

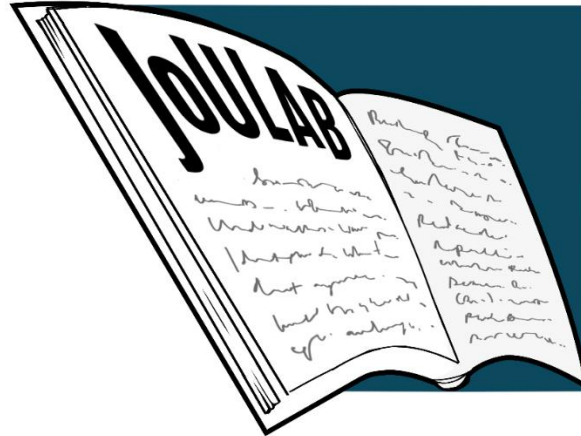
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The *Journal of the Undergraduate Linguistics Association of Britain* (ISSN 2754-0820) was founded in July 2020 as a Subcommittee of the Undergraduate Linguistics Association of Britain. It is the only academic journal in the world taking submissions solely from undergraduates in any area of linguistics. The Journal exists to provide a forum for the publication of exceptional undergraduate research in linguistics for students across the globe and from any background. In so doing, it seeks to offer undergraduate students an introduction to academic publishing and standard practices in academia, including the opportunity for undergraduates to have their research reviewed. We aim to publish at least two issues per twelve-month period, with each volume corresponding to the Editorial Committee that oversees its production. Every manuscript is peer-reviewed over multiple rounds by two members of the Board of Reviewers, which consists of doctoral students in linguistics from a plethora of countries and institutions.

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Foreword from the Editor and the Head of the Board of Reviewers

After the success of Issue 1, we are delighted to bring you JoULAB, Volume 1, Issue 2! Going from strength to strength, the Journal has expanded in many ways since our first publication. We've recruited more dedicated members of the Board of Reviewers, sharpened our submissions and reviewing processes, and have been growing our reach with the assistance of our parent organisation, ULAB. Our overarching objective is to establish ourselves in the field as *the* publication to which every great linguist submitted their first piece of research. Along the way, we have strived to improve upon and innovate the conventional practices of traditional journals: we have face-to-face meetings with every reviewer to ensure a degree of familiarity with the Journal; we provide in-line feedback on authors' manuscripts to circumvent review vagueness; and we prioritise a submission's potential rather than expecting a finished product on day one.

In Issue 2, we present more world-class undergraduate research to the global linguistics community. Lucy Gill's *Pay Attention: A Labovian Study into the Production of Dental Fricatives by German Speakers of English* is a fascinating investigation into the influences of register and speaker attention on the production of certain non-native phonemes. Intriguingly, Gill finds that where L2 participants were requested to read a wordlist aloud, there were fewer productions of dental fricatives than predicted by trends found amongst L1 speakers. In Martin Renard's paper, *Revitalising Kanyen'kéha on the Grand River: A Case Study of Indigenous Language Revitalisation and its Theoretical Implications*, readers will be treated to a wonderful fusion of fieldwork and formal linguistics. Renard considers the implications of the teaching methods of an indigenous language school in Canada on morphological theory, reaching interesting conclusions on the constructive vs. abstractive debate. Our final paper, Emma Laird's *Acquisition of Plosive Perception in Korean L2 Learners*, makes for a thought-provoking read for those working in speech perception and second language acquisition. In a perception study of Korean plosive consonants, Laird finds that L2 Korean speakers showed less accurate perception than even L1 English listeners with no experience of Korean.

This publication marks the end of Tom's tenure as Editor of the Journal. Reflecting on almost two years reveals about the experience a number of similarities with being involved in a start-up. Feelings of elation at receiving the first submission, excitement in growing our audience online, pride in watching the professional development of those recruited, and hope in seeing the Journal's sophistication advance all come to mind. Both Tom and Liam wish to give particular thanks to the previous Head of the Board of Reviewers, Bran Papineau. Their passion for providing opportunities to others and for academic rigour made up the backbone of the Journal, and their sharpness, passion, and cheekiness have been difficult to replace. So too is our gratitude owed to Eleonora Kael, in whose role as Associate Copyeditor for over a year she set consistently high standards for quality, detail, and dedication. We also thank you, for reading, and hope you enjoy this issue!

T. R. Williamson,
Editor, JoULAB
University of Cambridge

Liam McKnight,
Head of the Board of Reviewers, JoULAB
University of Cambridge

Foreword from the National Chair of ULAB

I am thrilled to have a part in bringing you Issue 2 of the Journal of the Undergraduate Linguistics Association of Britain. JoULAB has continued to grow since the publication of Issue 1, with over twenty more reviewers being recruited. We have also received many more submissions since reopening submissions on a rolling basis, and hope to receive even more in the coming months, as current final-year undergraduates finish their dissertations. The authors published in this issue have carried out fascinating research and worked hard to perfect their articles in response to the comments of our expert reviewers. I hope that publication in our Journal is an achievement these authors are proud of, and one that assists them in achieving their long-term goals. I am also optimistic that the work published here will encourage and inspire current and incoming undergraduate students to undertake their own research in linguistics.

A huge amount of hard work has gone into this Issue, and I am incredibly grateful for all of the time and effort that our Editorial Committee, including our copyediting team, and the Board of Reviewers have put into the Journal over the last year; I am consistently impressed by the ideas, enthusiasm, and initiative of all of my fellow Subcommittee members.

I would like to thank the ULAB Webmaster, Louis Van Steene, for creating a well-designed platform on which we can host the Journal and all its related information, and my fellow JoULAB Associate Editor Lydia Wiernik for designing beautiful front and back covers for this issue. Since Issue 1 we have also recruited a new Head of the Board of Reviewers, Liam McKnight, who has shown impressive dedication to improving the future of the Journal, through evaluating and updating our policies and structures, with the aim of eventually making the Journal suitable for indexation in the Directory of Open Access Journals.

Finally, I would of course like to thank the JoULAB Editor, Tom, whose term as JoULAB Editor is coming to an end, and without whom I am doubtful the Journal would even exist. He is one of the most dedicated individuals I have ever had the privilege of working with, and his strong leadership skills and vision for the Journal are significant contributing factors to its success. The next JoULAB Editor will have big boots to fill, but I am nevertheless confident that they will continue to ensure that the Journal fulfils its aims, and I am excited to see what they and their new Editorial Committee do with the Journal over the next year.

Clíodhna Hughes,
National Chair, ULAB
Associate Editor, JoULAB
University of Edinburgh

Pay Attention: A Labovian Study into the Production of Dental Fricatives by German Speakers of English

Lucy Gill

University of Leeds

Abstract. This study draws on research in areas of intraspeaker variation, specifically Labov’s work on speech style, and second language acquisition, to examine whether second language (L2) speakers of English follow similar patterns of intraspeaker variation as a function of formality as first language (L1) speakers of English. The participants were five female university students or recent graduates who all shared German as L1 and English as L2. The sociolinguistic interview method was adopted from Labov’s work to elicit speech samples from participants in four different contexts ranging from least formal to most formal, beginning with a casual interview stage, moving to reading aloud a short passage, a list of words in isolation, and finishing with a list of minimal pairs which contrasted the target sound, dental fricatives, with phonetically-similar sounds. These voice recordings were then auditorily and acoustically analysed to find which speech contexts yielded the most standard productions, showing that, similarly to L1 speakers, L2 speakers show a positive correlation between the formality of the context and the amount of attention paid to speech and the frequency of standard productions. Additionally, it was also found that in situations where other sounds were used as replacements for the dental fricative, voiced alveolar plosives replaced voiced dental fricatives and voiceless labiodental fricatives replaced the voiceless dental fricatives in all cases except those in which coarticulation occurred. The implications of this study are far-reaching, demonstrating crossover research is much needed in the areas of L2 acquisition and L2 users’ speech patterns.

Plain English Abstract. Labov’s (1966) seminal work on speech style proposed that the attention paid to speech and the formality of the speech context affect how a speaker uses language. His original findings showed that speakers changed the way they spoke to include more standard speech sounds in more formal contexts, where most attention was paid to speech. This study investigates whether this model is applicable to a second language (L2) speech context. L2 speech research has shown that the perception of L2 speech sounds is influenced by the speaker’s first language (L1) (Flege, 1995) and as a consequence, L2 speakers often replace certain L2 sounds by similar L1 categories. I hypothesised that L2 German speakers would use more dental fricatives in more formal styles, where most attention was paid to speech, and more sound replacements, e.g., labiodental fricatives, in more informal contexts. I used the sociolinguistic interview to elicit data from five German speakers of English in four speech styles (casual, passage reading, isolated words, minimal pairs). The target phonemes were the English dental fricatives /θ ð/, typically realised as voiced in words such as ‘then’, and as voiceless in words such as ‘thumb’ in many varieties of English. Results confirmed the hypothesis, showing that participants used fewer instances of dental fricatives in the more casual speech styles, using more replacement sounds instead, and more instances of dental fricatives in the more formal speech contexts. These findings provide a basis for further investigation in L2 style-shifting, and potential changes in L2 teaching.

Keywords: dental fricatives; language variation; second language speech learning; sociolinguistics; speech style; L2 style-shifting

1 Introduction

Language is a key aspect of humanity, enabling communication and bonding, connecting people, and forming the basis of identities. While speaking one language is seen as a basic human ability, the number of people speaking two or more languages is rising and it is thought that, globally, the number of multilingual speakers far overwhelms the number of monolingual speakers (Tucker, 1999): moreover, Ansaldo et al. (2008) make the case that over 50% of the world’s population are bilingual. The number

of English speakers is thought to be over two billion, a combination of both L1 and L2 speakers of English, making it the most widely used language worldwide (Crystal, 2004). This number is rapidly growing each day, with people often seeing having English as a second language as being a necessary skill in areas of life such as travelling or working, as it can often be used as a lingua franca between different first language speakers.

There is a wealth of research into the factors which influence L2 speech production, examining causes such as motivation to learn the language, the age of acquisition, or interference from the first language. Models of speech perception and production of L1 speech can be mapped onto L2 learning, such as Flege's Speech Learning Model (SLM), Best's Perceptual Assimilation Model (PAM, PAM-L2), or Iverson and colleagues' Perceptual Interference Account (PIA), in attempts to explain some of the causes of a foreign accent (Flege, 1995; Iverson et al., 2003; Best & Tyler, 2007; Tyler, 2019). However, L2 speech is not only affected in terms of production and pronunciation, but may also be influenced by social factors. One such area within sociophonetics is intraspeaker variation; research in this area has shown how a person's speech changes as a result of external factors, such as audience or the formality of the speech context. In those more formal situations, more attention is paid to speech, an idea which has been the topic of much of Labov's work (1966; 1972), investigating how attention paid to speech affects the production of speech.

There has been little research into the overlap of second language acquisition (SLA) and this type of intraspeaker variation; however, an interesting question to pose is whether L2 speakers' variation follows a similar pattern to that of L1 English speakers, and whether subsequent analysis of this variation reveals patterns of replacement sounds expected from the models of speech perception and production. As Labov's work formed foundations in understanding how phonetic variables are linked to social categories, since then, many researchers have used this work as a basis for delving further into analysing the relations between speech and social context, particularly the ways in which speakers construct different personas in different contexts. For this reason, it seemed appropriate to use a first wave, Labovian approach to investigating L2 speakers, as these are an under-researched population in sociophonetics, meaning that this can be used as a starting point for further research into L2 speakers and contextual presentations. The first section of this work will review the existing literature relating to both SLA and intraspeaker variation, before outlining the study methodology, analysis, and results, concluding with a discussion of these results in relation to the relevant literature.

2 Literature Review

2.1 First Language Acquisition and the Critical Period Hypothesis

Before SLA can begin to be explored, its background in first language acquisition (FLA) must first be established. FLA is a broad area of linguistics, covering topics from morphology to lexicology and phonology, and within the Critical Period Hypothesis (CPH), first proposed in *Speech and Brain Mechanisms* (Penfield & Roberts, 1959) but popularised later on by Lenneberg (1967). The foundations of the CPH advocate that there is a biological time period in which speech must be acquired, and after that time it may become very difficult or even near impossible to do; Lenneberg's original theory posed that 'basic skills not acquired by [the end of the critical period] usually remain deficient for life' (Lenneberg, 1967, p. 158). There is indeed evidence from cases of children with limited or no language exposure evidencing that if there is a severe lack of input, then language abilities do not develop (Curtiss, 1977; Hoff, 2004; Aitchison, 2008; Brooks & Kempe, 2012). However, a large part of the dispute surrounding the CPH is that if it is assumed to exist, there is no clearly-definable end period.

Some argue that there are ‘different critical periods for different language skills’ (Genetti, 2014, p. 354), such as morphology, syntax, or phonology, and for SLA this would mean that if a speaker learning an L2 had not acquired the phonology of the L2 by the end of the hypothesised specific critical period, then they would be unable to do so. Thompson (1991) explored this in a study into the pronunciation of English by Russian immigrants, hypothesising that the age of acquisition of English would be the ‘strongest predictor of the accuracy of their pronunciation’ (Thompson, 1991, p. 184). This study involved Russian adults who had emigrated to the U.S. at different ages having their speech recorded on three different tasks; sentence reading, with sentences containing sounds ‘known to be difficult for Russian speakers to pronounce’ (Thompson, 1991, p. 185); passage reading, with this speech middling between sentences and casual speech; and spontaneous speech, where participants were asked to speak for a minute on their day thus far. These speech samples were rated by two groups of listeners, one experienced in foreign languages who had frequent contact with Russian speakers and one inexperienced group who had little to no knowledge of foreign languages or L2 speakers. These groups were asked to rate how accented the speech of the Russian speakers seemed in each of the sample contexts, and they found that the age of arrival to the U.S. — and therefore the earlier or later age of acquisition — was the biggest indicator into how accented their L2 speech was perceived to be (Thompson, 1991).

2.2 Models of Speech Production and Perception

The existence of a critical period for language learning also has evidence against it; this evidence includes the aforementioned debate about the undefined cut-off period before which language must be learned, making it difficult for evidence supporting it to be much more than speculation. Additionally, there is evidence that L2 learning can continue after the proposed ages for the end of the critical period into adulthood, and while there is a decline in performance on grammaticality judgement tasks (Birdsong & Molis, 2001), a maturational account such as the CPH does not predict the linear relation between age and accuracy. For this reason, the CPH has largely been overshadowed by other theories which have risen from further research into speech perception. One of these ideas, as raised by Thompson, is that L1 has a greater effect on the production of L2 than may have been first considered. Flege’s SLM is based upon this idea that ‘interference from the L1’ (Flege, 1995, p. 235) is the leading phonological cause of a foreign accent for speakers of an L2. Flege proposes this being a result of sounds from the L1 replacing those of the L2 in production, even when they ‘differ phonologically’ (Flege, 1995, p. 235). He posits that a foreign accent is caused by a lack of ability to perceive L2 sounds differing from those in the L1 as speech perception becomes ‘attuned to the contrastive phonic elements of the L1’ (Flege, 1995, p. 238), which in turn constrains the ability to produce these different sounds.

Piske et al. (2001) examined the different factors which could affect the degree of a foreign accent in L2 speakers, using a delayed repetition technique to elicit three spoken sentences from participants. These were played to a group of raters, who were then asked to indicate on a scale from one to nine how strong a foreign accent they perceived the participants as having. They found that the speakers rated as having closest to no foreign accent were those that had begun learning English as children and had a low use of their L1, followed by those that had begun learning English as children but maintained high use of their L1. Those that had begun learning English later in life with low use of their L1 were third, and those perceived as having the strongest foreign accent were the participants who learned English later and still frequently used their L1. Piske et al.’s findings support one of the hypotheses of the SLM in showing that there is a negative correlation between age and ability to perceive phonetic differences, and that this in turn limits the ability to produce differing sounds in the L2, leading to more accented speech in both of the late bilingual categories.

In turn, PAM (Best, 1994) builds on this categorical perception work and aims to account for the ways in which naive listeners, those who are unfamiliar with a language, perceive non-native speech sounds. This model theorises that when listening to an unfamiliar phonetic segment, naive listeners will assimilate the sound to be one heard in their native language that they are familiar with, one which has similar ‘articulatory-gestural’ properties (Best, 1994, p. 190). It is predicted that listeners will not be able to perceive discrepancies in unfamiliar non-native sounds when these phones have similarities to those found in the phonemic catalogue of the native language, meaning that the sounds will be assimilated to the most similar familiar phone. When this is the case, these sounds are categorised as ‘good, acceptable, or poor instance[s]’ (Tyler, 2019, p. 610) of native phones. If the listener is able to perceive discrepancies between the sounds, this is thought to be a result of them finding a lack of similarities between the ‘articulatory-gestural’ properties and the non-native sound will not be assimilated; these are uncategorised sounds, those that are not perceived to be part of the native inventory. As the PAM is concerned with native speakers’ perception of non-native sounds, Best and Tyler (2007) proposed the PAM-L2 model which mapped the original PAM projections to SLA to predict how L2 learners would acquire the unfamiliar sound categories when learning the L2. This is explained in terms of how if an L2 learner perceives contrasting phones as being part of different L1 sound categories, they form new categories to learn the L2 with using their knowledge of said categories from the L1. However, the PAM-L2 model has its limitations in that it is only focused on the perception of familiar vs. non-native sounds, rather than perception and production as in the SLM, and that it does not go further than the beginnings of learning a language to explain how these perceptual assimilation categories may affect L2 competency.

