ARIEAL RESEARCH MAGAZINE

VOLUME 3 SUMMER-FALL 2025

Editor's Note

In this Summer-Fall 2025 issue of *The ARiEAL Research Magazine*, we continue to provide an avenue for student trainees to disseminate high-quality and original research alongside spotlighting current issues within the fields of linguistics, cognitive science of language and related areas of knowledge. In addition to that, this issue is extending beyond the confines of our own research center, inviting student trainees and researchers from around the globe who share our passion for linguistics and languages to also contribute to the excellence of our magazine.

In this issue, Amba Mohammed, one of our undergraduate trainees, presents an investigation of habitual aspect in Trinidadian English, showing us how this dialect of English has a richer aspectual system compared to the standardized variety.

We also learn from Akomolafe Olamide, an undergraduate student from Lagos State University of Education, about language acquisition in multilingual environments and the implications of current findings for education in multilingual contexts.

Through a series of lexical recognition experimental tasks, Joyce Zeng, a PhD student in in the Cognitive Science of Language program, explores the interaction between word transparency and lexical quality, showing us that as individuals become more skilled readers it becomes easier to overcome reading challenges (such as opaque words).

Analyzing data collected from several Arabic-English bilinguals, Judy Meshmesh, another undergraduate trainee, investigated the contrast between native versus heritage speakers as well as the specific dialect of Arabic spoken on production of geminates, demonstrating that heritage speakers still maintain geminate-singleton contrasts.

Keerat Purewal, a master's student in the Cognitive Science of Language program, investigated the impact of first language and citizenship status on the income of those who graduate from Canadian Universities, giving us a more accurate picture of the financial prospects of our trainees.

Paloma Van Vliet, another of our graduate trainees, investigates the role of the enclitic particle *=lu* in Inuktitut, showcasing the challenges it presents to modern theories of coordination.

Samira Ghanbarnejadnaeini, another PhD student in our program, proposes an analysis of the allomorphy in Persian plural formation under the framework of Distributed Morphology, showing how both morphological features and phonotactic constraints play a role in determining the allomorph used in each context.

Editor's Note

Somya Khurana, undergraduate student, in partnership with Fiza Ahmed, a master's graduate, investigated short-term memory capacity for non-verbal rhythm through a couple of experimental tasks. In general, the experiments reveal that longer patterns were more difficult to reproduce due to greater memory and motor demands.

The ARiEAL Research Magazine, Volume 3 is composed of high-quality and innovative research that reflects the interdisciplinarity and talent at ARiEAL. Phonetics, phonology, morphology, syntax, language acquisition, dialectal variation, cognitive science of language, education, multilingualism. Those are some of the topics that have shown up in the current issue. We are proud to celebrate our trainees' accomplishments and research that not only pushes academic knowledge but has societal benefits.

Sincerely,
2025 Editorial Team:

Alexandra Jackson
Braulio Lopes
Simran Sandal

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Contextual Allomorphy in Persian Plurals

SAMIRA GHANBARNEJADNAEINI

Abstract: Modern Persian exhibits multiple plural markers, including the native suffixes *-ān* and *-hā*, as well as the Arabic-derived *-āt*. This study examines the morphophonological realization of Persian plural morphemes within the framework of Distributed Morphology (DM). It proposes that the [+PL] feature on the terminal node of NumP is realized phonologically through three Vocabulary Items during Vocabulary Insertion, each conditioned by morphosyntactic features such as animacy and lexical origin. Specifically, the analysis treats these suffixes as instances of contextual allomorphy: *-āt* is restricted to nouns of Arabic origin, *-ān* typically appears with [+animate] nouns, and *-hā* serves as the default elsewhere. Surface variation in forms with *-ān* is attributed to hiatus resolution, as Persian phonotactics prohibit adjacent vowels across morpheme boundaries. To resolve such violations, Persian employs repair strategies such as glide insertion ([j], [w]), vowel shortening, and the realization of the latent segment [ɟ], which is retained from Middle Persian in the underlying forms of nouns ending in [e].

1. Introduction

Modern Persian has two native plural morphemes: *-ān* and *-hā*, both diachronically traceable to Middle Persian. In addition to these, Persian has incorporated two Arabic-derived affixal plural markers, *-āt* and *-in*, as well as Arabic broken plurals for nominal pluralization. Examples of plural forms are shown in (1).

(1)

a. [-ān]	Gloss	Plural form
zæn	woman	zæn-ān
mærd	man	mærd-ān
māde-ʃir	female-lion	made-ʃir-ān
deræxt	tree	deræxt-ān
kif	bag	*kif-ān
pāk-kon	eraser (clean-do)	*pāk-kon-ān

b. [-hā]	Gloss	Plural form
zæn	woman	zæn-hā
medād	pencil	medād-hā
ɟol	flower	ɟol-hā
māhi	fish	māhi-hā
pāk-kon	eraser (clean-do)	pāk-kon-hā
laptop	laptop	laptop-hā
fekr	thought	fekr-hā
entexāb	election	entexāb
-āt	-s	-āt-hā

c. [-āt]	Gloss	Plural form
hejvān	animal	hejvān-āt
moʃkel	problem	moʃkel-āt
zæn	woman	*zæn-āt
ɟol	flower	*ɟol-āt

d. [-in]	gloss	Plural form
moællem	teacher	moællem-in
mohāfez	guardian	mohāfez-in
pesær	boy	*pesær-in

e. Arabic broken plurals	Gloss	Plural form
ketāb	book	kotob
fekr	thought	æfkār

As shown in (1a), nouns with the [+animate] feature, including those denoting humans, animals, and even plants, can be pluralized with the Persian plural suffix *-ān*, regardless of the number of syllables or whether the noun is simplex or compound. In contrast, nouns with the [–animate] feature, typically referring to inanimate objects such as 'bag' or 'eraser', cannot be pluralized using *-ān*. The examples in (1b) illustrate the broader distribution of the suffix *-hā*, which can attach to both [+animate] and [–animate] nouns. This morpheme is also productive with borrowed nouns such as *laptop* or [fekr] 'thought' (from Arabic). Additionally, nouns already pluralized using Arabic morphology, such as the suffix *-āt* or broken plural templates, can sometimes be reanalyzed by Persian speakers as singular and re-pluralized with *-hā*, as in [entexāb-āt-hā] 'election-s-s'.

Examples in (1c) and (1d) demonstrate that native Persian nouns like 'woman', 'flower', and 'boy' cannot be pluralized using the Arabic suffixes *-āt* or *-in*. Among these, the use of *-in* is particularly rare and marginal in Persian. Arabic broken plurals in (1e), which are non-affixal and follow a non-concatenative morphophonological system, are likewise not applicable to Persian nouns, as Persian does not permit this kind of root-and-pattern morphological process.

However, plural forms built with -ān also exhibit variation, as illustrated in (2).

(2)

a. [-jān]	Gloss	Plural form
dānā	sage	dānā-jān
binā	one who can see	binā-jān

b. [-jān]	Gloss	Plural form
māhi	fish	mahi-jān
Irani	Iranian	Irani-jān

c. [-wān]	Gloss	Plural form
āhu	deer	āho-wān
bānu	lady	bāno-wān

d. [-ɟān]	Gloss	Plural form
bænde	servant	bænde-ɟān
setāre	star	setāre- ɟān

e. [-jān]	Gloss	Plural form
dāneʃ-dʒu	student	dāneʃ-dʒu-jān
soxæn-ɟu	speaker	soxæn-ɟu-jān

This study investigates the morphophonological distribution of plural morpheme in Persian within the framework of Distributed Morphology (DM) (Halle & Marantz 1993; Bobaljik 2017) and aims to present an analysis to account for the morphophonological variations in the realization of plural morpheme.

In the current study, I will focus on two Persian plural morphemes, *-ān* and *-hā*, and the Arabic suffixal plural morpheme -āt. The Arabic plural morpheme *-in* is extremely rare, and in Persian it occurs even less

frequently than *-āt*, being largely restricted to a handful of Arabic-origin nouns used mainly in formal or literary registers. Given its minimal productivity and highly limited distribution, *-in* falls outside the scope of the present analysis.

Similarly, this study does not examine Arabic broken plurals, as they are formed through non-concatenative morphological processes that are specific to Arabic and not productive in Persian. Broken plurals rely on internal modifications to the root and do not involve the linear addition of affixes. In contrast, the analysis adopted here assumes a concatenative morphological structure, in which the linear order of morphemes matters (Embick 2010). Since non-concatenative patterns do not conform to this framework, broken plurals are excluded from the present investigation.

This paper is organized as follows. Section 2 presents a Distributed Morphology account of Persian plural allomorphy, treating *-āt*, *-ān*, and *-hā* as suppletive allomorphs of the [+PL] feature realized in the NumP projection. Section 3 turns to the phonological variation observed in *-ān* plurals, illustrating how Persian employs various hiatus resolution strategies that give rise to the surface forms in question. This analysis is preferable, as it more effectively accounts for the data and highlights the consistency in the use of plural morphemes in Persian. Section 4 offers an alternative analysis of these patterns in terms of phonologically conditioned allomorphy, proposing that surface variants such as *-jān*, *-wān*, and *-ɟān* result from the interaction between morphological selection and phonological local context. Finally, Section 5 concludes the paper.

2. Distributed Morphology and Morphological Analysis

In this section, I present an analysis of Persian plural allomorphy within the framework of Distributed Morphology (DM) a syntactic approach to morphology that integrates word formation into the generative part of the grammar, that is syntax (Halle & Marantz 1993; Bobaljik 2017). Unlike traditional lexicalist theories, which assume that complex words are formed in the lexicon, DM posits that the internal hierarchical structure of words is built by syntactic operations, and morpheme realization occurs post-syntactically (Late Insertion), through the process of Vocabulary Insertion. This model separates three components: syntax (which builds structure), the morphology (which interprets that structure), and the phonological component (which linearizes and spells out forms).

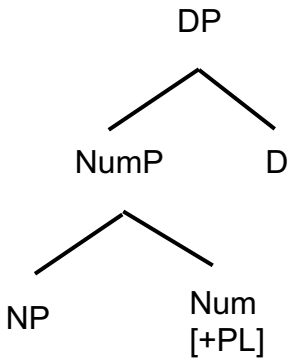
Late Insertion is one of the core principles of DM, which holds that phonological exponents or Vocabulary Items (VIs) are inserted into abstract morphemes after syntactic derivation is complete. These VIs are not inherent to the morphemes themselves but are selected based on feature matching. When multiple VIs are eligible to realize a given morpheme, the grammar follows the Elsewhere Principle: the most specific VI is inserted, and more general forms are only inserted when no more specific VI applies (Halle & Marantz 1993; Bobaljik 2012).

In this approach, contextual allomorphy arises when different phonological exponents realize a single morphosyntactic feature on a terminal node

(e.g., [+PL]). This kind of allomorphy is called suppletive because the surface forms are not phonologically predictable from one another (Embick 2010a).

In the case of Persian, following Darzi and Moazami (2006), I assume that DPs in Persian contain a NumP which is the locus of [+PL] feature. The internal hierarchical structure of a plural noun in the syntax component is illustrated in (3).

(3)



(Darzi and Moazami, 2006)

To account for the data in (1), the variation among Persian plural morphemes can be analyzed as an instance of contextual allomorphy within the framework of DM. In this analysis, the [+PL] feature located in the Num head is realized phonologically by three distinct VIs during Vocabulary Insertion: *-āt*, *-ān*, and *-hā*. VIs compete for insertion in such a way that the most contextually specified VI is selected, and this competition results in blocking, as defined by Embick and Marantz (2008). The VI *-āt* is limited to nouns of Arabic origin, and thus, is the most contextually specified one. Thus, once *-āt* is inserted, the insertion of *-ān* is blocked in the context of Arabic-origin words due to the prior application of the more specific *-āt*.

