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Message from the Editors

The 23rd meeting of the Texas Linguistics Society (TLS 2024) was held 23-24, 2024, at the University of Texas at Austin. Presentations came from all areas of linguistics, but this year's conference placed a special focus on computational methods in linguistics.

Many thanks to our keynote speakers: Gašper Beguš (University of California, Berkeley), Zoey Liu (University of Florida), and Kyle Mahowald (University of Texas at Austin). Many thanks also to our sponsors at the University of Texas at Austin: Department of Linguistics, Department of Asian Studies, Department of Germanic Studies, Department of Psychology, and College of Liberal Arts. Finally, thanks to our presenters and especially those who chose to include a paper in the proceedings; we hope this publication helps your research find an even wider audience.

For more information about the conference, including a listing of all presentations and abstracts, see the conference website at <http://tls.ling.utexas.edu/2024/>. To cite these proceedings, use: Jáuregui J.P., Ren, H., Rojas, O., Smith, M. and Stump, T. (Eds.). (2024). Proceedings of the 23rd Meeting of the Texas Linguistics Society.

Signed, the editors:

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CP Selection at the Syntax-Semantics Interface: A Case Study in Mandarin *think* “*xiang*”

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1 Introduction

Zheng (2023) identifies a semantic shift in the Mandarin predicate *xiang* between two interpretations: *think* and *want*. The verb *xiang* also shows a interaction between interrogativity and complement selection, which involves factors like stativity. As illustrated by Figure 1, the selectional puzzles of *xiang* are beyond interrogativity. This work tries to mainly figure out the connections between the complements taken and the verb meanings. One factor I want to discuss particularly is finiteness, which I assume to be ONE OF the factors influencing the interpretation of *xiang*.

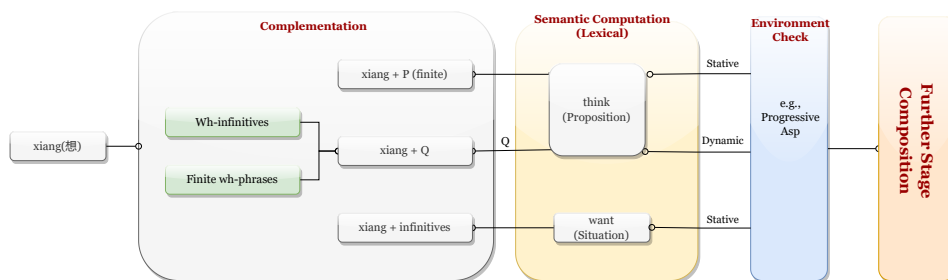


Figure 1: The empirical picture of the semantic shift in *xiang*

Departing from a pure lexicalist view, I argue that the alternation and selection pattern we saw in *xiang* is a result of interactions at the syntax-semantics interface. That is, only limited structures are allowed by the semantics. The complements taken play a crucial role in the overall meaning computation (see also Moulton 2009 a.o.). However, this paper does not address all the factors in this alternation, but it hopes to provide some insights into clausal complement selection.

2 Finiteness in the Doxastic and Bouletic Alternation

Take a look at the following examples (1, 2). We can notice that the addition of the aspect marker ‘le’ and the future modal ‘hui (will)’ seem to alternate the verb from *want* to *think*. The extra elements are usually related to finiteness in Mandarin. According to Huang (2022) and references therein, a clause is finite if (1) the clause has an indefinite time reference, (2) there is a speaker-oriented evaluative expression, (3) there is a(n) epistemic/future modal (e.g., *keneng*, *yinggai*, *hui*, *yao*), (4) there is a perfective marker or a clausal final ‘le’ (also, *laizhe*, *ne*), or (5) it is compatible with before collocation (e.g., *congqian -guo*). By saying a clause is finite in the rest of the paper, I mean the clause must at least pass one of the above diagnostics.

- (1) a. Wo xiang ta qu-le Beijing
I think he go-PERF Beijing
‘I think that he have gone to Beijing.’
b. Wo xiang ta qu Beijing
I want he go Beijing
‘I want him to go to Beijing.’

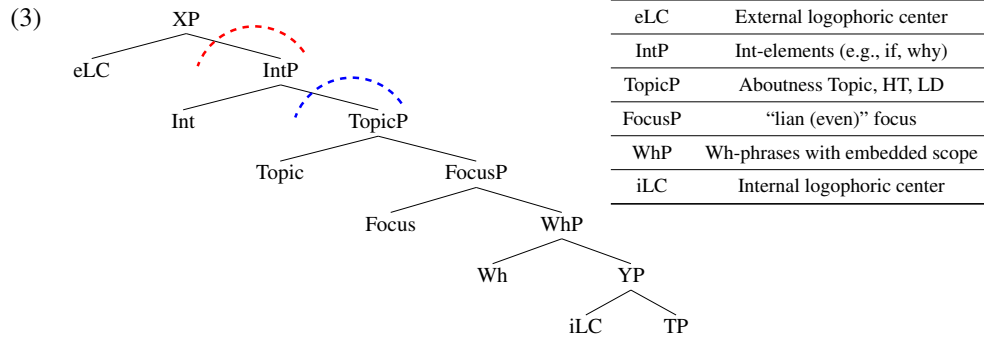
*This work has benefited from the input by Caroline Heycock. For helpful comments and suggestions, I also thank Kajsa Djärv, John Beavers, and Ashwini Deo.

- (2) a. Wo xiang Lisi hui canjia na-chang huiyi
I think Lisi will attend that-CL conference
'I think Lisi will attend that conference tonight.'
- b. Wo xiang Lisi canjia na-chang huiyi
I want Lisi attend that-CL conference
'I want Lisi to attend that conference.'

2.1 Finiteness as clause size

Finiteness, once primarily defined by morphosyntactic features like tense and agreement, carries syntactic significance. Its association with tense, agreement, and other factors (e.g., illocutionary force) remains relevant (Nikolaeva 2007, Wurmbrand et al. 2020). In addition to this string of investigations, considerations extend to clause size (Pesetsky 2019 among others, see also references in Satk 2021; For Mandarin, such a view is discussed by Grano 2015, 2017, Xue and McFetridge 1998) given the arbitrariness of morphosyntactic features encoded in different languages, which found itself hard to form a uniform explanation. This view prompts queries about the critical clause size for finiteness. The conventional truncation stance (e.g., Adger 2007) posits three tiers: CP, TP, and vP¹. Each can host non-finite forms under different predicates. Recent research by Satk (2021) delves into a nuanced non-finite clause size in terms of CP cartography, showcasing how different languages differ in the maximal infinitival projection in left peripheries.

Following the typology work on left peripheries of non-finite clauses by Satk (2021), I examined the fine-grained left-peripheries of Mandarin (non-)finite clauses. Given that this (i.e., the cartography) is not the main focus of my study, the detailed discussion is omitted.



The maximal left peripheries of non-finite clauses can be illustrated as in (3). The boundary between non-finite and finite clauses is indicated by the red dashed line (N.B. for the specific case of *xiang*, the boundary is indicated by the blue dashed line²). Although there are many issues under debate in this cartographic approach (i.e., eCL/iCL cf. the ForceP/FinP, see also Huang 2021), the structure above should suffice to show a difference in clause size between (non-)finite clauses.

2.2 Mapping finiteness (clause size) onto the semantics

In light of this difference in finiteness, we are in need of an account that maps the clause size distinction onto different interpretations (i.e., semantics). Wurmbrand and Lohninger (2023)’s Im-

¹For Mandarin, Xue and McFetridge (1996) initially proposed a simpler binary split: clausal complement and VP complements.

²I noticed that *xiang* cannot embed non-finite IntP (see ex.1: diagnostic: *congqian* cannot occur inside a non-finite clause but can occur inside its matrix (finite) clause.), and I leave this to further investigation.

- (1) Wo (*congqian) zai xiang Lisi ?weishenme/shifou (congqian) canjia-guo na-chang huiyi
I before -PROG think Lisi why/whether before attend-EXP that-CL conference
'I'm thinking why/whether Lisi has attend that conference before.'

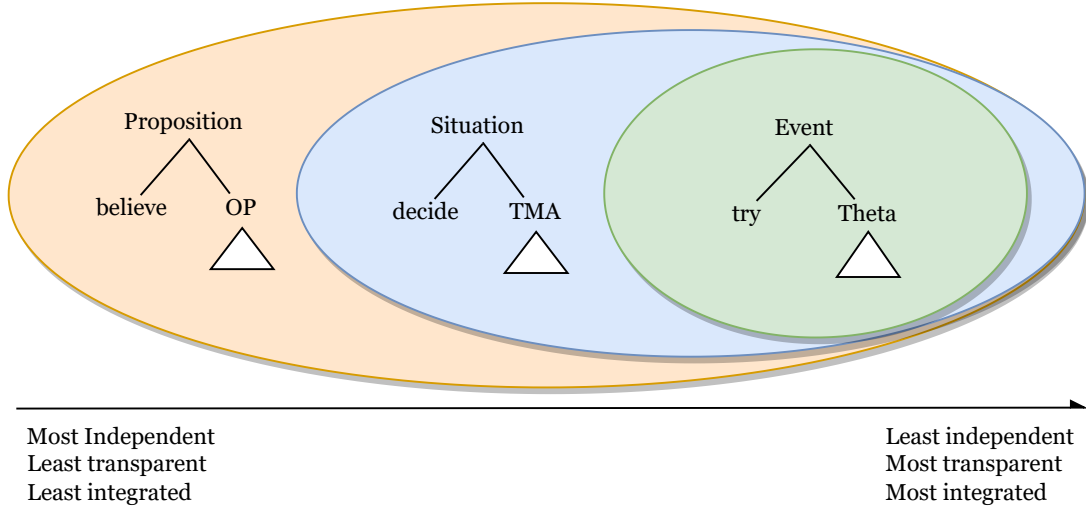


Figure 2: ICH with the minimal structure of each domain adapted from Wurmbrand & Lohninger (2023)

plicational Complementation Hierarchy (ICH) and the synthesis model establish a fundamental link between clause size and semantics. Each semantic object corresponds to a *minimal* structure or Canonical Structural Realization (CSR), as pointed out in Chomsky (1986). Building on this concept, I propose that the interpretation (*want*), specified as SITUATION, selects a minimal structure like TP, while another interpretation (*think*), specified as PROPOSITION, aligns with a minimal CP structure. This elucidates the distinction between “think P” and “want P”, albeit not comprehensively. As the synthesis model grants greater syntactic flexibility, it also reveals a challenge: there is no upper boundary; that is, the structure can become very large (e.g., the largest complement taken by *think* can also be the complement of *want*). The Wurmbrand’s model provides an explanation for the availability of larger structures but lacks a limit on clause size.

2.3 Explaining the syntax-semantics mismatch

The challenge lies in explaining this overgeneralization by the synthesis model. One such solution is to claim there is something besides clause size in the complement structure that helps us distinguish *think* and *want*. Such account found its precedents in Kratzer (2006, 2013) and Moulton (2009, 2015). They argued there are modals in the complements, quantifying the possible worlds and contributing to different interpretations. Following this idea, in the specific case of *xiang*, the doxastic modal is located higher than the bouletic modal. Consequently, the bouletic modal is superimposed in a larger structure setting, preventing bouletic interpretation from co-occurring with a larger structure in Mandarin. Hence, the synthesis model’s syntactic flexibility is maintained, and the surface meaning emerges after the interactions (involving factors like clause size and modals) at the interface.

$$(4) \quad [[\text{xiang}]] = \lambda e. \text{ATTITUDE}(e)$$

- $$(5) \quad \begin{aligned} \text{a. } & [[\text{Wo } v_{Exp} \text{ xiang eLC } \textit{Modal}_{Belief} \text{ Lisi xihuan Wangwu}]] = \exists e [\text{experiencer}(e) = \text{Wo} \ \& \\ & \text{attitude}(e) \ \& \ \forall w \in \text{BELIEF}(e): \text{Lisi xihuan Wangwu in } w] \\ \text{b. } & [[\text{Wo } v_{Exp} \text{ xiang TopicP } \textit{Modal}_{Desire} \text{ Lisi xihuan Wangwu}]] = \exists e [\text{experiencer}(e) = \text{Wo} \ \& \\ & \text{attitude}(e) \ \& \ \forall w \in \text{DESIRE}(e): \text{Lisi xihuan Wangwu in } w] \end{aligned}$$

Limitations and other possibilities The cartographic approach to clause size combined with the Moulton (2009)’s account to explain this alternation is not explanatory enough. For example, this

explanation relies on the mapping between clause size and interpretations. Even if there is much empirical evidence (see Wurmbrand and Lohninger 2023), it remains unclear how the extended projections get interpreted in the account above. For example, how do we relate TopicP/FocusP/WhP to the *want* interpretation? Otherwise, we need semantically more transparent left-peripheral projections, which can actually provide a more direct mapping with semantics (e.g., ContP and SitP, as in Bondarenko 2022).

On the other hand, finiteness is not the only factor that gives rise to the alternation. Aspect, negation, and collocational constraints are also involved. Take aspect as an example. *think* and *want* exhibit distinct Aktionsarten (lexical aspects). Progressives are known to be selecting the Aktionsart of the verb phrase (Dowty 1979, inter alios). “*xiang* (*want*)” does not harmonize with the progressive, but “*xiang* (*think*)” is compatible. This implies that only *think* is “chosen” in a dynamic environment (e.g., progressives, see 6a), excluding *want*. Additionally, a stative environment yields ambiguity for *xiang*, permitting both *think* and *want* interpretations (see 6b). Hence, a dynamic context rules out *want*. This divergence in Aktionsart holds true across languages (e.g., the ungrammatical **be wanting* in English). Apart from the grammatical aspects in matrix clauses, I noticed the lexical aspects of the embedded verbs will also influence meaning (6b cf. 6c). When the embedded verb is stative (i.e., like), *think* interpretation is allowed, while the embedded verb is dynamic (i.e., attend), the same interpretation is gone. However, I have to point out that (after p.c. with Yimei Xiang) 6b and 6c have different embedded clause sizes because ‘Lisi attend conference’ is not an independent sentence while ‘Lisi like Wangwu’ is. Hence, clause size might still play a role here, but it does not exclude the possibility that aspect also lends a hand. To give a unified account, we need to take all these factors into consideration, and I leave this to further investigation.

- (6) a. Wo zai-xiang Lisi weishenme xihuan Wangwu
I think-PROG Lisi why like Wangwu
‘I’m thinking why Lisi likes Wangwu.’ (not want)
- b. Wo xiang Lisi xihuan Wangwu
I want Lisi like Wangwu
‘I think Lisi likes Wangwu.’ (also ‘I want Lisi to like Wangwu.’)
- c. Wo xiang Lisi canjia huiyi
I want Lisi attend conference
‘I want Lisi to attend the conference.’

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Cross-Linguistic Priming in Spanish-English Bilingual Adults

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Abstract

In the present study I investigated whether bilingual speakers have a shared or separate syntax storage for the languages they know. I used a cross-linguistic priming task to investigate the underlying representations of syntactic structures in Spanish-English bilingual speakers. In the separate syntax account only word order overlap would produce priming while in the shared syntax account priming can occur even when there is no word order overlap. It was my hypothesis that there would be observable priming of preverbal object relative clauses since Spanish and English share this word order. A total of 25 Spanish-English bilinguals were tested using a picture description task. The results showed no priming effect for object relative clauses in the priming conditions (pre and postverbal) compared to the baseline conditions. Some limitations of the present investigation are discussed.

1. Introduction

In this paper, I look at the linguistic representation of syntactic structures for Spanish-English bilinguals. Multiple studies of monolingual speakers have shown that structural priming can be used to investigate underlying representations for syntactic structures. The aim of this research project is to identify how bilingual speakers are affected by prime sentences and if the syntactic storage is a single storage (shared syntax account) or if it is composed of multiple storages (separate syntax account). This paper will first give an introduction about syntactic priming.

1.1 Syntactic Priming

Syntactic priming is the processing of an utterance that affects the processing of another utterance that shares an aspect of linguistic structure but is otherwise unrelated (Branigan & Pickering 2017). In other words, one sentence that a person hears or reads affects a later sentence that they produce. Syntactic priming was first observed by Bock (1986) who used a picture-description task with monolingual speakers. Participants were told to describe pictures after repeating a prime sentence that, although conceptually unrelated, shared the syntactic structure of the target sentence. Bock found that participants were more likely to use a passive structure (e.g., “the building manager was mugged by a gang of teenagers”) after repeating a prime containing a passive structure (e.g., “The referee was punched by one of the fans”) than after repeating a prime containing an active syntactic structure (e.g., “One of the fans punched the referee”).