Iverson et al. (2003) build on Best and Flege’s work on non-native speech perception to form the basis of the PIA, which also uses theories of first language acquisition to explain L2 speech perception. It is widely believed that individuals are born with the ability to acquire any language (e.g., Eimas et al., 1971; Werker & Tees, 1984) but that from language exposure these abilities become language-specific (Kuhl, 1992; 1994; Kuhl et al., 2008). The PIA posits that this language-specific perception interferes with low levels of speech processing, exemplified in the study involving Japanese and German L2 speakers of American English, and native speakers. For this study, /r/-/l/ tokens were used: these are sounds known to be difficult to Japanese learners of English, while German learners are not known to have problems with these. Participants were given a number of tasks to determine their perception of each sound in the stimulus pair. These results were then analysed to investigate the underlying perceptual spaces of each group of participants. It was found that these were dependant on language experience, and that the American native English speakers were the most sensitive discriminatorily to the differences between the /r/ and /l/ phones, the German listeners’ perceptions were close to that of the Americans, and that the Japanese group often assimilated the stimuli into their L1 /r/ category. This appeared to differ, however, in that often the sounds presented with lower F2 frequencies were perceived to sound more like /w/. Iverson et al. concluded that for adult SLA, perceptual changes are a result of changes to linguistic processes at a higher level, but that ‘lower-level perceptual processes can interfere with the adaptability’ (Iverson et al., 2003, p. 54) of the higher-level processes. Consequently, it can be difficult for a speaker to produce certain sounds in an L2, as if the underlying perceptual spaces make it difficult to perceive sounds, then it must be difficult to produce them.

2.3 Intraspeaker Variation

Now that SLA has been contextualised in the theories of first language acquisition and models of both speech perception and production in L1 and L2 have been explained, it is important to consider how

variation in L1 speech may affect variation in L2 speech. Intraspeaker variation, that is, variation within an individual's speech, has been the subject of much sociophonetic research. Factors affecting this include variation as a result of the audience, including changes as a result of the audience or the interlocutor. Bell's (1984) Audience Design theory explains intraspeaker variation as a result of who the audience or addressee of the speech is, while Accommodation Theory (Giles, 1973) focuses more on the role of the interlocutor. Both draw similar conclusions in that speech appears to change in two main ways; convergence, where speech morphs to the norms of the addressee, or divergence, where speech increases the difference between speaker and addressee. There is much evidence from sociophonetic studies that speech is varied as a result of audience (e.g., Coupland, 1980; Bell, 1984; Sharma, 2018), yet additionally there is evidence that attention paid to speech is also a strong contributing factor to intraspeaker variation. Simply put, the more attention is paid to speech, the more a person will speak in a more idealised way, using a more standard form of language or more 'prestige' variants.

Labov (1966) first used these terms to describe the way participants spoke in his study in New York City (NYC) department stores, a study which was designed to test how attention paid to speech affected the use of the [r] variable, either in the presence or absence of the postvocalic /r/ variant. At the time in NYC, the use of the postvocalic /r/ was considered prestigious, used more often by those who belonged to a higher socioeconomic class, and its absence was the typical way of speaking in New York. To test how the use of this sound correlated with both attention paid to speech and socioeconomic class, Labov extracted four instances of [r] in shops which each correlated with a different social stratification, in both the context of less attention and more attention paid to speech. He found firstly that when more attention was paid to speech, the prestigious variant, this is the presence of postvocalic /r/, was used more often than when less attention was paid to speech. Secondly, these uses also varied along with the social stratification of the store, with the shop assistants in the more socially elite store using more instances of the prestigious variant. Thus, Labov's work has demonstrated how the use of standard variants, those carrying a higher level of social prestige, with the contrasting nonstandard variants, those which have less favourable wider social connotations, vary as a result of the formality of the speech context. Those with more formality have more attention paid to speech with the inverse occurring for less formal contexts. However, it is important to note that style shifting is a nuanced phenomenon and can occur in many different ways; nonstandard or vernacular variants are produced by speakers in a range of contexts, from casual to formal, and indeed, there may be no style shifting occurring for some phonetic variables.

In order to investigate these further, Labov conducted 'sociolinguistic interviews', which were designed to elicit speech from participants in a range of formalities. Speech was procured in most formal contexts, by way of reading lists of minimal pairs and words in isolation, to more casual contexts through participants reading a short passage aloud and discussion with the interviewer, allowing for a variable to be seeded throughout the materials for analysis in a range of contexts and for it to occur spontaneously (Labov, 1972). While there is far less research into the area of variation in L2 use, there is some relevant work to note. For example, Drummond's (2010) work in Manchester, examining the ways that L2 English speakers, specifically Polish L1 speakers, acquire localised speech features they are exposed to. This study found that the L2 speakers of English did acquire accent features local to Manchester, such as the realisation of STRUT as a high back vowel, however while these findings show sociolinguistic variation in L2 speakers, the variation is a result of speakers' sense of identity, as well as geographical features altering speech in all contexts as opposed to the context affecting speech, as would be observed in intraspeaker variation.

2.4 Rationale

For this study, German speakers who have English as their L2 will be the participants, using the dental fricative as the target variable for examination. The appeal for using this variable in this study is threefold; firstly, its frequency in English allowed it to be incorporated into the materials, such as the reading passage, without the participant being aware of that being the token variable. Secondly, its rarity in other languages made it easy to identify participants with a first language that did not include this sound, specifically German, and thirdly, there are sounds similar to it in both English and German, so replacement sounds could be used in the materials, especially the minimal pairs, and by participants, while still being identifiable to answer the second research question. While production of this sound is difficult for many L2 speakers of English (e.g., Owolabi, 2012), is often the case that many native English speakers do not have this sound in their inventory either. In a phenomenon referred to as TH-fronting, dental fricatives /θ, ð/ are often replaced by the labiodental fricatives /f, v/. Despite this being commonplace in a number of English-speaking areas in the UK, the realisation of the labiodental fricative in place of the dental fricative is often stigmatised in some areas of the UK (e.g., Levon & Fox, 2014).

While there is variation in the realisation of dental fricatives, which can be related to social factors, L2 speaker production of the dental fricative as labiodental is likely explained in terms of the L2 speech perception models. These models would predict that the sounds produced instead would be those that also occur in the first language and which share similar ‘articulatory-gestural’ properties, and in the case of the dental fricatives /θ, ð/ it is expected that they will be assimilated to either labiodental fricatives /f, v/ or to the alveolar stops /t, d/, likely with the voiceless variants replacing the voiceless and a similar pattern for the voiced variants. The realisation of /θ/ as [d] is one also shown in a study by Rahman and Hasan (2019), in which they investigated the way Chinese L2 speakers of English produced the dental fricative sound, as it also does not exist in Chinese. A similar method was used in that they used a wordlist of thirty common English words which featured the tokens in question to elicit speech samples. Their results showed that both males and females followed similar patterns of replacement with this sound, and that it was a challenging sound to all participants. Similarly, Owolabi (2012) studied the production of dental fricatives by native Yoruba speakers who were learning English as an L2, eliciting productions through participants’ reading of a passage aloud which contained sets of minimal pairs, contrasting the dental fricatives with their alveolar plosive counterparts, and finding that participants indeed struggled with production. It is predicted, based on Labov’s work into speech style, that in the contexts where a speaker is paying more attention to their speech, such as in reading a list of minimal pairs, they will use more realisations of the standard variation, in this instance the dental fricative, and in the contexts where less attention is paid, such as in a casual interview, more instances of an assimilated sound will occur as a vernacular counterpart, as it would in native English speakers in different instances such as talking to friends.

This study will examine whether Labov’s original hypothesis investigating this pattern of variation in L1 speakers is also seen in L2 speakers. Feagin specifies that in order to get the most casual speech, participants should be talking about ‘subjects [with which] they are intimately involved’ (Feagin, 2002, p. 30), meaning that in the interview to elicit casual speech participants will be asked about things such as their time at university and where they previously lived in Germany. For the purpose of the current study, the dental fricative will be considered the ‘standard’ variant and any other ‘vernacular’, non-standard sounds, which will likely be comprised of an assimilated variant of the sound, to answer two research questions. The first will examine whether speech style plays a role in the production of dental fricatives by L2 speakers of English. The second research question builds on the first and will seek to answer which sounds are used in place of the dental. It is hypothesised that the patterns of variation will follow those of L1 speakers, showing a positive correlation between the

formality of the speech context and the number of standard sounds used, and that the nonstandard replacement sounds will be those aforementioned, either labiodental fricatives or alveolar plosives.

3 Methodology

3.1 Participants

Table 1: *Participants’ demographic details.*

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Native language	German	German	German	German	German
Fluent languages	German, English, French, Dutch	German, English	German, English	English	German, English
Place of birth	Bonn	Baden-Wurttemberg	Stuttgart	Hamburg	Worms
Other residences, longer than six months	France, 1 year	Berlin, 7 years	n/a	Coventry, 11 years	Kent, 1 ½ years
English acquisition method(s)	In school	In school	In school, exchange programs	In school — after moving to the UK	In school
Age of English acquisition (years)	9	4	10	8	5

Five female speakers were self-selected from the student population at the University of Leeds by replying to an advert placed on a Facebook page for this demographic, and following an initial interest they were asked the following questions to ensure they met the criteria for participation: how long they had lived in Germany, at what age they had begun learning English, and at what age they moved to England (Table 1). Four were students, and a fifth (Participant 1) had just completed a Master’s degree at the University of Huddersfield, working now as an anatomical pathology scientist and living in Leeds. All had been living in Germany for at least the first eight years of their lives, attending German schools where they learned English as an L2, with no participants speaking it from birth. Participant 4 reported having lost the ability to speak German, meaning that although it was the native language she grew up speaking, English was now her primary and only fluent language. One participant had moved previously to Kent in the south of England to attend a boarding school there, one and a half years before beginning at the University of Leeds, and one had moved from Germany to Coventry at the age of eight. The other three participants had moved to the country to begin university, meaning the length of time living in England was between two and 11 years. No participants reported any speech or hearing impediments or any learning difficulties. Participants were not paid for their participation.

3.2 Materials

The materials for this study were those making up the different contexts, from less formal speech with less attention paid to more formal speech with more attention paid. There were ten tokens of the dental

fricative in each context, with five voiceless and five voiced variables. In the first context, the least formal, the interview questions were open-ended enough to allow sufficient speech to find ten tokens of the dental fricatives within for analysis, but as participants were not aware at this point of the variable being investigated the questions did not encourage use of the /θ, ð/ sounds, instead they occurred naturally. In the short reading passage, although it featured ten instances of the token sound at the beginning of ten words, they did not all take the same structure or shape, as this may have made it appear less natural (Appendix One). In the next two contexts however, all the words, including the filler words in the word list and the counterparts in the minimal pair, were monosyllabic with the token sounds in the word initial position of the CVC structure (Appendices Two and Three). In the final and most formal context with the minimal pairs, there were no filler pairs as participants should be paying the most attention to their speech here, in particular if they recognise the repeated pattern of dental fricatives at the beginning of words.

Participants were interviewed in a setting in the University of Leeds that was quiet enough that the background noise did not affect the quality of the audio recordings, but somewhere where it also seemed casual enough so that they could feel comfortable having a normal conversation and did not feel as though they were under scrutiny. The audio recordings were done using an Apple iPhone 6S. Participants were taken through each context of speech from the least formal to the most formal, beginning with the interview questions and ending with the minimal pairs. The rationale for conducting the interview in this way was so that participants were not immediately aware of the target variable, as this may have influenced the way in which they used it through the rest of the interview, meaning therefore the tokens in the casual speech would be more naturalistic if they are not aware then of the target sound being analysed. The contradictory nature of investigating how speech is used when not being observed, but having to observe in order to achieve this, is a concept referred to by Labov as the Observer's Paradox (Labov, 1972). It was hoped that by beginning with the casual style, it would enable participants to feel more comfortable, and distract from the purpose of the task; this design was intended as a way of minimising the effects of the Observer's Paradox and allowing for as natural speech as possible. Additionally, in the casual interview questions, participants were asked some of the same questions, such as how their day had been and where they lived in Germany before, however other questions evolved from the responses given to participants. This meant that it was not always possible to elicit the target sounds in the same words across participants, but enough tokens were produced overall to get a sufficient amount for analysis. Lastly, they were asked to fill in a language background questionnaire (Appendix Three). The interviews consisting of all four contexts took no longer than 20 minutes.

3.3 Data Analysis

To analyse participants' realisation of the dental fricatives, both voiced and voiceless, an auditory analysis was first performed to investigate whether participants produced the forms [θ] and [ð] as in standard English, or whether they assimilated the sounds to one in the German language, previously hypothesised to be either a labiodental fricative [f], [v], or an alveolar stop, [t] or [d]. These results were coded as following:

- (1) 0 – [θ] [ð] production
- (2) 1 – [f] [v] production
- (3) 2 – [t] [d] production
- (4) 3 – other sound produced

From this, the productions of each token in each speech context could be quantified to see the sounds that are most often replaced, the contexts which have the most replacement sounds, as well as the factors that could potentially govern the changes in these sounds' productions. The auditory analysis coding will also be used to perform a chi-square test to determine the type of correlation between the sound produced and the attention paid to speech. From the sounds identified by the auditory analysis as being fricatives, those coded as 0 or 1, centre of gravity (CoG) measurements were taken as further evidence to determine the place of articulation of these sounds. CoG measurements are useful in helping to distinguish places of articulation, as it is expected that the higher the CoG measurement in Hertz, the further forward in the mouth the sound is produced (Jongman et al., 2000); therefore, these measurements were taken to add further support to the auditory analysis. The centre of gravity measurements were performed in Praat (Boersma & Weenink, 2019). Following the method used by Jongman et al. (2000) in their study of the acoustic characteristics of English fricatives, the middle 40ms of each token fricative was used to do a CoG measurement. This timeframe was chosen so as to avoid any noise or disruption at either the beginning or end of the sound, and in cases where the sound did not last for a minimum of 40ms, the middle 20ms of the fricative production was used. In cases where the token did not last for a duration of at least 20ms, these tokens were excluded from analysis, as this was only the case in the casual speech context where there were plenty of other token productions to select. This allowed for results to be more generalisable and large discrepancies in measurement length to be excluded as a factor affecting centre of gravity results. Figures 1-5 below demonstrate the waveforms and spectrograms of participants' recorded speech in the Praat software, demonstrating both the standard (Figures 1 and 2) sound and its alternatives (Figures 3, 4, and 5). The properties of each production can be seen on each waveform; in the voiced fricative production (Figure 1), the periodic waves of the voicing can be seen followed by the aperiodic waves of the turbulent airflow, and a voicing bar in the spectrogram. In Figures 2 and 3, the voiceless fricatives show aperiodic waves on the waveform and high frequency frication in the spectrogram. As previously stated, acoustic analysis will also be used to further explore the differences between dental and labiodental fricatives, those coded as 0 or 1. The results coded as 2 were all voiced alveolar plosives, and demonstrate the features of said sounds (Figure 4) in that there is a hold phase comprised of low amplitude periodic waves followed by transient waves during the release of the sound. Figure 5 demonstrates a production that was coded as a 3, 'other', where the dental fricative sound is omitted and instead the final sound of the previous word, /n/, is used, as the words run into each other.

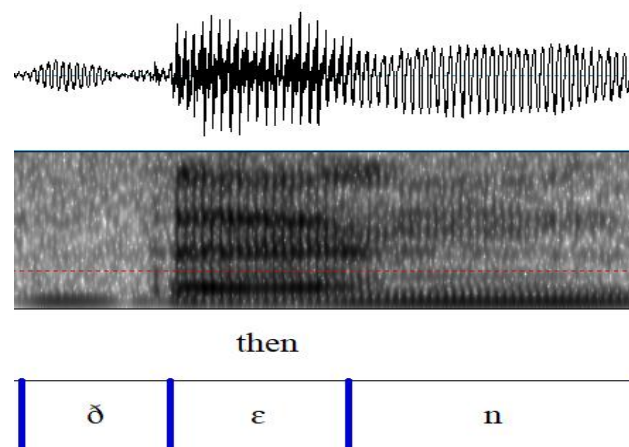


Figure 1: Voiced dental fricative, taken from Participant 2 in the pairs condition, coded as 0.

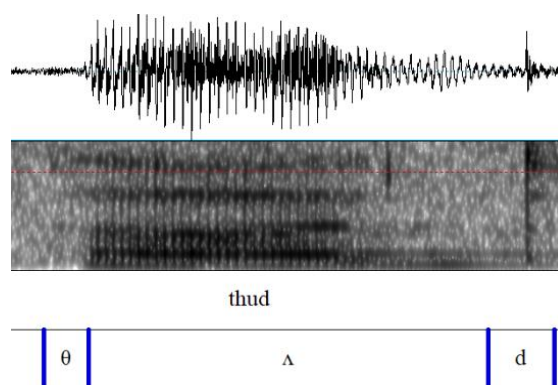


Figure 2: *Voiceless dental fricative, taken from Participant 2 in the word list condition, coded as 0.*

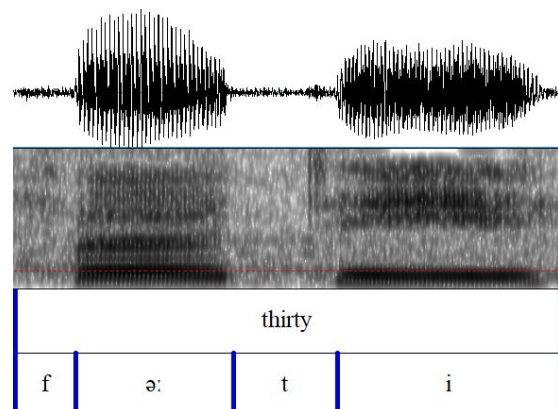


Figure 3: *Voiceless labiodental fricative, taken from Participant 1 in the reading condition, coded as 1.*

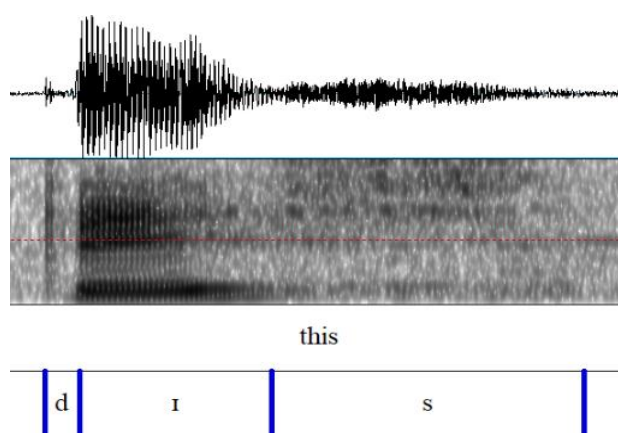


Figure 4: *Voiced alveolar plosive, taken from Participant 1 in the pairs condition, coded as 2.*

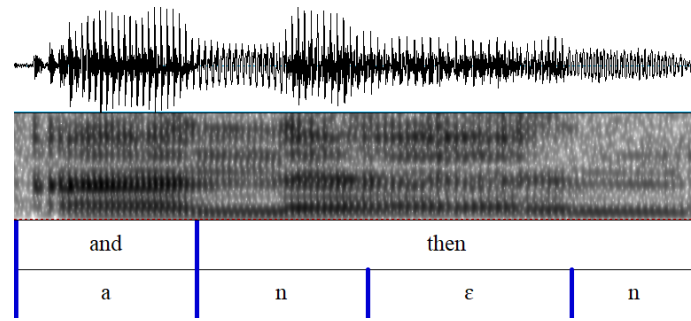


Figure 5: Voiced alveolar nasal, taken from Participant 5 in the casual condition, coded as 3.