The suffix *-ān* is generally associated with [+animate] nouns and commonly appears in literary or formal registers, while *-hā* is linked to [−animate] nouns and serves as the most productive plural marker, often functioning as the default. Over time, however, *-hā* has expanded in usage and is now applied to both [+animate] and [−animate] nouns (Mahootian (1997), among others).

The three VI in (4) realize suppletive allomorphy for the [+PL] feature.

(4)

[+PL] ↔ -āt/ [Arabic Roots]
[+PL] ↔ -ān/ [+animate]
[+PL] ↔ -hā/ elsewhere

The analysis presented for the data in (1) was based on the idea that the phonological realizations of the plural morphemes are not phonologically related to one another. Rather, they are suppletive forms, whose only commonality lies in their function: they all serve to realize the plural feature of the noun. As such, they are best analyzed as allomorphs conditioned by the semantic or lexical features of the noun. In contrast, the plural suffixes in (2) appear to be phonologically related and do not represent distinct Vocabulary Items inserted through hierarchical competition. Instead, their variation is likely governed by phonological processes rather than by suppletive allomorphy. The analysis of the patterns observed in (2) is presented in the following section.

3. Phonological Analysis

In this section, I will examine the variation observed in the examples presented in (2),

repeated here in (5). A closer look at these examples reveals that all the singular noun forms share a key phonological property: they end in a vowel. In the corresponding plural forms, the suffix *-ān* consistently appears preceded by a consonant, typically a glide such as [j]or [w]. This pattern suggests that the consonant is not part of a distinct morphological unit but rather serves a phonological function. Specifically, I propose that this variation can be analyzed as a case of vowel hiatus resolution. The insertion of a glide between the stem-final vowel and the plural suffix prevents the occurrence of adjacent vowels across a morpheme boundary, a configuration that is disfavored in Persian. Under this analysis, the plural suffix remains *-ān*, and the intervening consonant is inserted after spell-out in phonology component of the grammar to maintain well-formed syllable structure and phonotactic constraints.

(5)

dānā	sage	dānā-jān
Irani	Iranian	Irani-jān
bānu	lady	bāno-wān
setāre	star	setāre-ɟān
soxæn-ɟu	speaker	soxæn-ɟu-jān

Before delving into the details of the phonological analysis of the plural variations presented in (5), it is important to first understand why vowel hiatus is disfavored in Persian and to identify the strategies that the language employs to resolve such configurations.

3.1. Vowel Hiatus

Vowel hiatus is a phonological phenomenon where two adjacent vowels occur without an intervening consonant (e.g., CV.VC). Vowel hiatus can occur across syllable or morpheme boundaries. This configuration is often dispreferred cross-linguistically, and many languages adopt different strategies to eliminate it (Casali, 2011). Persian, in line with cross-linguistic tendencies, employs a range of hiatus resolution strategies such as inserting an extra segment (epenthesis), inserting glides, shortening one of the vowels, or occasionally deleting a vowel.

3.2. Persian Syllable Structure

Persian syllable structure permits three basic configurations: CV as in [mā] ‘we’, CVC as in [xāb] ‘sleep’, and CVCC as in [māst] ‘yogurt’. From these patterns, we can generalize that the minimal permissible syllable in Persian conforms to the template CV(C)(C), in which the coda position, which is represented by one or two final consonants, is optional. Importantly, this structure reflects a core phonotactic constraint of Persian: while the language allows open syllables (those lacking a coda), it does not permit onsetless syllables. That is, every syllable must begin with a consonant. This restriction plays a crucial role in how the language handles vowel sequences.

When two vowels appear adjacent to each other across syllables, such that the first syllable ends in a vowel (with no coda) and the second begins with a vowel (with no onset), the structure violates Persian’s syllable well-formedness conditions. This configuration leads to hiatus, which is disfavored in Persian because it results in an onsetless syllable and disrupts the preferred syllable template. Such hiatus can occur

either within a single prosodic word or at morpheme boundaries in complex words, particularly when a vowel-final root is followed by a vowel-initial suffix. The Persian vowel inventory further conditions the types of hiatus that arise and the strategies used to resolve them. Persian has six vowels: [i], [e], [æ], [u], [o], and [ā]. Among these, the high vowels [i] and [u], and the low vowel [ā], are typically long, while [e], [o], and [æ] are short.

In the next subsection, I review two studies that examine the strategies Persian employs to avoid or resolve vowel hiatus.

3.3. Hiatus Resolution Strategies in Persian

3.3.1. Jam (2015) argues that hiatus resolution is obligatory in Persian because the language requires onset-filled syllables . The study adopts Optimality Theory (OT) to analyze potential resolution strategies, focusing on those most prevalent in Persian. The analysis hinges on the following constraint hierarchy in Persian: *HIATUS (no vowel-vowel sequences) ≫ ONSET (syllables must have onsets) ≫ MAX-V (preserve input vowels) ≫ DEP (no epenthesis) ≫ UNIFORMITY (no fusion of segments).

The paper identifies five universal strategies for resolving hiatus including epenthesis, vowel deletion, vowel coalescence, glide formation and diphthongization but only three of them are active in Persian: epenthesis, vowel deletion, vowel coalescence. Jam rejects glide formation and diphthongization for Persian arguing that while some dialects convert [i] or [u] to glides [j]/[w] (e.g., /mi+ā+i/ → [mi.jāj] 'you are coming'), this is actually epenthesis + deletion and not true glide formation.

The most common method for resolving vowel hiatus in Persian is consonant epenthesis, where a stop, glide or glottal stop is inserted between vowels. Studies such as Samareh (1977) and Bijankhan (2012) document the insertion of consonants like [j], [w], [ʔ], and [ɟ] in contexts where hiatus would otherwise occur. For example, /zende+i/ (life) surfaces as [zende.ɟi], and /be+æt/ (to you) becomes [be.het]. This process is governed by the OT constraint ranking ONSET >> DEP, where the requirement for syllable onsets overrides the prohibition against inserting segments.

The second strategy is vowel deletion, where either the first (V1) or second (V2) vowel is elided. Jam (2015) proposes that V1 deletion occurs primarily when V1 is [e] and V2 is [æ], as in /xāle+æʃ/ → [xāl.æʃ] (her aunt). Conversely, V2 deletion applies when the second vowel is [e] or [æ], as in /zi.bā+æm/ → [zi.bām] (I'm beautiful). This process reflects the constraint hierarchy *HIATUS >> MAX-V, where avoiding hiatus takes precedence over preserving input vowels. However, since the hierarchy does not indicate optionality, Jam also notes that deletion is often optional and influenced by speech rate and register and overall, it is more tolerated in colloquial Persian.

The third strategy, vowel coalescence, involves merging two identical vowels into a single long vowel. This is frequently observed in possessive constructions, such as /ʒāle+e rāzi/ → [ʒāle: rāzi] (Zhaleh's Razi), where the possessive marker [e] merges with a stem-final [e] (Jam, 2015). The OT account posits the ranking

*HIATUS >> UNIFORMITY, permitting fusion to resolve hiatus despite violating the constraint against segment merging (McCarthy & Prince, 1995). Overall, coalescence is less productive than epenthesis or deletion and is largely restricted to specific morphological environments.

3.3.2. Ariayee and Jurgec (2021) state that their study is the first to experimentally examine vowel hiatus in Persian. They highlight three main findings: Persian uses all the common strategies found in other languages to resolve hiatus; while it is generally marked, hiatus can surface under specific conditions; and Persian shows an unusual pattern of V2 deletion, even in borrowed or nonce words. They identify three possible patterns when hiatus arises at a root-suffix boundary: (1) deletion of the second vowel (V2), as in /indʒɑ-æm/ 'here-copula.1SG' becoming [indʒɑm]; (2) insertion of a glottal stop ([ʔ]), resulting in [indʒɑʔæm]; and (3) retention of the hiatus, producing [indʒɑæm] with no resolution.

Ariyaee and Jurgec conducted production and perception experiments to study hiatus resolution in Persian. They found that speakers preferred V2 deletion with longer suffixes but retained hiatus with shorter ones to preserve morphological contrasts. Epenthesis was rarely used. Perception data confirmed these patterns.

The authors OT analysis proposes that a highly ranked REALIZEMORPHEME constraint prevents vowel deletion in monosegmental suffixes to maintain meaning, while the constraints DEP and *HIATUS favor deletion in other contexts (REALIZEMORPHEME >> DEP >> *HIATUS >> MAX). They used a Maximum Entropy (MaxEnt) grammar to model the perception data, which accurately predicted the observed variation. This supports the idea that Persian resolves hiatus in a systematic way, balancing phonological preferences with the need to preserve morphological distinctions, particularly as influenced by suffix length.

To sum up, Jam (2015) and Ariayee & Jurgec (2021) both examine Persian vowel hiatus resolution within OT. Jam argues hiatus resolution is obligatory through epenthesis (primary strategy), vowel deletion (contextual), and coalescence (morphologically restricted), Ariayee & Jurgec's experimental study shows hiatus can surface intact, with V2 deletion preferred for longer suffixes (to preserve morphology) and epenthesis being rare. Both agree on deletion's role but diverge on its obligatoriness and epenthesis' frequency, with Jam prioritizing phonological constraints (*HIATUS ≫ ONSET) and Ariayee & Jurgec emphasizing morphological preservation (REALIZEMORPHEME).

In the following subsection, I present a phonological analysis of the variations of the plural morpheme -ān as observed in (2) and repeated in (5).

3.4. Variations of the Plural Morpheme -*ān*

The variations in the plural forms presented in (2) and (5) can be grouped into three categories, each corresponding to one of the hiatus resolution strategies discussed in the previous subsection. These variations are repeated in (6) with revised

segmentation to better illustrate the underlying phonological processes.

(6)

dānā	sage	dānā-**j-ān**
Irani	Iranian	Irani-**j-ān**
bānu	lady	bāno-**w-ān**
setāre	star	setāre-**ɟ-ān**
soxæn-ɟu	speaker	soxæn-**ɟuj-ān**

As previously mentioned, under the phonological analysis of the plural form variations illustrated in (6), the plural morpheme remains *-ān*, and the intervening consonants that appear are understood as strategies for resolving vowel hiatus. This hiatus arises from the sequence of the final vowel of the root or base immediately followed by the initial vowel of the plural morpheme *-ān*. In the discussion that follows, I will focus specifically on the selection of the intervening consonant used to repair the hiatus and offer an explanation for the phonological strategies underlying the observed variations in (6).

3.4.1. Epenthetic Glide [j] and [w]

In the examples shown in (6a–c), the final vowels of the roots include [ā], [i], and [u], and the consonants inserted to resolve the resulting vowel hiatus are the glides [j] and [w]. This raises the question of whether the appearance of [j] and [w] in these forms should be analyzed as instances of true glide formation. As discussed by Jam (2015), the use of [j] and [w] in Persian to resolve hiatus does not reflect genuine glide formation in the phonological sense. Instead, it results from a combination of epenthesis and deletion, whereby a glide is inserted between adjacent vowels to prevent hiatus. Similarly, Ariyaee and Jurgec (2021) do not identify glide formation as a productive or independent strategy for hiatus resolution in Persian.