Bock (1989) demonstrated that the priming effect was not a result of word repetition. She showed that participants used prepositional object (PO) dative sentences (The girl is handing a paintbrush to the man) rather than double object (DO) sentences (The girl is handing the man a paintbrush) after a dative sentence even when the dative sentence did not include *to* (The secretary bakes the cake for her boss). The PO and DO sentences shared every word except for *to* and described the same events refuting theories based on meaning.

Additional evidence for syntactic priming was provided by Hartsuiker and Westenberg (2000) who found that Dutch participants repeated the order of auxiliary and main verbs (was geblokkeerd “was blocked”) vs. (geblokkeerd was “blocked was”), even though verbs did not differ in meaning. In addition, Bock and Loebell (1990) presented evidence against repetition

by metrical structure because “The girl is handing a paintbrush to the man” was not primed by “Susan brought a book to the study” although it was primed by the metrically equivalent “Susan brought a book to Stella”. Bock and colleagues were able to rule out attributing syntactic priming to lexical factors, thematic roles, or overlap in prosody in a series of seminal studies (Bock 1989, Bock & Loebell 1989).

Once the existence of syntactic priming was established, different theories were proposed to discuss whether priming occurred at multiple levels, one level, or at some level in between. Pickering and Branigan (2017) assumed priming occurred at multiple levels and proposed a distinction between a lexeme level that contains phonological information and a lemma level that contains syntactic information. For example, if a transitive verb such as *hit* was used in a passive structure in the prime, both the passive combinatorial node and the connection between *hit* and the passive become highly activated. In this theory, multiple levels are activated in the brain to allow priming to occur.

Syntactic priming has been studied in monolinguals in both comprehension and production. It is observed in comprehension through a reduced reading time of a primed sentence and for production as a repetition of the same or similar structure across sentences (VanGompel & Arai 2017). For both comprehension and production research, several paradigms have been used, including picture description under the guise of a memory task (Bock 1986), sentence completion (Pickering & Branigan 1998), and dialogue game paradigms where two subjects (a confederate of the experiment and a naïve subject) alternate in describing pictures to each other and verifying whether the other person’s description corresponds to their “matching pictures” (Branigan, Pickering & McLean 2000).

The importance of syntactic priming research in psycholinguistics is well-illustrated by Branigan and Pickering (2017) who argued that structural priming can provide a valid method of testing that can be informative about the nature of language. According to Branigan and Pickering (2017), syntactic priming provides evidence for linguistic representation that can be used to expand linguistic theory, processing accounts based on those theories, and claims about language development. Pickering and Branigan (1998) found that syntactic priming is enhanced by lexical repetition, an effect known as the “lexical boost”. Additional research has demonstrated that the syntactic priming effect is enhanced when a particular lemma such as the verb or noun is repeated between the prime and the target. For example, Cai et al. (2011) observed that when verbs had the same meaning there was a greater prime than between different-meaning verbs. The effect held cross-linguistically when Cai et al. (2011) found a cognate boost to the priming effect, with a larger between-language priming effect with cognate verbs than with different-meaning verbs (cross-linguistic priming is something that will be addressed subsequently). Even though a lexical boost can occur during priming, it has been demonstrated that abstract priming occurs even in the absence of lexical overlap. Additionally, these two types of priming effects may rely on different underlying processes. For instance, Chang et al. (2006) hypothesized that the lexical boost may differ from abstract priming because lexical overlap activates explicit memory linking the lexical item presented in the prime to the target structure.

1.2 Cross-linguistic priming

There are two theoretical accounts that discuss cross-linguistic priming in bilingual individuals: the shared-syntax model and the separate-syntax model. The shared-syntax model claims that

syntactic structures are fully shared between languages; that is, there is only one combinatorial node for a syntactic construction in the two languages of a bilingual speaker. The separate-syntax model proposed that both languages of a proficient bilingual are processed independently from each other and that different nodes are activated symmetrically for the same syntactic structure. The shared-syntax model was proposed by Hartsuiker, Pickering and Velkamp (2004) who observed that structural representations in different languages are shared. They noticed cross-linguistic structural priming in Spanish-English bilinguals who produced more passive picture descriptions in English after hearing a Spanish passive sentence than after hearing either a Spanish active or intransitive sentence. Hartsuiker et al. (2004) included multilingual individuals by adding a language level in Pickering and Branigan's (1998) model of syntactic priming which originally only had a lexeme and lemma level.

Studies in favor of the shared-syntax model include Kantola and VanGompel (2010) and Desmet and Declercq (2006) whose findings are consistent with an account in which structural priming between and within languages is equally strong. Equal structural priming between and within languages supports the shared-syntax account because if different languages are sharing the same combinatorial nodes, then residual activation of the node resulting in structural priming should occur whether the target is in the same or different language as the prime (Kantola & VanKompel 2011).

In the separate-syntax approach, it is predicted that between-language priming occurs less than within-language priming because with within-language priming there is residual activation of the connection between the verb lemma and the combinatorial lemma (Kantola & VanGompel 2011). Kantola and VanGompel (2011) also noted that much of the early evidence for cross-

linguistic syntactic priming is consistent with the view that syntactic representations in different languages are merely connected rather than fully shared. In other words, one language activates a related but separate representation in another language. Some of the evidence comes from studies that tested cross-linguistic priming in contexts where the syntactic structures of the prime and target had similar or different word order. For example, Loebell and Bock (2003) found priming between German and English PO/DO structures that shared constituent order. Gunner et al. (2016) replicated this study and agreed with these findings but added that significant cross-linguistic structural priming emerged only if the prime and target were similar regarding both constituent order (i.e. PO, DO) and level of embedment. Another study noted that despite different relative clause word orders in Dutch and English the authors still observed cross-linguistic structural priming for relative clause attachment in Dutch-English bilingual production (Desmet & Declercq 2006). In addition, Loebell and Bock (2003) and Bernolet et al. (2007) showed consistent findings that suggest that cross-linguistic priming only emerged when the prime and target shared the same constituent order.

1.3 Object relative clauses

Relative clauses, the structures that are investigated in the present study are observed through cross-linguistic priming. Relative clauses (RC) are embedded syntactic structures that children may acquire late across different languages. Research has shown that some RCs may be easier to process than others (Lau et al 2021). For example, in most European languages subject RCs are easier to process for children and adults than object RCs (Kirjavainen, Kidd & Lieven 2016). An example of English Subject and Object RCs are:

1. Subject RC (SRC): The boy [that _chased the girl]
2. Object RC (ORC): The boy [that the girl chased _]

Subject and Object Relative clauses are not processed at the same speed. According to Keenan and Comrie's noun phrase accessibility hierarchy, there is progressively greater difficulty in processing RCs as the clause's place in the hierarchy decreases. The authors proposed the following hierarchy:

3. Subject > Direct Object > Indirect Object > Oblique > Genitive > Object of Comparison.

Various studies have focused on the comprehension asymmetry between SRCs and ORCs. The term subject-object asymmetry refers to the difference in processing speed and comprehension accuracy between the two structures. One of the underlying factors explaining the subject-object asymmetry could be the working memory cost associated with processing the dependency (the linear distance between the head of the relative clause and the gap). In English, the distance between the head and its gap is longer in ORCs than in SRCs, causing a greater burden on working memory because the filler must be retained for a longer time before the dependency is resolved (Lau et al. 2021). King and Just (1991) provide evidence of an increased need for working memory resources to process ORCs in reading tasks compared to SRCs. A different theoretical account suggests that an RC's difficulty depends on the depth of the gap and not working memory. The object gap is more deeply embedded in the syntactic structure, and the structural distance between the head and the gap is greater in ORCs than SRCs (Lau et al. 2021).

1.4 Present Study

In the present study, I will be looking at ORC cross-linguistic priming between English and Spanish bilinguals. While English has a strict word order in relative clauses (preverbal/Object-Subject-Verb (OSV)), as shown in example 4, in Spanish there is some flexibility in the word order within the relative clauses (preverbal/OSV and postverbal/Object-Verb-Subject (OVS)), as shown in examples 5 and 6. English is an SVO language with post-nominal RCs and Spanish, which is also an SVO language, allows VSO in post-nominal RCs. The following sentences illustrate ORCs in English and Spanish.

4. English ORC: “Which is the dog_[obj] that the cats_[subj] are chasing_[verb]?”

5. Spanish preverbal ORC “¿Cuál es el perro que los gatos persiguen?”

Which is the dog _[obj] that the cats _[subj] are chasing _[verb].

6. Spanish postverbal ORC “¿Cuál es el perro que persiguen los gatos?”

Which is the dog _[obj] that are chasing _[verb] the cats _[subj]

Cross-linguistic priming of ORCs has been investigated in a study by Kidd et al. (2015). Kidd et al. (2015) examined the comprehension of German and English ORCs in a sentence-picture matching task conducted with English-German bilinguals. English and German do not share the same word order. English subject RCs have canonical Noun-Verb-Noun (NVN) order, while English object RCs have non-canonical Noun-Noun-Verb (NNV) order, and in contrast, all German subordinate clauses are verb-final with NNV word order (Kidd et al 2015). In addition, when the NPs in the RC are either feminine or neutral, there is morphological ambiguity between nominative and accusative cases.

English/ German word overlap occurs in Object RCs but not between Subject RCs, as shown in (Examples 7-9).

7. English Subj RC: The woman_[subj] that kisses_[verb] the man_[obj]
8. English Obj RC: The woman_[obj] that the man_[sub] kisses_[verb]
9. German ambiguous RC: Die Frau, die das Mädchen küsst

The woman _[Sub/Obj] that the girl _[Sub/Obj] kisses_[verb]

Thus, examining if cross-linguistic priming can occur between English and German can provide insight into whether priming effects can also emerge in the absence of word-order overlap. Using a comprehension-priming paradigm, the study showed that English object RCs prime object RC interpretations of ambiguous German RCs in German-English bilingual speakers. The participants read a prime sentence in English (e.g., 10. Where is the princess_[obj] that the child_[sub] is pushing_[verb]?) and then had to choose which of the two pictures presented best matched the sentence. The prime sentence was followed by a target sentence, which contained an ambiguous German RC (e.g., 11. *Wo ist die Malerin, die Hexe schlägt?* - Where is the painter _[Sub/Obj] that the witch _[Obj/Sub] hit?). Priming was observed if the bilinguals chose the object interpretation for the ambiguous German RC.

2. Aims and Predictions

Research has shown syntactic priming between languages through common syntactic structures and word-order overlap (Bernolet et al 2007, Desmet and Declercq 2006, Kantola & VanGompel 2010, Meijer & Fox Tree 2003, Loebell & Bock 2003). The present study will assess if relative clauses are primed cross-linguistically in production with Spanish-English bilinguals. I will test

if both preverbal and postverbal ORCs in Spanish prime English object relative clauses or if only preverbal ORCs, which overlap between English and Spanish, will prime English ORCs (see examples 4-6 of English and Spanish ORC word order). If an effect of priming is found in the production of English ORCs when the prime is either pre or postverbal in Spanish, the results will suggest abstract conceptual priming and support a shared syntax account (Hartsuiker et al., 2004).

If an effect of priming is found in the production of English ORCs when the prime is only preverbal Spanish ORCs, the results will suggest strict word order overlap and support a separate syntax account.

3. Method

3.1 Participants

Twenty Five ($n=25$) Spanish-English bilingual participants (mean age =20.56 years, $SD=2.79$). Fifteen participants had Spanish as their L1 and the other ten participants had English as their L1; the average age at which they began learning English was 2.8 years ($SD=3.86$). All participants were recruited from a southwestern university located on the US- Mexico border. The participants' English proficiency was assessed using the MELICET (Michigan English Language Institute College English Test) and the BNT (Boston Naming Task) in English and in Spanish. The BNT is an assessment that measures word retrieval in a specific language. There are a total of 30 items in Spanish and 30 items in English. The participants' average Spanish BNT score was 15.73/30 and their average English BNT score was 16.30/30. The DELE

(Diplomas de Español Como Lengua Extranjera) and the BNT in Spanish assessed participants' Spanish proficiency. The MELICET and DELE are scored out of 50 and the questions are divided into two sections: 30 grammar multiple-choice questions and 20 cloze questions. The participants average MELICET score was 34.2/50 and their average DELE score was 33.64/50. In addition to the main task and the proficiency assessments, participants had to fill out an LHQ (Language History Questionnaire). On average, the participants had been speaking English for 6.4 years ($SD=5.15$). All twenty-five of the participants had spent time in an English-speaking country with an average of 12.78 years spent in the U.S. Participants received two credits for class to compensate for their time.

3.2 Materials

Thirty pairs of pictures depicting reversible transitive actions were used. The pictures were assembled from human and animal animated characters and transitive verbs. Thirty pictures served as targets, and 30 served as primes.

The participants were told that they were participating in a study that would later be used on children. All participants were tested in a quiet room using a 24-inch screen. A sentence-picture matching task was used. The experiment was presented using E-Prime 2.0 (Psychological Software Tools, Pittsburgh, PA, USA). A schematic representation of a prime-target trail is presented in Figure 1. Participants first read a Spanish prime sentence on the computer monitor (black text, white background). After reading the sentence in the same slide, the participants had to choose which of the two pictures above the sentence represented the meaning by pressing 0 or 1 on their keyboard. Following the prime sentence, the participants were presented with the

target fragment sentence, which elicited an English RC (e.g., The arrow is pointing to the zebra that _____). As in the prime trial, the target picture that the participants had to describe was indicated by a red arrow. There was no lexico-semantic overlap between prime and target sentences; that is, there were no cognate or translational equivalent words shared between prime and target sentences. Therefore, any observed priming effects suggest abstract syntactic representations shared between languages. The location of the pictures was counterbalanced across the experimental orders.

Figure 1. Example of a Prime Sentence (Picture Selection Task)



Participants read on the screen. Then they choose the correct image by pressing either 1 or 0 on their keyboard.

Baseline: ¿Cuál fantasma _(obj) asustan _(verb) las brujas _(subj)?

Which ghost are the witches scaring?

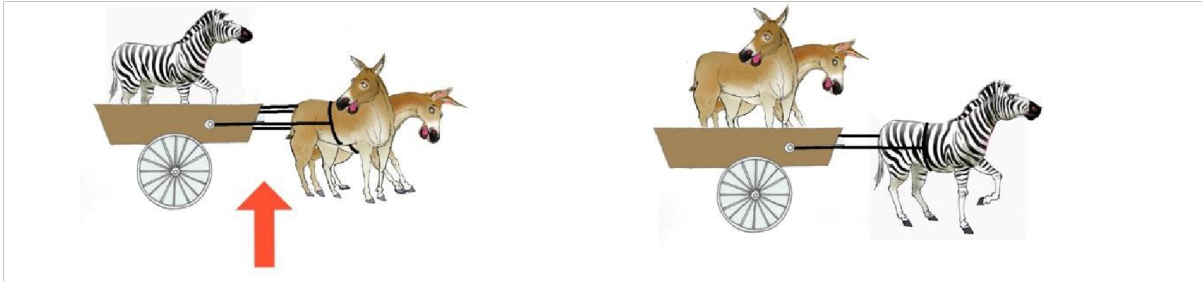
Prime Preverbal: ¿Cuál es el fantasma _(obj) que las brujas _(subj) asustan _(verb)?

Which is the ghost that the witches are scaring?

Prime Postverbal: ¿Cuál es el fantasma _(obj) que asustan _(verb) las brujas _(subj)?

Which is the ghost that the witches are scaring?

Figure 2. Example of Target Item (Picture Description Task)



The red arrow points to the target picture on the screen. Participants reads off the screen:

The arrow is pointing to the zebra that...

(Target structure: ORC) the donkeys are carrying.

(alternative structure: passive subject relative) is being carried by the donkeys.

3.3 Procedure

The experimenter read the instructions to the participants, and followed-up with the participant in case they had any questions. At the beginning, five practice trials were presented, which helped the participants to understand the task. The oral production was recorded with a USB microphone using the Audacity program (a digital audio recorder). After the experimental task, the participants were asked to complete the MELICET, DELE and BNT proficiency test and the LHQ, which were presented as Google surveys.

3.4 Scoring

In the analysis, I included only productions in which a subject or an object RC was produced (see e.g. 12):

E.g. 12.

The arrow is pointing to the cat that _____.