4 Results

4.1 Variation as a Result of Attention Paid to Speech

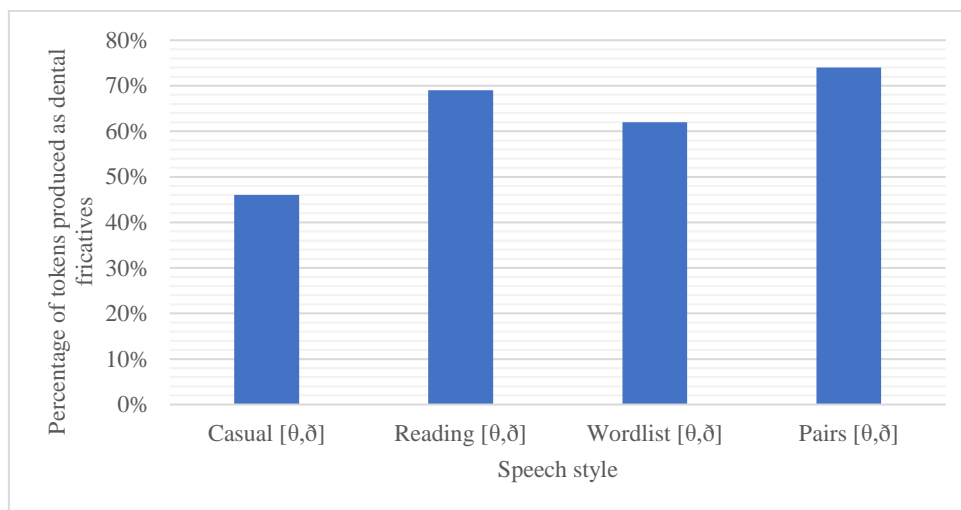


Figure 6: The percentage of all tokens produced as standard (coded as 0) by all participants across each speech context, from least to most formal.

In total, 415 tokens were recorded across all interviews, with 3.89% (16 tokens) of these, from the casual context only, being discarded for not meeting the criterion required for a centre of gravity measurement. This meant that 399 sounds were auditorily analysed and subsequently those that were coded as a 0 for the dental fricatives or a 1 for labiodental fricatives then had CoG measurements taken for acoustic analysis. The auditory analysis shows evidence for variation in the different tasks and speech contexts, as Figure 6 above shows the overall positive trend of the tokens produced as standard by all participants as a function of the formality of the task. The graph shows the increasing use of the standard variant in each context from least attention paid in the casual context to most attention paid in the minimal pairs context. While this is the overall trend, there is an unexpected result in the wordlist context. The coding of participants' speech in this task shows a lower number of dental fricatives being used than in the reading context, despite it being expected that the wordlist would elicit more standard productions as there is more attention paid to speech. A linear regression model has been fitted in R using dummy variables for the different contexts, shown in Table 2. The baseline context is the casual context, shown by the intercept of the model. The intercept is roughly equal to 1 and very statistically

significant, meaning the average value of the coded tokens is roughly 1. The dummy variables then test whether there is a significant difference in this average for the different contexts. The coefficient for the pairs context is significantly negative and $\beta = -0.64$, which implies the average value of the coded tokens is lower in this context, compared to the casual context. Similarly, for the reading context, a coefficient of $\beta = -0.63$ is also found, implying again that the average value for the coded tokens in this context is lower. Finally, the coefficient for the words context is less significant than the other coefficients but still significant at the 5% level ($p = 0.04$), and negative at $\beta = -0.33$. This means that more tokens coded as 0 were used, compared to the casual context, but fewer than the other two conditions. This supports the previous finding that the word list context is not as different from the casual context as the other speech conditions, however it still follows the same trend of having more standard tokens.

Table 2: *Linear regression output testing the significance of the difference between token usage in contexts.*

Coefficient	Estimate	SD	t-value	p value	95% Confidence Interval	
					Lower	Upper
Intercept	1.082	0.064	16.807	<0.001	0.955	1.209
Pairs	-0.642	0.156	-4.112	<0.001	-0.949	-0.335
Reading	-0.627	0.15	-4.18	<0.001	-0.923	-0.332
Words	-0.332	0.156	-2.062	0.0398	-0.629	-0.015
R²	0.0705					
F-statistic	9.987					
p value	<0.001					

4.2 Nonstandard Variants Used

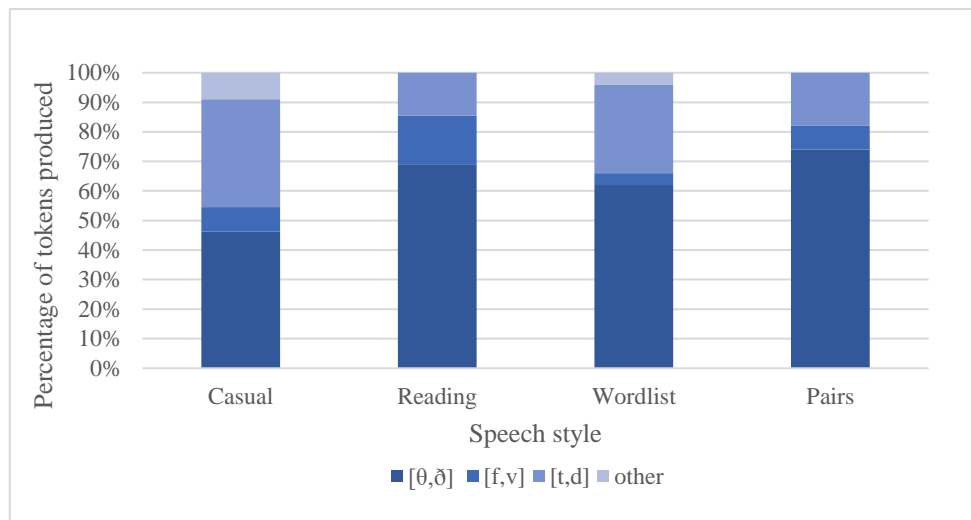


Figure 7: *The auditory analysis results from all participants in each speech context, showing the percentage realisation of each token in each speech context.*

The second research question of this study was to determine the nonstandard sounds used in cases where variation did occur. Figure 7 shows, of the nonstandard sounds produced in each context, the percentage of each variant used in place of the dental fricative. It can be seen in the casual speech context that the number of dental fricative productions almost matches the production of the alveolar stop, and accounts for less than half of the total productions. This is in contrast to the minimal pairs context, in which it is hypothesised that the most attention was paid to speech by participants, where the production of dental fricatives accounts for around three quarters of the total productions. Notably, when the sounds were coded, the labiodental fricative variants were always voiceless /f/ in place of the voiceless dental fricatives, with no voiced variant recorded in this place. The inverse was also true with the alveolar plosive sound in that the voiced variant /d/ always replaced the voiced dental fricative, and no instances of voiceless plosives replacing any standard production. Of the 399 recorded sounds retained for auditory analysis, 254 of these (63.7%) were coded as either a 0 or a 1, indicating either a dental fricative or a voiceless labiodental fricative. For the centre of gravity measurements, 203 of these sounds were long enough to use the central 40ms of the fricative, while the remaining 51 tokens had shorter fricative durations resulting in the middle 20ms of the fricative being analysed. The acoustic analysis of these tokens serves to further differentiate the fricatives produced, shown by Figure 8, a box and whisker diagram for all CoG measurements from all participants in all speech contexts, supporting the auditory analysis by demonstrating that the results coded as a 1 to represent labiodental fricatives have an average higher centre of gravity than the dental fricatives. There is not a large difference between the two mean CoG measurements, as the places of articulation are in close approximation to each other. However, there is a larger range of measurements for the dental fricatives than for the labiodental fricative, which could be a result of there being more productions of the former than the latter, meaning more variation in the productions.

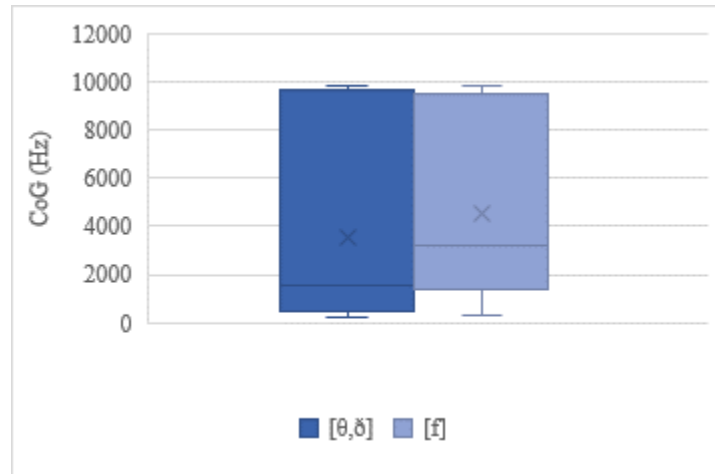


Figure 8: Box and whisker plot showing the centre of gravity measurements for dental fricatives and the labiodental fricative [f].

4.3 Individual Speaker Variation

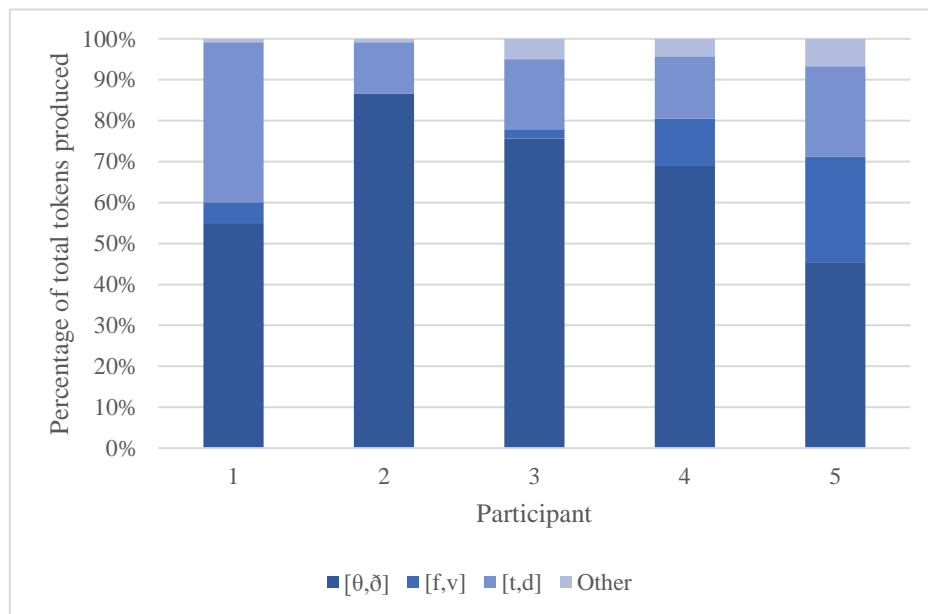


Figure 9: Percentage of total tokens produced per participant across all speech contexts.

Another way to interpret the results, in addition to in terms of the research questions and hypotheses, is to examine trends and variations by each participant individually. Figure 9 illustrates the productions by each participant across all speech contexts, showing that the percentage of standard productions varied greatly between participants, ranging from 45% to 87% between Participant 5 and Participant 2, respectively. As well as using the least frequent standard productions, Participant 5 used the greatest number of instances of the labiodental fricative as well as sounds coded as ‘other’, such as the alveolar nasal seen in Figure 5, or other unintelligible sounds. Table 3 shows the count of sounds used in each context by each participant and the variation between sounds produced in each context, as opposed to generalised across all contexts as in Figure 9.

Table 3: *Number of tokens recorded and auditorily analysed, per participant, per condition, per realisation.*

			Participant				
			1	2	3	4	5
Condition	Casual	[θ,ð]	33	23	29	18	10
		[f,v]	2	0	0	7	11
		[t,d]	53	6	12	9	9
		Other	3	1	0	7	11
	Reading	[θ,ð]	7	11	9	8	3
		[f,v]	2	0	1	2	4
		[t,d]	2	0	1	1	4
		Other	0	0	0	0	0
	Words	[θ,ð]	6	7	9	7	5
		[f,v]	0	0	0	1	1
		[t,d]	4	3	1	2	4
		Other	0	0	0	0	0
	Pairs	[θ,ð]	6	10	9	9	3
		[f,v]	0	0	0	0	4
		[t,d]	4	0	1	1	3
		Other	0	0	0	0	0

5 Discussion

The aim of this study, in short, was to investigate how attention paid to speech affects intraspeaker variation in L2 speakers of English, specifically examining how the formality of speech contexts affects the production of the dental fricative by German speakers of English. A secondary research question was to determine the vernacular variants which replaced the target dental fricatives in contexts where variation did occur. The study was conducted using the Labovian sociolinguistic interview, allowing for four different contexts of speech with target sounds placed throughout. The results show that through the four speech contexts, the more attention that was paid to speech, the more standard tokens were used, and in the most casual context the most nonstandard replacements occurred, however, there was an unexpected result in that the wordlist condition elicited fewer dental fricative productions than expected. The result of the linear regression in particular showed a strong correlation between the formality of the speech context and the number of standard tokens produced by speakers.

5.1 Intraspeaker Variation in Different Speech Contexts

The first research question addressed the phenomenon of intraspeaker variation, particularly the effects of speech style on the realisation of dental fricatives by L2 speakers. Labov’s original study in the New York City department stores examined the use of the postvocalic /r/ variable, noting its presence as being the ‘prestigious’ form of it and its absence as being the typical New York realisation. These concepts were adopted in the present study to investigate both the voiced and voiceless dental fricative, with its use being considered ‘standard’ and its replacement being considered ‘nonstandard’ or ‘vernacular’. The results of this study replicate that of Labov’s in L2 speech, in that the more formal speech contexts when participants paid more attention to speech – such as in minimal pairs condition in the 1972 study of NYC speech, using the sociolinguistic interview — there was more frequent use

of the variant which carried higher social connotations; in Labov's 1972 work, this was the presence of the postvocalic */r/*, and in this study the use of the dental fricative. Similarly, the results of this study mirrored others which showed an effect of different speech contexts, attention to speech, and formality on speech change, such as Sharma (2018).

While the studies appear parallel for the most part in that there is a positive association between attention paid to speech and variant use, the results of this study show an unexpected outcome: the wordlist condition elicited fewer standard productions from participants than the reading condition, despite being more formal. A potential explanation to account for this difference is that to an outsider, that is, someone who is not familiar with the format and theory behind the sociolinguistic interview, it may appear more natural to read individual words aloud, as opposed to reading out a passage to someone else. Moreover, when learning a second language, it is often the case that learners read aloud individual words in order to practice production and memorise them, while there often isn't the same opportunity to read aloud longer passages in the L2. This could be because it is not an everyday occurrence to read longer texts aloud; while there may be similar monologue style pieces in casual speech, these are more often spontaneous speech and not a pre-prepared paragraph. Additionally, work by Gafter (2016) explored the relation between different pharyngeal segments in Hebrew and their production in different speech contexts, finding that reading words in isolation had ties to cultural meanings in Hebrew speakers, and results therefore differed from the expected pattern in the word list speech context. It is difficult to say whether there were effects of either previous language learning techniques or perhaps cultural identity biases on the results of this study, and therefore, more research would be needed to determine these possible effects. A further potential factor to account for these results are that in the original study, Labov only set out to research intraspeaker variation in the L1. This could mean that the sociolinguistic interview is not necessarily equipped to measure variation in L2 use, as there may be additional factors relating to the ways in which participants utilise their L2 which were not controlled for through the use of this method.

5.2 Use of Nonstandard Sounds

As it is established that variation in L2 speakers occurs in a similar way to L1 English speakers, the results of the second research question can now be discussed. When nonstandard productions were used, the replacement sounds of the dental fricative varied. As previously seen, these sounds were subdivided into four groups from the auditory analysis; 0, for the standard sound; 1, for those which were produced as a labiodental fricative; 2, for those produced as an alveolar plosive, and 3 for any other productions. The prediction for this was that voiced dental fricatives would be replaced with either of its voiced counterparts, either the labiodental fricative or alveolar plosive, and that the voiceless standard would be likewise replaced with the voiceless nonstandard variants, as these sounds have the closest features of articulation to those which feature in the German phonological system. The results of this study show that it was not just one of these pairs used, but one sound from each of them; that is to say that it was not just labiodental fricatives replacing the dental fricative, but instead the voiceless labiodental fricative replacing the voiceless dental fricative, and the voiced alveolar plosive replacing the voiced dental fricative.

To set aside the sounds categorised as 'other', in productions where nonstandard replacement sounds occurred, in every case of the voiced dental fricative being replaced it was by the voiced alveolar plosive, and voiceless dental fricatives were replaced with voiceless labiodental fricatives. The same pattern of replacement was found in this context as in the studies by Rahman and Hasan (2019) involving Chinese speakers of English, and Owolabi's (2012) Yoruba learners of English, with the voiced fricative being replaced with the voiced alveolar plosive. While these studies did not make use

of any other speech contexts or methods of elicitation to test patterns of variation, instead simply investigating the replacement that occurred, the results of their work parallel with this work in that the other sounds used were found to be the same, demonstrating how speakers of different native languages assimilate the unfamiliar dental fricative to the same familiar L1 sound. This further supports the predictions made by the speech perception and production models, Best's PAM (1994), Flege's SLM (1995), and Iverson's PIA (2003), in that unfamiliar sounds will be assimilated into a familiar one belonging to the L1 phonological system. There is, however, less regular replacement for the voiceless dental fricative across studies. This examination showed how it was replaced every time, still discounting the 'other' sounds, by the voiceless labiodental fricative [f], but this is not always the case; Koffi's (2015) report of the production of [θ] in seven different L2 varieties of English show it being replaced in their study sample by [t̪] 13.14% of the time, [s] 9.55% of the time and by [f] 7.76% of the time. TH-fronting, that is, replacing [θ] with [f], is a common feature in English varieties, especially British English speakers, despite carrying with it negative evaluations from listeners (e.g., Kerswill, 2003; Clark & Trousdale, 2009). Perhaps, in the context of this, the production of [f] by L2 speakers may be affected by the production of this sound in varieties of English they are exposed to, similarly to the patterns of variation in that of Drummond's (2010) work. If this were the case, it could be said that the participants in this study who produced the labiodental fricative were not replacing the sound with one which contributed to their non-native accent, but instead acquiring patterns of variation they were exposed to while learning. However, it is difficult to determine whether participants are using a replacement [f] as a sound from their L1 or whether it is related to the varieties of English they have been exposed to, hence more research would be needed in this area to investigate what governs the replacement.

