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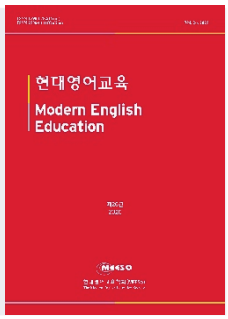

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L2 Learners' Functional Development of *of*-Phrases in Online Written Interaction

Hyung-Sun Kim (Chosun University)
Ung-Yong Choi (Chonnam National University)

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Hyung-Sun Kim (First author)
Professor
Division of Undeclared Majors
Chosun University
hskim4@chosun.ac.kr

Ung-Yong Choi
(Corresponding author)
Professor Emeritus
Business Administration
Chonnam National University
uychoi@jnu.ac.kr

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Abstract

This paper explored Korean EFL learners' use of English prepositions—especially those involving *of*—in written interactions with L1 speakers. Using learner texts from a Virtual Intercultural Exchange (VIE) project, this study tracked how the functional use of *of* evolved across three stages of interaction. Though the initial lens for functional development was a markedness perspective, results suggested that learners' use of *of* reflected a more localized but dynamic interplay between strategic choices shaped by planning needs and discourse awareness. Analysis results showed that learners often fell back on routinized structures such as noun + *of* + noun patterns and fixed expressions that were typically grammatical but occasionally misaligned with pragmatic norms. As the exchange progressed, learners appeared to use *of* with increased contextual sensitivity in discourse-level functions, hinting a potential role of incidental learning in functional development beyond mere lexical use. These findings imply that ongoing, meaning-focused interaction in online spaces can help learners grasp abstract grammar functions. They also suggest mutual accommodation, as L1 speakers and L2 learners exhibited parallel trends in their use of prepositions over time. Altogether, these results underscore the value of authentic, discourse-rich interaction for fostering incidental yet meaningful gains in L2 grammatical competence.

INTRODUCTION

Prepositions play a fundamental role in English syntax and semantics, serving as essential elements that establish spatial, temporal, and relational connections (Huddleston & Pullum, 2002). Despite their grammatical simplicity, prepositions present persistent challenges for L2 learners, especially those whose native languages lack direct grammatical equivalents for many English prepositions, such as Korean (Jeong, 2012). Unlike content words with relatively transparent meanings, prepositions are often polysemous and highly context-dependent, which complicates their acquisition through direct instruction or isolated practice (Ellis, 2002; Nation, 2013).

Previous research has shown that L2 learners tend to rely on prepositional functions that are semantically concrete or structurally simpler, while avoiding those that demand greater abstraction or discourse-level[1] reasoning (Eckman, 1985, 2008; Slabakova, 2009). Corpus-based studies confirmed this tendency, indicating that Korean learners frequently overuse setting prepositions like *in*, which have relatively clear L1 equivalents, and underuse relational prepositions like *of*, which exhibit greater functional variability (Hahn & Hong, 2024; Kim & Choe, 2020). While *in* and *of* are among the most frequently used English prepositions, *of* presents particular challenges due to its wide semantic range and complex discourse functions (Kim & Kim, 2024).

To account for these challenges, researchers have turned to Markedness Theory, which posits that less salient, less frequent, or cognitively more demanding linguistic forms tend to be acquired later (Andersen, 1989; Gass et al., 2020). In the case of prepositions, markedness can be understood both across lexical items (e.g., *in* vs. *of*) and within a single item's multiple functions—what Kim and Kim (2024) describe as intra-lexical markedness. From this perspective, *of* serves as a particularly rich site for investigating the developmental trajectory of L2 learners' functional competence, especially in academic and discourse-oriented writing.

At the same time, the learning environment itself also influences how and whether learners acquire such complex forms. A growing area of focus in recent research is Virtual Intercultural Exchange (VIE), where L2 learners engage in sustained online dialogue with L1 peers. Unlike classroom instruction, which often focuses on decontextualized input, VIE provides ongoing, authentic exposure to a wide range of grammatical and discourse features in use (Dooly & Vinagre, 2022; Helm, 2019). Such environments may support incidental learning, enabling learners to gradually internalize grammatical patterns through meaningful interaction over time than explicit instruction.

Building on these earlier works, the present study investigates how Korean L2 learners use English prepositions—focusing on *of*—in an online intercultural exchange setting. Extending previous findings from Kim and Kim (2024), which analyzed a student essay corpus, this study examines learners participating in a three-month VIE project involving sustained written interaction with L1 counterparts. Specifically, it explores how learners engage with *of* across a range of functional categories and whether meaningful interaction in VIE promotes more contextually appropriate and discourse-sensitive use over time.

This study addresses the following research questions:

i) How do L2 learners use prepositions overall, with particular attention to the functional uses of *of* in relation to developmental patterns and markedness?
ii) What features of L2 writing emerge in a VIE context, and how do they shape or reflect learners' written engagement with L1 participants over time?
iii) To what extent does incidental learning contribute to the functional development of prepositional uses among L2 learners in a VIE context?

BACKGROUND

The Challenge of Prepositions in L2 Learning

English prepositions, while structurally simple, are functionally complex and pose persistent challenges for second language (L2) learners. They are compact carriers of meaning (Celce-Murcia & Larsen-Freeman, 1999; Cowan, 2008), used to encode spatial, temporal, causal, and abstract relationships (Huddleston & Pullum, 2002). Their compact form and frequent use are

[1] In this study, discourse refers to language use beyond the sentence level, characterized by thematic structuring of topics and pragmatically appropriate choices aligned with communicative purpose (Celce-Murcia & Olshtain, 2000).

reminiscent of what Bybee (2010) describes as linguistic economy—a general tendency in language whereby frequently used forms become reduced or simplified for articulatory and processing efficiency. This economy may contribute to their unmarked status and perceived ease of acquisition, as speakers favor structures that are easier to pronounce and recall. However, their highly polysemous nature (Tyler & Evans, 2003) and context sensitivity make them difficult to acquire, especially when explicit instruction focuses on prototypical meanings without exposing learners to more varied or discourse-dependent uses. Nation (2013) notes that even frequent function words like prepositions require repeated, contextualized exposure to be fully acquired, particularly when their functions extend beyond basic meanings. Therefore, the challenge lies not only in lexical unfamiliarity but also in mastering the flexible and relational functions that prepositions often serve in extended discourse contexts.