- a. SR active: is in the middle of the dogs
- b. SR passive: is being played by the dogs
- c. ORC: The dogs are punching

SRs with a passive are commonly used when an ORC is expected because, SRs with a passive are easier to process, thus, they were counted as alternative structures to the target ORC. I excluded from the analysis 26 productions because they contained: (i) naming errors; (ii) missing productions; (iii) unclear descriptions; (iv) productions in the wrong language (Spanish instead of English).

For the statistical analysis, ORs were scored as 1 or 0 per subject and item and analyzed using glmer (*lme4* library, Bates & Sarkar, 2007). The dependent measure is the number of ORs produced. In the statistical analysis, three separate models compared the likelihood of OR production in the three testing conditions. The first model compared the prime postverbal to the baseline. The predictor in this model was Condition1 (baseline was coded as 0.5; prime postverbal was coded as -0.5; prime preverbal was coded as 0). The second model was identical except that the Condition predictor compared prime preverbal to the baseline (baseline was coded as 0.5; prime preverbal was coded as -0.5; prime postverbal was coded as 0). In the third model, the Condition predictor compared prime postverbal to the prime preverbal (baseline was coded as 0; prime preverbal was coded as -0.5; prime postverbal was coded as 0.5).

4. Results

Table 2 illustrates the proportion of ORCs produced by the L2 participants out of the total number of ORC, active and passive SR produced in the three conditions.

Table 2. Proportion of ORC, active and passive SR produced by participants.

	OR (%)	Passive SR (%)	Active SR (%)
Baseline	0.03	0.84	0.13
Prime Postverbal	0.01	0.84	0.15
Prime Preverbal	0.02	0.85	0.12

The results of the statistical analysis are illustrated in Table 3.

Table 3. Statistical model

	Estimate	Std. Error	z value	Pr(> z)

(Intercept)	-7.6716	2.4501	-3.131	0.001
Condition1	0.7135	0.4168	1.712	0.08
(Intercept)	-7.5454	2.4218	-3.116	0.001
Condition 2	0.4386	0.3856	1.137	0.2
(Intercept)	-7.4557	2.4107	-3.093	0.001
Condition 3	0.2259	0.3861	0.585	0.5

The statistical analysis did not show any main effect of Condition in the models, indicating that bilinguals were not primed to produce ORs in the baseline vs. priming conditions (pre and postverbal).

5. Discussion

Syntactic priming occurs when the processing of one utterance affects the processing of another utterance because they share some part of their linguistic structure. The present study investigated the cross-linguistic syntactic priming effects of relative clauses in Spanish-English

bilingual adults. The aim is to understand if the syntactic storage is a single (shared syntax account) or if there are multiple storages (separate syntax account) in bilinguals. I examined the priming of ORCs sentences, a structure infrequently produced that takes longer to process than SRCs (Lau et al 2021). In addition, English has a strict word order of Object-Subject-Verb in ORCs, while in Spanish, word order is flexible between Object-Subject-Verb and Object-Verb-Subject. Following the shared syntax account, a bilingual should present priming effects as they should store the shared aspect of the constructions as one underlying representation for sentences that have word order overlap and for sentences that do not overlap in word order. Thus, under the Shared Syntax account, I expected to see an increase in the production of English ORCs after participants are presented with Spanish postverbal and preverbal ORCs.

Under the Separate Syntax account, I also predicted that if abstract cross linguistic priming comprehension was dependent on word order overlap between prime and target, I should only observe priming in preverbal ORC, which is the shared word order by English and Spanish.

The results did not show a main effect of Condition in the model, showing that there was no evidence of cross-linguistic syntactic priming in either preverbal or postverbal conditions. To account for the lack of priming effect, I will present some possible limitations of the present study.

One limitation of the present study is the small group of participants. Twenty five participants were included in the study when originally I had planned for 50 participants. An underpowered

group of participants may have made it difficult to observe an effect of priming. Priming effects can be small and a larger pool of participants may be needed (e.g., Zigler et al., 2019). For future research at least 50 participants should be recruited.

Additionally, when looking at the structure of the conditions used in the experiment, the word order in the baseline and postverbal prime condition are very similar, as shown in examples 13-15, even though the baseline condition does not include any embedding. This might have affected the results since if there are not enough differences between the conditions, participants might have associated them to one another and may not distinguish the difference, resulting in no priming effect. Future research should investigate this open question by using structures that are not so similar between the conditions, as shown in examples 13-15.

13) Baseline: ¿Los pitufos retratan a cuál Blancanieves?

14) Preverbal: ¿Cuál es la Blancanieves que los pitufos retratan?

15) Postverbal: ¿Cuál es la Blancanieves que retratan los pitufos?

Finally, the structure in the prime and target in the present study was not identical. The prime was a which question with an embedded RC and the target was a declarative sentence with an embedded RC. It is possible that a lack of priming effect could be due to the difference in syntactic structure between prime and target. Future research should use a prime and a target with a more similar structure to determine if there is a priming effect. One possibility is to have identical structures like the following sentences (16-19), which are examples of primes closer to the target in syntactic structure.

- 16) En una de las dos imágenes, los pitufos retratan a Blancanieves
- 17) En una de las dos imágenes, hay una Blancanieves que los pitufos retratan
- 18) En una de las dos imágenes, hay una Blancanieves que retratan los pitufos
- 19) Target: In one of the two pictures, the arrow is pointing to the monkey

that _____

In conclusion, the question of how the syntactic storage structure in bilingual adults works remains unresolved. I used syntactic priming to study the representation of syntactic structures such as relative clauses in bilinguals. I asked whether cross-linguistic priming could occur with object relative clauses in Spanish-English bilingual adults. In this study, I found no effect of cross-linguistic priming between Object Relative clauses in Spanish-English bilinguals. I would recommend that further research is done on this topic and that a bigger participant pool is used along with some modifications to the sentence structure of the prime sentences.

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State of the Field: A Nationwide Study of Linguistics Education in American Colleges and Universities¹

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Abstract. The field of linguistics has existed, though not explicitly denominated as such, for at least four thousand years. Consequently, this natural interest has led to courses in linguistics being taught, at least historically, by scholars in various academic fields and departments. However, many fail to recognize that “this year's pure research occasionally turns into the next year's school syllabus” (Hudson 2020:12) and, for that reason, it is crucial for educators to appraise the current curricular landscape before retaining or modifying instruction, mainly because such reflection is “a complex, rigorous, intellectual, and emotional enterprise that takes time to do well” (Rodgers 2002:844). Nevertheless, the last comprehensive examination of linguistics education occurred forty years ago. Furthermore, very little research examines institutional written material like course catalogs (cf. Biber 2006). As a result, the present study presents a content-based inventory and analysis of over six-thousand (N=6,081) courses in linguistics offered at over one-hundred (N=152) colleges and universities in the USA. Excluding course titles and administrative information (e.g. prerequisites), the resulting corpus of course descriptions contained a quarter-million words (N=236,804) in a variety of subfields, hereby offering a degree of breadth that far surpasses any extant study on course descriptions in any field in recent history.

1.0 Introduction

Linguistics, commonly referred to as the scientific study of language, has existed for at least four-thousand years (cf. Robins 1997, Allan 2013, and Campbell 2017), beginning presumably with the Sumerian grammatical tradition and becoming formally recognized as a distinctive academic field in the late nineteenth and early twentieth centuries. Moreover, if language is, to follow in the spirit of Sapir (1921), “the most massive and inclusive art we know, a mountainous and anonymous work of unconscious generations” (p. 235), then the realization that interest in linguistics is widespread becomes far less surprising. Indeed, many colleges and universities in the United States of America (USA) offer undergraduate and graduate degrees in the subject, and countless others provide coursework in adjacent fields.

Such offerings are not only limited to the post-secondary level, though, as educators have expressed interest in the incorporation of linguistics and/or have integrated linguistics into instruction in primary schools (see e.g. Denham 2007), secondary schools (see e.g. O'Donnell 1966; Sledd 1966; Lewis 1966; Lorentzen 1969; Virgilio 1980; Mulder 2007; Stewart and Cárdenes 2010; Loosen 2014; Astori 2017; Bateman 2019; Plackowski 2020; Gutiérrez 2021; Casillas et al. 2023), or K-12 instruction more broadly (see Denham and Lobeck 2010). In a similar vein, attempts have been made recently to formalize the content of an introductory, college-level course in linguistics to be offered in American high schools (see Larson et al. 2019 and Larson

¹ The title and inspiration for this paper come from Whitlow's (1975) fascinating survey on the teaching of courses in and particular works of African American literature in the USA in the mid- to late-twentieth century, an article the author first discovered many years ago as an undergraduate student.

2023), in order for these students to receive college credit for demonstrating sufficient mastery of the content before formal enrollment.

However, even though efforts have been underway for many years to incorporate linguistic knowledge and linguistic perspectives into the classroom, there is a comparative dearth of scholarship on teaching linguistics compared to the quantity of work on reading, writing, and mathematics instruction. Consequently, the present study attempts to offer a more nuanced appraisal of the current state of and trends found in linguistics education at the post-secondary level by examining course offerings at American colleges and universities. To this end, this article is divided into four additional parts. Section 2 offers a literature review of existing publications concerning the unification of pedagogy and linguistics and the limited scholarship on course descriptions more broadly. Section 3 describes the methodological approach utilized in the present study to obtain the relevant data and contextualize the corresponding institutions. Section 4 engages with the resulting corpus, perhaps better understood as a database, to determine if any generalizations can be made about linguistics instruction. Finally, section 5 offers concluding remarks and highlights both the contributions of this study and areas for future research.

2.0 Literature Review

2.1 Studies on Pedagogy and Linguistics

The scholarship referenced in the introduction seems to indicate, thus, that educators have taken Lehmann's (197x) dictum seriously: "If our concern is language, linguists should also contribute to this central component of our educational system" (p. 2). In conjunction with the Linguistic Society of America (LSA), Langendoen (1988) secured funding from the National Endowment for the Humanities (NEH) and launched a two-year project—*Linguistics in the Undergraduate Curriculum*—in the late 1980s with the expressed objective to "study the state of undergraduate instruction in linguistics in the United States and Canada and to suggest directions for its future development" (p. 462). With a fifty-two percent (52%) response rate to the mailed letter and survey, relevant information from 116 institutions² in the USA and Canada was included in the final report. However, this was certainly not the first time that members of the LSA had formally expressed an interest in issues related to teaching linguistics, as the erstwhile *University Resources in the United States and Canada for the Study of Linguistics*, which was launched in the 1960s, shared information with readers about programs, faculty, and courses in the field at a variety of post-secondary institutions.

Such interest has remained consistent over the decades. In fact, one year after founding the Linguistic Society of America in 1924, members launched an academic journal entitled *Language*. About to celebrate its centennial, *Language* has been and remains an influential journal within the field of linguistics. Although it has historically published more theoretically-oriented articles, *Language* has dedicated a special section for the last eleven years (since August 2012) to teaching linguistics and incorporating linguistics into the classroom. As a result, this has become one of the

² The report states the following: "The questionnaire was purposely kept brief to encourage recipients to complete and return it. It was sent to 225 institutions in the United States and Canada; 116 responses were received." It should also be noted here that 128 are actually enumerated in the list, though the difference (twelve) is accounted for when one identifies those based in Canada. Consequently, this suggests that only those in the United States submitted instructional materials. On the other hand, the sample syllabi presented in the report, which are intended to reflect 'innovative' courses in linguistics, were chosen from fifty-five (55) descriptions of courses available at twenty-two (22) institutions.

most straightforward venues in which to publish research that bridges linguistics and pedagogy. Two other academic journals have also made ardent efforts in this arena, including the erstwhile *Innovations in Linguistic Education* (1979-1991) and the more recent *Pedagogical Linguistics* (2020-).

Academic publications are, of course, one way for linguists to fulfill their obligation by "beginning to concern [themselves] more actively with courses for the non-specialist" (Lehmann 197x, p. 2). Indeed, this topic has received limited consideration over the last five decades (see e.g. Levin 1983, Spring et al. 2000, Berardi-Wiltshire and Petrucci 2015, Trester 2022, and Gawne and Cabraal 2023). Similarly, Pincas (1980) interrogates the usefulness of neologisms in linguistics for students of any academic background or prior exposure to the field. On the other hand, other scholarship focuses on the role of linguistics in teacher education (Dineen 1974, Carter 2012 [1982], Curzan 2013, de Klerk 1992) and effective pedagogy (Freeman 1983, Kuiper 2011, Zuraw et al. 2019, Welch and Shappeck 2020, Calhoun 2021, Metz and Knight 2021, and Saihi 2021). In alignment with this objective to make linguistics more accessible for non-linguists, other attempts to ensure equitable access to academic materials have resulted, for instance, in Anderson et al.'s (2023) extensively revised textbook *Essentials of Linguistics*.

Finally, a significant body of literature has developed that offers specific pedagogical strategies, sources of data, and approaches to instruction in linguistics. For instance, science fiction (Barnes 1975 and Wheatley 1979) and constructed languages (Sanders 2016; Fountain, Punske, and Sanders 2020; and Yilmaz 2023) have proven effective in undergraduate linguistics education. Furthermore, there exists scholarship focusing specifically on courses in introductory linguistics (Filimonova 2020), syntax (Lasnik 2013), phonology (Anderson 2016), sociolinguistics (Heiman 1967 and Cépeda et al. 2023), onomastics (Mackenzie 2018), and field linguistics (Maxwell 2010, Macaulay 2004, and Tsikewa 2021). Additional work focuses on specific applications of linguistic knowledge, such as foreign language instruction and speech-language pathology (Grundstrom 1983, Müller and Ball 1995).

2.2 *Studies on Curricular Content and Descriptions*

Despite all these efforts toward expanding and including linguistics at different levels of instruction, it has now been almost forty years since the last comprehensive attempt to characterize how the field is taught. The most recent, similar study is Larson (2023), which examines introductory courses in (General) Linguistics at the undergraduate level to derive an analogous curriculum for AP Linguistics. His findings indicate that phonetics, phonology, morphology, and syntax are covered in *most* of these courses; semantics, in *many* of these courses; and pragmatics, in *some* of these courses. Nonetheless, the actual methodology employed to arrive at these conclusions is not transparent; as a result, one cannot reproduce the same conclusions as the author and must, instead, take those findings at face value.

On the other hand, Petray (2004) offers a more focused examination of five regularly republished textbooks—for undergraduate students—employed in the introductory linguistics classroom, emphasizing the subject matter and the pedagogical strategies employed (e.g. the type and quantity of examples and exercises). The methodology is much more transparent in this study; nonetheless, to analyze the content of these textbooks as an indication of the instruction disregards the high probability that instructors supplement these with their own materials and readings, organize the semester differently from one another (perhaps even based on their area of specialty or interest), and offer their own forms of formal and informal, formative and summative

assessments. Understood another way, the textbook is not—or, perhaps put more forcefully, must not be—the curriculum³.

In contrast to the highly structured, generally legally-regulated curriculum at the primary and secondary levels, course descriptions for undergraduate and graduate classes are far less consistent from one institution to another. Nonetheless, a typical course description may contain learning objectives, an enumeration of the primary topics or themes to be covered, the total number of credit hours/units awarded, and prerequisite or corequisite courses. Some may also include information about the possibility of repeating the course (e.g. under a different topic) and even information about how content will be delivered or assignments evaluated. Prototypical descriptions are offered below.

- (1) “This course examines recent developments in controversial areas of phonetics. Topics will vary and will address issues in speech production (articulation, acoustics), speech perception, phonetic theory, and the relationship between phonetics and phonology. May be repeated for credit up to two times.”
(Topics in Phonetics, LIGN-214, University of California-San Diego)
- (2) “Linguistics is designed to introduce students to the various disciplines which comprise the scientific study of language. These include a survey of applied, comparative, descriptive and historical linguistics. The course will primarily focus on the English language.”
(Linguistics, ENGL-249, Ivy Tech Community College)
- (3) “An introduction to how computers process language and solve language-related tasks. This course discusses the language technologies of our daily life—spam filtering, machine translation, and many more—and shows how they work under the hood. The course explores a variety of issues: Why do computers do well in some areas (spell checking) yet fail miserably in others (essay grading)? Will we ever have perfectly fluent AIs as depicted in science fiction? And how will these technological advances impact the role of language in our society? Students will also acquire basic programming skills and write scripts for simple language tasks. No previous training in mathematics or computer science required.”
(Computers and Language, LING-3300, University of Utah)

Still, despite course descriptions being typically formulaic, research into this topic has been slow to expand. Additionally, the extant scholarship presents variations on a familiar heuristic that involves a random selection of institutions and/or courses. This is followed by a content-based analysis *or* an investigation concerning how accurately those descriptions support the intended learning outcomes for a given course or program of study. To this end, four main curricular areas (Communications, Library Science, the Fine Arts, and STEM) can be broadly identified, as outlined in Table 1. For comparison, the present study is also included in this table.

