal logistic regression for the L2 BP speakers' data (Table 4.4) showed a difference in the acceptability ratings by L1 and Elementary speakers (OR= -1.43, $Z= -4.86$, $p<.01$) as well as Elementary and the other two L2 levels (L2 BP Intermediate: [OR= 1.18, $Z= 3.25$, $p<.01$]; L2 BP Advanced: [(OR= 1.77, $Z= 3.39$, $p<.01$]). A positive effect of proficiency can be observed in the comparison between the ratings by Intermediate and Advanced learners in relation to L1 speakers. There was no statistical difference between the ratings of L2 BP Intermediate and L1 speakers (OR= -0.24, $Z= -0.61$, $p=.92$) or between the

Table 4.4: Between-Group Comparison

Language	Pattern	Proficiency	Estimate	SE	Z-value	p-value
Portuguese	Manner verb + Path satellite	Mono	-	-	-	-
		Elem	1.43	0.29	4.86	1.17e-6
		Inter	0.24	0.40	0.61	0.53
		Adv	-0.33	0.54	-0.61	0.53
	Path verb + Manner clause	Mono	-	-	-	-
		Elem	-1.00	0.33	-2.99	0.002
		Inter	-2.85	0.47	-5.95	2e-9
		Adv	-1.10	0.63	-1.73	0.08
	Path verb + Manner prep	Mono	-	-	-	-
		Elem	-1.95	0.30	-6.30	2.82e-10
		Inter	-2.76	0.41	-6.60	4.08e-11
		Adv	-1.97	0.55	-3.55	0.00
English	Manner verb + Path satellite	Mono	-	-	-	-
		Elem	0.13	0.16	0.80	0.42
		Inter	1.53	0.21	7.19	6.5e-13
		Adv	-0.60	0.16	-0.41	0.67
	Path verb + Manner clause	Mono	-	-	-	-
		Elem	-0.68	0.16	-4.08	4.42e-05
		Inter	-1.07	0.20	-5.37	7.76e-08
		Adv	-0.21	0.16	-1.29	0.19
	Path verb + Manner prep	Mono	-	-	-	-
		Elem	-0.73	0.17	-4.31	1.62e-05
		Inter	-0.21	0.19	-1.90	0.27
		Adv	-0.56	0.16	-3.38	0.0007

acceptability judgments by L2 Advanced and L1 speakers (OR= 0.33, $Z= 0.61$, $p<.92$). The effects of L2 proficiency were stable from the Intermediate level onwards, as there were no differences between the judgments by Intermediate and Advanced speakers either (OR= 0.58, $Z= 0.99$, $p<.75$).

As in the previous tests, participant variability had no effect for any of the groups (L2 English: [$s^2= 1.67$, $SD= 1.29$], L2 BP: [$s^2= 0.65$, $SD= 0.80$]). The significance of these findings will be addressed in the Discussion section.

Manner in a prepositional phrase constructions

For Manner-prep constructions, English speakers ratings showed a positive effect of L2 proficiency. The ordinal logistic regression showed that there is a significant difference between the acceptability judgments of L1 and Elementary speakers (OR= 0.94, $Z= 2.71$, $p=.03$). There were, however, no differences between the ratings by L1 and Intermediate (OR= 0.39, $Z= 0.93$, $p=.78$) or L1 and Advanced speakers (OR= 0.75, $Z= 2.06$, $p=.16$). There were also no effects of proficiency between Intermediate and Advanced learners (OR= 0.35, $Z= 0.83$, $p=.84$).

L2 BP data showed differences in the acceptability ratings compared to those by L1 and all L2 speakers (Elementary: [OR= 1.95, $Z= 6.30$, $p<.01$]; Intermediate: [OR= 2.76, $Z= 6.60$, $p<.01$]; Advanced: [OR= 1.97, $Z= 3.55$, $p<.01$]). It also showed no differences in the judgments from Elementary to other L2 proficiency levels (Intermediate: [OR= 0.81, $Z= 2.28$, $p=.10$]; Advanced: [OR= 0.02, $Z= 0.05$, $p=.99$]) or between Intermediate and Advanced (OR= -0.78, $Z= -1.34$, $p=.53$). Participant variability had no effect for any of the L2 groups (L2 English: [$s^2= 1.33$, $SD= 1.15$], L2 BP: [$s^2= 0.65$, $SD= 0.80$]).

Manner in an adverbial clause constructions

For L2 English speakers' ratings, the ordinal logistic regression showed that there were significant differences in the acceptability judgments by Elementary and Intermediate speakers compared to L1 speakers (Elementary: [OR= 0.95, $Z= 2.70$, $p=.03$]; Intermediate: [OR= 1.48, $Z= 3.40$, $p<.01$]). There were no differences between the ratings by Elementary and Intermediate speakers (OR= 0.53, $Z= 1.25$, $p=.59$). Higher L2 proficiency had an effect as Advanced and L1 speakers ratings converged (OR= 0.30, $Z= 0.81$, $p=.84$). This observation was also supported by the fact that there was a significant difference in the judgments by Intermediate and Advanced speakers (OR= -1.18, $Z= -2.70$, $p<.03$).

L2 BP speakers' data showed a similar effect of high proficiency in participants' results. There were differences in the ratings provided by Elementary and

Intermediate speakers compared to those by L1 speakers (Elementary: [OR= 1.00, $Z= 2.99$, $p=.01$]; Intermediate: [OR= 2.85, $Z= 5.95$, $p<.01$]). There were, however, differences between the ratings by Elementary and Intermediate speakers (OR= 1.84, $Z= 4.37$, $p<.01$). Highly proficient learners showed no difference in their ratings in relation to L1 speakers (OR= 1.10, $Z= 1.73$, $p=.30$). This effect was corroborated by the difference in acceptability judgment by their less proficient counterparts (Intermediate: OR= -1.75, $Z= 2.56$, $p=.05$).

While participant variability had no effect for the English group ($s^2= 1.38$, $SD= 1.17$), the model showed that it played a role in the results by the BP group ($s^2= 0.98$, $SD= 0.99$). This fact, which helps clarify some points in the data, will be addressed in the following section.

4.3 Discussion

The study reported on in this chapter set off to answer three research questions. First, considering that both English and Brazilian Portuguese allow descriptions of motion with a Path verb and an optional Manner prepositional phrase, I investigated where the Manner-prep structure ranks compared to the canonical structures of each language. Second, my goal was to identify at what stage of L2 development (i.e., the effects of L2 proficiency) L2 Portuguese learners' acceptability ratings of Manner-verb, Manner-AdvClause and Manner-prep converged with those of L1 Portuguese speakers. Third, my aim was to identify at what stage of L2 development (i.e., the effects of L2 proficiency) L2 English learners' acceptability ratings of the same three structures approximated to those of L1 English speakers. In this section, I attempt to answer these three questions based on the results I encountered.

4.3.1 The elaboration of Manner in a prepositional phrase

L1 English speakers demonstrate a higher acceptability for Manner-verb constructions over Manner-prep, which is expected considering the theoretical work in the field of semantic typology (Slobin, 2004; Talmy, 1985, 1991, 2000). Manner-verb is, after all, the most frequent encoding strategy employed by s-framed languages, which is the canonical classification English has received in the literature (Lewandowski, 2021; Pavlenko and Volynsky, 2015; Slobin, 2004). Interestingly, however, L1 English did not rate Manner-prep and Manner-AdvClause significantly differently from one another. As previously discussed, the acceptability of Manner-Adv- Clause constructions comes to no surprise as English allows encoding of the type (*Mary crossed the river swimming*). What is

remarkable in participants' judgments is that the structure received ratings that are not distinguishable from those for Manner-prep constructions. According to Slobin (2004), what plays a more important role is when Manner *must* be encoded as opposed to when it *may* be encoded. In this study, my focus was on instances in which Manner was encoded and no Mannerless clauses were provided. Due to the Manner elaboration being presented and licit, speakers may assume that it has done so for a reason (i.e., a pragmatic motivation). The investigation of speakers' assumptions about the obligatoriness of Manner encoding is outside the scope of this work.

As for the question at hand, although L1 English speakers rated Manner-prep structures as less acceptable than the canonical Manner-verb one, they did not show any particular higher or lower judgment of the structure compared to Manner-AdvClause – the other canonical v-framed structure. This seems to indicate that, while the Manner-verb structure is preferred, the v-framed constructions may be used in lieu of one another.

For L1 BP speakers, ratings show acceptability that matches what one would expect based on the literature. Manner-prep and Manner-AdvClause constructions – the prototypical v-framing structures – were preferred over Manner-verb – the common s-framing strategy. The data shows how Manner-prep fares in relation to Manner-AdvClause: speakers consider Manner-prep encoding more acceptable than Manner-AdvClause, which is most often used as an example of canonical v-framing strategy. Overall, this corroborates the argument that BP favors verb-framing (H. J. Batoréo and Ferrari, 2016; Nogueira, 2009b).

4.3.2 L2 English development

For Manner-verb structures, Advanced L2 English speakers' acceptability ratings converged with those by L1 English speakers – showing that high proficiency does have an effect on their judgments of the canonical s-framed structure. For Manner-prep constructions, the effects were observed earlier, at the Intermediate level. This convergence also holds for L2 Advanced learners. Therefore, bilingual learners' judgments were sensitive to lower acceptability of Manner encoding in the preposition at a somewhat early stage of L2 development. For Manner-AdvClause constructions, the convergence occurred somewhat later, at the Advanced level – as observed for Manner-verb structures. Speakers at the Intermediate level showed significant difference from L1ers, a difference also observed between this group and Advanced learners. These results are particularly promising if we consider the sample size ($n=73$) and the years learning the L2 ($M=13.07$, $SD=11.22$).

The data partially supported my hypothesis that learners at earlier stages would demonstrate higher acceptability ratings for sentences that reflect the thinking-for-speaking strategies of their L1. For instance, L2 English speakers demonstrated late convergence for Manner-verb and Manner-AdvClause constructions, despite the high ratings they received from L1 English speakers. It did not, however, support my prediction for Manner-prep, where convergence began to occur significantly early, at the Intermediate level. The fact that Manner-AdvClause sentences received different ratings from Elementary and Intermediate learners when compared to L1 speakers also supports my hypothesis that there would be differences in their ratings despite the grammaticality of the structure in English. The data also partially supported my prediction that late bilingual speakers will begin to assign higher ratings to sentences that show the pattern of thinking-for-speaking of their L2 as early as at the Intermediate level. While this was true for Manner-prep constructions, the other two types – which were equally considered significantly acceptable by L1 speakers, received lower ratings by L2ers, which suggests transfer from the L1. My final hypothesis, that the large verb lexicon of the s-framed languages would indicate an early convergence of ratings was not entirely supported. L2 Elementary and Intermediate learners did not rate Manner-prep constructions as highly as their L1 counterparts.

4.3.3 L2 Portuguese development

For Manner-verb structures, Intermediate proficiency had an effect on the judgments of L2 Portuguese learners, who provided acceptability ratings that converge with those of L1 Portuguese speakers. As the results suggested that this convergence also holds for L2 Advanced learners, it seems that as bilingual learners of BP (a v-framed language) judgments are sensitive to lower acceptability of Manner encoding in the main verb in BP at a somewhat early stage of L2 development. For Manner-prep constructions, the data showed no convergence of acceptability among any of the L2 groups and the L1 participants. This indicates a locus of difficulty in the development of judgment of learners of a v-framed language, which is of particular relevance since this is the most acceptable structure according to L1 BP speakers. It is important to note, however, that the Advanced sample is very small ($n=4$), so these results cannot be generalized. For Manner-AdvClause constructions, the convergence also does not occur during Elementary or Intermediate stages. We can observe, however, that Advanced speakers assign acceptability ratings that match those of L1 BP speakers. This result is particularly interesting because L1 English participants rated Manner-AdvClause constructions as acceptable as Manner-verb (the canonical s-framed

structure). It would not be a far-reaching assumption that if L1 transfer were to occur, L2 speakers' ratings would converge earlier. Naturally, there are several other variables that need to be accounted for in this case, so this issue remains for future studies.

These results support my prediction that L2 BP learners would consider Manner-prep less acceptable than L1 speakers regardless of it being the highest rated structure by L1 speakers. This indicates L1 influence, especially since this structure was rated significantly low by L1 English speakers in their language. Similarly, the data confirmed my hypothesis that L2 BP speakers would consider v-framed structures less acceptable in general despite the low frequency of Manner verbs in BP. Learners were able to determine that Manner-verb constructions are disfavored compared to other types, but not that v-framed structures are preferred overall. My assumption that late bilingual speakers would begin to assign higher ratings to sentences that show the pattern of thinking-for-speaking of their L2 as early as at the Intermediate level was only met for Manner-prep constructions. However, as I argued for the Manner-prep constructions, I note the limited Advanced sample size: the convergence might not properly illustrate the acquisition of a v-framed L2. Another point that needs to be acknowledged for the acquisition of BP as a second language is that BP learners, despite their L2 proficiency, have a significantly lower average of years spent learning a language compared to those learning English (see Table 4.2). Considering that the teaching of motion encoding is often not emphasized in the language classroom (Mengali, 2020), overall exposure may have a significant effect as it supports the development of vocabulary and structure (Gass and Mackey, 2006).

4.4 Conclusion

This study investigated at what stages of L2 proficiency (Elementary, Intermediate and Advanced) L2 Brazilian Portuguese and L2 English learners' acceptability ratings converge with those of L1 speakers when rating sentences using the three structures (Manner-verb, Manner-prep, and Manner-AdvClause). My goal was to fill gaps in the literature by (i) providing more data on the acquisition of v-framed L2s – in this case, Brazilian Portuguese – by speakers of s-framed languages; (ii) introducing results collected from a significantly large sample of beginners and intermediate L2 speakers – both acquiring an s-framed and a v-framed language; and by (iii) offering more data on the acquisition of L2 English by L1 Portuguese speakers – in contrast with most studies that have hardly superseded an average of 15 participants.

My first question was how Manner-prep structures rank compared to the canonical lexicalization pattern of English (Manner-verb) and Portuguese (Manner-AdvClause). I found that L1 English speakers rated Manner-prep as less acceptable than the prototypical Manner-verb structure, but did not show any particular preference for the structure compared to Manner-AdvClause. Therefore, it seems that, while the Manner-verb structure is preferred, the v-framed constructions may be used in lieu of one another. L1 BP speakers rated Manner-prep and Manner-AdvClause – the prototypical v-framing structures – higher than Manner-verb constructions. These findings corroborate the argument that BP favors verb-framing (H. J. Batoréo and Ferrari, 2016; Nogueira, 2009b).

My second question was at what stage of L2 development L2 Portuguese learners' acceptability ratings of Manner-verb, Manner-AdvClause and Manner-prep converged with those of L1 Portuguese speakers. The assumption that late bilinguals would assign higher ratings to sentences that show the pattern of thinking-for-speaking of their L2 starting at the Intermediate level was only met for Manner-prep structures. Overall, while learners were able to determine that Manner-verb constructions are less preferred compared to other types in their L2, they did not rate v-framed structures as highly as L1 speakers did. Although this suggests crosslinguistic influence from the L1 (English speakers rated s-framed higher than v-framed structure), it also shows signs of a change toward the structure of their L2 (in many cases, Manner-verb constructions are not grammatical in Portuguese).

My third and final question was at what stage of L2 development L2 English learners' acceptability ratings of the same three structures approximated to those of L1 English speakers. Results showed that, at least to an extent, learners at earlier stages demonstrated higher acceptability ratings for sentences that reflect the thinking-for-speaking strategies of their L1. L2 English speakers demonstrated late convergence for Manner-verb and Manner-AdvClause constructions, despite the high ratings they received from L1 English speakers. However, the convergence occurred as early as at the Intermediate level for Manner-prep structures. For both languages, results show that convergence starts at the Intermediate level for Manner-prep constructions and at a later proficiency stage for Manner-verb and Manner-AdvClause structures.

Moving forward, I recommend carrying out work with a larger sample size of advanced learners to provide a clearer picture of v-framed structure acquisition at higher proficiency levels. I also recommend more work on the acquisition of the English-Portuguese pair with a focus on production tasks, which is currently an understudied area. More specifically, as proposed in Lewandowski

(2021), I suggest more elicitation of motion encoding in speech and writing via video clips that display nonstatic portrayals of motion.

CHAPTER 5

THE DEVELOPMENT OF MOTION ENCODING STRATEGIES IN L2 WRITING

5.1 The present study

This study aims to answer four questions – two intertypological in nature and two centered on second-language acquisition:

RQ1. Do monolingual English speakers exhibit more Manner Bias when describing motion events than monolingual Portuguese speakers?

RQ2. Do monolingual English speakers elaborate Path more frequently via prepositional phrases when describing motion events than monolingual Portuguese speakers?

RQ3. Does L2 language proficiency have an effect on how L2 English speakers elaborate Manner and Path when describing motion events?

RQ4. Does L2 language proficiency have an effect on how L2 Portuguese speakers elaborate Manner and Path when describing motion events?

The hypotheses are that English monolinguals will exhibit an overall Bias to encoding Manner in their motion-event descriptions (RQ1). I determine Manner Bias as the sum of all possible Manner encodings tested in this experiment (Manner information in the verb, in an adverbial clause, and in an adverb) divided by the number of clauses provided per stimuli. I anticipate that the Bias will be observable in their use of Manner verbs and Manner-Path verbs.

For RQ2, I expect that English monolinguals will also encode Path information more often than Portuguese monolinguals. This is due to the fact that the language allows prepositional phrase (PP) stacking, which is not allowed in

Portuguese. Portuguese speakers, however, will encode Path information in the main verb.

For RQ₃, I anticipate that English learners will exhibit lower Manner Bias, lower usage of Manner verbs, and lower usage of Manner-Path verbs. They should, in theory, prefer Motion generics to at least elaborate Path outside the verb. English learners will also use fewer Path prepositions (i.e., not use as much stacking as monolinguals), but will use more Path verbs to convey Path information.

Finally, for RQ₄, I predict that Portuguese learners will have higher Manner Bias than Portuguese monolinguals, which will be observable especially for Manner verbs, Manner-Path verbs and Path prepositions. They will, however, use fewer Path verbs.

5.1.1 Participants

Participants (n=90) consisted of four groups: monolingual English speakers (n=30), monolingual Portuguese speakers (n=16), late bilingual speakers whose first language is Portuguese and second language is English (n=24), and late bilingual speakers whose first language is English and second language is Portuguese (n=20). See Table 5.1 for background information on participants.

Table 5.1: Background information of participants

Group	Age at testing	Age of onset	Years learning
L1 English (n=30)	31.03 (SD=13.77, range=18-70)	NA	NA
L1 Portuguese (n=16)	38.00 (SD=8.59, range=24-57)	NA	NA
L2 English (n=24)	34.13 (SD=12.86, range=18-66)	14.96 (SD=11.03, range=7-58)	13.83 (SD=7.79, range=4-34)
L2 Portuguese (n=20)	20.05 (SD=1.96, range=18-27)	18.15 (SD=2.20, range=14-26)	1.95 (SD=1.20, range=1-4)

Participants recruitment took place at higher education institutions in three locations: Brazil, Canada, and the United States. To isolate the effects of L₃ transfer on the learners' English and Portuguese, L₂ English learners who reported an Intermediate level in another s-framed language (where Manner is encoded in the verb and Path in a satellite) as well as L₂ Portuguese learners who reported the same level in another v-framed language (where Path is encoded

in the verb and Manner in an optional adverbial clause) were not eligible to participate in the study. The study collected informed consent from participants prior to its beginning.

5.1.2 Proficiency Measurements

As participants were enrolled in language programs at higher education institutions, they were asked to report their current level at the time of testing. As universities differ on their placement system (two of them use ILR, one uses the ACTFL standards, and the others use the CEFR), L2 English and L2 Portuguese learners also took a self-reported proficiency test designed at the Michigan State University. The exam, which is in line with the American Council on the Teaching of Foreign Languages (ACTFL) standards for language learning, classifies learners in one of five bands: Level 1: Novice Low to Novice High, Level 2: Novice High to Intermediate Mid, Level 3: Intermediate Mid to Advanced Low, Level 4: Intermediate High to Advanced Mid, Level 5: Advanced Mid to Superior. The self-reported proficiency test is divided into five sections and has participants rate Can-Do statements according to their perceived language skills. The test performs conservative scoring: each set of 10 statements has 10 possible points, with one point awarded if the person selected the highest ability level (Tigchelaar et al., 2017). A participant who scored 8 out of 10 on a set was able to advance to the next set.

Table 5.2: L2 Proficiency Levels

Proficiency	Age at testing	Age of onset	Years learning
English Elementary (n=1)	35 (SD=0, range=35-35)	26 (SD=0, range=26-26)	8 (SD=0, range=8-8)
English Intermediate (n=10)	38.1 (SD=17.17, range=18-66)	18.2 (SD=15.78, range=7-58)	14.9 (SD=5.3, range=8-27)
English Advanced (n=13)	31.0 (SD=7.52, range=18-47)	11.62 (SD=2.10, range=7-15)	13.46 (SD=9.32, range=4-34)
Portuguese Elementary (n=9)	20.22 (SD=2.53, range=18-27)	19.00 (SD=2.49, range=18-26)	1.33 (SD=0.67, range=1-3)
Portuguese Intermediate (n=11)	19.91 (SD=1.31, range=18-22)	17.45 (SD=1.62, range=14-19)	2.45 (SD=1.30, range=1-4)

I averaged the results of their university level and their self-reported proficiency exam. I then conflated the test levels into three bands: Elementary,

Intermediate, and Advanced. First, we correlated the ACTFL levels with the Common European Framework of Reference (CEFR) bands. We noted that the one CEFR band ranged over one or two ACTFL levels, i.e., both test levels 1 and 2 fit within the CEFR's "Basic User" (Elementary); similarly, levels 3 and 4 were equivalent to the CEFR's "Independent User" (Intermediate). Level 5 corresponded to the CEFR's "Proficient User" (Advanced). This system allowed us to reduce the number of subgroups from 5 to 3. The proficiency data can be seen in Table 5.2.¹³

5.1.3 Methods

Monolingual participants filled out a language background questionnaire with questions about their age, experiences abroad (visits and stays), proficiency in additional languages, and academic and professional background (see Appendix A). The questionnaire aimed to remove participants who spoke a typologically similar language to bilinguals' L2s (e.g., Portuguese speakers that spoke German or English speakers that spoke Spanish) from the study. No participants declared knowledge that could affect the results. The questionnaire also assisted in determining whether participants had spent a significant amount of time in a country where the bilinguals' L2 language was spoken. As determined in Costa-Silva et al. (forthcoming), a period of over 30 days was considered significant. Bilingual speakers completed a questionnaire that also included questions about the time spent learning the L2, methods of instruction, and age of onset. None of the answers to these questions were an exclusion criterion.

Monolingual participants completed the experiment in their L1. The aim of this collection was to establish a baseline against which to compare bilingual ratings and to assess whether there was general Manner Bias across L1s. As the study focuses on crosslinguistic influence and unidirectional effects (i.e., the effects of the L1 in the L2), L2 participants completed the experiment in their additional language.

Participants were asked to watch 15 short video clips depicting self-propelled motion events (i.e., those in which an individual moves itself) performed by a videogame character. The decision to adopt scenes from a videogame is an answer to Lewandowski (2021), who calls for data collection focused on dynamic rather than using static elicitation tools. The selected videogame was *The Legend of Zelda: Breath of the Wild* (Nintendo, 2017), a critically acclaimed open-world action-adventure game developed by Nintendo. It focuses on an open-ended gameplay structure that allows players to explore a vast, interconnected world at their own pace. Players assume the role of Link (the main character), navigating the expansive landscape to uncover secrets, solve puzzles, and defeat

¹³ There was only 1 participant in the Elementary level. I am including their results in this study, but I stress that these cannot be generalized.

enemies. The game is notable for its immersive design, featuring mechanics such as climbing, gliding, and environmental interaction, which enhance exploration. The primary perspective is third-person; however, following the character from behind, which allows players to clearly visualize his movements.

Participants were asked to watch a scene and write a sentence input describing what they saw. They were allowed to use Google Translate as a dictionary but only to search one word at a time. They were not allowed online or physical dictionaries as those may contain sample sentences using the word being searched. The tasks were completed online via *Qualtrics*. Participants were informed that they could rewatch video clips as needed.

The action scenes were collected to illustrate common events, as described in Gagarina, 2009 and in Chapter 4. Table 5.3 shows a list of the events selected including the Manner verb and the Path preposition anticipated.¹⁴

¹⁴ The list uses English as a reference as Manner Bias is an essential part of the analysis in this study.

Table 5.3: Motion events

Event #	Manner Verb	Path Preposition
1	jump	in
2	jump	into
3	jump	on
4	jump	off
5	run	up
6	run	down
7	run	across
8	run	out of
9	walk	down
10	walk	around
11	climb	up
12	climb	out of
13	swim	across
14	land	on
15	ride	(on)

5.1.4 Data Analysis

Data was analyzed in using the R software (R Core, 2020). To investigate Manner elaboration in English and Portuguese monolingual speakers' writing, I ran

linear mixed-effect regressions for each dependent variable coded for Manner (Manner Bias, Manner verb, Manner Path, Manner Adverbial Clause, Manner Adverbial) as well as Motion Generic, using Test Language (Portuguese vs English, in which English is the reference) as fixed effect, and participant and event as random effects. I determined Manner Bias by conflating the four possible Manner description patterns present in the data (Manner verb + Manner Path verb + Manner adverbial clause + Manner adverbial) and dividing the result by the number of clauses provided by the participants.

To analyze the use of Path prepositions and Path verbs, I ran linear mixed-effect regressions for the two Path-related variables using Test Language (English vs Portuguese) as fixed effect, and participant and event as random effects.

To investigate Manner elaboration in L1 and L2 English speakers' writing, I ran linear mixed-effect regressions for each dependent variable coded for Manner as well as Motion Generic, using Proficiency (Monolingual, Elementary, Intermediate, Advanced levels, in which Monolingual is the reference) as fixed effect, and participant and event as random effects. The same process was employed for Path prepositions and Path verbs.

5.2 Results

5.2.1 Manner and Path Elaboration

Monolingual Manner Elaboration

Figure 5.1 illustrates the trends in L1 descriptions of motion. The results (Table 5.2.1) show some variability between participants (variance= .029, SD=.170) and higher variability between events (variance=.084, SD=.291) in relation to a potential **Manner Bias**. As for the fixed effects, the positive value of the Intercept ($B=1.09$, $p<.01$) indicates a higher degree of Manner Bias in L1 English users' descriptions (Figure 1). The negative estimate for L1 Portuguese speakers ($B=-0.462$, $p<.01$) shows that Portuguese speakers (L1 Portuguese) use less Manner Bias than English speakers (L1 English) suggesting that the language spoken by participants significantly influences their use of Manner Bias. Therefore, English speakers do exhibit higher Manner Bias than Portuguese speakers when describing motion events.

I also analyzed each type of Manner elaboration. For **Manner verb** usage, the variance for Participants (variance=.015, SD=.124) suggests that there is relatively small individual variation between participants in their use of Manner Verbs. The events, however, have a notable impact on how often Manner verbs are used (variance=.091, SD=.302). Concerning the fixed effects, the intercept

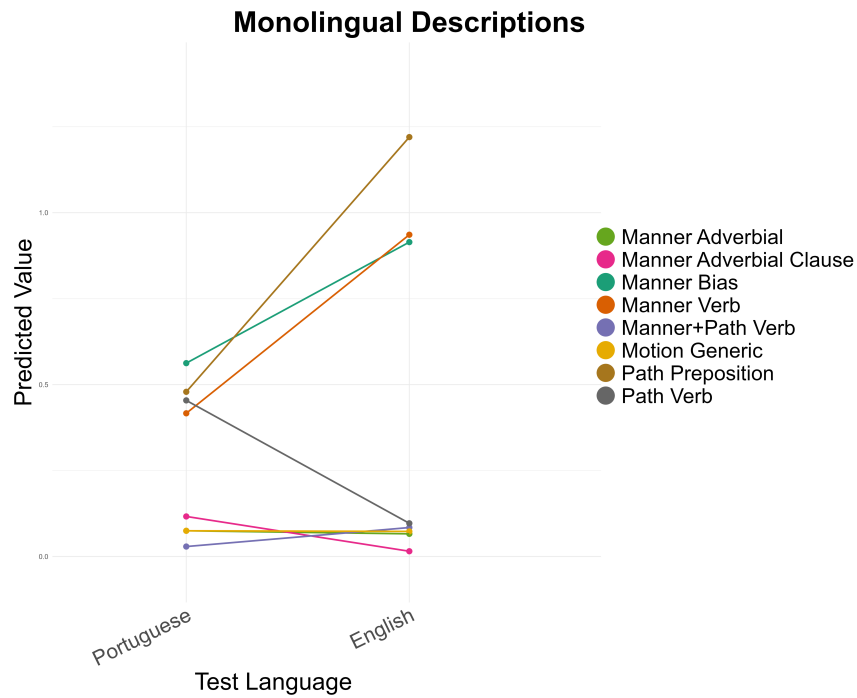


Figure 5.1: Monolingual Descriptions of Motion

of English speakers ($B=.935$, $p<.01$) shows that on average, English speakers use Manner Verbs at a high rate. The coefficient for L1 Portuguese ($B=-.519$, $p<.01$) is negative and highly significant, suggesting that Portuguese speakers use Manner Verbs less frequently than English speakers when describing motion events. The difference is substantial and statistically significant ($p<.01$). This means that, overall, English speakers tend to use more Manner Verbs than Portuguese speakers.

I also investigated the use of **Manner-Path verbs** (i.e., climb, scale, *so-brevoar* ‘fly over’) The result suggests that there is no variability between participants (variance=0, $SD=.023$) in their use of Manner-Path Verbs. As expected, the variance for event is higher (variance=.027, $SD=.166$) since only a few specific scenes show the character climbing or scaling a rock. On average, English speakers use Manner-Path Verbs ($B=.084$), but not at a particularly high rate ($p=0.07$). Portuguese speakers, however, use significantly fewer Manner-Path Verbs when describing motion events ($B=.055$, $p<.01$).

Concerning **Manner adverbial clauses** (i.e., *He crossed the river **swimming***), individual differences between participants (variance=.004, $SD=.065$)

contribute very little to the variability in Manner adverbial clause usage. Event variance is even lower (variance=.001, SD=.044), suggesting minimal impact. The intercept for English speakers ($B=.015$, $p=.42$) is not statistically significant, indicating that they do not frequently use Manner Adverbial Clauses when describing motion events. L1 Portuguese speakers are significantly more likely to use Manner Adverbial Clauses than L1 English speakers ($B=.101$, $p<.01$).

Results show minimal variability between individuals (variance=.002, SD=.047) and events (variance=.005, SD=.076) in the use of **Manner adverbs**. The estimate for English speakers ($B=.066$, $p=.01$) is statistically significant, indicating that, on average, English speakers employ Manner adverbs in their descriptions of motion; however, at a relatively low rate. As for Portuguese speakers, the estimate ($B=.008$, $p=.72$) is not statistically significant – Portuguese speakers do not differ significantly from English speakers in their use of Manner adverbs.

The variability between participants (variance=.003, SD=.059) and events (variance=.003, SD=.058) shows that these factors contribute very minimally to the use of **Motion Generics**. As for the fixed effects, the estimate for English speakers ($B=.073$, $p<.01$) indicates that, on average, English speakers use Motion Generics at a low but significant rate. The coefficient for Portuguese speakers ($B=.001$, $p=.94$) shows that Portuguese speakers do not differ significantly from English speakers in their use of Motion Generic verbs.

Monolingual Path Elaboration

The results for **Path preposition** use show moderate individual variability between participants (variance=.045, SD=.214) and a larger impact of event (variance=.123, SD=.350). As for the fixed effects, the estimate $B=1.21$, $p<.01$) suggests that, on average, English speakers use a high number of Path prepositions in their descriptions of motion events. The estimate for Portuguese speakers' use is significantly lower ($B=.740$, $p<.01$).

Finally, the analysis of the usage of **Path verbs** shows moderate variability between participants (variance=.017, SD=.133) and a slightly higher variability across events (variance=.029, SD=.171). English speakers use Path verbs at a relatively low rate, and their usage is not statistically significant ($B=.096$, $p=.08$). Portuguese speakers use more Path Verbs than English speakers ($B=.357$, $p<.01$), which aligns with the typological characterization of Portuguese as a verb-framed language.