Returning to the sounds categorised as 'other' through the auditory analysis, they had a range of different productions which were, in and of themselves, not enough to credit a separate category. There were two productions of the voiceless dental fricative in place of the standard voiced, which could be explained by the participant being unfamiliar with the words they were reading, despite attempts to utilise common words. The other results arose from productions where co-articulation occurred, therefore, it appeared as though the dental fricative was being replaced by the nasal stop [n] most often, or in one case by the voiceless alveolar fricative [s]. Co-articulation is the process in which the oral articulators are preparing to produce the next sound as one is already being produced (Gordon, 2014), resulting in a 'run on' effect, as seen in Figure 5 above in the production of the phrase 'and then' by Participant 5. Figure 7 shows how these 'other' sounds were most frequent in the casual speech context with less attention paid to speech and could have resulted from casual speech being faster than other speech contexts (e.g., Zwicky, 1972).

5.3 Individual Participants' Variation

Lastly, the results could also be interpreted in terms of age effects on L2 acquisition. As shown by Piske et al. (2001), there are numerous factors which could affect strength of a foreign accent, principally being the age of acquisition, with frequency of use of the L1 also factoring in. Interestingly, Participant 5, who had an age of acquisition just one year older than Participant 2, had the lowest use of nonstandard features, a divergence from the expected result. On the other end of the scale, Participant 3 had the oldest age of acquisition of English at ten years old, yet this too was not reflected in the results. Participant 3 had the second highest use of the standard dental fricative token across all speech contexts, again not showing the age effects expected, which could raise questions as to why this could be. All participants learned English in school, perhaps suggesting that the variations in standard and non-standard production is not so much a matter of the age of acquisition, as previously suggested, but

instead a result of other factors such as variability in teaching and learning methods, or motivation to learn. Continued use of the L1 was not measured for in this study, which could also potentially explain the results, as seen in Piske et al.'s (2001) work. Indeed, these results may even be a reflection of the participants' attitudes towards the tasks set before them, enabling other contributors to intraspeaker variation such as interlocutor (the interviewer, an unfamiliar person) or the audience (the researcher hearing the tapes of participants' speech) to cause the changes seen.

6 Conclusion

This study was based on Labov's work on attention paid to speech as a factor of intraspeaker variation applied in an SLA context. This was investigated by addressing two research questions, the first being the way in which formality and attention paid to speech affected the production of the dental fricative, considered 'standard', and the second focusing on the nonstandard replacement sounds in the productions where variation did occur. With regards to the first research question, the use of the sociolinguistic interview in this study to replicate Labov's methods allowed speech samples to be elicited in a range of contexts from least formal, with least attention paid to speech, to most formal, with most attention paid to speech. The auditory and acoustic analysis of standard dental fricatives and replacement sounds provided evidence for a similar trend of intraspeaker variation in L2 English speakers as in L1 English speakers, with the exception of the wordlist condition where there were fewer standard productions than expected. This analysis also proved fruitful in answering the second research question as to what the replacement sounds were in instances where nonstandard productions occurred, showing a consistent pattern of voiced dental fricatives being replaced by voiced alveolar plosives. This is as expected from the three models of speech production and perception cited in the literature review, particularly following Best's (1994) predictions that sounds will be replaced with those with the most similar 'articulatory-gestural' features, as well as evidence from other studies which show L2 speakers of English with different L1s also commonly use this as a replacement sound (e.g., Rahman & Hasan, 2019). It also showed that replacement sounds for standard voiceless dental fricatives were most frequently voiceless labiodental fricatives, however previous studies' results show that replacement nonstandard sounds for this are more varied (Koffi, 2015).

With this in mind, it must be acknowledged that while these results show evidence for attention to speech affecting productions in L2 speakers of English, this study examined a limited amount of tokens. While this is sufficient as a basis of investigation into this area, further work is needed to confirm the validity of these findings. Included in these are other factors which may have affected participants' performances in the sociolinguistic interview tasks, such as how often they still used their L1, for what purposes did they use each language, or indeed the teaching methods through which they learned English, as these may all have affected their varied use of the dental fricative. It must also be acknowledged that using the Labovian, first wave approach to this question provides a basis for further research, and that more is needed in this area using different sociolinguistic approaches (e.g. Eckert, 2012) to explore further how speakers use phonetic details to construct identities in their L2 and in different contexts. The topic of intraspeaker variation is one which is largely under-researched in the area of SLA, and advances in this niche area would provide many important real-world benefits. These include potential changes in the way second languages are taught and used, with an emphasis on L2 users' speech patterns.

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8 Appendices

The following appendices contain the materials used to elicit tokens for analysis in the reading passage (Appendix One), wordlist (Appendix Two), and pairs conditions (Appendix Three). Words in bold are the target words, containing the dental fricatives. Note that that there are no target words for the casual speech condition, as these were naturally occurring words and as such, there were no pre-planned words for analysis.

8.1 Appendix One

Last Thursday, my family all went to the beach for the day by themselves. I wouldn't normally like this, but since I had about thirty things to do that day, I was pretty thankful I had some peace. Maybe I'll go next time they're going, which might be on the 13th.

8.2 Appendix Two

Beige	Three
Theme	Zone
Thin	Thus
Court	Lick
Though	Rain
Fudge	Thud
Heart	They
Third	Sheet
Light	Torch
These	There

8.3 Appendix Three

Thank / Sank	Throne / Zone
Thumb / Tum	Then / Zen
Thing / Sing	Than / Dan
Thick / Tick	Those / Doze
Thorn / Torn	This / Diss

About the Author

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Revitalising Kanyen'kéha on the Grand River: A Case Study of Indigenous Language Revitalisation and its Theoretical Implications

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Abstract. In this work, I investigate a case study of language revitalisation involving the adult immersion school Onkwawén:na Kentyóhkwa (OK), which is located in Ohswé:ken along the Grand River (Ontario), and where the Northern Iroquoian language Kanyen'kéha (Mohawk) has been taught as a second language since 1999. I focus on three major aspects. First, I look at the different arguments that have been proposed in favour of and against language revitalisation, and how they relate to the motivations underlying the OK project. Second, I analyse the challenges involved in teaching a polysynthetic Iroquoian language to native English speakers, especially in terms of morphological complexity and discourse patterns. Third, I present the main strategy that has been implemented by the school to engage with these challenges, a morpheme-based teaching technique called the 'Root Word Method' (RWM), before considering its theoretical implications. I tentatively argue that the paradox between the pedagogical usefulness of the morpheme, as suggested by the success of the RWM, and the fact that L1 speakers probably process some morphological structures in terms of the abstractive approach is illusory, because the pedagogical efficiency of the constructive approach in L2 acquisition is logically independent from the issue of its psychological adequacy in accounting for L1 competence. I conclude by suggesting that these interesting implications of a case study of language revitalisation for significant issues in modern linguistic theory, such as the constructive-abstractive debate in morphology, provide a good example of the value of applied linguistics projects to theoretical linguistics.

Plain English Abstract. Many languages today are under threat of disappearing due to pressure from 'big' languages like English, especially in countries that were historically colonised by Europeans. For example, the Indigenous North American language Kanyen'kéha (or Mohawk) is severely endangered, with less than 4,000 speakers remaining in Ontario, Quebec, and New York State. This has led community-members to create several projects to try and revitalise the language, such as the Onkwawén:na Kentyóhkwa language school on the Six Nations Reserve along the Grand River (Ontario), where the language has been taught since 1999 in order to create new second-language speakers. My task in this work is to analyse this case study of language revitalisation along three dimensions, namely its motivations (i.e., why do they want to revitalise their language?), the challenges it encounters (i.e., what makes teaching Kanyen'kéha to English speakers difficult?), and the teaching strategies they employ (i.e., how can we overcome these challenges?). I will show that the biggest difficulty in teaching Kanyen'kéha is that it is 'polysynthetic', meaning that speakers package most of the information in single verbs, which can therefore be very long and composed of many individual parts called 'morphemes'. In order to deal with this challenge, the teachers do not teach the language using words, but rather morphemes, in order to allow learners to construct their own words by combining morphemes, and hence learn the language more quickly. I end the article by exploring the significant implications of the success of this teaching method for linguistic theories.

Keywords: language revitalisation; Kanyen'kéha (Mohawk); morphology; language acquisition; language teaching; applied linguistics

1 Introduction

Approximately 50% of the world's 7,000 languages may disappear by the end of this century (Krauss, 1992, p. 6). This situation is particularly pronounced in areas historically colonised by Europeans. For instance, Krauss (1992, p. 5) estimates that 80% of the Indigenous languages still spoken in North America are moribund, meaning that they retain a small number of old native speakers, but are no longer acquired as L1s, and are therefore doomed to disappear when the last speakers pass away.

The Iroquoian family epitomises this situation (Mithun, 1999, pp. 418–425). The only language of the Southern branch, Cherokee, has maintained a significant degree of vitality, but of the fourteen Northern Iroquoian languages, eight are extinct (Susquehannock, Huron-Wyandot, Petun, Wenro, Neutral, Erie, Laurentian, Nottoway) and five are moribund (Seneca, Cayuga, Onondaga, Oneida, Tuscarora). Only Kanyen'kéha still retains a substantial speech community, although the residential school system has accelerated its endangerment throughout the 20th Century (Gomashie, 2019, p. 154).

A discussion of terminology is necessary before going further. 'Mohawk' ("Bear People") is an exonym originally given to this nation by their Mohican neighbours and enemies, and later spread by Dutch settlers (Bonvillain, 2005, p. 9). Despite the greater popularity of this term, the endonyms 'Kanyen'kéha' ("Way of the Flint Place") and 'Kanyen'kehá:ka' ("People of the Flint Place") will be used throughout to refer to the Mohawk language and people respectively, both for the sake of terminological accuracy, and out of respect for the many Kanyen'kéha speakers who tend to prefer these endonyms.

Significant 'grey areas' composed of highly varied degrees of proficiency typically make it very difficult to obtain precise and reliable language endangerment statistics. Nevertheless, it is estimated that Kanyen'kéha is spoken by around 4,000 people in six communities: Kahnawà:ke and Kaneshatà:ke in Quebec; Kenhtè:ke, Wáhta, and Ohswé:ken in Ontario; and Akwesáhsne straddling the borders between these two provinces and New York State (Mithun, 1999, p. 424). Kanyen'kéha is a 'declining language' (i.e., there is a significant number of old speakers, but few young ones) according to Bauman's (1980) scale of language vitality.

Kanyen'kéha has three dialects: a Western dialect in Ontario, a Central dialect in Akwesáhsne, and an Eastern dialect in Quebec (Bonvillain, 1984). The differences between them are minor and only affect relatively superficial levels of linguistic structure, such as single phonemes (e.g., Western /dʒ/ corresponds to Eastern /dz/) and isolated lexical items (e.g., "eagle" is 'atonyon'kó:wa' in the West but 'ákweks' in the East) (ibid.), and can therefore be ignored for our purposes.

Kanyen'kéha orthography was standardised in 1993 and is largely phonemic (Grenoble & Whaley, 2005, pp. 91–92). Most symbols have the same value as in the International Phonetic Alphabet (IPA), except <ʔ> which marks glottal stops, and <en> and <on> which represent the nasal vowels /ẽ/ and /õ/ respectively. Only one major spelling difference exists between communities: /j/ is represented as <y> in Ohswé:ken, but as <i> in other communities (e.g., "doll" is <kaya'tón:ni> in Ohswé:ken but <kaja'tón:ni> in Kahnawà:ke).

This work is essentially a case study of Indigenous language revitalisation that has never been systematically examined before, namely the revitalisation of Kanyen'kéha at Onkwawén:na Kentyóhkwa ("Our Language Society", henceforth OK), one of several revitalisation schools combating the endangerment of the language. OK was founded in 1999 by Owennatékha Brian Maracle in Ohswé:ken, also known as the Six Nations Reserve, a large Kanyen'kehá:ka community located in Southern Ontario along the Grand River. OK offers a two-year adult immersion programme aimed at creating new L2 speakers (Gomashie, 2019, p. 159), and specifically targets the Western Kanyen'kéha dialect as spoken in Ohswé:ken. I will therefore follow the orthographic conventions of this community throughout (except when a word is inherently associated with a different community).

The paper proceeds as follows. Sections 2, 3, and 4 each focus on one of the three main questions that emerge when investigating any revitalisation project. First, *why* was the project founded? I will attempt to answer this question in Section 2 by determining the *motivations* underlying this programme, based on interviews conducted with four OK teachers in July 2019. This will provide an opportunity to review the arguments for and against revitalisation, and how they apply to our particular case. Second, *what* must teachers and students do in order to satisfy these motivations? To address this issue in Section 3, I will try to identify the *challenges* that teachers and students at OK encounter, especially in terms of the difficulties involved in teaching a polysynthetic language to monolingual English speakers. This

will allow me to analyse central aspects of Kanyen'kéha morphology and discourse. Third, *how* do teachers and students overcome these challenges? I will approach this last aspect in Section 4 by reviewing the *strategies* that they implement to engage with the complexity of their language. I will particularly focus on the morpheme-based teaching technique used at OK, called the 'Root Word Method', and investigate its theoretical implications. Finally, Section 5 concludes, and will notably underscore the idea that this case study forms an example of the mutually beneficial relationship that can exist between theoretical and applied linguistics: just as applied linguistics projects can gain crucial insights from theoretical linguistics, so does theoretical linguistics have much to learn from applied linguistics, as suggested by the implications of this case study of Indigenous language revitalisation for important issues in modern linguistic theory, such as the constructive-abstractive debate in morphology.

2 Motivations

In this section, I investigate the motivations underlying the OK project in the context of the debate about the necessity of language revitalisation. I will begin by reviewing the different arguments for and against revitalisation, before looking at how they relate to our case study.

2.1 Language Revitalisation

The last three decades have seen a surge of publications presenting arguments both for and against revitalisation (Kruijt & Turin, 2017, p. 257). I will look at both of these in turn.

2.1.1 Arguments for Revitalisation

Drawing on Pike's (1967, p. 37) etic-emic dichotomy, we can distinguish between two types of arguments for revitalisation.

First, some arguments view endangered languages from an etic perspective (i.e., the objective and external point of view of an observer) as scientific resources to preserve. These are usually associated with linguists, who consider revitalisation necessary to stop the ongoing loss of linguistic diversity caused by the socio-political pressures exerted by majority societies on minority groups, a phenomenon which manifests a larger trend of diversity reduction in all areas (e.g., intellectual, cultural, linguistic, biological) (Hale, 1992, p. 1). In the linguistic realm, this is more concretely visible in the unequal distribution of the world's languages, as exemplified by the so-called '6/94 split' (Dalrymple, 2019): 6% of the world's languages are the L1 of 94% of the world's population, while 94% of the world's languages are the L1 of 6% of the world's population. Trying to prevent this situation from worsening is seen by most linguists as both ethically and scientifically motivated. Ethically, every community should be given the chance to speak their ancestral language. Scientifically, linguists cannot afford to lose half of the empirical base of their field (Krauss, 1992, p. 8), especially as the loss of a language also implies the loss of the crucial cultural and environmental knowledge it encodes (Evans, 2010). According to these linguists, endangered languages should therefore be revitalised so that our theories can be built on an empirical foundation that is representative of linguistic diversity. An obvious counter-argument is that documentation could achieve the same objective, making revitalisation scientifically superfluous (Newman, 2003, p. 6). We will see below that this does not necessarily hold.

Second, other arguments see endangered languages from an emic perspective (i.e., the subjective and internal point of view of a community member) as markers of ethnic identities and vehicles of traditional cultures to maintain. They often emanate from community members who stress the crucial link between language, identity, and culture. If an entire group abandons its language and shifts to the

majority variety, its identity and culture are often harder to maintain, and it is more likely to assimilate into the wider society, or even stop existing as a distinct ethnic group (Krauss, 1992, pp. 8–9). Language is often pivotal in the maintenance of identity and culture, because of what it symbolically represents (e.g., speaking Kanyen'kéha is a way to show one's identity as Kanyen'kehá:ka), and what it culturally enables (e.g., speaking Kanyen'kéha facilitates the understanding of and participation in traditional Kanyen'kehá:ka culture, such as ceremonies). Community members often articulate these arguments eloquently, as they feel more directly emotionally concerned with the relationship between their language, identity, and culture. For example, Karihwakátste Cara Deer, co-director of the language programme Yakwahwatsiratátie in Kahnawà:ke, believes that Kanyen'kéha is 'at the core of what defines us' and that 'our language is deeply rooted within our culture, our ceremonies, and our way of life' (Walz, 2014). This does not mean that ethnic identity cannot be achieved without knowledge of the ancestral language, because language is only one way to experience culture (Nicholas, 2009, p. 321). Nevertheless, language remains a core element of social identity construction, which has led Joseph (2004) to consider the possibility that it may actually constitute one of the major functions of language. Costa (2017) goes even further by claiming that language revitalisation is not about language per se, but should rather be seen as the struggle of minorities to redefine their identity in opposition to mainstream society through the 'totem' of language.

2.1.2 Arguments against Revitalisation

Several types of arguments have been levelled against the systematic necessity or worth of language revitalisation.