³ It has been well-established, particularly by Wiggins and McTighe (2005), that effective instruction begins by determining the intended learning outcomes and benchmarks for mastery before instruction begins. To foreground a textbook as *the* curriculum, then, would be simply to reproduce the material without regard for the audience of this instruction.

Table 1: Studies on Course Descriptions

Study		Institutions	Courses	Ratio ⁴	Field / Subject
Communications	Spier (2021)	72	171	1:2.375	<i>Developmental Writing</i>
	Sideris (2004)	136	136	1:1	<i>First-Year Writing</i>
	Bailey (2017)	110	114	1:1.036	<i>Professional Writing</i>
	Mandel and Applbaum (2009)	1	7	1:7	<i>Speech</i>
	Langendoen (1988)	22	55	1:2.5	<i>Linguistics</i>
	Present Study	152	6,081	1:40.013	<i>Linguistics</i>
Library	Valenti and Lund (2021)	58	114	1:1.965	<i>Library Science</i>
	Irwin (2002)	45	217	1:4.822	<i>Library Science</i>
Fine Arts	Mishra et al. (2011)	59	32	1:0.542	<i>Music Education</i>
	Pouls (2017)	97	452	1:4.659	<i>Art Education</i>
STEM	Muscato et al. (2021)	11	62	1:6.636	<i>Agricultural Leadership</i>
	Dickinson et al. (2022)	75	75	1:1	<i>Nursing Education</i>

Prior studies on course descriptions are not very numerous, and those that do exist tend to focus broadly on a particular field—as opposed to one specific subject—and typically focus on a small number of institutions and/or a small number of courses. The exception to this pattern seems less pronounced in Communications, as Table 1 indicates above, which offers a more concerted effort to examine and illustrate the objectives in specific courses. On the other hand, the same table also shows a growing interest in this subject, likely for institutional assessment purposes and more effective course alignment/sequencing. Nonetheless, greater attention should be paid to this area of institutional written material, as Biber (2006) remarks, because “[m]any of these texts are among the first material that a prospective student receives from a university [...] written material of this type is ubiquitous on campus and required reading for the prospective student attempting to navigate the maze of university requirements and services” (p. 26).

3.0 Methodology and Corpus

The methodological approach employed in the present study is decidedly non-random. While extant scholarship has tacitly acknowledged the inherent difficulty in presenting a comprehensive account of coursework in a given field at as many institutions as possible, the decision of convenience to utilize a randomized selection sacrifices breadth for the sake of depth. Conversely, this study attempts to offer the fullest ‘picture’ possible on the state of linguistics education at American colleges and universities *without* relying on random sampling or departmental surveying. For this reason, the present study is perhaps better understood as a ‘mapping’ study of the pedagogical landscape, i.e. one that retains the potential to inform instruction and curriculum, as opposed to a systematic literature review or a more prototypical corpus study (cf. Kitchenham 2011). To this end, the data were obtained through two different points of entry, which are addressed in more detail below. The first relies on data reported from American colleges and universities to the Department of Education, and the second utilizes a targeted formula to retrieve results from Google.

⁴ This ratio must be understood within the institutional context and the purposes for which the corresponding study was undertaken. This means, for instance, that any given ratio is not inherently ‘better’ or ‘worse’ than another.

The first point of entry begins with the National Council for Education Statistics (NCES), which is part of the United States Department of Education and which maintains an online database of information related to approximately six-thousand post-secondary educational institutions nationwide. By using *College Navigator*, their online electronic interface, users can connect directly to and extract information from the *Integrated Post-Secondary Education Data System* (IPEDS). Before conducting a search, it is also possible to obtain specific results by utilizing various search filters, which correspond e.g. to the type of institution, the location, the types of certificates and degrees offered, etc. Furthermore, an additional option enables users to qualify the results according to any number of the thirty-eight listed fields, containing almost two-thousand further subfields.

By employing this electronic database, the institutions initially selected for consideration in the present study were identified based on their being linked to at least one of the four following fields: *Applied Linguistics*, *Linguistics*, *Linguistics and Anthropology*, *Linguistics and Computer Science*. However, there are two important notes to consider: First, programs with a decidedly applied focus that appeared under different labels were not included, such as Speech-Language Pathology. Second, almost four-hundred institutions provide instruction in foreign and modern languages, and these were also disqualified from inclusion. While these students likely complete courses in linguistics, these frequently focus on a particular language (e.g. 'Language and Society in Africa' or 'Introduction to Mvskoke Linguistics'), the same students will also fulfill curricular requirements in literature, history, film, etc. For these reasons, neither category is overtly considered in the present study⁵. To this end, the results provided by *College Navigator* indicate that approximately two-hundred post-secondary institutions (N=203) offer programs in at least one of these four areas⁶.

The second point of entry begins with a targeted formula⁷ to retrieve results from Google. Although colleges and universities provide information about their course offerings in a variety of formats, the Acalog ACMS is used widely to share and allow users to search current and archived course catalogs. For this reason, different post-secondary institutions that use this software have similar URLs, which enables one to access and extract this information straightforwardly. As a result, a custom search provided results for pages that necessarily included the word 'linguistics' and whose URL included a subdomain (*catalog*), an educational extension (*.edu*), and a separate directory for course-related information (*/courses/*). Any asterisks in the query are placeholders for any combination of alphanumeric characters. Finally, the top-level links and all course-related information were extracted automatically by writing a script in Python v3.8.10. It should be noted that this approach is identical to that found in Spier (2021), which examined descriptions for courses in developmental composition, i.e. a writing course taken by undergraduate students whose

5 Understandably, some courses in e.g. Speech-Language Pathology, Translation/Interpretation, etc. did arise, as the corresponding programs were coded as 'Linguistics.' A similar situation occurs in other fields where, e.g. courses coded as 'Art History' might actually teach painting or photography.

6 It was the case that some of the programs listed no longer have a relevant program and/or that some of the institutions have since closed or been absorbed. For instance, Ashford University, a former fully-online and for-profit educational institution, was purchased in 2020 by the University of Arizona. Similarly, when this paper was written, West Virginia University had decided to eliminate numerous academic programs, including the entire Department of Languages, Literature, and Linguistics. Furthermore, although several institutions were recognized in *College Navigator* as having a program in linguistics, only a few relevant courses could be found in the catalog, suggesting that such colleges and universities may have historically had more numerous offerings.

7 "linguistics" site:catalog.*.edu/courses/

academic abilities do not yet indicate sufficient mastery of the skills necessary to succeed in first-year composition.

By combining these two approaches, it was possible to build a relational database—and, by extension, the corresponding online interface⁸ containing a user-accessible version of the corpus—of over six-thousand (N=6,081) courses in linguistics offered at over one-hundred (N=152) colleges and universities in the USA. Unsurprisingly, the majority of these institutions are primarily undergraduate-serving (94.74%), enable students to earn a four-year degree (96.05%), and offer on-campus student housing (91.45%). Collectively, these institutions provide an education to approximately three-million students (3,201,280), and about two-thirds are administered publicly (69.07%) while the remaining one-third are private (30.03%). Finally, forty-six states⁹ are represented from the eight regions¹⁰ established by the Bureau of Economic Analysis. For the reader's consultation, a complete list of these colleges and universities is available in Appendix 1. Similarly, a more specific breakdown of the states, institutions, and students by region is found in Appendix 2 in Table 2.1; the administration and locale of these institutions by region, in Table 2.2; and the size¹¹ of these institutions by region in Table 2.3.

Each course entry maximally contained six pieces of information: the name of the institution; the prefixed code (e.g. *ENG* or *LING*), number, and title for the course; the total number of possible credits/units to be earned; and the prosaic description. This resulted in two separate corpora, the first of which contains the title of courses; the second, the descriptions of courses. Basic statistical information about both corpora and the ten most frequently occurring lemmata (excluding stop words and punctuation) in both titles and descriptions, the latter of which was calculated through the use of the *Natural Language Toolkit* (NLTK), are found in Table 2.

Table 2: Statistical Information and Lemmata in the Corpus

Basic Statistical Information				Most Common Lemmata	
	Titles	Descriptions		Titles	Descriptions
Tokens	21,093	236,804	1	language	language
Types	1,321	9,377	2	linguistics	course
Lemmas	1,365	8,484	3	introduction	student
TTR	15.967	25.254	4	topic	topic
N	6,081	5,833	5	english	linguistics

⁸ This website was built with HTML5, CSS, and PHP, and the MySQL database was created by importing the original spreadsheet as a TSV file.

⁹ Only Alabama, Nebraska, South Dakota, and Wyoming remain unrepresented. Although not recognized as a state, the District of Columbia contains two of these institutions, and *College Navigator* includes it as a distinct location. Indeed, the five states (California, Illinois, Pennsylvania, New York, and Michigan) with the highest number of institutions collectively account for almost forty percent (36.84%) of all institutions surveyed here.

¹⁰ More information about the demarcation of these eight regions can be found in *Bulletin No. 20-01*, which was released on March 6, 2020, by the Office of Management and Budget, which is available online at the following link: <https://www.whitehouse.gov/wp-content/uploads/2020/03/Bulletin-20-01.pdf>.

¹¹ Following the classification offered in Gevert (2019), locations are minimally distinguished as ‘urban’ or ‘rural.’ However, subcategories exist for each of these, reflecting not only the population size, but also the distance from an ‘urbanized area’ or ‘urban cluster.’ As a result, cities, suburbs, towns, and rural areas each have three specific subclassifications. In the case of cities and suburbs, these are *large*, *mid-size*, and *small*; on the other hand, towns and rural areas can be *fringe*, *distant*, or *remote*. In both cases, however, the population size decreases, such that a large city is “inside an Urbanized Area and inside a Principal City with population of 250,000 or more” (p. 1) while a remote rural area is “more than 25 miles from an Urbanized Area and also more than 10 miles from an Urban Cluster” (p. 2).

min(len)	1	1	6	seminar	study
max(len)	13	492	7	study	english
avg(len)	3.47	40.64	8	research	research
med(len)	3	32	9	method	theory
mo(len)	3	21	10	phonology	analysis

However, it should also be noted that there were courses either without a description or with a description identical to the title; as a result, both were treated as blank and non-meaningful, which is why the lowest range is listed as one instead of zero. This also explains why the total number of titles does not match the total number of descriptions. Finally, the most commonly attested collocations for ‘language,’ the top lemma in both titles and descriptions, can be found in Table 3.

Table 3: *Common Collocates for ‘Language’*

<i>Language and ____</i>		<i>____ and Language</i>
Acquisition	Human Nature	Bilingualism
Advertising	Humor	Brain
Brain	Identity	Children
Cognition	Indigeneity in Mesoamerica	Computers
Communication	Law	Crosswords
Community	Life in a Selected Area of the World	Gender
Complex Systems	Linguistics	Gender, Culture,
Computation	Literacy	Latinas, Latinos,
Computers	Meaning	Law
Conceptual Development	Media	Logic
Conflict	Mind	Poetry
Consciousness	Minorities in Europe	Psychology
Cross-Cultural Communication	Music	Race, Ethnicity,
Culture	Number	Seminar in Thought
Disability	Politics	Women
Discourse on the Web	Popular Culture	Writing, Reading,
Discrimination	Power	
Diversity	Prejudice	
Emotion	Race	
Environment	Racialization	
Environmental Politics	Reading Development in Children	
Ethnicity	Sexuality	
Formal Reasoning	Social Cognition	
Gender	Social Identity	
Globalization	Social Interaction	
Human Behavior	Social Justice	

4.0 Discussion and Findings

Although the majority of the courses are coded explicitly as ‘linguistics,’ ‘language science,’ or some variation thereof (92.55%), a variety of other course codes were also attested, evincing the interdisciplinary status of the field. For instance, a particular focus on a singular linguistic variety was more likely to result in a language-specific course code, e.g. ‘Japanese Linguistics’ or ‘Applied Spanish Linguistics.’ To this end, it is entirely possible (and likely) that additional codes would arise if a more thorough course-by-course examination of college and university catalogs were undertaken¹².

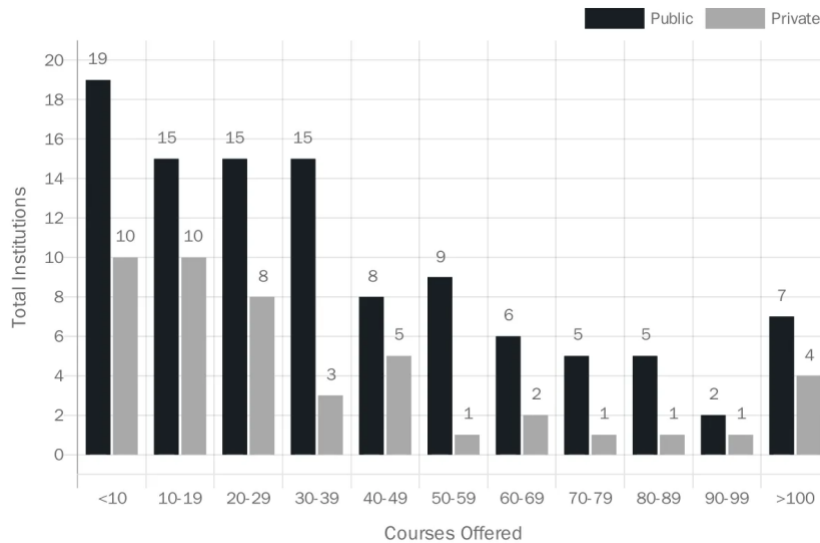
Similarly, approximately two-thirds (69.91%) of the courses examined were assigned a value of three or four credits, and approximately ten-percent (11.46%) were allotted variable value—either by explicitly stating ‘variable’ or by offering a range (e.g. 1-12). Nevertheless, one must recognize that credits/units for a course are institution-specific; as a result, while a four-credit course at one school might require the same amount of labor as a three-credit course at another, some colleges and universities here differentiated these within their departments, whereby the former might require additional work or additional contact or lab hours. Thus, while this may be interesting from a descriptive perspective, it cannot be employed as a meaningful metric to differentiate the courses from one another. For the same reason, the course number assigned also presents analytical limitations: Even if one assumes a distinction between undergraduate and graduate courses around 499/4999, this is complicated by the fact that more than a non-significant number of institutions included in the present study utilize single (e.g. *LIN6*) or punctuated numbers (*LING2367.02*).

As illustrated in Figure 1, a public/private distinction in terms of the total number of courses offered does seem to exist, as public institutions have more offerings at every bracket and offer, on average, a more significant number of courses ($\bar{x} = 41.97$) than their private counterparts ($\bar{x} = 35.5$). In fact, the database¹³ indicates a range from one to two courses to as many as three-hundred, though the typical upper limit seems to be thirty courses (± 10) per college or university. Indeed, forty percent (39.13%) of courses at private institutions and seventy percent (69.74%) of courses at public institutions fall within this range. Additionally, when fewer courses are offered, these tend to be introductory courses in linguistics as a science (with titles like ‘Linguistics’ or ‘Introduction to Linguistics’), courses that foreground English (with titles like ‘History of the English Language’ and ‘Old English’), and/or courses rooted in decidedly more sociologically-facing issues (with titles like ‘Language and Identity’ or ‘Urban Dialects’).

Figure 1: *Total Courses Offered by Institution Type*

¹² Unfortunately, it was not feasible for the author to examine every course in every catalog at every university under consideration in the present study, given that post-secondary institutions presented their course offerings in various formats and sometimes under hundreds of different codes. Consequently, many other language-specific or field-specific courses are likely excluded here. Nonetheless, those that are included offer the most realistic reflection of the state of the field of linguistics teaching.

¹³ Independent searches can be undertaken by readers at the following link: <https://www.troyspier.com/LCS>.