Table 5.4: Monolingual Results: Manner, Motion Generic, and Path use

	Manner Bias	Manner Verb	Manner+Path	Manner AdvCl	Manner Adv	Motion Gen.	Path Prep	Path Verb
Participant								
Variance	.02922	.01549	.0005591	.004246	.002241	.003598	.04595	.01772
SD	.1709	.1245	.02365	.06516	.04734	.05998	.2144	.1331
Event								
Variance	.08494	.09172	.0276254	.001944	.005833	.003374	.12305	.02948
SD	.2914	.3028	.16621	.04409	.07637	.05808	.3508	.1717
Residual								
Variance	.30949	.22314	.0368545	.042851	.062901	.064761	.35257	.11057
SD	.5563	.4724	.19198	.20700	.25080	.25448	.5938	.3325
English (Int)								
Estimate	1.09972	.93593	.08440	.01549	.066108	.073162	1.21985	.09675
Std Error	.08556	.08441	.04407	.01913	.024552	.022095	.10255	.05292
df	19.62703	17.01740	14.68625	34.29809	20.778289	26.933758	19.94389	23.20530
t-value	12.85	11.088	1.915	.809	2.693	3.311	11.90	1.828
Pr(> t)	5.18e-11 ***	3.30e-09 ***	.07514	.423815	.0137 *	.00265 **	1.64e-10 ***	.0804
Portuguese								
Estimate	-.46222	-.51927	-.05523	.10118	.008892	.001838	-.74068	.35741
Std Error	.06909	.05393	.01699	.02608	.024821	.027532	.08157	.04902
df	44.08994	44.07814	43.80139	43.94790	43.899304	43.916483	44.07890	43.97130
t-value	-6.69	-9.629	-3.251	3.879	.358	.067	-9.08	7.291
Pr(> t)	3.23e-08 ***	2.08e-12 ***	.00222 **	0.000347 ***	.7219	.94707	1.18e-11 ***	4.31e-09 ***

L2 English Manner Elaboration

The results for English speakers include English monolinguals as well as L2 users across proficiency levels (Figure 5.2). The results in Table 5.2.1 show that the variance for events (variance=.055, SD=.236) plays a more significant role in explaining **Manner Bias** than individual differences between participants (variance=.010, SD=.100). The estimate for monolinguals ($B=.914$, $p<0.01$) suggests that they exhibit a relatively high degree of Manner Bias. In contrast, participants at the Elementary ($B=-.337$, $p=0.02$) and Intermediate ($B=-.183$, $p<0.01$) proficiency levels display significantly lower Manner Bias than monolinguals. Although participants at the Advanced level also show lower Manner Bias ($B=.079$, $p=.10$), this result is not statistically significant. Overall, the results indicate that Manner Bias increases with proficiency.

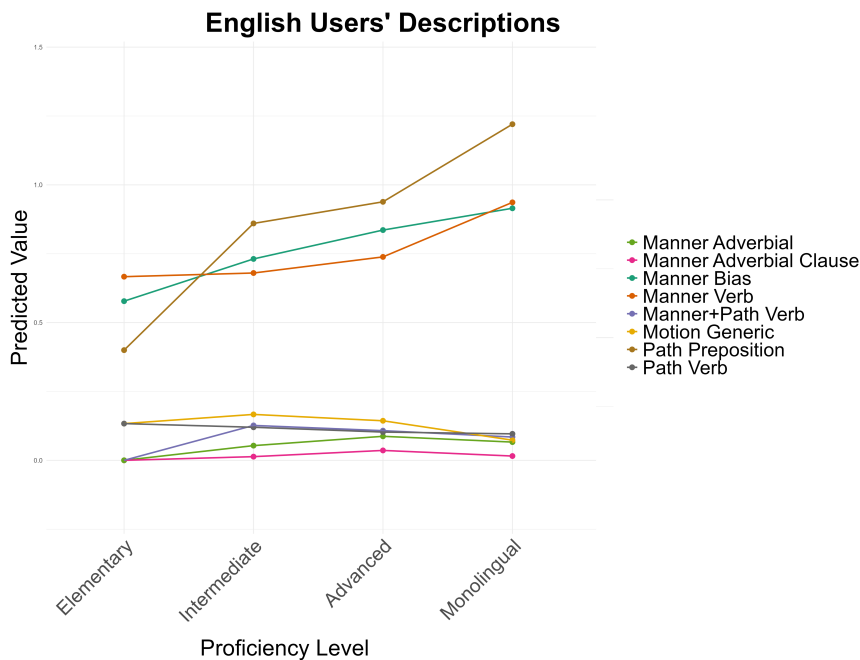


Figure 5.2: English Speakers' Descriptions of Motion

For **Manner verb** use, the variance for participants (variance=.022, SD=.150) is moderate, while events have a more substantial effect (variance=.152, SD=.391). Monolinguals ($B=.936$, $p<0.01$) use Manner Verbs at a significantly higher rate than learners at the Intermediate ($B=-.256$, $p<0.01$) and Advanced ($B=-.197$, $p<0.01$) levels. Elementary speakers also show low Manner Verb use; however, the result is not statistically significant ($B=-.269$, $p=.16$). These results suggest that while Manner Verb use increases from the Intermediate to the Advanced level, it still does not reach monolingual levels.

Regarding **Manner-Path verbs**, the variance for event (variance=.046, SD=.214) has a larger influence compared to participant differences (variance=.002, SD=.054). The results indicate no significant differences in Manner-Path verb use across proficiency levels. Participants at the Elementary ($B=-.084$, $p=.28$), Intermediate ($B=.042$, $p=.13$), and Advanced ($B=.023$, $p=.36$) levels show no statistically significant differences from monolinguals. Additionally, monolingual use of Manner-Path Verbs is not statistically significant ($B=.084$, $p=.15$).

The analysis of **Manner adverbial clauses** shows minimal variability between participants (variance=.001, SD=.038) and events (variance=.000, SD=.019). The use by monolingual speakers is not statistically significant ($B=.015$, $p=.15$), indicating low overall usage of Manner adverbial clauses in English. None of the proficiency levels show significant differences from the baseline: Elementary ($B=-.015$, $p=.76$), Intermediate ($B=-.002$, $p=.90$), and Advanced ($B=.020$, $p=.24$). Therefore, proficiency does not have an impact on the use of Manner adverbial clauses, and that usage remains stable across participants and events.

For **Manner adverbs**, participant variance is small (variance=.004, SD=.064) and event variability is slightly larger (variance=.007, SD=.084). Monolingual use is low, yet statistically significant ($B=.066$, $p=.02$). However, none of the proficiency levels show significant differences from monolinguals: Elementary ($B=-.066$, $p=.47$), Intermediate ($B=-.012$, $p=.69$), and Advanced ($B=.020$, $p=.48$). This suggests that proficiency does not meaningfully influence the use of Manner adverbials.

Finally, in the analysis of **Motion-Generic verbs**, there is very little participant variability (variance=.000, SD=.025), while event variability (variance=.006, SD=.083) has a larger influence. The use of Motion Generics by monolinguals is moderate ($B=.073$, $p=.01$). While Elementary speakers do not differ significantly from the monolinguals ($B=.060$, $p=.48$), participants at the Intermediate ($B=.093$, $p<.01$) and Advanced ($B=.070$, $p=.01$) levels use significantly more Motion-Generic Verbs in comparison. These results suggest that learners at higher proficiency levels increasingly rely on general motion verbs, with certain events prompting more frequent use of these verbs.

Table 5.5: English Speakers' Results: Manner, Motion Generic, and Path use

	Manner Bias	Manner Verb	Manner+Path	Manner Adv Cl	Manner Adv	Motion Gen.	Path Prep	Path Verb
Participant								
Variance	.01011	.02264	.002964	.0015109	.004192	.0006266	.04965	.0003146
SD	.1005	.1505	.05444	.03887	.06474	.02503	.2228	.01774
Event								
Variance	.05587	.15292	.046076	.0003826	.007217	.0069840	.14986	.0360959
SD	.2364	.3910	.21465	.01956	.08495	.08357	.3871	.18999
Monolingual								
Estimate	.91498	.93645	.08461	.015550	.06624	.07320	1.22020	.096133
Std Error	.06645	.10676	.05715	.010712	.02735	.02653	.11140	.050461
df	17.60317	16.61170	15.27776	41.222892	24.11613	19.23900	19.57741	14.774653
t-value	13.769	8.771	1.480	1.452	2.421	2.759	10.953	1.905
Pr(> t)	7.34e-11 ***	1.23e-07 ***	0.159	.154	0.0233 *	.01239 *	8.53e-10 ***	.0764
Intermediate								
Estimate	-.18387	-.25645	.04206	-.002217	-.01290	.09347	-.36020	.023867
Std Error	.05264	.06943	.02794	.018905	.03271	.03092	.09844	.023695
df	49.91786	50.03450	49.91594	49.958230	49.93931	49.86567	50.06466	50.229685
t-value	-3.493	-3.694	1.506	-.117	-.394	3.023	-3.659	1.007
Pr(> t)	.00101 **	.000547 ***	.138	.907	.6949	.00394 **	.000609 ***	.3186
Advanced								
Estimate	-.07908	-.19799	.02309	.020347	.02094	.07039	-.28174	.006431
Std Error	.04786	0.06313	.02540	.017191	.02974	.02811	.08952	.021545
df	49.90613	50.02639	49.90476	49.948482	49.92853	49.84155	50.05793	50.205022
t-value	-1.652	-3.136	.909	1.184	.704	2.504	-3.147	.298
Pr(> t)	.10478	.002867 **	.368	.242	.4846	.01560 *	.002775 **	.7666

L2 English Path Elaboration

For **Path prepositions**, while participant had moderate variability (variance=.049, SD=.222), event variability was higher (variance=.149, SD=.387), suggesting that the specific event being described plays a substantial role in the use of Path prepositions. The fixed effects show that the monolinguals use Path prepositions frequently in their description of motion events ($B=1.220$, $p<.01$). Elementary ($B=-.820$, $p<.01$), Intermediate ($B=-.360$, $p<.01$), and Advanced speakers ($B=-.281$, $p<.01$) all show significantly low usage of Path prepositions in comparison.

For **Path Verbs**, participant variance is minimal (variance=.000, SD=.017). However, events seem to play a substantial role in the use of Path verbs (variance=.036, SD=.189). The fixed effects show that the intercept ($B=.096$, $p=.07$) is marginally significant, suggesting that monolinguals use Path verbs relatively infrequently. However, there are no significant differences across proficiency levels: Elementary ($B=.037$, $p=.57$), Intermediate ($B=.023867$, $p=.31$), and Advanced speakers ($B=.006$, $p=.76$) show no significant variation in Path Verb use compared to monolinguals.

L2 Portuguese Manner Elaboration

Figure 5.3 shows the trends of monolingual and bilingual Portuguese speakers. The results (Table 5.2.1) show moderate variance for participants (variance=.013, SD=.114) and larger event variability (variance=.076, SD=.276) in their **Manner Bias** scores. The fixed effects show that monolinguals have a moderate Manner Bias when describing motion events ($B=.562$, $p<.01$). The results for both Elementary ($B=.196$, $p<.01$) and Intermediate speakers ($B=.185$, $p<.01$) suggest that Portuguese learners show a higher Bias rate than monolingual speakers, regardless of their L2 level.

A similar trend is observable for **Manner verb** usage. While Portuguese speakers use Manner verbs to a moderate level ($B=.416$, $p<.01$), both Elementary ($B=.242$, $p<.01$) and Intermediate speakers ($B=.201$, $p<.01$) encode more Manner information in the verb in their descriptions of motion. The participant variance is moderate (variance=.010, SD=.101) and event variability is more substantial (variance=.106, SD=.325).

For **Manner-Path verbs**, the intercept ($B=.029$, $p=.38$) indicates that Portuguese monolinguals use Manner-Path verbs infrequently. Neither Elementary ($B=.015$, $p=.43$) nor Intermediate ($B=.019$, $p=.29$) show significant differences from the baseline. The variance for participant (variance=.000, SD=.024)

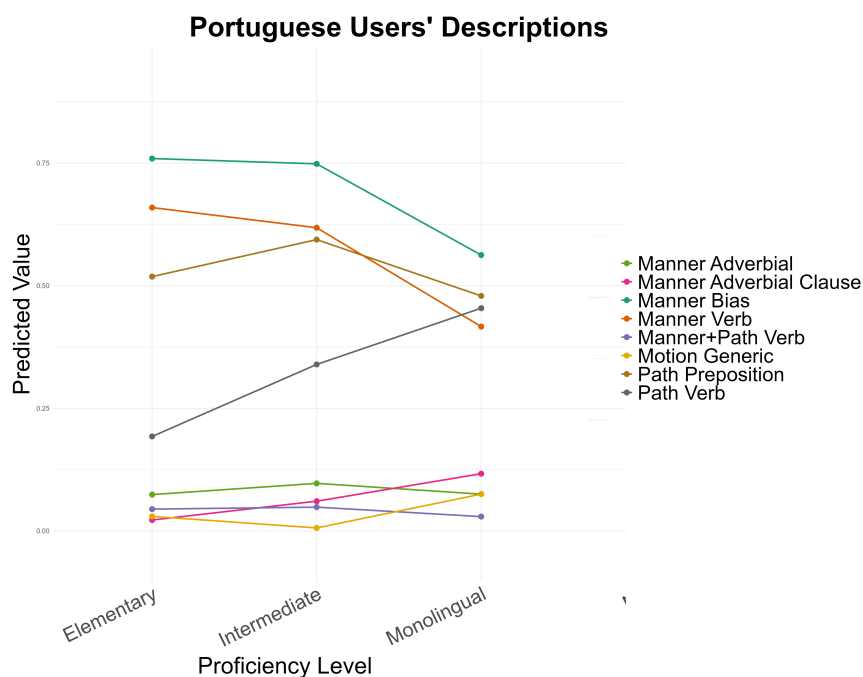


Figure 5.3: Portuguese Speakers' Descriptions of Motion

indicates very little variability. Event variability (variance=.014, SD=.118) suggests that the specific event being described plays a moderate role.

The analysis of **Manner adverbial clauses** shows that participant variability is moderate (variance=.006, SD=.082) and event variability is minimal (variance=.004, SD=.065). The fixed effects reveal that the intercept ($B=.116$, $p<.01$) is significant, indicating frequent use of Manner Adverbial Clauses at the baseline proficiency level. However, Elementary speakers ($B=-.094$, $p=.03$) exhibit low adverbial-clause encoding while Intermediate ($B=-.056$, $p=.18$) show no significant difference from monolinguals.

As for Manner adverbials, Portuguese monolinguals use **Manner adverbs** infrequently, but at a meaningful frequency ($B=.075$, $p=.03$). Neither Elementary ($B=-.000$, $p=.97$) nor Intermediate proficiency ($B=.021$, $p=.45$) show significant differences from the baseline. There is very little variability between participants (variance=.001, SD=.037) and moderate variability across events (variance=.012, SD=.110).

Table 5.6: Portuguese Speakers' Results: Manner, Motion Generic, and Path use

	Manner Bias	Manner Verb	Manner+Path	Manner Adv Cl	Manner Adv	Motion Gen.	Path Prep	Path Verb
Participant								
Variance	.01301	.01035	.0005882	.006872	.001412	.003771	.01584	.03420
SD	.1141	.1017	.02425	.08290	.03757	.06141	.1258	.1849
Event								
Variance	.07637	.10619	.0140892	.004271	.012207	.002676	.08556	.06345
SD	.2763	.3259	.11870	.06535	.11049	.05173	.2925	.2519
Monolingual								
Estimate	.56250	.41667	.02917	.11667	.0750000	.07500	.47917	.45417
Std Error	.08293	.09216	.03279	.03121	.0340883	.02358	.08716	.08363
df	20.77943	18.06380	16.59867	36.67635	20.6480983	36.39191	20.82397	29.05579
t-value	6.782	4.521	.890	3.738	2.200	3.180	5.497	5.431
Pr(> t)	1.1e-06 ***	.000262 ***	.386	.000631 ***	0.0393 *	.0030 **	1.93e-05 ***	7.62e-06 ***
Elementary								
Estimate	.19676	.24259	.01528	-.09444	-.0009259	-.04537	.03935	-.26157
Std Error	.07045	.06269	.01941	.04376	.0311004	.03239	.07252	.08761
df	33.00004	33.00000	33.00000	33.00008	32.9999880	33.00003	32.99998	32.99989
t-value	2.793	3.870	.787	-2.158	-.030	-1.401	.543	-2.986
Pr(> t)	.00863 **	.000486 ***	.437	.038294 *	.9764	.1707	.591	.0053 **
Intermediate								
Estimate	.18598	.20152	.01932	-.05606	.0219697	-.06894	.11477	-.11477
Std Error	.06623	.05893	.01825	.04114	.0292350	.03045	.06817	.08235
df	33.00004	33.00000	33.00000	33.00008	32.9999880	33.00003	32.99998	32.99989
t-value	2.808	3.420	1.059	-1.363	.751	-2.264	1.684	-1.394
Pr(> t)	.00830 **	.001686 **	.297	.182190	.4577	.0303 *	.102	.1727

There is moderate variability between participants (variance=.003, SD=.061) and minimal variability across events when **Motion Generics** are tested. The low, but significant, usage of Motion Generics by Portuguese monolinguals ($B=.075$, $p<0.01$) is not different from that of Elementary speakers ($B=-.045$, $p=.17$). However, Intermediate speakers ($B=-.068$, $p=.03$) use Motion Generic verbs less frequently than monolinguals.

L2 Portuguese Path Elaboration

The results for **Path prepositions** indicate a moderate variability between participants (variance=.015, SD=.125) and a larger event variability (variance=.085, SD=.292). The fixed effects show that Portuguese monolinguals do use Path prepositions relatively frequently when describing motion events ($B=.479$, $p<0.01$), and that there are no significant differences at Elementary ($B=.039$, $p=.59$) or Intermediate levels ($B=.114$, $p=.10$).

Portuguese monolinguals exhibit a significant frequency of **Path verbs** in their motion descriptions ($B=.454$, $p<0.01$). Elementary speakers, however, show lower scores ($B=-.261$, $p<0.01$), suggesting that learners at this proficiency level are less likely to use Path Verbs in their descriptions of motion events. At the Intermediate level, however, ($B=-.114$, $p=.17$), the encoding of Path through the main verb approximates that of monolinguals.

5.2.2 Lexical Diversity in Manner and Path Elaboration

While the logistic regressions help us determine the frequency of use and the likelihood of a particular group to elaborate Manner and Path in a certain way, it fails to inform us about lexical diversity. For instance, based on the tests carried out thus far, we cannot ascertain which Manner verbs and Path prepositions are more commonly used according to proficiency levels. To test for lexical diversity, I compiled a list with all the Manner verbs and Path prepositions for each language. I then ran lexical diversity tests to statistically determine how significant their usage was. Typically, the Type-Token Ratio (TTR) is the most widely used to assess lexical diversity. However, since TTR is sensitive to text length, it led to unreliable comparisons when the number of Manner verb and Path preposition occurrences (tokens) differs significantly across proficiency groups. As TTR decreases as the number of tokens increases, it provided misleading results when comparing groups with different sample sizes. To address this issue, I carried out two other diversity measures: the **Guiraud's Index** and **Shannon's Entropy**, which adjust for text length and provide a more nuanced and accurate comparison across proficiency groups.

Lexical Diversity of Manner verbs

The overall trend shows that Monolinguals tend to use a wider range of Manner verbs with more variety and complexity, indicating a richer, more nuanced command of action-related vocabulary (Figure 5.4). English monolinguals exhibit a much greater variety of Manner verbs, including verbs with more specialized meanings like "soar", "scramble", and "paraglide". Common and basic verbs like "run", "jump", and "walk" are frequently used, demonstrating reliance on a core set of basic actions. While Portuguese monolinguals also use a wider variety of Manner verbs than learners, these are not as frequently used as those used by English monolinguals. Common verbs include *pular* 'jump' and *saltar* 'leap', and there is tendency to use verbs associated with basic and common actions like *andar* 'walk' and *caminhar* 'walk'.

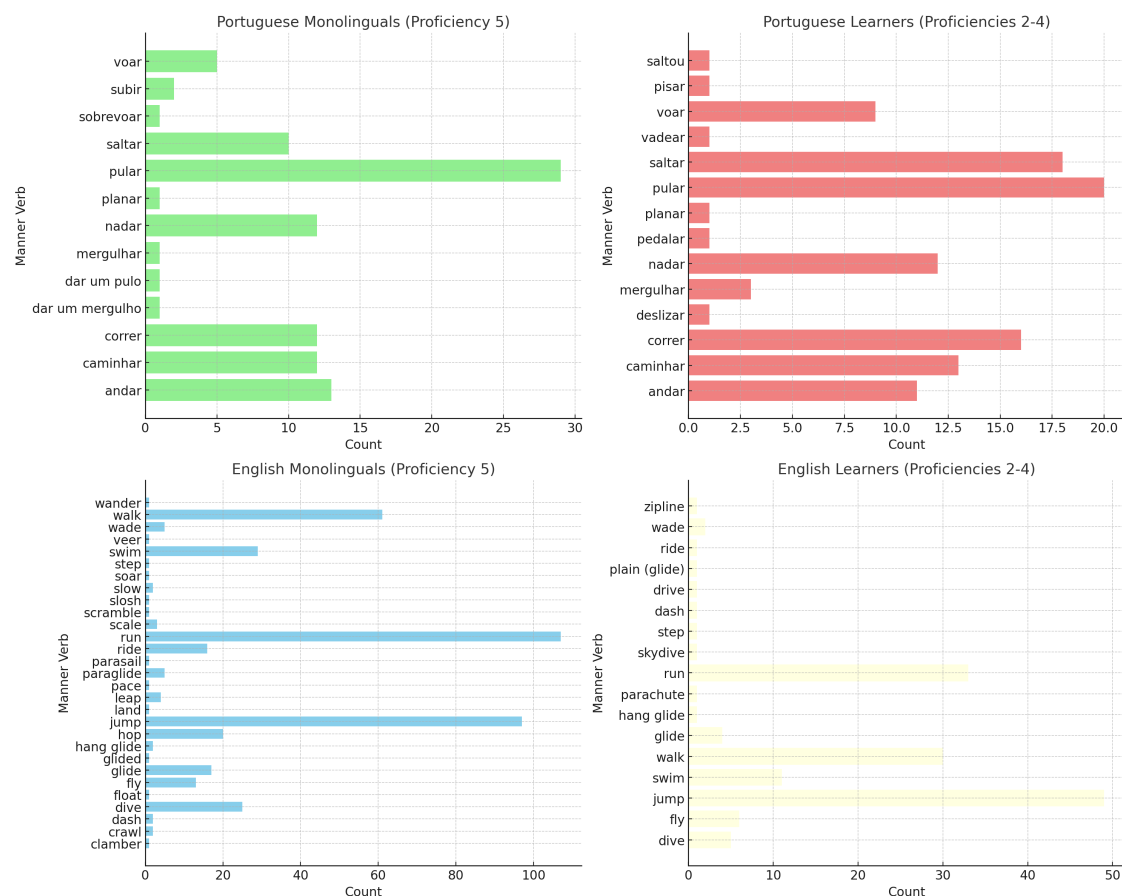


Figure 5.4: Lexical Diversity of Manner verbs

Learners, on the other hand, rely on a smaller set of frequent and basic verbs, suggesting a narrower linguistic range. This pattern is consistent in both Portuguese and English. English learners use fewer verbs overall, and the verbs

Table 5.7: Guiraud's Index for Manner Verb Usage

Language	Proficiency	Types	Tokens	Guiraud
Portuguese	Monolingual	13	13	3.605551
Portuguese	Elementary	12	12	3.464102
Portuguese	Intermediate	11	11	3.316625
English	Monolingual	29	29	5.385165
English	Elementary	5	5	2.236068
English	Intermediate	11	11	3.316625
English	Advanced	14	14	3.741657

they do use are more common actions like "run", "walk", and "jump". The variety of these verbs is significantly lower compared to monolinguals, showing learners rely on simpler, more frequent verbs. As for Portuguese, learners also tend to use fewer different Manner verbs, such as *pular* 'jump' and *saltar* 'leap', which appear in a consistent high frequency, likely because learners rely more on a limited set of verbs.

As for lexical diversity tests, the higher the Guiraud's Index, the greater the lexical diversity. The results show that monolinguals in both languages tend to have higher Guiraud Index values compared to learners (see Table 5.7). Interestingly, the Guiraud's Index for English Monolinguals is still observably higher than that of Portuguese Monolinguals.

Shannon's Entropy measures the unpredictability or uncertainty in the distribution of Manner verbs. Higher entropy values mean the usage of verbs is more evenly spread across the verb types, implying less redundancy. Lower entropy suggests that certain verbs are used much more frequently, leading to a less diverse and more predictable distribution. The results can be seen in Table 5.8.

English Monolinguals have the highest entropy (around 4.85), which suggests the most diverse and evenly distributed Manner verb usage. Contrastingly, English learners show much lower entropy (around 2.32), indicating a heavy reliance on a smaller set of verbs and that their usage of Manner verbs is more predictable and redundant. As for Portuguese Monolinguals, the higher entropy (around 3.7) indicates that Manner verb usage is relatively balanced and diverse, with no overwhelming reliance on a small set of verbs. Portuguese learners, however, have slightly lower entropy (around 3.46), showing that while they use a range of verbs, they tend to repeat certain verbs more often than monolinguals, leading to a less balanced distribution.

Table 5.8: Shannon's Entropy for Manner Verb Usage

Language	Proficiency	Entropy
Portuguese	Monolingual	3.700439718
Portuguese	Elementary	3.584962501
Portuguese	Intermediate	3.459431619
English	Monolingual	4.857980995
English	Elementary	2.321928095
English	Intermediate	3.459431619
English	Advanced	3.807354922

To sum up, the Guiraud's Index shows that monolinguals (both Portuguese and English) consistently demonstrate higher lexical diversity, using a wider range of verbs. Shannon's Entropy supports this by showing that monolinguals have a more even distribution of Manner verbs, indicating less repetition and more balanced use. In contrast, learners show lower entropy, meaning their Manner verb usage is more concentrated on a few common verbs.

Lexical Diversity of Path prepositions

The general trend shows that monolingual speakers, both in Portuguese and English, exhibit greater diversity in Path prepositions and a more balanced distribution, showing richer and more flexible spatial language use (Figure 5.5). Learners in both languages tend to rely on a smaller set of frequently used prepositions, demonstrating limited spatial vocabulary. English monolinguals show the greatest variety and even distribution of Path prepositions. Common prepositions include "into", "onto", "through", and "across", each with numerous occurrences. For Portuguese monolinguals, the most frequent Path preposition is *em* 'in/on', with a noticeably higher number of occurrences compared to others. Other prepositions like *até* 'to/until' and *a* 'to/at' also appear, but much less frequently. English learners use a much narrower range of prepositions, with "into", "on", and "over" being the most frequent. The distribution is heavily skewed, with fewer types being used more frequently, indicating a limited ability to express complex spatial relations. The variety of Portuguese learners' Path prepositions is slightly larger than that of monolinguals, but certain prepositions are heavily relied upon, suggesting that learners might use more spatial complexity, though they repeat specific prepositions.

The Guiraud's Index results can be seen in Table 5.9. According to the Index, English Monolinguals display the greatest diversity and balance in their

Table 5.9: Guiraud's Index for Path Preposition Usage

Language	Proficiency	Types	Tokens	Guiraud
Portuguese	Monolingual	16	16	4
Portuguese	Elementary	13	13	3.605551
Portuguese	Intermediate	25	25	5
English	Monolingual	69	69	8.306624
English	Elementary	4	4	2
English	Intermediate	28	28	5.291503
English	Advanced	34	34	5.830952

Table 5.10: Shannon's Entropy for Manner Verb Usage

Language	Proficiency	Entropy
Portuguese	Monolingual	4
Portuguese	Elementary	3.70044
Portuguese	Intermediate	4.643856
English	Monolingual	6.108524
English	Elementary	2
English	Intermediate	4.807355

use of Path prepositions. Portuguese Monolinguals also show good diversity, though somewhat less compared to their English counterparts. Learners in both languages tend to use fewer prepositions, with less balance and diversity, relying on a small set of common prepositions. However, when we look at specific proficiency subgroups, we can see that Intermediate Portuguese speakers show more lexical diversity than monolinguals.

As for Shannon's Entropy results (Table 5.10), English Monolinguals exhibit the highest entropy, around 6.1, indicating a very balanced and diverse usage of Path prepositions. Portuguese Monolinguals, however, show an entropy of around 4, indicating a moderately balanced distribution of Path prepositions. As in the Index, Intermediate Portuguese learners have a slightly higher score than Portuguese monolinguals. Although English learners have higher entropy level than monolingual Portuguese speakers (their L1), their results are not as high as those of L1 English speakers.

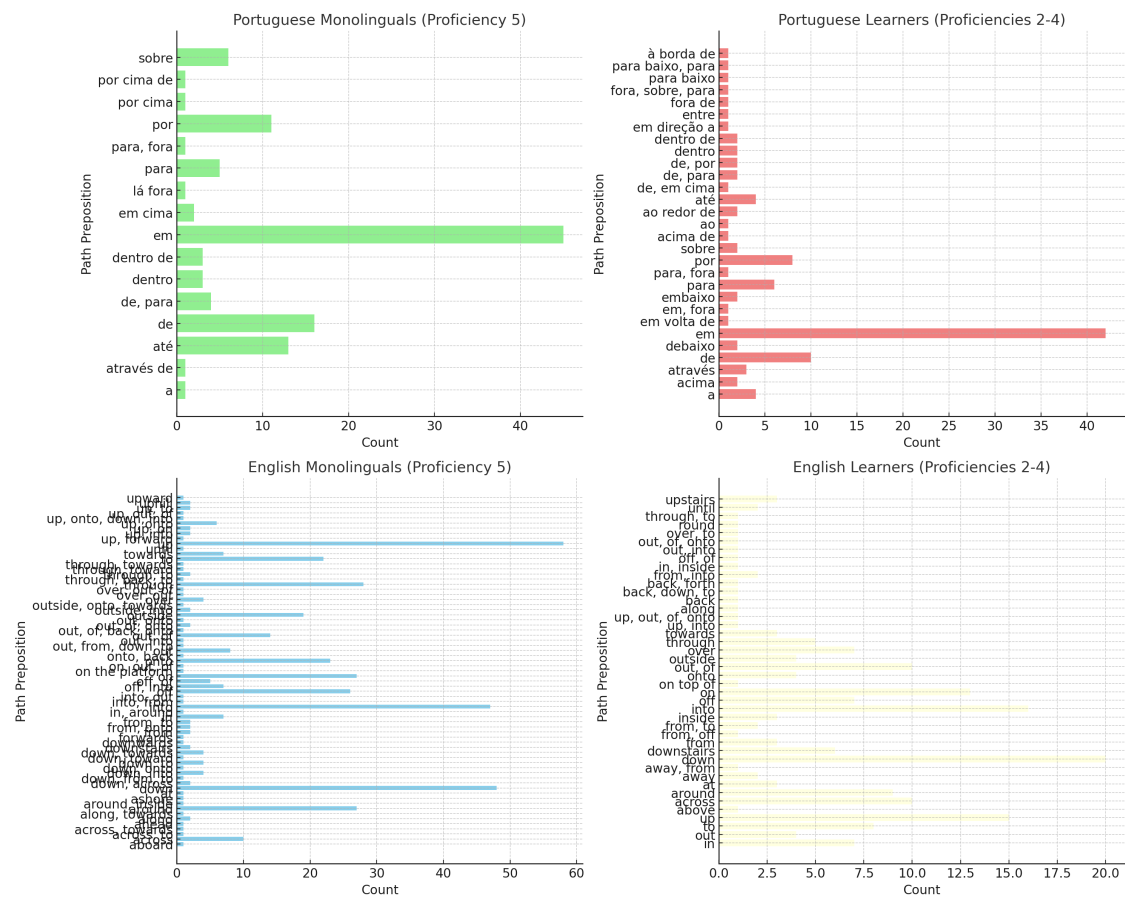


Figure 5.5: Lexical Diversity of Path Prepositions

5.3 Discussion

5.3.1 Monolingual Manner Bias

Research Question 1 sought to determine whether monolingual English speakers use a greater degree of Manner Bias (encompassing Manner verbs, Manner adverbials, and Manner + Path verbs) compared to monolingual Portuguese speakers when describing motion events. My hypothesis was that English speakers would use significantly more Manner-Biased constructions than Portuguese speakers, reflecting their categorization within semantic typology (Slobin, 2004; Talmy, 1985, 1991, 2000). According to the results, monolingual English speakers do indeed exhibit a significantly higher Manner Bias compared to monolingual Portuguese speakers. These findings align with expectations, given the typological differences between English and Portuguese. Event variability was moderate, which is expected considering that the elicitation method included complex events like "flying across," which consist of multiple smaller motion phases (e.g., "jump off", "glide", "fly across", "land"). Overall, the hypothesis was confirmed, with English speakers relying on Manner-Biased constructions significantly more than their Portuguese counterparts.