Among English prepositions, *of* is especially important due to its high frequency and the wide variety of abstract functions it performs (Kim & Kim, 2024; Lee, 1998). Yet, because many of these functions are relational or conceptual in nature (Hahn & Hong, 2024; Van Langendonck, 1975), they may be harder for learners to grasp without sustained exposure in meaningful contexts (Nation, 2013). Kim and Kim (2024) have noted that prepositional acquisition cannot be fully explained by simple frequency counts alone; rather, it often reflects a deeper interplay between cognitive complexity, discourse salience—namely, how prominently a form appears in input and how likely it is to attract learner attention (Bardovi-Harlig, 1987)—and instructional emphasis. These issues provide the point of departure for this study, which focuses on how L2 learners navigate prepositional functions that vary in semantic and functional transparency, particularly in contexts where exposure occurs through extended, meaningful interaction rather than explicit instruction.

Functional Complexity and Markedness

Markedness Theory offers a foundational lens for explaining why certain linguistic forms are more difficult to acquire than others. Originally developed in the context of phonology (Andersen, 1989), markedness was first applied to predict developmental sequences in first language acquisition, where unmarked forms—those that are more frequent, salient, or cognitively simple—tend to emerge earlier (Brown, 1973). This theoretical approach was later extended to second language acquisition, with Eckman (1985) proposing the Markedness Differential Hypothesis, and Rutherford (1982) exploring the role of markedness in L2 development.

In the case of prepositions, markedness is closely tied to functional complexity and semantic abstraction. Van Langendonck (1975) distinguished between setting prepositions like *in* or *at*, which are generally unmarked due to their concrete spatial or temporal uses; relational prepositions like *of* or *by*, which often encode complex, abstract relationships that depend on broader discourse context; and operational prepositions like *with*, which indicate manner or means and fall somewhere in between. While the original theory drew a dichotomy between marked and unmarked forms, later perspectives initiated a continuum model (Bybee, 2010). This approach allows for a more refined understanding of both inter-lexical markedness (across prepositions) and intra-lexical markedness (within a single preposition's multiple meanings), as further elaborated in Kim and Kim (2024). In this view, even a common preposition like *in* may range from unmarked uses such as spatial inclusion to more marked abstract or idiomatic uses (e.g., *in practice*, *in essence*).

This study adopts this continuum-based perspective to explore how L2 learners engage with a range of prepositional functions. While markedness serves as a useful initial framework, the study also recognizes that other factors—such as exposure frequency, communicative context, and input conditions—interact with markedness in shaping acquisition.

Functional Categorization of *of* in Relation to Markedness

Building on the concept of intra-lexical markedness introduced in the previous section, this study proposes a functional categorization of *of* as a representative case of how a single preposition can encode multiple functions. Among the high-frequency prepositions in English, *of* has been classified as marked due to its abstract, relational meanings and discourse-level functions, in contrast to more concrete prepositions such as *in* or *at* (Van Langendonck, 1975; Kim & Kim, 2024). This makes *of* a particularly revealing site for examining the range and complexity of prepositional functions in L2 writing.

These meanings span from concrete to abstract, and from lexically contentful to more grammaticalized uses (Biber et al., 1999; Quirk et al., 1985). For example, in *the cover of the book*, *of* expresses a concrete part–whole relation, while in *a lot of students* or *because of pressure*, it serves a more structural role, which is later detailed in the categorization framework below. The wide variability of *of* across these contexts calls for a principled categorization framework.

The framework adopted in this study draws on functional linguistics, which sees prepositions not simply as grammatical markers but as indicators of broader semantic and discourse-level relationships (Dirven, 1993; Langacker, 1987). This

perspective is particularly useful for examining *of*, whose meanings often extend beyond spatial or possessive notions to encompass abstract argument structures and conceptual framing. As Quirk et al. (1985) and Biber et al. (1999) have noted, such usages span a broad spectrum of semantic and structural complexity, posing different types of challenges for L2 learners.

Grounded in this functional perspective, the categorization of *of* in this study adopts the eight functional categories proposed by Kim and Kim (2024), which provide the baseline for the current analysis. Their framework, in turn, is based on Lee (1998), who applied insights from conceptual metaphor theory (Lakoff & Johnson, 1980) to account for the diverse functional realizations of prepositions including *of* across concrete and abstract domains. This influence supports the current study's functional categorization of *of*-phrases into semantically and pragmatically motivated categories, reflecting how learners deploy *of* to encode a range of relational, descriptive, and discourse-level meanings. The present framework, compared to the original framework, involves a reorganization and refinement of functional boundaries to better align with the semantic and discourse-level characteristics of the VIE texts examined in this study. While much of the original structure is retained, certain categories have been redefined or renamed for clarity and analytic utility. For instance, the previous category of "Relevance (apposition)" (p. 439) has been reconceptualized as Discourse & Conceptual Structuring to more accurately capture its role in framing abstract and metalinguistic relations, such as the naming of issues, themes, or theoretical constructs in academic writing. Similarly, the earlier category labeled "Adjective + of"—which emphasized syntactic collocation—has been absorbed into the broader functional category of Attributive & Descriptive Relations, which foregrounds its semantic contribution. Categories such as "Affiliation" and "Material/Composition" have been relabeled as Group & Identity Association and Composition & Material, respectively. These modifications reflect an effort to maintain continuity with prior work while enhancing the framework's sensitivity to context-driven meaning and usage, resulting in the eight functional categories: (1) Possession/Part–Whole Relations refer to expressions that encode ownership, inclusion, or physical containment between two entities (e.g., *the roof of the house*); (2) Attributive & Descriptive Relations describe inherent, evaluative, or identifying qualities of the head noun, functioning in an adjectival capacity (e.g., *a man of integrity*); (3) Argument Structure includes cases where the *of*-phrase serves as the subject or object of a nominalized verb or predicate (e.g., *the destruction of the city*); (4) Composition & Material captures expressions that indicate the material, content, or substance of a larger whole. (e.g., *a cup of tea*); (5) Group & Identity Association denotes social, institutional, or categorical membership (e.g., *a member of the team*); (6) Temporal Expressions refer to time-related meanings, such as boundaries, durations, or points in time (e.g., *the end of the semester*); (7) Discourse & Conceptual Structuring is used to frame abstract ideas, topics, or metalinguistic references (e.g., *the idea of freedom*, *the issue of justice*, *the concept of identity*); and (8) Idiomatic & Fixed Expressions include formulaic or semi-fixed combinations in which *of* functions as part of a conventionalized unit rather than conveying a clear semantic relation (e.g., *a lot of people*, *kind of problem*, *because of traffic*).