Each course was assigned at least one tag based on the title and description available. Although it would have been much easier to assign these tags computationally through the presence or absence of particular lexical items, the decision was made to code them manually without a pre-existing set of categories for two reasons. First, to begin with established codes would require one to make theoretical assumptions *a priori* about the entire field. For instance, if Givón's (1971) statement that “today's morphology is yesterday's syntax” is correct, then such an assumption would require one to categorize, untenably so, all courses in either area as morphosyntax, which would not accurately reflect courses that focus independently on one of these two. Second, some course titles overlap enough to suggest an identical purpose. For instance, several courses have variations of “English Grammar” in the title, but the descriptions clarify that some of these are general courses on the morphology and syntax of English, some are intended to teach the prescriptive rules of syntax in Standard American English to teachers-in-training, and others are actually focused language study, either for ELLs or graduate students more broadly. Similarly, other courses include “Indigenous Languages” in the title, but the descriptions differentiate the focus according to geography (e.g. the USA, North America, or the Americas in general) and academic focus (e.g. comparative/typological vs. preservation/revitalization/documentation). As outlined in Table 3, seven major curricular categories arose throughout the tagging process, and the individual subjects are ranked by frequency for the readers’ consideration.

Table 3: *Categories in Linguistics Course Offerings*

	Curricular Category	Subjects Covered	Tagged	
1	Introductory	General Linguistics	6.09%	6.09%
2	Core Branches	Syntax	5.93%	22.89%
		Phonology	4.70%	
		Phonetics	4.30%	
		Semantics	3.43%	
		Morphology	3.09%	
		Pragmatics	1.45%	
3	Core-Adjacent	Historical	5.26%	12.44%
		Psycholinguistics	2.36%	

		Comparative	1.79%	
		Cognitive Linguistics	1.11%	
		Typological	0.88%	
		Neurolinguistics	0.58%	
		Philosophy	0.42%	
		Semiotics	0.04%	
4	Sociological	Sociolinguistics	11.55%	16.51%
		Discourse/Conversation Analysis	1.87%	
		Applied Linguistics	0.82%	
		Anthropological Linguistics	0.65%	
		Translation/Interpretation	0.45%	
		Pidgins and Creoles	0.36%	
		Writing	0.33%	
		Constructed Languages	0.22%	
		Lexicography	0.16%	
		Theolinguistics	0.09%	
		Extraterrestrial	0.01%	
5	Research and Methods	Computational/Technological	4.05%	13.28%
		Language Documentation/Fieldwork	3.98%	
		General/Unspecified Methods	3.49%	
		Corpus Linguistics	0.77%	
		Experimental Linguistics	0.35%	
		Quantitative Methods	0.27%	
		Statistics	0.26%	
		Qualitative Methods	0.12%	
6	Pedagogical/Educational	Teaching English as a Second Language	6.67%	11.63%
		Language Acquisition	4.03%	
		Bilingualism/Multilingualism	0.93%	
7	Other	Topical Courses	7.01%	17.17%
		Independent Study/Research	4.22%	
		Thesis/Dissertation/Capstone	2.37%	
		Internships/Practica	1.63%	
		Focused Language Study	1.08%	
		Transfer Credits	0.72%	
		Academic Writing in Linguistics	0.12%	
			100%	

The first category (6.09%) contains any courses that initiate college- or university-level instruction in linguistics. As one might expect, these introductory courses typically follow the structuralist pattern, beginning with phonetics and ending with semantics or pragmatics. However, some also introduce topics in historical linguistics and/or contemporary sociolinguistics. The latter topics were more commonly, but not exclusively, attested at institutions with fewer curricular offerings for students, and the overwhelming emphasis across all institutions was the English language, as seen in the examples below.

- (4) “A detailed examination of language structure (phonology, morphology, and syntax) and its relation to language use (sociolinguistics).”
(*Introduction to Structural Linguistics*, LING-311, West Virginia University)
- (5) “A general introduction to the theory of language, this course will focus on language systems, with particular attention to phonology, morphology, syntax, semantics, and regional and social varieties of English. Examples of general linguistic principles will be drawn from English as well as other languages known to those who teach the course. Writing assignments, as appropriate to the discipline, are part of the course.”
(*Introduction to Linguistics*, LING-102, City Colleges of Chicago)
- (6) “A comprehensive introduction to the science of language and communication. Topics include an introduction to levels of language and language study, language variation, discourse analysis, language in context, communication process models, cross-cultural communication; language issues in social stratification, and a brief introduction to the academic study of translation and interpretation. In conjunction with the lectures, students will spend at least seven hours observing situations where interpreting occurs.”
(*Introduction to Language and Communication*, LIN-705, Gallaudet University)

Some institutions, particularly those without an extensively developed major and/or minor, included introductory courses that refer to other languages to illustrate similar concepts, especially for students pursuing a degree in the given language. These were often other Indo-European languages, in particular those from Romance (Spanish and French), Germanic (German and Yiddish), and Slavic (Russian). Nevertheless, others were also attested, including Afro-Asiatic (Arabic and Hebrew), Niger-Congo (Bantu), signed (American and Ho Chi Minh City), and those of East Asia (Korean, Japanese, Chinese).

- (7) “In the first half of this course, students will learn about the linguistic structure of modern standard Arabic and related dialects with a special focus on the phonology, morphology and syntax. Material in the second half of the course will focus primarily on social issues related to the Arabic language including discourse, dialectology and language variation, diglossia and language contact.”
(*Introduction to Arabic Linguistics*, LING-1520, University of Pittsburgh)
- (8) “Examines Russian from the perspective of linguistic analysis. How do sounds, words, and sentences pattern in Russian? How do these compare with patterns in other languages? Also considers the influence of evidence from Russian on the development of linguistic theory.”
(*Structure of Russian*, LING-562, University of North Carolina at Chapel Hill)
- (9) “This course includes an overview of basic morphology, phonology, syntax and sociolinguistics; a study of systems previously used to analyze American Sign Language; and comparison of the structure of American Sign Language to spoken languages.”
(*Linguistics of American Sign Language*, CSDS-96, California State University-Fresno)

The second category (22.89%) contains the commonly understood ‘core’ branches of linguistics, which are typically introduced only superficially in many introductory courses. For this reason, any course that specifically listed more than three of these fields was coded as introductory. However, there were natural pairings of these core areas. As such, while students could pursue a course specifically in syntax or semantics, quite a few courses unified more than one area, viz. phonetics and phonology, morphology and syntax, syntax and semantics, or semantics and pragmatics. Most of these courses did not specify a particular theoretical framework, though those that did indicated a preference for the formalist tradition, viz. through pointed reference to e.g. Optimality Theory and Minimalism.

- (10) “Introduction to the description and analysis of word formation processes and sentence structure from a cross-linguistic perspective. Instruction in basic morphemic analysis and constituent testing using data drawn from languages outside the Indo-European family. Also includes an introduction to typological analysis in the study of morpho-syntax.”

(Morphology and Syntax, LIN-341, Cleveland State University)

- (11) “An introduction to generative phonology, the theory of natural language sound systems. Includes discussion of articulatory phonetics, distinctive feature theory, the concept of a “natural class,” morphology and the nature of morphophonemics, and universal properties of the rules that relate morphophonemic and phonetic representations. Usually offered every year.”

(Phonology I, LING-110a, Brandeis University)

- (12) “This course aims to provide undergraduate students with basic understanding of the principles, concepts and tools involved in the construction of semantic analyses of natural language. It investigates the empirical linguistic issues of predicates, modifiers, reference, quantifiers, intensionality, tense, aspect, modality, propositional attitudes, presuppositions, implicatures, topic, focus, and indexicals.”

(Introduction to Linguistic Meaning, LIN-333LEC, University of Buffalo)

Very few offered functionalist or usage-based perspectives, and an even smaller number were comparative in nature. Nonetheless, as noted earlier, some provide a language-specific approach, emphasizing e.g. pronunciation (phonetics) or rules of sentence-building (syntax) in a given language. For obvious reasons, this was more common among the three languages most commonly taught across the United States both historically and presently: Spanish, French, and German.

- (13) “An introductory study of the articulation, classification, distribution, and regional variations of the sounds of the Spanish language. Taught in Spanish.”

(Spanish Pronunciation, LING-352, Iowa State University)

- (14) “Contrastive English-German segmental and suprasegmental phonemes, contrastive English-German linguistic structures, selected topics in advanced German grammar and syntactic analysis.”

(Structure of the German Language, LING-435, University of Tennessee-Knoxville)

- (15) “The syntax of modern French through readings in descriptive analysis and examples of literary texts to see how word order contributes to meaning. Particular emphasis on levels of style and reflections of social class. Frequent compositions required. Given in French.”

(French Syntax and Meaning, LING-4800, University of Georgia)

The third category (12.44%) contains fields in linguistics that are directly connected to the ‘core’ branches but only sometimes covered in-depth in introductory courses. Similarly, these fields often tacitly require prerequisite knowledge found only in those ‘core’ branches. For instance, any discussion of historical linguistics, whether broadly construed or focused on a particular language, will necessitate at least some level of familiarity with linguistic analysis at different levels. Both comparative and typological linguistics are similar in this regard.

- (16) “This course focuses on the principles and methods of historical linguistics. Students will learn how languages change on all levels (phonetic, phonological, morphological, syntactic, semantic, and lexical), and will learn to apply the principles of language change to the reconstruction of vanished protolanguages and their associated cultures.”

(Historical Linguistics, LING-27, Dartmouth College)

- (17) “How are languages the same and how are they different? Which characteristics are universal to all languages and which ones are rare? In this course, students will learn to evaluate what is unusual and what is expected

in a language. We will determine the range of possible sound inventories, word order patterns, grammatical categories, and lexical categories found within the world's languages."
(Linguistic Typology, LIN-228, Grinnell College)

- (18) "This course is an introduction to the study of how language is represented in the human mind and what processes are involved in language use, including producing, comprehending, and storing both spoken and written language. Together, we will explore questions such as the following: How do humans store and recognize words? How do we analyze speech? What processes are involved when we speak and read? We will study spontaneously-occurring speech errors and misperceptions and carry out experimental investigations on language production and comprehension. This course is open to students from all academic majors."
(Psycholinguistics, LIN-318, Saint Joseph's University)

The most extensive listings in this category are those in historical linguistics, which generally focus on development and change in a particular language, family, or stock. The examples below indicate that these are often coupled with a comparative or typological focus.

- (19) "An introduction to the phonology, morphology, and syntax of Proto-Indo-European and the chief historical developments of the daughter languages."
(Introduction to Indo-European Linguistics, LING-2261, Cornell University)
- (20) "An introduction to Old Church Slavic, the earliest written Slavic language. The grammar of Old Church Slavic, reading and translation of texts, and the prehistory of the Slavic language family."
(Old Church Slavic, LING-4905, University of Georgia)
- (21) "This course explores the history of sign language in the Western world, and the marginalization of the American Deaf community. Emphasis is placed upon the presences of sign language in Deaf education, and the socio- linguistic culture of Deaf communities. No prior knowledge of sign language required."
(History of Sign Language, LING-375, Southern Illinois University-Carbondale)

Additionally, other courses in this category add a more sociologically-informed dimension, such as the unrelated languages spoken by adherents of Judaism in (22), or even present an overview of the historical development of the field as in (23) and (24). Although not reproduced here, one institution also offered an interdisciplinary course on the research and positions of Noam Chomsky, at least some of which must focus on linguistics, given its coding as a linguistics course.

- (22) "A course dealing with the history and structure of Judaic languages such as Hebrew, Yiddish, Judeo-Arabic, and Ladino."
(History of Judaic Languages, LING-326, Emory University)
- (23) "Surveys the recent history of the field of linguistics and familiarizes students with the key figures and theories in recent linguistic history, with special attention to the development and emergence of generative theories of syntax, semantics, and phonology."
(History of Linguistics, LING-4370, University of Texas-Arlington)
- (24) "This course covers the history of linguistics from ancient times up until the present, concentrating on 20th century. Major themes include: the controversy over the status of linguistics as a science; the recurrent conflict between theoretical and applied linguistics; the relation of trends in linguistics to general contemporaneous intellectual trends; and the relative importance of social factors in determining the acceptance of particular linguists' ideas. Specific theoretical issues will also be considered, such as: the nature and significance of the phoneme; the degree to which syntax is independent of semantics and pragmatics;

realist vs. nominalist views of linguistic description; and formalist vs. functionalist disagreements over the autonomy of language.”

(History of Linguistics, LING-50.05, Dartmouth College)

The fourth category (16.51%) contains sociologically-focused courses, including those that focus on sociolinguistics broadly. As indicated previously in Table 2 and exemplified in Table 3, the most frequently occurring lemma in titles and descriptions is "language." Unsurprisingly, many of these courses fall under the umbrella of sociolinguistics due to the collocations attested, as the following examples indicate.

- (25) “There is a complex relationship between language and society. This course examines how language variation is tied to identity and the role of language in human social interaction. We will consider language as it relates to social status, age, gender, ethnicity, and location as well as theoretical models used to study variation. We will also examine how language is used in conversation, in the media, and beyond using ethnography of communication and discourse analysis. You will become more aware of how language is used in your own daily life and will be able to argue sociolinguistic perspectives on language attitudes.”

(Introduction to Sociolinguistics, LING-135, Carleton College)

- (26) “Investigates the various ways that language and gender interact and intersect in society. Examines such questions as: Does society use language to favor one sex over the other? Why is language a crucial component in formulating constructs of masculinity and femininity? What stereotypes of gender-based language are promoted in our society? How can we analyze language to reveal disparate views and treatment of the sexes?”

(Language, Gender, and Society, ENGL-336, Indiana University of Pennsylvania)

- (27) “The course explores the interface between language and our legal system. Students study the legal language up to the present day. Topics to be covered include, among others, the impact of (il)literacy on the law, the linguistic ramifications of governing bilingual societies, the functions of written laws and legal language, and the social psychological impact of language use in modern-day litigation.”

(Language of the Law, LNGN-290, Montclair State University)

Others foreground discourse/conversation analysis, applied and anthropological linguistics, translation and interpretation, pidgins and creoles, writing and lexicography, and constructed languages. A few courses focus on theolinguistics, admittedly at religiously-focused institutions, and one course highlights the possibility of engaging in extraterrestrial communication.

- (28) “Theories of discourse structure. Text and context. Frameworks for analyzing written and spoken discourses such as genre analysis, conversation analysis, critical discourse analysis, discourse and grammar, speech act theory, and corpus linguistics. Applications of discourse analysis such as cross-cultural misunderstanding.”

(Discourse Analysis, LING-526, San Diego State University)

- (29) “A survey of the origins and diversity of pidgins and creoles around the world, an examination of characteristics of groups of creoles, and discussion of contributions to sociolinguistics and human language in general.”

(Pidgins and Creoles, LIN-545, University of Mississippi)

- (30) “An introduction to the principles and problems of cross-language and cross-cultural communication with special emphasis on translating the Bible into indigenous languages.”

(Introduction to Bible Translation, ISAL-535, Biola University)

- (31) “If representatives from an alien species appeared on earth from outer space, how would we communicate with them? What if they were not organic creatures, but were instead machines? What would an alien species sound like? What kinds of changes will happen to languages over the next several centuries? Science fiction

tropes like aliens, robots, and time travel richly reward linguistic investigation. In this class, we will apply current linguistic theory to various works of science fiction, asking first and foremost: “How linguistically plausible are the scenarios, tropes, and narratives depicted here?”

(Language in Science Fiction, LING-1095, University of Pittsburgh)

The fifth category (13.28%) contains courses in computational linguistics, language documentation/description and fieldwork, corpus linguistics, and research methods. Offerings in computational linguistics foreground machine learning, text extraction and manipulation, corpus creation, the history of the relationship between language and computers, machine translation, data visualization, and applications to each of the 'core' fields of linguistics. In particular, emphasis is placed upon writing regular expressions and using R and Python to analyze natural languages.

- (32) “Introduction to the principles, history, and accomplishments of natural language processing from the perspective of the structure of human language. Overview of the techniques used by natural language processing to deal with the phonetics, phonology, morphology, syntax, and semantics of natural languages. Interaction between ideas in the philosophy of language and developments growing out of natural language processing. Applications of natural language processing to a wide range of real-world contexts.”

(Introduction to Natural Language Processing, LING-3023, Brooklyn College)

- (33) “This course covers the basics of Python programming, with a strong practical component focusing on problems of relevance to linguistics. Students will learn about best practices, common data types and operations, control structures, debugging, and some advanced topics like error handling and objects. No prior programming knowledge is required.”

(Programming for Linguistics, LIN-3XXX, Florida State University)

- (34) “The aim of this course is to learn how to analyze linguistic phenomena based on data extracted from large databases. Students will learn the distinction between corpus methods and the traditional, intuition-based approaches. After reviewing key linguistic concepts learned in the prerequisite linguistics course, students will learn several statistical tests widely used in linguistics and how those tests are applied to the data extracted from large corpora. Students will also acquire basic computer programming skills in Python and R to clean up and manipulate the data structure for the purpose of linguistic exploration. Students will be able to evaluate competing hypotheses using the results of their empirical investigations.”