Similarly, monolingual English speakers used more Manner verbs than monolingual Portuguese speakers. This result reinforces the idea that, given the language's structure, English speakers are more inclined to specify the Manner in which motion is carried out within the verb itself (Cadierno, 2017; Lewandowski, 2021; Slobin, 2004). The moderate role of event variability suggests that events with more complex motion Paths might prompt greater or lesser use of Manner verbs depending on the language. While participant variability remained low, future studies might benefit from a closer look at whether specific event types lead to different outcomes across languages. Overall, this finding confirms the hypothesis that English speakers use significantly more Manner verbs than Portuguese speakers.

In terms of Manner-Path verbs, the results were more opaque. English speakers did use Manner-Path verbs, but not at a significantly high rate, while Portuguese speakers used even fewer Manner-Path verbs. Although the hypothesis was confirmed, the moderate effect of event variability suggests that specific types of motion events play a role in determining whether participants from either language group use Manner-Path verbs. Besides that, the number of stimuli focused on these types of verbs was limited (as discussed in Chapter 3, there is disagreement in the literature as to how we should classify these verbs - see Beavers et al. (2010) and Zlatev and Yangklang (2004) for different analyses).

This points to a potential area for further exploration, as the interaction between motion complexity and language-specific encoding strategies may offer deeper insights into how different languages handle Manner-Path verb constructions.

A key difference between the groups pertains to the use of Manner adverbial clauses. Despite the high Manner Bias observed in English speakers' descriptions of motion, Portuguese speakers use significantly more adverbial clauses to encode Manner. This is no surprise as it reflects the typological patterns of the language. As observed in Chapter 4, English speakers deem structures as such (e.g., *He enters the room **running***) as significantly less acceptable than Portuguese speakers do. Although these results do not advance our understanding of the typological structures of Portuguese and English, they work in tandem with those in Chapter 4 to show that speakers also produce them at a higher rate. For Manner adverbial clauses, participant and event variability were minimal, suggesting that this encoding preference is relatively stable across different types of motion events.

The use of Manner adverbs did not differ significantly between the two language groups. Portuguese speakers and English speakers showed similar tendencies in this regard. This is not surprising as Manner adverbs are considered optional in both languages.¹⁵ The minimal role of both participant and event variability suggests that Manner adverb use is not heavily influenced by individual or situational factors. This finding highlights the optional nature of Manner adverbs, as participants across both language groups demonstrated a low but stable use of this construction.

Finally, there was no significant difference in the use of Motion Generic verbs between Portuguese and English speakers. This, again, is expected as both languages allow the use of generic verbs such as "go" and "get" to describe movement to space. Participant and event variability were minimal, further emphasizing that this pattern is consistent across individuals and situations.

¹⁵ One may argue that they are marginal to the description of motion events as they consist of adjuncts. However, the high frequency of structures like "He goes to school **on foot**" in Portuguese called for an investigation.

5.3.2 Monolingual Path Elaboration

Research Question 2 explored whether monolingual English speakers elaborate the Path of motion more frequently through Path prepositions compared to monolingual Portuguese speakers, who were expected to rely more on Path verbs. My hypothesis was that English speakers would encode Path more often (via more Path prepositions per clause), while Portuguese speakers would use more Path verbs.

The results confirmed the hypothesis. Monolingual English speakers used significantly more Path prepositions in their descriptions of motion events than Portuguese speakers. This finding aligns with the typological characterization

of English as a satellite-framed language, where the Path of motion is encoded in prepositional phrases that can be stacked within the same clause (Slobin, 2004). Event variability was significant, suggesting that different motion event types had a noticeable impact on the frequency of Path prepositions. This could be due to the complexity of certain events, which may prompt more elaborate Path descriptions. Future studies may control for the number of Path possibilities in each motion event to determine whether speakers will vary in Path encoding across multiple scenes.

As anticipated, monolingual Portuguese speakers used significantly more Path verbs than English speakers. This result is consistent with the typological tendencies of Portuguese as a verb-framed language, where the Path of motion is frequently encoded within the verb itself (H. Batoréo, 2014; H. J. Batoréo and Ferrari, 2016; H. J. Batoréo, 2014). Both participant and event variability were moderate, indicating that these factors contributed to some variation in the use of Path verbs. The confirmation of this hypothesis highlights the contrasting strategies used by English and Portuguese speakers in encoding motion Paths, with English relying more on prepositions and Portuguese on verbs.

5.3.3 L2 English Speakers' Development of Manner Bias and Path Encoding

Research Question 3 investigated whether L2 English speakers develop Manner Bias and Path encoding (via stacking) patterns similar to monolingual English speakers as their proficiency increases. The hypothesis posited that L2 English speakers with higher proficiency would exhibit Manner Bias and Path stacking similar to English monolinguals.

Pertaining the development of an overall **Manner Bias** in the L2, the results indicate that Advanced learners showed no difference from Monolingual speakers. This suggests that proficiency has an effect on the acquisition of the Bias, but English language learners only reach L2-like command at the highest level of proficiency (C1 and C2, according to the Common European Framework). Neither Elementary nor Intermediate learners approximated the levels of Monolinguals. This was expected based on the literature (Cadierno, 2004, 2017). However, Monolinguals used Manner verbs at significantly higher rates than L2 speakers. While there is an increase in usage from Intermediate to Advanced levels, the results were not significant. Combined with the Manner Bias results, Advanced users seem to find other ways to encode Manner in a clause, even if not via the prototypical S-framed structure of English.

Manner-Path verb use did not show significant differences across any of the proficiency levels. This is, again, no surprise as the number of Manner-Path verbs in the study were rather limited (climb/scale or *sobrevoar* ‘fly over’). These results also do not indicate linguistic development as there were no observable differences between English and Portuguese monolinguals.

The results for the use of Manner adverbial clauses show an interesting scenario. There were no statistical differences between L2 English users and Monolinguals despite the fact that the construction is very common in Portuguese. It is difficult, however, to assert that this indicates L2 development. First, this type of Manner encoding is optional in V-framed languages (H. J. Batoréo and Ferrari, 2016; Pavlenko and Volynsky, 2015; Slobin, 2004; Talmy, 1985, 1991, 2000). This means that learners may have no motivation to employ it in their second language. Second, adverbial clauses take a higher cognitive toll, as they entail the assignment of an argument structure (Chomsky, 1957). As they are considered a narrative luxury (Slobin, 2004) in the L1, it is no surprise that learners leave them out.¹⁶ None of the proficiency levels showed significant differences from monolinguals in the use of Manner adverbs. However, no differences were observed between monolingual speakers of either language, suggesting that transfer, if any, is positive.

The results for Motion Generic verbs presented an interesting contrast. English Monolinguals used Motion Generics at a moderate rate, but Intermediate and Advanced learners used them significantly more often. These results work well in tandem with the findings for Manner verbs. As learners use fewer Manner verbs in the description of motion events, they rely on Motion Generic verbs that are not only more common in the L1, but also frequent in English (Papafragou and Grigoroglou, 2019; Slobin, 1996; Talmy, 1991, 2000).

As for **Path elaboration**, while Monolinguals employed Path prepositions frequently, L2 speakers across all proficiency levels used them significantly less often in their descriptions. The results indicate that Path stacking, a structural possibility of English, is not acquired by L2 learners, even at the Advanced level. When these results are analyzed alongside lexical diversity, we can observe not only that learners often lack Path encoding, but also that, if they do encode Path, they do so with a low degree of complexity. Finally, no significant differences were found in the use of Path verbs across proficiency levels. As English monolinguals use them less frequently than Portuguese monolinguals, this could indicate two possible scenarios: either learners begin to encode Path less frequently in the verb as they start learning English or they begin to employ Motion Generics more often and, as these occupy the verb position, there is no slot available for Path.

¹⁶ Another possibility is the lack of positive evidence. Although a strict frequency-based analysis of input is outside the scope of my work, I hypothesize that if language development is at play for these results, it could be the result of the low occurrence of the structure in English. This could suggest that learners do not produce it either for lack of input or for lack of corrective feedback.

5.3.4 L2 Portuguese Speakers' Use of Path Verbs and Manner Adverbials

Research Question 4 examined whether L2 Portuguese speakers use more Path verbs and Manner adverbials in a way that mirrors Portuguese monolinguals. My hypothesis was that L2 Portuguese speakers with higher proficiency levels would show increased use of Path verbs and Manner adverbials in ways that match those of Monolingual speakers.

The use of **Manner adverbial clauses** was relatively high among Portuguese monolinguals. Elementary learners did not reach the same rates. Intermediate speakers, however, showed no statistical difference from Monolinguals. These results are encouraging from the learner's perspective for a few reasons. First, it shows that there are, at least to an extent, effects of L2 proficiency in the acquisition of periphrastic Manner information. Portuguese learners are able to move Manner information from the main verb and into an optional clause in ways that match the strategy employed by Portuguese monolinguals. Second, this process is, as stated above, complex because of the syntactic structure it requires.¹⁷

The results also provide us with valuable insights into the process of acquisition of Manner encoding altogether. L2 Portuguese learners showed a much higher Manner Bias than Monolinguals, with a very small difference between Elementary and Intermediate levels. As participant and event variability was moderate, L2 learners overencode Manner information in most contexts. Interestingly, however, both L2 groups used Manner verbs less frequently in their descriptions than Monolingual speakers. To explain this, we can analyze the results of the Lexical Diversity tests. As learners also used fewer and less distributed Manner verbs, it seems that their less frequent encoding of Manner through the verb is related to their vocabulary size. Another possibility, which is also more positive in nature, is that learners notice that these are not as common in Portuguese as they are in their L1. As some of the Manner verb constructions are ungrammatical in Portuguese, learners may notice early on that Manner is encoded elsewhere.

As was the case for Monolinguals and for L2 English learners, Portuguese speakers at the Elementary and Intermediate levels also showed no difference from Monolinguals in their use of Manner-Path verbs and Manner adverbs. As for the use of Motion Generics, Elementary learners' usage matched that of Monolinguals. However, Intermediate learners used them less frequently. This seems to be related to their acquisition of encoding Path in the verb. While Elementary learners used **Path verbs** less frequently, Intermediate speakers used them at the same rate as Monolinguals. These findings confirm the hypothesis

¹⁷ As I discussed in the previous section, the motivation for the acquisition of this encoding strategy is beyond this work. I can hypothesize the positive evidence from Portuguese, which employs this pattern frequently, and that the form is so salient that it supports acquisition even with little explicit instruction.

that higher proficiency L2 Portuguese speakers use Path verbs more frequently, and similarly to Portuguese monolinguals. These findings may also help explain why Intermediate learners use few Motion Generics: as they encode Path in the verb, the verb slot is occupied and there is no need (or space, for that matter) for a generic verb to indicate motion.

Finally, there were no differences between L2 and Monolingual speakers in the number of Path prepositions they employed to describe motion events. A possible explanation for this is that L2 descriptions of motion may be simpler and learners may avoid adding information that will challenge their language level. However, another important factor needs to be considered. The Lexical Diversity of prepositions used by L2 learners exceeded that of Monolingual Portuguese speakers in both Guiraud's Index and Shannon's Entropy. Therefore, although learners have the lexical items to describe Path, they may make a choice not to. This poses interesting questions about the acquisition of Path descriptions calling for further investigation: Are learners choosing to encode less because they understand the structural constraints of the L2? Or are they not encoding it because of cognitive costs?

5.4 Conclusion

This study set out to examine how monolingual English, monolingual Portuguese, and L2 speakers of both languages encode Manner and Path of motion events, focusing on Manner Bias and Path elaboration. The findings largely confirmed the hypotheses, illustrating clear typological differences between English and Portuguese speakers. English monolinguals demonstrated a stronger tendency to encode Manner within the verb and through Manner-Biased constructions, while Portuguese speakers relied more on Path verbs and Manner adverbials. These results support the existing classifications of English as a satellite-framed language and Portuguese as a verb-framed language.

For L2 learners, proficiency played a crucial role. L2 English speakers showed a gradual increase in Manner Bias and Manner verb usage, though they did not fully match the patterns observed in Monolinguals, even at Advanced proficiency levels. The same was observed for Path encoding via Path stacking. On the other hand, L2 Portuguese speakers demonstrated an increased use of Path verbs and Manner adverbials as their proficiency improved, approaching the encoding strategies of Portuguese monolinguals, beginning at the Intermediate level. These findings support other findings in the literature that the process of acquiring a satellite-framed language as the L2 is more challenging than the other way around for structural and lexical reasons (as seen in Cadierno (2004,

2017), Hasko (2009), Liste Lamas (2016), Özçalışkan (2015), and Pavlenko and Volynsky (2015)).

Overall, this study underscores the importance of language-specific factors in the encoding of motion events and highlights how proficiency influences L2 learners' adoption of native-like patterns. It adds to the evergrowing body of literature on motion descriptions by bringing in a less-commonly investigated pair of languages (English and Portuguese) and informs the loci of difficulty for learners of both languages.

CHAPTER 6

THE DEVELOPMENT OF MOTION ENCODING STRATEGIES IN L2 SPEECH

6.1 The present study

As in the previous experiments (Chapters 4, 5), I aim to identify whether, if at all, late bilinguals' elaboration of motion events approximates that of monolingual speakers. The study reported here, however, focuses on spoken production. Differently from previous work, I look at both *simultaneous* and *delayed storytelling*, as recommended in Lewandowski and Mateu (2020). By having participants perform a commentary task (alongside a recall one), we can aim at a better representation of their cognition.

This study aims to answer three major questions followed by two minor questions each:

Monolingual speakers:

RQ1. Do monolingual English speakers exhibit a stronger Manner Bias and more detailed Path elaboration compared to monolingual Portuguese speakers in oral descriptions of motion?

a) How different are their Manner and Path elaboration of boundary-crossing and non-boundary-crossing events?

b) Does simultaneous versus delayed elicitation impact the way Manner and Path information is encoded by monolingual speakers?

Bilingual speakers:

RQ1. Do English-Portuguese bilingual speakers exhibit crosslinguistic influence from the L1 in their Manner and Path elaboration in the L2?

a) How different are their Manner and Path elaboration of boundary-crossing and non-boundary-crossing compared to L1 speakers’?

b) Does simultaneous versus delayed elicitation impact the way Manner and Path information is encoded by bilingual speakers compared to monolingual speakers?

RQ2. Do English-Portuguese bilingual speakers exhibit crosslinguistic influence from the L2 in their Manner and Path elaboration in the L1?

a) How different are their Manner and Path elaboration of boundary-crossing and non-boundary-crossing compared to L1 speakers’?

b.) Does simultaneous versus delayed elicitation impact the way Manner and Path information is encoded by bilingual speakers compared to monolingual speakers?

The hypotheses for **Monolingual speakers** follow. Monolingual English speakers will exhibit a stronger Manner Bias and more detailed Path elaboration compared to monolingual Portuguese speakers in oral descriptions of motion. This aligns with the typological distinction between English as a satellite-framed language, which emphasizes Manner in the verb and Path in additional elements, and Portuguese as a verb-framed language, which prioritizes Path encoding while often omitting Manner (Slobin, 1996; Talmy, 2000). English speakers will encode Manner information consistently, regardless of whether the event involves boundary-crossing, whereas Portuguese speakers will encode Path information more frequently in boundary-crossing events while omitting Manner. Portuguese speakers will elaborate Path less in non-boundary-crossing events compared to boundary-crossing events, while English speakers will maintain consistent Path elaboration in both contexts. This is anticipated as Path encoding is typically more emphasized (and Manner is omitted) in boundary-crossing events in verb-framed languages like Portuguese (Ibarretxe-Antuñano et al., 2016). Simultaneous elicitation will lead to more detailed Manner encoding in English speakers and more detailed Path encoding in Portuguese speakers compared to delayed elicitation. It may emphasize immediate cognitive processing, which aligns with typological preferences—Manner in English and Path in Portuguese (Stam, 2010; Wang and Wei, 2021).

For the **transfer from the L1 (L1 Portuguese to L2 English)**, the hypotheses are that bilingual speakers will exhibit L1 influence in their L2 motion descriptions, particularly in their reduced use of Manner verbs and a limited acquisition of the Manner Bias. This is expected based on work by Cadierno (2004), Hasko (2009), and Pavlenko and Volynsky (2015)). They will also show less consistent use of Path prepositions compared to L1 English monolinguals. They will be more resistant to encoding Manner in boundary-crossing events

compared to L1 English speakers. Finally, if elicitation type has any effect, it will influence bilinguals in encoding more Manner and Path information during delayed elicitation than simultaneous elicitation, as the additional time allows for more planning.

As for the **transfer from the L2 (L2 English to L1 Portuguese)**, I expect that Advanced learners will show an increased Manner Bias in their L1 Portuguese descriptions compared to monolingual Portuguese speakers. They will also use Path prepositions more frequently in their L1 Portuguese descriptions, influenced by their L2 English patterns. I do not expect to encounter major differences in the boundary-crossing events. It is possible that Advanced English learners will encode more Manner information in boundary-crossing events than L1 Portuguese monolinguals. However, I anticipate that the boundary-crossing constraint will cause speakers to produce an ungrammatical structure that bilinguals will still be able to assess. If any effects are observed for elicitation type, simultaneous elicitation should affect the results only for Advanced learners.

For the **transfer from the L1 (L1 English to L2 Portuguese)**, the hypotheses are that bilingual speakers will exhibit L1 influence in their L2 motion descriptions, particularly through their strong Manner Bias and frequent use of Manner verbs. They will also use Path prepositions more frequently in their L2 Portuguese descriptions compared to L1 Portuguese monolinguals, reflecting their L1 English patterns. Regarding boundary-crossing events, bilingual speakers are expected to encode more Manner information than L1 Portuguese monolinguals, as their L1 English influences how they conceptualize these events. Finally, elicitation type is expected to play a role: during delayed elicitation, bilingual speakers are predicted to encode less Manner and Path information than in simultaneous elicitation, as the additional planning time allows for better adaptation to L2 Portuguese norms.

Finally, for the **transfer from the L2 (L2 Portuguese to L1 English)**, the hypotheses are that bilingual speakers will exhibit reduced Manner Bias in their L1 English descriptions compared to L1 English monolinguals, influenced by the reduced emphasis on Manner in L2 Portuguese. Additionally, bilingual speakers are expected to rely less on Path prepositions in their L1 English descriptions, reflecting patterns from their L2 Portuguese motion descriptions. For boundary-crossing events, bilinguals are anticipated to encode less Manner information compared to L1 English monolinguals, demonstrating an influence of L2 norms. Regarding the effects of elicitation type, if any, Intermediate students might encode less Manner information in simultaneous elicitation.

6.1.1 Participants

Participants (n=50) consisted of four groups: monolingual English speakers (n=10), monolingual Portuguese speakers (n=10), late bilinguals with L1 Portuguese and L2 English (n=17), and late bilinguals with L1 English and L2 Portuguese (n=13). The sample size reflects earlier work by Lewandowski (2021) and Özçalışkan (2009), which showed that 10 subjects per group provide at least 84 percent power to detect reliable effects ($\eta^2 = 0.08$, $p < .05$; $n=10/\text{group}$). See Table 6.1 for information on participants.

Table 6.1: Background information of participants

Group	Age at testing	Age of onset	Years learning L2
L1 English (n=10)	19.4 (SD=2.01, range=18-24)	NA	NA
L1 Portuguese (n=10)	54.3 (SD=15.07, range=32-72)	NA	NA
L2 English (n=17)	33 (SD=6.02, range=26-49)	15.06 (SD=5.89, range=6-29)	17.94 (SD=8.47, range=6-36)
L2 Portuguese (n=13)	22.54 (SD=3.2, range=18-27)	19.58 (SD=5.71, range=3-26.5)	2.96 (SD=5.82, range=0.5-23)

Participants were recruited at two higher education institutions in the United States (one in the southeast and one in the northeast of the country) and one higher education institution in Brazil. To isolate the effects of transfer from other foreign languages, L2 English learners who reported an Intermediate level in another S-framed language (e.g., German or Russian) as well as L2 Portuguese learners who reported Intermediate level in another V-framed language (e.g., Spanish or Italian) were not eligible to participate. The researcher collected informed consent from participants during the meeting in the lab, before the experiment started.

6.1.2 Proficiency Measurements

As participants were enrolled in language programs at universities, they were asked to report their current level at the time of testing. The three institutions in this study differ in their placement system (i.e., one of them uses ILR scale, one uses the ACTFL standards, and the other one uses the Common European Framework of Reference). Participants' levels were adjusted using the CEFR as reference. To add another layer of validity, L2 English and L2 Portuguese

learners took take a self-reported proficiency test. The exam places learners into five bands according to the ACTFL standards for language learning: **Level 1:** Novice Low to Novice High, **Level 2:** Novice High to Intermediate Mid, **Level 3:** Intermediate Mid to Advanced Low, **Level 4:** Intermediate High to Advanced Mid, **Level 5:** Advanced Mid to Superior. The proficiency test is divided into five sections which include Can-Do statements that participants rate according to their perceived linguistic skills. The exam performs conservative scoring: each set of 10 statements has 10 possible points, with one point awarded if the person selected the highest ability level (Tigheelaar et al., 2017). Any participant who scores 8 out of 10 on a set can advance to the next set.

I averaged participants' university level and the results of their self-reported proficiency (Levels 1-5) exam and conflated their score into three bands: Elementary (1-2), Intermediate (3-4), and Advanced (5). The proficiency data can be seen in Table 6.2.

Table 6.2: L2 Proficiency Levels

Proficiency	Age at Testing	Age of Onset	Years Learning
L2 English Inter (n=2)	33.0 (SD=4.24, range 30-36)	17.5 (SD=9.19, range 11-24)	15.5 (SD=13.44, range 6-25)
L2 English Advanced (n=15)	33.0 (SD=6.34, range 26-49)	14.73 (SD=5.92, range 6-29)	18.27 (SD=8.56, range 6-36)
L2 Portuguese Elementary (n=5)	22.4 (SD=4.28, range 18-27)	21.3 (SD=3.96, range 17-26)	1.1 (SD=0.55, range 0.5-2)
L2 Portuguese Inter (n=6)	21.67 (SD=2.73, range 20-27)	20.17 (SD=3.14, range 18-26.5)	1.5 (SD=0.77, range 0.5-2.5)
L2 Portuguese Advanced (n=2)	25.5 (SD=0.71, range 25-26)	13.5 (SD=14.85, range 3-24)	12.0 (SD=15.56, range 1-23)

6.1.3 Methods

Prior to participating in the study, individuals filled out an online screening with questions about their language background. This aimed at filtering those who spoke a language that would interfere with the study results: Portuguese monolinguals with any knowledge of an S-framed language, English monolinguals with any knowledge of a V-framed language, or L2 learners who had not been studying the language for at least 6 months. Those who met the criteria were invited for a 30-minute elicitation session in the lab. Before the elicitation session, participants filled out a language background questionnaire (see Appendix A). For monolinguals, this included age, experiences abroad (visits

and stays), proficiency in additional languages, and academic and professional background. Bilingual questionnaires also included questions about age of onset, years learning the language and mode of instruction. The answers to the additional questions were not exclusion criteria.

As in the previous experiment (Chapter 5), participants watched short clips depicting self-propelled motion events performed by a videogame character. The videos, however, were different from the ones used in the collection of written descriptions. Participants watched 26 clips of approximately 10 seconds each. All clips were presented randomly and showed events in which the character crossed and did not cross a physical border. For the first set of 13 clips, participants were asked to describe what the character was doing while watching the video in a *commentary task*. There was a 5-second break between each video. For the second set, participants were asked to watch and then describe what they saw in a *recall task*. There was a 10-second pause for individuals to speak.

Monolinguals completed the task in their L1. As this study focused on bidirectional transfer (i.e., the effects of the L1 on the L2 as well as the effects of the L2 on the L1), English and Portuguese late bilinguals completed the task twice: once in their L2 and once in their L1. All data was collected in one session.

The scenes were selected to illustrate common motion events. The list was created based on Gagarina, 2009 and the study in Chapter 4 (currently in-press). Table 3 shows a list of the verbs, prepositions and boundary-crossing conditions.

The stimuli consisted of 5 instances of boundary-crossing, 4 instances of non-boundary-crossing, and 4 instances in which there is boundary crossing, but English might not map the boundary-crossing information onto the preposition.¹⁸ The motivation for Monolingual speakers to map the boundary crossing onto the preposition is outside the scope of this chapter. However, these instances are acknowledged here as they might influence the frequency of uses of “in” and “on” in relation to “into” and “onto”.

¹⁸ This phenomenon is discussed in Tutton (2009) and in Chapter 3 of this dissertation.

6.1.4 Data Analysis

Data was analyzed in using the R software (R Core Team, 2021). I investigated the influence of test language (Monolinguals), proficiency (Bilinguals), boundary-crossing status and elicitation technique on Manner Bias as well as the use of each encoding strategy: Manner verb (e.g., “jump”, “run”), Manner-Path verb (e.g., “climb”), Manner Adverbial Clause (e.g., “walking”, “jumping”), Manner Adverbial (e.g., “slowly”, “on foot”), Motion Generic (e.g., “go”, “get”, “land”), Path preposition (e.g., “in”, “on”, “across”) and Path verb (e.g., “enter”, “exit”). Manner Bias was defined as the sum of all possible Manner information

Table 6.3: Motion events

Event #	Boundary Crossing	Manner Verb	Path Preposition
1	no	walk	in/around
2	no	run	in/around
3	no	swim	in
4	no	climb	up
5	no	fly	over
6	yes	jump	off
7	yes	swim	across
8	yes	fly	across
9	yes	walk	out of
10	yes*	jump	on/onto
11	yes*	jump	in/into
12	yes*	run	in/into
13	yes*	walk	in/into

encodings divided by the number of clauses per event. Linear mixed-effects models were used to test whether proficiency level (Proficiency 2 = Elementary, Proficiency 3 = Intermediate, Proficiency 4 = Advanced, Proficiency 5 = Monolingual), boundary-crossing status (boundary-crossing vs. non-boundary), or elicitation (simultaneous vs delayed) significantly impacted each of the lexicalization patterns and Manner Bias observed. Participant ID and event were included as random effects in the model. Pairwise comparisons were conducted using Tukey adjustments to compare proficiency levels across boundary and non-boundary contexts.

I also examined lexical diversity across proficiency levels in two categories: Manner Verbs and Path Prepositions. Using Shannon Entropy and Guiraud's Index, I assessed both the variety and the richness of vocabulary used by Monolingual, Advanced, Intermediate, and Elementary speakers. Using Shannon Entropy and Guiraud's Index is preferable because they address the limitations of Type-Token Ratio. TTR is highly sensitive to text length, decreasing as texts grow longer, regardless of true lexical richness. Shannon Entropy captures both the variety of word types and their distribution, offering a finer measure of diversity. Guiraud's Index normalizes type counts by the square root of token

counts, making it length-independent and better suited for comparing texts of different sizes. Both metrics provide more reliable and interpretable insights into lexical richness, especially for large-scale or naturalistic datasets.

The results are presented below alongside tables that report the contrasts between the relevant groups. For Model Summary and Estimated Means, see Appendix B.

6.2 Results

6.2.1 Monolingual speakers' Manner and Path elaboration

Figure 6.1 provides a visualization of Monolingual's use of different encoding strategies in each condition.

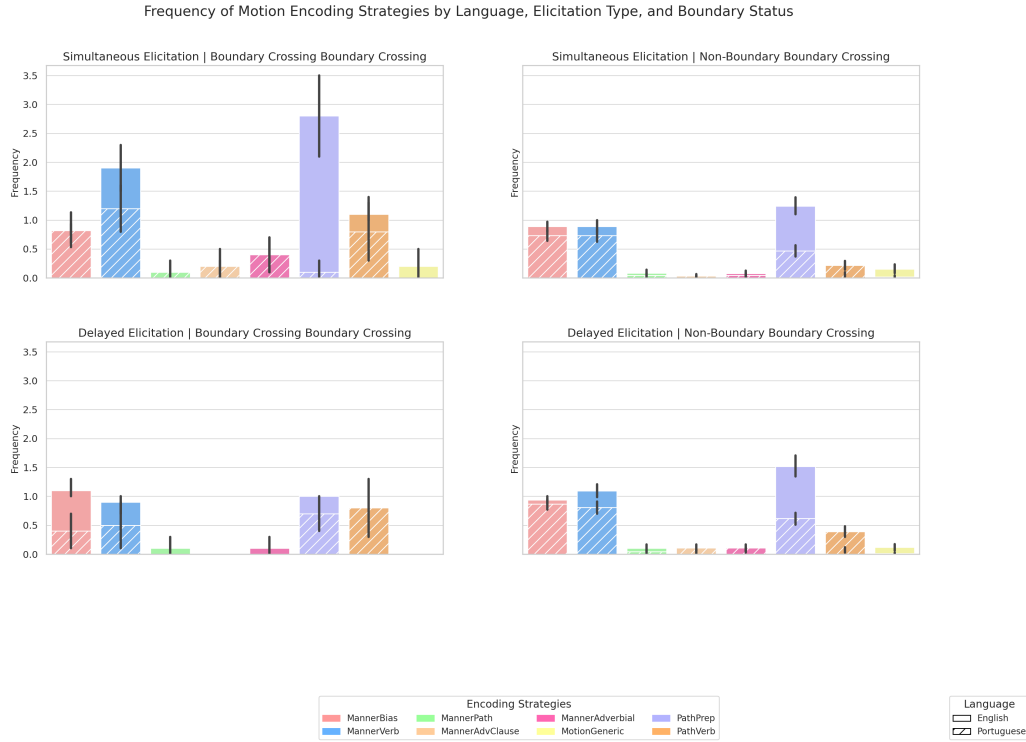


Figure 6.1: Monolingual Encoding Strategies

The results (Table 6.4) show that simultaneous elicitation was associated with a lower **Manner Bias** than delayed elicitation ($B=-0.20$, $SE=0.07$, $t=-2.64$, $p>.05$). English speakers (ENG) had a marginally higher Manner Bias than Portuguese speakers (PT) ($p=.06$). An interaction between elicitation type and boundary-crossing events was also significant ($p>.05$). No significant three-way

Table 6.4: Between-Group Comparisons: Monolinguals

Type	Contrast	Estimate	SE	DF	t.ratio	p.value
Manner Bias	PT bound simul - PT nonbound simul	-0.2728	0.0884	446	-3.086	0.0445
Manner Verb	ENG bound - PT bound	0.3571	0.0714	41.9	5.005	0.0001
Manner-Path	ENG nonbound - PT nonbound	0.1	0.0288	80.4	3.476	0.0045
Motion Generic	ENG bound - PT bound	0.1714	0.0405	34	4.229	0.0009
	ENG bound - ENG nonbound	0.1022	0.0352	348.1	2.905	0.0203
	ENG bound - PT nonbound	0.1605	0.0436	42.6	3.68	0.0035
Path prep	PT delayed bound - ENG delayed nonbound	-0.6585	0.182	88.1	-3.619	0.0111
	ENG simul bound - ENG delayed nonbound	0.4314	0.133	493.9	3.246	0.0272
	PT simul bound - ENG delayed nonbound	-0.7829	0.167	67	-4.678	0.0004
	ENG delayed nonbound - PT delayed nonbound	0.7167	0.165	63.4	4.356	0.0012
	ENG simul nonbound - PT simul nonbound	0.5833	0.165	63.4	3.545	0.016
Path verb	ENG delayed bound - PT delayed bound	-0.42857	0.0865	52.9	-4.952	0.0002
	ENG delayed bound - PT simul bound	-0.32247	0.0934	68.3	-3.452	0.0204
	ENG delayed bound - PT delayed nonbound	-0.31509	0.0996	84.4	-3.165	0.0429
	PT delayed bound - ENG delayed nonbound	0.39682	0.0996	84.4	3.985	0.0034
	PT delayed bound - PT simul nonbound	0.3397	0.0729	493.6	4.663	0.0001
	ENG simul bound - ENG simul nonbound	0.28361	0.0822	405	3.452	0.0141
	PT simul bound - ENG delayed nonbound	0.29072	0.092	66	3.159	0.0464
	PT simul bound - ENG simul nonbound	0.38361	0.0996	84.4	3.853	0.0053
	ENG delayed nonbound - PT delayed nonbound	-0.28333	0.0906	62.9	-3.127	0.0511
	PT delayed nonbound - ENG simul nonbound	0.37622	0.0995	84.9	3.782	0.0067

interaction was observed between test language, elicitation type, and boundary-crossing status ($p < .05$). EN speakers describing boundary-crossing events in a delayed elicitation context had a higher Manner Bias ($M = 0.97$) compared to PT speakers in the same condition ($M = 0.83$). PT speakers showed a significantly lower Manner Bias than EN speakers for boundary events ($B = -0.39$, $SE = 0.09$, $p < .01$) and non-boundary events in simultaneous elicitation ($B = -0.27$, $SE = 0.08$, $p < .05$).