While some of these categories (e.g., Possession/Part–Whole Relations and Composition & Material) involve relatively concrete referents and are therefore considered unmarked, others (e.g., Argument Structure and Group & Identity Association) are moderately marked. The remaining categories, including Discourse & Conceptual Structuring, encode more abstract or relational meanings and are considered the most marked. This continuum of markedness serves as a conceptual reference point for interpreting learners' use of *of*-phrases across functions in this study.

Syntactic Tendencies in L2 Learner Writing

L2 writing has been widely observed to exhibit distinct syntactic tendencies compared to that of native speakers. Hinkel (2002) provides a detailed analysis of the linguistic and rhetorical features of L2 English writing, identifying common patterns such as grammatical simplification (e.g., preference for present tense, low use of passives and conditionals), reliance on noun-based expressions (e.g., *the use of computers*), underuse of adverbs and adjectives, frequent misuse or overuse of cohesive devices (e.g., *moreover*, *in addition*), and limited use of idiomatic expressions and collocations. These features are commonly associated with instructional influences and limited syntactic resources available to L2 writers.

Biber et al. (2011) present a different perspective from Hinkel (2002), noting that L2 writing often depends on clause-based structures that resemble spoken discourse. In contrast, proficient academic writing is characterized by phrase-level complexity, particularly through nominalization and lexically dense noun phrase constructions. They argue that the development of L2 writing competence should move beyond T-unit or clause-based metrics to also include measures of phrasal elaboration. This view aligns with Halliday's (1989) systemic functional linguistics, which contrasts clause-based spoken language with the nominalized, lexically dense nature of written language.

Drawing on these perspectives—which highlight both the noun-based tendencies in L2 writing from different angles: L2 learners' preference for noun-based constructions (as observed by Hinkel, 2002) and the limited development of phrase-

level complexity (as emphasized by Biber et al., 2011)—the present study draws on these perspectives to interpret L2 learners' use of noun + *of* + noun constructions by examining whether such usage aligns more closely with phrase-level preferences or reflects a distinct, learner-specific pattern.

Incidental Learning in Online Interaction

While prepositional acquisition has traditionally been approached through explicit instruction or controlled experiments, this study assumes that while such approaches may suffice for basic lexical-level learning, the functional complexity embedded within individual prepositions necessitates incidental learning for deeper, context-sensitive development.

The conceptualization of written interaction in SLA has evolved from Computer-Mediated-Communication (CMC) to VIE, which integrates cultural engagement and experiential learning (Machwate et al., 2021; O'Dowd & O'Rourke, 2019). Unlike explicit instruction settings, VIE fosters incidental learning by immersing learners in collaborative, meaning-driven interactions, where prepositions, along with their functional complexity, are naturally encountered and internalized over time through peer feedback and authentic exchanges (Donnery, 2022).

This study views incidental learning as a key mechanism through which learners gradually integrate more marked prepositional functions into their output. In particular, VIE discussions serve as a setting where repeated exposure to prepositional forms and their contextual functions can lead to gradual functional expansion. This aligns with broader claims in SLA that implicit learning unfolds through cycles of noticing, hypothesis formation, and re-use over time (Schmidt, 1990). The analysis in subsequent sections will examine whether learners show signs of such expansion in their use of prepositions, particularly in their marked functions, during sustained written exchanges. Incidental learning, in this context, is not merely a by-product of interaction but a central pathway to developing flexible functions informed by discourse awareness.

METHOD

Participants, Data, and Preprocessing

This study examined how Korean L2 learners used the preposition *of* in different functional categories during asynchronous written interactions with American L1 speakers. The dataset was derived from a three-month-long VIE project jointly coordinated by two university instructors—one from a Korean university and one from a U.S. university—who were teaching the same course topic in educational psychology at their respective institutions. Although the authors were not directly involved in classroom instruction, the project data were shared with the research team for secondary analysis, with informed consent obtained from all participants.

Structured online discussions were integrated into the course at both institutions to promote intercultural academic exchange. Participants included 22 Korean university students majoring in education or related fields and 27 American university students from a teacher training program. The Korean students were generally advanced English users, as demonstrated by their ability to engage in abstract academic discussions in the VIE setting.

The online interaction spanned three discourse sessions (VIE 1, VIE 2, and VIE 3), each lasting approximately one month. During each session, students were asked to upload at least one original post and one response to peers per week. All posts addressed course-related academic topics such as how culture affects learning, student motivation, and assessment practices. No external readings were required, but students were encouraged to draw on course content and personal experiences. Their written contributions were compiled into text files for each session and group (L1 and L2).

Prior to analysis, all texts underwent preprocessing to remove formatting inconsistencies, such as quoted replies, system-generated headers, and irregular spacing or line breaks. Sentence boundaries were standardized, resulting in sentence-level segmentation of the corpus.

The raw files varied in length across sessions and groups, ranging from approximately 17,000 to 33,000 words, with the total word count reaching 143,130 words prior to trimming. Following the preprocessing steps, each file was manually trimmed to ensure similar length across sessions and groups. Specifically, the final corpus for each session consisted of approximately 13,000 words (e.g., VIE1-L1: 12,998 words; VIE1-L2: 12,996 words), thereby eliminating the need for post-hoc statistical normalization. Minor variations in word count were due to sentence-level segmentation.

Data Analysis

Frequency-Based Comparison of Top-5 Prepositions

To investigate the overall distributional patterns of preposition use, a frequency-based analysis was conducted on the five most frequently used prepositions across the corpus: *in*, *of*, *to*, *for*, and *with*. These prepositions were identified through an initial frequency count of all prepositional tokens across the three VIE sessions using AntConc.[2] Special attention was given to distinguishing between prepositional and infinitival uses of *to*, which are frequently conflated in automatic parsing. A rule-based classification script was developed for this purpose; examples of the parsing logic and classification rules are illustrated in Figure 1. All instances of the five target prepositions were then extracted using concordance searches and categorized by user group (L1 vs. L2) and session (VIE 1, VIE 2, and VIE 3).