(Corpus Linguistics, LING-4104, University of Minnesota-Duluth)

On the other hand, courses that focus on language documentation/description often, but not always, require direct contact with a linguist consultant who speaks the language to be recorded and analyzed during the semester. Courses in research methods are heavily skewed toward quantitative approaches, though qualitative perspectives were attested, albeit typically with reference to more pedagogically-oriented courses.

- (35) “Work with a native speaker of a foreign language. Gathering and collation of data. Evaluation of possible phonemic and grammatical analyses.”

(Field Methods, LINGUIS-490, University of Wisconsin-Milwaukee)

- (36) “An introduction to field methods in linguistics for language documentation and description. Students engage in linguistic fieldwork with a speaker of a particular language and undertake original research with the resulting language data. Offered by English. May not be repeated for credit.”

(Linguistic Field Methods, LING-673, George Mason University)

- (37) “Language loss is accelerating at alarming rates. In fact, Linguists predict that only five percent of the six thousand languages currently spoken in the world are expected to survive into the 22nd century. In this course, we will examine the historical, political, and socio-economic factors behind the endangerment and/or

marginalization of languages in Africa, Asia, Australia, Europe, and North and South America. We will also concentrate on the globalization of English (and other major languages), which plays a primary role in language endangerment and marginalization. Additional topics include: linguistic diversity, language policy, multilingualism (in both nations and individuals), global language conflict, and language revitalization. Students will have the opportunity to learn first-hand about these issues by interviewing speakers of an endangered and/or minority language.”

(Endangered/Minority Languages, LING-206, Macalester College)

- (38) “Introduction to statistical methods used in linguistics research. Focuses on understanding reports of statistical results and applying statistical methods to data sets.”

(Introduction to Statistics for Linguists, LING-520, University of Washington)

- (39) “Provides an introduction to a range of quantitative and qualitative research methods widely applicable in linguistic research and to the different steps involved in scientific investigation and academic writing. Students will learn techniques for using library resources, formulating research questions, writing a literature review, collecting and analyzing data, preparing and writing a research proposal for a language study.”

(Scientific Methods, LING-4060, University of North Texas)

The sixth category (11.63%) contains courses that are decidedly pedagogical in nature. Most of these courses focus on issues related to the teaching of English as a second language (TESOL), emphasizing instructional strategies, evaluation, and assessment. Additionally, a significant number foreground language acquisition, though there is a skewed distribution in favor of L2 acquisition instead of L1 acquisition. As a result of these two topics, various courses also focus on issues related to monolingualism, bilingualism, and multilingualism.

- (40) “Covers the development of language in childhood and into adult life, emphasizing the role of environment and biological endowment in learning to communicate with words, sentences, and narratives.”

(Language Development, LING-4560, University of Colorado-Boulder)

- (41) “Historical overview of trends in language teaching technology, ranging from communicative approaches to techniques for teaching listening, speaking, reading and writing. Trains students to instruct small groups and individuals in English language skills.”

(Introduction to Teaching English as a Second Language, TSL-3360, University of Florida)

- (42) “The linguistic, cognitive, cultural, and social dimensions of individual and societal bilingualism, which dispel common myths about the way bilinguals develop and use their two or more languages.”

(Introduction to Bilingualism, LING-297, University of Oregon)

The seventh category (17.17%) contains any other courses that do not fit cohesively under a single theme. This includes topical courses; independent study/research; final theses, dissertations, and capstone projects; internships and practica, which are generally pedagogical in nature; focused study on less commonly taught languages; credits transferred from other domestic and international institutions; and those that offer direct instruction in academic writing for the field. Because such courses often did not include a description that differed markedly from the title, examples only of the latter, arguably one of the most practical for students in the field, are reproduced below.

- (43) “Academic writing for publication in scholarly journals in linguistics. Individualized meetings and/or small-group workshop format.”

(Writing in Linguistics, LING-592, University of California-Santa Barbara)

- (44) “Majors in linguistics refine their skills in writing for the discipline by critiquing successive revisions of previously written work.”
(*Writing in Linguistics*, LIN-405, Stony Brook University)
- (45) “The practice of advanced professional writing skills, including the writing of grants. Students bring their own academic material to the workshop.”
(*Advanced Skills for Language Science*, LSCI-202D, University of California-Irvine)

5.0 Conclusion

The field of linguistics, which has been and is increasingly interdisciplinary, has existed—at least in spirit—for a very long time due to the natural interest humans have in the usage of such a tool for communicative purposes. However, academic scholarship has historically neglected the critical role of pedagogy in the teaching of this subject. Despite a recently renewed interest through a special section of *Language and Pedagogical Linguistics*, a journal dedicated to this subject, the last comprehensive examination of linguistics education occurred forty years ago. To this end, the present study has resulted in the development of a corpus of over six-thousand (N=6,081) courses in linguistics offered at over one-hundred (N=152) colleges and universities in the United States, resulting both in a qualitatively- and quantitatively-derived taxonomy of such courses and the creation of a searchable database for educators.

Although the author of this paper does not consider himself important enough to provide directives for the future of linguistics education, there are some subfields that might merit greater attention moving forward. For instance, very few courses in the database foreground academic writing skills within linguistics. Because of greater interest in making science accessible to experts and lay-people alike, this is certainly a skill that would provide a valuable benefit to the field more broadly. Similarly, although Hudson (2020, following Hudson 2004) notes the important, bidirectional relationship between linguistics and education, he falls short of explicitly acknowledging the importance of pedagogical principles and practice to and in the teaching of linguistics. Consequently, as necessary as it may be to consider the educational implications of research for college curricula, that very research remains inaccessible and even impractical for students without recourse to the full range of pedagogical tools at the disposal of educators. Furthermore, if colleges and universities concern themselves with the employability of their future graduates, then expansion of the more career-focused subjects might be worthwhile, such as translation/interpretation, intensive foreign language instruction¹⁴, pedagogical linguistics, and all areas directly addressing the expansive computational dimension of the twenty-first century. Finally, pragmatics remains underrepresented at the post-secondary level, mirroring introductory linguistics courses, and could also be developed more fully at institutions currently offering curriculum in the field of linguistics.

Nevertheless, the present study, despite offering extensive coverage of linguistics education at the post-secondary level, is not quite as exhaustive as it may seem at first glance. For this reason, there are at least a few areas where continued research is necessary. First, only colleges and universities in the United States are considered here. Exciting attempts at diversifying and reinvigorating education are not restricted to a single country, and much could be learned through

¹⁴ Of course, this is easier said than done, as the Modern Language Association (MLA) has noted repeatedly in their annual reports (see e.g. Lusin et al. 2023) that enrollment in foreign languages dropped by almost seventeen percent between 2016 and 2021. Because this rate was greater than the decline in overall college students, this indicates that incoming college students are also enrolling less frequently in such courses with only three exceptions: American Sign Language, Biblical Hebrew, and Korean.

a similar examination of curriculum in other countries—or, more specifically, through consideration of institutional materials like syllabi to identify which types of assignments are typically required or employed in such courses. Second, any institution not identified through the two points of entry outlined in Section 2.0 was not included in this conversation, which omits any institutions with recently developed programs or limited coursework in linguistics that would further serve to characterize this taxonomy. Third, the tagging process utilized in categorizing courses is, admittedly, not one that can be undertaken in a purely objective manner. For example, to code them automatically would necessarily exclude courses whose titles and/or descriptions do not utilize a particular set of vocabulary, regardless of the actual content studied throughout instruction. For example, a course entitled “English Linguistics” that only focuses on morphology and syntax is, in fact, not necessarily an introduction *to* linguistics but, rather, an introduction to morphology and syntax *in* English. Finally, attempts were made to standardize the descriptions through the removal of repetitive information and prerequisites or corequisites, as including the former would have skewed the quantitative results, and including the latter would require one to be familiar with all the institution-specific course codes to make sense of the academic trajectory for students. Despite these avenues for expansion, it is hoped that those holding teaching positions within linguistics are now better equipped to speak confidently about and make modifications to their own institutional curriculum. Consequently, the present study is a continuation—and not the end—of important conversations concerning linguistics instruction.

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Appendix 1

Table 1.1: Institution-Specific Details (Sorted Alphabetically)

Institution Name	States	Years	Administration	Type	Size	Courses
Ashford University	CA	4	Private	City	Large	11
Augusta University	GA	4	Public	City	Midsize	10
Ball State University	IN	4	Public	City	Small	33
Bard College at Simon's Rock	MA	4	Private	Town	Distant	10
Baylor University	TX	4	Private	City	Midsize	22
Benedictine University	IL	4	Private	Suburb	Large	29
Bethel University	MN	4	Private	Suburb	Large	2
Biola University	CA	4	Private	Suburb	Large	66
Boise State University	ID	4	Public	City	Midsize	27
Brandeis University	MA	4	Private	City	Small	48
Brooklyn College (CUNY)	PA	4	Private	Town	Distant	14
Bucknell University	CA	4	Public	City	Midsize	26
California State University, Chico	CA	4	Public	City	Large	7
California State University, Fresno	CA	4	Public	Suburb	Large	52
California State University, Fullerton	CA	4	Public	City	Large	29
California State University, Long Beach	MI	4	Private	City	Midsize	55
Calvin University	MN	4	Private	Town	Distant	5
Carleton College	TN	4	Private	Suburb	Small	24
Carson-Newman University	OH	4	Private	Town	Fringe	1
Cedarville University	IL	2	Public	City	Large	14
City Colleges of Chicago	OH	4	Public	City	Large	3
Cleveland State University	NY	4	Private	City	Small	18
Cornell University	MI	4	Private	City	Midsize	101
Cornerstone University	NY	4	Public	City	Large	37
Dartmouth College	NH	4	Private	Town	Remote	48
Earlham College	IN	4	Private	Town	Distant	5
Eastern Michigan University	MI	4	Public	Suburb	Large	29
Emory University	GA	4	Private	City	Large	83
Florida International University	FL	4	Public	Suburb	Large	57
Florida State University	FL	4	Public	City	Midsize	19
Furman University	SC	4	Private	Suburb	Large	12
Gallaudet University	DC	4	Private	City	Large	67
George Mason University	VA	4	Public	Suburb	Large	54
Georgia Institute of Technology	GA	4	Public	City	Large	25
Georgia State University	GA	4	Public	City	Large	18
Gordon College	MA	4	Private	Suburb	Large	10
Governors State University	IL	4	Public	Rural	Fringe	4
Grand Valley State University	MI	4	Public	Suburb	Large	19
Great Northern University	WA	4	Private	City	Midsize	17
Grinnell College	IA	4	Private	Town	Remote	14
Hofstra University	NY	4	Private	Suburb	Large	22
Indiana University of Pennsylvania	PA	4	Public	Town	Distant	5
Iowa State University	IA	4	Public	City	Small	63
Ivy Tech Community College	IN	2	Public	City	Large	2
Johnson University	TN	4	Private	Rural	Fringe	15
Kutztown University	PA	4	Public	Town	Fringe	3
Lakeland Community College	OH	2	Public	Suburb	Large	1
Lawrence University	WI	4	Private	City	Small	45
Long Beach City College	CA	2	Public	City	Large	5

Macalester College	MN	4	Private	City	Large	47
Metropolitan State University	MN	4	Public	City	Large	12
Metropolitan State University of Denver	CO	4	Public	City	Large	23
Miami University	OH	4	Public	Town	Fringe	12
Mid-America Christian College	OK	4	Private	City	Large	3
Mid-Atlantic Christian University	NC	4	Private	Town	Distant	9
Missouri Southern State University	MO	4	Public	City	Small	3
Missouri State University	MO	4	Public	City	Midsize	13
Montclair State University	NJ	4	Public	Suburb	Large	40
Monterey Peninsula College	CA	2	Public	Suburb	Midsize	10
Northeastern Illinois University	IL	4	Public	City	Large	73
Northeastern University	MA	4	Private	City	Large	32
Northwestern University	IL	4	Private	City	Small	70
Oakland University	MI	4	Public	Suburb	Large	36
Ohio State University	OH	4	Public	City	Large	71
Pasadena City College	CA	2	Public	City	Midsize	8
Pennsylvania State University	PA	4	Public	City	Small	29
Pitzer College	CA	4	Private	Suburb	Large	8
Plymouth State University	NH	4	Public	Town	Remote	1
Pomona College	CA	4	Private	Suburb	Large	34
Purdue University	IN	4	Public	City	Large	34
Purdue University, Fort Wayne	IN	4	Public	City	Small	25
Reed College	OR	4	Private	City	Large	22
Rutgers University	NJ	4	Public	City	Small	53
Saint Joseph's University	PA	4	Private	City	Large	37
Salisbury University	MD	4	Public	Suburb	Small	40
San Diego State University	CA	4	Public	City	Large	68
San Jose State University	CA	4	Public	City	Large	38
Santa Monica College	CA	4	Public	City	Small	2
Scripps College	CA	4	Private	Suburb	Large	5
Seattle Pacific University	WA	4	Private	City	Large	19
Southern Illinois University, Carbondale	IL	4	Public	City	Small	48
Stanford University	CA	4	Private	Suburb	Large	131
State University of New York, Albany	NY	4	Public	City	Small	19
State University of New York, Oswego	NY	4	Public	Town	Distant	9
Stetson University	FL	4	Private	City	Small	6
Stony Brook University	NY	4	Public	Suburb	Large	55
Swarthmore College	NY	4	Public	City	Small	62
Syracuse University	PA	4	Private	Suburb	Large	28
Texas Tech University	NY	4	Private	City	Midsize	22
The College of William & Mary	TX	4	Public	City	Large	37
Truman State University	MO	4	Public	Town	Remote	25
Tulane University	LA	4	Private	City	Large	99
Union University	TN	4	Private	City	Small	9
University of Alaska, Anchorage	NY	4	Public	Suburb	Large	3
University of Alaska, Fairbanks	AK	4	Public	City	Large	53
University of Buffalo	AK	4	Public	Suburb	Small	47
University of California, Davis	CA	4	Public	Suburb	Small	75
University of California, Irvine	CA	4	Public	City	Large	87
University of California, San Diego	CA	4	Public	City	Large	108
University of California, Santa Barbara	CA	4	Public	Suburb	Midsize	306
University of California, Santa Cruz	CA	4	Public	City	Small	105
University of Central Arkansas	AR	4	Public	City	Small	18
University of Chicago	IL	4	Private	City	Large	46

University of Colorado Boulder	CO	4	Public	City	Midsize	84
University of Connecticut	CT	4	Public	Suburb	Large	27
University of Delaware	DE	4	Public	Suburb	Large	38
University of Florida	FL	4	Public	City	Midsize	73
University of Georgia	GA	4	Public	City	Midsize	192
University of Hawaii, Hilo	HI	4	Public	Town	Remote	27
University of Hawaii, Manoa	HI	4	Public	City	Large	61
University of Illinois, Chicago	IL	4	Public	City	Large	39
University of Illinois, Urbana-Champaign	IL	4	Public	City	Small	82
University of Iowa	IA	4	Public	City	Small	66
University of Michigan, Dearborn	MI	4	Public	City	Midsize	21
University of Michigan, Flint	MI	4	Public	City	Small	19
University of Minnesota, Duluth	MN	4	Public	City	Small	21
University of Minnesota, Twin Cities	MN	4	Public	City	Large	47
University of Mississippi	MS	4	Public	Town	Remote	87
University of Missouri	MO	4	Public	City	Midsize	58
University of Montana	MT	4	Public	City	Small	36
University of Nevada, Las Vegas	NV	4	Public	City	Midsize	9
University of New Hampshire	NH	4	Public	Suburb	Small	13
University of New Mexico	NM	4	Public	City	Large	63
University of North Carolina at Chapel Hill	NC	4	Public	City	Small	98
University of North Dakota	ND	4	Public	City	Small	9
University of North Texas	TX	4	Public	City	Midsize	35
University of Oklahoma	OK	4	Public	Suburb	Midsize	35
University of Oregon	OR	4	Public	City	Midsize	72
University of Pennsylvania	PA	4	Private	City	Large	102
University of Pittsburgh	PA	4	Public	City	Large	48
University of South Carolina	SC	4	Public	City	Midsize	51
University of South Florida	FL	4	Public	City	Large	14
University of Southern California	CA	4	Private	City	Large	100
University of Southern Maine	ME	4	Public	City	Small	43
University of Tennessee, Knoxville	TN	4	Public	City	Midsize	22
University of Texas, Arlington	TX	4	Public	City	Large	120
University of Texas, Austin	TX	4	Public	City	Large	96
University of Texas, El Paso	TX	4	Public	City	Large	40
University of Texas, San Antonio	TX	4	Public	City	Large	8
University of Utah	UT	4	Public	City	Midsize	82
University of Vermont	VT	4	Public	City	Small	33
University of Virginia	VA	4	Public	Suburb	Small	54
University of Washington	WA	4	Public	City	Large	119
University of Wisconsin-Madison	WI	4	Public	City	Large	34
University of Wisconsin-Milwaukee	WI	4	Public	City	Large	107
Utah Valley University	UT	4	Public	City	Small	3
West Chester University	PA	4	Public	Suburb	Large	14
West Virginia University	WV	4	Public	City	Small	8
Western Washington University	WA	4	Public	City	Small	30
Wichita State University	KS	4	Public	City	Large	30
Yale University	CT	4	Private	City	Midsize	29
Youngstown State University	OH	4	Public	City	Small	21