English speakers used more **Manner verbs** than PT speakers ($B = -0.35$, $SE = 0.07$, $t = -5.00$, $p < .01$). Boundary events elicited higher Manner verb use than non-boundary events ($B = -0.37$, $SE = 0.07$, $t = -5.13$, $p < .01$). An interaction between test language and boundary-crossing status was also significant ($p < .01$), suggesting that the difference in Manner verb use was more pronounced for boundary-crossing events. EN speakers describing boundary-crossing events had a higher mean Manner Verb use ($M = 1.19$) compared to PT speakers ($M = 0.83$, $B = 0.35$, $SE = 0.07$, $p < .01$). For non-boundary events, EN speakers also had a higher Manner verb use ($M = 0.82$) compared to PT speakers ($M = 0.70$). Finally, EN speakers also used more Manner verbs in boundary-crossing than in non-boundary-crossing events ($B = 0.37$, $SE = 0.07$, $p < .01$).

Non-boundary events were associated with greater **Manner-Path** verb use ($B = 0.16$, $SE = 0.03$, $t = 5.22$, $p < .01$). There was no significant effect of test language, suggesting similar Manner-Path verb usage by both EN and PT speak-

ers. However, a significant interaction was found between test language and boundary-crossing events ($p < .01$), indicating that the increase in Manner-Path verb use for non-boundary events was more pronounced in EN speakers. EN speakers used Manner-Path verbs more frequently in non-boundary events ($M = 0.176$) compared to boundary events ($M = 0.014$, $p < .01$). For PT speakers, Manner-Path verb usage was also higher for non-boundary events ($M = 0.076$) compared to boundary events ($M = 0.014$). There was a significant difference in Manner-Path verb use for non-boundary events ($p < .01$), with EN speakers using more Manner-Path verbs.

Although PT speakers exhibited a marginally higher use of **Manner Adverbial Clauses** than EN speakers, this effect did not reach significance ($p = .09$). There was no significant interaction between test language and elicitation type ($p = .30$). PT speakers under delayed elicitation showed a higher mean Manner Adverbial Clause use ($M = 0.10$) compared to EN speakers ($M = 0.03$). In simultaneous elicitation, PT speakers also had a slightly higher mean ($M = 0.04$) compared to EN speakers ($M = 0.02$).

No significant main effect of test language was found, suggesting similar **Manner Adverbial** usage between EN and PT speakers ($p = 1.00$). Estimated marginal means revealed identical means for Manner Adverbial use between EN and BP speakers ($M = 0.08$ for both groups) with no significant difference ($B = -6.5 \times 10^{-18}$, $SE = 0.03$, $p = 1.00$).

EN speakers used more **Motion Generic** verbs than PT speakers ($B = -0.17$, $SE = 0.04$, $t = -4.22$, $p < .001$). Non-boundary events elicited fewer Motion Generic verbs than boundary events ($B = -0.10$, $SE = 0.03$, $t = -2.95$, $p < .01$). An interaction was found between test language and the boundary-crossing condition ($p < .01$). For boundary-crossing events, EN speakers used more Motion Generic verb ($M = 0.178$) than PT speakers ($M = 0.007$, $B = 0.17$, $SE = 0.04$, $p < .01$). In non-boundary events, EN speakers also showed higher usage ($M = 0.076$) than PT speakers ($M = 0.017$). EN speakers also used more Motion Generic verbs in boundary events compared to non-boundary events ($B = 0.10$, $SE = 0.03$, $p < .05$).

For boundary events under delayed elicitation, EN speakers used more **Path prepositions** on average ($M = 1.621$) compared to PT speakers ($M = 0.650$). Similarly, in boundary events under simultaneous elicitation, EN speakers again demonstrated higher use of Path prepositions ($M = 1.740$) than PT speakers ($M = 0.526$). For non-boundary events, EN speakers continued to use more Path prepositions than PT speakers ($M = 1.308$) for delayed elicitation and 0.920 for simultaneous elicitation, compared to PT speakers' means of 0.592 and 0.337 , respectively. EN speakers used significantly more Path prepositions than PT speakers in boundary events, whether elicitation was delayed ($p < .01$) or simulta-

neous ($B=1.21$, $SE=0.15$, $p<.01$). In non-boundary-crossing events, EN speakers also used significantly more Path prepositions than PT speakers, for both delayed ($B=0.71$, $SE=0.16$, $p<.01$) and simultaneous elicitation ($B=0.58$, $SE=0.16$, $p<.01$). There was no significant difference in how EN speakers ($p=.43$) or PT speakers ($p=.91$) used Path prepositions in boundary than in non-boundary events under delayed elicitation.

PT speakers used significantly more **Path Verbs** than EN speakers ($B=0.42$, $SE=0.08$, $p<.01$), with simultaneous elicitation associated with greater Path Verb use than delayed elicitation ($p<.01$). PT speakers used fewer Path Verbs under simultaneous elicitation than EN speakers ($p<.01$). Simultaneous elicitation in non-boundary-crossing events were associated with lower Path Verb use ($B=-0.31$, $SE=0.12$, $p<.01$). For boundary-crossing events under delayed elicitation, PT speakers showed higher mean Path Verb use ($M = 0.476$) compared to EN speakers ($M = 0.047$, $B=-0.42$, $SE=0.08$, $p<.01$). Under simultaneous elicitation for boundary events, both groups exhibited moderate Path Verb use, though PT speakers still used more ($M = 0.369$, $B=0.38$, $SE=0.09$, $p<.01$) than EN speakers ($M=0.269$). In non-boundary-crossing events, PT speakers again used more Path Verbs than EN speakers in both delayed ($M=0.362$ vs. 0.079) and simultaneous ($M=0.136$ vs. -0.014) conditions.

6.2.2 Crosslinguistic Effects of the L1 on the L2

From L1 Portuguese to L2 English

Speakers at the Intermediate level showed significantly lower **Manner Bias** compared to Monolinguals ($B=-0.29$, $SE=0.11$, $p<.05$) (see Figure 6.2 for results, Figure 6.3 for trends, and Table 6.7 for significant numbers). Elicitation type also influenced Manner Bias, with simultaneous associated with a reduction in Manner Bias compared to delayed ($B=-0.17$, $SE=0.07$, $p<.05$). For boundary-crossing events under delayed elicitation, Monolingual speakers demonstrated the highest Manner Bias ($M=0.973$), followed by Advanced ($M=0.874$) and Intermediate users ($M=0.677$, $B=0.29$, $SE=0.11$, $p<.05$). However, the difference between Monolinguals and Advanced speakers was not significant ($p=.91$). In non-boundary-crossing events under the same condition, Manner Bias was higher among Monolingual speakers ($M=0.924$) compared to Advanced ($M=0.993$) and Intermediate users ($M=0.960$). Under simultaneous elicitation, Monolingual speakers showed the highest Manner Bias in non-boundary events ($M=0.977$), while Manner Bias was lower for Advanced and Intermediate across both boundary and non-boundary conditions. Intermediate speakers demon-

strated a marginally significant increase in Manner Bias in boundary vs. non-boundary events under simultaneous elicitation ($p < .01$).

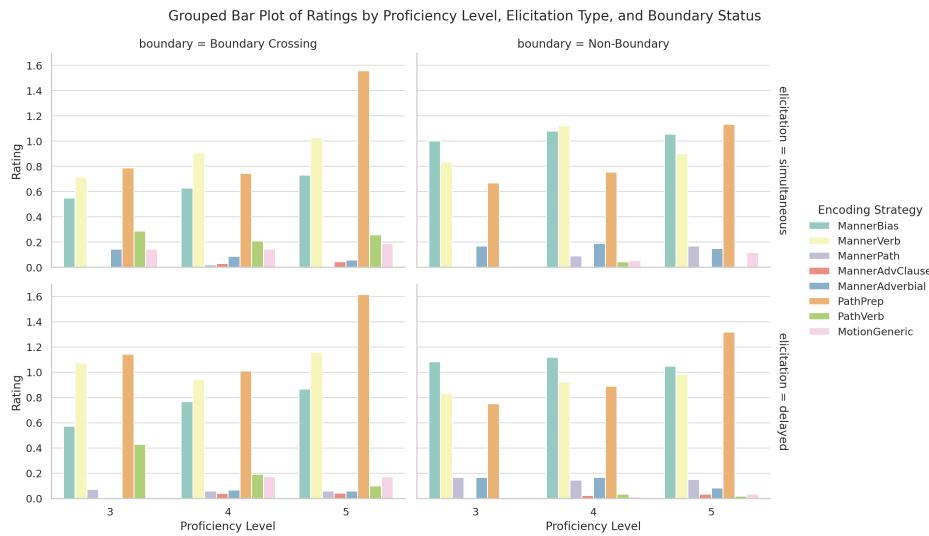


Figure 6.2: L2 English Learners' Motion Encoding Strategies (Results)

Intermediate speakers used significantly fewer **Manner Verbs** compared to Advanced ones ($B = -0.21$, $SE = 0.09$, $p = .03$). Additionally, non-boundary-crossing events were associated with a reduction in Manner Verb usage ($B = -0.23$, $SE = 0.11$, $p < .05$). Simultaneous elicitation was a contributing factor ($B = -0.40$, $SE = 0.16$, $p < .05$). For boundary-crossing events under delayed elicitation, Monolinguals had the highest Manner Verb usage ($M = 1.184$), followed by Intermediate ($M = 1.098$) and Advanced ($M = 0.970$).



Figure 6.3: L2 English Learners' Motion Encoding Strategies (Trends)

There was a significant effect of boundary-crossing status on **Manner-Path** verb usage, with non-boundary-crossing events associated with a higher frequency of Manner-Path Verbs ($B = 0.137$, $SE = 0.046$, $p < .01$). However, no significant main effects were found for proficiency level or elicitation type, nor were

there significant interactions among proficiency, boundary, and elicitation factors, indicating that boundary-crossing status alone may play a more influential role in Manner-Path Verb selection.

No significant effects were found for proficiency level or boundary-crossing status, nor were there significant interactions between proficiency level and boundary status, indicating that these factors may not influence **Manner Adverbial Clause** or **Manner Adverbials** usage. Similarly, the results indicate that proficiency level, boundary-crossing status, and elicitation type had minimal impact on the use of **Motion Generics** altogether.

Advanced speakers showed lower **Path Preposition** use compared to Monolinguals ($B=-0.6048$, $SE=0.1460$, $p<.01$), indicating that proficiency affects Path Preposition use. Non-boundary events were associated with reduced Path Preposition use ($B=-0.3328$, $SE=0.1521$, $p=.02$), and simultaneous elicitation in non-boundary events further decreased use ($B=-0.4862$, $SE=0.2263$, $p=.03$). Monolinguals used more Path Prepositions during delayed elicitation of boundary events ($M=1.63$) than Advanced speakers ($M=1.03$). Intermediate speakers had the lowest usage in non-boundary, simultaneous elicitation ($M=0.45$). Monolinguals in boundary, delayed conditions showed significantly higher use than both Advanced speakers in the same condition ($B=0.6048$, $SE=0.146$, $p<.01$) and Monolinguals in non-boundary, simultaneous conditions ($B=0.7100$, $SE=0.138$, $p<.01$).

Table 6.5: Between-Group Comparisons: L2 English

Type	Contrast	Estimate	SE	DF	t.ratio	p.value
Manner Bias	INT bound delayed - MONO bound simul	0.27769	0.0711	278	3.907	0.0065
Manner-Path	MONO bound delayed - MONO nonbound simul	-0.15467	0.0418	661	-3.704	0.0123
	ADV bound delayed - MONO nonbound simul	-0.15467	0.0388	346	-3.991	0.0045
	MONO nonbound delayed - MONO bound simul	0.195	0.0418	661	4.67	0.0002
	MONO nonbound delayed - ADV bound simul	0.17595	0.0388	346	4.54	0.0005
	ADV nonbound delayed - MONO bound simul	0.18945	0.0382	335	4.955	0.0001
	ADV nonbound delayed - ADV bound simul	0.1704	0.0349	663	4.878	0.0001
	MONO bound simul - MONO nonbound simul	-0.21271	0.0467	663	-4.556	0.0004
	ADV bound simul - MONO nonbound simul	-0.19366	0.044	444	-4.399	0.0008
Path prep	MONO bound delayed - ADV bound delayed	0.60476	0.146	78.9	4.141	0.0046
	MONO bound delayed - ADV nonbound delayed	0.76058	0.169	129.4	4.51	0.0009
	MONO bound delayed - ADV bound simul	0.70526	0.158	104.7	4.451	0.0012
	MONO bound delayed - INT nonbound simul	1.17666	0.292	95.8	4.031	0.006
	ADV bound delayed - MONO bound simul	-0.71378	0.158	104.7	-4.504	0.001
	ADV bound delayed - ADV nonbound simul	0.48301	0.115	665.9	4.183	0.0019
	MONO nonbound delayed - ADV nonbound simul	0.75497	0.169	132.1	4.457	0.001
	INT nonbound delayed - MONO bound simul	-1.00849	0.292	95.8	-3.454	0.0371
	MONO bound simul - INT nonbound simul	1.28568	0.299	104.6	4.294	0.0022
Path Verb	MONO bound delayed - ADV bound delayed	0.60476	0.146	78.9	4.141	0.0046
	MONO bound delayed - ADV nonbound delayed	0.76058	0.169	129.4	4.51	0.0009
	MONO bound delayed - ADV bound simul	0.70526	0.158	104.7	4.451	0.0012
	MONO bound delayed - INT nonbound simul	1.17666	0.292	95.8	4.031	0.006
	ADV bound delayed - MONO bound simul	-0.71378	0.158	104.7	-4.504	0.001
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	INT nonbound delayed - MONO bound simul	-1.00849	0.292	95.8	-3.454	0.0371
	MONO bound simul - INT nonbound simul	1.28568	0.299	104.6	4.294	0.0022

Intermediate speakers showed significantly higher **Path Verb** use than Monolinguals ($B=0.3286$, $SE=0.0983$, $p<.01$), suggesting a role of proficiency in Path Verb elaboration. Simultaneous elicitation increased overall Path Verb use ($B=0.2097$, $SE=0.0568$, $p<.01$). Contextual interactions showed reduced Path Verb use by Intermediate speakers in non-boundary events ($B=-0.3452$, $SE=0.1309$, $p<.01$) and simultaneous elicitation ($B=-0.3000$, $SE=0.1257$, $p<.05$). Non-boundary, simultaneous elicitation led to decreased Path Verb use across all proficiency levels ($B=-0.2876$, $SE=0.0922$, $p<.01$). Monolinguals used Path Verbs most frequently in boundary events with delayed elicitation ($M=1.63$), while Intermediate speakers showed low use in non-boundary, simultaneous elicitation ($M=0.45$). Pairwise contrasts revealed Monolinguals in boundary, delayed elicitation conditions used Path Verbs more than Advanced speakers in the same condition ($B=0.6048$, $SE=0.146$, $p<.01$) and Monolinguals in non-boundary, simultaneous conditions ($B=0.7100$, $SE=0.138$, $p<.01$).

Lexical Diversity: English

The most frequently used Manner Verbs can be seen in Figure 6.4. The Shannon Entropy scores for **Manner Verbs** reveal a clear trend in verb variety and unpre-

dictability (Table 6.6). Monolingual speakers achieve the highest entropy (3.13), indicating a broader and more even use of Manner Verbs compared to other groups. Advanced learners show substantial, though slightly reduced, diversity, suggesting that their verb usage is somewhat predictable and limited compared to Monolinguals. Intermediate learners have the lowest entropy (2.20), implying a narrower range of Manner Verbs and a tendency toward repetitive usage.

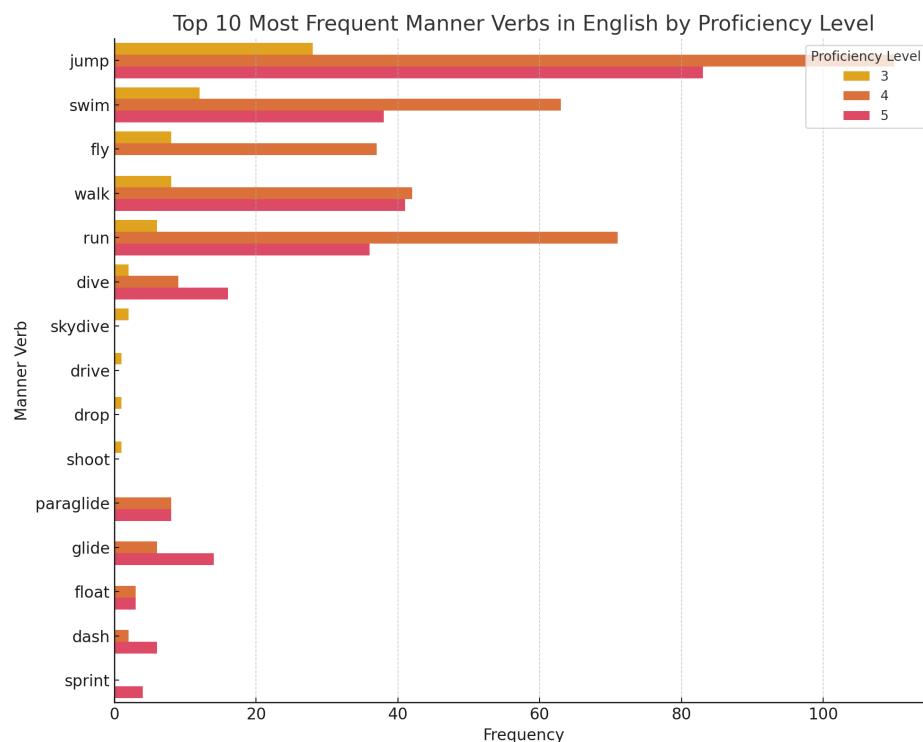


Figure 6.4: Lexical Diversity: Manner verbs (English)

The Guiraud Index, which considers the number of unique verbs relative to the sample size, also highlights a strong trend in lexical richness. Monolinguals rank highest with a Guiraud Index of 1.28, reflecting a rich and varied use of unique Manner Verbs. Intermediate learners rank second (1.04), suggesting an effort to use diverse Manner Verbs despite their lower proficiency. Advanced learners have the lowest Guiraud Index (0.77), indicating a more restricted variety relative to the total number of verbs used.

For **Path Prepositions** (Figure 6.5), Shannon Entropy again shows Monolinguals with the highest diversity score (4.71), indicating a broad and varied use of prepositions. Advanced learners follow closely, showing diverse but slightly more predictable usage than Monolinguals. Intermediate learners exhibit the lowest entropy (3.22), suggesting a more constrained and repetitive pattern in their choice of Path Prepositions. In terms of richness, as measured by Guiraud's

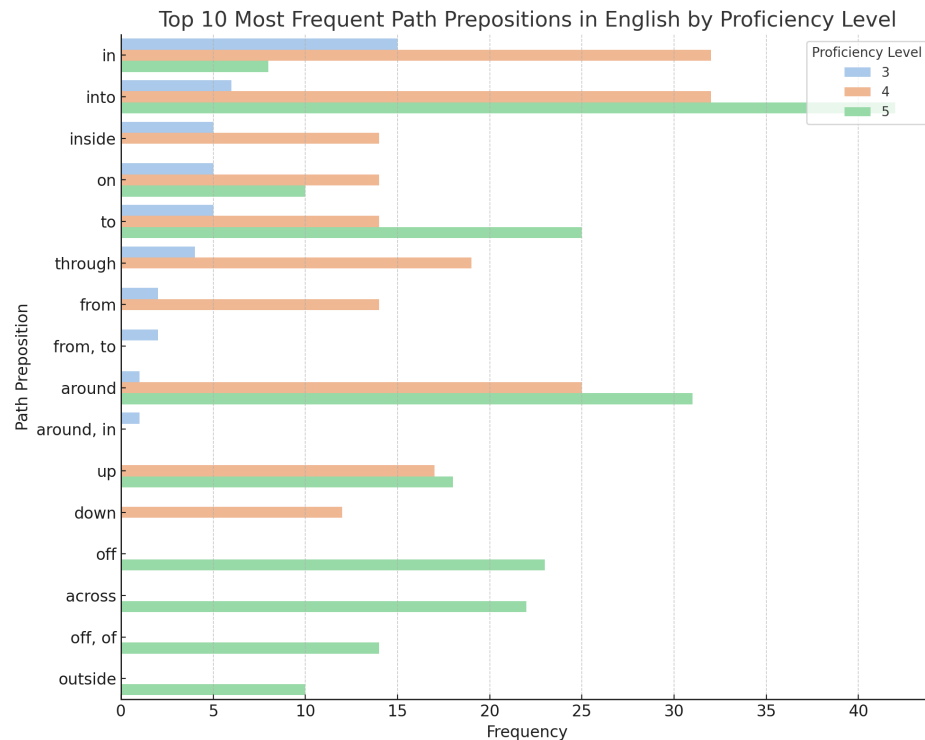


Figure 6.5: Lexical Diversity: Path Prepositions (English)

Index, Monolinguals again display the richest vocabulary (3.21) for Path Prepositions. Advanced learners follow with a score of 2.85, reflecting good diversity though not as extensive as Monolinguals. Intermediate learners have the lowest richness score (2.08), showing the least variety in their use of Path Prepositions.

From L1 English to L2 Portuguese

Figure 6.6 shows the results and Figure 6.7 illustrates the trends for Portuguese learners. No significant effects were found for proficiency level or boundary status on **Manner Bias** (see Table 6.7 for all significant numbers). Proficiency ($F(2, 52.00) = 0.27$; $p > .5$ for Elementary, $p > .5$ for Intermediate) did not significantly affect Manner Bias, indicating no differences across levels. Similarly, boundary-crossing status did not predict Manner Bias ($B = 0.10$, $SE = 0.068$, $t(570.76) = 1.48$, $p < .5$), showing consistency between boundary-crossing and non-boundary-crossing events. Interaction effects between proficiency and boundary status were also non-significant ($p > .5$). Descriptively, non-boundary events had slightly higher Manner Bias scores across all proficiency levels, especially for Interme-

Table 6.6: Guiraud's Index and Shannon's Entropy for Manner Verb and Path Preposition Usage in English

	Proficiency	Shannon Entropy	Guiraud Index
Manner Verb	Advanced	2.731376774	0.770498245
	Intermediate	2.200453788	1.043498389
	Monolingual	3.132661039	1.282779166
Path Preposition	Advanced	4.591687328	2.848067149
	Intermediate	3.223395148	2.081665999
	Monolingual	4.705375811	3.211820274

Intermediate speakers ($M=0.946$, $SE=0.096$). Monolinguals displayed lower Manner Bias in boundary contexts ($M=0.736$, $SE=0.081$) than in non-boundary ones ($M=0.837$, $SE=0.083$), although these differences were not statistically significant.

The analysis found no significant effect of proficiency level on **Manner Verb** usage. Elementary ($B=-0.021$, $p>.5$) and Intermediate ($B=0.021$, $p>.5$) speakers did not differ from Monolinguals. Boundary-crossing status also showed no significant effect ($p>.5$). Proficiency level had no significant effect for either Elementary ($B=-0.037$, $p=.15$) or Intermediate speakers ($B=.019$, $p=.521$) compared to Monolinguals, suggesting proficiency did not impact **Manner-Path Verb** usage. Pairwise comparisons showed no significant differences between proficiency levels (all $p>.05$). Proficiency level (the only relevant effect for the model) also had no significant effect on either Elementary ($B=-0.044$, $p=.1$) or Intermediate speakers ($B=-0.050$, $p=.1$) compared to Monolinguals for **Manner Adverbial Clauses**.

The analysis found no significant effects for proficiency level or boundary-crossing status on **Manner Adverbial** usage. Neither Proficiency level (Elementary: $B=-0.005$, $p=.90$; Intermediate: $B=.036$, $p=.49$) nor boundary status ($B=.052$, $p=.169$) influenced Manner Adverbial usage. Interaction effects between proficiency and boundary status were also non-significant, (Elementary: $B=.016$, $p=.76$; Intermediate: $B=0.039$, $p=0.515$). Descriptive trends suggested higher Manner Adverbial usage in non-boundary contexts, particularly for Intermediate speakers ($M=0.188$).

Proficiency effects were non-significant for both Elementary ($B=0.013$, $SE=0.026$, $t(20)=0.48$, $p>.5$) and Intermediate speakers ($B=0.050$, $SE=0.030$, $t(20)=1.65$, $p<.5$) for **Motion Generics**. Tukey-adjusted pairwise comparisons revealed no significant differences between proficiency levels (all $p>.5$). Estimated marginal



Figure 6.6: L2 Portuguese Learners' Motion Encoding Strategies (Results)

means indicated slightly higher usage by Intermediate speakers ($M=0.062$, $SE=0.025$) compared to Monolingual ($M=0.012$, $SE=0.018$) and Elementary speakers ($M=0.024$, $SE=0.020$). These were not statistically significant.



Figure 6.7: L2 Portuguese Learners' Motion Encoding Strategies (Trends)

The analysis showed that simultaneous elicitation significantly reduced **Path Preposition** usage compared to delayed elicitation ($B=-0.236$, $SE=0.100$, $t(505.19)=-2.37$, $p=.01$). Proficiency level and boundary-crossing status had no significant effects: Elementary ($B=-0.018$, $SE=0.168$, $t(34.24)=-0.11$, $p=.91$) and Intermediate speakers ($B=0.186$, $SE=0.194$, $t(34.24)=0.96$, $p=.34$) did not differ from Monolinguals, and boundary-crossing status ($B=-0.048$, $SE=0.109$, $t(457.19)=-0.44$, $p=0.658$) was not predictive. No significant interaction effects were found, including between Intermediate proficiency, non-boundary events, and simultaneous elicitation ($B=-0.155$, $SE=0.230$, $t(553.88)=-0.67$, $p=.502$). Pairwise com-

parisons showed no significant differences across proficiency levels and contexts (all $p > 0.05$).

There were significant effects of the intercept and proficiency level. Monolinguals had a strong baseline tendency to use **Path Verbs** ($B = 0.413$, $SE = 0.070$, $t(36.29) = 5.92$, $p < .01$). Elementary speakers used significantly fewer Path Verbs than Monolinguals ($B = -0.238$, $SE = 0.089$, $t(27.92) = -2.67$, $p < .01$), while Intermediate speakers showed no difference from the baseline group ($B = -0.171$, $SE = 0.103$, $t(27.92) = -1.67$, $p = .10$). Boundary-crossing events were associated with higher Path Verb usage than non-boundary events ($B = -0.153$, $SE = 0.055$, $t(544.13) = -2.78$, $p < .01$). Interaction effects between proficiency and boundary-crossing were non-significant. Tukey-adjusted comparisons showed Monolinguals in boundary contexts used significantly more Path Verbs than Elementary ($B = 0.285$, $SE = 0.093$, $t(33.4) = 3.05$, $p < .05$) and Intermediate speakers in non-boundary contexts ($B = 0.345$, $SE = 0.107$, $t(32.8) = 3.22$, $p < .05$). Other comparisons were non-significant (all $p > .05$).

Table 6.7: Between-Group Comparisons: L2 Portuguese

Type	Contrast	Estimate	SE	df	t.ratio	p.value
Manner Bias	MONO bound - ELE bound	-0.02202	0.068144	52.0038	-0.3232	0.999503
	MONO bound - INTER bound	-0.02143	0.078686	52.0038	-0.27233	0.999785
	ELE bound - INTER bound	0.000595	0.081899	52.0038	0.007268	1
	ELE bound - ELE nonbound	-0.09123	0.07454	571.9012	-1.22385	0.825137
	INTER bound - INTER nonbound	-0.1887	0.091363	571.0654	-2.06534	0.307103
	MONO nonbound - ELE nonbound	-0.01285	0.072716	66.6523	-0.17668	0.999975
	MONO nonbound - INTER nonbound	-0.10972	0.083966	66.6523	-1.30675	0.780308
	ELE nonbound - INTER nonbound	-0.09688	0.087394	66.6523	-1.10848	0.876194
Manner Verb	MONO bound - ELE bound	0.021429	0.083283	39.08618	0.257299	0.999834
	MONO bound - INTER bound	-0.02143	0.096167	39.08618	-0.22283	0.999918
	ELE bound - INTER bound	-0.04286	0.100093	39.08618	-0.42817	0.998027
	ELE bound - ELE nonbound	0.094084	0.078929	571.1393	1.192003	0.840699
	INTER bound - INTER nonbound	0.180691	0.096654	568.8198	1.869473	0.422157
	MONO nonbound - ELE nonbound	-0.01875	0.087488	47.36755	-0.21431	0.999934
	MONO nonbound - INTER nonbound	0.025	0.101023	47.36755	0.247469	0.999865
	ELE nonbound - INTER nonbound	0.04375	0.105148	47.36755	0.416081	0.998303
Manner-Path	MONO - ELE	0.0375	0.025468	20	1.472435	0.324836
	MONO - INTER	-0.01923	0.029408	20	-0.65393	0.792309
	ELE - INTER	-0.05673	0.030609	20	-1.85342	0.178322
Manner AdvCl	MONO - ELE	0.044231	0.030419	20	1.454063	0.333496
	MONO - INTER	0.05	0.035125	20	1.423507	0.348215
	ELE - INTER	0.005769	0.036559	20	0.157807	0.986374
Manner Adv	MONO bound - ELE bound	0.005357	0.044535	39.73013	0.120291	0.999996
	MONO bound - INTER bound	-0.03571	0.051425	39.73013	-0.6945	0.981524
	ELE bound - INTER bound	-0.04107	0.053524	39.73013	-0.76734	0.971431
	ELE bound - ELE nonbound	-0.06778	0.041922	540.4226	-1.61679	0.587756
	INTER bound - INTER nonbound	-0.09129	0.051631	565.396	-1.76815	0.487301
	MONO nonbound - ELE nonbound	-0.01042	0.046829	48.32094	-0.22244	0.99992
	MONO nonbound - INTER nonbound	-0.075	0.054074	48.32094	-1.387	0.734447
	ELE nonbound - INTER nonbound	-0.06458	0.056282	48.32094	-1.1475	0.858846
Motion Generic	MONO - ELE	-0.0125	0.026177	20	-0.47752	0.882614
	MONO - INTER	-0.05	0.030227	20	-1.65417	0.247067
	ELE - INTER	-0.0375	0.031461	20	-1.19196	0.471441
Path Preposition	MONO bound delayed - ELE bound delayed	0.017857	0.168159	34.24301	0.106192	1
	MONO bound delayed - INTER bound delayed	-0.18571	0.194173	34.24301	-0.95644	0.997742
	MONO bound delayed - MONO nonbound delayed	0.048237	0.110303	458.4245	0.437316	0.999999
	MONO bound delayed - MONO bound simul	0.235977	0.10074	505.9536	2.342443	0.447797
	ELE bound delayed - INTER bound delayed	-0.20357	0.202101	34.24301	-1.00727	0.99647
	ELE bound delayed - ELE nonbound delayed	0.13038	0.119897	492.8406	1.087432	0.995118
	ELE bound delayed - ELE bound simul	0.096691	0.110396	529.9155	0.875858	0.999311
	INTER bound delayed - INTER nonbound delayed	0.333951	0.144918	541.0234	2.304419	0.474676
	INTER bound delayed - INTER bound simul	0.364548	0.13529	557.5395	2.69457	0.231638
	MONO nonbound delayed - ELE nonbound delayed	0.1	0.172645	37.97935	0.579223	0.999982
	MONO nonbound delayed - INTER nonbound delayed	0.1	0.199353	37.97935	0.501622	0.999996
	MONO nonbound delayed - MONO nonbound simul	0.124694	0.110578	484.6674	1.127657	0.993339
	ELE nonbound delayed - INTER nonbound delayed	2.19E-16	0.207494	37.97935	1.05E-15	1
	ELE nonbound delayed - ELE nonbound simul	0.220527	0.120855	514.2196	1.824722	0.803821
	INTER nonbound delayed - INTER nonbound simul	0.408027	0.14745	551.3384	2.767223	0.197162
	MONO bound simul - ELE bound simul	-0.12143	0.168159	34.24301	-0.72211	0.999831
	MONO bound simul - INTER bound simul	-0.05714	0.194173	34.24301	-0.29429	1
	MONO bound simul - MONO nonbound simul	-0.06305	0.110303	458.4245	-0.57157	0.999999
	ELE bound simul - INTER bound simul	0.064286	0.202101	34.24301	0.318086	1
	ELE bound simul - ELE nonbound simul	0.254217	0.119897	492.8406	2.120288	0.608422
	INTER bound simul - INTER nonbound simul	0.377431	0.144918	541.0234	2.604447	0.279711
	MONO nonbound simul - ELE nonbound simul	0.195833	0.172645	37.97935	1.134311	0.990862
	MONO nonbound simul - INTER nonbound simul	0.383333	0.199353	37.97935	1.922883	0.738259
	ELE nonbound simul - INTER nonbound simul	0.1875	0.207494	37.97935	0.903642	0.998683
Path Verb	MONO bound - ELE bound	0.2375	0.088898	27.91724	2.671592	0.113367
	MONO bound - INTER bound	0.171429	0.102651	27.91724	1.670015	0.561704
	ELE bound - INTER bound	-0.06607	0.106842	27.91724	-0.6184	0.988727
	ELE bound - ELE nonbound	0.046959	0.061059	557.872	0.769073	0.972582
	INTER bound - INTER nonbound	0.173447	0.075059	570.2815	2.310807	0.191312
	MONO nonbound - ELE nonbound	0.13125	0.091338	31.07925	1.436967	0.704904
	MONO nonbound - INTER nonbound	0.191667	0.105468	31.07925	1.817292	0.469889
	ELE nonbound - INTER nonbound	0.060417	0.109775	31.07925	0.550369	0.993447

Lexical Diversity: Portuguese

The analysis of lexical diversity among Portuguese speakers of varying proficiency levels, measured by Shannon Entropy and the Guiraud Index, reveals notable differences in lexical diversity and richness of Manner verbs (Figure 6.8) and Path prepositions (Figure 6.9). For **Manner verbs**, Monolingual speakers exhibit the highest Shannon Entropy (3.04) (Table 6.8), indicating a broad and unpredictable selection of Manner Verbs, closely followed by Elementary learners (3.01), who also show substantial diversity. Intermediate learners display the lowest entropy (2.75), reflecting a more predictable and constrained range of verb choices. Similarly, the Guiraud Index, which assesses lexical richness by accounting for unique verbs relative to total usage, ranks Monolinguals highest (1.19), suggesting a more extensive and varied vocabulary. Elementary learners, with a Guiraud Index of 1.11, demonstrate a moderate level of lexical richness, while Intermediate learners show the lowest richness (0.95), indicating a limited verb repertoire. These results suggest that proficiency level is positively associated with both lexical diversity and richness, with Monolingual speakers showing the greatest variety and richness in Manner Verb usage, followed by Elementary learners, while Intermediate learners rely on a narrower, more predictable set of verbs.