The analysis aimed to compare preposition usage in two main dimensions: (1) between L1 and L2 participants at each session, and (2) within each group across the three sessions. To allow for these comparisons, token frequency and type frequency were calculated for each group and session. While the overall token count indicated general usage tendencies, type frequency identifies how narrowly or diversely each group relied on specific prepositions. Chi-square tests of independence were conducted to compare the distribution of the top-5 prepositions across groups and sessions. The purpose of this analysis was to identify whether learners exhibited disproportionate reliance on specific prepositions (e.g., overuse of *in* or *of*) and whether sustained interaction with L1 speakers led to observable changes in L2 learners' use of these frequent forms, potentially indicating incidental development.

```
# Function to classify "to" as either a prepositional or infinitival usage
def classify_to_usage(sentence):
    doc = nlp(sentence)
    for token in doc:
        if token.text.lower() == "to":
            head_pos = token.head.pos_  # POS of the head word
            dep = token.dep_  # Dependency relation of "to"
            children = [child.dep_ for child in token.children]  # List of child nodes

            # Rule for identifying prepositional "to"
            if dep == "prep" and "pobj" in children:
                usage = "Prepositional to"
            # Rule for identifying infinitival "to"
            elif dep in ["aux", "mark"] and head_pos == "VERB":
                usage = "Infinitival to"
            else:
                usage = "Unknown"

            # Print the classification result
            print(f"Sentence: {sentence}")
            print(f" - Token: {token.text}")
            print(f" - POS: {token.pos_}, Dependency: {token.dep_}")
            print(f" - Head: {token.head.text} ({token.head.pos_})")
            print(f" - Children: {children}")
            print(f" - Classified as: {usage}\n")
```

FIGURE 1
Sample Python Code for Distinguishing Prepositional and Infinitival Uses of "to"

Functional Categorization and Data Refinement of of-Phrases

To complement lexical frequency-based comparisons and better understand how learners use prepositions in context, this study conducted a functional categorization of *of*-phrases. The categorization was based on eight functional categories, developed from the theoretical rationale introduced in the Background section, particularly drawing on the concepts of markedness and discourse-sensitive usage. All *of*-phrases extracted from the corpus were then manually annotated according to these functions, using context-based analysis by the researchers. Special attention was paid to the consistent application of classification criteria across the dataset. To enhance classification reliability, ambiguous cases were jointly reviewed by two researchers, and any disagreements were resolved through discussion.

Notably, these functions are not always mutually exclusive. For example, *the results of standardized tests* (VIE3-L2) may

[2] AntConc is a freeware corpus analysis toolkit developed by Laurence Anthony (https://www.laurenceanthony.net/software/antconc/).

typically be categorized as Possession/Part–Whole Relations, as it denotes the outcome derived from the test. However, when the focus shifts to the interpretation, evaluation, or discussion of the results as a conceptual entity—particularly in academic or argumentative contexts—it may be more appropriately classified under Discourse & Conceptual Structuring. In such cases, classification was guided by the most salient function in context, with an emphasis on pragmatic clarity and pedagogical relevance, rather than strict theoretical categorization A similar approach was taken for *a boyfriend of almost three years* (VIE1-L1), which was categorized under Temporal Expressions. While the phrase does not follow the typical form of a time adjunct, as in *the end of this year* (VIE1-L2), the *of*-phrase conveys clear temporal meaning by indicating the duration of a relationship. As with other cases, this classification was based on its most salient discourse function in context, in line with the overall functional framework of this study.

Building on this observation, a separate validation process was implemented for Discourse & Conceptual Structuring, which showed the greatest divergence between L1 and L2 usage patterns. Many L2 examples in this category revealed syntactically well-formed but pragmatically awkward constructions, such as *technique of teaching* (cf. *teaching technique*), *tool of instruction* (cf. *instructional tool*), *form of tests* (cf. *test format*), and *process of learning* (cf. *learning process*). These forms constituted a non-trivial portion of L2 tokens within this category, warranting the refinement of L2 data. To more accurately track learners' development in contextually appropriate uses of *of*, we excluded these pragmatically awkward expressions from this category. This distinction allowed the study to differentiate between formally accurate but pragmatically unnatural uses and contextually natural uses of *of*.

Subsequently, statistical comparisons were conducted to examine how the functional use of *of* evolved over time and differed between groups. The frequency of each of the eight functional categories was retrieved separately for the L1 and L2 groups across the three VIE sessions. This allowed for both cross-sectional (L1 vs. L2) and longitudinal (VIE 1 → VIE 2 → VIE 3) comparisons. Chi-square tests of independence were also applied to determine whether observed differences in category distributions were statistically significant. First, the distribution of *of*-phrases across the eight functional categories was compared between L1 and L2 participants for each session. Then, within-group comparisons were conducted to identify significant changes in the distribution of functional categories across sessions.

To clarify the overall data analysis sequence, Figure 2 illustrates the workflow from corpus preparation through functional categorization and refinement to interpretation.

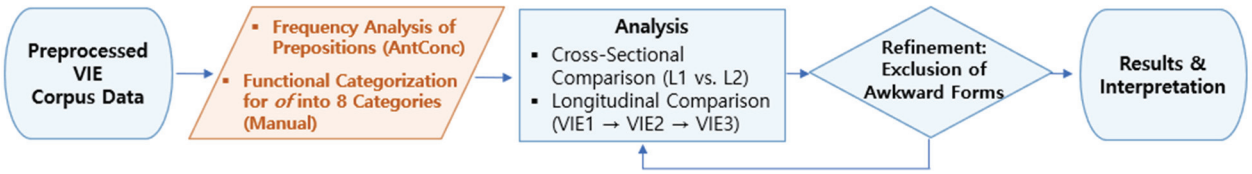

FIGURE 2
Overall Sequence of Data Processing and Functional Analysis of of-Phrases

RESULTS

Top-5 Prepositions

Table 1 and Figure 3 show the results of cross-group comparison over three VIE sessions for the distribution of the top five most common prepositions, *in, of, to, for*, and *with*; and the Chi-square values. L2 learners consistently used more prepositions than L1 speakers. Overall, *of* was the most frequently used preposition among L2 learners (840 out of 4,215 tokens), which is particularly noteworthy given its classification as a marked preposition (see Background), prompting further discussions in the following section. *In*, classified as unmarked, also appeared more frequently in L2 texts, showing relatively consistent patterns across the timeline.