Kambuziya et al. (2017) argues that in Persian, when the long vowels [uː] and [iː] occur at the end of stems before the plural suffix [-ān], vowel hiatus arises. To resolve this, [iː] undergoes shortening and partial glide formation into [j]. This alters both syllable quantity and, in some cases, vowel quality as seen in the shift of the final vowel [u] to [o] in (6c).

Ghalkhani and Razavian (2024) proposed an OT analysis of the appearance of [j] and [w] between two vowels. In their phonological analysis, Ghalkhani and Razavian propose that the high long vowel [iː] carries two moras. When the plural suffix [-ɑn] attaches to stems ending in [iː], the language avoids vowel hiatus by shortening [iː] to [i], and assigning the lost mora to a following glide [j]. Although the vowel is shortened, it maintains its original quality. A similar process occurs with the high long rounded vowel [u], which contributes to the formation of the glide [w] in hiatus contexts. However, unlike [i], the vowel [u] not only shortens but also changes in quality, shifting to [o] as part of the repair strategy. This explains why the final vowel in words following the pattern in (6c) shifts from [u] to [o]. Although their analysis does not address [ā], as seen in (6a), the data clearly show that words ending in [ā] behave similarly to those ending in [i], with no qualitative change to the vowel [ā].

Ghalkhani and Razavian provide the following phonological rules for the hiatus resolution in the context of the plural morpheme *-ān*.

(7)
a. /i/ → [i+j] / —[ā]
b. /u/ → [o+w] / —[ā]

In their OT analysis, Ghalkhani and Razavian propose the hierarchy of constraints in (8). Since the primary factor driving hiatus resolution in Persian is the requirement for syllables to have an onset, the markedness constraint ONSET acquires the highest ranking. The markedness constraints AGREE(place) (ensures the homogeneity of the place of articulation for the glide and the vowel) and *Vhighw (high vowels are not allowed before the glide /w/) enforce place harmony between vowels and glides, requiring correspondence for [i+j] but prohibiting it for [o+w].
(8)

a. [i- ā]: ONSET >> AGREE(place) >> MAX >> DEP >> IDENT(μ).

b. [u-ā]: ONSET >> *Vhighw, AGREE(place) >> MAX >> DEP >> IDENT(μ).

3.4.2. Resurface of the Lost Segment [ɟ]

Regarding the analysis of example in (6d) and the words that pattern with it such as [pærænde] 'bird', [nevisænde] 'writer', [bænde] 'servant', Sadeghi (2002) provides a historical account for the occurrence of [ɟ] as a hiatus resolving segment in words ending in [e] in Persian. He notes that in Middle Persian, many words that currently end in [e] originally ended in the consonant [ɟ], such as [bændeɟ] 'servant'. Over time, this final [ɟ] disappeared from singular forms but was preserved in derived forms like [bændeɟih] 'servitude' and [bændeɟān] 'servants'. In Modern Persian, speakers sometimes reinstate [ɟ] in certain morpho-phonological contexts including in resolving hiatus based on analogy with these older forms, even extending the pattern to some Arabic loanwords.

In their analysis of hiatus resolution in tetrasyllabic Persian words in [e-i] and [e-ā] environments within the framework of OT, Ghorbanpour et al. (2019) argue that when the derivational suffix [-i], which functions both as a nominalizer and an adjectivizer, attaches to stems ending in the vowel [e], the resulting [e-i] vowel sequence creates a hiatus that Persian phonology seeks to avoid. To resolve this, an epenthetic consonant is inserted between the two vowels. The choice of epenthetic consonant depends on the morphological function of the suffix: in adjective formation, the hiatus is typically resolved by inserting a glottal stop [ʔ], while in noun derivation, the inserted consonant is [ɟ], thus yielding different repair strategies for the same phonological environment based on morphological context. They propose the following constraint hierarchy: ONSET (Assign one violation mark for every onsetless syllable.) ≫ MAX (Assign one violation mark for every input segment that does not have an output correspondent or no deletion.) ≫ ALIGN-R(-ān, base) (Assign one violation mark for every segment intervening between the pluralizer -ān and the right edge of the base.), ≫DEP(base) (Assign one violation mark for every output base node that does not have an input correspondent.) ≫ *DOR (place markedness hierarchy proposed by Prince and Smolensky (2004) *LAB, *DOR ≫ *COR ≫ *PHAR) ≫ MAX(subseg) (Assign one violation mark for every subsegment in the input that does not have a

correspondent in the output.). The highly ranked ONSET requires syllables to have onset and MAX enforces no deletion. ALIGN-R forces [ɟ] to surface in noun/adverb contexts.

Ghorbanpour et al. (2019) further argue that analyzing [ɟ] as an epenthetic consonant is problematic because [ɟ] is considered highly marked according to the phonological place markedness hierarchy (Prince & Smolensky 2004), making it an unlikely candidate for insertion during epenthesis. Additionally, [ɟ] has morphophonologically restricted distributions; it appears in hiatus resolution in phonological environment involving [e-i], [e-ā] and surfaces in specific morphological contexts, such as noun, plural and adverb suffixation. Instead of treating [ɟ] as truly epenthetic, the authors adopt the view of Naderi and van Oostendorp (2011), who argue that this consonant functions as a latent segment. This interpretation is consistent with Zoll's (2001) theory of floating features, which posits that some segments lack a root node and are only realized in specific morpho-phonemic environments.

3.4.3. Resurface of the Final Glide [j]

The final group of plural forms involves words ending in the vowel [u], as illustrated in (6e). These include examples such as [soxæn-ɟu] 'speaker', [dāneʃ-d͡ʒu] 'student', and [zibā-ru] 'beautiful person'. Given that these words end in [u], one might expect them to pattern like the examples in (6c), such as [bānu] 'lady', whose plural form is [bāno-wān], featuring both a [w] insertion and a vowel shift from [u] to [o]. However, this is not the case for the words in (6e). Instead, their plural forms involve the glide [j] and retain the vowel [u] without shifting to [o], resulting in forms such as [soxæn-ɟu-jān], [dāneʃ-d͡ʒu-jān], and [zibā-ru-jān].

The explanation for this difference lies in the morphological structure of these words. They are compounds, and in each case, the second element, ending in [u], originally contained a final [j] that has been dropped. For instance, the full underlying form of [-ɟu] in [soxæn-ɟu] is actually [-ɟuj]. In colloquial and rapid speech, this final glide [j] is often omitted, but it is preserved in more formal, literary, or written contexts. According to Sadeghi (2002), this dropped [j] re-emerges in the plural forms, where it functions as a hiatus-resolving glide between the stem and the plural suffix *-ān*. Importantly, this case differs from the analysis of [ɟ] as a latent segment (as proposed in other contexts), since the final [j] in these compound forms has not been historically lost. Rather, it still exists in Modern Persian but is simply suppressed in spoken compounds and reappears when phonotactically needed such as in resolving hiatus.

4. Phonologically Conditioned Allomorphy

An alternative analysis of the variation in Persian plural morphemes considers the role of phonologically conditioned allomorphy (Embick 2010b). Under a phonological account, such as the one presented in the previous section, the underlying form of the plural morpheme in the examples in (9) is consistently *-ān*, regardless of the surface variations observed. These variations are attributed to the influence of local phonological context. In this view, phonological rules apply after the

morphological structure has been established, and the selection of allomorphs is constrained by strictly local phonological properties, such as the nature of adjacent segments or morphemes, rather than by syntactic or semantic features. The phonological rules conditioning the allomorphy in (9) is presented in (10).

(9)

dānā	sage	dānā-**jān**
Irani	Iranian	Irani-**jān**
bānu	lady	bāno-**wān**
setāre	star	setāre-**ɟān**
soxæn-ɟu	speaker	soxæn-ɟu-**jān**

(10)

a. [+PL] ↔ -jān/ [long vowels]—#
b. [+PL] ↔ -wān/ [o] —#
c. [+PL] ↔ -ɟān/ [e] —#

The analysis of allomorphy conditioned by local phonological context offers a principled account for treating long vowels as a natural class that triggers the surface allomorph *-jān* for the plural morpheme. This approach also allows for a clear distinction between the forms in (9c) and (9e), both of which end in [u] in the singular. However, only the forms in (9c) exhibit a vowel shift to [o] in the plural, highlighting the role of phonological environment in conditioning the observed variation.

5. Conclusion

The paper analyzed Persian plural morphology through the lens of Distributed Morphology, focusing on the suffixes *-āt*, *-ān*, and *-hā* as suppletive allomorphs of the [+PL] feature. Their distribution is shaped by morphosyntactic features such as animacy and lexical origin: *-āt* attaches to Arabic-origin nouns, *-ān* to [+animate] nouns in formal registers, and *-hā* serves as the general plural marker.

The paper then turned to the surface variation seen in *-ān*-plurals, where forms like *-jān*, *-wān*, and *-ɟān* appear. These variations were not analyzed as separate morphemes, but as outcomes of hiatus resolution. When *-ān* follows a vowel-final stem, Persian avoids vowel hiatus by inserting glides or resurfacing latent segments. For instance, stems ending in [i] or [ā] insert [j], while [u] first shifts to [o] and triggers [w]-insertion. In some compounds, the glide [j] reappears from an underlying form that is typically dropped in casual speech. In other cases, [ɟ] reflects a historically lost segment that resurfaces in specific morpho-phonemic environments such as resolving hiatus as a result of pluralization.

This study shows that Persian plural formation involves both morphologically and phonologically conditioned allomorphy. Morphological selection is sensitive to features like animacy and origin, while surface variation is driven by phonotactic constraints and local phonological context.

On a final note, the example [entexāb-āt-hā] ‘election-s-s’—where the noun *entexāb* ‘election’ is pluralized twice, first by the Arabic plural morpheme *-āt* and then by the Persian plural morpheme *-hā*—presents an interesting, yet potentially problematic, case for Distributed Morphology (DM). As previously discussed, VIs compete for insertion at a given terminal node, and when the most highly specified VI

is inserted, it blocks the insertion of less specified alternatives. However, in the case of [entexāb-āt-hā], the insertion of *-āt*, the most specified VI, does not block the subsequent insertion of *-hā*, which is the least specified or default VI.

A thorough analysis of this case would require a separate, detailed investigation, but some preliminary hypotheses can be proposed. One possible explanation is that [entexāb-āt] is stored as a singular root and enters the derivation as a morphologically simplex form. From this perspective, Vocabulary Insertion treats it as a singular base and inserts *-hā* as the default plural marker. This raises the question: if the noun is of Arabic origin, why is it not pluralized again by *-āt*? One potential answer is that the process of Vocabulary Insertion cannot access the internal morphological structure of [entexāb-āt] at that point in the derivation, and therefore simply inserts the default elsewhere VI *-hā*.

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You does be working hard': Investigating the Habitual Aspect in Trinidadian English

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Abstract: The habitual is an aspect which conveys that an action or process is repeated over time. Unlike other languages, standardized English(es) (SE) indicate habitual meaning using adverbs of frequency. However, Trinidadian English (TE), a Caribbean English dialect, appears to have grammaticalized habitual aspect with two distinct structures, both involving an item '*does*'. The first structure is comprised of *does* and an uninflected verb, such as '*They does read*'. The second structure is constructed using *does*, the item *be* and either an adjective, or the apparent progressive form of the verb, as in '*They does be reading*'. Previous work on TE has only documented the existence a habitual aspect. This investigation proposes an analysis that aims to formalize how the morphosyntactic properties of these structures communicate habitual meaning. A difference in the semantics of the two structures is proposed to distinguish between them, and a syntactic analysis of both structures is proposed. This paper investigates points where TE grammar deviates from that of SE, to showcase the difference in perspective that analysing dialects- which are created from a fusion of a multitude of languages and cultures- can grant.