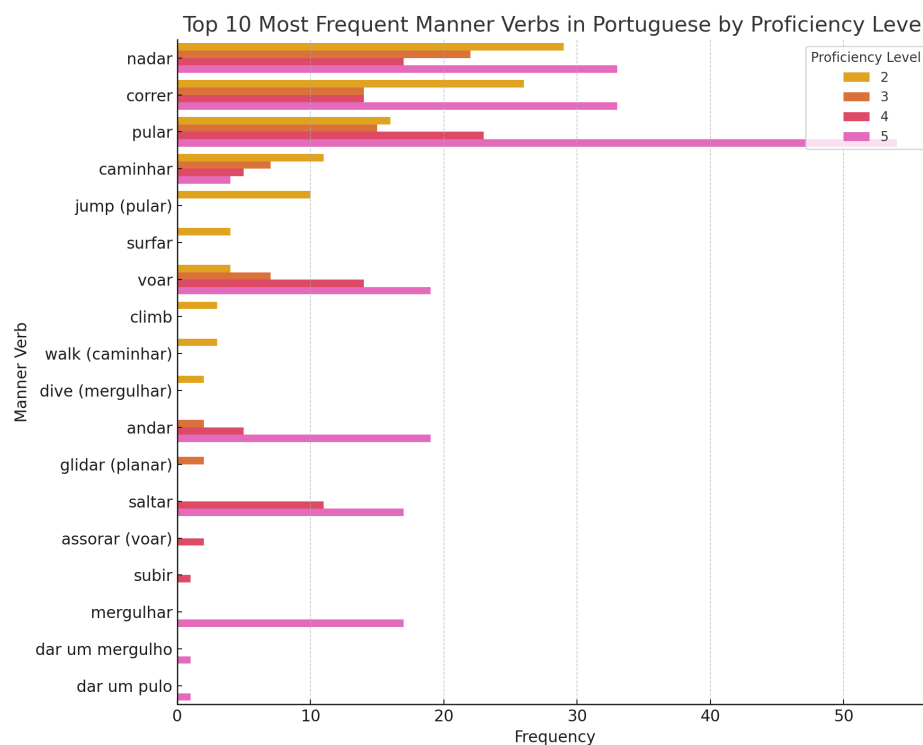


Figure 6.8: Lexical Diversity: Manner Verbs (Portuguese)

For **Path Preposition**, Elementary speakers exhibit the highest Shannon Entropy score (3.50), indicating a wide and varied use of Path Prepositions. This suggests that Elementary learners may experiment with different prepositions, resulting in greater diversity. Monolingual speakers follow with an entropy score of 2.77, indicating moderately diverse but more predictable usage compared to Elementary speakers. Intermediate speakers display the lowest entropy (2.28), suggesting a narrower and more repetitive selection of Path Prepositions, likely reflecting a reliance on familiar or limited vocabulary. In terms of lexical richness, as measured by the Guiraud Index, Elementary speakers again show the highest score (2.96), indicating a rich variety of unique Path Prepositions relative to total use. Monolingual speakers have a moderate Guiraud Index (1.83), reflecting a fairly diverse set but less variety than Elementary speakers. Intermediate speakers have the lowest richness (1.50), suggesting a constrained selection of Path Prepositions with more frequent repetition.

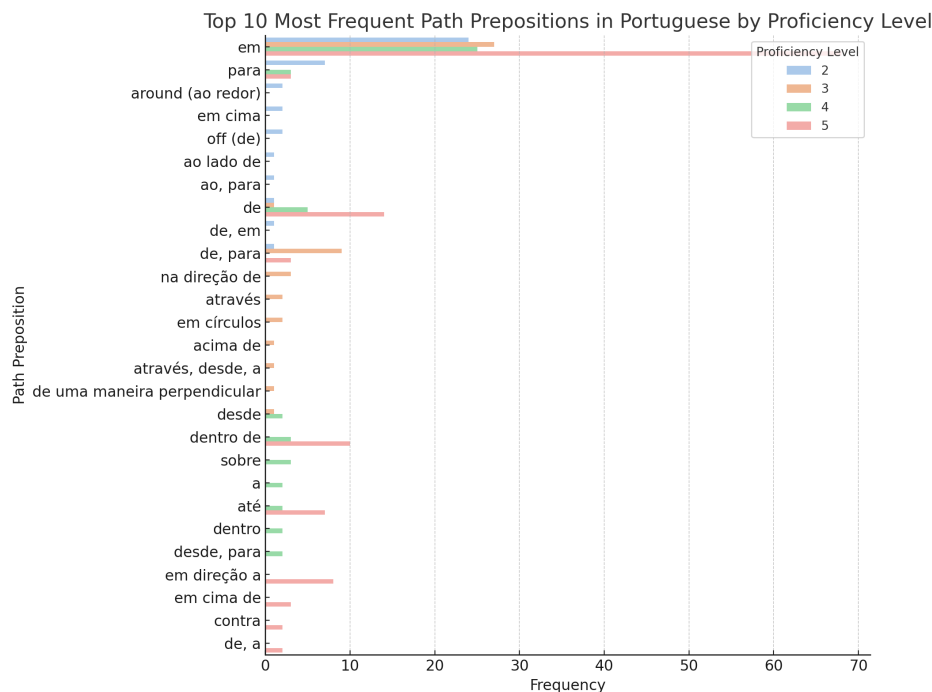


Figure 6.9: Lexical Diversity: Path Prepositions (Portuguese)

6.2.3 Crosslinguistic Effects of the L2 on the L1

From L2 English to L1 Portuguese

The analysis revealed a significant overall mean for **Manner Bias** ($B=0.807$, $SE=0.092$, $p<.01$), indicating a moderate level within the sample (see Figure

Table 6.8: Guiraud's Index and Shannon's Entropy for Manner Verb and Path Preposition Usage in Portuguese

	Proficiency	Shannon Entropy	Guiraud Index
Manner Verbs	Elementary	3.005365937	1.108831906
	Intermediate	2.745621025	0.948683298
	Monolingual	3.035143909	1.187331503
Path Prepositions	Elementary	3.498637532	2.955987834
	Intermediate	2.277567098	1.496910398
	Monolingual	2.768743589	1.827815388

6.10 for results and Figure 6.11 for trends). Proficiency level had minimal impact, with non-significant effects for Intermediate ($B=-0.1881$, $SE=0.1427$, $p=.18$) and Advanced speakers ($B=-0.0079$, $SE=0.0752$, $p=.91$) compared to Monolinguals. Boundary-crossing status ($B=0.0464$, $SE=0.0952$, $p=.62$) and elicitation type ($B=-0.1151$, $SE=0.0872$, $p=.18$) also showed no significant effects. Interactions between proficiency, boundary status, and elicitation type were non-significant. Pairwise contrasts showed no significant differences, except a borderline significant effect between Advanced speakers in non-boundary, simultaneous contexts and Monolinguals in boundary, simultaneous contexts ($p=.03$). All results are reported in Table 6.9.

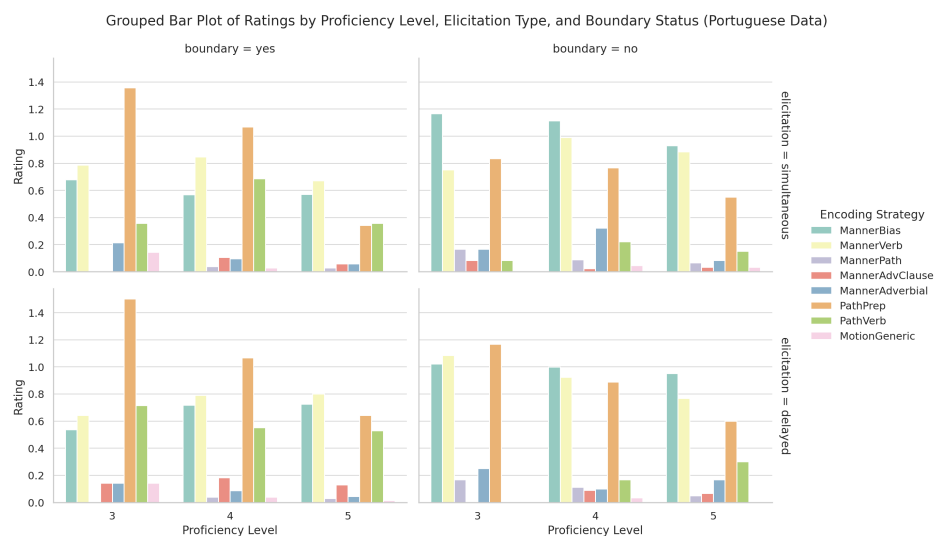


Figure 6.10: Effects of L2 English Proficiency on L1 Portuguese

Proficiency differences were non-significant for Intermediate ($B=-0.157$, $SE=0.188$, $p=0.404$) and Advanced speakers ($B=-0.010$, $SE=0.099$, $p=.92$) com-

pared to Monolinguals, suggesting minimal impact of proficiency on the use of **Manner Verbs**. Non-boundary events showed a non-significant trend towards lower Manner Verb use ($B=-0.209$, $SE=0.122$, $p=.08$). Simultaneous elicitation also had no significant effect ($B=-0.033$, $SE=0.112$, $p=.76$). An interaction between Intermediate speakers and boundary-crossing approached significance ($B=0.474$, $SE=0.255$, $p=.06$), suggesting boundary-crossing may slightly increase Manner Verb use for this group. In simultaneous, non-boundary contexts, Intermediate speakers showed the lowest use ($M=0.544$), while Advanced speakers had the highest ($M=1.024$).

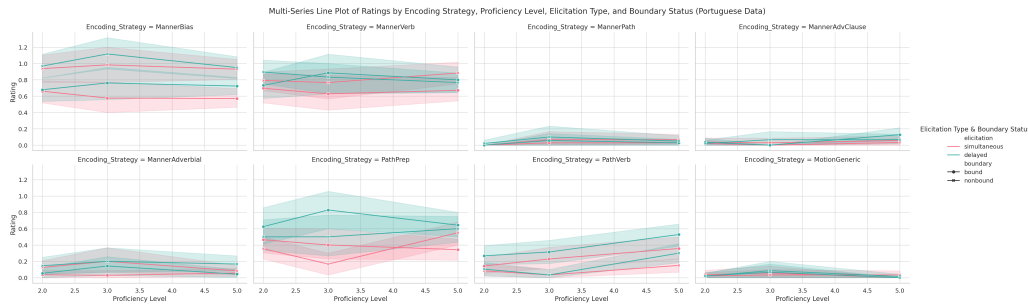


Figure 6.11: Effects of L2 English Proficiency on L1 Portuguese (Trends)

Proficiency effects were non-significant, with Intermediate ($B=-0.029$, $SE=0.053$, $p=.59$) and Advanced speakers ($B=0.010$, $SE=0.028$, $p=.73$) showing no differences from Monolinguals for **Manner-Path Verb** use. Non-boundary events showed a non-significant trend toward increased usage ($B=0.045$, $SE=0.030$, $p=.12$). A significant interaction between Intermediate speakers and boundary-crossing status ($B=0.137$, $SE=0.068$, $p=.04$) indicated higher Manner-Path Verb use in non-boundary contexts for Intermediate speakers. Pairwise contrasts showed significant differences between contexts. Advanced speakers used Manner-Path Verbs significantly more in non-boundary than boundary contexts ($B=-0.078$, $SE=0.026$, $p=.02$).

For **Manner Adverbial Clause** use, proficiency effects were also not significant, with Intermediate ($B=0.014$, $SE=0.091$, $p=.87$) and Advanced speakers ($B=0.052$, $SE=0.048$, $p=.27$) showing no differences from Monolinguals. Boundary-crossing status ($B=-0.035$, $SE=0.054$, $p=.519$) and elicitation mode ($B=-0.034$, $SE=0.050$, $p=.490$) also had no significant effects. Tukey-adjusted pairwise contrasts showed few significant differences, but Advanced speakers used Manner Adverbial Clauses more in non-boundary, delayed contexts compared to boundary-crossing, simultaneous contexts ($B=0.175$, $SE=0.042$, $p=0.002$).

Table 6.9: Between-Group Comparisons: L1 Portuguese

Type	Contrast	Estimate	SE	DF	t.ratio	p.value
Manner Bias	ADV bound simul - ADV nonbound simul	-0.285401	0.0834	629	-3.424	0.0319
Manner-Path	INT bound - INT nonbound	-0.18237	0.0628	669.7	-2.905	0.0438
	ADV bound - ADV nonbound	-0.07761	0.0255	604.7	-3.047	0.029
Manner AdvCl	ADV bound delayed - ADV nonbound simul	0.174643	0.0421	617	4.144	0.0023
Manner Adv	MONO bound delayed - ADV nonbound simul	-0.23916	0.0606	162	-3.946	0.0064
	ADV bound delayed - ADV nonbound simul	-0.1963	0.0501	665	-3.917	0.0056
	MONO nonbound simul - ADV nonbound simul	-0.23889	0.0599	157	-3.988	0.0056
Motion Generic	MONO bound - INT bound	-0.13571	0.0342	80.6	-3.968	0.0021
	INT bound - ADV bound	0.10952	0.0332	80.6	3.295	0.0177
	INT bound - MONO nonbound	0.12661	0.0357	92.9	3.55	0.0078
	INT bound - INT nonbound	0.14327	0.0467	671.5	3.067	0.0272
	INT bound - ADV nonbound	0.10438	0.0346	92	3.018	0.0375
Path prep	INT bound delayed - MONO nonbound delayed	0.99629	0.2722	64.6	3.661	0.0235
	INT bound delayed - MONO bound simul	1.09293	0.2674	60.4	4.088	0.0067
	INT bound delayed - MONO nonbound simul	1.1212	0.2666	59.9	4.206	0.0046
	INT bound delayed - INT nonbound simul	0.83787	0.2473	657.9	3.388	0.0358
	INT bound delayed - ADV nonbound simul	0.90454	0.2587	59.6	3.496	0.0387
	ADV bound delayed - MONO nonbound delayed	0.56295	0.1559	86.9	3.611	0.0241
	ADV bound delayed - MONO bound simul	0.6596	0.1474	70.8	4.476	0.0016
	ADV bound delayed - MONO nonbound simul	0.68787	0.146	69.1	4.712	0.0007
	ADV bound delayed - ADV nonbound simul	0.4712	0.0961	665.5	4.903	0.0001
	MONO nonbound delayed - INT bound simul	-0.91764	0.2666	59.9	-3.442	0.0447
	MONO nonbound delayed - ADV bound simul	-0.62717	0.146	69.1	-4.297	0.003
	ADV nonbound delayed - ADV bound simul	-0.33828	0.0961	665.5	-3.52	0.0232
	MONO bound simul - INT bound simul	-1.01429	0.2625	56.5	-3.864	0.0139
	MONO bound simul - ADV bound simul	-0.72381	0.1383	56.5	-5.232	0.0002
	INT bound simul - MONO nonbound simul	1.04256	0.2722	64.6	3.831	0.0142
	ADV bound simul - MONO nonbound simul	0.75209	0.1559	86.9	4.824	0.0004
	ADV bound simul - ADV nonbound simul	0.55542	0.1106	564.6	4.84	0.0001
Path verb	ADV bound simul - MONO nonbound simul	0.4744	0.1193	115.2	3.976	0.0066
	ADV bound simul - ADV nonbound simul	0.4022	0.0912	493.1	4.41	0.0008

Intermediate ($B=0.100$, $SE=0.107$, $p=0.351$) and Advanced ($B=0.043$, $SE=0.056$, $p=.44$) speakers of EN did not differ from Monolinguals PT speakers in their use of **Manner Adverbials**. However, boundary-crossing events significantly increased Manner Adverbial Use ($B=0.160$, $SE=0.066$, $p=.01$), while elicitation mode ($B=0.080$, $SE=0.060$, $p=.18$) showed no significant effect. Boundary-crossing and elicitation mode interacted significantly ($B=-0.239$, $SE=0.098$, $p=.01$). A three-way interaction ($B=0.310$, $SE=0.104$, $p<.01$) indicated Advanced speakers used Manner Adverbials more frequently in simultaneous, boundary-crossing events.

For **Motion Generics**, proficiency level was significant, with Intermediate speakers using Motion Generic descriptions more than Monolinguals ($B=0.136$, $SE=0.034$, $p<.01$). Advanced speakers did not differ significantly from Monolinguals ($p=.14$). Boundary-crossing status had no effect ($B=0.009$, $SE=0.022$, $p=.67$).

Proficiency significantly influenced the use of **Path Prepositions**, with Intermediate ($B=0.857$, $SE=0.263$, $p<.01$) and Advanced speakers ($B=0.424$,

SE=0.138, $p < .01$) using more Path elaborations than Monolinguals, highlighting transfer from the L2. Simultaneous elicitation reduced Path Preposition use overall ($B = -0.236$, SE=0.116, $p < .05$), but Advanced speakers showed increased Path elaboration under the condition ($B = 0.300$, SE=0.136, $p < .05$). Estimated marginal means indicated higher Path Preposition use for Intermediate and Advanced speakers in boundary contexts, with simultaneous elicitation reducing usage across levels.

Intermediate speakers showed a significant decrease in **Path Verb** use for non-boundary events ($B = -0.486$, SE=0.223, $p < .05$), while Advanced speakers demonstrated increased usage in simultaneous elicitation contexts ($B = 0.305$, SE=0.113, $p < .01$). Estimated marginal means showed higher use in boundary contexts for Intermediate speakers ($M = 0.670$) compared to Monolinguals ($M = 0.484$). Simultaneous elicitation generally reduced usage across levels, except for Advanced speakers, who showed a slight increase. Pairwise contrasts highlighted that Advanced speakers used more Path Verbs in simultaneous-boundary contexts than Monolinguals in the same context ($B = 0.474$, SE=0.119, $p < .01$) and significantly more than Monolinguals in non-boundary-delayed contexts ($B = 0.402$, SE=0.091, $p < .01$).

From L2 Portuguese to L1 English

Proficiency level and boundary-crossing status had no significant effects on Manner Bias (Figures 6.12, 6.13, and Table 6.10: Elementary ($B = -0.071$, SE=0.074, $t(143.35) = -0.96$, $p = .33$) and Intermediate speakers ($B = 0.071$, SE=0.086, $t(143.35) = 0.82$, $p = .41$) did not differ from Monolinguals, nor did boundary-crossing status ($B = 0.009$, SE=0.080, $t(462.94) = 0.12$, $p = .90$). Simultaneous elicitation significantly reduced Manner Bias compared to delayed elicitation ($B = -0.197$, SE=0.073, $t(508.70) = -2.70$, $p < .01$). A significant interaction revealed higher Manner Bias in non-boundary events with simultaneous elicitation compared to boundary-crossing events ($B = 0.274$, SE=0.118, $t(373.24) = 2.31$, $p < .05$). Proficiency level did not significantly affect Manner Verb usage, as Elementary ($B = -0.146$, SE=0.087, $t(34.60) = -1.69$, $p = .10$) and Intermediate speakers ($B = -0.079$, SE=0.100, $t(34.60) = -0.78$, $p = .43$) showed no differences from Monolinguals. Interaction terms between proficiency and boundary-crossing were also non-significant.

The analysis found no significant effect of proficiency levels on Manner-Path verb usage. Monolinguals showed baseline usage ($B = 0.002$, SE=0.052, $t(15.22) = 0.045$, $p = .96$), with no significant differences for Elementary ($B = 0.007$, SE=0.028, $t(580) = 0.252$, $p = .80$) or Intermediate speakers ($B = 2.266 \times 10^{-16}$, SE=0.033, $t(580) = 0.000$, $p = 1.0$). Boundary-crossing status significantly influenced usage, with non-boundary events linked to higher Manner-Path verb use

($p < .01$). Interaction terms were non-significant, indicating no combined effects of proficiency and boundary status. Elementary ($B = -0.179$, $SE = 0.033$, $t(111.6) = -5.505$, $p < 0.001$) and Intermediate speakers ($B = -0.195$, $SE = 0.037$, $t(566.1) = -4.663$, $p < 0.001$) used more Manner-Path in non-boundary than in boundary-crossing events.

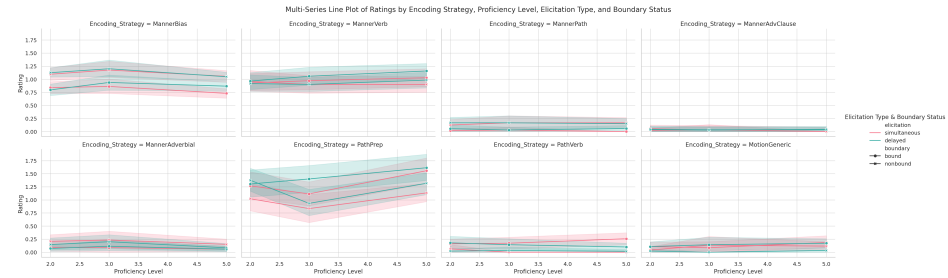


Figure 6.12: Effects of L2 Portuguese Proficiency on L1 English

The analysis also showed no significant impact of proficiency level on **Manner Adverbial Clause** usage. Monolinguals' baseline usage was not significant ($p = .12$), and neither Elementary ($p = .75$) nor Intermediate speakers ($p = 1.0$) differed significantly from them. Tukey-adjusted comparisons confirmed no significant differences across proficiency levels. The baseline **Manner Adverbial** usage among Monolinguals in boundary-crossing contexts was not significant ($B = 0.0600$, $SE = 0.0410$, $t(36.08) = 1.463$, $p = .15$). Neither Elementary ($B = 0.0232$, $SE = 0.0471$, $t(44.38) = 0.493$, $p = .62$) nor Intermediate speakers ($B = 0.0429$, $SE = 0.0544$, $t(44.38) = 0.788$, $p = .43$) differed significantly from Monolinguals in boundary contexts. Boundary-crossing status was also non-significant ($p = .21$). There were no significant differences across proficiency levels in boundary or non-boundary contexts.

Table 6.10: Between-Group Comparisons: L1 English

Factor	Contrast	Estimate	SE	df	t.ratio	p.value
Manner Bias	ELE nonbound delayed - MONO bound simul	0.284247	0.080742	185.6835	3.520457	0.026291
	INTER nonbound delayed - MONO bound simul	0.359247	0.092908	184.2122	3.866698	0.008211
	MONO bound simul - MONO nonbound simul	-0.28357	0.08075	470.1905	-3.51167	0.024343
	MONO bound simul - ELE nonbound simul	-0.3235	0.088233	221.7705	-3.66638	0.015795
	MONO bound simul - INTER nonbound simul	-0.40301	0.099488	215.1995	-4.05086	0.004012
Manner Verb	MONO bound - MONO nonbound	0.387984	0.069044	570.7492	5.619388	4.48E-07
	MONO bound - ELE nonbound	0.39215	0.094266	47.33807	4.160024	0.001755
	MONO bound - INTER nonbound	0.42965	0.107808	45.65383	3.985342	0.003103
	ELE bound - ELE nonbound	0.245722	0.075607	569.7088	3.249969	0.015409
	INTER bound - INTER nonbound	0.351079	0.092546	567.294	3.79355	0.002264
Manner-Path	MONO bound - MONO nonbound	-0.18655	0.031192	569.4379	-5.98053	5.93E-08
	MONO bound - ELE nonbound	-0.17405	0.032819	114.3839	-5.30321	8.26E-06
	MONO bound - INTER nonbound	-0.19488	0.037276	108.0242	-5.22806	1.24E-05
	ELE bound - MONO nonbound	-0.1794	0.032591	111.6018	-5.50459	3.52E-06
	ELE bound - ELE nonbound	-0.1669	0.034152	568.3383	-4.88711	1.97E-05
	ELE bound - INTER nonbound	-0.18774	0.038454	104.6778	-4.88207	5.47E-05
	INTER bound - MONO nonbound	-0.18655	0.036469	99.86389	-5.11522	2.21E-05
	INTER bound - ELE nonbound	-0.17405	0.037869	99.06017	-4.59593	0.000181
	INTER bound - INTER nonbound	-0.19488	0.041791	566.0786	-4.66318	5.69E-05
	MONO bound delayed - INTER nonbound delayed	0.807816	0.234233	105.2467	3.448774	0.036842
Path Preposition	MONO bound delayed - MONO nonbound simul	0.836417	0.149653	563.8066	5.589059	2.32E-06
	MONO bound delayed - ELE nonbound simul	0.948917	0.191696	86.58874	4.950123	0.000219
	MONO bound delayed - INTER nonbound simul	1.136417	0.220611	85.61283	5.151228	0.0001
	ELE bound delayed - ELE nonbound simul	0.638203	0.16543	562.5932	3.857839	0.007057
	ELE bound delayed - INTER nonbound simul	0.825703	0.228606	84.24728	3.611902	0.024271
	INTER bound delayed - INTER nonbound simul	0.922131	0.205623	560.1366	4.484574	0.000544
	MONO nonbound delayed - MONO bound simul	-0.56328	0.149653	563.8066	-3.76394	0.009981
	INTER nonbound delayed - MONO bound simul	-0.94662	0.220611	85.61283	-4.29089	0.002591
	MONO bound simul - MONO nonbound simul	0.975217	0.169091	550.6682	5.76741	8.79E-07
	MONO bound simul - ELE nonbound simul	1.087717	0.207227	112.9091	5.248913	4.55E-05
	MONO bound simul - INTER nonbound simul	1.275217	0.234233	105.2467	5.444228	2.16E-05
	ELE bound simul - MONO nonbound simul	0.685932	0.206302	111.1165	3.324884	0.052019
	ELE bound simul - ELE nonbound simul	0.798432	0.183202	557.9928	4.358202	0.000943
	ELE bound simul - INTER nonbound simul	0.985932	0.241778	102.2711	4.077838	0.00489
	INTER bound simul - INTER nonbound simul	0.83236	0.220174	565.2265	3.780463	0.009395
Path Verb	MONO bound delayed - MONO bound simul	-0.2386	0.052676	553.1884	-4.52962	0.000446
	MONO nonbound delayed - MONO bound simul	-0.20784	0.051346	564.8174	-4.04772	0.003392
	ELE nonbound delayed - MONO bound simul	-0.20367	0.058333	163.2192	-3.49148	0.029464
	MONO bound simul - MONO nonbound simul	0.319538	0.057864	538.9667	5.522209	3.39E-06
	MONO bound simul - ELE nonbound simul	0.257038	0.064145	212.1341	4.00714	0.004745
	MONO bound simul - INTER nonbound simul	0.319538	0.072193	199.138	4.426166	0.000942
	ELE bound simul - MONO nonbound simul	0.22311	0.063793	208.6521	3.497424	0.027771
	INTER bound simul - MONO nonbound simul	0.233824	0.070933	188.5921	3.296421	0.05197

Although the baseline use of **Motion Generic** terms among Monolinguals in boundary-crossing contexts was significant ($B=0.1752$, $SE=0.0410$, $t(39.19)=4.281$, $p<.01$), proficiency levels had no significant effects; neither Elementary ($B=-0.0714$, $SE=0.0503$, $t(37.77)=-1.419$, $p=.16$) nor Intermediate speakers ($B=-0.0643$, $SE=0.0581$, $t(37.77)=-1.106$, $p=.27$) differed from them in boundary contexts. There was significant reduction of Motion Generic usage in non-boundary contexts compared to boundary contexts ($B=-0.0962$, $SE=0.0413$, $t(517.84)=-2.330$, $p<.05$), reflecting lower usage in non-boundary events. Interaction effects between proficiency and boundary status were non-significant.

For **Path Prepositions**, proficiency levels showed no significant differences, with Elementary ($B=-0.311$, $SE=0.180$, $t(68.46)=-1.728$, $p=.08$) and Intermediate speakers ($B=-0.214$, $SE=0.208$, $t(68.46)=-1.032$, $p=.30$) not differing from

Monolinguals. Path Preposition use significantly decreased in non-boundary contexts compared to boundary contexts ($B=-0.424$, $SE=0.168$, $t(550.11)=-2.528$, $p<.05$). Simultaneous elicitation further reduced usage in non-boundary contexts ($B=-0.551$, $SE=0.252$, $t(519.32)=-2.186$, $p<.05$), though elicitation type alone had no significant effect. Tukey-adjusted comparisons showed significant contrasts, with higher Path Preposition use in boundary-delayed contexts compared to non-boundary-simultaneous contexts across all proficiency levels ($p<.01$).

Baseline **Path Verb** usage among Monolinguals in boundary-crossing, delayed contexts was low and not significant ($B=0.047$, $SE=0.054$, $p=.38$). Neither Elementary ($B=0.079$, $SE=0.054$, $p=.14$) nor Intermediate speakers ($B=0.043$, $SE=0.062$, $p=.49$) differed significantly from them. Boundary-crossing status had no effect ($p=.59$). Simultaneous elicitation significantly increased Path Verb usage compared to delayed elicitation ($B=0.239$, $SE=0.052$, $p<.01$). A significant Proficiency $\times$ Elicitation interaction showed Elementary speakers used fewer Path Verbs in simultaneous than delayed contexts ($B=-0.175$, $SE=0.070$, $p<.01$). Path Verb usage also decreased in non-boundary events under simultaneous elicitation ($B=-0.350$, $SE=0.086$, $p<.01$). A three-way interaction indicated increased Path Verb usage by Elementary speakers in non-boundary, simultaneous contexts ($B=0.233$, $SE=0.103$, $p<.01$).