TABLE 1
Top-5 Prepositions Used in VIE 1, VIE 2, and VIE3: Comparison Between L1 and L2

		VIE 1			VIE 2			VIE 3		
Rank	Preposition	L1	L2	χ^2	L1	L2	χ^2	L1	L2	χ^2
1	in	232	280	1.41	226	295	8.12*	220	247	1.33
2	of	191	245	3.12	286	311	.57	277	284	.01
3	to	125	134	.04	124	123	.15	105	122	1.07
4	for	89	125	3.45	109	110	.05	110	113	.00
5	with	105	120	.10	116	87	5.76*	86	83	.13
Others		538	501		553	541		520	494	
Total No. Preps		1,280	1,405	14.09* (df = 5)	1,414	1,467	13.66* (df = 5)	1,318	1,343	3.45 (df = 5)
Total No. Types		40	25		39	37		40	38	

*: $p < .05$

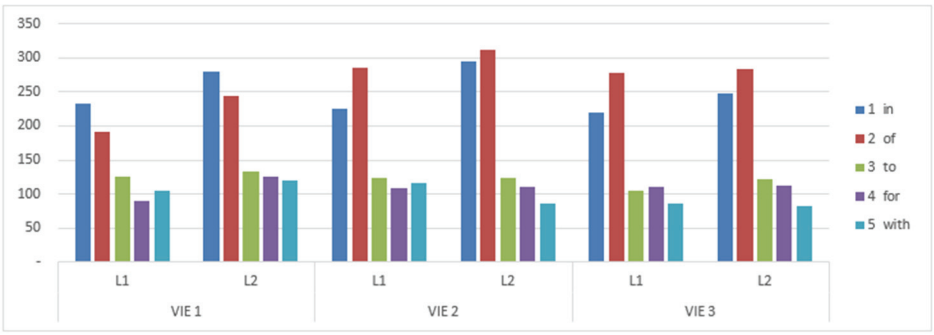

FIGURE 3
Distribution of Top-5 Prepositions Used in VIE1, VIE2, and VIE3

Table 1 also reveals that L1 texts show a relatively broader distribution of prepositions than L2 texts, with top-5 prepositions accounting for 58.0% to 60.7% of total preposition tokens across the three sessions. In contrast, the top-5 prepositions in L2 texts accounted for a higher proportion, ranging from 63.1% to 64.3%, indicating heavier reliance on a limited set of frequent forms. Additionally, the total number of preposition types (i.e., the number of different prepositions used, regardless of how many times each occurred) used by L1 writers was consistently higher than that of L2 writers (e.g., 40 vs. 25 in VIE 1), further supporting the interpretation that L1 speakers employed a more diverse range of prepositional forms. Yet, the total number of prepositional tokens (i.e., the overall number of prepositions used, including repetitions) produced by L2 learners gradually approached those of L1 speakers across sessions, particularly by the final stage. This narrowing of the token gap suggests increasing surface-level similarity in overall preposition use between the two groups.

In terms of statistical significance, the overall use of prepositions showed significant differences between L1 and L2 users in VIE 1 ($\chi^2 = 14.09$, $p = .015$) and VIE 2 ($\chi^2 = 13.66$, $p = .018$), but not in VIE 3 ($\chi^2 = 3.45$, $p = .631$). This shift suggests a developmental convergence between the groups, particularly in the relative frequencies of the top-5 prepositions, as L2 learners' usage patterns gradually became more aligned with those of L1 participants. More specifically, *in* showed a significant difference in VIE 2 ($\chi^2 = 8.12$, $p = .004$), with L2 learners using it much more frequently than L1 speakers. In contrast, *with*, considered moderately marked, was used more frequently by L1 speakers than L2 learners in VIE 2, also showing a significant difference ($\chi^2 = 5.76$, $p = .016$). This pattern aligns with previous findings that Korean learners of English tend to favor unmarked prepositions and avoid those with higher markedness.

In addition to the cross-sectional comparisons shown in Table 1, further longitudinal analyses were conducted to examine changes in the use of the top five prepositions across the three VIE sessions within each group. These analyses, based on chi-square tests across VIE 1, 2, and 3, revealed statistically significant shifts in both groups. Among L2 learners, the overall distribution of prepositions changed significantly over time ($\chi^2 = 19.53$, $p = .034$, $df = 2$), particularly in the increased use of *of* ($\chi^2 = 8.20$, $p = .017$, $df = 2$) and the decreased use of *with* ($\chi^2 = 9.14$, $p = .010$, $df = 2$). These findings suggest that L2

learners' prepositional patterns evolved during the interaction period, potentially reflecting incidental development. Similarly, L1 texts also showed significant variation over time ($\chi^2 = 25.66$, $p = .004$, $df = 2$), with the use of *of* increasing notably across the sessions ($\chi^2 = 18.35$, $p = .000$, $df = 2$). This trend may indicate subtle mutual influence, where L1 speakers adapt to the discourse patterns of their L2 partners.

Among the top-5 prepositions, *of* emerged as the most frequent in L2 texts, while also showing significant developmental changes over time. Given the markedness and functional variability associated with *of*, the following section examines its use in greater detail, focusing on how L2 learners employed *of* in relation to various functional categories.

Functional Analysis of *of*

Table 2 presents the frequency distribution of the preposition *of* across eight functional categories, as defined in the Background section, comparing L1 and L2 texts for each of the three VIE sessions. The overall frequencies of *of* in Table 2 differ from those reported in Table 1 because pragmatically awkward *of*-constructions—considered deliberate overuses of syntactic routinization as a planning-time strategy—were excluded from this analysis, as described in the Method section. Statistically significant group differences emerged in VIE 1 ($\chi^2 = 15.92$, $p = .026$, $df = 7$) and VIE 3 ($\chi^2 = 19.56$, $p = .003$, $df = 6$), indicating that L1 and L2 users differed considerably in how they employed *of* in those sessions.

TABLE 2
Distribution and Functional Analysis of "of"

	VIE 1			VIE 2			VIE 3		
Functional Categories	L1	L2	χ^2	L1	L2	χ^2	L1	L2	χ^2
Possession/Part-Whole Relations	87	90	.17	101	109	2.18	112	98	.13
Idiomatic & Fixed Expressions	41	70	7.53*	88	80	.01	69	91	7.85*
Discourse & Conceptual Structuring	22	19	.59	69	58	.33	67	50	1.45
Attributive & Descriptive Relations	13	4	5.77	8	0	N/A	1	3	N/A
Group & Identity Association	14	6	4.09*	2	0	N/A	0	2	N/A
Temporal Expressions	9	13	.47	13	12	.00	26	7	9.85*
Composition & Material	2	2	N/A	0	2	N/A	0	0	N/A
Argument Structure	3	3	N/A	5	2	N/A	2	1	N/A
	191	207	15.92* ($df = 7$)	286	263	14.03 ($df = 7$)	277	252	19.56* ($df = 6$)

*: $p < .05$; N/A indicates that chi-square values were not calculated due to expected frequencies below 5.