1. Introduction

1.1 Background

Trinidadian English (TE), also known as Trinidadian English Creole/ Dialect, is one of the many varieties of English spoken in the Caribbean. Trinidad, where TE is spoken, is part of a twin island Republic with its neighbouring island Tobago, with the overall population being approximately 1.511 million (Worldometer, 2025). Despite the twin island republic being considered a single nation, Trinidadian English is a distinct variety from Tobagonian English.

Previous research into and analysis of TE has generally been done from more of a sociolinguistic perspective. Investigations tended to be conducted using factors such as socioeconomic class to group different realizations of the dialect (such as basilects, mesolects etc.) and to determine how much the realization diverged from standardized English(es)(SE) (James et al., 2020; Winford, 1992).

As a dialectal variety of English, the tense and aspect systems of TE and SE are not identical. Tense locates a situation in time: it is comprised of "*elements that restrict the temporal relation between an evaluation time (in matrix clauses, usually the utterance time) and a reference (a.k.a. topic) time (the time about which the clause makes a claim)*" (Matthewson et al., 2022). On the other hand, aspectual markers indicate something about the situation's distribution over time: these are "*elements that restrict relations between reference times and event (a.k.a. situation) times*" (Matthewson et al., 2022).

Of particular interest to this investigation is the apparent grammaticalization of the so-called habitual aspect in TE. The habitual aspect, as a subtype of the imperfective aspect, semantically expresses a repeated action or process. Mair and Binnick (2012) define habituality as "*repetition, or potential*

recurrence at regular intervals". As further argued by Green (2000), "*there is an element of "time" or "occasion" associated with the habitual reading of a sentence*". As in (1), while TE has a construction dedicated to grammaticalizing the habitual aspect, SE forms equivalents using adverbs of frequency, (Fortuin, 2023).

(1) I does read books (TE) = I (often) read books (SE)

The item '*does*' appears to be the marker which grammaticalizes the habitual aspect in TE. Two properties of this habitual '*does*' item are of immediate interest. Firstly, *does* never inflects to reflect the **φ** (person/number/gender) features of its subject. Secondly, there are two apparent constructions in which habitual '*does*' surfaces in TE. As in (1), habitual *does* forms a construction with an uninflected verb, but may also form a construction with the auxiliary *be* and either what appears to be the progressive form of the verb, or an adjective, as in (2a-b).

(2) a. She does be reading books. (TE) = She is usually reading books. (SE)
b. She does be tired. (TE) = She is usually tired. (SE)

1.2 Research Question

The primary direction of this study is to investigate these two possible grammaticalizations of the habitual aspect in TE. Previous literature connects the concept of habitually occurring events to the imperfect, suggesting that the habitual construction contains an imperfect verb form (Fortuin, 2023). Other approaches consider habituality to be a subtype of genericity: this refers to the 'generic' reading which arises from sentences such as (3) (Boneh et al., 2008).

(3) Lions are fierce.

This study proposes an analysis of the habitual aspectual form in TE, arguing that the form *does* which surfaces is a form of the auxiliary *do* with an inflectional affix attached, and that either the adjective or the apparent progressive form of the verb which surfaces alongside '*be*' is an active participle. These points of interest to the investigation are captured in the research question stated in (4) below.

(4) Research Question

What is the analysis of the morphosyntactic properties of the habitual aspect in Trinidadian English?

i. Why are there two constructions which grammaticalize the habitual aspect in TE?
ii. What are the morphosyntactic constraints on the auxiliary '*do*' in the habitual structure such that it always surfaces as '*does*'?
iii. What is the analysis of the participle-like item (the adjective or alternately the apparent progressive form of the verb which forms part of the structure with *be*)?

This investigation proceeds as follows. Section 2 aims to identify and label the item *does* more accurately, through examination of other auxiliaries in TE and briefly comparing the habitual structure in TE to invariant *be* in African American English (AAE). Section 3 discusses the difference between the two habitual structures by proposing labels to distinguish the two constructions. In section 4, a syntactic analysis of the two constructions is proposed, and section 5 briefly concludes.

2. '*Does*' / '*Does + be*': Auxiliaries?

2.1 Auxiliaries in TE Grammar

One of the conventional 'tests' to confirm whether an item is an auxiliary- or has auxiliary like properties- is whether it inverts with the subject in questions. However, TE grammar lacks subject-auxiliary inversion entirely, as in (5).

(5) What you was saying? (TE)
= What were you saying? (SE)

As in (2a-b), it is possible for the item *does* in the habitual construction to occur alongside an auxiliary, i.e. *be.* However, there are restrictions imposed by the grammar on how that specific construction of the habitual is realised. The item *be* cannot be inflected in this construction, but if *be* is followed by a verb, this verbal item must inflected, as in (6a-c).

(6) a. They does be working at that hour. (TE) = They are usually working at that hour. (SE)
b. *They does *is* working at that hour.
c. *They does be *work* at that hour.

In (6b), although the sentence itself is ungrammatical, a possible inflected form of *be* is suggested to be '*is*'. In the present tense of TE grammar, the item *be* always surfaces as *is*, independent of the **φ** features of the subject. This characteristic lack of agreement of **φ** features in TE grammar will be further discussed in section 4, in developing the syntactic analysis.

Do as a lexical verb also exists in TE grammar, and it can also be combined with the 'habitual *does*' construction, as in (7a-b).

(7) a. She does do everything for she children. (TE)
b. She (always) does everything for her children. (SE)

Comparing the two consecutive forms of *do*, they appear to play distinct roles in the sentence. In (7a), only '*do*', not '*does*' appears to be the lexical form of the verb. This can be confirmed looking at the SE equivalent in (7b), where the instance of the item *'does'* is reflected by the optional adverb of frequency. The role of lexical *do* is consistent across TE and SE.

2.2 Comparison with invariant "be" in African American English (AAE)

AAE is a variety of English which also possesses a habitual marker, which has been labelled as 'invariant *be*' (Zanuttini & Martin, 2017). In Collins et al. (2006)'s analysis of habitual *be* in AAE, he identified a structure which he labelled '*agentive be*', and suggested that the semantics of the structure implies '*deliberateness*' as in (8).

(8) Adapted from Collins et al. (2006)

a. If you don't be careful, you will be caught.
= If you are not careful, you will be caught.

Collins et al. (2006) note that agentive *be* can never precede negation, unlike standardized English equivalents. By building on the argument of Chomsky (1995), which states that auxiliary movement in English is motivated by the fact that they are semantically vacuous, Collins generalizes that agentive *be* acts like a non-auxiliary lexical verb, which is why it does not undergo overt raising (Collins et al., 2006).

Green (2000) further observes that habitual *be* in AAE also cannot host negation (i.e. cannot surface with inflected negation), which Green defines as a characteristic of an aspectual marker, as opposed to a finite auxiliary, as in (9a-b).

(9) Adapted from Green (2000)
a. *Becky be not/ben't watching the basketball games?
b. Becky be watching the basketball games?
= Is Becky (usually) watching the basketball games?

However, when considering the habitual *does/does be* construction in TE, negation is obligatorily inflected onto the item *does,* as in (10a-b).

(10) a. She doesn't (or: doh) read the newspaper.
b. She doesn't (or: doh) be reading the newspaper.

Comparing the observations made by Green (2000) and Collins et al. (2006) and the behaviour of the habitual construction in TE, it appears that the item *does* has properties of an auxiliary, but also properties of an aspectual marker. It is unlikely that *does* is a default form in TE grammar; while **φ** features of the subject are not inflected, tense and/or aspectual features are, allowing past tense forms as in (11).

(11) She done do that. (TE) = She already did that. (SE)

As such, it is proposed that the item *does* in the habitual construction in TE grammar is an auxiliary, *do*, with an aspectual, inflectional affix attached, *'-es'*, from which the habitual aspect is obtained.

3. Dispositional 'Does' versus Actualized 'Does be'

In an analysis of the habitual aspect in Tlingit, Cable (2022) proposes the concept of 'Actualization of Habits', adapted in (12).

(12) Adapted from Cable (2022)
Capacities/functions/occupations that have not been 'actualized' yet cannot be described by verbs in the habitual mode.

By 'actualized', Cable (2022) is referring to the fact that, for an action to be attributed as habitual, it must first be established that whatever or whoever is performing the action is capable of doing so (repeatedly). To demonstrate this, he uses an example with 'habitual *be*' in AAE, adapted in (13).

(13) Adapted from Cable (2022)
Scenario: We've just bought a new printer. It's never been used. But it

has the capacity to print a hundred pages a minute.

a. This printer print a hundred pages a minute.

b. # This printer be printing a hundred pages a minute.

If it has not yet been established that the specific printer in question is capable of printing one hundred pages a minute, habitual '*be*' cannot be grammatically used.

With these observations in mind, there appears to be a semantic restriction which constrains which habitual construction is grammatical in a given situation in TE. There is a difference in the semantics of the possible grammaticalizations of the habitual construction. In other words, the two possible structures in (14a-b) grammaticalize different types of aspectual meaning.

(14) a. They does read.

b. They does be reading.

For the use of (14b), where both *does* and *be* form the habitual structure, to be grammatical, the action of reading books must have been pre-established as a habit of the person(s) in question. This restriction on the usage of this habitual construction in TE aligns with the observations of Cable (2022) with regard to the necessity for habits and/or habitual actions to be actualized before they can be described using a habitual construction. Given the conditions required for grammatical use of the construction in (14b), the label *Actualized Does Be* is proposed to distinguish this construction from the one in (14a).

In contrast, there is no requirement for the action being described to have been pre-established or actualized for (14a) to be used. (14a) can semantically express either repetition of the action of reading books, or the capacity of the individual to perform the action of reading books. Previous literature has labelled the latter reading as '*dispositional*', and has also discussed habitual constructions being characterized in ways such that both a dispositional reading and a habitual reading can be accessed (Bervoets, 2014). Thus, the label *Dispositional Does* is proposed to characterize the habitual construction in (14a).

4.Morphosyntactic Analysis of *Dispositional Does* and *Actualized Does Be*

To begin, a summary of the key points to be discussed in the analysis is captured in (15).

(15) Key Characteristics of the Habitual Construction in TE

a. No agreement with **φ** features of the subject
b. Item '*does*' has been analyzed as auxiliary 'do' with an inflectional, aspectual affix attached ('-es')
c. Two structures are proposed: Actualized Does Be and Dispositional Does

The analysis of the participle-like item in the Actualized Does Be structure has yet to be discussed. Given that Actualized Does Be only occurs in a structure with an unambiguous habitual reading, it is proposed that the item in question is an active participle, which has an adjectival

interpretation (Bešlin, 2024). The interpretation of active participles has received attention in the literature: the question of whether they should be classified as adjectives or verbs is still being debated. However, in the Actualized Does Be construction, the action or state being described is being interpreted as an (actualized) habit which is characteristic of the individual in question, a characteristic of active participles. It is proposed that in the structure, this active participle will be represented as a complex category phrase; when present, the '-ing' suffix will be realized via a post-syntactic realizational rule, with the conditioning environments being the presence of a habitual feature [HAB] and the presence of the item 'be', as in (16).