Appendix 2

Table 2.1: Overview of Post-Secondary Institutions Included in the Present Study

	States		Institutions		Students	
<i>New England</i>	5	11.36%	11	7.24%	125,539	3.92%
<i>Mideast</i>	6	13.64%	23	15.13%	434,780	13.58%
<i>Great Lakes</i>	5	11.36%	30	19.74%	620,862	19.39%
<i>Plains</i>	5	11.36%	15	9.87%	232,482	7.26%
<i>Southeast</i>	10	22.73%	24	15.79%	601,016	18.77%
<i>Southwest</i>	3	6.82%	10	6.58%	313,160	9.78%
<i>Rocky Mountain</i>	4	9.09%	6	3.95%	170,483	5.33%
<i>Far West</i>	6	13.64%	33	21.71%	702,958	21.96%
Totals	44	≈100%	152	≈100%	3,201,280	≈100%

Table 2.2: Post-Secondary Institutions Organized by Region, Locale, and Administration

	City		Suburb		Town		Rural	
	<i>Public</i>	<i>Private</i>	<i>Public</i>	<i>Private</i>	<i>Public</i>	<i>Private</i>	<i>Public</i>	<i>Private</i>
<i>New England</i>	2	3	2	1	1	2	—	—
<i>Mideast</i>	6	5	6	2	3	1	—	—
<i>Great Lakes</i>	16	5	4	1	1	2	1	—
<i>Plains</i>	10	1	—	1	1	2	—	—
<i>Southeast</i>	12	4	3	2	1	1	—	1
<i>Southwest</i>	7	2	1	—	—	—	—	—
<i>Rocky Mountain</i>	6	—	—	—	—	—	—	—
<i>Far West</i>	17	5	5	5	1	—	—	—
Totals	76	25	21	12	8	8	1	1
	101		33		16		2	
	66.45%		21.71%		10.53%		1.32%	

Table 2.3: Post-Secondary Institutions Organized by Region and Size

	<i>Small</i>	<i>Mid-Size</i>	<i>Large</i>	<i>Distant</i>	<i>Remote</i>	<i>Fringe</i>
<i>New England</i>	4	1	3	1	2	—
<i>Mideast</i>	6	1	12	3	0	1
<i>Great Lakes</i>	8	3	15	1	—	3
<i>Plains</i>	5	2	5	1	2	—
<i>Southeast</i>	7	6	8	1	1	1
<i>Southwest</i>	—	3	7	—	—	—
<i>Rocky Mountain</i>	2	3	1	—	—	—
<i>Far West</i>	5	7	20	—	1	0
Totals	37	26	71	7	6	5
	24.32%	17.11%	46.71%	4.61%	3.95%	3.29%

The Effects of Genitive Subject in L2 Processing of Japanese Object Relative

Clause by L1 Chinese Learners

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Introduction

Previous studies have shown that L1 speakers of Japanese rely on the case markers for thematic role assignments (Miyamoto, 2002) and use both lexical semantics of an NP and its case markers to predict upcoming arguments before verbs (Kamide, Altmann & Haywood, 2003). However, the effects of case-marker cues for predictive processing might be unreliable when it comes to the case alternation.

Under the generative grammar framework, one of the most prominent case alternations in Japanese first noted and analyzed by Harada (1971) is called Nominative/Genitive Alternation (NGA) or *ga/no* conversion, which is a well-studied syntactic phenomenon about the ambiguous case-marking in Japanese. The syntactic aspect of *ga/no* conversion has been examined in almost every proposed grammatical paradigm (Harada, 1971; Shibatani, 1975; Harada, 1976; Inoue, 1976; Nakai, 1980; Miyagawa, 1993; Ura, 1993; Watanabe, 1996; Ochi, 2001; Hiraiwa, 2005; Maki and Uchibori, 2008). Most of the literature deals with the issue where the genitive *no* is

acceptable, especially about the syntactic differences between D-licensing hypothesis (Miyagawa, 1993, 2008; Ochi, 2001) and C-linking hypothesis (Watanabe, 1996; Hiraiwa, 2005). D-licensing hypothesis specifies that the genitive subject should occur with a nominal head such as head noun in relative clauses in (1) and with D to be licensed (Nambu, 2010), while C-linking hypothesis argues that *ga/no* conversion is allowed even no external D is involved (Hiraiwa, 2005). For example, the genitive subject occurs without a nominal head, such as *made* clauses as in (2).

- (1) [kinoo Naomi-ga/no tabeta] soba
 yesterday Naomi-nom/gen ate noodle
 ‘the noodle that Naomi ate’

(Nambu, 2010, (3))

- (2) John-wa [ame-ga/no yamu made] ofisu-ni ita.
 John-top rain-nom/gen stop until office-at was
 ‘John was at his office until the rain stopped.’

(Hiraiwa, 2005, (5))

Miyagawa (2011) argues that *made* clauses have a phonetically null head to support the D-licensing hypothesis. In this sense, the current study uses the D-licensing hypothesis to deal with *ga/no* conversion in Japanese relative clauses syntactically. However, Nambu & Matsuda (2007) suggest in their corpus study that

younger linguists may well prefer *ga* to *no* in certain syntactic positions than older linguists, but the issue has never been addressed in the field of Japanese syntax. Furthermore, Nambu (2016) did a quantitative analysis using the Corpus of Spontaneous Japanese (CSJ) and counted the frequencies of the nominative *ga* and the genitive *no* in relevant environments, and then conducted a logistic regression analysis to verify whether there exists an ongoing change in NGA, excluding effects of other language external/internal factors.

The results suggest that the occurrence of NGA most often occurs in adnominal clauses, such as relative clause in stative/nominal environments, and provide evidence that more formal speech shows a higher frequency of the genitive *no*. In general, the genitive *no* is less frequent in Nominative/Genitive Alternation. Therefore, how Japanese speakers perceived and comprehended the *ga/no* conversion needs to be further studied, especially in terms of sentence processing.

Currently, only Horii (1990) has one dedicated study of sentence processing on *ga/no* conversion by L1 Japanese speakers. Horii (1990) uses the *Minimal Attachment Hypothesis* to predict the reading time between *ga*-typed sentences and *no*-typed sentences, which will be further discussed in the next section. On the other hand, there were also very few L2 processing studies on *ga/no* conversion. Kahraman (2012) did the processing research from L1 Turkish L2 Japanese learners since Turkish and Japanese have similar nominative to genitive conversion phenomenon (also mentioned

in Miyagawa, 2011), and both languages are SOV and head-final languages. The results from Kahraman (2012) showed some L1 transfer effects, however, they're hard to distinguish if Turkish speaking learners learned how to process Japanese sentences independent of their L1. L2 sentence processing with a language syntactically different from Japanese should be interesting to see the L2 learner's processing patterns. Therefore, Mandarin Chinese is included in this study.

Mandarin Chinese (henceforth Chinese) does not have overt case marker system, but Chinese relative clause (RC) construction is also prenominal like Japanese. Although Japanese RC does not have a relative marker or a complementizer like *that* in English RC, the only syntactic/morphological indication is the verbal tense conjugation, such as *ta* in *tabeta* 'ate' from (3), repeated from (1), which lines the boundary between relative clause and head noun *soba* 'noodle'. On the other hand, Chinese RC has a relative marker *de*, which often lines the boundary between relative clause and head noun as a complementizer (Cheng, 1986), such as in (4).

- (3) [kinoo Naomi-ga/no tabeta] soba
 yesterday Naomi-nom/gen ate noodle
 'the noodle that Naomi ate'

(Nambu, 2010, (3))

(4) mai le zuotian Naomi chi de mian

Buy ASP yesterday Naomi ate DE noodle

‘(I) bought the noodle Naomi ate yesterday.’

As shown in (4), Chinese is also a pro-drop language like Japanese, without the topic pronoun (“I”) in this case. *zuotian Naomi chi de* ‘Naomi ate yesterday’ is a relative clause with *de* as a relative marker or a complementizer argued by Cheng (1986). However, *de* is very versatile, which can function as a genitive marker as well. For example, in *Naomi de mian* ‘Naomi’s noodle’ *de* is a genitive marker, like Japanese *no* in *Naomi no soba* ‘Naomi’s noodle’.

Even though Chinese is a SVO language, it is head-final and has prenominal relative clause and NP modification as Japanese. *De* in Chinese and *no* in Japanese both occur as the prenominal modification markers. In Japanese, *no* is a genitive marker, while in Chinese, *de* is a genitive marker and a relative marker. Therefore, how L1 Chinese L2 Japanese learners process *ga/no* conversion in the Japanese relative clause is interesting because nominative case maker is not in the Chinese relative clause, but *de* is required in the Chinese relative clause, so the question needs to be addressed whether *no*, as the superficial interlanguage equivalent to *de* can affect the response time of Japanese relative clause from L1 Chinese learners.

L1 Processing of ga/no conversion

(5) a. Kinoo otooto-ga kaita hon-o yonda.

yesterday brother-NOM wrote book-ACC read

‘I read the book which Brother wrote yesterday.’

b. Kinoo otooto-no kaita hon-o yonda.

yesterday brother-GEN wrote book-ACC read

‘I read the book which Brother wrote yesterday.’

(Horii, 1990, (11))

In his L1 processing study of ga/no conversion, Horii (1990) argued in (5a), the initial portion, *Kinoo otooto-ga kaita* is ambiguous; it can either be (i) a main clause with an empty object, or (ii) a relative clause. In (5b), *otooto-no* is ambiguous; it can be interpreted as either (i) as the possessive reading, or (ii) the nominative reading, which makes N-no the subject of a relative clause. Horii (1990) also argued that *Minimal Attachment Hypothesis* predicts that the reading time for *kaita* should be longer in (5b) than in its counterpart (5a) which does not require restructuring at *kaita*.

Minimal Attachment Hypothesis is one of the famous serial parsing models proposed by Frazier & Rayner (1982). It was defined as “attach incoming material into the phrase-marker being constructed using the fewest nodes consistent with the well-

formedness rules of the language”. Moreover, *Locality-based Parsing Principle* proposed by Gibson et al. (1996) argued similarly that the ambiguous modifiers are integrated into the current parse in accordance with the locality principle of *recency* effect (attach new incoming material to the most recently processed phrase). In addition to the *Locality-based Parsing Principles*, modifier ambiguity resolution is also known to be influenced by lexical-semantic information, especially during L2 processing. Some L2 processing studies show evidence for the use of verb-based lexical information. Juffs (1998) found that advanced L2 learners depend on the argument structure information during the processing. Similarly, Frenck-Mestre and Pynte (1997) found the verb subcategorization information has influences on L2 ambiguity resolution. Therefore, the syntactic and lexical factors will both be addressed in the current processing study.

According to Horii (1990), *Minimal Attachment Hypothesis* makes the following predictions for the processing of *ga/no* conversion: First, the reading time for the relative clause verb should take longer in *no* type sentences than the corresponding *ga* type sentence, because *no* sets up an NP structure not an S structure, and the verb is not expected. Second, the reading time for the head noun should take longer in *ga* type sentence than the equivalent phrase in *no* type sentences. In *no* type sentences, it is already predictable that these must be relative clauses, while in the *ga* sentences, the relative clause is signaled by the head noun.

From the foregoing evidence in the previous literature, the ambiguous syntactic phenomenon of *ga/no* conversion in Japanese relative clause (RC) is an excellent candidate to test the sentence processing hypothesis of ambiguity in both L1 speakers and L2 learners and investigate whether there is a facilitatory effect of genitive RC subject in Japanese object RC to predict head NP in L2 processing. Thus, the research questions answered in current study are as follows:

- (i) whether the genitive RC subject in Japanese object RC can expedite the L2 processing of Japanese object RC with genitive RC subject comparing with more frequent nominative RC subject.
- (ii) whether the genitive RC subject in Japanese object RC can facilitate the L2 processing accurately.

Methods

Data/Participants

Since the current study is a pilot study, a small sample of participants were selected to take part in the experiment. 4 L1 Chinese learners of Japanese (lower-intermediate level) with 1 to 2 years of learning Japanese participated the experiment. Their language proficiency levels were determined through the Japanese language background questionnaires before the tests as well as their Japanese Language Proficiency Test (JLPT) level. 4 L1 Japanese speakers participated the experiment. 3 of them are from the Tokyo area, and one is from Okinawa. Besides, 1 half-Chinese

half-Japanese bilingual participant joined the study, but his data is considered as an outlier, since it is much different from others. So, his data is excluded in the study.

Instruments

The study has two components, a word-by-word non-cumulative online self-paced reading test and an offline acceptability judgment test.

Since the current study includes both L1 and L2 sentence processing of *ga/no* conversion, one fundamental issue is especially whether L2 learners has the competence of *ga/no* conversion in Japanese, which will be tested in the binary offline judgment test. Also, how they accept the *ga/no* conversion will affect the online L2 sentence processing. As for the L1 speaker group, their knowledge of *ga/no* conversion will also be tested.

Both tests have two types of test items, *ga*-type sentences, and *no*-type sentences. The reading test is self-paced with word-by-word function and includes 16 items and 16 fillers followed by a comprehension question individually. The binary offline judgment test also has 16 test items and 16 fillers. The relative clause test items were constructed with animate nouns to prevent bias. The purpose of the reading test is to test which region requires less reading time. The test items were divided into 6 regions Region: PP (temporal word), NP (animate noun), Case (*ga* or *no*), Verb, Head NP (animate noun), and Accusative case

marker *-o* を, excluding the final non-critical matrix verb region. The regions Case and Head NP are considered as critical regions, and Head NP is also considered as the disambiguation point.¹

The sample test items and region division in the reading test are as follows in (3) *ga* type sentence and (4) *no* type sentence:

(3) Kinou imoto-ga hometa youjin-o sagasiteiru.
Yesterday sister-NOM praised friend-ACC be-looking-for
Region: PP NP Case Verb Head NP を X

‘‘I’ am looking for the friend (my) sister praised yesterday.’

(4) Kinou imoto-no hometa youjin-o sagasiteiru.
Yesterday sister-GEN praised friend-ACC be-looking-for
Region: PP NP Case Verb Head NP を X

‘‘I’ am looking for the friend (my) sister praised yesterday.’

To balance the types of items and hide the purpose of the study, multiple fillers were created in both online reading test and offline judgment test. For the online reading test, 16 fillers were created with the comprehension questions. Relative clauses

¹ Traditionally in L1 processing study, case marker is attached to the preceding noun in the same region. But in current L2 study, case marker is in its own region as a critical region.

were constructed with inanimate head nouns to be different from the relative clause construction in the test items. 8 of 16 fillers were made ungrammatical through tense errors. For the offline judgment test, 16 fillers were also created with the subject relative clause (SRC) construction, which is different from the object relative clause (ORC) construction in the test items. 8 of 16 fillers were made ungrammatical through tense errors.

Procedures

To carry out the experiment with two parts efficiently and remotely, PCIBex (PennController for Internet Based Experiments)² was used and all the test items were created in JavaScript. In the reading test, after reading a sentence, participants will answer a yes-no question to identify the relative clauses. In the following judgment test, forced binary choices will be answered. The accuracy rate will be calculated for both tests with binary choices. There was an intermission between the two tests with instructions and practices. For L1 Japanese speaker group, there was a basic information consent before the tests, while for L2 Japanese learner group, there was a basic Japanese language background questionnaire before the tests.