When examining individual categories, Idiomatic & Fixed Expressions stood out as a source of significant difference in both VIE 1 ($\chi^2 = 7.53$, $p = .006$) and VIE 3 ($\chi^2 = 7.85$, $p = .005$), with L2 learners using this category more frequently than L1 speakers. However, it is important to note that the majority of L2 uses in this category consisted of formulaic expressions, particularly *kind(s) of* and *lot(s) of*. For example, *kind(s) of* appeared 23 times in VIE 1 (out of 70 total uses), 18 times in VIE 2 (out of 80), and 29 times in VIE 3 (out of 91), While *lot(s) of* occurred10 times in VIE 1, 12 times in VIE 2, and 17 times in VIE 3. This concentration may limit the interpretive weight of these statistical differences. Accordingly, these quantitative differences are not taken as signs of functional development.

Another significant group difference was found in Temporal Expressions in VIE 3 ($\chi^2 = 9.85$, $p = .002$), though this result should also be interpreted with caution given the generally low frequency of this category among L2 learners. To illustrate these categories, examples of *of*-phrases from the corpus are presented below:

Possession/Part-Whole Relations

- *Hopefully, through my caring and love for the kids, they would have a part of their life as a positive one.* – VIE1-L1
- *I am excited to be a part of this activity.* – VIE1-L2

Idiomatic & Fixed Expressions

- *So, a very happy moment for me this week (amongst others, of course) was this flood of gorgeous colors, feeling, tastes, smells, and sounds from the restaurant.* – VIE3-L1
- *My computer was out of order yesterday. It was fixed, so I can send a few sentences now.* – VIE1-L2

Discourse & Conceptual Structuring

- *So, what did you think of that idea of caring?* – VIE1-L1
- *The very fact that the minister was there is an indication of how serious the problem of private tutoring is.* – VIE2-L2

Attributive & Descriptive Relations

- *Similarly, if the child receives positive comments and is treated in a mature manner, then he or she will begin to behave in a way worthy of such praise.* – VIE1-L1
- *All children are in some way productive and valuable, that they are all doing the best they can, and that they are all themselves potentially people of value.* – VIE3-L1

Group & Identity Association

- *Aside from school, I am a member of the Global Volunteers Club, a student-run organization focused on community outreach.* – VIE1-L1
- *Last spring, I spent a month abroad as a representative of an academic exchange team organized by an international education program.* – VIE1-L2

Temporal Expressions

- *I have a boyfriend of almost three years now and he's not going anywhere, hopefully.* – VIE1-L1
- *The third have to take an entrance test for high school at the end of this year.* – VIE1-L2

Composition & Material

- *It can become much easier if someone says to you "I am tired too, let's brainstorm an idea both of us can use as we go out for a cup of coffee."* – VIE1-L1
- *Just one word of praise diverted my destiny to the road of becoming an English teacher.* – VIE3-L1

Argument Structure (Subject or Object of Action)

- *You could write responses to their writings and this way you are having an exchange of thoughts and ideas with all your students.* – VIE2-L1
- *I am excited to have a change of pace with what I will be doing.* – VIE3-L1

In addition to these cross-sectional comparisons in Table 2, Table 3 shows the results of a longitudinal analysis conducted to examine how each group's use of *of* evolved across the three VIE sessions. While the absolute frequencies are already provided in Table 2, percentage values are reported here to highlight proportional differences across sessions and to emphasize the dominance of the top three functions, which together account for the vast majority of *of* uses in both groups.

TABLE 3

Percentage Distribution of "of" Across Functional Categories by Group and Session

	L1				L2			
Functional Categories	VIE 1	VIE 2	VIE 3	χ^2	VIE 1	VIE 2	VIE 3	χ^2
Possession/Part-Whole Relations	45.55	35.31	40.43	5.08	43.48	41.44	38.89	1.01
Idiomatic & Fixed Expressions	21.47	30.77	24.91	5.53	33.82	30.42	36.11	1.90
Discourse & Conceptual Structuring	11.52	24.13	24.19	13.75*	9.18	22.05	19.84	14.60*
Attributive & Descriptive Relations	6.81	2.80	0.36	N/A	1.93	0.00	1.19	N/A
Group & Identity Association	7.33	0.70	0.00	N/A	2.90	0.00	0.79	N/A
Temporal Expressions	4.71	4.55	9.39	6.71*	6.28	4.57	2.78	3.31
Composition & Material	1.05	0.00	0.00	N/A	0.97	0.76	0.00	N/A
Argument Structure	1.56	1.74	0.72	N/A	1.44	0.76	0.40	N/A
Total	100.00	100.00	100.00		100.00	100.00	100.00	

*: $p < .05$; N/A indicates that chi-square values were not calculated due to expected frequencies below 5 in the raw data.

Figure 4 complements Table 3 with a stacked visualization, displaying the proportional distribution of *of* functions for L1 and L2 groups over time. The dominance of the top three categories—Possession/Part-Whole Relations, Idiomatic & Fixed Expressions, and Discourse & Conceptual Structuring—is clearly visible in both groups, while other functions remain marginal throughout. This visual aid helps to immediately convey the functional concentration of *of* usage and facilitates cross-session and cross-group comparisons.

Among L1 speakers, Possession/Part-Whole Relations was consistently the most frequent category across all three sessions, accounting for 35.31% to 45.55% of all *of* uses. This was followed by Idiomatic & Fixed Expressions (21.47% to 30.77%) and Discourse & Conceptual Structuring (11.52% to 24.19%), with these three categories collectively making up 78.54%, 90.21%, and 89.53% of total of usage in VIE 1, 2, and 3, respectively.

A similar pattern was found in L2 texts. Possession/Part-Whole Relations remained the dominant category (38.89% to 43.48%), followed by Idiomatic & Fixed Expressions (30.42% to 36.11%) and Discourse & Conceptual Structuring (9.18% to 22.05%). Together, these three categories accounted for 86.48%, 93.91%, and 94.84% of all *of* uses in VIE 1, 2, and 3, respectively.

Among these, the most substantial proportional increase occurred in the use of Discourse & Conceptual Structuring, prompting further attention. Both L1 and L2 groups showed a statistically significant increase in this category over time (L1: $\chi^2 = 13.75$, $p = .001$; L2: $\chi^2 = 14.60$, $p = .001$), and while L2 learners' absolute frequencies did not reach those of L1's, their proportional use followed a similar upward trend, signaling a possible shift toward more discourse-oriented and contextually attuned use of *of*-phrases.