6.3 Discussion

6.3.1 Monolingual Motion Descriptions

This part of the study explored whether monolingual English speakers display a stronger Manner Bias and more detailed Path elaboration in oral descriptions of motion events compared to monolingual Portuguese speakers. The study also examined how boundary-crossing status and elicitation type (simultaneous vs. delayed) might influence these descriptive patterns. Overall, the findings provide substantial support for the hypotheses, though some variations emerged, particularly concerning the impact of elicitation type on Path elaboration.

Manner Bias and Manner Verb Usage

Consistent with the hypothesis, English speakers exhibited a higher Manner Bias than Portuguese speakers, as indicated by their significantly greater use of Manner Verbs, especially in descriptions of boundary-crossing events. This stronger Manner Bias in English aligns with prior research (Hendriks et al., 2022; Hickmann et al., 2009; Larrañaga et al., 2012; Naigles et al., 1998; Oliveira

and Fernandes, 2022; Slobin, 2004), which suggests that English speakers often emphasize the dynamic aspects of motion (e.g., the Manner of movement) over Path details compared to speakers of languages like Portuguese, which may prioritize Path information. Specifically, English speakers showed a markedly higher tendency to incorporate Manner Verbs under delayed elicitation conditions, particularly in boundary contexts, suggesting that when given more processing time, English speakers provide richer Manner details and stress the absence of a boundary constraint (as discussed in Larrañaga et al., 2012; Naigles et al., 1998; Tutton, 2009). The absence of significant differences in Manner Adverbial Clause usage across languages implies that the main driver of Manner elaboration is verb choice rather than the use of additional adverbial modifiers (which was also observed in Chapter 5). This finding reinforces the idea that English speakers prioritize Manner encoding at the verb level.

Path Elaboration and Boundary-Crossing Events

Path elaboration, as measured by Path Preposition usage, also showed clear differences between the language groups, supporting the hypothesis that English speakers would demonstrate more detailed Path encoding than Portuguese speakers. English speakers consistently used more Path Prepositions than Portuguese speakers across all conditions (which is expected as it allows Path stacking, as described by Slobin, 2004), with the most substantial differences occurring during boundary-crossing events. This finding suggests that, even though English does not have a boundary-crossing constraint that deems Manner encoding ungrammatical, it still subscribes to the universal that Path is essential to describe motion events (Talmy, 2000). Conversely, Portuguese speakers exhibited relatively stable Path elaboration across boundary and non-boundary contexts, which may indicate a language-specific pattern in which Path is encoded consistently without marked increases in boundary contexts. This pattern reflects the typological differences in motion encoding between the two languages, as English often emphasizes Manner with Path details as supplementary, whereas Portuguese naturally integrates Path in the main verb.

Effects of Simultaneous vs. Delayed Elicitation

Although it was hypothesized that elicitation type would have limited effects, the results revealed a notable impact on Path encoding. Delayed elicitation led to significantly higher Path Preposition usage among English speakers, particularly in boundary contexts, suggesting that when time constraints are relaxed, English speakers provide richer Path details. This pattern implies that Path elab-

oration may require additional cognitive processing, which delayed conditions allow, while simultaneous elicitation might restrict this due to time limitations. This influence of elicitation type was not as pronounced for Manner elaboration, where English speakers' Manner Bias remained relatively stable across both elicitation types. These findings suggest that while Manner information is intrinsic and easily accessible in English motion descriptions, Path information might be more sensitive to elicitation context, requiring specific task conditions (e.g., delayed elicitation) to be fully articulated.

English and Portuguese in Boundary Contexts

The interaction between language, boundary-crossing status, and elicitation type provides further insights into language-specific encoding patterns. English speakers showed a heightened distinction between boundary and non-boundary contexts in their Path elaboration, particularly under delayed conditions, whereas Portuguese speakers maintained relatively uniform Path prepositional usage. This consistent Path elaboration in Portuguese may reflect the language's tendency to encode Path as a primary feature of motion events without the need for additional elaboration. In contrast, English speakers seemed to vary their Path descriptions more based on linguistic context, suggesting that boundary-crossing events and time for reflection (delayed elicitation) prompt English speakers to enrich their Path descriptions.

6.3.2 Crosslinguistic Influence from L1 Portuguese on L2 English

This study also investigated crosslinguistic influence from the L1 on the L2 in English-Portuguese bilinguals' descriptions of motion events. The investigation focused on Manner and Path elaboration in both their L1 Portuguese and L2 English. I also brought into question the effects of boundary-crossing events and of simultaneous versus delayed elicitation.

Manner and Path elaboration

The results support the hypothesis that L1 Portuguese speakers transfer linguistic features to their L2 English motion descriptions. Intermediate-level bilinguals showed significantly lower Manner Bias and reduced Manner verb use compared to Advanced speakers and Monolinguals (as discussed in Larrañaga et al., 2012; Naigles et al., 1998; Nogueira, 2009b; Oliveira and Fernandes, 2022; Slobin, 2004). This suggests a gradual acquisition of Manner encoding in En-

glish, potentially due to the influence of Portuguese, where Manner elaboration is less emphasized. Path prepositions also presented challenges, with bilinguals at all proficiency levels underusing them compared to monolinguals, particularly in non-boundary and simultaneous elicitation contexts. This aligns with the predicted difficulty bilinguals face in adapting to the more detailed Path encoding requirements of English.

Impact of Boundary-Crossing and Elicitation Type in L2

Boundary-crossing events highlighted notable differences in encoding strategies. Monolingual speakers consistently exhibited higher Manner Bias and Manner verb use across elicitation conditions. Advanced bilinguals approached monolingual-like performance in delayed elicitation, suggesting time for planning facilitates closer adherence to L2 norms (Lewandowski and Mateu, 2020). Conversely, simultaneous elicitation led to reduced Manner encoding, particularly for Intermediate speakers, reinforcing the importance of proficiency and task conditions in shaping bilingual output. The results further indicate that boundary-crossing status independently influences verb choice, with boundary-crossing events prompting more frequent Manner-Path verb usage across all groups. This is expected as the Manner-Path events in this study demonstrate crossing a horizontal boundary, which allows Manner encoding even in languages where the boundary-crossing constraint is observed (Slobin and Hoiting, 1994).

6.3.3 Crosslinguistic Influence from L2 English on L1 Portuguese

Manner and Path elaboration

The results provide partial support for the hypothesis that L2 English influences L1 Portuguese motion descriptions. Intermediate and Advanced speakers demonstrated a higher use of Path prepositions compared to monolingual Portuguese speakers, reflecting L2 English patterns where explicit Path elaboration is more common. This is particularly interesting as it suggests that speakers may be using Path stacking in their L1. However, Manner verb usage showed minimal differences across groups, with no significant effect of proficiency level. These findings suggest that while L2 English influences Path elaboration, its impact on Manner encoding in L1 Portuguese is less pronounced, possibly due to typological constraints of Portuguese.

Manner Bias remained consistent with monolingual patterns, suggesting resistance to L2 influence in this domain. Boundary-crossing contexts did not significantly alter Manner or Path encoding, except for a slight increase in Manner-Path verb use among Intermediate speakers, which is a rather small group of participants.

Effects of Boundary-Crossing and Elicitation Type in L1

Boundary-crossing status had minimal impact on Manner and Path elaboration, aligning with monolingual Portuguese patterns. Simultaneous elicitation reduced Path preposition use across proficiency levels, supporting the idea that late bilingual speakers rely on L1 strategies under time constraints. Advanced speakers, however, demonstrated increased Path elaboration during simultaneous elicitation, suggesting significant effects from the L2 on their L1. The lack of significant changes in Manner encoding highlights the robustness of L1 Portuguese's typological characteristics, even under L2 English influence.

6.3.4 Crosslinguistic Influence from L1 English on L2 Portuguese

Manner and Path elaboration

Despite their strong L1 Manner Bias, bilinguals showed minimal differences in Manner encoding when compared to monolingual Portuguese speakers. This result could indicate that bilinguals adjust their motion descriptions to align more closely with L2 norms. The reduced influence of L1 English Manner Bias in Portuguese may reflect increased sensitivity to the typological features of the target language. However, as discussed in Chapter 5, the correlation with their low lexical diversity may indicate that their lack of Manner elaboration is due to limited vocabulary in the L2. In this study, in particular, most speakers were at the Elementary and Intermediate level and no list of verbs was provided. Advanced speakers demonstrated a slight preference for Path prepositions in delayed elicitation contexts, potentially revealing a subtle influence of English's preference for explicit Path marking. These findings indicate that while L1 English influence is present, proficiency and context mitigate its effects.

Effect of Boundary-Crossing and Elicitation Type in L2

Boundary-crossing events showed limited influence on Manner and Path elaboration, with bilinguals displaying patterns similar to monolingual Portuguese speakers. Elicitation type had a greater impact, as delayed tasks led to higher

Path verb use among monolinguals and bilinguals alike. Simultaneous elicitation, however, reduced Path preposition and verb usage, particularly for less proficient bilinguals, who may rely more heavily on default L1 strategies under time constraints.

6.3.5 Crosslinguistic Influence from L2 Portuguese on L1 English

Manner and Path elaboration

The findings confirm some influence of L2 Portuguese on L1 English motion descriptions. Bilingual speakers exhibited reduced reliance on Path prepositions in L1 English, mirroring the reduced Path elaboration typical of L2 Portuguese. This could, in theory, support the idea that Path stacking is optional and bilingual speakers understand that they can simply not encode it (Slobin, 1996, 2004). No significant differences in Manner verb usage were observed between bilingual and monolingual speakers, suggesting that L2 Portuguese does not strongly diminish L1 English's inherent Manner Bias.

Boundary-crossing contexts did not significantly affect Manner elaboration, with bilingual speakers encoding less Path information in these contexts compared to monolinguals. This suggests that while bilinguals may adapt their Path encoding to align with L2 Portuguese norms, Manner encoding remains resilient in L1 English due to its entrenched typological emphasis.

Effects of Boundary-Crossing and Elicitation Type in L1

Simultaneous elicitation significantly reduced Manner Bias and Path elaboration in L1 English, particularly in non-boundary contexts. This, in itself, does not support our hypothesis as elicitation type seems to affect Manner and Path elaboration in other environments. Boundary-crossing contexts elicited slightly higher Path verb use among monolingual speakers than bilinguals, which is somewhat unexpected as Path verb prominence is a characteristic of Portuguese, not English.

6.3.6 Bidirectional Transfer in the Acquisition of Motion Encoding Strategies

The results of this study illustrate that the interaction between linguistic systems in bilinguals is not unidirectional but dynamic and context-dependent, aligning

with theoretical frameworks that view bilingual language systems as interactive rather than isolated (Jarvis and Pavlenko, 2008b; Odlin, 2003).

The evidence of L1 Portuguese influencing L2 English motion descriptions highlights the persistent role of the L1 in shaping the acquisition and use of the L2. Intermediate bilinguals' reduced Manner Bias and underuse of Path prepositions compared to monolingual English speakers suggest that L1 typological constraints affect how motion events are conceptualized and described in the L2. This aligns with research showing that learners often transfer the motion encoding preferences of their L1 to their L2, particularly in early stages of acquisition (Jarvis and Pavlenko, 2008b; Nogueira, 2009b; Slobin, 1996). The finding that delayed elicitation improves Manner and Path elaboration among more advanced speakers suggests that proficiency and task type mediate the extent of L1 influence, supporting theories of gradual adaptation to L2 norms (Han, 2004; Lewandowski and Mateu, 2020).

The influence of L2 English on L1 Portuguese provides further evidence for the bidirectionality of transfer. Advanced bilinguals' increased use of Path prepositions in L1 Portuguese suggests that L2 norms can shape L1 performance, particularly for features like Path encoding that are less salient in the L1 (Pavlenko and Jarvis, 2000; Schmid and Köpke, 2013). This supports the hypothesis that bilinguals may develop a "hybrid" linguistic system where features of the L2 are incorporated into the L1 (Cook, 2003). However, the limited effect of L2 English on Manner verb usage in L1 Portuguese highlights the resistance of entrenched typological features to L2 influence, consistent with findings that core properties of the L1 are less likely to undergo change (Jarvis and Pavlenko, 2008b; Pavlenko and Jarvis, 2000).

The findings also highlight that bidirectional transfer is not uniform across linguistic features. Manner encoding in L1 English remained robust despite exposure to L2 Portuguese, whereas Path elaboration in L1 Portuguese showed more susceptibility to L2 English influence. This asymmetry reflects the differential cognitive and linguistic salience of Manner and Path information across languages (Odlin, 2003; Slobin, 1996). It also underscores the importance of typological similarity: features that are marked or less prominent in one language are more likely to be influenced by the other (Pavlenko, 2011; Schmid and Köpke, 2013).

The role of elicitation type in modulating transfer effects is particularly noteworthy. When speaking their L2, bilinguals aligned more closely with the L2 norms in delayed tasks, indicating that time for reflection can facilitate the activation of the target language's encoding strategies. In contrast, simultaneous elicitation revealed greater reliance on L1 strategies, especially for less proficient

speakers. This aligns with studies showing that task conditions and cognitive demands influence the direction and extent of transfer (Jarvis and Pavlenko, 2008b; Pavlenko, 2011). These findings suggest that bidirectional transfer is not static but dynamically shaped by contextual and task-specific factors.

Overall, this study contributes to the literature on bidirectional transfer by demonstrating how bilinguals navigate competing linguistic systems and how typology, proficiency, and task type interact to shape transfer patterns. The findings reinforce the view that bidirectional transfer is a selective process, influenced by the salience and complexity of linguistic features as well as the cognitive and contextual demands of the task (Jarvis and Pavlenko, 2008b; Pavlenko, 2011; Slobin, 2004). Future research should explore additional linguistic domains and bilingual populations to further uncover the mechanisms underlying bidirectional transfer.

6.4 Conclusion

This study investigated the differences in Manner Bias and Path elaboration between L1 English and L1 Portuguese speakers. It also sought to identify the crosslinguistic bidirectional effects in the acquisition of English and Portuguese as additional languages. The development of the boundary-crossing constraint and the effects of different types of elicitation (delayed vs simultaneous) were assessed as well.

The findings underscore distinct language-specific patterns in motion event encoding, with English speakers displaying a stronger Manner Bias and more variable Path elaboration compared to Portuguese speakers. Boundary-crossing contexts especially prompt English speakers to elaborate on Path details, suggesting a possible cognitive prioritization of Path when movement across a boundary is salient. The influence of elicitation type on Path elaboration, particularly under delayed conditions, highlights the role of processing time in supporting richer Path descriptions among English speakers. These results contribute to the understanding of cross-linguistic differences in motion event descriptions, suggesting that English speakers flexibly adjust Path encoding based on contextual factors, while Portuguese speakers tend to integrate Path more consistently, regardless of context.

L1 Portuguese influences bilinguals' L2 English descriptions by limiting Manner elaboration, particularly under simultaneous elicitation and in boundary-crossing contexts. Conversely, L2 English influences L1 Portuguese, with bilinguals incorporating more Manner elaboration and Path prepositions than monolingual Portuguese speakers, especially in boundary contexts. The results sug-

gest that crosslinguistic influence is sensitive to the elicitation types. Bilinguals showed more L2 influence in L1 descriptions in delayed elicitation, which shows that even when given time, they will still employ strategies from their L2. In L2 Portuguese, bilinguals exhibit English-like Manner elaboration in boundary-crossing events, even under delayed conditions, which stresses their challenge of rethinking-for-speaking in the L2. In L1 English, bilinguals show Portuguese-like tendencies in boundary-crossing contexts, especially under time constraints, which highlights the adaptability of bilingual encoding strategies based on the demands of the context.

These findings contribute to our understanding of crosslinguistic influence in bilingual motion descriptions, revealing how L1 and L2 strategies interact dynamically based on contextual factors such as boundary status and elicitation timing. Further research could explore these effects in natural conversational settings, examining whether bilinguals adapt their encoding strategies differently in spontaneous versus structured tasks. Additionally, investigating a broader range of bilingual language pairs would provide deeper insight into the generalizability of these crosslinguistic patterns across diverse linguistic backgrounds.

CHAPTER 7

CONCLUSION

In this dissertation, I set out to investigate the acquisition of motion encoding lexicalization strategies by late bilingual speakers of English and Brazilian Portuguese (BP), aiming to deepen our understanding of the linguistic and cognitive processes involved in second language development. To achieve this, I conducted three studies, each designed to address different facets of bilingual motion encoding. These studies utilized acceptability ratings, written production, and spoken production tasks, incorporating both delayed and simultaneous elicitation methods to capture a range of cognitive and linguistic behaviors. My overarching goal was to provide a comprehensive account of how Portuguese speakers learning English and English speakers learning Portuguese navigate the challenges posed by typologically distinct motion encoding systems.

The first study focused on the effects of bilingual proficiency on the acceptability of motion encoding strategies. I found that Intermediate L2 speakers begin to align with L1 norms for certain structures. Advanced learners show even greater convergence, particularly in canonical motion encoding strategies of the target language. L1 English speakers learning BP rated verb-framed structures as more acceptable as their proficiency increased, reflecting adaptation to BP norms. L1 BP speakers learning English showed a similar pattern of increased acceptability for satellite-framed structures with higher proficiency, aligning more closely with English norms. This study was, in a way, exploratory in nature. I envisioned it as a strategy to pave the way for experiments focused on production tasks. My hypothesis was proven: there were significant differences between the two languages and in the process of L2 development to justify further investigation.

The second study investigated the development of Manner and Path encoding in L2 writing. The experiment was innovative as it invited learners to watch scenes from a videogame in which the main character performed motion

events. L2 English learners exhibited lower Manner bias compared to English monolinguals, even at Advanced proficiency levels. Path elaboration through prepositions remains limited in L2 English learners, and they rely more on motion-generic verbs than monolinguals. The overall finding was that proficiency affects Manner verb usage positively, but L2 learners do not fully reach native-like patterns. L2 Portuguese learners demonstrated increased Manner bias, exceeding that of Portuguese monolinguals, especially through Manner verbs. Intermediate-level learners show significant improvement in encoding Path with verbs, aligning closer to monolingual Portuguese speakers. The encoding of Manner via adverbial clauses is a key point of development, as it is underused by elementary learners but improves with proficiency. I found out, however, that variability in motion encoding is influenced by event complexity, with some events prompting more elaborate motion descriptions. As I will discuss later in this section, this could be a point for further investigation. As for lexical diversity, Monolinguals exhibited greater lexical diversity in both Manner verbs and Path prepositions compared to L2 English learners. However, L2 Portuguese learners demonstrated greater lexical diversity in the use of Path prepositions than monolinguals. Overall, learners rely on a smaller set of frequent constructions, with less balanced usage of available linguistic resources.

The third study analyzed the development of Manner and Path encoding in L2 speech under delayed and simultaneous elicitation. Bilingual speakers of BP and English exhibit distinct patterns in motion encoding influenced by their first language and second-language acquisition. For L1 Portuguese speakers learning English as a second language (L2), there is a reduced Manner Bias in their L2 descriptions compared to English monolinguals. This is particularly evident in boundary-crossing events, where they encode less Manner and occasionally underuse Path prepositions, reflecting the influence of their verb-framed native language. However, delayed elicitation tasks enable these speakers to incorporate richer Manner and Path details, aligning more closely with English norms, especially in boundary contexts.

Conversely, L1 English speakers learning Portuguese as an L2 demonstrate reduced Manner Bias compared to English monolinguals but show slightly higher Manner elaboration compared to Portuguese monolinguals. Their satellite-framed native language leads them to incorporate more Path prepositions in L2 Portuguese, revealing some transfer from English. However, simultaneous elicitation reduces both Manner and Path elaboration in their L2, indicating reliance on L1 strategies when processing time is limited.

Bidirectional crosslinguistic effects further shape bilingual motion descriptions. The influence of an L2 on an L1 is subtle but present, with L1 Portuguese

speakers exhibiting increased Path preposition use in Portuguese after acquiring English. L1 English speakers demonstrate reduced reliance on Path prepositions in English and slight changes in Manner elaboration, reflecting L2 Portuguese influence. These adaptations highlight how an L2 can affect how motion is conceptualized and described in an L1, but the extent of this influence is mediated by task type and proficiency. On the other hand, the influence of an L1 on an L2 remains strong, with bilinguals frequently transferring encoding patterns from their native language. For example, L1 Portuguese speakers show reduced Manner elaboration and boundary sensitivity in their L2 English, while L1 English speakers encode more Path in their L2 Portuguese, even in contexts where Path elaboration is not typical.

The type of elicitation used in motion description tasks significantly impacts bilingual performance. Delayed elicitation allows for richer elaboration of both Manner and Path, enabling bilinguals to align more closely with the norms of the target language. In contrast, simultaneous elicitation introduces time constraints that reduce both Manner and Path encoding in bilinguals' L2 and amplify reliance on native patterns in L1 descriptions.

Boundary-crossing events provide a particularly revealing lens through which to examine these dynamics. English speakers elaborate more on both Manner and Path during boundary-crossing events, while Portuguese speakers maintain a consistent focus on Path regardless of the event. Bilinguals adapt their descriptions in these contexts based on the typological tendencies of their L1, leading to transfer effects that are moderated by elicitation type and proficiency.

Proficiency and lexical diversity also play critical roles in shaping motion descriptions. Advanced bilinguals show greater alignment with native norms in their L2, particularly in how they encode Manner and Path in delayed tasks. Lexical diversity, reflected in the use of Manner verbs and Path prepositions, reveals typological differences and language-specific strategies. More proficient bilinguals demonstrate greater variety and accuracy in their descriptions, underscoring the importance of language experience and task conditions in bilingual motion encoding.

7.1 Contributions

This dissertation contributes to the fields of Cognitive Linguistics and Second Language Acquisition by addressing critical gaps in understanding how bilingual speakers of Brazilian Portuguese (BP) and English acquire motion encoding lexicalization patterns in their second language. By investigating both L1 Portuguese/L2 English and L1 English/L2 Portuguese learners, this work pro-

vides valuable insights into the bidirectional transfer of motion encoding strategies. This phenomenon, while extensively theorized, remains underexplored in the context of this language dyad.

The studies presented in this dissertation leverage novel and multimodal methodologies to investigate bilingual motion encoding. These methods include the use of dynamic stimuli, such as video game motion events, which capture continuous and naturalistic motion patterns. Additionally, the research employs task variability, comparing simultaneous and delayed elicitation tasks to assess the cognitive demands and contextual influences on bilingual motion descriptions. Furthermore, the study incorporates large-scale data collection with robust sample sizes, addressing the limitations of prior research that often relied on small participant groups and static images (Almeida, 2002; Lewandowski, 2021; Lewandowski and Mateu, 2020; Nogueira, 2009b). These methodological innovations enable a comprehensive examination of bilinguals' encoding strategies in both spoken and written modalities, revealing how task type, mode of production, and language typology interact to shape motion event descriptions.

The findings provide a detailed account of bidirectional crosslinguistic influence. From L1 Portuguese to L2 English, learners exhibit a reduced Manner bias, underuse Path prepositions, and face challenges in encoding boundary-crossing events, reflecting the verb-framed typology of their native language. From L1 English to L2 Portuguese, learners demonstrate an increased Manner bias and a stronger tendency to stack Path prepositions, influenced by the satellite-framed nature of English. Critically, the results highlight asymmetries in transfer, with L2 influence on L1 being more subtle and feature-specific, such as increased Path elaboration in L1 Portuguese, compared to the more robust influence of L1 on L2. These asymmetries underscore the typological constraints and cognitive salience of Manner and Path in bilingual processing.

The dissertation emphasizes the role of proficiency and lexical diversity in shaping bilingual motion encoding. Advanced learners demonstrate greater alignment with native norms, showing that proficiency mitigates L1 influence and facilitates convergence with L2 typological strategies. In contrast, intermediate learners rely more heavily on L1 strategies, particularly under simultaneous elicitation conditions, reflecting the cognitive demands of bilingual language use. By exploring how elicitation type (simultaneous vs. delayed) and contextual variables affect encoding strategies, the research uncovers task-dependent dynamics in bilingual cognition. It also identifies potential thresholds for achieving typological convergence, providing a developmental perspective on motion encoding in bilinguals.

This work advances theoretical models of language typology and bilingual cognition. It confirms and refines Talmy's typological framework (Talmy, 2000) in bilingual contexts, demonstrating its applicability in explaining crosslinguistic motion encoding patterns. The findings also extend Slobin's Thinking-for-Speaking Hypothesis (Slobin, 1996, 2004) by showing how task conditions and elicitation type modulate bilingual encoding strategies. Additionally, the research adds to the literature on crosslinguistic influence, particularly in the context of bidirectional transfer.

From a pedagogical perspective, this dissertation offers practical recommendations for teaching motion encoding in English and Portuguese. It emphasizes the need for explicit instruction on typological differences, such as the contrast between Manner-Path distinctions in these languages, to enhance learners' awareness and facilitate target-like production. Task-based learning, incorporating dynamic motion stimuli, is proposed as a means of simulating real-world communication and fostering natural encoding patterns. Additionally, the findings highlight the importance of tailored feedback based on proficiency level, with advanced strategies like Path stacking being beneficial for L1 English learners of Portuguese and enhanced boundary-crossing sensitivity for L1 Portuguese learners of English.

By addressing theoretical, methodological, and pedagogical gaps, this dissertation contributes to a broader understanding of how typologically distinct languages interact in bilingual cognition. It establishes a foundation for future research on bilingual motion encoding, encouraging the integration of dynamic, multimodal methodologies and crosslinguistic comparisons across additional language pairs. The work not only deepens our understanding of bilingual cognition but also bridges the domains of methodology, theory, and practice, offering a comprehensive approach to studying motion encoding in bilingual contexts.

7.2 Future Directions

Building on the findings of this dissertation, several avenues for future research emerge. First, the role of event complexity in shaping motion encoding strategies warrants further exploration. While this research identified that certain events prompt more elaborate motion descriptions (e.g., commentary tasks of self-propelled motion in which the character flew across a field over a period of time), a systematic investigation into the interplay between event complexity and typological constraints could offer deeper insights into bilingual processing.

Second, examining the effects of different types of exposure, such as immersive versus classroom-based learning, on motion encoding strategies would enhance our understanding of how bilinguals internalize L2 patterns. Future studies could also explore how these effects manifest across various age groups, shedding light on the potential impact of age of onset on the acquisition of motion encoding strategies.

Third, expanding this research to include European Portuguese learners of English and vice versa could illuminate intralinguistic variability within the Portuguese language and its implications for bilingual acquisition. Comparative studies with other Romance or Germanic languages could further contextualize the findings and refine our understanding of crosslinguistic transfer mechanisms.

There are other - more specific - points that can be explored based on the findings presented here. First, in investigating typological differences between Portuguese and English, future studies may curate stimuli that better controls for the number of Path possibilities in each motion event. This will help determine whether Path encoding will vary across scenes. Issues that are closer to SLA instruction can also be explored. For instance, the effects of input (including positive and negative evidence), corrective feedback, and explicit feedback are potential answers to some of the questions raised in Chapters 4 and 5. Another important question that calls for further investigation is whether Portuguese learners (or learners of any V-framed language) choose to encode less Path information because they understand the structural constraints of the L1 or because of cognitive costs.

Finally, pedagogical interventions should be developed and tested to address the challenges identified in this research. Future studies could evaluate the effectiveness of dynamic, video-based teaching tools in helping learners overcome typological barriers and improve their alignment with native motion encoding patterns. By integrating these directions, the field can continue to build on the foundational contributions of this dissertation, advancing both theoretical knowledge and practical applications in bilingual education.

7.3 Pedagogical Interventions

The findings presented here support many other SLA researchers in their call for innovative teaching approaches to address the challenges of cross-linguistic differences in motion encoding (Alghamdi, 2019; Elliott and Yountchi, 2009; Gagarina, 2009; Hasko, 2009). These differences, particularly between typologically distinct languages like English and Brazilian Portuguese, call for dynamic

and context-driven strategies that go beyond traditional methods (Cadierno et al., 2023).

One promising approach is the integration of applied language typology into teaching materials and curricula. This not only enhances learners' understanding of linguistic structures but also fosters cross-linguistic awareness, helping students navigate the complexities of motion expression (Cadierno et al., 2023). Dynamic and multimodal tools, such as videos and real-world motion scenarios, may also be effective. Pavlenko and Volynsky (2015) highlight the value of transitioning from static exercises to tasks that are both engaging and contextually rich. Such tasks encourage learners to decode motion verb information and use it meaningfully in communication, reducing errors caused by lexical imprecision.

In addition to these strategies, activities that physically engage learners, such as Total Physical Response (TPR), have proven beneficial for mastering motion verbs. Elliott and Yountchi (2009) suggest that linking language to physical action helps reinforce comprehension and usage. However, Hasko (2009) notes, these efforts need to be part of a broader curriculum overhaul. Embedding motion expression instruction consistently across educational programs rather than relying solely on textbook exercises can provide students with more extensive and integrated practice.

Finally, research demonstrates that late bilinguals can develop new mental representations for motion events, even when these differ from those in their L1. This finding supports the idea that second-language learners can acquire robust representations of motion expression patterns despite typological differences (Athanasopoulos, 2009; Cadierno and Ruiz, 2006; Cook, 2016; Ibarretxe-Antuñano et al., 2016; Lewis, 2012). The combination of typological insights, dynamic exercises, and physical engagement can foster a richer, more effective learning environment that enables students to master the complexities of motion in a second language.

APPENDIX A

Background Questionnaire: English Monolinguals

1. How old are you? (please numbers only)
2. To which gender identity do you most identify? (Male, female, transgender male, transgender female, gender variant/non-conforming, not listed, prefer not to answer)
3. What do you do for a living?/What's your profession?
4. Is English your first (native) language?
5. Do you speak any other language at a conversational level (for example, you could hold a conversation with a native speaker of such language)? Which one(s)?
6. Do you consider yourself monolingual (a person who speaks only one language)?
7. Have you ever visited a foreign country? (any time less than 30 days would be classified as visiting)
8. If you have visited another country, what country was it and how long did you stay there?
9. If you visited another country, what language did you use to communicate?
10. Have you ever lived in a Portuguese-speaking country? (any time over one month would classify as living) Where? For how long?
11. Have you studied a foreign language at school?
12. If you have studied a foreign language at school, what language was it? For how long?

Background Questionnaire: L1 English L2 Portuguese

1. How old are you? (please numbers only)
2. To which gender identity do you most identify? (Male, female, transgender male, transgender female, gender variant/non-conforming, not listed, prefer not to answer)
3. What do you do for a living?/What's your profession?
4. Is English your first (native) language?
5. Do you consider yourself bilingual (a person who speaks more than one language)?
6. How long have you been studying Portuguese?
7. Where have you studied Portuguese? (select all that apply: online, at a regular school, at a language center, at university, with a private instructor, by yourself, other)
8. Have you ever visited a foreign country? (any time less than 30 days would be classified as visiting)
9. If you have visited another country, what country was it and how long did you stay there?
10. If you visited another country, what language did you use to communicate?
11. Have you ever lived in a Portuguese-speaking country? (any time over one month would classify as living) Where? For how long?

Background Questionnaire: Portuguese Monolinguals

1. Quantos anos você tem? (números apenas)
2. Com qual gênero você se identifica? (Masculino, feminino, mulher transgênero, homem transgênero, variância/não-conformância de gênero, não listado, prefiro não responder)
3. Qual é a sua profissão?
4. A sua língua nativa (primeira língua) é o português?
5. Você fala alguma outra língua em um nível conversacional (por exemplo, você conseguiria ter uma conversa com um falante nativo dessa língua)? Qual/quais?
6. Você se considera um falante monolíngue (uma pessoa que fala apenas uma língua)?
7. Você já visitou um país estrangeiro? (um período menor que 30 dias é considerado visita)
8. Se você já visitou um país estrangeiro, qual país foi e quanto tempo você ficou lá?
9. Se você já visitou um país estrangeiro, qual língua você usou para se comunicar?
10. Você já morou em um país de língua inglesa? (um período superior a 30 dias é considerado vivência) Onde? Por quanto tempo?
11. Você estudou alguma língua estrangeira na escola?
12. Se você já estudou uma língua estrangeira na escola, qual língua foi? E por quanto tempo?

Background Questionnaire: L1 Portuguese L2 English

1. Quantos anos você tem? (números apenas)
2. Com qual gênero você se identifica? (Masculino, feminino, mulher transgênero, homem transgênero, variância/não-conformância de gênero, não listado, prefiro não responder)
3. Qual é a sua profissão?
4. A sua língua nativa (primeira língua) é o português?
5. Você se considera um falante bilíngue (alguém que fala mais de uma língua)?
6. Há quanto tempo você estuda inglês?
7. Onde você estuda (ou estudou) português? (selecione as opções que forem verdade para você: online, na escola regular, em cursos de idioma, na universidade, com um professor particular, sozinho, outro)
8. Você já visitou um país estrangeiro (qualquer período menor que 30 dias é considerado visita)?
9. Se você já visitou um país estrangeiro, qual língua você usou para se comunicar?
10. Se você já visitou um país estrangeiro, qual país foi e quanto tempo você ficou lá?
11. Você já morou em um país de língua inglesa? (um período superior a 30 dias é considerado vivência) Onde? Por quanto tempo?