A first argument is based on the idea that such endeavours are pointless because language death is a natural and unavoidable process with which we should not interfere. Thus, Mitchell (2010) claims that language death parallels natural selection in the biological world: if a language disappears, it is because humans no longer need it to communicate, like a species dying out and being replaced by another one with greater evolutionary advantages. Similarly, Heller-Roazen (2008, pp. 53–75) believes that language death is a necessary stage of the natural life cycle of any language, which is born, thrives, declines, and eventually dies, as it turns into distinct daughter languages, creating a continuum in which language birth and death cannot be distinguished. These ideas are problematic because they ignore that the worldwide process of linguistic extinction is entirely artificial (Mętrak, 2018, pp. 4–6). Most languages today are not dying because they are no longer used for communication, or because they painlessly give birth to daughter languages, but rather because of man-made discriminatory pressures exerted on their speakers by politically dominant groups (Piller, 2016). The parallels between language death and natural selection or language change are thus unfounded, because there is nothing natural in the processes by which minority language speakers shift to majority languages.

Another argument is provided by Malik (2000), who reduces language to a mere communicative tool. In this brutally utilitarian view, minority language speakers *can* shift to majority languages without losing any aspect of their culture or identity, because these are all faithfully expressible in the majority language, which is qualitatively equal to the community's ancestral language, as it is simply 'another way of saying the same things'. In fact, they *should* shift to the majority language, as it provides a greater communicative value (i.e., it is spoken by more people). This argument ignores the multidimensionality of languages, which cannot be reduced to communicative tools because they often encode culture-specific concepts that are difficult to translate and cannot be properly appreciated outside their natural sociocultural context (Mętrak, 2018, p. 7).

Furthermore, Newman (2003, p. 6) believes that revitalisation projects should be abandoned because they drain human and financial resources from the more important task of documentation. His idea is that documentation should be the primary goal of linguists, as it yields the same scientific

benefits as revitalisation (i.e., primary data about minority languages, making the empirical base of our theories more representative of linguistic diversity), without requiring them to become social workers when they should remain scientists. The validity of this argument ultimately depends on one's subjective conception of our mission as linguists, making it difficult to assess objectively. Should we confine ourselves to the realm of objective scientific analysis, or also apply our knowledge in the intersubjective social world to promote causes we value as worthwhile, such as revitalisation? That goes beyond the scope of this work, but in any case, it is not clear that revitalisation should be systematically jettisoned. First, although revitalisation may be less important than documentation to some linguists, it remains crucial for many community members. Second, the quick documentation of a language before it disappears may not systematically provide the quantity and quality of data necessary to analyse it thoroughly. Even from a purely objective and scientific viewpoint, then, keeping languages alive whenever possible seems preferable, as it creates potentially infinite data sources.

Finally, Ladefoged (1992, p. 810) claims that it is paternalistic of linguists to assume that revitalisation is always the best course of action for a community. Language endangerment situations cannot be simplistically reduced to a manichean conflict between a minority language to preserve and a majority language to reject, as a myriad of additional social, political, and cultural considerations come into play. If speakers wish to abandon their minority ancestral language and shift to the majority language, for instance for economic (e.g., to gain access to better employment opportunities), social (e.g., to reach a higher social status and become more integrated in modernity and globalisation), and/or political (e.g., to achieve national unity) reasons, linguists should respect this choice and not try to impose their scientifically-motivated desire for revitalisation. In other words, when the community's emic objective competes with linguists' etic intentions, the former should ethically always prevail. This argument seems sensible, as it urges us to steer clear of political considerations and remain as neutral and objective as possible (Mętrak, 2018, p. 8). The problem is that there seems to be no truly apolitical position when it comes to language endangerment, as linguists become variables in the political equation as soon as they start working on an endangered language. In fact, even the choice to respect the community's decisions concerning their own language is strictly speaking a political position (Dorian, 1993, p. 575). Still, Ladefoged (1992, p. 810) seems to provide the only viable argument against systematic revitalisation. However, his position also implies that, if a community indeed wants to maintain its language, then implementing revitalisation efforts becomes well-motivated and justified. This is generally the case in Ohswé:ken, which led to the foundation of OK, as we will see below.

2.2 Onkwawén:na Kentyóhkwa

OK is run by activists who are obviously deeply committed to the revitalisation of Kanyen'kéha. However, not everyone in Ohswé:ken sees the language as equally valuable. To assess this situation, I conducted a few interviews, revealing two main themes through which it can be explored: the relevance of Kanyen'kéha in a modern context, and its relationship with Kanyen'kehá:ka culture and identity.

Before looking at these, however, a methodological note is necessary. I personally conducted these interviews on my own with four OK teachers (hereafter referred to as [Interviewee 1–4] for the sake of anonymity) in July 2019 at the language school in Ohswé:ken, Ontario. These 4 interviews were semi-structured (i.e., I had a list of general questions, but interviewees were free to discuss any topic) and individual (i.e., not group interviews). Each interview lasted approximately 20 minutes and was recorded (audio only). I chose to carry out a smaller number of in-depth interviews rather than a larger number of written surveys, as I felt that the issues addressed (e.g., personal motivations for contributing to the revitalisation of Kanyen'kéha) potentially involved an emotional weight that required a research method with more depth than breadth.

The biggest challenge was to avoid biased and leading questions, which would have almost certainly made all interviewees converge on similar responses. Thus, as far as possible, I attempted to steer clear of overly specific formulations (e.g., 'Do you believe that the connection between the Kanyen'kéha language and Kanyen'kehá:ka identity motivates revitalisation?'), and tried to restrict myself to more general and open-ended ones (e.g., 'What motivates the revitalisation of Kanyen'kéha, in your opinion?'). Another limitation, similarly to most qualitative data collection projects, was the famous Observer's Paradox (e.g., Dörnyei, 2007): it proved very difficult to determine if and to what extent interviewees' responses were unwittingly influenced by my presence, and thus not entirely honest. However, acknowledging this problem and keeping it in mind while considering the data presented below hopefully constitutes the first step towards solving it.

2.2.1 *Relevance in a Modern Context*

An observation that was corroborated by all my interviewees is that no community member is actively opposed to the revitalisation of Kanyen'kéha ('No one is actively opposed to the language.' [Interviewee 3]). The difference lies between those who value it to the point that they actively work towards its revitalisation, and those who are passive in this regard ('Everybody thinks it's important, but not everybody chooses to do something about it.' [Interviewee 1]). These two attitudes are not specific to our case, but are relatively common in other endangerment contexts as well, such as Guernsey Norman French (Sallabank, 2013, p. 109). Of course, they should ideally be studied as two different points along a continuum of language ideologies, but for our purposes it suffices to distinguish them as discrete categories.

Those working towards the revitalisation of Kanyen'kéha are motivated by a straightforward fact: most native speakers across all communities are old and likely to pass away in the next few decades. It is thus necessary to create new fluent speakers to prevent an abrupt decline in the number of speakers and an acceleration of language endangerment ('We have over 1,000 first language speakers that are going to pass away in the next 30 or 40 years, and if we don't create a stable number of second language speakers, then Kanyen'kéha is going to die.' [Interviewee 3]). Other Kanyen'kehá:ka communities like Kahnawà:ke are faring slightly better, with a significant number of children acquiring Kanyen'kéha as an L1 (Gomashie, 2019, p. 156). However, the situation of the Ohswé:ken dialect is more problematic, in that there are virtually no L1 speakers left, nor are there any children currently acquiring the language as an L1 ('Today, there are only one or two first language speakers left.' [Interviewee 2]). Teaching the language as an L2 is thus seen as the only solution to recreate speakers and prevent total language shift ('We can't teach people to be first language speakers, we can only teach them to be second language speakers.' [Interviewee 2]), and this is the main motivation driving the OK project.

However, other community members feel that spending two full years learning Kanyen'kéha at OK is pointless, because it will not help them gain access to better employment and higher socio-economic status ('They don't really see the value of Kanyen'kéha, because they want to see their kids and grandkids get real jobs.' [Interviewee 3]). In other words, a part of the community views Kanyen'kéha as irrelevant in a modern context outside the community, especially when it is in competition with international languages like English. Such attitudes typically lead to an incomprehension of the motives other community members may have for wanting to learn the language ('My brothers and sisters were like 'Why are you doing it? What good is learning Mohawk?'' [Interviewee 4]). Nevertheless, these community members do not oppose revitalisation efforts by others, making these two attitudes mutually compatible. Different community members simply pursue different non-competing priorities.

2.2.2 *Culture and Identity*

We saw that OK was founded to maintain Kanyen'kéha. But why does the OK staff see preserving their ancestral language as so important? My interviews revealed two areas where answers could be found: culture and identity.

First, all interviewees agreed that acquiring Kanyen'kéha is not simply a matter of learning new lexical items and grammatical rules, but also requires learning a new cultural system which provides speakers with novel ways of thinking and viewing the world ('Kanyen'kéha is a mindset and a worldview, it's not just words.' [Interviewee 3]). These speakers tend to view culture and language as almost co-substantial: it is impossible to learn one without the other, because they rely on and feed into each other, in that culture is encoded in language, and language is the primary form of cultural expression. OK was thus founded to preserve and promote a better understanding of Kanyen'kehá:ka culture, even if the achieved linguistic and cultural knowledge is imperfect (in the sense of different from native speakers'), as these speakers view imperfect L2 knowledge as preferable to no knowledge at all. More generally, the puristic attitudes of older L1 speakers who reject the imperfect speech of younger L2 speakers may hinder the revitalisation of minority languages (Dorian, 1994, pp. 480–481). This issue does not emerge in Ohswé:ken, as all remaining speakers learnt the language as an L2, and therefore are more willing to tolerate imperfections in the speech of others, as their own performance also diverges from that of native speakers.

Let us look at an example of this language-culture connection. Interviewee 3 pointed to a significant difference between English, in which nouns form the basic referential tool ('The English language is obsessed with naming things.'), and Kanyen'kéha, which usually refers to non-basic concepts via verbal descriptions ('In Kanyen'kéha, if it's not a very basic cultural or natural concept, it is just described.'). This creates a cultural hierarchy in which culturally central concepts are referred to by nouns (e.g., 'onhwéntsya' "land"), while secondary or borrowed concepts are described with verbs (e.g., 'yontkonhshohare'táhkwa' "bathroom sink", lit. "one uses it to wash one's face"). The point is that speakers often believe that one can only become aware of this cultural hierarchy by learning the language; that is, they view this cultural hierarchy as formally encoded in the language. Although such claims might justifiably seem doubtful from the viewpoint of modern linguistics' canon of scientific rigour, and especially to those who are sceptical of linguistic relativity and the controversial Sapir-Whorf Hypothesis (Whorf & Carroll, 1964), it is crucial to remember that 'for many members of endangered language communities, links between language, culture, and identity are subjectively real' (Sallabank, 2013, p. 79).

Second, most interviewees agreed that speaking Kanyen'kéha is an essential aspect of one's identity as Kanyen'kehá:ka ('What's at stake in revitalising Kanyen'kéha is our identity.' [Interviewee 4]). Fluent speakers can easily identify as such by simply conversing in the language. Others can symbolically use a few phrases to show their ethnic affiliation, even if they do not speak the language ('I was working with the Chief, and I teach her some words here and there, and she was trying to get everyone to say 'shé:kon' ["hello"], 'nyá:wen' ["thanks"], and 'ó:nen' ["bye"]. They do all this for show. It helps her identify that she's 'Onkwehón:we' ["Native American"].' [Interviewee 4]). However, they all stressed that language is only one way among many to mark one's identity as Kanyen'kehá:ka or Onkwehón:we, because social identities are inherently multi-faceted constructs ('There's a whole big issue of who is 'Onkwehón:we': Do you have to live in the community? Do you need to have a particular blood quantum? These are very divisive concepts.' [Interviewee 3]). Religion seems to be a particularly important factor, as it does not necessarily align with language ('There's people going to church who are first language speakers, just as there's people going to traditional Longhouse ceremonies who don't speak the language.' [Interviewee 3]). Despite these nuances, there remains a

strong sense among the speakers I have interviewed in which, in order to be 'fully' Kanyen'kehá:ka, one should still try and learn the language, and the OK project is partly fuelled by this sentiment.

2.3 Conclusion

In this section, I argued in favour of language revitalisation in general, and tried to show that OK provides a good specific example of the emic arguments for revitalisation: preserving Kanyen'kéha as an L2 is considered crucial for understanding Kanyen'kehá:ka culture and maintaining Kanyen'kehá:ka identity, even though language is only one aspect of this multi-faceted social construct. The attitudes of some community members who assign little value to Kanyen'kéha in a modern context also remind us of the need to prioritise the community's will over academic objectives, although they are not in direct conflict in this particular case.

I have only attempted to show broad tendencies. Ultimately, one's attitude towards one's ancestral language is entirely subjective, and there are many different reasons why one might want (or refuse) to contribute to the revitalisation of Kanyen'kéha by learning it, as articulated by Interviewee 2: 'I think it's highly subjective what people feel about language revitalisation. There's a variety of reasons for people to want to learn the language.' Such diverging motivations may justify attempts at preemptive 'language-ideological clarification' (Kroskrity, 2009; see also Fishman, 1991, e.g., p. 394, and Dauenhauer & Dauenhauer, 1998), that is discussions among all the actors involved in a revitalisation project aimed at making their different language ideologies explicit, and thus solve potential conflicts between them before they become obstacles to the project's success (although the usefulness of this concept has sometimes been contested, for instance by Roche, 2019).

3 Challenges

Let us now turn to the challenges that OK faces in satisfying the motivations identified in Section 2. Any revitalisation project encounters various difficulties (e.g., different initial proficiency levels, lack of financial or institutional support, lack of pedagogical material, dialectal variation), and OK is no exception. However, I have chosen to focus exclusively on the specific linguistic challenges encountered at OK, namely in terms of morphological complexity and discourse patterns, as this will pave the way for our discussion of the Root Word Method in Section 4 below.

3.1 Morphology

Kanyen'kéha is polysynthetic, which entails a very complex morphological system. The idea that polysynthetic languages are *objectively* more complex than morphologically poorer languages is controversial, because of the lack of consensus about the definition and measure of objective linguistic complexity (Dahl, 2017).

However, Kanyen'kéha seems *subjectively* more complex to learn than less morphology-heavy languages from the standpoint of English-speaking L2 learners. Indeed, according to Eckman's (1977) Markedness Differential Hypothesis, areas of the target language which are different from and more marked than in the L1 are more difficult to acquire.

Thus, it will typically take more effort for an English speaker to learn Kanyen'kéha morphology (which is the key to acquiring any polysynthetic language) than French morphology, due to the greater typological distance between English and Kanyen'kéha than between English and French, and because Kanyen'kéha polysynthetic structures are arguably more marked than English analytic ones.

I will explore Kanyen'kéha morphology in terms of the two dimensions of syntagmatic and paradigmatic complexity, derived from Saussure's (1916) famous syntagm-paradigm dichotomy. We will leave aside the issue of the validity of the morpheme for now, and this term will be used throughout this section in a theory-neutral sense of sub-word morphological unit.

3.1.1 Syntagmatic Complexity

Syntagmatic complexity can be defined as the internal morphological complexity of words, and may be considered along formal (i.e., relating to form) or functional (i.e., relating to meaning) dimensions. More precisely, formal syntagmatic complexity can be (at least for our purposes) straightforwardly viewed as the number of morphemes per word. In this regard, Kanyen'kéha is clearly more complex than English, as its polysynthetic nature means that most words are composed of many more morphemes than analytic lexical items in an isolating language like English, with an average ratio of only 1.68 morphemes per word (Katamba, 1994, p. 35).

Kanyen'kéha features only three morphological categories, namely particles, nouns, and verbs. These are not to be mistaken with syntactic categories, which do not straightforwardly map onto morphological ones (e.g., morphological verbs can function syntactically as nominals, as we will see in Section 3.2.1). Unless otherwise indicated, we focus on morphological categories here. Particles are defined as being completely indecomposable and lacking any sort of internal morphological structure. They carry out a wide range of different syntactic and discursive functions, as they can have, inter alia, a temporal (e.g., 'ó:nen' "at this time"), spatial (e.g., 'é'tho' "over there"), or numeral (e.g., 'áhsen' "three") meaning, and can also function as pronominals (e.g., 'í:se' "you"), demonstratives (e.g., 'thí:ken' "that"), quantifiers (e.g., 'é:so' "many, very"), conjunctions (e.g., 'táhnnon' "and"), grammatical markers (e.g., 'ken' marks a polar question), interjections (e.g., 'hánio' "come on!"), and several other things (Mithun, 2008, p. 564–565). There is also a small set of morphological particles that behave syntactically as nouns, including onomatopoeic animal names (e.g., 'kwéskwes' "pig") and foreign loanwords (e.g., 'rakérens' "barn", from French 'la grange'), which cannot enter in the full range of morphosyntactic operations available to nouns because of their atomic morphophonological make-up (e.g., noun incorporation requires extraction of a nominal root, which is obviously absent here).

From the perspective of Kanyen'kéha morphology as a whole, however, particles form the exception rather than the norm, as most words are not atomic but highly morphologically complex. Morphological nouns, for instance, minimally contain three morphemes, namely a gender prefix, the nominal root, and a nominal suffix, as in (1); and may be further modified by a possessive prefix, as in (2), or by a locative suffix, as in (3) (Maracle, 2016, p. 257). In all the examples below, we ignore irrelevant morphophonological processes.

- (1) *kanónhsa*
ka-nonhs-a
 N-house-NOM
 'house'

- (2) *akenónhsa*
ake-nonhs-a
 1.SG.POSS.AL-house-NOM
 'my house'

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- (3) *kanónhskon*
ka-nonhs-kon
N-house-inside
'inside the house'

Nouns may also be derived from a verbal root using a nominaliser, as in (4), and can be pluralised using a distributive suffix (usually accompanied by a diminutive suffix), as in (5) (Mithun, 2008, p. 566).

- (4) *kahyatónhshera*
ka-hyaton-hsher-a
N-write-NMS-NOM
'book'

- (5) *orihwa'shòn: 'a*
o-rihw-shon' -a
N-idea-DIS-DIM
'ideas'

Indicating a specific number of entities also involves a complex synthetic pattern, as can be seen below (Maracle, 2016, p. 100).