(16) Realizational rule for the active participle in Actualized Does Be

$$a \leftrightarrow \text{-ing} / \left[\begin{array}{c} \text{HAB} \\ \text{BE} \end{array} \right]$$

In section 2.1, it was observed that the form of the verb realized in TE grammar does not agree with the **φ** features of its subject: there is a lack of spec-head agreement. While tense and aspectual information is inflected onto the verb, only a single form of **φ** feature agreement is ever realized, as in (17a-b).

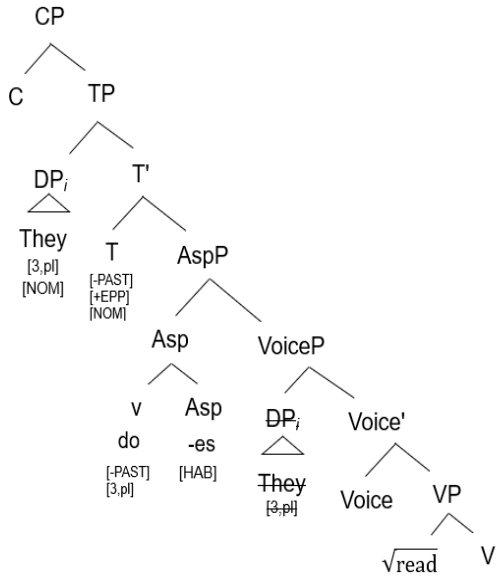
(17) a. Present Tense of 'BE' in TE: I *is*, you *is*, he/she *is*, we *is*, they *is*
b. Past Tense of 'SEE' in TE: I *see*, you *see*, he/she *see*, we *see*, they *see*

Leaving aside possible complications regarding the realization of the past tense in TE, a single consistent form of the verb is always realized, independent of the features of the subject. With these observations in mind, in building the syntactic structures for Actualized Does Be and Dispositional Does, it is proposed that the **φ** features of the DP subject are still assigned to the item *do* but are not morpho-syntactically realised. Features are proposed to be assigned via Bidirectional Agree, definition in (18) (Baker, 2008; Norris, 2017).

(18) **Bidirectional Agree**: Agreement of features between a probe with an unvalued feature F on head H and a goal G with a valued feature F is established through c-command. The probe may c-command the goal, or the goal may c-command the probe.

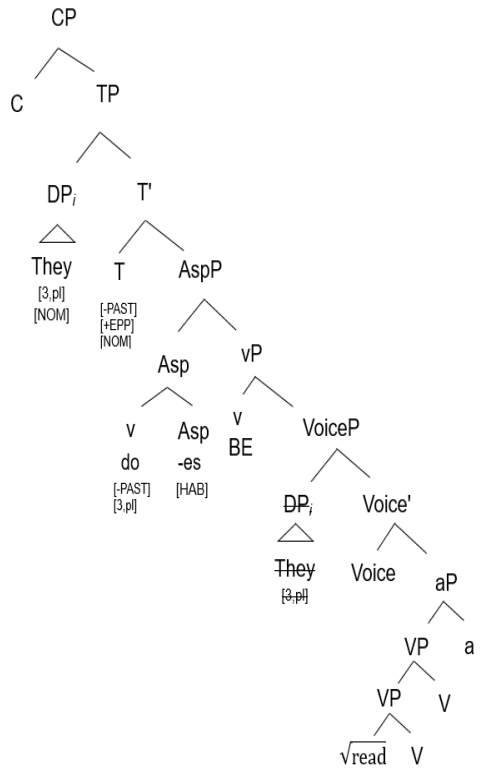
The sentences in (14a-b) are used to propose structures for Dispositional Does and Actualized Does Be, represented below in (19a-b).

(19) a. *Structure of Dispositional Does Sentence: They does read.*



b. *Structure of Actualized Does Be*

Sentence: They does be reading.



The established ordering of the projections in the verbal spine has been adapted and added to; the usual order has TP (the Tense Phrase projection) embedding PerfP (the perfect), which embeds ProgP (the progressive) which then embeds VoiceP (active/passive distinction) which finally embeds VP (Carnie, 2021). In both (19a) and (19b), an Aspectual Phrase (AspP) projection has been added to the VP shell, which hosts the item *does*. With other aspectual phrases in English, such as the perfect or the progressive, the aspectual affix undergoes post-syntactic lowering; as such, the inflection is realized on the following verbal projection. However, there is no lowering of the habitual aspectual affix to any other verbal projections in TE. This is another point where TE grammar deviates from that of SE.

The primary difference between (19a) and (19b) is the complex category phrase representing the active participle in (19b). The projection which hosts the habitual construction itself is proposed to be the same in both structures.

5. Conclusion

In conclusion, the grammaticalization of the habitual aspect in TE has been analyzed into two distinct structures: Dispositional Does and Actualized Does Be. This distinction has been proposed due to the difference in the semantics of the two ways in which TE grammaticalizes the habitual aspect. Compared to SE, there is a richer aspectual system in TE. Dialects are not subject to the conventional, often prescriptivist rules which constrain standardized varieties of language. As such, dialects provide an interesting perspective on how language can be realized: any given dialect will reflect facets of the diverse cultures and languages of the people who form the community which speaks it.

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Spelling-to-sound transparency and lexical quality among individuals in word recognition

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Abstract: Word transparency significantly influences reading efficiency by regulating cognitive load and lexical access. The study examines how spelling-to-sound transparency affects word recognition and whether this effect is affected by the Lexical Quality Hypothesis (LQH) (Perfetti & Hart, 2002). According to the LQH, how well a word's form (e.g., orthography, phonology) and its meaning (semantics) are encoded and connected determines reading ability. Higher lexical quality allows for reading efficiency and less effort across conditions while lower lexical quality leads to greater reading challenges. In order to test the LQH, a lexical recognition experiment with two tasks was conducted. First, a lexical decision task was used to assess word recognition reaction time and accuracy under varying degrees of spelling-to-sound transparency. Adapted from Edwards et al. (2024), stimuli included both transparent words (e.g., "man"; sound is predictable) and opaque (e.g., "bourgeoisie"; sound is less predictable). Secondly, a spelling recognition task (SRT) was conducted to measure individual differences in lexical quality (how well the words are encoded in an individual's mind). Participants were then asked to judge whether presented words were correctly spelled (e.g., "receipt" vs. "reciept"). Results from a multiple linear regression analysis showed that spelling-to-sound transparency and spelling ability significantly influenced response times in the lexical decision task. Poor spellers showed greater reaction time differences across transparency levels, with faster recognition for more transparent words while good spellers showed no differences regardless of transparency. The significant interaction effect suggests that lexical quality moderates the influence of transparency on word recognition supporting the LQH. Findings indicate that individuals with stronger lexical quality rely less on transparency for efficient word recognition.

1. Introduction

Lexical processing involves recognizing a word's written form and retrieving its meaning from memory (Perfetti & Hart, 2002; Perfetti, 2007). Visual word processing shows how words map to meaning and how this influences the cognitive load of learning, storing, and accessing words during language use (Seidenberg & McClelland, 1989). Additionally, individual differences in lexical quality significantly affect reading efficiency, with skilled readers tending to recognize words more quickly and retrieve meanings with higher accuracy, while less skilled readers may require more time, struggle to access word meanings and show reduced accuracy (Perfetti & Hart, 2002; Perfetti, 2007). Thus, lexical quality, linguistic properties (e.g., spelling-to-sound transparency) are critical for cognitive load and individual challenges in word processing.

Literature review - Normal reading acquisition can be strongly influenced by the consistency between a language's orthography and its phonology. As orthographies become more complex (e.g., morphological structure and spelling-to-sound mappings, etc.), reading development may be impacted.

Inconsistencies in these relationships can impact greater cognitive demands on learners and can hinder early decoding skills (Seymour, 2005; Edwards et al., 2024). Therefore, word recognition with respect to more deep orthographic languages such as English may offer more challenges to readers. This difficulty arises not only from irregular word-level spellings but also from unpredictability in their pronunciation of consonants and vowels. For example, the same vowel /a/ can be pronounced differently in *cat* [kæt], *cake* [keɪk] and *father* [fɑðər] (Edwards et al., 2024). Similarly, consonants also show variation in sound as exemplified by the letter *g,* which is pronounced as /ɡ/ in *go* [ɡoʊ], but as /dʒ/ in giant [dʒaɪənt], and it is silent in *knight* [naɪt]. Another interesting example is the /f/ sound which is spelled inconsistently, as it can be seen in words like *phone* [foʊn] and *cough* [kɔf]. These irregularities may increase cognitive load and make word reading challenging.

According to Perfetti and Hart (2002), the extent to which a reader knows each word in terms of its orthographic form (spelling), phonology (sound) and semantics (meaning) determines the efficiency of word recognition where high-quality lexical representations support automatic processing and facilitate comprehension. Therefore, readers with stronger lexical knowledge may process words more efficiently than less skilled readers. This raises a question about whether spelling-to-sound transparency would be affected by the differences in lexical quality of readers.

Another area where lexical quality might be relevant is the decoding strategies. Ehri (1998) proposed that there is a linkage between knowing the letter to sound mapping which can be important to skilled reading. Conversely, weaker lexical representations may rely more on grapheme-to-phoneme conversion. When spelling-to-sound mappings are irregular, decoding strategies become less effective (Ehri, 1998) (e.g., *knight*; the graphemes show *k-n-i-g-h-t* and phonemes */n/-/aɪ/-/t/*, the silent *k* and *gh* letters are not pronounced) and may result in increased processing difficulty for less skilled readers.

Thus, how readers process different transparencies of words is not yet well understood particularly when considering words that vary in these spelling-to-sound transparency mappings. For example, do skilled readers with stronger lexical knowledge process both regular and irregular words (*e.g., cat, cough, knight*) more evenly? Moreover, are both skilled and less skilled readers affected by transparency (e.g., spelling-to-sound) to a similar degree or is one group affected more?

Purpose - The present study investigated how spelling-to-sound transparency interacts with individual lexical quality differences in reading ability to influence word recognition during reading by focusing on the cognitive demands associated with spelling-to-sound transparency. Therefore, the study aimed to clarify how orthographic transparency affects reading efficiency and to identify which readers' statuses (e.g., skilled vs. less skilled) are most sensitive to these differences. The study contributes to a more acute understanding of the relationship between the linguistic properties of words and the reader's internal lexical representations (Perfetti, 2007).

Research questions & Hypothesis - The research questions are as follows: (1) does spelling-to-sound transparency influence word recognition and (2) how do individual differences in lexical quality (as measured by the SRT) influence processing of words?

It is hypothesized that transparent words will be recognized faster than opaque words because consistent spelling-to-sound mappings utilize less effort on word recognition processing. Moreover, readers with higher lexical quality representation are expected to show reduced performance differences between transparent and opaque words as their well-integrated lexical representations facilitate processing regardless of transparency. On the other hand, readers with lower lexical quality are predicted to experience greater difficulty with opaque words, relying more on surface-level decoding strategies that are disrupted by irregular orthographic patterns.

2. Methodology

Participants - Participants were undergraduate university students who were native English speakers (N= 15). One participant was excluded from the data analysis because of the participant's struggle with English, as identified by the fact that they were sounding all words out loud and asking questions such as "is this a spelling mistake?" (N=14). Participants were assigned through SONA, using their university email to create an account and select the best time slots. Although specific demographic information such as age and gender was not recorded, participants were estimated to be between 18 -25 years old. All participants received a course credit by participating in the experiment.