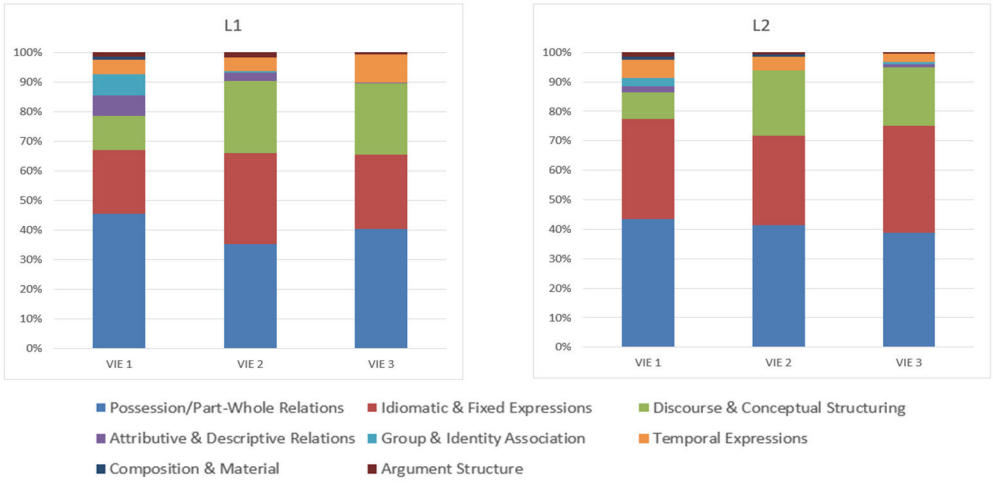

FIGURE 4
Percentage Distribution of "of" Across Functional Categories

FINDINGS AND DISCUSSION

This section presents key findings and interprets them in light of the study's theoretical framework and research context. Among the eight functional categories identified for *of*-phrases, three—Possession/Part-Whole Relations, Discourse & Conceptual Structuring, and Idiomatic & Fixed Expressions—accounted for the majority of uses in both L1 and L2 texts. Overall frequent use of Possession/Part-Whole Relations was expected, as it represents a prototypical meaning of *of*. However, in the other two categories, notable differences emerged between L1 and L2 groups, not only in terms of frequency but also in functional development. These categories form the primary focus of the discussion, which first examines learners' developmental patterns and strategies, then reinterprets these findings in relation to markedness theory, and finally considers the broader interactional dynamics within the VIE context.

Discourse-Oriented Development and Strategic Use of Idiomatic & Fixed Expressions

In the case of Discourse & Conceptual Structuring, the relatively high frequency of *of*-phrases in L2 texts was found to

result largely from pragmatically awkward or semantically redundant uses of the preposition, such as *technique of teaching* or *tool of instruction* instead of *teaching technique* or *instruction tool*, as noted in the Method section. This tendency aligns with previous studies showing that L2 writers often rely on nominal constructions (Halliday, 1989; Hinkel, 2002), particularly noun + *of* + noun patterns, even though these expressions often diverge from how L1 speakers typically write. A more intuitive explanation is offered by Biber et al. (2011), who argue that proficient academic writing tends to favor phrase-level complexity over clause-based structures. However, the L2 learners in this study—despite their relatively advanced communicative competence—may not have fully internalized native-like pre-modifying structures. Instead, they appeared to approximate this stylistic norm through more accessible clause-like patterns such as noun + *of* + noun, where *of*-phrases function as postmodifiers—even in contexts where a more natural alternative would be an adjective + noun construction (Parkinson & Musgrave, 2014). This structural choice likely reflects learners' preference for clearer syntactic boundaries and their reliance on familiar, clause-like constructions that reduce processing demands; as Biber et al. (2011) explain, "(a)ttributive adjectives and nouns as nominal premodifiers are (structurally) less clear-cut" (p. 27), making them harder for learners to process or produce with confidence. However, the frequent use of these constructions can reduce readability and result in expressions that are grammatically accurate but pragmatically unnatural.

In addition to this structural preference to emulate academic style, such forms may also function as a planning strategy. When L2 learners are under pressure to produce language—especially in cognitively demanding situations—they may use longer or more elaborate sentence structures to give themselves extra time to plan what they want to say next. In this way, syntax becomes not just a structure for expressing ideas but also a tool for managing planning and processing demands (Robinson, 2001; Skehan, 2009). Mehnert (1998) showed that more planning time can lead to greater syntactic complexity, but the opposite may also be true: learners may choose more complex structures as a way to secure that planning time while speaking or writing. The concept of syntactic routinization (Parkinson & Musgrave, 2014) explains this behavior as a fluency strategy under cognitive constraints. While such constructions may superficially resemble L1 usage, they often do not fully reflect authentic discourse patterns.

However, when such examples were removed, a clearer pattern of functional development emerged among L2 learners: their distribution of *of* in this category remained relatively close to that of L1 users across the three sessions, particularly marked by a notable increase in VIE 2 (see Table 3 and 4). This pattern suggests that as the VIE interaction progressed and the discussion became more abstract and reflective, L1 speakers increased their use of Discourse & Conceptual Structuring function of *of*—as evidenced by the statistically significant cross-session shift in their distribution ($\chi^2 = 13.75$, $p = .001$; see Table 3). Importantly, L2 learners' proportional increase—although their absolute frequencies remained somewhat lower than those of L1 speakers—mirrored a similar upward trend ($\chi^2 = 14.60$, $p = .001$; see Table 3), implying a potential alignment process possibly supported by sustained interaction and exposure to L1 input. Given the high markedness of this function, such shifts may be indicative of discourse-sensitive development. This pattern may also reflect a form of incidental learning, whereby learners gradually adjusted their use of *of* in response to contextual cues and L1 modeling throughout the interaction.

A similar pattern of strategic use can be observed in the case of Idiomatic & Fixed Expressions. As noted in the Results section, the high frequency in this category was largely driven by formulaic expressions such as *kind(s) of* and *lot(s) of*. While these expressions constitute another form of syntactic routinization rather than genuine functional expansion, they may serve a similar strategic purpose: allowing learners to manage cognitive load and buy time while planning the rest of the sentence. Although they were classified under the category of Idiomatic & Fixed Expressions and grammatically well-formed, these expressions do not necessarily reflect idiomatic competence.

Rethinking Markedness in Light of the Findings

The study was initially grounded in a markedness-based classification of prepositional functions, therefore anticipating that the gradient of functional markedness would be reflected in the distributional patterns of *of*. In other words, L2 use of marked prepositional functions would become more L1-aligned in terms of frequency through the VIE sessions over time. The results supported this hypothesis, but not in the way we originally expected. High frequencies observed from the outset in categories such as Idiomatic & Fixed Expressions and Discourse & Conceptual Structuring were primarily driven by formulaic or pragmatically inappropriate constructions.