- (6) *sewenhni:sera*
se-w-enhniser-a
REP-N-day-NOM
'one day'

- (7) *tewenhniserá:ke*
te-w-enhniser-ake
DUP-N-day-NSG
'two days'

- (8) *x niwenhniserá:ke*
x ni-w-enhniser-ake
x PART-N-day-NSG
'x days' (with $x > 2$)

Of course, these various morphological operations can often be cumulated in a same item, as in (9), which features both a complex deverbal stem and a locative marker, and (10), in which possession and pluralisation co-occur (ibid., p. 211).

- (9) *kahyatonhsherà:ke*
ka-hyaton-hsher-ake
N-write-NMS-in
'in the book'

- (10) *akerihwa'shòn: 'a*
ake-rihw-shon' -a
1.SG.POSS.AL-idea-DIS-SIM

‘my ideas’

Nominal morphology, however, does not go much farther than that, and it is rather in verbal structures that true morphological complexity is to be found. Verbs also minimally contain three morphemes, namely a pronominal prefix, the verbal root, and an aspectual suffix, as in (11), with the exception of some imperatives which lack an aspectual suffix, as in (12) (Mithun, 2008, p. 567).

(11) *keríhtha*
ke-riht-ha
 1.SG.AGT-cook-HAB
 ‘I cook it’

(12) *sériht*
se-riht
 2.SG.AGT-cook
 ‘cook it!’

Verbal forms are routinely much more complex, however, as they can contain a high number of additional prefixes and suffixes, and may exhibit noun incorporation, a phenomenon which is very frequent in such heavily polysynthetic languages. The temporal-aspectual system is also fairly intricate, and is expressed using a range of prefixes and suffixes displaying complex patterns of allomorphy. All of this means that the range of possible verbal structures is far greater than what could be exhaustively covered within the scope of this work. Nevertheless, in order to give a flavour of the morphological complexity of polysynthetic Kanyen’kéha verbs, a fairly exhaustive verbal template is given below.

Table 1: *Morphological template of Kanyen’kéha verbs* (adapted from Julian, 2010, pp. 130–131)

(Modifier)	(Tense)	Pronoun	(Modifier)	(Noun)	(NMS)	Verb	(Modifier)	Aspect
Coincidental							Ambulative	Habitual
Duplicative					–a–		Benefactive	Punctual
Negative	Definite	Agentive	Middle		–		Causative	Perfective
Partitive	Indefinite	Patientive	Reflexive		<i>hsher–</i>		Distributive	Progressive
Repetitive	Future	Transitive	Reciprocal		– <i>hkw–</i>		Purposive	Stative
Cislocative					–’t–		Reversive	
Translocative								

A few concrete examples are provided in (13) below (DeCaire, 2013).

(13) (a) *sana ’khwén: ’on*
sa-na ’khwen ’-on
 2.SG.PAT-become.angry-PERF
 ‘you are angry’

(b) *shiwakatehyaróntyé*
shi-wak-ate-hyaron-tye-Ø
 COINC-1.SG.PAT-MID-grow.up-AMB-STAT
 ‘when I was growing up’

- (c) *akenenstayéntho'*
a-ke-nenst-yenthó-'
INDEF-1.SG.AGT-corn-plant-PUNC
'I would plant corn'
- (d) *wa'ke'nákerate'*
wa'-ke-'nakerat-e'
DEF-1.SG.AGT-be.born-PUNC
'I was born'
- (e) *nisahsennò:ten*
ni-sa-hsenn-oten-Ø
PART-2.SG.AGT-name-be.a.kind.of-STAT
'it is your name'
- (f) *tewakhwihshenhé:yon*
te-wak-hwihs-enhey-on
DUP-1SG.PAT-energy-die-PERF
'I am tired'
- (g) *tenskená:tahkwe'*
t-en-s-ke-natahkw-e'
CLOC-FUT-REP-1.SG.AGT-move-PUNC
'I will move back (to my former place of residence)'
- (h) *asahyatonhshera'yén:ta'ne'*
a-sa-hyaton-hshera-yen-ta'-ne'
INDEF-2.SG.AGT-write-NMS-have-CAUS-PUNC
'you should get a book'

As the examples above hopefully make clear, it is common for Kanyen'kéha verbs to contain many more than three morphemes, with sometimes up to seven (and sometimes even more) morphemes. The logical conclusion from our discussion of Kanyen'kéha nouns and verbs is therefore that this language exhibits a higher degree of formal syntagmatic complexity than English.

Functional syntagmatic complexity, on the other hand, corresponds to the degree of opacity of the form-meaning mapping within a word, understood as the predictive value that elements on one level (i.e., meaning or form) provide about elements on the other level. For an L2 acquirer, words whose meaning cannot be compositionally predicted from the sum of those of their parts are harder to learn, because they require the additional effort of memorising the meaning of the whole word. Non-compositionality usually implies idiomaticity, because opaque semantic structures can only be maintained if they are frequently used as idiomatic collocations by native speakers (Mithun, 2008, p. 579). Thus, Kanyen'kéha noun incorporation creates a continuum from perfectly transparent constructions, as in (13c) ('akenenstayéntho'' 'I would corn-plant'), to semantically opaque ones, as in (14) below (Mithun, 2008, p. 578).

- (14) *enskontatewenni:yohne'*
en-s-kon-tate-wenn-iyo-hne-'

FUT-REP-3.PL.N.AGT-REFL-word-be.good-PURP-PUNC

‘they were going to be free’ (lit. ‘they were going to be word–good’)

The example in (13f) (‘tewakhwihshenhé:yon’ ‘I am tired’, lit. ‘I am energy-dead’) is probably somewhere in-between these two extremes along this continuum, as its overall meaning is still somewhat retrievable from those of its parts, although not as straightforwardly as in (13c).

Idiomaticity, that is cases in which a combination of morphemes does not yield the expected meaning, is difficult to acquire in any target L2. However, this is exacerbated in Kanyen’kéha by the fact that idiomatic expressions are even more obscure for learners who are not aware of the different cultural background which motivates them, and also because idiomaticity in Kanyen’kéha is mainly manifested in noun incorporation constructions, a pattern which is in itself probably difficult to acquire for monolingual English speakers due to its ‘markedness differential’ (Eckman, 1977). Idiomatic noun incorporation constructions are actually very frequent in Kanyen’kéha, which poses a serious challenge for L2 learners who are not merely satisfied with speaking grammatically and communicating effectively, but also want to get as close as possible to native-like proficiency (DeCaire, p.c.). Noun incorporation constructions are discussed further in Section 4.2.2, but a few additional examples of idiomatic ones are provided in (15) below, to give an idea of the obstacle learners face (Brant, 2017).

(15) (a) *yahatsí:renhte’*

y-a-ra-tsir-enht-e’

TLOC-DEF-3.SG.M.AGT-fire-drop-PUNC

‘he made matters worse’ (lit. ‘he dropped fire’)

(b) *thotyá:ro’kte*

t-ro-t-yar-o’kt-e

CLOC-3.SG.M.PAT-MID-bag-miss-HAB

‘he is dumb’ (lit. ‘he is missing a bag’)

(c) *tehothsinéston*

te-ro-t-hsin-e-tst-on

DUP-3.SG.M.PAT-MID-leg-be.long-CAUS-PERF

‘he is bossy’ (lit. ‘his legs have become long’)

(d) *tehononhwarawénrye*

te-ro-nonhwar-wenrye-Ø

DUP-3.SG.M.PAT-brain-stir-STAT

‘he is crazy’ (lit. ‘his brain is stirred’)

(e) *tewakathahahkwahnónhne*

te-wak-at-hah-hkwa-hnon-hne-Ø

DUP-1.SG.PAT-MID-road-pick.up-PURP-PST-STAT

‘I went for a walk’ (lit. ‘I went to pick up the road’)

(f) *wesattsikhè:tya’khse’*

we-s-at-tsikhe’t-ya’k-hse-’

DEF-2.SG.AGT-MID-sugar-break-BEN-PUNC

‘you were cut out of something valuable you expected’ (lit. ‘you broke the sugar’)

The reverse situation, where a given meaning is not expressed by the expected combination of morphemes, is just as difficult, as learners cannot regularly generate the word using the morphemes and rules they have learned so far, but must memorise an idiosyncratic structure. Kinship terms provide a good example. They are generally constructed by combining a transitive pronominal prefix (i.e., a prefix which expresses both the agent and patient) and a verbal root expressing the kinship relation, with the senior member of the relation acting as the agent and the junior member as the patient (Mithun, 2012, p. 9), as in (16a). Thus, following the general pattern, we would expect a word like “my older brothers” to begin with the prefix ‘yonk-’ (3.PL.M>1.SG), as in (16b). However, this structure is illicit, and speakers rather attach a pluralising distributive suffix to the singular form, as in (16c) (ibid., pp 9–10).

- (16) (a) *rakhsótha*
rak-hsot-ha
3.SG.M>1.SG-be.grandparent-HAB
‘my grandfather’ (lit. ‘he is grandparent to me’)
- (b) **yonkhtsi:’a*
yonk-htsi’-a
3.PL.M>1.SG-be.older.sibling-DIM
Intended: ‘my older brothers’ (lit. ‘they (M) are older siblings to me’)
- (c) *rakhtsi’shòn:’a*
rak-htsi’-shon’-a
3.SG.M>1.SG-be.older.sibling-DIS-DIM
‘my older brothers’ (lit. ‘he is older brother to me (PL)’)

The point is that this phenomenon contributes to the opacity of the form-meaning mapping in many Kanyen’kéha lexical items, which is already substantially obscured by widespread idiomaticity. We can therefore conclude that Kanyen’kéha displays a relatively high level of functional syntagmatic complexity from the viewpoint of English speakers. More generally, the overall conclusion is that Kanyen’kéha is syntagmatically complex to learn for English speakers, to the extent that many words contain a high number of morphemes, and feature an opaque form-meaning mapping.

3.1.2 Paradigmatic Complexity

Paradigmatic complexity can be viewed as the internal morphological complexity of paradigms. Formally, it corresponds to the number of cells in paradigms. Kanyen’kéha seems more complex than English in this respect as well, as its paradigms usually contain many more elements than English ones. Pronominal prefixes are a good example (Maracle, 2016). Kanyen’kéha is a head-marking language, with the agent and/or patient always marked on the verb via a prefix. There are three sets of pronominal prefixes. First, we have fifteen subjective prefixes, which mark the relationship between a human agent and a non-human patient, or are used when there is only a human agent. We also have eleven objective prefixes, denoting the relationship between a non-human agent and a human patient, or used when there is only a human patient. Finally, we have thirty-five transitive prefixes, expressing the relationship between a human agent and a human patient. There is also a set of eleven possessive prefixes used on nouns to mark possession (as in example (2) ‘*akenónhsa*’ “my house”), but these are historically derived from the set of objective prefixes through a few phonological processes (e.g., initial glide deletion from ‘wake-’ to ‘ake-’), and therefore do not strictly speaking count as an additional paradigm.

The higher number of pronominal markers compared to English is due to the presence of additional inflectional features, such as clusivity on non-singular first person prefixes, and dual number. There is no space to present all of these sixty-one pronominal prefixes exhaustively, but a representative sample is provided in Table 2.

Table 2: *Examples of Kanyen 'kéha pronominal prefixes* (adapted from Maracle, 2016, pp. 9–14)

Subjective prefixes (AGT)		Objective prefixes (PAT)		Transitive prefixes (AGT>PAT)	
1.SG.AGT	<i>ke-</i>	1.SG.PAT	<i>wake-</i>	1.SG>2.SG	<i>kon-</i>
1.DU.INC.AGT	<i>teni-</i>	1.DU.PAT	<i>yonkeni-</i>	1.PL>2.SG	<i>kwa-</i>
1.DU.EXC.AGT	<i>yakeni-</i>	1.PL.PAT	<i>yonkwa-</i>	1.DU.INC>3.SG.M	<i>etshiteni-</i>
1.PL.INC.AGT	<i>tewa-</i>	2.SG.PAT	<i>sa-</i>	1.NSG.EXC>3.SG.F	<i>yakhi-</i>
1.PL.EXC.AGT	<i>yakwa-</i>	2.DU.PAT	<i>seni-</i>	2.SG>1.SG	<i>take-</i>
2.SG.AGT	<i>se-</i>	2.PL.PAT	<i>sewa-</i>	2.DU>3.SG.M	<i>etshiseni-</i>
2.DU.AGT	<i>seni-</i>	3.SG.N.PAT	<i>yo-</i>	2.PL>3.SG.M	<i>etshisewa-</i>
2.PL.AGT	<i>sewa-</i>	3.SG.M.PAT	<i>ro-</i>	3.SG.M>1.SG	<i>rake-</i>
3.SG.F.AGT	<i>ye-</i>	3.NSG.M.PAT	<i>roti-</i>	3.SG.M>1.DU	<i>shonkeni-</i>
3.DU.F.AGT	<i>keni-</i>	3.SG.F.PAT	<i>yako-</i>	3.SG.F>1.SG	<i>yonke-</i>
3.PL.F.AGT	<i>konti-</i>	3.NSG.F.PAT	<i>yoti-</i>	3.SG.F>2.NSG	<i>yetshi-</i>

Furthermore, each prefix has multiple allomorphs depending on the initial segment of the following morpheme. The combined allomorphy patterns of all prefixes requires positing five different inflectional classes, defined by the phoneme that follows them (C(onsonant), A, I, E, and O class), although individual prefixes rarely have more than three allomorphs. Examples are given in Table 3.

Table 3: *Examples of Kanyen 'kéha inflectional classes* (adapted from Maracle, 2016, p. 10)

	C class	A class	E class
Subjective: 3.PL.M.AGT	<i>rati-rákwás</i> 'they (M) choose it'	<i>ron-(æ)tò:rats</i> 'they (M) hunt it'	<i>ronn-entórha</i> 'they (M) are lazy'
Objective: 3.SG.F.PAT	<i>yako-nòn:we's</i> 'it likes her'	<i>yako-(æ)ta'karí:te</i> 'she is healthy'	<i>yakaw-é:kahs</i> 'she likes the taste of it'
Transitive: 2.DU>1.SG	<i>takeni-kwényes</i> 'you two defeat me'	<i>taky-aterò:roks</i> 'you two watch me'	<i>taken-ehyà:ra's</i> 'you two remember me'

Kanyen 'kéha thus clearly seems to exhibit a higher level of formal paradigmatic complexity (at least in the area of verbal inflections) than English, with its massive syncretisms and reduced paradigms.

Functional paradigmatic complexity, on the other hand, can be defined as the degree of opacity of the cell-function mapping within a paradigm. That is, functional paradigmatic complexity increases when the mapping of paradigmatic cells to specific grammatical functions is not systematically predictable from regular patterns. The Kanyen 'kéha temporal-aspectual system nicely exemplifies this phenomenon. All verbs in the same category basically follow the same pattern. Exclusively stative verbs have five possible forms, namely present (e.g., 'wakatshennón:ni' "I am happy"), past (e.g., 'wakatshennoníhne' "I was happy"), future (e.g., 'enwakatshennonníhake' "I will be happy"), conditional (e.g., 'aonkwatshennonníhake' "I would be happy"), and imperative ('satshennonníhak' "be happy!") (Maracle, 2016, p. 126). Active verbs, however, have a more complex temporal-aspectual structure (DeCaire, n.d.). They are organised around three basic aspectual endings, namely habitual

(e.g., ‘wakenà:khwens’ “I become angry habitually”), perfective (e.g., ‘wakena’khwén:’on’ “I have become angry”), and punctual, alongside an isolated imperative form (e.g., ‘sanà:khwen’ “become angry”). Verbal expressions in the habitual aspect can occur in the five forms described for the stative series above, while those in the perfective aspect can occur in all but the imperative, and have an additional ‘ambulative’ form instead (i.e., meaning “to go along doing something”; e.g., ‘wakena’khwen’onhátye’ “I am going along becoming angry”). Within the punctual series, forms instead surface as what is traditionally termed definite (i.e., single event in the past; e.g., ‘onkenà:khwen’ “I became angry”), indefinite (i.e., a kind of irrealis; e.g., ‘aonkenà:khwen’ “I would become angry”), or future (i.e., single event in the future; e.g., ‘enwakenà:khwen’ “I will become angry”). This is represented diagrammatically in Figure 1 below (*ibid.*).

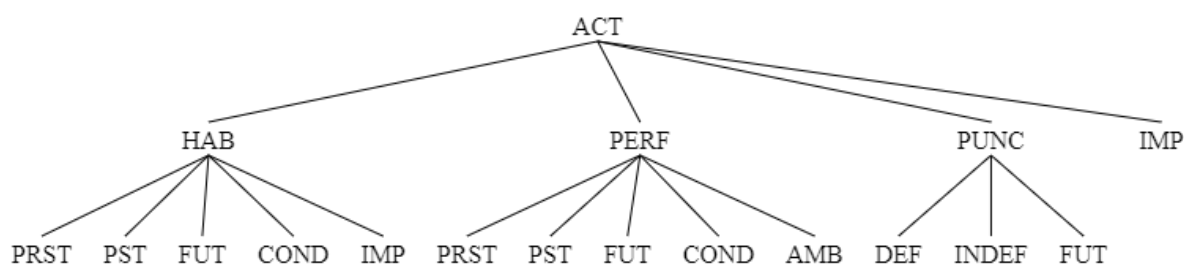


Figure 1: *The Kanyen'kéha temporal-aspectual system.*

There also exists a fourth aspectual series traditionally termed ‘progressive’, which refers to actions occurring ‘right now/then’ at the time of reference, and can also take the five usual temporal forms described above. What is crucial for our purposes is that the base stem of this aspectual series is variable (*ibid.*). That is, the verbal form which is selected as the basic present progressive form upon which the rest of the progressive paradigm is constructed varies from verb to verb in a relatively unpredictable way, and must therefore be learned idiosyncratically for each verb (some patterns exist, but can only be revealed by an in-depth morphological analysis of a large number of stems, and are probably not directly accessible to L2 learners). In some verbs, the habitual present form is selected, so that the progressive paradigm is formally identical to the habitual one (e.g., ‘kateweyénhstha’ “I study habitually” or “I am studying right now”; ‘kateweyénhsthahkwe’ “I used to study habitually” or “I was studying right then”; etc.). In others, the perfective present form is selected (e.g., ‘wakhnekì:ren’ “I have drunk” or “I am drinking right now”; ‘wakhnekihren:ne’ “I had drunk” or “I was drinking right then”; etc.). In yet others, the form with the ambulative suffix is selected (e.g., ‘wakatorihátye’ “I am driving along the road” or “I am driving right now”; ‘wakatorihátyehkwe’ “I was driving along the road” or “I was driving right then”; etc.). Finally, some verbs have a separate unique form for the progressive (e.g., ‘wakyó’te’ “I am working right now”; ‘wakyó’tehkwe’ “I was working right then”; etc). The point is that the progressive grammatical function is not systematically tied to one constant paradigmatic cell, but varies idiosyncratically from verb to verb, opacifying the mapping of cells to functions, exacerbating functional paradigmatic complexity, and creating an additional challenge for English-speaking learners.