APPENDIX B

Table 1: Experiment 3: Model Summary (Monolingual)

Type	Effect	Estimate	Std. Error	df	t value	Pr(> t)
Manner Bias	(Intercept)	0.97896	0.07907	37.41868	12.381	8.40E-15
	test_languageportuguese	-0.14357	0.07721	104.2808	-1.859	0.06579
	elicitationssimultaneous	-0.20983	0.07941	466.7001	-2.642	0.00851
	boundarynonbound	-0.0619	0.08743	442.867	-0.708	0.47927
	test_languageportuguese:elicitationssimultaneous	-0.01429	0.09904	481.1463	-0.144	0.88537
	test_languageportuguese:boundarynonbound	0.04635	0.10308	481.1463	0.45	0.65318
	elicitationssimultaneous:boundarynonbound	0.30185	0.13117	384.4201	2.301	0.02191
	test_languageportuguese:elicitationssimultaneous:boundarynonbound	-0.01349	0.14578	481.1463	-0.093	0.9263
	(Intercept)	1.19591	0.10846	17.63554	11.026	2.44E-09
	test_languageportuguese	-0.35714	0.07135	41.88677	-5.005	1.05E-05
Manner Verb	boundarynonbound	-0.37446	0.07299	497.6085	-5.13	4.16E-07
	test_languageportuguese:boundarynonbound	0.24048	0.09119	485.8112	2.637	0.00863
	(Intercept)	0.01353	0.03438	20.96	0.394	0.698
	test_languageportuguese	-1.27E-16	0.02663	504.04	0	1
Manner-Path	boundarynonbound	0.1623	0.03108	511.2	5.224	2.56E-07
	test_languageportuguese:boundarynonbound	-0.1	0.0392	504.04	-2.551	0.011
	(Intercept)	0.03846	0.02534	34.21597	1.518	0.1382
	test_languageportuguese	0.06154	0.03583	34.21597	1.718	0.0949
Manner-Adverbial Clause	elicitationssimultaneous	-0.01538	0.02665	498	-0.577	0.564
	test_languageportuguese:elicitationssimultaneous	-0.03846	0.03769	498	-1.021	0.308
	(Intercept)	0.08462	0.03539	19.67	2.391	0.0269
	test_languageportuguese	6.50E-18	0.03119	18	0	1
Manner Adverbials	(Intercept)	0.17793	0.03172	35.87326	5.609	2.34E-06
	test_languageportuguese	-0.17143	0.04053	34.03028	-4.229	0.000167
	boundarynonbound	-0.10219	0.03459	351.1896	-2.954	0.00335
	test_languageportuguese:boundarynonbound	0.1131	0.04602	486.3828	2.457	0.014344
Motion Generic	(Intercept)	1.6214	0.1459	44.7413	11.117	1.84E-14
	test_languageportuguese	-0.9714	0.1571	53.2286	-6.183	9.10E-08
	elicitationssimultaneous	0.1184	0.1355	461.6956	0.874	0.3824
	boundarynonbound	-0.3129	0.1491	434.5199	-2.099	0.0364
	test_languageportuguese:elicitationssimultaneous	-0.2429	0.1693	481.0906	-1.434	0.1521
	test_languageportuguese:boundarynonbound	0.2548	0.1762	481.0906	1.446	0.1489
	elicitationssimultaneous:boundarynonbound	-0.5066	0.2234	371.1342	-2.268	0.0239
	test_languageportuguese:elicitationssimultaneous:boundarynonbound	0.3762	0.2492	481.0906	1.51	0.1318
	(Intercept)	0.04688	0.07648	51.39013	0.613	0.542567
	test_languageportuguese	0.42857	0.08654	52.85289	4.952	7.90E-06
Path preposition	elicitationssimultaneous	0.22247	0.0738	442.646	3.015	0.002721
	boundarynonbound	0.03176	0.08103	403.5557	0.392	0.695358
	test_languageportuguese:elicitationssimultaneous	-0.32857	0.09302	481.8122	-3.532	0.000452
	test_languageportuguese:boundarynonbound	-0.14524	0.09682	481.8122	-1.5	0.134246
	elicitationssimultaneous:boundarynonbound	-0.31536	0.12096	327.1716	-2.607	0.009549
	test_languageportuguese:elicitationssimultaneous:boundarynonbound	0.19524	0.13692	481.8122	1.426	0.154547
	(Intercept)	0.04688	0.07648	51.39013	0.613	0.542567
	test_languageportuguese	0.42857	0.08654	52.85289	4.952	7.90E-06
Path verb	elicitationssimultaneous	0.22247	0.0738	442.646	3.015	0.002721
	boundarynonbound	0.03176	0.08103	403.5557	0.392	0.695358
	test_languageportuguese:elicitationssimultaneous	-0.32857	0.09302	481.8122	-3.532	0.000452
	test_languageportuguese:boundarynonbound	-0.14524	0.09682	481.8122	-1.5	0.134246
	elicitationssimultaneous:boundarynonbound	-0.31536	0.12096	327.1716	-2.607	0.009549
	test_languageportuguese:elicitationssimultaneous:boundarynonbound	0.19524	0.13692	481.8122	1.426	0.154547
	(Intercept)	0.04688	0.07648	51.39013	0.613	0.542567
	test_languageportuguese	0.42857	0.08654	52.85289	4.952	7.90E-06

Table 2: Experiment 3: Model Result (Monolingual)

Type	Test Language	Boundary	Elicitation	Emmean	SE	DF	Lower CL	Upper CL
Manner Bias	English	Bound	Delayed	0.979	0.0793	39.9	0.819	1.139
	Portuguese	Bound	Delayed	0.835	0.0793	39.9	0.675	0.996
	English	Nonbound	Delayed	0.917	0.083	39.9	0.75	1.084
	Portuguese	Nonbound	Delayed	0.82	0.083	39.9	0.653	0.987
	English	Bound	Simultaneous	0.769	0.0793	39.9	0.609	0.929
	Portuguese	Bound	Simultaneous	0.611	0.0793	39.9	0.451	0.772
	English	Nonbound	Simultaneous	1.009	0.083	39.9	0.842	1.176
	Portuguese	Nonbound	Simultaneous	0.884	0.083	39.9	0.717	1.051
Manner Verbs	English	Bound	NA	1.196	0.108	17.9	0.968	1.424
	Portuguese	Bound	NA	0.839	0.108	17.9	0.611	1.067
	English	Nonbound	NA	0.821	0.11	19.1	0.591	1.052
	Portuguese	Nonbound	NA	0.705	0.11	19.1	0.474	0.936
Manner-Path	English	Bound	NA	0.0135	0.0344	20.4	-0.05817	0.0852
	Portuguese	Bound	NA	0.0135	0.0344	20.4	-0.05817	0.0852
	English	Nonbound	NA	0.1759	0.0355	22.9	0.10244	0.2493
	Portuguese	Nonbound	NA	0.0759	0.0355	22.9	0.00244	0.1493
Manner-Adverbial Clause	English	NA	Delayed	0.0385	0.0253	32.6	-0.01311	0.09
	Portuguese	NA	Delayed	0.1	0.0253	32.6	0.04843	0.1516
	English	NA	Simultaneous	0.0231	0.0253	32.6	-0.02849	0.0746
	Portuguese	NA	Simultaneous	0.0462	0.0253	32.6	-0.00542	0.0977
Manner Adverb	English	NA	NA	0.0846	0.0354	19.7	0.0107	0.159
	Portuguese	NA	NA	0.0846	0.0354	19.7	0.0107	0.159
Motion Generic	English	Bound	NA	0.1779	0.0319	35.6	0.11329	0.2426
	Portuguese	Bound	NA	0.0065	0.0319	35.6	-0.05814	0.0711
	English	Nonbound	NA	0.0757	0.0333	41.4	0.00847	0.143
	Portuguese	Nonbound	NA	0.0174	0.0333	41.4	-0.04986	0.0847
Path preposition	English	Delayed	Bound	1.621	0.146	47.1	1.3272	1.916
	Portuguese	Delayed	Bound	0.65	0.146	47.1	0.3558	0.944
	English	Simultaneous	Bound	1.74	0.146	47.1	1.4456	2.034
	Portuguese	Simultaneous	Bound	0.526	0.146	47.1	0.2313	0.82
	English	Delayed	Nonbound	1.308	0.146	47.1	1.0034	1.613
	Portuguese	Delayed	Nonbound	0.592	0.146	47.1	0.2868	0.897
	English	Simultaneous	Nonbound	0.92	0.146	47.1	0.6152	1.225
	Portuguese	Simultaneous	Nonbound	0.337	0.146	47.1	0.0319	0.642
Path verb	English	Delayed	Bound	0.0469	0.0767	52	-0.1071	0.201
	Portuguese	Delayed	Bound	0.4755	0.0767	52	0.3215	0.629
	English	Simultaneous	Bound	0.2694	0.0767	52	0.1154	0.423
	Portuguese	Simultaneous	Bound	0.3694	0.0767	52	0.2154	0.523
	English	Delayed	Nonbound	0.0786	0.08	59.4	-0.0815	0.239
	Portuguese	Delayed	Nonbound	0.362	0.08	59.4	0.2018	0.522
	English	Simultaneous	Nonbound	-0.0142	0.08	59.4	-0.1744	0.146
	Portuguese	Simultaneous	Nonbound	0.1358	0.08	59.4	-0.0244	0.296

Table 3: Experiment 3: Model Summary (L2 English)

Type	Effect	Estimate	Std. Error	df	t value	Pr(> t)
Manner Bias	(Intercept)	0.6771	0.1245	133.1743	5.439	2.48E-07
	as.factor(proficiency)4	0.1968	0.1161	198.66	1.696	0.0915
	as.factor(proficiency)5	0.2959	0.1194	198.3515	2.479	0.014
	boundarynonbound	0.283	0.1599	662.422	1.77	0.0771
	elicitationsimultaneous	-0.0619	0.1518	660.6422	-0.408	0.6837
	as.factor(proficiency)4:boundarynonbound	-0.1635	0.1645	652.7058	-0.994	0.3206
	as.factor(proficiency)5:boundarynonbound	-0.3321	0.1692	652.6849	-1.963	0.0501
	as.factor(proficiency)4:elicitationsimultaneous	-0.1166	0.158	652.7076	-0.738	0.4606
	as.factor(proficiency)5:elicitationsimultaneous	-0.1143	0.1625	652.6849	-0.703	0.4822
	boundarynonbound:elicitationsimultaneous	0.023	0.2293	664.7195	0.1	0.9201
	as.factor(proficiency)4:boundarynonbound:elicitationsimultaneous	0.1629	0.2325	652.6954	0.701	0.4837
	as.factor(proficiency)5:boundarynonbound:elicitationsimultaneous	0.2059	0.2392	652.6849	0.861	0.3896
	(Intercept)	1.208206	0.124078	26.64945	9.737	2.86E-10
	proficiency2	-0.12857	0.124499	73.16512	-1.033	0.30514
Manner Verb	proficiency3	-0.20476	0.117379	73.16512	-1.744	0.08528
	proficiency4	-0.08571	0.176068	73.16512	-0.487	0.62784
	boundarynonbound	-0.28445	0.104983	561.1235	-2.709	0.00695
	elicitationsimultaneous	-0.01148	0.095497	562.748	-0.12	0.90433
	proficiency2:boundarynonbound	0.078571	0.151418	550.8769	0.519	0.60404
	proficiency3:boundarynonbound	0.110317	0.142758	550.8769	0.773	0.44
	proficiency4:boundarynonbound	0.019048	0.214138	550.8769	0.089	0.92915
	proficiency2:elicitationsimultaneous	0.1	0.145478	550.8769	0.687	0.49213
	proficiency3:elicitationsimultaneous	0.080952	0.137158	550.8769	0.59	0.55529
	proficiency4:elicitationsimultaneous	-0.01429	0.205737	550.8769	-0.069	0.94467
	boundarynonbound:elicitationsimultaneous	-0.20845	0.158048	551.846	-1.319	0.18774
	proficiency2:boundarynonbound:elicitationsimultaneous	0.05	0.214138	550.8769	0.233	0.81546
	proficiency3:boundarynonbound:elicitationsimultaneous	0.002381	0.201891	550.8769	0.012	0.99059
	proficiency4:boundarynonbound:elicitationsimultaneous	0.097619	0.302836	550.8769	0.322	0.74731
Manner-Path	(Intercept)	0.026329	0.056839	20.62447	0.463	0.648059
	proficiency2	-0.02857	0.046483	570.1041	-0.615	0.539023
	proficiency3	-0.00952	0.043825	570.1041	-0.217	0.82804
	proficiency4	0.014286	0.065737	570.1041	0.217	0.82804
	boundarynonbound	0.159621	0.047559	581.4864	3.356	0.000842
	elicitationsimultaneous	-0.04792	0.043242	581.9997	-1.108	0.268299
	proficiency2:boundarynonbound	0.045238	0.068421	570.1041	0.661	0.508771
	proficiency3:boundarynonbound	0.02619	0.064508	570.1041	0.406	0.684893
	proficiency4:boundarynonbound	0.002381	0.096762	570.1041	0.025	0.980378
	proficiency2:elicitationsimultaneous	0.028571	0.065737	570.1041	0.435	0.663994
	proficiency3:elicitationsimultaneous	0.057143	0.061978	570.1041	0.922	0.356922
	proficiency4:elicitationsimultaneous	-0.01429	0.092966	570.1041	-0.154	0.877928
	boundarynonbound:elicitationsimultaneous	0.053815	0.071673	576.1102	0.751	0.453055
	proficiency2:boundarynonbound:elicitationsimultaneous	-0.04524	0.096762	570.1041	-0.468	0.640308
Manner Adverbial Clause	proficiency3:boundarynonbound:elicitationsimultaneous	-0.10159	0.091228	570.1041	-1.114	0.265942
	(Intercept)	0.045205	0.017292	48.68596	2.614	0.0119
	proficiency3	-0.04286	0.038046	49.35034	-1.126	0.2654
	proficiency4	-0.00952	0.020052	49.35034	-0.475	0.6369
	boundarynonbound	-0.03128	0.0196	534.18	-1.596	0.1111
	proficiency3:boundarynonbound	0.02619	0.04553	660.1329	0.575	0.5653
	proficiency4:boundarynonbound	0.003968	0.023996	660.1329	0.165	0.8687
	(Intercept)	0.06326	0.05059	69.09938	1.25	0.215
	proficiency2	0.028571	0.071648	113.541	0.399	0.691
	proficiency3	0.038095	0.067551	113.541	0.564	0.574
	proficiency4	0.014286	0.101326	113.541	0.141	0.888
	boundarynonbound	0.012936	0.063395	410.2532	0.204	0.838
	elicitationsimultaneous	-0.00649	0.058266	475.2622	-0.111	0.911
	proficiency2:boundarynonbound	0.054762	0.096097	551.6115	0.57	0.569
Manner Adverbials	proficiency3:boundarynonbound	0.01746	0.090601	551.6115	0.193	0.847
	proficiency4:boundarynonbound	0.152381	0.135902	551.6115	1.121	0.263
	proficiency2:elicitationsimultaneous	-0.05714	0.092327	551.6115	-0.619	0.536
	proficiency3:elicitationsimultaneous	0.071429	0.087047	551.6115	0.821	0.412
	proficiency4:elicitationsimultaneous	-0.07143	0.13057	551.6115	-0.547	0.585
	boundarynonbound:elicitationsimultaneous	0.080736	0.093568	311.0394	0.863	0.389
	proficiency2:boundarynonbound:elicitationsimultaneous	0.02381	0.135902	551.6115	0.175	0.861
	proficiency3:boundarynonbound:elicitationsimultaneous	-0.02698	0.128129	551.6115	-0.211	0.833
	proficiency4:boundarynonbound:elicitationsimultaneous	-0.07857	0.192194	551.6115	-0.409	0.683
	(Intercept)	0.1577	0.04435	108.1	3.555	0.000561
	proficiency3	-0.1714	0.1008	162.8	-1.701	0.090856
	proficiency4	0	0.05312	162.8	0	1
	boundarynonbound	-0.1083	0.06041	310.3	-1.793	0.073939
	elicitationsimultaneous	0.02302	0.0566	454.5	0.407	0.684449
Motion Generic	proficiency3:boundarynonbound	0.1381	0.1384	653.4	0.998	0.318688
	proficiency4:boundarynonbound	-0.0222	0.07293	653.4	-0.305	0.760701
	proficiency2:elicitationsimultaneous	0.1286	0.133	653.4	0.967	0.333884
	proficiency4:elicitationsimultaneous	-0.0429	0.07007	653.4	-0.612	0.541011
	boundarynonbound:elicitationsimultaneous	0.05013	0.08713	207.3	0.575	0.565647
	proficiency3:boundarynonbound:elicitationsimultaneous	-0.2119	0.1957	653.4	-1.083	0.279303
	proficiency4:boundarynonbound:elicitationsimultaneous	0.003968	0.1031	653.4	0.038	0.969323

Table 4: Experiment 3: Model Summary (L2 English) cont.

Type	Effect	Estimate	Std. Error	df	t value	Pr(> t)
Path preposition	(Intercept)	1.63053	0.14989	50.06089	10.878	8.63E-15
	proficiency3	-0.47143	0.27707	78.87406	-1.701	0.0928
	proficiency4	-0.60476	0.14603	78.87406	-4.141	8.60E-05
	boundarynonbound	-0.33281	0.15214	626.8897	-2.188	0.0291
	elicitationsimultaneous	0.10902	0.13962	647.2804	0.781	0.4352
	proficiency3:boundarynonbound	-0.09524	0.32193	653.4789	-0.296	0.7674
	proficiency4:boundarynonbound	0.17698	0.16967	653.4789	1.043	0.2973
	proficiency3:elicitationsimultaneous	-0.3	0.3093	653.4789	-0.97	0.3324
	proficiency4:elicitationsimultaneous	-0.20952	0.16301	653.4789	-1.285	0.1991
	boundarynonbound:elicitationsimultaneous	-0.48621	0.22629	569.014	-2.149	0.0321
	proficiency3:boundarynonbound:elicitationsimultaneous	0.4	0.45527	653.4789	0.879	0.3799
	proficiency4:boundarynonbound:elicitationsimultaneous	0.25952	0.23995	653.4789	1.082	0.2798
Path verb	(Intercept)	0.05561	0.05779	42.53282	0.962	0.341334
	proficiency3	0.32857	0.09834	136.8986	3.341	0.001076
	proficiency4	0.09048	0.05183	136.8986	1.746	0.083131
	boundarynonbound	0.01285	0.06196	635.4388	0.207	0.835775
	elicitationsimultaneous	0.20969	0.05684	651.842	3.689	0.000244
	proficiency3:boundarynonbound	-0.34524	0.13087	654.025	-2.638	0.008536
	proficiency4:boundarynonbound	-0.07381	0.06897	654.025	-1.07	0.284957
	proficiency3:elicitationsimultaneous	-0.3	0.12573	654.025	-2.386	0.017315
	proficiency4:elicitationsimultaneous	-0.1381	0.06627	654.025	-2.084	0.037554
	boundarynonbound:elicitationsimultaneous	-0.28765	0.09224	586.3128	-3.119	0.001907
	proficiency3:boundarynonbound:elicitationsimultaneous	0.31667	0.18507	654.025	1.711	0.087549
	proficiency4:boundarynonbound:elicitationsimultaneous	0.16587	0.09754	654.025	1.701	0.089507

Table 5: Experiment 3: Model Result (L2 English)

Type	Proficiency	Boundary	Elicitation	Emmean	SE	DF	Lower CL	Upper CL
Manner Bias	3	Bound	Delayed	0.973	0.0775	33	0.815	1.131
	4	Bound	Delayed	0.677	0.1245	135.4	0.431	0.923
	5	Bound	Delayed	0.874	0.0723	25.4	0.725	1.023
	3	Nonbound	Delayed	0.924	0.0807	38.2	0.761	1.087
	4	Nonbound	Delayed	0.96	0.1322	165.8	0.699	1.221
	5	Nonbound	Delayed	0.993	0.0749	28.7	0.84	1.147
	3	Bound	Simultaneous	0.797	0.0775	33	0.639	0.955
	4	Bound	Simultaneous	0.615	0.1245	135.4	0.369	0.861
	5	Bound	Simultaneous	0.695	0.0723	25.2	0.547	0.844
	3	Nonbound	Simultaneous	0.977	0.0807	38.2	0.813	1.14
	4	Nonbound	Simultaneous	0.921	0.1322	165.8	0.66	1.182
	5	Nonbound	Simultaneous	1.001	0.0749	28.7	0.848	1.154
Manner Verb	5	Bound	Delayed	1.184	0.141	24.2	0.894	1.474
	3	Bound	Delayed	1.098	0.207	77.3	0.686	1.511
	4	Bound	Delayed	0.97	0.134	19.9	0.691	1.248
	5	Nonbound	Delayed	0.952	0.144	26.6	0.656	1.248
	3	Nonbound	Delayed	0.802	0.216	90.6	0.373	1.231
	4	Nonbound	Delayed	0.891	0.136	21.6	0.608	1.174
	5	Bound	Simultaneous	1.261	0.141	24.2	0.971	1.551
	3	Bound	Simultaneous	0.947	0.207	77.3	0.534	1.359
	4	Bound	Simultaneous	1.137	0.134	19.9	0.858	1.416
	5	Nonbound	Simultaneous	0.629	0.144	26.6	0.333	0.925
	3	Nonbound	Simultaneous	0.562	0.216	90.6	0.133	0.992
	4	Nonbound	Simultaneous	0.851	0.136	21.6	0.568	1.134
Manner-Path	5	bound	delayed	0.0368	0.05	24.4	-0.0662	0.1398
	3	bound	delayed	0.0511	0.0735	96	-0.0947	0.1969
	4	bound	delayed	0.0368	0.0475	20	-0.0623	0.1358
	5	nonbound	delayed	0.1738	0.0516	27.6	0.068	0.2795
	3	nonbound	delayed	0.1904	0.0778	117.8	0.0364	0.3444
	4	nonbound	delayed	0.1682	0.0488	22.2	0.067	0.2694
	5	bound	simultaneous	-0.0212	0.05	24.4	-0.1243	0.0818
	3	bound	simultaneous	-0.0212	0.0735	96	-0.1671	0.1246
	4	bound	simultaneous	-0.0022	0.0475	20	-0.1012	0.0968
	5	nonbound	simultaneous	0.1915	0.0516	27.6	0.0857	0.2972
	3	nonbound	simultaneous	0.0248	0.0778	117.8	-0.1292	0.1788
	4	nonbound	simultaneous	0.1137	0.0488	22.2	0.0125	0.2148
Manner Adverbial Clause	5	bound	NA	0.0452	0.0173	48.5	0.01033	0.0801
	3	bound	NA	0.00235	0.0356	53	-0.06902	0.0737
	4	bound	NA	0.03568	0.0149	40.2	0.00567	0.0657
	5	nonbound	NA	0.01393	0.0182	57.3	-0.02251	0.0504
	3	nonbound	NA	-0.00274	0.0374	64.6	-0.07754	0.0721
	4	nonbound	NA	0.00837	0.0156	46.6	-0.02292	0.0397
Manner Adverbials	5	bound	delayed	0.0464	0.0509	61.2	-0.0553	0.148
	3	bound	delayed	-0.0107	0.0939	133.6	-0.1965	0.175
	4	bound	delayed	0.0559	0.0455	43.4	-0.0357	0.148
	5	nonbound	delayed	0.0958	0.0535	72	-0.0107	0.202
	3	nonbound	delayed	0.1792	0.0995	163	-0.0174	0.376
	4	nonbound	delayed	0.1792	0.0477	50.4	0.0835	0.275
	5	bound	simultaneous	0.073	0.0509	61.2	-0.0287	0.175
	3	bound	simultaneous	0.1587	0.0939	133.6	-0.0271	0.344
	4	bound	simultaneous	0.1016	0.0455	43.4	0.0099	0.193
	5	nonbound	simultaneous	0.1315	0.0535	72	0.0249	0.238
	3	nonbound	simultaneous	0.1482	0.0995	163	-0.0483	0.345
	4	nonbound	simultaneous	0.1704	0.0477	50.4	0.0747	0.266

Table 6: Experiment 3: Model Result (L2 English) cont.

Type	Proficiency	Boundary	Elicitation	Emmean	SE	DF	Lower CL	Upper CL
Motion Generics	5	bound	delayed	0.15768	0.0447	111.6	0.0692	0.246
	3	bound	delayed	-0.01375	0.0936	167.9	-0.1986	0.171
	4	bound	delayed	0.15768	0.0378	78.4	0.0824	0.233
	5	nonbound	delayed	0.04937	0.0478	129.8	-0.0452	0.144
	3	nonbound	delayed	0.01604	0.1002	208.4	-0.1815	0.214
	4	nonbound	delayed	0.02715	0.0405	88.8	-0.0533	0.108
	5	bound	simultaneous	0.1807	0.0447	111.6	0.0922	0.269
	3	bound	simultaneous	0.13784	0.0936	167.9	-0.047	0.323
	4	bound	simultaneous	0.13784	0.0378	78.4	0.0626	0.213
	5	nonbound	simultaneous	0.12252	0.0478	129.8	0.028	0.217
	3	nonbound	simultaneous	0.00585	0.1002	208.4	-0.1917	0.203
	4	nonbound	simultaneous	0.06141	0.0405	88.8	-0.019	0.142
Path Prep	5	bound	delayed	1.631	0.15	51.8	1.329	1.932
	3	bound	delayed	1.159	0.272	91.1	0.62	1.698
	4	bound	delayed	1.026	0.135	38.5	0.752	1.299
	5	nonbound	delayed	1.298	0.156	59.2	0.985	1.61
	3	nonbound	delayed	0.731	0.284	107.9	0.167	1.295
	4	nonbound	delayed	0.87	0.14	43.6	0.587	1.152
	5	bound	simultaneous	1.74	0.15	51.8	1.438	2.041
	3	bound	simultaneous	0.968	0.272	91.1	0.429	1.507
	4	bound	simultaneous	0.925	0.135	38.5	0.652	1.199
	5	nonbound	simultaneous	0.921	0.156	59.2	0.608	1.233
	3	nonbound	simultaneous	0.454	0.284	107.9	-0.11	1.017
	4	nonbound	simultaneous	0.543	0.14	43.6	0.26	0.825
Path Verb	5	bound	delayed	1.631	0.15	51.8	1.329	1.932
	3	bound	delayed	1.159	0.272	91.1	0.62	1.698
	4	bound	delayed	1.026	0.135	38.5	0.752	1.299
	5	nonbound	delayed	1.298	0.156	59.2	0.985	1.61
	3	nonbound	delayed	0.731	0.284	107.9	0.167	1.295
	4	nonbound	delayed	0.87	0.14	43.6	0.587	1.152
	5	bound	simultaneous	1.74	0.15	51.8	1.438	2.041
	3	bound	simultaneous	0.968	0.272	91.1	0.429	1.507
	4	bound	simultaneous	0.925	0.135	38.5	0.652	1.199
	5	nonbound	simultaneous	0.921	0.156	59.2	0.608	1.233
	3	nonbound	simultaneous	0.454	0.284	107.9	-0.11	1.017
	4	nonbound	simultaneous	0.543	0.14	43.6	0.26	0.825

Table 7: Experiment 3: Model Summary (L1 Portuguese)

Type	Effect	Estimate	Std. Error	df	t value	Pr(> t)
Manner Bias	(Intercept)	0.806804	0.092386	32.2712	8.733	5.20E-10
	as.factor(proficiency)3	-0.1881	0.142749	184.2569	-1.318	0.189
	as.factor(proficiency)4	-0.00794	0.075235	184.2569	-0.105	0.916
	boundarynonbound	0.04637	0.095197	650.8618	0.487	0.626
	elicitationsimultaneous	-0.11512	0.087239	659.9589	-1.32	0.187
	as.factor(proficiency)3:boundarynonbound	0.258929	0.200009	653.6655	1.295	0.196
	as.factor(proficiency)4:boundarynonbound	0.055159	0.105414	653.6655	0.523	0.601
	as.factor(proficiency)3:elicitationsimultaneous	0.295238	0.192163	653.6655	1.536	0.125
	as.factor(proficiency)4:elicitationsimultaneous	0.004444	0.101279	653.6655	0.044	0.965
	boundarynonbound:elicitationsimultaneous	0.052205	0.142023	619.0431	0.368	0.713
	as.factor(proficiency)3:boundarynonbound:elicitationsimultaneous	-0.12996	0.282856	653.6655	-0.459	0.646
	as.factor(proficiency)4:boundarynonbound:elicitationsimultaneous	0.131667	0.149078	653.6655	0.883	0.377
	(Intercept)	0.880918	0.131698	27.424	6.689	3.25E-07
	proficiency3	-0.15714	0.187711	153.9574	-0.837	0.4038
Manner verb	proficiency4	-0.00952	0.098932	153.9574	-0.096	0.9234
	boundarynonbound	-0.20866	0.122138	661.9146	-1.708	0.088
	elicitationsimultaneous	-0.03322	0.111813	665.0454	-0.297	0.7665
	proficiency3:boundarynonbound	0.47381	0.255259	653.8532	1.856	0.0639
	proficiency4:boundarynonbound	0.165079	0.134533	653.8532	1.227	0.2202
	proficiency3:elicitationsimultaneous	0.271429	0.245245	653.8532	1.107	0.2688
	proficiency4:elicitationsimultaneous	0.185714	0.129255	653.8532	1.437	0.1513
	boundarynonbound:elicitationsimultaneous	0.038647	0.182625	647.2443	0.212	0.8325
	proficiency3:boundarynonbound:elicitationsimultaneous	-0.72143	0.36099	653.8532	-1.998	0.0461
	proficiency4:boundarynonbound:elicitationsimultaneous	-0.23571	0.190259	653.8532	-1.239	0.2158
	(Intercept)	0.021322	0.028909	37.53936	0.738	0.465
	proficiency3	-0.02857	0.05305	55.40571	-0.539	0.592
	proficiency4	0.009524	0.02796	55.40571	0.341	0.735
	boundarynonbound	0.04547	0.029831	646.2386	1.524	0.128
Manner-Path	proficiency3:boundarynonbound	0.136905	0.067527	660.0723	2.027	0.043
	proficiency4:boundarynonbound	0.032143	0.03559	660.0723	0.903	0.367
	(Intercept)	0.116001	0.041918	85.99202	2.767	0.00692
	proficiency3	0.014286	0.09115	126.2336	0.157	0.87571
	proficiency4	0.052381	0.04804	126.2336	1.09	0.27763
	boundarynonbound	-0.03467	0.053662	381.2549	-0.646	0.51862
	elicitationsimultaneous	-0.03445	0.049839	496.0294	-0.691	0.48981
	proficiency3:boundarynonbound	-0.08095	0.119357	651.9942	-0.678	0.49786
	proficiency4:boundarynonbound	-0.03016	0.062907	651.9942	-0.479	0.6318
	proficiency3:elicitationsimultaneous	-0.07143	0.114675	651.9942	-0.623	0.53358
	proficiency4:elicitationsimultaneous	-0.00476	0.060439	651.9942	-0.079	0.93722
	boundarynonbound:elicitationsimultaneous	-0.04204	0.078234	260.4339	-0.537	0.59151
	proficiency3:boundarynonbound:elicitationsimultaneous	0.188095	0.168796	651.9942	1.114	0.26555
	proficiency4:boundarynonbound:elicitationsimultaneous	-0.02857	0.088964	651.9942	-0.321	0.74819
Manner Adverbial Clause	(Intercept)	0.026158	0.058203	52.82193	0.449	0.65497
	proficiency3	0.1	0.106837	126.506	0.936	0.35105
	proficiency4	0.042857	0.056308	126.506	0.761	0.448
	boundarynonbound	0.159992	0.065762	603.839	2.433	0.01527
	elicitationsimultaneous	0.079762	0.060423	634.3528	1.32	0.18729
	proficiency3:boundarynonbound	-0.01667	0.139955	653.7601	-0.119	0.90524
	proficiency4:boundarynonbound	-0.10952	0.073763	653.7601	-1.485	0.13807
	proficiency3:elicitationsimultaneous	0.057143	0.134464	653.7601	0.425	0.671
	proficiency4:elicitationsimultaneous	-0.00476	0.070869	653.7601	-0.067	0.94645
	boundarynonbound:elicitationsimultaneous	-0.23948	0.097579	527.8836	-2.454	0.01444
	proficiency3:boundarynonbound:elicitationsimultaneous	-0.05714	0.197926	653.7601	-0.289	0.7729
	proficiency4:boundarynonbound:elicitationsimultaneous	0.310317	0.104316	653.7601	2.975	0.00304
	(Intercept)	0.007334	0.017712	50.47794	0.414	0.68056
	proficiency3	0.135714	0.034206	684.262	3.968	8.03E-05
Motion Generic	proficiency4	0.02619	0.018028	684.262	1.453	0.14675
	boundarynonbound	0.009109	0.021976	616.5427	0.414	0.67866
	proficiency3:boundarynonbound	-0.15238	0.05035	684.262	-3.026	0.00257
	proficiency4:boundarynonbound	-0.00397	0.026537	684.262	-0.15	0.88117
	(Intercept)	0.6873	0.1321	57.0451	5.201	2.79E-06
	proficiency3	0.8571	0.2625	56.5437	3.265	0.00186
	proficiency4	0.4238	0.1383	56.5437	3.063	0.00335
	boundarynonbound	-0.1391	0.1263	615.4683	-1.101	0.27117
	elicitationsimultaneous	-0.2358	0.116	640.8977	-2.032	0.04253
	proficiency3:boundarynonbound	-0.2905	0.2682	653.7996	-1.083	0.27912
	proficiency4:boundarynonbound	-0.1349	0.1413	653.7996	-0.955	0.34013
	proficiency3:elicitationsimultaneous	0.1571	0.2576	653.7996	0.61	0.54213
	proficiency4:elicitationsimultaneous	0.3	0.1358	653.7996	2.209	0.0275
	boundarynonbound:elicitationsimultaneous	0.1109	0.1877	548.22	0.591	0.55493
	proficiency3:boundarynonbound:elicitationsimultaneous	-0.4405	0.3792	653.7996	-1.161	0.24588
Path preposition	proficiency4:boundarynonbound:elicitationsimultaneous	-0.3722	0.1999	653.7996	-1.862	0.06302

Table 8: Experiment 3: Model Summary (L1 Portuguese) cont.