L2 learners initially relied on seemingly marked functions as syntactic routines to ease planning demands. Yet, as reflected in a statistically significant increase nearly parallel to that observed in L1 usage for Discourse & Conceptual Structuring (see Table 3), they gradually refined their usage through interaction, offering a signal of incidental learning. This developmental trend calls for a reconsideration of how markedness is understood and applied in discourse-based L2 research.

Rather than assuming that increased proficiency will naturally lead to greater use of marked prepositional functions, it may be more productive to explore the dynamic interplay between learners' evolving proficiency and their reliance on suboptimal yet strategic uses of these functions. In particular, this study observed that the transitional stages of development often involved formulaic or pragmatically inappropriate uses of marked forms, which gradually gave way to more contextually appropriate realizations through sustained interaction. These findings may position markedness not as a static hierarchy of complexity, but as a dynamic construct shaped by learners' strategies, constraints, and the affordances of the learning environment.

Interactional Influence and Development in VIE Context

An important factor to consider in interpreting these findings is the proficiency level of the L2 participants and the nature of the learning context. Unlike earlier studies that focused on beginner to intermediate learners (e.g., the Yonsei Corpus), the present study involved learners capable of engaging in sustained online academic discussions with L1 speakers. Although their exact proficiency level was not officially reported, the VIE setting itself presupposes a relatively advanced level of communicative competence. This distinction likely contributed to the more context-sensitive patterns of development observed in this study, particularly in discourse-level usage.

Together, the findings underscore the value of sustained intercultural interaction in promoting functional development in L2 preposition use. While frequency alone does not equate to acquisition, the observed distributional shifts, especially in discourse-oriented functions of *of*, may suggest that learners were beginning to use prepositions in ways that more closely reflected L1 distributional patterns over time.

More specifically, from the perspective of L2 learners, their overall use of prepositions—initially showing a broader gap in both token frequency and type variety compared to L1 peers in VIE 1—appeared to draw closer to L1 usage by VIE 3, as shown in Table 1, suggesting an overall trend of convergence in surface-level usage. This convergence was particularly notable in the use of the marked preposition *of*, where the initial frequency gap between L1 and L2 users diminished substantially. Moreover, L2 learners' use of *of* in Discourse & Conceptual Structuring, though still lower in absolute frequency, exhibited a pattern of adjustment that kept pace with the marked increase observed in L1 usage over time, contributing to the broader converging trend. In addition to the changes observed among L2 learners, patterns among L1 users also offered complementary insights into the nature of linguistic interaction in the VIE setting. While L2 learners consistently used more prepositions than L1 speakers throughout the three sessions, L1 participants gradually increased their preposition usage—particularly of *of*—over time. By VIE 3, the frequency of preposition use among L1 speakers had risen to a level comparable to that of their L2 peers.

This bidirectional shift suggests that L2 learners' incidental learning during online discourse may be supported by mutual accommodation—a process in which both L1 and L2 users adjust their linguistic output in response to each other's patterns (Giles, et al., 1991). In this study, such mutual accommodation may be reflected in the gradual increase in L1 speakers' overall preposition use, including *of*, over the course of the VIE sessions. The narrowing L1–L2 frequency gap and parallel trends suggest that sustained interaction encouraged adaptive responses on both sides. While not central to the study's main findings, these patterns offer tentative support for the view that VIE settings can promote mutual responsiveness and increased attention to audience discourse.

SUMMARY AND CONCLUSION

This study investigated how L2 learners use prepositions in a VIE context, with particular focus on the preposition *of* due to its high frequency and functional diversity. Drawing on a functional categorization framework, the analysis examined how *of*-phrases were distributed across eight semantic and discourse-related categories. While learners frequently relied on formulaic or structurally routinized expressions—especially in marked categories such as Discourse & Conceptual Structuring and Idiomatic & Fixed Expressions—their usage also showed signs of gradual functional development, particularly in the discourse-oriented contexts. These observations suggest the potential of incidental learning in supporting more context-sensitive use of complex grammatical forms during sustained interaction.

The study further explored how typical features of L2 academic writing—such as the preference for postmodifying structures and the strategic use of prepositional phrases—manifest in this intercultural online setting. Learners' reliance on such forms appears to serve as a planning-time strategy under cognitive load, rather than a reflection of full idiomatic control or syntactic flexibility. However, as interaction continued, L2 learners' use of *of*-phrases in marked functions showed a

pattern of increased contextual appropriateness that paralleled shifts in L1 usage suggesting a potential process of mutual adaptation rather than a unidirectional trajectory of development.

These findings call for a broader understanding of incidental learning in L2 development, particularly within marked functional domains. Although the functional refinement observed in these domains was not always statistically significant, it offers clues that sustained exposure to discourse in authentic communicative contexts can support learners' ability to use complex grammatical forms more appropriately. It is noteworthy that the notion of markedness is better understood not as a set of rigid categorical boundaries or a predictive model of acquisition difficulty, but rather as a flexible interpretive tool for identifying areas where L2 learners may require additional exposure, contextual support, or time to develop more target-like usage. This perspective, along with the observed clues of incidental learning, underscores the value of immersive, interaction-rich environments—such as VIE—in promoting subtle but meaningful gains in L2 learners' grammatical and discourse-level competence.

Finally, while L2 learners consistently produced more prepositions than L1 speakers, the latter group also demonstrated gradual increases in preposition usage, including *of*, over time. The narrowing frequency gap and parallel trends observed suggest that sustained intercultural interaction may foster adaptive responses among both learner and native speaker groups. These patterns, though not central to the study's primary focus, align with the broader aims of VIE to promote linguistic flexibility and mutual awareness among all participants.

As with any study, several limitations should be acknowledged. First, the scope of functional analysis was limited to a single preposition *of* and to a relatively small number of participants within a specific VIE context. Nevertheless, this focused scope allowed for manual annotation followed by fine-grained functional categorization, which in turn enabled detailed discourse-level analysis. Yet, the scope restricts the generalizability of the findings. In addition, while qualitative patterns of incidental learning were observed, the study did not include follow-up beyond the short-term interactional setting, raising the question of whether the observed developments would persist or transfer to other contexts.

Future research could extend this line of inquiry by incorporating other high-frequency prepositions with complex functional distributions, such as *in* or *with*, and by examining learner performance across diverse proficiency levels and intercultural settings. Longitudinal designs that combine discourse analysis with controlled experimental measures may also help clarify the mechanisms through which incidental learning unfolds in naturalistic environments. Moreover, further investigation into the dynamics of mutual accommodation—particularly from the perspective of L1 participants—could deepen our understanding of how intercultural dialogue shapes not only L2 development, but also native speakers' linguistic awareness and flexibility.

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