A more specific example of increased functional paradigmatic complexity can be identified: if the relative distribution of two morphemes belonging to a same paradigm (i.e., competing for a same syntagmatic slot) is not motivated by any predictable pattern, then it is less transparent, thereby increasing functional paradigmatic complexity. Several such cases exist in Kanyen'kéha. For example, we saw that subjective prefixes are used with human agents, and objective prefixes with human patients. However, this pattern has exceptions, as some verbs which take agentive subjects are rather used with

objective prefixes, such as ‘*wak-yó’te*’ “I work” (Mithun, 2012, p. 5). The reverse situation also exists, as in ‘*k-atonhkárya’ks*’ “I am hungry”, a verb which takes a patientive subject and yet is used with a subjective prefix. The historical reasons explaining these irregularities (e.g., the verb ‘to work’ used to mean ‘to be busy’, which takes patientive subjects) are irrelevant to L2 learners, who cannot access diachronic information (ibid.). As far as they are concerned, these are simply exceptions that have to be memorised to avoid overgeneralisations, which further complexifies L2 acquisition.

All in all, then, Kanyen’kéha also seems paradigmatically difficult to acquire for English speakers. Section 3.1 is summarised in Table 4 below.

Table 4: *Summary of Section 3.1*

Complexity	Formal	Functional
Syntagmatic	Words typically contain many morphemes.	The form-meaning mapping within words can be unpredictable.
Paradigmatic	Paradigms typically contain many cells.	The cell-function mapping within paradigms can be unpredictable.

3.2 Discourse

I now turn to acquisition difficulties on the discourse level. As is to be expected by virtue of their different sociocultural setting and genetic unrelatedness, Kanyen’kéha and English discourse patterns differ widely. This is particularly noticeable in the high frequency of verbs and particles.

3.2.1 Verbal Constructions

One salient feature of Kanyen’kéha discourse is the high frequency of verbs. When Wallace Chafe investigated this issue based on comparable corpora, he found that the verb-noun ratio was 1:1 in English, but 17:1 in Kanyen’kéha (Mithun, 2015, pp. 15–16). Kanyen’kéha verbs are used for a much wider range of functions than English ones, and appear where a language like English would have nouns, as in (17), adjectives, as in (18), or adverbs, as in (19) (Maracle, 2016).

- (17) *kaksóhares*
ka-ks-ohare-s
 3.SG.N.AGT-dish-wash-HAB
 ‘dishwasher’ (lit. ‘it washes dishes’)
- (18) *ro’nikonhrowá:nen*
ro-’nikonhr-owanen
 3.SG.M.PAT-mind-be.big
 ‘he is intelligent’ (lit. ‘he is big-minded’)
- (19) *sewatyé:ren’s*
se-w-at-yeren-’s
 REP-3.SG.N.AGT-MID-happen-DIS
 ‘sometimes’ (lit. ‘it happens here and there’)

As a consequence, Kanyen'kéha predicates, arguments, and adjuncts can all frequently be realised as verbs, leading to speech patterns which substantially differ from English. For example, the utterance in (20) contains no nouns, six verbs, and seven particles. The English translation, however, has only four verbs, and relies heavily on the presence of adjectives and nouns. Another important discourse difference is that half of the English verbs are non-finite. Kanyen'kéha verbs are always finite, and English infinitives generally correspond to finite verbs in the indefinite aspect, marked by the 'a-' prefix (e.g., 'akherihónnyen' "I would teach them") (Maracle, 2016). This is exemplified in (20) below (DeCaire, 2013).

- (20) *Í:kehre tsi kwáh iorihowá:nen akherihónnyen' ne ratiksa'okòn:'a'*
V P P V V P V
I-think that quite it-is-a-big-matter I-would-teach-them the they-are-children
- 'tsi ní:yoht tsi ahatiyéntho' ne nya'té:kon.*
P P P V P V
how they-would-plant the it-amounts-variously

'I think it is important to teach children how to plant all sorts of things.'

Arguably, these significant discourse differences derived from the verb-based nature of Kanyen'kéha create additional challenges for English-speaking L2 learners. First, verbs are so omnipresent in Kanyen'kéha speech that mastering their complex morphology becomes even more crucial. For instance, L2 learners must entirely acquire the complex sets of pronominal prefixes to reach even basic proficiency. Second, Kanyen'kéha discourse patterns differ from English ones to such an extent that an English-speaking L2 Kanyen'kéha learner will rarely (if ever) be successful when transferring English morphosyntactic structures and filling them out with Kanyen'kéha lexical items, as is often done in the early stages of L2 acquisition, according to approaches assuming significant transfer from the L1 grammar (e.g., Schwartz & Sprouse, 1996). Most tellingly, some textbooks (e.g., Deering & Harries-Delisle, 1976, p. 1) explicitly discourage L2 learners from attempting to innovate new morphosyntactic structures based on previous knowledge, especially in the early stages of acquisition, because they are likely to produce ungrammatical structures based on English patterns.

3.2.2 Discourse Particles

Another essential aspect of Kanyen'kéha speech is the high frequency of discourse particles. As we saw in Section 3.1.1, these are defined as lacking internal morphological structure (Mithun, 2008, p. 564). They include adverbials (e.g., 'á:re' "again"), pronouns (e.g., 'í:se' "you"), grammatical markers (e.g., 'ken' marking yes-no questions), conjunctions (e.g., 'táhnnon' "and"), and various other types of expressions (ibid., p. 565). Some have easily translatable and hence learnable meanings (e.g., 'wísk' "five"), but others have a more abstract discourse function, being used to structure speech or monitor information flow (Mithun, 2015, p. 36). These functions are crucial in a language like Kanyen'kéha, where word-order is not fixed but pragmatically determined, with more important or novel elements being fronted (Maracle, 2016, p., 19). This makes particles particularly difficult for L2 learners to acquire, as knowing their English translation(s) does not suffice to capture the full range of their pragmatic functions. One must already be proficient in Kanyen'kéha and familiar with its discourse patterns to be able to appreciate how these particles are used.

A good example of such an elusive word is the particle ‘tsi’. It can be used in a very wide range of functions, including subordinating conjunction, as in (21a), locative particle, as in (21b), temporal particle, as in (21c), and a particle roughly meaning “the way that”, as in (21d) (DeCaire, 2013).

- (21) (a) *Ó:nen sateryèn:tare tsi Wáhta nitewaké:non.*
 already you-know that Wáhta I-come-from-there
 ‘You already know that I come from Wáhta.’
- (b) *Tsi tkahéhtayen enwakyó’ten’.*
 where garden-lies I-will-work
 ‘I will work on a farm.’
- (c) *Táhnnon kéntho wa’tkená:tahkwe’ teyohserá:ke tsi náhe.*
 and here I-moved-from-there two-years P ago
 ‘I moved here two years ago.’
- (d) *Akeweyentéhta’ne’ ne onkwawén:na táhnnon tsi niyonkwarihò:ten.*
 I-would-learn the our-language and the-way-that our-kind-of-business
 ‘I would learn our language and our traditions.’

Given such a wide range of functions, L2 learners cannot master particles like ‘tsi’ by simply learning an English translation, as may be done with most content words (e.g., students only have to know that ‘è:rhar’ means “dog” to use it properly). Instead, statistical learning over many utterances in which the particles are used in different contexts seems necessary, which further complexifies L2 acquisition.

3.3 Conclusion

The syntagmatic and paradigmatic complexity of Kanyen’kéha morphology, as well as the relatively marked discourse patterns characterised by the high frequency of verbs and particles, are significant obstacles to the L2 acquisition of Kanyen’kéha by L1 English speakers within revitalisation programmes like OK. I only looked at the most salient and widespread linguistic challenges, and each learner undoubtedly has a unique acquisition experience with its own set of specific difficulties. However, these are beyond the scope of this study.

I want to emphasise again that I have not attempted to show that Kanyen’kéha is objectively more complex than English, because the notion of objective linguistic complexity is controversial, so that there is as of yet no meaningful sense in which this could be correct. Rather, I argued that, for L1 English speakers, Kanyen’kéha is subjectively more complex to acquire as an L2 than typologically closer languages.

4 Strategies

This section will examine the specific teaching strategies implemented within the OK programme in order to cope with the learning challenges reviewed in Section 3. Several such methods can be identified, including language immersion, reliance on new technologies, and an innovative teaching technique called the Root Word Method (RWM).

I have chosen to focus solely on the latter, however, because it is the main basis for OK’s pedagogical success, and a more direct response to the acquisition difficulties identified in Section 3,

as we will see below. I will begin by presenting the RWM in detail, and then consider some of its theoretical implications.

4.1 The Root Word Method

The RWM was created by Kanatawákhon David Maracle in Kenhtè:ke, and was then expanded to a wider range of morphological structures and pedagogical contexts by Owennatékhha Brian Maracle to found OK in 1999 (Maracle, p.c.). It has been the basis for the school's success ever since (Gomashie, 2019, p. 159). I will first examine its basic principles, and then look at a specific example of how it is implemented in practice.

4.1.1 Basic Principles

The linguistic challenges identified in Section 3 all seem to more or less directly derive from the polysynthetic nature of Kanyen'kéha. Morphological complexity indeed straightforwardly correlates with polysynthesis. The connection between discourse patterns and polysynthetic structures is less obvious, but no less significant. On the one hand, there is a clear correlation between the morphological richness of polysynthetic verbs and their high frequency in speech, as it makes sense for the most frequent morphological category to be the most expressively powerful as well. On the other hand, the abundance of small, complex, and abstract discourse particles can be seen as a necessary compensatory measure, functioning as a crucial speech-structuring mechanism in a language which tends (when compared with English) to pack great amounts of information within few long words. I do not wish to imply any direct diachronic or cognitive link between these linguistic challenges and polysynthesis, except perhaps when it comes to morphological complexity. I am merely arguing that they are connected in such a way as to make polysynthesis the central obstacle to the L2 acquisition of Kanyen'kéha by L1 English speakers from which all other difficulties derive. Thus, by dealing with this core challenge, L2 acquisition is facilitated on all levels. The RWM, as a morpheme-based teaching technique designed to facilitate the L2 acquisition of Kanyen'kéha agglutinative polysynthetic structures, was developed as a direct response to this observation.

Indeed, the core principle of the RWM is that Kanyen'kéha should not be taught based on words, which are too long, numerous, and complex. Morphemes should be used instead, because they operate on the most acquisitionally profitable level of generalisation, in that they enable learners to generate a large number of words based on a small set of units. More formally, the RWM maximises the output-input ratio in the L2 acquisition of Kanyen'kéha, where 'output' refers to the licit structures one can construct, and 'input' to the atomic units one has to rote-learn. If 'there are as many possible words in Kanyen'kéha as possible sentences in English' ([Interviewee 3]), then it makes as little sense to teach Kanyen'kéha through words as to teach English through sentences. The most efficient way to acquire Kanyen'kéha as an L2 is thus to directly learn morphemes and combinatorial rules specifying in which orders morphemes can co-occur ('We develop the foundation to learn vast amounts of vocabulary at once by teaching students morphemes and how to combine them into words.' [Interviewee 3]).

The purpose of the RWM is not psychological adequacy (i.e., constructing a theory that faithfully reflects the mental representations and processing procedures of L1 speakers), but pedagogical efficiency (i.e., designing a teaching technique that maximally facilitates L2 acquisition). In practice, this means that morphemes and rules in the OK programme are designed to minimise allomorphy and maximise productivity, rather than to be psychologically real (i.e., correspond to actual entities in L1 speakers' competence). Students can successfully innovate new vocabulary as new communicative needs emerge based on the morphemes and rules they already know, thanks to the productivity and

systematicity of Kanyen'kéha morphology ('Our method allows speakers to create their own vocabulary based on the morphemes they know.' [Interviewee 3]). However, this may occasionally result in overgeneralisations, in cases where L1 speakers use a suppletive form instead of a regular but illicit form which may be expected by virtue of general patterns. OK teachers are aware of this flaw, but stress that it is not problematic, because it rarely results in misunderstandings, as L1 speakers can usually comprehend what was meant by analogy with frequent patterns. In fact, L1 speakers sometimes make similar mistakes themselves, although they are usually more reluctant to extrapolate beyond the forms which they have previously encountered by creating altogether new structures (Mithun, p.c.). Moreover, such mistakes can be easily corrected through exposure to and memorisation of irregular forms in the speech of L1 speakers ('L1 speakers sometimes disagree with how things are said, but whether 100% of the words students can theoretically build is correct is irrelevant, as long as they can communicate. These errors become less and less frequent as they interact with native speakers.' [Interviewee 3]).

4.1.2 Implementation

Let us now consider how the RWM is implemented in the immersion programme. OK textbooks never use the term 'morpheme', but only 'root' for verbal and nominal roots, seen as the central element of any word (hence the name 'Root Word Method') around which 'prefixes' and 'suffixes' revolve. A good example is the lesson in the OK textbook on noun incorporation, partially represented in Table 5.

Table 5: Application of the RWM to noun incorporation (adapted from Maracle, 2016, p. 85)

Pronoun	Nominal root	Verbal root	Tense
wake- 'I'	-ksa't- 'child'	-yen- 'to have'	-Ø PRESENT
ye- 'she'	-ya'tase'- 'young woman'	-iyo- 'to be good'	-hne/hkwe PAST

In this system, by learning a morphological rule defined by a four-slot template and a couple of morphemes for each slot, students can construct a great number of words. For example, by knowing two objective pronominal prefixes, two nominal roots, two verbal roots, two tense suffixes, and the template in Table 5, an OK student can generate $2^4 = 16$ morphologically correct words, a sample of which is given in (22) (Maracle, 2016, p. 85). Moreover, by the time students learn this morphological rule, they know all objective prefixes, and several additional verbal and nominal roots, which exponentially increases the number of well-formed words that they can generate.

- (22) (a) *wakeksà:tayen*
 'I have a child.'
- (b) *yeya'tase'tsheryóhne*
 'She used to be a good young woman.'
- (c) *wakya'tase'tsheryèn:tahkwe*
 'I used to have a young woman.'

Despite its general reliability, the RWM cannot always be applied entirely blindly. Students often have to deal with morphophonemic irregularities that must be memorised, as can be seen in all three examples in (22). For instance, the combination of the nominal root '-ya'tase'- with a verbal root triggers the insertion of the connector morpheme '-tsher-', as can be seen in (22b) and (22c). Fortunately, such

inconsistencies do not jeopardise the overall efficiency of the RWM, because it is supplemented in the immersion programme by auxiliary resources allowing learners to check doubtful forms, such as descriptive root dictionaries (e.g., Maracle, 2005), and pedagogical software like the computer application 'Kawennón:nis' ("It Makes Words"), which yields the correct verbal form based on the user's specification of a number of parameters (e.g., verbal root, agent, patient, tense, aspect) (Kazantseva et al., 2018). In any case, the Kanyen'kéha morphology is globally regularly agglutinative, and irregularities of the type found in (22) are not highly common.

4.2 Theoretical Implications

Being founded on the controversial concept of the morpheme, the RWM has interesting implications for the debate between the constructive and abstractive approaches to morphology. After presenting both frameworks, I will consider what lessons can be learnt from a thorough investigation of the RWM.

4.2.1 *Two Approaches to Morphology*

Although the reality is more complex, with several third-party approaches and competing sub-theories, it suffices for our purposes to view morphology as polarised into two frameworks known as the constructive and abstractive approaches (Blevins, 2006, p. 533). They can be distinguished by their conflicting positions with respect to various criteria, as shown in Table 6.

Table 6: *Main principles of the constructive and abstractive theories* (adapted from Blevins, 2006)

Criterion	Constructive approach	Abstractive approach
(a) Descriptive focus	Focus on syntagmatic structure, that is the combination of morphemes into words	Focus on paradigmatic structure, that is the organisation of words into paradigms
(b) Descriptive methods	Morphological systems can be fully described based on morphemes and combinatorial rules	Morphological systems can be fully described based on words and paradigms
(c) Basic units	Morphemes are the basic units which combine to form words	Words are the basic units which combine to form paradigms
(d) Status of units	Morphemes are persistent units and words are ephemeral constructions	Words are persistent units and morpheme-like units are ephemeral abstractions
(e) Function of units	Morphemes denote specific semantic or morphosyntactic properties in isolation	Recurrent sub-word units discriminate different word-forms within a system
(f) Part–whole relations	Morphemes are combined to construct words	Recurrent sub-word units are abstracted from words
(g) Systemic organisation	Genealogical system, where words are related through shared morphemes	Implicational system, where variation encodes predictive information about other forms
(h) Lexicon	Atomistic lexicon composed of isolated morphemes	Holistic lexicon composed of whole word-forms
(i) Mental representations	Words are generated based on or decomposed into morphemes online	Words are stored, retrieved, and accessed as whole forms in the lexicon
(j) New word formation	Generative formation of a new word by combining existing morphemes in a new way	Analogical formation of a new word by extending patterns from one word to another
(k) Typology	All languages are underlyingly agglutinative, and superficial differences are due to different morphological rules, which may map the underlying structure onto the surface one in an opaque way	Typologically distinct languages are superficially and underlyingly different, and their lexicon constitute a network of forms linked through patterns of analogy and discrimination

The Indian grammarians, such as Pāṇini who described Sanskrit morphology based on roots and affixes, are generally considered to be the first constructivists and the precursors of the concept of morpheme (Blevins, 2016, p. 14). More recently, the constructive approach has been associated with the American Structuralists, including for instance Bloomfield (1933) and Harris (1942), who viewed language as a succession of discrete levels on which units combine to form the basic units of the next level. Morphemes were seen as the central units on the morphological level, entirely composed of phonemes on the phonological level, and combining to form words on the syntactic level. Later, different authors writing within the generative framework carried on the constructive tradition by proposing different

Item-and-Arrangement treatments of morphology (i.e., analyses of morphological systems based on an inventory of morphemes and rules to combine them into words), such as Halle and Marantz's (1993) Distributed Morphology, which views morphology as an application of generative syntactic operations on the lexical level, and assigns a hierarchical structure to words whereby morphemes are inserted into terminal nodes.