Hypothesis

Since *ga/no* conversion is a very common syntactic phenomenon in Japanese, I hypothesize that the response times between case region *ga* and case region *no* are

² Demo: <https://farm.pcibex.net/r/OCOeVH/>

not very different from L1 Japanese group. As for the L2 learner group, my hypothesis is that genitive case markers will be processed faster than nominative case marker due to the interlanguage facilitation of the genitive subject with the case marker *no*.

For the most important question, whether the L2 learner can process *ga*-type or *no*-type sentence accurately in the online comprehension and accept them accurately in the offline judgment is not easy to predict, since there's other factor involved, such as, whether there's any difference of response time when the participants scored on each test accurately or not for the same case type sentence.

In order to statistically analyze the data, the comprehension test results and the judgment test results are coded as 1 or 0, as the binary independent nominal variables. The response time is the continuous interval variable as a dependent variable. The test accuracy rate is a ratio variable. The Mann-Whitney-Wilcoxon Test (U test) is used to test whether there's a significant difference of the dependent variable between two independent nominal variables.

Results

R (R Core Team, 2021) was used to clean the data and calculate the mean response time in the self-paced reading test and the accuracy rate in the online comprehension test and offline forced binary acceptability judgment test. As shown in Table 1, the descriptive statistics of the critical Case region are demonstrated. The mean

response time of nominative case in the L1 group is 567.38 *ms* (SD = 265.96), while the mean response time of genitive case is 599 *ms* (SD = 386.22). On the other hand, the mean response time of nominative case in the L2 group is 448 *ms* (SD = 374.88) while the mean response time of genitive case is 353.6 *ms* (SD = 137.81). Clearly, the mean response time of genitive case in the L2 group is much smaller than others with smaller standard deviation as well, which means, L2 group responds the genitive case faster than nominative case in general.

Table 1. *Descriptive Statistics:*

<i>L1 Mean Response Time (ms)</i>					
Type	Region	Mean	SD	SE	CI
Nominative	Case	567.38	265.96	66.49	130.32
Nominative	Head NP	1275.06	1305.39	326.35	639.64
Genitive	Case	599	368.22	92.05	180.43
Genitive	Head NP	1556	2109.58	527.39	1033.69

<i>L2 Mean Response Time (ms)</i>					
Type	Region	Mean	SD	SE	CI
Nominative	Case	448	374.88	93.72	183.7
Nominative	Head NP	453.56	182.54	45.63	89.44
Genitive	Case	353.56	137.81	34.45	67.53
Genitive	Head NP	516.63	456.57	114.14	223.72

Furthermore, Fig.1 shows the different patterns of L1 mean response time on two different types of sentences. The blue line represents the mean response time pattern in six regions of nominative case type sentence, while the red line represents the genitive case type sentence. It's clearly demonstrated that the response times of the critical Case regions almost overlapped, which indicates the similar patterns when L1 Japanese native speakers process these two types of sentences. It should also be noticed that head

NP region is processed much slower than other regions, which can be argued to be the “garden path” region. The garden path region in processing is generally regarded as the point of “turning back” to rewind the memory and reconstruct the sentence because of processing difficulties. Clearly, head NP is not expected in the L1 processing, and it requires more time for the L1 group to construct a relative clause.

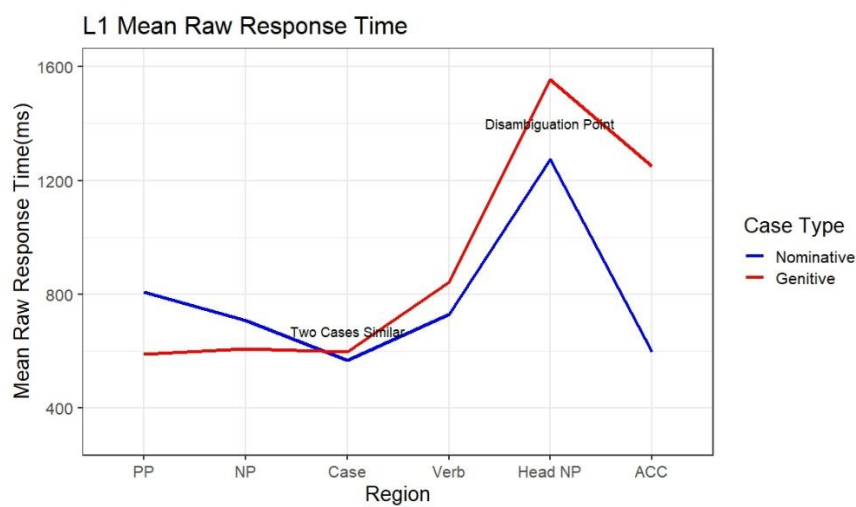


Fig.1 L1 Mean Response Time (ms)

On the other hand, Fig.2 shows the pattern of L2 group when processing two types of sentences marked by two different case markers. It’s clearly visualized that the genitive case region is processed faster than the nominative case region in the L2 group, which supports the hypothesis of the current study. However, the verb region is processed much slower than other regions, on the contrary to the Head NP region in the L1 group. This is a very interesting finding since verb is not supposed to be a “garden path” point in this case. We can assume that the slower L2 processing of verb after the case marker can reflect an interesting

pattern in a language-specific situation. Since Chinese lacks overt case markers, the Chinese learners of Japanese may encounter the processing difficulties when seeing the verb after the case markers. This phenomenon also suggests that a “familiar” case marker like *no* can ease the processing difficulties in the interlanguage grammar.

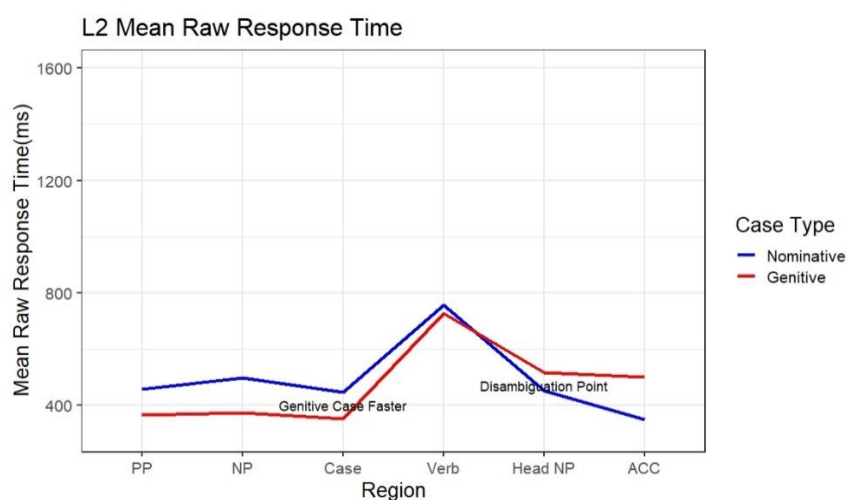


Fig.2 L2 Mean Response Time (ms)

To further understand the relationship between the response time and case type, region and participant group, linear mixed effects modeling (*lmer* in R) is used to test whether there’s a significant difference of response time regarding to different case type, region, and participant group. Response time was also log-transformed for modeling. Log-transformed response time shows a similar trend as the previous raw data, as shown in Fig.3. The genitive case type of sentence shows a faster processing trend than nominative case in the L2 group.

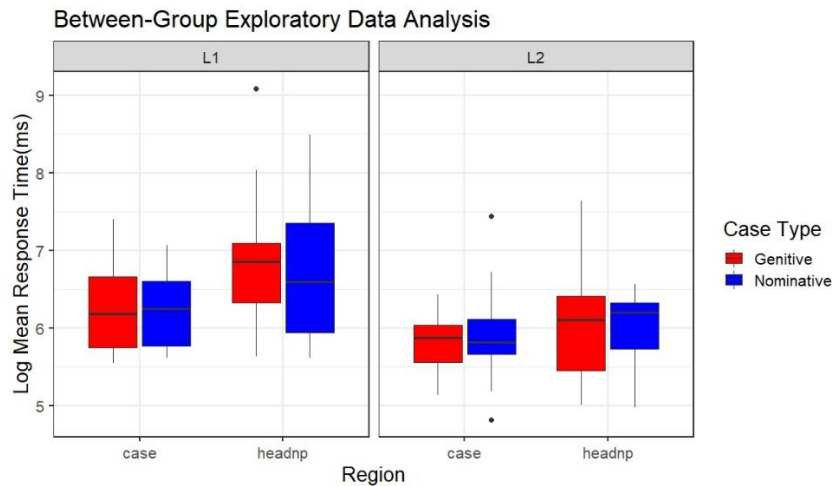


Fig.3 Between-Group Log-Transformed Response Time

Two types of linear mixed effects model were created. In model 1, Case type and Group are used as the fixed predictors, and ID (Participant) and Region are used as the random predictors. In model 2, Region and Group are used as the fixed predictors, and ID (Participant) and Case type are used as the random predictors.³ Sum-contrast coding is used, which means, Case type, Region and Group are coded as either -1 or 1. Therefore, the intercept can represent the grand mean response time. From model 1, there is no significant effect of Case type. But from model 2, the main effect of Region is significant ($\beta=.56$, $p<.001$), and the interaction effect of Region and Group is significant ($\beta=-.4$, $p<.05$). From the current dataset, we can assume that there's no significant difference of response time in relation to different case types. However, there is a significant difference of response time according to different regions, specifically when comparing

³ model1 <- lmer(log(as.numeric(Reading.time)) ~ Casetype * Group + (1|ID)+(1|Region), total_rt, REML = F)
model2 <- lmer(log(as.numeric(Reading.time)) ~ Region * Group + (1|ID)+(1| Casetype), total_rt, REML = F)

different participant groups. Therefore, we cannot argue that genitive RC subject with *no* in Japanese object RC may expedite the L2 processing. On the other hand, the critical regions might have more impact on response time between L1 and L2 group.

To further understand the relationship between the response time and online comprehension test results as well as offline judgment test results, a nonparametric test, Mann-Whitney-Wilcoxon Test (U test), is used to test whether there's a significant difference of response time when the participants scored on the online and offline tests accurately or not (1 or 0) for the same case type sentence. The accuracy rate is also calculated for both online and offline tests.

Fig.4 shows the accuracy rate of L1 group on both online comprehension test and offline judgment test, in red bar and blue bar respectively. The accuracy rate of all the tests on both case type sentences is high, except that the accuracy rate of offline judgment test on genitive case is comparatively lower than others, which also indicates the fact that genitive case type sentence is less common than nominative case type sentence in the L1 group, based on the grammatical knowledge. However, the high processing comprehension accuracy rate indicates the *ga/no* conversion phenomenon is very common and cannot affect processing negatively. Lastly, there's a statistically significant difference of response time when the L1 participants scored on the online and offline test accurately or not (1

or 0) for the same case type sentence. ($p < 0.001$ on both case type sentences and both online/offline tests).

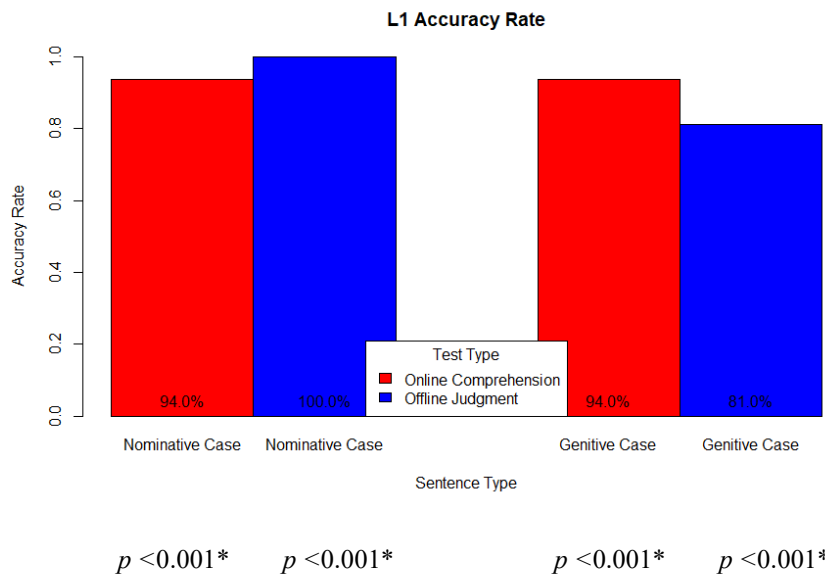


Fig.4 L1 Accuracy Rate (p -value is calculated based on Mann-Whitney-Wilcoxon Test (U test) between RT and test results on the same case type)

Fig. 5 shows that the accuracy rate of two case type sentences in the L2 group is generally lower than the L1 group on both online and offline tests. However, the accuracy rate of genitive case type sentence in the offline judgment test is relatively higher than others, which indicates that the superficial interlanguage similarity can facilitate the grammatical understanding of the sentence. But interestingly, the accuracy rate of genitive case type sentence in the online comprehension test is much lower than others, which indicates that the shallow structure cannot truly facilitate L2 learners to use the syntactic structure in a real-time comprehension scenario. Also, there's a statistically significant difference of response time when the L2 participants scored on the online and

offline test accurately or not (1 or 0) for the same case type sentence. ($p < 0.001$ on both case type sentences and both online/offline tests).

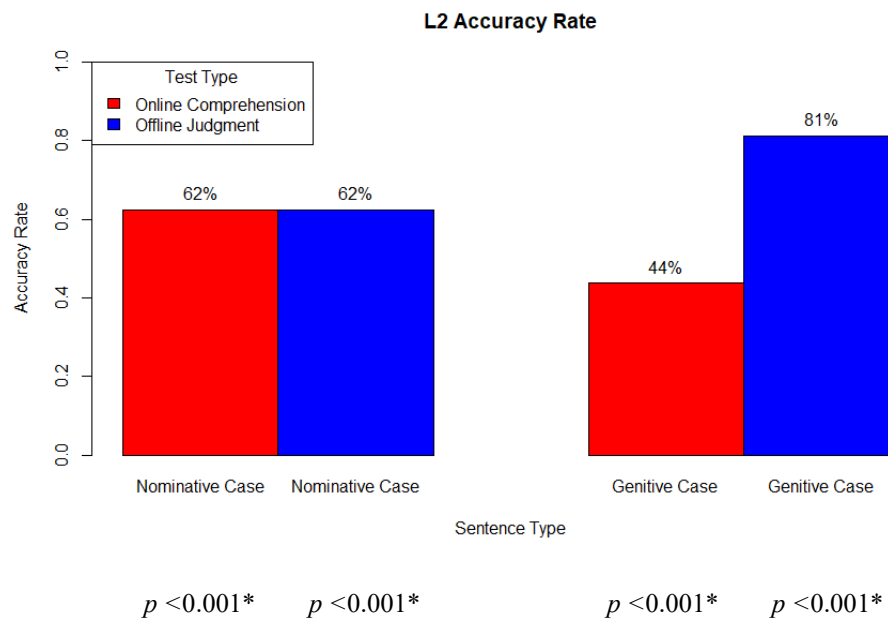


Fig.5 L2 Accuracy Rate (p -value is calculated based on Mann-Whitney-Wilcoxon Test (U test) between RT and test results on the same case type)

To summarize, it's a very interesting finding that although L2 learners may acquire the knowledge of a target language through the interlanguage grammar, they cannot accurately process the sentence with accurate comprehension in the real-time situation. We can assume that the performance issue can be a major influencing factor on L2 processing. The result of this study provides alternative evidence to argue for the complexity of L2 processing based on interlanguage grammar, since the distinction between competence and performance is very clear in the L2 processing.

Discussion

I argue that in L2 sentence processing, in addition to the syntactic constraint and knowledge, the mental information of familiarity between L1 and L2 affects L2 processing. The interlanguage which preserves some features from L1 should be further addressed in the L2 processing studies. *No* is a very interesting example as I previously discussed, since it superficially resembles *de* in Chinese, which can create an interlanguage with L1 features especially for beginner or lower intermediate learners. To be clear, it is not L1 transfer at all, because during the online processing, some evidence in the current study that show the comparatively faster processing time of *no* in L2 processing could indicate that L2 learners rely on some similarity between L1 and L2 rather than full knowledge transfer.

Therefore, how this interlanguage evidence affects the L2 processing needs to be further analyzed, so a larger sample of L2 participants needs to be collected. It will be necessary to compare the lower level L2 group with the higher level L2 group to determine whether the interlanguage with some L1 features affect the processing of advanced L2 learners and to what extent. Also, learners could be different individually in terms of the input to acquire the *ga/no* conversion knowledge and the performance to use this interesting phenomenon. To conclude, since there were very few L2 processing studies on *ga/no* conversion, this pilot study can provide some insightful evidence and data to carry out a full-fledged study on the previously mentioned issues.

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