Design - The experiment was developed with PsychoPy further utilizing a multiple linear regression model where we tested whether transparency (from the lexical decision task ratings) and lexical quality (correct misspelling identification scores in SRT) could predict response times.
Stimuli - The first task was the lexical decision task (LDT) (Meyer & Schvaneveldt (1971). The task consisted of 207 trials which included 160 real words (70%) and 47 non-words (30%) for the LDT. The real words were selected from Edwards et al. (2024) which provided ratings for spelling-to-sound transparency based on adult judgments using a 1-6 Likert scale. The scale rated how easy it is to map a word's spelling to its pronunciation, with 1 indicating high transparency and 6 meaning low transparency [e.g., rating range from the transparent word *Man* (1.08) to *Bourgeoisie* (5.5)] (Edwards et al., 2024).

The rating study conducted by Edwards et al. (2024) explored the 20,000 most frequent English words selected from the English Lexicon Project. From the dataset, we randomly selected 1,000 words then further narrowed it down to 160 words using an R package to ensure that the final selection of the dataset followed a normal distribution (e.g., bell curve). With respect to non-words such as *srping, cordre, compteru*, they were constructed using pseudo-random letter sequences. All trials were randomized.

The second task was a paper-based spelling recognition test (SRT) designed to measure the individual's reading ability (e.g., lexical quality). The test included 88 items

which varied in length (e.g., 5 to 14 letters) and contained both correctly spelled and misspelled words (e.g., *benefit* vs. *benafit).*

Procedure - Our study was conducted at the university lab. Participants arrived at the lab individually and were shown a consent form, which they were kindly asked to read carefully before signing their name to confirm their voluntary participation without any risk and harm. After the participants signed the consent form, debriefing sheet was given to participants in which they were further asked not to share details of the study with others, as prior knowledge could affect future participants' performance or results. Participants were briefly instructed on how to participate in the study, on their rights to withdraw at any time without losing course credit, and on the purpose of the study (including an explanation of why we would be measuring the speed of their responses). Finally, we assured each participant that their anonymity would be preserved.

Moreover, for the LDT, participants were seated in front of a Windows computer at a normal viewing distance. They read each word string displayed on the screen and pressed 'F' for a real word and 'J' for the non-word. Participants were instructed to respond as quickly and as accurately as possible by pressing the aforementioned keys. Only correct responses times (RTs) were recorded. After completing the LDT, the participant were immediately moved to the SRT in the same lab session. In the SRT, they were asked to circle misspelled words that they believed were incorrect from a mixed list of correctly and incorrectly spelled words. The correct identification to misspelling scores were recorded. Overall, the entire experiment time lasted about 30 minutes.

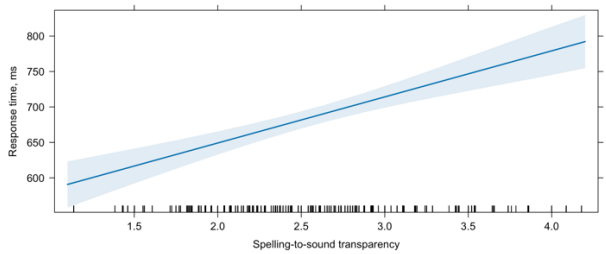
Analysis - Data analysis used the R statistical software where a multiple linear regression model was further utilized. Outlier removal was based on the method described by Keuleers et al. (2012), using the 3xIQR rule (interquartile range). Firstly, response times (RTs) below 200ms were removed due to a visual check from the boxplot as some responses may have been too fast and may not reflect true lexical processing. Next, response times data were checked for each participant due to their different response speeds. Trials with RTs greater than 3xIQR above the 75th percentile or below the 25th percentile were identified as outliers and removed. This method led to the exclusion of two trials, representing 13.33% of the remaining dataset and these trials had RTs ranging from about 2319ms to 2355ms which may reflect unfamiliarity rather than typical word recognition. Lastly, the overall accuracy of the LDT was a 95% and 73% for correctly identified misspellings of the SRT after data cleansing.

3. Results

Multiple linear regression was used to examine whether word frequency (Freq_HAL), word length, spelling-to-sound transparency (Rating), lexical quality (Spelling scores) and their interaction significantly predicted response time (RT in millisecond) on word recognition. The fitted regression model was: RT = 787.7 + 65.01×(Rating) − 3.96×(Spelling_score) + 2.32×(Length) + 0.00000317×(Freq_HAL). The model was statistically significant, F (4, 1957) = 16.96, p < .001, explaining

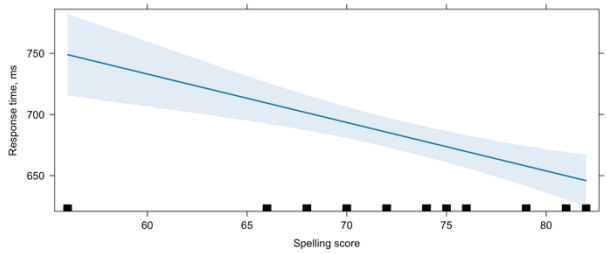
approximately 3.4% of the variance in RT (R^2 = .034). A significant main effect of rating was observed, **β** = 65.01, p < .001, indicating that opaque words take longer response times (see Figure 1).

Figure 1 – Transparency on response time



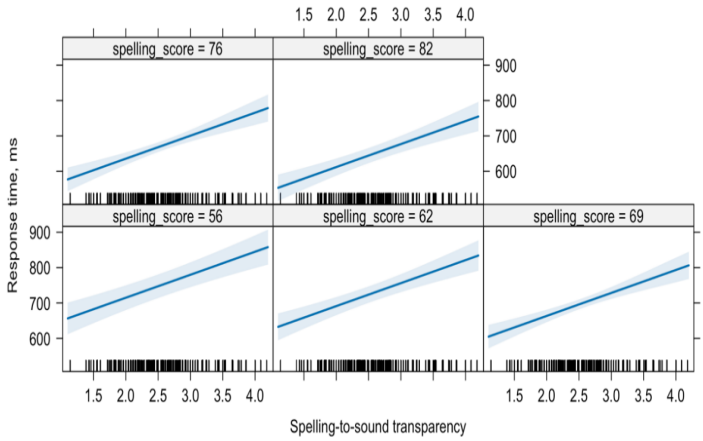
A significant main effect was also found for lexical quality, **β** = –3.96, p < .001, suggesting that individuals with higher lexical quality responded faster across all word types (see Figure 2).

Figure 2 – Spelling scores across word type on response time



In contrast, word frequency (p = .895) and word length (p = .377) were not significant, indicating frequency and length of words may likely minimally effect in this context. The interaction between transparency and lexical quality was not significant, **β** = 0.48, SE = 1.59, t(1956) = 0.31, p = .76, indicating that the effect of transparency on RT was consistent regardless of participants' lexical quality (e.g., spelling ability) (see Figure 3).

Figure 3 – Transparency interacting with Spelling score on response time



4. Discussion

The study investigated how spelling-to-sound transparency and individual differences in lexical quality influence word recognition. Our research questions were: (1) does spelling-to-sound transparency influence word recognition and (2) how do individual differences in lexical quality (as measured by the SRT) influence processing of words?

We proposed two main hypotheses: first, words with higher spelling-to-sound transparency would be recognized more quickly than opaque words. Second, individuals with higher lexical quality would show minimal differences between transparent and opaque words, while less lexical quality readers would struggle more with opaque words.

Following our first hypothesis, we found that spelling-to-sound transparency significantly influenced response times. Words with less transparency took longer to

be recognized in line with Seymour et al. (2005) who emphasized the critical role of orthographic transparency in lexical access efficiency. It also supports the decoding-based models of reading difficulty (Ehri, 1998).

For the second hypothesis, we found that lexical quality (as indexed by SRT scores) also significantly affected response times. Participants with higher lexical quality showed faster and higher scores than lower lexical quality readers in line with the Lexical Quality Hypothesis.

Interestingly, across all panels, we observed a consistent positive trend as spelling-to-sound transparency increased and so did the response times. Also, response time increased regardless of spelling ability. This may suggest that more opaque words were generally processed slower by readers, partially supporting our second hypothesis where we hypothesized that the transparency level would not matter for skilled readers, but opaque words would affect less skilled readers in a more pronounced way.

Although these effects did not reach statistical significance, the uniform direction of the slopes strengthens the interpretation that spelling-to-sound transparency consistently affects processing. Notably, readers with lower spelling scores (e.g., score = 56) show a stronger slowdown in response times compared to readers with higher spelling scores (score = 82).

However, the interaction between transparency and lexical quality (spelling ability) was not statistically significant. This may seem surprising given previous research highlighting differential processing strategies across readers' skill levels (Perfetti & Hart, 2002). One possible explanation may be due to the relatively small sample size limiting the statistical power to detect interaction effect.

Lastly, the small amount of variance (3.4%) explained by the model suggests that while transparency and lexical quality are important, other factors such as morphological complexity and word familiarity likely also contribute to response time differences. Besides the small sample size, another limitation is that although all participants were university students, the study did not directly assess or control for their lexical quality beyond the spelling measure. Future research could build on these findings by including additional linguistic properties and using larger samples.

5. Conclusion

The results add to the growing body of data highlighting the contributions of word transparency and lexical quality to reading efficiency. They further support the LQH by showing that stronger lexical representations facilitated word processing.

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Multilingual Environments: A Literature Review and Implications for Education

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Abstract: In multilingual settings, children are exposed to multiple languages simultaneously, each shaping how they acquire new vocabulary. This paper reviews recent research (2020–2025) to explore how children learn words in such environments, focusing on key factors like language dominance, cognitive flexibility, translanguaging, and social interaction. Drawing from studies in linguistically diverse societies, this review highlights how children manage multiple languages in real time, often developing unique strategies for word learning. The paper also identifies educational implications, emphasizing the need for inclusive, culturally responsive, and linguistically rich learning environments.

1. INTRODUCTION

In an increasingly globalized world, multilingualism is becoming more common among children, especially in linguistically diverse societies. Understanding how children learn new words in such environments is crucial for educators, parents, and policymakers. Unlike monolingual children, multilingual learners navigate complex language input, negotiate meaning across linguistic systems, and develop strategies unique to their experience (Bialystok, 2021, p. 19).

Research over the past five years highlights that multilingual word learning is influenced by multiple factors, including language exposure, social context, cognitive flexibility, and code-switching behavior (Hansen et al., 2025, pp. 2–5). These children often learn words not only through direct instruction but also through interaction in culturally layered and linguistically dynamic environments (Huang, 2025, p. 39).

This review focuses on recent empirical studies (2020–2025) that explore how multilingual children acquire vocabulary and what that implies for effective educational practices. By synthesizing current findings, the paper aims to identify consistent themes and propose practical applications for inclusive, multilingual pedagogy.

2. LITERATURE REVIEW

Language dominance affects initial vocabulary learning. Children tend to acquire new words faster in their stronger language but may transfer knowledge across languages when there are similarities (de Diego-Lázaro, 2021, pp. 2543–2546).

Code-switching is now understood as purposeful, not random. Huang (2025) identifies how bilingual children switch languages for clarity, emphasis, or emotion showing advanced language control (pp. 39–43).

Translanguaging where children blend languages fluidly, gives them access to all their linguistic resources and deepens understanding (Garcia & Wei, 2022, pp. 35–40).

Cognitive flexibility a strength in multilingual children, supports working memory and attention—key for learning and recalling words. Hansen et al. (2025) found code-switching
enhances these skills (pp. 4–7).

Cultural and social contexts play a vital role. Children learn best when classroom language reflects their lived

experiences and home languages (Kim & Park, 2023, pp. 152–155). Balanced exposure to languages also matters. Ndlovu & Chan (2023) observed better vocabulary growth when children received regular, meaningful input in all their languages (pp. 88–90).