Type	Effect	Estimate	Std. Error	df	t value	Pr(> t)
Path verb	(Intercept)	0.48403	0.09759	66.30945	4.96	5.18E-06
	proficiency3	0.18571	0.19745	72.81172	0.941	0.35003
	proficiency4	0.02381	0.10406	72.81172	0.229	0.81967
	boundarynonbound	-0.13207	0.10422	572.4849	-1.267	0.20559
	elicitationsimultaneous	-0.15518	0.09591	616.266	-1.618	0.10617
	proficiency3:boundarynonbound	-0.48571	0.22342	654.1631	-2.174	0.03007
	proficiency4:boundarynonbound	-0.15714	0.11775	654.1631	-1.334	0.18251
	proficiency3:elicitationsimultaneous	-0.18571	0.21466	654.1631	-0.865	0.38727
	proficiency4:elicitationsimultaneous	0.30476	0.11314	654.1631	2.694	0.00725
	boundarynonbound:elicitationsimultaneous	-0.01377	0.15417	478.5131	-0.089	0.92886
	proficiency3:boundarynonbound:elicitationsimultaneous	0.41905	0.31597	654.1631	1.326	0.18523
	proficiency4:boundarynonbound:elicitationsimultaneous	-0.09921	0.16653	654.1631	-0.596	0.55157

Table 9: Experiment 3: Model Result (L1 Portuguese)

Type	proficiency	boundary	elicitation	emmean	SE	df	lower.CL	upper.CL
Manner Bias	5	bound	delayed	0.807	0.0925	33.1	0.619	0.995
	3	bound	delayed	0.619	0.1488	132.2	0.324	0.913
	4	bound	delayed	0.799	0.0862	25.4	0.622	0.976
	5	nonbound	delayed	0.853	0.0962	38.3	0.658	1.048
	3	nonbound	delayed	0.924	0.1578	161.5	0.612	1.236
	4	nonbound	delayed	0.9	0.0892	28.7	0.718	1.083
	5	bound	simultaneous	0.692	0.0925	33.1	0.504	0.88
	3	bound	simultaneous	0.799	0.1488	132.2	0.504	1.093
	4	bound	simultaneous	0.688	0.0862	25.4	0.511	0.866
	5	nonbound	simultaneous	0.79	0.0962	38.3	0.595	0.985
	3	nonbound	simultaneous	1.026	0.1578	161.5	0.715	1.338
	4	nonbound	simultaneous	0.974	0.0892	28.7	0.791	1.156
Manner verb	5	bound	delayed	0.881	0.132	27.8	0.611	1.151
	3	bound	delayed	0.724	0.202	102.8	0.323	1.125
	4	bound	delayed	0.871	0.124	22.1	0.614	1.129
	5	nonbound	delayed	0.672	0.136	31.3	0.395	0.95
	3	nonbound	delayed	0.989	0.213	124	0.567	1.41
	4	nonbound	delayed	0.828	0.128	24.5	0.565	1.091
	5	bound	simultaneous	0.848	0.132	27.8	0.578	1.118
	3	bound	simultaneous	0.962	0.202	102.8	0.561	1.363
	4	bound	simultaneous	1.024	0.124	22.1	0.766	1.281
	5	nonbound	simultaneous	0.678	0.136	31.3	0.4	0.955
	3	nonbound	simultaneous	0.544	0.213	124	0.123	0.966
	4	nonbound	simultaneous	0.783	0.128	24.5	0.52	1.046
Manner-Path	5	bound	NA	0.02132	0.029	37.4	-0.03732	0.08
	3	bound	NA	-0.00725	0.0521	64.6	-0.11132	0.0968
	4	bound	NA	0.03085	0.0261	28	-0.02265	0.0843
	5	nonbound	NA	0.06679	0.0301	43.2	0.00604	0.1275
	3	nonbound	NA	0.17512	0.0549	79.1	0.06578	0.2845
Manner Adverbial Clause	4	nonbound	NA	0.10846	0.0271	31.8	0.05334	0.1636
	5	bound	delayed	0.116	0.0421	93.9	0.03232	0.1997
	3	bound	delayed	0.13029	0.0855	134.3	-0.03887	0.2994
	4	bound	delayed	0.16838	0.0363	68.5	0.09603	0.2407
	5	nonbound	delayed	0.08133	0.0448	110.2	-0.0074	0.1701
	3	nonbound	delayed	0.01467	0.091	165.5	-0.16493	0.1943
	4	nonbound	delayed	0.10355	0.0385	78.8	0.02691	0.1802
	5	bound	simultaneous	0.08156	0.0421	93.9	-0.00213	0.1652
	3	bound	simultaneous	0.02441	0.0855	134.3	-0.14475	0.1936
	4	bound	simultaneous	0.12918	0.0363	68.5	0.05683	0.2015
	5	nonbound	simultaneous	0.00485	0.0448	110.2	-0.08388	0.0936
	3	nonbound	simultaneous	0.05485	0.091	165.5	-0.12475	0.2344
	4	nonbound	simultaneous	-0.00626	0.0385	78.8	-0.0829	0.0704
Manner Adverbials	5	bound	delayed	0.0262	0.0583	53.8	-0.09083	0.143
	3	bound	delayed	0.1262	0.1049	134.4	-0.0814	0.334
	4	bound	delayed	0.069	0.0526	38.4	-0.0375	0.176
	5	nonbound	delayed	0.1861	0.0612	63	0.06389	0.308
	3	nonbound	delayed	0.2695	0.1112	163.6	0.04999	0.489
	4	nonbound	delayed	0.1195	0.055	44.4	0.00866	0.23
	5	bound	simultaneous	0.1059	0.0583	53.8	-0.01107	0.223
	3	bound	simultaneous	0.2631	0.1049	134.4	0.0555	0.471
	4	bound	simultaneous	0.144	0.0526	38.4	0.0375	0.251
	5	nonbound	simultaneous	0.0264	0.0612	63	-0.09583	0.149
	3	nonbound	simultaneous	0.1098	0.1112	163.6	-0.10973	0.329
	4	nonbound	simultaneous	0.2653	0.055	44.4	0.1545	0.376
Motion Generic	5	bound	NA	0.007334	0.0178	40.8	-0.02855	0.0432
	3	bound	NA	0.143049	0.0331	87.3	0.07726	0.2088
	4	bound	NA	0.033525	0.0158	28.7	0.00113	0.0659
	5	nonbound	NA	0.016443	0.0188	49.6	-0.02133	0.0542
	3	nonbound	NA	-0.00022	0.0355	113.5	-0.07064	0.0702
	4	nonbound	NA	0.038665	0.0167	34.1	0.0048	0.0725

Table 10: Experiment 3: Model Result (L1 Portuguese) cont.

Type	proficiency	boundary	elicitation	emmean	SE	df	lower.CL	upper.CL
Path preposition	5	bound	delayed	0.687	0.132	57.6	0.422	0.952
	3	bound	delayed	1.544	0.252	65.6	1.041	2.047
	4	bound	delayed	1.111	0.117	46.5	0.876	1.347
	5	nonbound	delayed	0.548	0.137	65	0.275	0.822
	3	nonbound	delayed	1.115	0.262	75.7	0.594	1.636
	4	nonbound	delayed	0.837	0.121	52	0.594	1.08
	5	bound	simultaneous	0.452	0.132	57.6	0.187	0.716
	3	bound	simultaneous	1.466	0.252	65.6	0.963	1.969
	4	bound	simultaneous	1.175	0.117	46.5	0.94	1.411
	5	nonbound	simultaneous	0.423	0.137	65	0.15	0.697
	3	nonbound	simultaneous	0.707	0.262	75.7	0.186	1.227
	4	nonbound	simultaneous	0.64	0.121	52	0.397	0.883
Path verb	5	bound	delayed	0.484	0.0978	65.9	0.2887	0.679
	3	bound	delayed	0.67	0.1886	82.5	0.2946	1.045
	4	bound	delayed	0.508	0.0861	51.4	0.3351	0.681
	5	nonbound	delayed	0.352	0.1021	75.8	0.1486	0.555
	3	nonbound	delayed	0.052	0.1974	97.8	-0.3398	0.444
	4	nonbound	delayed	0.219	0.0897	58.5	0.0391	0.398
	5	bound	simultaneous	0.329	0.0978	65.9	0.1335	0.524
	3	bound	simultaneous	0.329	0.1886	82.5	-0.0463	0.704
	4	bound	simultaneous	0.657	0.0861	51.4	0.4847	0.83
	5	nonbound	simultaneous	0.183	0.1021	75.8	-0.0204	0.386
	3	nonbound	simultaneous	0.116	0.1974	97.8	-0.2754	0.508
	4	nonbound	simultaneous	0.255	0.0897	58.5	0.0757	0.435

Table II: Experiment 3: Model Summary (L2 Portuguese)

Type	Effect	Estimate	Std. Error	df	t value	Pr(> t)
Manner Bias	(Intercept)	0.736333	0.080551	21.05894	9.141	8.88E-09
	as.factor(proficiency)2	0.022024	0.068144	52.00308	0.323	0.748
	as.factor(proficiency)3	0.021429	0.078686	52.00308	0.272	0.786
	boundarynonbound	0.100402	0.067712	570.7609	1.483	0.139
	as.factor(proficiency)2:boundarynonbound	-0.00918	0.091505	559.4389	-0.1	0.92
	as.factor(proficiency)3:boundarynonbound	0.088294	0.105661	559.4389	0.836	0.404
Manner verb	(Intercept)	0.83889	0.10357	20.62033	8.099	7.71E-08
	proficiency2	-0.02143	0.08328	39.08607	-0.257	0.7983
	proficiency3	0.02143	0.09617	39.08607	0.223	0.8248
	boundarynonbound	-0.13426	0.07184	571.8271	-1.869	0.0621
	proficiency2:boundarynonbound	0.04018	0.09662	559.7448	0.416	0.6777
	proficiency3:boundarynonbound	-0.04643	0.11157	559.7448	-0.416	0.6775
Manner-Path	(Intercept)	0.04231	0.01955	24.91954	2.164	0.0403
	proficiency2	-0.0375	0.02547	20.00008	-1.472	0.1565
	proficiency3	0.01923	0.02941	20.00008	0.654	0.5206
Manner Adverbial Clause	(Intercept)	0.07308	0.02076	20.33923	3.519	0.00211
	proficiency2	-0.04423	0.03042	19.99991	-1.454	0.16144
	proficiency3	-0.05	0.03512	19.99991	-1.424	0.17
Manner Adverbials	(Intercept)	0.060613	0.03665	38.42566	1.654	0.106
	proficiency2	-0.00536	0.044535	39.7301	-0.12	0.905
	proficiency3	0.035714	0.051425	39.7301	0.694	0.491
	boundarynonbound	0.052005	0.037761	517.3849	1.377	0.169
	proficiency2:boundarynonbound	0.015774	0.0522	559.9579	0.302	0.763
	proficiency3:boundarynonbound	0.039286	0.060275	559.9579	0.652	0.515
Motion Generic	(Intercept)	0.01154	0.01745	20	0.661	0.516
	proficiency2	0.0125	0.02618	20	0.478	0.638
	proficiency3	0.05	0.03023	20	1.654	0.114
Path Preposition	(Intercept)	0.64534	0.1258	44.8622	5.13	6.00E-06
	proficiency2	-0.01786	0.16816	34.24298	-0.106	0.916
	proficiency3	0.18571	0.19417	34.24298	0.956	0.3456
	boundarynonbound	-0.04824	0.10889	457.1868	-0.443	0.658
	elicitationsimultaneous	-0.23598	0.09976	505.1902	-2.365	0.0184
	proficiency2:boundarynonbound	-0.08214	0.14099	553.8761	-0.583	0.5604
	proficiency3:boundarynonbound	-0.28571	0.1628	553.8761	-1.755	0.0798
	proficiency2:elicitationsimultaneous	0.13929	0.13546	553.8761	1.028	0.3043
	proficiency3:elicitationsimultaneous	-0.12857	0.15641	553.8761	-0.822	0.4114
	boundarynonbound:elicitationsimultaneous	0.11128	0.16158	366.5292	0.689	0.4914
Path verb	proficiency2:boundarynonbound:elicitationsimultaneous	-0.23512	0.19939	553.8761	-1.179	0.2388
	proficiency3:boundarynonbound:elicitationsimultaneous	-0.15476	0.23023	553.8761	-0.672	0.5017
	(Intercept)	0.41302	0.06982	36.28651	5.915	8.77E-07
	proficiency2	-0.2375	0.0889	27.91716	-2.672	0.01245
	proficiency3	-0.17143	0.10265	27.91716	-1.67	0.10609
	boundarynonbound	-0.15321	0.05517	544.1294	-2.777	0.00567
	proficiency2:boundarynonbound	0.10625	0.07561	559.6465	1.405	0.16051
	proficiency3:boundarynonbound	-0.02024	0.08731	559.6465	-0.232	0.81678

Table 12: Experiment 3: Model Result (L2 Portuguese)

proficiency	boundary	emmean	SE	df	lower.CL	upper.CL	Factor	elicitation
5	bound	0.736353	0.080605	22.00241	0.569189	0.903517	Manner Bias	NA
2	bound	0.758377	0.083745	25.04024	0.585915	0.930838	Manner Bias	NA
3	bound	0.757781	0.092526	33.8868	0.569723	0.94584	Manner Bias	NA
5	nonbound	0.836755	0.082783	24.35182	0.666029	1.007481	Manner Bias	NA
2	nonbound	0.849602	0.086259	28.03704	0.67292	1.026285	Manner Bias	NA
3	nonbound	0.946477	0.095933	38.93616	0.752424	1.14053	Manner Bias	NA
5	bound	0.838891	0.103606	21.03998	0.623455	1.054326	Manner Verb	NA
2	bound	0.817462	0.107261	23.58289	0.595879	1.039045	Manner Verb	NA
3	bound	0.860319	0.117545	30.77106	0.620512	1.100126	Manner Verb	NA
5	nonbound	0.704628	0.105516	22.53139	0.486127	0.923128	Manner Verb	NA
2	nonbound	0.723378	0.109472	25.52695	0.498152	0.948603	Manner Verb	NA
3	nonbound	0.679628	0.120563	33.96653	0.434605	0.924651	Manner Verb	NA
5	NA	0.042308	0.019553	24.91948	0.002031	0.082584	Manner-Path Verb	NA
2	NA	0.004808	0.021316	25.17018	-0.03908	0.048694	Manner-Path Verb	NA
3	NA	0.061538	0.025896	24.53187	0.008154	0.114923	Manner-Path Verb	NA
5	NA	0.073077	0.020764	20.33932	0.02981	0.116343	Manner Adverbial Clause	NA
2	NA	0.028846	0.023107	20.51759	-0.01928	0.07697	Manner Adverbial Clause	NA
3	NA	0.023077	0.029024	20.5641	-0.03736	0.083513	Manner Adverbial Clause	NA
5	bound	0.060613	0.036734	38.53164	-0.01372	0.134944	Manner Adverb	NA
2	bound	0.055256	0.03962	42.29766	-0.02468	0.135196	Manner Adverb	NA
3	bound	0.096327	0.047232	46.95994	0.001306	0.191348	Manner Adverb	NA
5	nonbound	0.112618	0.038227	44.33972	0.035594	0.189643	Manner Adverb	NA
2	nonbound	0.123035	0.041291	49.08964	0.040061	0.206009	Manner Adverb	NA
3	nonbound	0.187618	0.049355	55.35586	0.088722	0.286514	Manner Adverb	NA
5	NA	0.011538	0.017451	19.42825	-0.02493	0.04801	Motion Generic	NA
2	NA	0.024038	0.019511	19.63027	-0.01671	0.064787	Motion Generic	NA
3	NA	0.061538	0.02468	19.85393	0.010033	0.113044	Motion Generic	NA
5	bound	0.64534	0.126058	44.96591	0.391441	0.899239	Path Preposition	delayed
2	bound	0.627483	0.137958	44.06675	0.349458	0.905508	Path Preposition	delayed
3	bound	0.831055	0.168696	41.54132	0.490501	1.171608	Path Preposition	delayed
5	nonbound	0.597103	0.129717	49.78688	0.336531	0.857675	Path Preposition	delayed
2	nonbound	0.497103	0.14191	48.86523	0.211905	0.782301	Path Preposition	delayed
3	nonbound	0.497103	0.173418	46.13126	0.148058	0.846149	Path Preposition	delayed
5	bound	0.409364	0.126058	44.96591	0.155464	0.663263	Path Preposition	simultaneous
2	bound	0.530792	0.137958	44.06675	0.252767	0.808817	Path Preposition	simultaneous
3	bound	0.466507	0.168696	41.54132	0.125953	0.80706	Path Preposition	simultaneous
5	nonbound	0.472409	0.129717	49.78688	0.211837	0.732981	Path Preposition	simultaneous
2	nonbound	0.276576	0.14191	48.86523	-0.00862	0.561774	Path Preposition	simultaneous
3	nonbound	0.089076	0.173418	46.13126	-0.25997	0.438121	Path Preposition	simultaneous
5	bound	0.41302	0.069901	36.63454	0.27134	0.554699	Path Verb	NA
2	bound	0.17552	0.075922	36.89167	0.021671	0.329368	Path Verb	NA
3	bound	0.241591	0.091643	35.63854	0.055664	0.427518	Path Verb	NA
5	nonbound	0.25981	0.071582	40.01402	0.115139	0.404482	Path Verb	NA
2	nonbound	0.12856	0.077788	40.43618	-0.0286	0.285723	Path Verb	NA
3	nonbound	0.068144	0.093978	39.28512	-0.1219	0.258188	Path Verb	NA

Table 13: Experiment 3: Model Summary (L1 English)

Type	Effect	Estimate	Std. Error	df	t value	Pr(> t)
Manner Bias	(Intercept)	0.94603	0.065721	49.53134	14.395	<2e-16
	as.factor(proficiency)2	-0.07125	0.074315	143.3511	-0.959	0.3393
	as.factor(proficiency)3	0.070714	0.085812	143.3511	0.824	0.4113
	boundarynonbound	0.009434	0.079757	462.9421	0.118	0.9059
	elicitationsimultaneous	-0.19704	0.073023	508.6979	-2.698	0.0072
	as.factor(proficiency)2:boundarynonbound	0.149028	0.102956	552.9571	1.447	0.1483
	as.factor(proficiency)3:boundarynonbound	0.082063	0.118884	552.9571	0.69	0.4903
	as.factor(proficiency)2:elicitationsimultaneous	0.18125	0.098917	552.9571	1.832	0.0674
	as.factor(proficiency)3:elicitationsimultaneous	0.061905	0.11422	552.9571	0.542	0.5881
	boundarynonbound:elicitationsimultaneous	0.274132	0.118491	373.2405	2.314	0.0212
	as.factor(proficiency)2:boundarynonbound:elicitationsimultaneous	-0.2191	0.145602	552.9571	-1.505	0.133
	as.factor(proficiency)3:boundarynonbound:elicitationsimultaneous	-0.09524	0.168127	552.9571	-0.566	0.5713
	(Intercept)	1.20215	0.11228	20.00911	10.707	9.86E-10
	proficiency2	-0.14643	0.0869	34.59619	-1.685	0.101
Manner Verb	proficiency3	-0.07857	0.10034	34.59619	-0.783	0.439
	boundarynonbound	-0.38798	0.06888	570.7304	-5.633	2.79E-08
	proficiency2:boundarynonbound	0.14226	0.09244	559.8279	1.539	0.124
	proficiency3:boundarynonbound	0.0369	0.10674	559.8279	0.346	0.73
	(Intercept)	0.002364	0.05246	15.22	0.045	0.965
Manner-Path	proficiency2	0.007143	0.02834	580	0.252	0.801
	proficiency3	-3.88E-17	0.03273	580	0	1
	boundarynonbound	0.1865	0.03113	589.6	5.992	3.61E-09
	proficiency2:boundarynonbound	-0.01964	0.04172	580	-0.471	0.638
	proficiency3:boundarynonbound	0.008333	0.04817	580	0.173	0.863
Manner Adverbial Clause	(Intercept)	0.03077	0.01951	25.01	1.577	0.127
	proficiency2	0.007692	0.02461	20	0.313	0.758
	proficiency3	3.16E-17	0.02842	20	0	1
Manner Adverbials	(Intercept)	0.06	0.04101	36.08033	1.463	0.152
	proficiency2	0.02321	0.0471	44.37605	0.493	0.625
	proficiency3	0.04286	0.05439	44.37605	0.788	0.435
	boundarynonbound	0.05334	0.0427	533.4476	1.249	0.212
	proficiency2:boundarynonbound	0.0372	0.05876	560.2015	0.633	0.527
	proficiency3:boundarynonbound	0.05714	0.06786	560.2015	0.842	0.4
Motion Generic	(Intercept)	0.17517	0.04092	39.18936	4.281	0.000116
	proficiency2	-0.07143	0.05033	37.7698	-1.419	0.164029
	proficiency3	-0.06429	0.05811	37.7698	-1.106	0.27564
	boundarynonbound	-0.09621	0.0413	517.835	-2.33	0.0202
	proficiency2:boundarynonbound	0.02768	0.0571	560.2164	0.485	0.628031
	proficiency3:boundarynonbound	0.05595	0.06593	560.2164	0.849	0.396428
Path preposition	(Intercept)	1.67284	0.17674	36.28164	9.465	2.45E-11
	proficiency2	-0.31071	0.17979	68.46129	-1.728	0.0885
	proficiency3	-0.21429	0.2076	68.46129	-1.032	0.3056
	boundarynonbound	-0.42448	0.1679	550.1075	-2.528	0.0117
	elicitationsimultaneous	0.1388	0.15297	559.2479	0.907	0.3646
	proficiency2:boundarynonbound	0.36905	0.21152	553.5686	1.745	0.0816
	proficiency3:boundarynonbound	-0.16905	0.24424	553.5686	-0.692	0.4891
	proficiency2:elicitationsimultaneous	0.02143	0.20322	553.5686	0.105	0.9161
	proficiency3:elicitationsimultaneous	-0.22857	0.23466	553.5686	-0.974	0.3305
	boundarynonbound:elicitationsimultaneous	-0.55073	0.25189	519.3168	-2.186	0.0292
	proficiency2:boundarynonbound:elicitationsimultaneous	-0.19226	0.29914	553.5686	-0.643	0.5207
	proficiency3:boundarynonbound:elicitationsimultaneous	0.3119	0.34541	553.5686	0.903	0.3669
	(Intercept)	0.04734	0.05416	35.70087	0.874	0.388
	proficiency2	0.07857	0.05372	124.4636	1.463	0.1461
Path verb	proficiency3	0.04286	0.06203	124.4636	0.691	0.4909
	boundarynonbound	0.03077	0.05739	538.324	0.536	0.5921
	elicitationsimultaneous	0.2386	0.05233	552.8756	4.559	6.32E-06
	proficiency2:boundarynonbound	-0.0744	0.07264	553.7209	-1.024	0.3061
	proficiency3:boundarynonbound	-0.02619	0.08388	553.7209	-0.312	0.755
	proficiency2:elicitationsimultaneous	-0.175	0.06979	553.7209	-2.508	0.0124
	proficiency3:elicitationsimultaneous	-0.12857	0.08058	553.7209	-1.595	0.1112
	boundarynonbound:elicitationsimultaneous	-0.3503	0.08594	495.0545	-4.076	5.33E-05
	proficiency2:boundarynonbound:elicitationsimultaneous	0.23333	0.10273	553.7209	2.271	0.0235
	proficiency3:boundarynonbound:elicitationsimultaneous	0.1119	0.11862	553.7209	0.943	0.3459

Table 14: Experiment 3: Model Result (L1 English)

proficiency	boundary	elicitation	emmean	SE	df	lower.CL	upper.CL	Factor
5	bound	delayed	0.94603	0.065979	53.34599	0.813714	1.078347	Manner Bias
2	bound	delayed	0.87478	0.070476	65.18919	0.734038	1.015522	Manner Bias
3	bound	delayed	1.016745	0.082509	96.50513	0.852977	1.180513	Manner Bias
5	nonbound	delayed	0.955464	0.069676	63.13856	0.816234	1.094695	Manner Bias
2	nonbound	delayed	1.033242	0.074559	77.68515	0.884798	1.181687	Manner Bias
3	nonbound	delayed	1.108242	0.087588	116.4288	0.934769	1.281715	Manner Bias
5	bound	simultaneous	0.748995	0.065979	53.34599	0.616678	0.881312	Manner Bias
2	bound	simultaneous	0.858995	0.070476	65.18919	0.718253	0.999737	Manner Bias
3	bound	simultaneous	0.881614	0.082509	96.50513	0.717846	1.045382	Manner Bias
5	nonbound	simultaneous	1.032561	0.069676	63.13856	0.893331	1.171792	Manner Bias
2	nonbound	simultaneous	1.072492	0.074559	77.68515	0.924047	1.220936	Manner Bias
3	nonbound	simultaneous	1.152006	0.087588	116.4288	0.978533	1.325479	Manner Bias
5	bound	NA	1.202146	0.1123	20.2821	0.968102	1.436191	Manner Verb
2	bound	NA	1.055718	0.115976	22.5454	0.815336	1.295899	Manner Verb
3	bound	NA	1.123575	0.126363	28.9171	0.865102	1.382048	Manner Verb
5	nonbound	NA	0.814163	0.113921	21.44828	0.577553	1.050773	Manner Verb
2	nonbound	NA	0.809996	0.117856	24.00896	0.566758	1.053234	Manner Verb
3	nonbound	NA	0.772496	0.128943	31.30348	0.509617	1.055374	Manner Verb
5	bound	NA	0.002364	0.052468	15.16563	-0.10936	0.11409	Manner-Path Verb
2	bound	NA	0.009506	0.053312	16.13104	-0.10343	0.122447	Manner-Path Verb
3	bound	NA	0.002364	0.055766	19.13867	-0.1143	0.119027	Manner-Path Verb
5	nonbound	NA	0.188909	0.053176	15.98615	0.076173	0.301646	Manner-Path Verb
2	nonbound	NA	0.176409	0.054147	17.1485	0.062245	0.290573	Manner-Path Verb
3	nonbound	NA	0.197242	0.056958	20.8037	0.078723	0.315762	Manner-Path Verb
5	NA	NA	0.030769	0.019511	25.00572	-0.00941	0.070953	Manner Adverbial Clause
2	NA	NA	0.038462	0.021166	25.6183	-0.00508	0.082	Manner Adverbial Clause
3	NA	NA	0.030769	0.025494	25.34109	-0.0217	0.083238	Manner Adverbial Clause
5	bound	NA	0.059999	0.041101	35.67078	-0.02338	0.143382	Manner Adverb
2	bound	NA	0.083213	0.043998	40.60343	-0.00567	0.172094	Manner Adverb
3	bound	NA	0.102856	0.051723	49.13336	-0.00108	0.20679	Manner Adverb
5	nonbound	NA	0.113335	0.042803	41.19797	0.026904	0.199766	Manner Adverb
2	nonbound	NA	0.173752	0.045914	47.35744	0.081402	0.266101	Manner Adverb
3	nonbound	NA	0.213335	0.054186	58.40551	0.104885	0.321785	Manner Adverb
5	bound	NA	0.175174	0.041011	38.84089	0.092211	0.258137	Motion Generic
2	bound	NA	0.103745	0.04431	42.02762	0.014327	0.193164	Motion Generic
3	bound	NA	0.110888	0.052987	45.40335	0.004193	0.217584	Motion Generic
5	nonbound	NA	0.078964	0.042611	44.47488	-0.00689	0.164815	Motion Generic
2	nonbound	NA	0.035214	0.046098	48.50492	-0.05745	0.127875	Motion Generic
3	nonbound	NA	0.07063	0.055254	53.14504	-0.04019	0.181448	Motion Generic
5	bound	delayed	1.672838	0.176985	37.44155	1.314376	2.031301	Path Preposition
2	bound	delayed	1.362124	0.186856	43.70025	0.985467	1.738781	Path Preposition
3	bound	delayed	1.458553	0.213752	59.23147	1.030871	1.886235	Path Preposition
5	nonbound	delayed	1.248355	0.183093	42.281	0.878931	1.617779	Path Preposition
2	nonbound	delayed	1.306689	0.193641	49.69145	0.917688	1.695689	Path Preposition
3	nonbound	delayed	0.865022	0.222304	68.30587	0.421458	1.308586	Path Preposition
5	bound	simultaneous	1.811639	0.176985	37.44155	1.453176	2.170102	Path Preposition
2	bound	simultaneous	1.522353	0.186856	43.70025	1.145696	1.89901	Path Preposition
3	bound	simultaneous	1.368782	0.213752	59.23147	0.9411	1.796464	Path Preposition
5	nonbound	simultaneous	0.836421	0.183093	42.281	0.466998	1.205845	Path Preposition
2	nonbound	simultaneous	0.723921	0.193641	49.69145	0.334921	1.112921	Path Preposition
3	nonbound	simultaneous	0.536421	0.222304	68.30587	0.092857	0.979986	Path Preposition
5	bound	delayed	0.047339	0.054271	36.50745	-0.06267	0.157352	Path Verb
2	bound	delayed	0.12591	0.057148	43.54843	0.010702	0.241119	Path Verb
3	bound	delayed	0.090196	0.065022	64.53893	-0.03968	0.220072	Path Verb
5	nonbound	delayed	0.078105	0.056594	42.27716	-0.03608	0.192293	Path Verb
2	nonbound	delayed	0.082271	0.059738	50.88034	-0.03766	0.202207	Path Verb
3	nonbound	delayed	0.094771	0.068307	76.70484	-0.04125	0.230796	Path Verb
5	bound	simultaneous	0.285941	0.054271	36.50745	0.175928	0.395953	Path Verb
2	bound	simultaneous	0.189512	0.057148	43.54843	0.074303	0.304721	Path Verb
3	bound	simultaneous	0.200226	0.065022	64.53893	0.070351	0.330102	Path Verb
5	nonbound	simultaneous	-0.0336	0.056594	42.27716	-0.14779	0.080591	Path Verb
2	nonbound	simultaneous	0.028902	0.059738	50.88034	-0.09103	0.148838	Path Verb
3	nonbound	simultaneous	-0.0336	0.068307	76.70484	-0.16962	0.102427	Path Verb

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