3. KEY FINDINGS AND THEMATIC INSIGHTS

1. Language Dominance Shapes Learning
Dominant languages provide a base for learning, but children can transfer knowledge across languages effectively.

2. Code-Switching is a Communicative Tool
Used strategically by children to adjust meaning, match social cues, or clarify thoughts.

3. Translanguaging Builds Deeper Understanding
Mixing languages helps children access concepts faster and explain ideas better.

4. Cognitive Advantages Aid Word Learning
Multilingual children develop better focus, memory, and problem-solving skills.

5. Cultural Relevance Improves Retention
Learning is enhanced when language instruction connects with the child's identity and environment.

4. IMPLICATIONS FOR EDUCATION

- Use students' strongest language as a starting point while building others gradually.
- Embrace code-switching in the classroom as a valid way of expressing meaning.
- Apply translanguaging strategies to let children think and respond in multiple languages.
- Create activities that stimulate cognitive flexibility like categorizing, switching tasks, or storytelling across languages.
- Design lessons that reflect students' cultural and linguistic backgrounds.
- Ensure students hear and use each language regularly through stories, songs, and dialogue.

5. CONCLUSION

Multilingual children do not merely juggle languages—they actively construct meaning across systems. Their ability to switch, mix, and flex language based on context is a strength. This paper reveals that vocabulary development in multilingual settings thrives on balanced exposure, cognitive flexibility, and culturally inclusive teaching. With intentional support, these children can achieve rich and diverse linguistic competence, becoming confident communicators in all their languages.

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Refining a task to estimate short-term memory capacity for non-verbal rhythm

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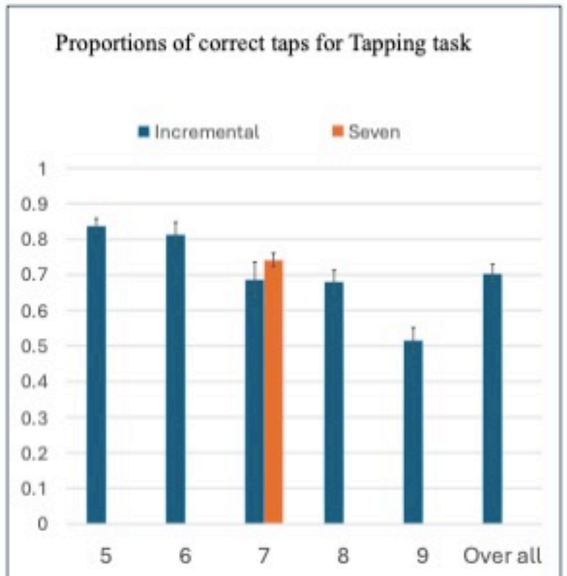
Introduction

Previous studies have linked phonological short-term memory (STM) to auditory temporal processing, but the mechanisms underlying this relationship remain unclear. This study sought to refine a task for studying individual differences in rhythmic STM. Replication of previous results relating rhythm STM to phonological STM were used for task validation. Preliminary results are reported for two variants of the rhythm STM task.

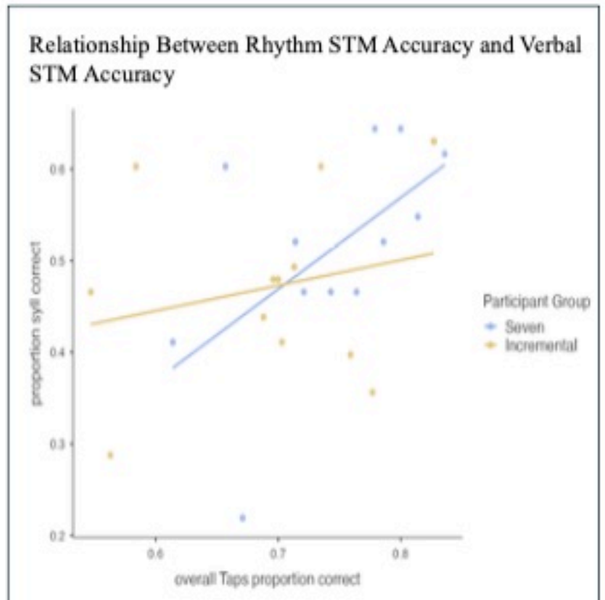
Methods

- Thirty-seven undergraduate students were divided into two groups that had to reproduce sequences of short (200 ms) and long (600 ms) beeps by **tapping**.
- For one group (Incremental), the sequence length increased from 5 to 9 beeps. Four sequences of each length were presented. The other group (Seven) was presented with twenty fixed-length 7-beep sequences.
- Participants then completed a **nonsense sentence repetition task**, with recall accuracy measured at the word, syllable, and consonant levels for verbal STM.

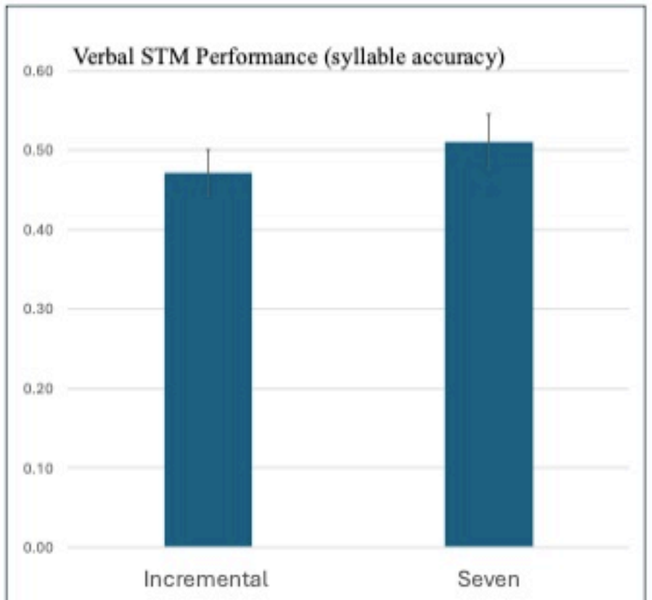
Results



- Accuracy in correctly remembering short and long beeps in the incremental vs. seven conditions was measured.
- Sequences of lengths 5 and 6 had the highest accuracy.
- The accuracy for sequence length 7 was similar in both conditions.
- The sequence of length 9 was too different, and performance varied too randomly for most participants.
- The overall score for sequence length 7 in the seven-condition was similar to that in the incremental condition.



STM for temporal patterns was correlated with STM for repetition accuracy for pseudo-word sentences (verbal STM).



Participants in the two STM conditions performed similarly in verbal STM.

Conclusion

The **Seven-condition** was completed in less time than the **Incremental condition**, yet both produced similar results for sequences of length seven, with 4 trials in the Incremental and 20 trials in the Seven condition.
Further analysis of the incremental tapping task with 105 undergraduate participants showed that performance declined as sequence length increased. Participants were most accurate on 7-beep sequences and least accurate on 9-beep sequences, suggesting that longer patterns were more difficult to reproduce due to greater memory and motor demands.

Exploring Geminate-Singleton Contrasts Among Arabic Heritage Speakers

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INTRODUCTION

- Gemination is a contrastive feature in Arabic, where the length of the consonant changes meaning (e.g., /kasar/ "he broke" vs. /kas:ar/ "he smashed"). Geminate consonants typically have longer durations than singletons; these contrasts can weaken in Heritage speakers (HS) due to English dominance (Oh & Redford, 2011; De Iacovo et al., 2023; Rafat et al., 2017).
- Gemination differences vary by consonant type, with stops typically most distinct and fricatives and nasals showing more variability (Kawahara, 2007; Al-Tamimi & Khattab, 2018; Podesva, 2002).
- Cross-dialectal studies on gemination in Arabic are limited, with some studies suggesting dialectal variation impacts gemination realization (Khattab & Al-Tamimi, 2008; Almutairi, 2021).

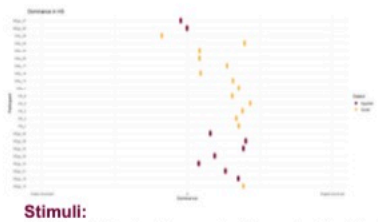
OBJECTIVES

- Singleton-geminate differences in HS and NS
- Dialectal differences in HS and NS
- Dominance effects in HS

METHODS

Participants: 44 Arabic-English bilinguals (F: 31, M:13)

	HS	NS
Egyptian	**Total**: 9 (M: 2 F: 7) Mean **age**: 23.59 years (SD: 12.39). Age of arrival: 8.7 years (SD: 6.1 years)	**Total**: 9 (M: 4 F: 5) Mean **age**: 19.57 years (SD: 1.27 years). Age of arrival: 14.87 years (2.47 years)
Syrian	**Total**: 13 (M: 3 F: 10) Mean **age**: 24.83 years (SD: 14.05). Age of arrival: 11.9 years (SD:11.2 years)	**Total**: 12 (M: 4 F: 8) Mean **age**: 26.45 (SD: 16.37 years). Age of arrival: 19.71 years (8.25 years)



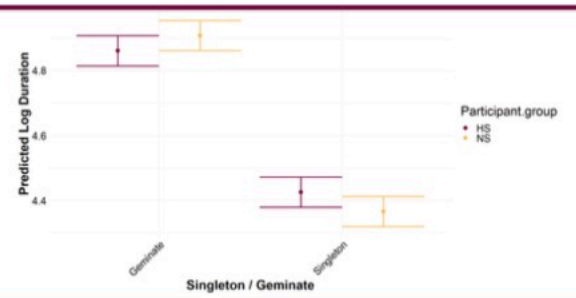
Stimuli:
- 84 bi-syllabic Arabic words: 42 geminate, 42 singleton
- 14 target consonants in word-medial position
- /k/, /t/, /t̪/, /b/, /d/, /f/, /s/, /ð/, /m/, /n/, /l/, /r/, /j/, /ʕ/

Procedure
- Each target word embedded in the carrier phrase: **/ʔna ʔqu:l _ ʔlʔa:n/** ('I say _ now'), read from slides

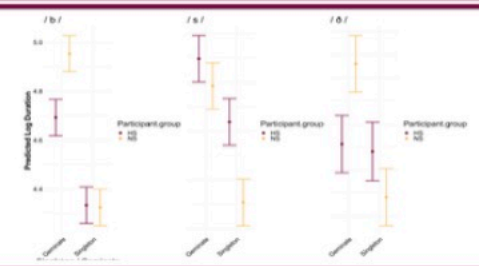
Data Analysis:
- **3,690 tokens** analyzed using **Praat**

RESULTS

Group effects:
- Geminate > Singleton ($p < 0.001$)
- HS = NS ($p = 0.16$)
- Sig. interaction but pairwise comparison show non-significance between:
  - NS singleton = HS singleton,
  - NS geminate = NS geminate

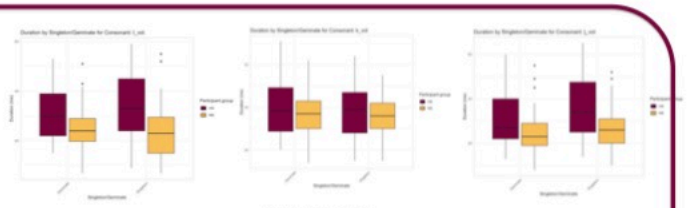


Consonant individual effects:
- Significant interactions found for /b/ /t̪/ /l/ /m/ /n/ /s/ /ð/ /ʕ/.
- Pairwise comparisons show that the contrast is neutralized for /ð/, /s/ and /b/.

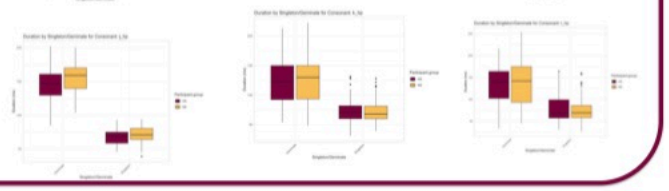


VOT and closure duration differences:
- VOT: Sig. difference in VOT for singleton vs geminate **only** in /t̪/ ($p = 0.02$).
- VOT: Lack of interaction group and singleton vs. geminate.
- Closure duration: non-significant

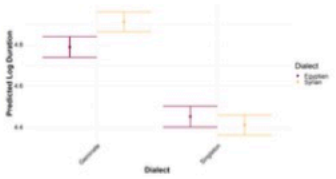
VOT

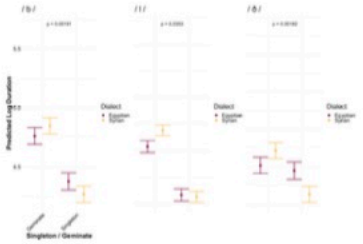


Closure duration



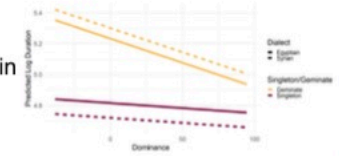
Dialect effects:
- Geminate Egyptian < Geminate Syrian ($p = 0.017$)
- Singleton Egyptian = Singleton Syrian ($p = 0.73$)
- No interaction Dialect × Singleton Geminate × Group





Dialect effects:
- Significant interactions found for /b/, /l/, /ð/
- Pairwise comparisons show that the contrast is neutralized for /ð/.

Dominance Effects
- No overall effect of dominance.
  - But dominance predicted differences in singleton – geminate only for /k/ in the consonant specific models.



DISCUSSION

- NS maintained **clear geminate-singleton contrasts. HS** maintained most contrasts except for /ð/, /s/ and /b/, supporting results showing overall maintenance of the contrast (see **De Iacovo et al. [2023]** for Italian or Rafat et al. [2017] for Farsi).
- Our study provides further evidence for an overall robust encoding of singleton-geminates, a contrast encoded at the phonological level (see Natvig, 2020).
- Findings partially align with **Alkhudidi et al. (2020),** showing that fricatives have the lowest ratio between singletons and geminates. Our results similarly showed neutralization for fricatives /s/ and /ð/.
- Dominance in HS does not significantly affect singleton-geminate maintenance, except for /k/, indicating overall low effects of dominance. It is possible, thus, that HS are exposed to input with generational erosion (see for English-Farsi bilinguals [**Rafat et al., 2017**]).
- Egyptian geminates are significantly shorter (contrast neutralized for /ð/) than Syrian ones, we will examine vowel durations for this contrast in the near future. However, no triple interaction between type of speaker, dialect and type of consonant. Thus, Egyptian HS are not differentially affected by the shorter geminates

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This work was partly funded by the Canadian NSERC grant RGPIN-2018-06518.

An Investigation of *=lu* in the Language of Inuktitut

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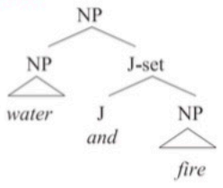
INTRODUCTION

Coordination



(Zhang 2023)

- Joining two elements with a coordinator

J-set theory

- Binary merge creates the structure
- Coordination and modification share the same underlying J-set structure
- Two conjuncts must be the same syntactic category

Inuktitut

- Zhang's (2023) theory assumes that if a language has intersective coordination, it must also have predicate modification since both use the same semantic operation
- Compton (2012) claims that Inuktitut lacks predicate modification
- *=lu* appears to behave like a coordinating structure

RESEARCH QUESTION

- Do J-sets fully account for the structure of coordination in all languages?
- This project examines the behaviour of *=lu* within different environments and aims to find a theory to account for the structure of *=lu*.

LANGUAGE DATA

Plural Pronoun Constructions & Associative Plurals

- Enclitic *=lu* adds a group member to plural pronoun or a noun
- Obeys person hierarchy

[Kelsey=lu (uvagut)]niqi-liuq-tugut

Kelsey=also (1P) food-make-INTR.1P

'I+Kelsey are cooking.'(not: 'we+Kelsey')

Eva-kku [pani-nga=lu]

Eva-ASSOC daughter-POSS.3S/3S=also

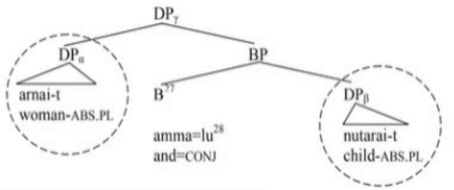
'Eva + her daughter'

Ammalu

- Free morpheme
- Appears between two conjuncts
- Links conjuncts of the same type
- Used by younger speakers

Doubling

- *=lu* can appear on both conjuncts
- Does not follow the typical rules for comitatives



Nominal Coordination

- *=lu* attaches to the second conjunct
- *=lu* can double
- *=lu* and *ammalu* can co-occur
- Only attaches to nominalized clauses?

Clausal Coordination

- *=lu* cannot double
- Only appears on the second conjunct
- Cannot cooccur with *ammalu*

THEORIES

Universal Coordination

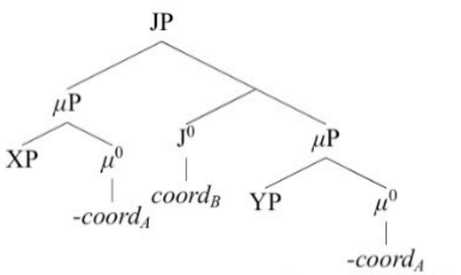
- Coordination is built from two main types of syntactic heads
- μ-type: expresses subset inclusion
- J-type: expresses intersective set building

=lu

- Not a pure comitative coordinator or pure μ-type coordinator
- Used in some clausal coordination when clauses are participials or nominalized
- Cannot double in clauses

Ammalu

- Behaves consistently as a J-type



(Schuurman 2019)

- In each conjunct there is an embedded μ head that introduces a coordination marker
- J-head sits in between and forms coordination on a larger scale

CONCLUSIONS

J-head

- In both J-set theory and Universal Coordination, J forms a set

μ-head

- Introduces morphological layer
- Explains doubling morphology cross linguistically

Universal coordination

- Accounts for Boolean coordination
- Accounts for group forming coordination
- Cannot fully account for the behaviors of *=lu*

Analysis

- Coordination requires two types of heads: μ head and a J head
- Universal Coordination adds the μ-type layer to the J-set theory
- *=lu* functions beyond μ head coordinator
- May signal subset forming groups with something already established in the discourse

REFERENCES & ACKNOWLEDGEMENTS

Thank you to the Office of the Vice President (Research) for funding my project and the faculty of Humanities. Thank you to my supervisor Dr. Kučerová for her support which has been crucial in the development of this work.

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Are Some Graduates Getting Lost in Translation?

How first language and immigration status impact Canadian college graduate income

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INTRODUCTION

- There is a common misconception that education = opportunities. This is not always true. Other factors (i.e., language, immigration status) are also important.
- Language ability is key human capital [1, 2].
- There is a gap in work on the role of first language (L1) and immigration status on Canadian college graduate income [3].
- We are examining the interaction of
  - **first language**
  - **language of schooling**
  - **immigration status**

  to predict **income after graduation**

RESEARCH QUESTIONS

1. How much does domestic status buy graduates with the same L1?
2. How much does speaking English/French as L1 buy graduates?
3. Is there an income difference between getting an English or French college education?

CONTROL VARIABLES

- Program type
- Marital status
- Gender
- Province of residence
- Age/years out of school

METHODS

- Microdata from Statistics Canada Research Data Centre datasets:
  → **Postsecondary Student Information System, T1 Family File**
- Considered only those people who completed **one** college program in a Canadian province
- Linear regression models were fitted to answer the research questions while controlling for the mentioned control variables.

RESULTS

The education system does not serve all graduates equally

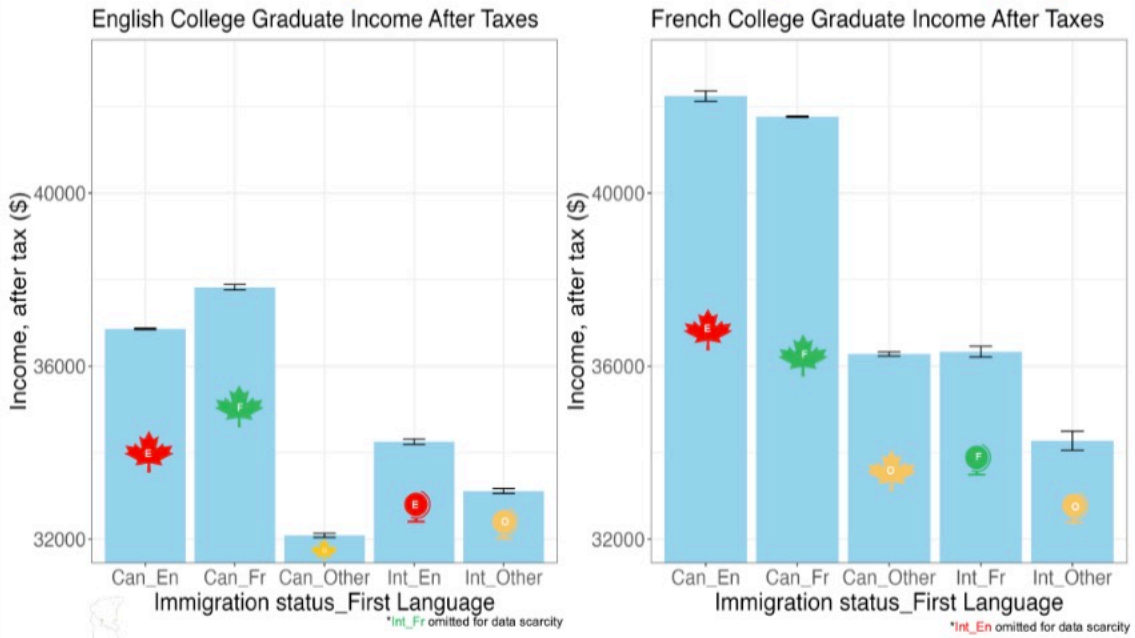

Figure 1. Estimated incomes after taxes for graduates by L1 and immigration status, per language of college instruction: English (left panel) and French (right panel). Imm_lang shows the L1 and immigration status: "Can" stands for the domestic student status, "Int" for visa status, "En" for English L1, "Fr" for French L1, and "Other" for the L1 that is neither English nor French. Error bars represent ±1SE.

RQ1

- For English college graduates, being a domestic English L1 buys you $2606 more/year
- For French college graduates, being a domestic French L1 buys you $5432 more/year

RQ2

- For domestic students, being English L1 vs Other L1 buys you $5366 more/year and being French L1 vs Other L1 buys you $5610 more/year

RQ3

- Graduating from a French college buys you ~$3000 more/year

IMPLICATIONS

- International status is the most impactful barrier.
- Granting domestic status to international students with English/French as their L1 would greatly improve earnings.
- Some improvement can come from investing in French language education for domestic students in French colleges. This improvement is comparable to giving domestic status to English/French L1 international students.

CONCLUSION

- Education cannot be deemed an equalizer.
- Variables like L1, language of schooling, and immigration status have large impacts on income post graduation.

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