The abstractive approach has its roots in the Greco-Roman tradition, with grammarians like Priscian who described Latin morphology in terms of words and paradigms (Blevins, 2016, p. 14). This remained the basic framework of morphological description in Europe until the late 19th Century, when the notion of morpheme first appeared in the West (Law, 2003, p. 68). It can also be found later in the works of the European Structuralist Saussure (1916), who stressed that linguistic signs never have a meaning in isolation, but only by virtue of their differences from other elements within a system. The abstractive approach, and morphology as an independent discipline in general, was then temporarily eclipsed by the rise of generativism in the 1950s–1970s, which moved allomorphy into phonology and morphotactics into syntax, leaving nothing for morphology to explain (Anderson, 2018). However, the abstractive approach has been undergoing a revival since the 1970s, notably with the writings of Matthews (e.g., 1972) and more recently Blevins (e.g., 2016), who advocate a Word-and-Paradigm approach to morphology, whereby morphological systems are best analysed in terms of the organisation of words into paradigms.

4.2.2 *Pedagogical Efficiency and Psychological Adequacy*

The RWM, as a teaching technique based on morphemes and co-occurrence rules, is essentially a pedagogical application of the constructive theory. This influence is indirect, in the sense that the RWM was not intentionally designed as such, but simply happens to rest on a similar view of morphological structure. Furthermore, OK is very successful, with most students achieving at least an intermediate-mid level by the end of the first year and an advanced-mid level by the end of the second year on the ACTFL (American Council on the Teaching of Foreign Languages) proficiency scale (Maracle, 2016, p. 5), and many students scoring even higher. That the use of the RWM is most likely the main cause of this pedagogical success is supported by the lower success rate of other programmes which do not rely on this method, such as the Kawenní:yo Immersion School in Ohswé:ken ('At Kawenní:yo, they taught Mohawk word by word, and kids were having a hard time making sentences. Only a handful came out with a good grasp of the language.' [Interviewee 4]). In fact, OK has been so successful that it has inspired the creation of similar RWM-based curriculums to teach related Northern Iroquoian languages, such as Cayuga (Maracle, p.c.).

The success of this morpheme-based teaching method suggests that, although its psychological reality remains controversial as it constitutes the crux of the constructive-abstractive debate, the morpheme is a pedagogically useful unit. Indeed, it allows us to capture the surface properties of a morphological system in a way that intuitively makes sense to language learners with no linguistic training, especially in regular polysynthetic and agglutinative languages like Kanyen'kéha. Therefore, while abstractive linguists abandon morphemes as *psychologically unrealistic* units (e.g., Anderson, 1992; Blevins, 2016), OK teachers still use them as *pedagogically useful* units, because they are motivated by a different and more practical objective. The former strive to accurately represent the morphological competence of native speakers, and believe that morphemes are inadequate for that purpose, whereas the latter simply want to efficiently teach their ancestral language as an L2, and find that morphemes are most useful to that end. In other words, the ongoing debate about the psychological reality of the constructive approach does not stop it from having pedagogically useful applications, because the psychological adequacy of a theoretical model of L1 competence and the pedagogical efficiency of an L2 teaching method are logically distinct objectives.

Due to the agglutinative and polysynthetic nature of Kanyen'kéha morphology, as well as its relatively high degree of productivity and regularity, we might expect L1 speakers to process their language constructively (i.e., in terms of morphemes). However, empirical evidence suggests that native speakers process at least some areas of Kanyen'kéha morphology abstractively. First, consider the example in (14), repeated in (23) below for the sake of convenience (Mithun, 2008, p. 578).

- (23) *enskontatewenni:yohne'*
en-s-kon-tate-wenn-iyó-hne-
 FUT-REP-3.PL.N.AGT.REFL-word-be.good-PURP-PUNC
 'they were going to be free' (lit. 'they were going to be word-good')

As we saw earlier, this word is an example of semantic non-compositionality, and hence idiomaticity (if we define idiomaticity basically as semantic non-compositionality). Despite their straightforward formal segmentability into agglutinative morphemes, such constructions are probably stored as whole forms in native speakers' mental lexicons, because there is no way that compositionally combining the meaning of the nominal root '-wenn-' ("word") with that of the verbal root '-iyó-' ("to be good") could possibly yield the surface expression '-wenn-iyó-' with the meaning "to be free". Such non-compositional structures likely arose via chunking into whole word-forms through frequent collocation (Beckner & Bybee, 2009, p. 30), and later metaphorical extension to new meanings based on culture-specific ways of conceptualising events (Mithun, 2008, p. 579), like "being free" as "being word-good".

Following the Bloomfieldian (1933) view whereby the mental lexicon is simply a repository of idiosyncratic information, one may argue that these non-compositional constructions are indeed stored as wholes, but that compositional Kanyen'kéha morphological structures are processed constructively. However, this does not seem to apply to all Kanyen'kéha words, as even some compositional structures show signs of being stored as whole forms. Kinship terms like "my mother" are a good example. According to the general pattern presented in Section 3.1.1, we would expect the word for "my mother" to literally mean "she is mother to me", as in (24), but the actual form uses a possessive instead of a transitive prefix, as in (25) (Maracle, 2016, p. 50).

- (24) **yonke'nihsténha*
**yonke-'nihstenha*
 3.SG.F>1.SG-be.mother
 Intended: 'my mother' (lit. 'she is mother to me')

- (25) *ake'nihsténha*
ake-'nihstenha
 1.SG.POSS.AL-be.mother
 'my mother'

This form is thus irregular in the sense that it does not follow the regular pattern applying to the overwhelming majority of kinship terms, but rather an irregular pattern applying only to the small subset of older female relatives. (Defining irregularity in terms of low type frequency in this way raises several important questions, especially concerning the generally higher token frequency of these 'irregular items' which is necessary to maintain their 'irregular' pattern in the first place (Wu et al., 2019); but this is beyond the scope of this work.) Moreover, the word for 'my mother' is often reduced to the atomic vocative form 'ihstá:' ("mum"). Finally, although statistical data is necessary to confirm this, we can safely hypothesise that 'ake'nihsténha', as the word for "my mother", is relatively frequent, and therefore has a greater memory strength (Haspelmath & Sims, 2010, p. 73).

Kanyen'kéha noun incorporation constructions are not just formally more compact ways of expressing the same meaning as their periphrastic equivalents, but rather the atomic products of a word-formation process that is by definition only invoked to express 'name-worthy' concepts, that is concepts which culturally deserve to be referred to using a single compound word because of their importance to speakers (Mithun, 2008, p. 581). Thus, in (26) and (27) above, "bread-making" and "new shirts" are clearly culturally important concepts that deserve to be referred to using single noun incorporation constructions, while things like "bread-throwing" and "buried shirts" are not, and can therefore not be expressed using an incorporation construction (doing so might be interpretable by speakers, but would be highly pragmatically anomalous). In fact, (26a) and (27a) often sound pragmatically odd to speakers, because these concepts are so commonplace that they are usually expressed using the incorporation structure, unless some special emphasis is placed upon the noun which warrants its 'excorporation', implying that the incorporation structure is in some sense the default in this case (DeCaire et al., 2017). According to Mithun (1984, p. 872), it follows that 'speakers are keenly aware of the lexical status of all such [noun-verb] combinations', because '[t]hey know not only which constructions are possible, but also which of these actually exist; i.e., which are lexicalised' and 'immediately recognise those that are not'. To sum up, '[a] Mohawk speaker's lexicon can be enormous, because of the high productivity of word formation process like noun incorporation; but it is well-defined' (ibid.). That noun incorporation constructions are lexicalised is further supported by the existence of idiomatic noun incorporation constructions, like that in (14) and (23) ('enskontatewenni:yohne' "they were going to be free", lit. "they were going to be word-good") and those in (15): only if a noun-verb compound has become 'fused' as a unitary stem in speakers' competence can it undergo semantic shift as a single unit and hence become idiomatic. This process is quite frequent in Kanyen'kéha noun incorporation (Mithun 2008, p. 578). The crucial point for our argument, however, is that the lexicalised status of noun incorporation constructions clearly indicates that they are treated abstractively as atomic units by native speakers. Again, then, the tentative conclusion is that even some compositional Kanyen'kéha morphological structures are probably processed as whole forms by L1 speakers as well.

This hypothesis is further supported by two findings. First, Zipf (1949) proposed the existence of a general human propensity to maximally reduce cognitive effort (i.e., the 'Principle of Least Effort'): why should speakers waste precious processing resources by generating online a highly frequent word that can easily be remembered as a whole? Second, psycholinguistic evidence suggests that the mental lexicon is not maximally economical, as assumed by Bloomfield (1933), but contains redundancies, in that frequent words can be stored as wholes despite their straightforward segmentability (Baayen et al., 2002). Therefore, even an easily segmentable word like 'ake'nihténha' may be stored as a whole rather than generated online. This tentative suggestion requires experimental confirmation, especially as there exists some psycholinguistic evidence in favour of morphemic decomposition (e.g., Bacovcin et al., 2017), but it can probably be maintained as a working hypothesis for our purposes. The overall conclusion is therefore that L1 Kanyen'kéha speakers most likely acquire, store, access, and process at least some areas of Kanyen'kéha morphology in their mental lexicon and linguistic competence abstractively, that is not by combining morphemes online, but rather by accessing them as whole words within a network of forms connected through patterns of analogy and discrimination, as per Table 6.

This brings us to an apparent paradox: how can a constructive L2 teaching method be so efficient if L1 speakers process (at least some) morphological structures abstractively? Part of the solution may lie in Bley-Vroman's (1989) Fundamental Difference Hypothesis (FDH), whereby L1 and L2 acquisition are 'fundamentally different', because the former is controlled by an innate generative language acquisition device, while the latter resembles general adult learning. One of the 'fundamental differences' between them is crucial for our purposes: L1 acquisition is subconscious, while L2 acquisition is conscious. Thus, learning Kanyen'kéha as an L2 at OK is a mostly conscious process, and it is thus unsurprising that teaching methods based on units which are easily consciously accessible,

such as morphemes in a highly regular agglutinative and polysynthetic language like Kanyen'kéha, are so successful. The L1 acquisition of Kanyen'kéha, on the other hand, is a subconscious process, as children are not explicitly taught morphemes and rules to generate words. It is therefore equally unsurprising that L1 speakers do not systematically process Kanyen'kéha morphology in terms of morphemes. A potential issue for this hypothesis is that no consensus has been reached yet concerning the actual nature of L1 and L2 acquisition and competence, and of the differences between them (in particular, some (e.g., Tomasello, 2003) reject the idea of a universal, innate, generative, and domain-specific 'language acquisition device' à la Chomsky (e.g., Chomsky, 1975), which means that the FDH on which our conclusion is based remains unconfirmed. Nevertheless, the specific point on which our hypothesis hinges is that L1 acquisition is mostly subconscious while L2 acquisition is mostly conscious, which is generally well-established and well-accepted. Our conclusion can therefore probably be maintained as a working hypothesis (at least for our purposes), although further empirical confirmation is of course necessary. Importantly, however, this conclusion should not be construed as evidence in favour of the FDH, but rather as being merely based on it (otherwise our reasoning would be circular).

This apparent paradox between the pedagogical efficiency of the morpheme in L2 teaching and its inadequacy for capturing (at least some of parts of) L1 competence therefore seems illusory: why should we expect L2 teaching techniques and theoretical models of L1 competence to follow the same principles, if (a) L1 and L2 acquisition are 'fundamentally different' (at least concerning the level of conscious awareness); and (b) these two systems are respectively motivated by the very different objectives of pedagogical efficiency as opposed to psychological adequacy? In other words, the RWM achieves pedagogical efficiency by using morphemes, as these units happen to be particularly well adapted to the conscious nature of L2 acquisition and the polysynthetic and agglutinative structure of Kanyen'kéha morphology, but this is independent from the question of the psychological reality of morphemes in L1 competence, because pedagogical efficiency and psychological adequacy are logically distinct, and L1 and L2 acquisition are fundamentally different. The disparity that we observe between L1 and L2 Kanyen'kéha speakers is therefore unproblematic, and even unsurprising because expected. As a final note, it is important to mention that unentangling this paradox was not an attempt to support either morphological theory. That the constructive approach is pedagogically more efficient for L2 Kanyen'kéha acquisition was not meant to suggest that it is generally superior, just as the fact that L1 Kanyen'kéha speakers probably process some morphological structures abstractively does not entail that the abstractive approach is universally more psychologically adequate. We have only tried to show that the RWM is an interesting application of the constructive approach to a revitalisation project and provides useful insights into this debate and the nature of the morpheme, and remain agnostic as to which of these two theories, if any, fares better than the other in a more universal sense (insofar as that question even makes sense).

4.3 Conclusion

This section focused on the morpheme-based teaching technique used at OK, known as the Root Word Method. I first presented its basic principles and implementation, before investigating its theoretical implications. Our discussion revealed a number of interesting findings. First, the success of the RWM suggests that morphemes, and hence the constructive approach, can have pedagogically useful applications. Second, native Kanyen'kéha speakers seem to process some morphological structures abstractively. Third, the apparent paradox between these two observations is illusory, because the pedagogical efficiency of the constructive approach in L2 acquisition, which is a conscious process, has

nothing to do with the issue of its psychological adequacy in accounting for L1 competence, which is the result of a subconscious process.

This hypothesis is only speculative, and requires empirical confirmation through psycholinguistic experiments aimed at confirming whether (a) L1 Kanyen'kéha speakers process some morphological structures abstractively; (b) L2 OK-trained Kanyen'kéha speakers process most morphological structures constructively; and (c) constructive L2 Kanyen'kéha teaching methods (e.g., the RWM) are more pedagogically efficient than abstractive ones (e.g., teaching whole words and expecting statistical learning). I also wish to underline again that I have not attempted to prove the superiority of one theory over the other. The constructive-abstractive debate is still going on and will not be settled here, as we have only examined how the contrast between these two frameworks applies to our specific case study.

5 Overall Conclusions

In this work, I presented a case study of language revitalisation involving the L2 acquisition of the endangered Iroquoian language Kanyen'kéha at the Onkwawén:na Kentyóhkwa language school in Ohswé:ken. I focused on three main aspects. I first explored the motivations underlying revitalisation projects in general and this immersion programme in particular (i.e., the 'why'), especially in terms of the relevance of the language in a modern context and its relationship to culture and identity. I then examined the challenges that teachers and students face in realising these motivations (i.e., the 'what'), particularly in the domains of morphology and discourse. Finally, I investigated the main strategy that they implement in order to overcome these challenges (i.e., the 'how'), namely the so-called Root Word Method (RWM), as well as its theoretical implications.

The findings highlighted in our discussion of the theoretical implications of the RWM show that, as suggested in the introduction, theoretical linguistics (understood broadly as the scientific study of language in an academic context) and applied linguistics (defined by Grabe (2010) as the discipline which engages with real-world language-based problems) can enter in a mutually beneficial relationship. That is, just as applied linguistics projects have much to learn from insights gained through theoretical linguistic research (e.g., theoretical insights concerning language acquisition can help design more efficient revitalisation programmes and hence help combat language endangerment), theoretical linguistics can hugely benefit from a thorough investigation of applied linguistics projects. Thus, I tried to show that exploring the OK revitalisation project can shed light on the nature of the morpheme, as well as on the constructive-abstractive debate, and their interactions with considerations of pedagogical efficiency and psychological adequacy. The RWM therefore epitomises this mutually beneficial relationship which holds between theoretical and applied linguistics: on the one hand, it constitutes a concrete application of the constructive theory; on the other hand, investigating it provides valuable insights into the nature of this framework.

Our discussion reveals another intriguing phenomenon. Because OK students learn Kanyen'kéha through morphemes, we can hypothesise that their competence is largely constructive, and thus probably differs in some areas from the partly abstractive competence of native Kanyen'kéha speakers. Many differences between the performance of L1 and L2 OK-trained Kanyen'kéha speakers can thus be predicted (e.g., L2 OK-trained speakers are likely to overgeneralise where L1 speakers use an irregular form, as we saw in Section 4.1.1). Testing these predicted differences empirically in the context of the constructive-abstractive debate thus seems worthy of further research, as it could shed light on properties of L1 and L2 acquisition in morphologically complex languages like Kanyen'kéha.

6 References

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7 Appendix: Morphological Abbreviations

> transitive prefix

INDEF indefinite

1	first person	INTS	intensive
2	second person	M	masculine
3	third person	MID	middle / semi-reflexive
ACT	active	N	neuter
AGT	agent	NMS	nominaliser
AL	alienable	NOM	nominal
AMB	ambulative	NSG	non-singular
BEN	benefactive	P	particle
CAUS	causative	PART	partitive
CLOC	cislocative	PAT	patient
COINC	coincidental	PERF	perfective
COND	conditional	PL	plural
DEF	definite	POSS	possessive
DIM	diminutive	PRST	present
DIS	distributive	PST	past
DU	dual	PUNC	punctual
DUP	duplicative	PURP	purposive
EXC	exclusive	REFL	reflexive
F	feminine	REP	repetitive
FUT	future	SG	singular
HAB	habitual	STAT	stative
IMP	imperative	TLOC	translocative
INC	inclusive	V	verb

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Acquisition of Plosive Perception in Korean L2 Learners

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Abstract. Korean as an L2 has increased in popularity over the last decade, and with it has opened up a great interest into studying the linguistic nature of Korean L2 acquisition. The goal of this research was to explore the ability of Korean L2 learners to acquire the ability to perceive between Korean stop consonants, in both word-initial and intervocalic positions. Best’s Perceptual Assimilation Model and Flege’s Speech Learning Model are utilised to provide the theoretical framework for discussing naïve listener perception of non-native sound and L2 learner perception of L2 sounds respectively. While English utilises the voiced vs. voiceless contrast, Korean has a three-way distinction between stops. An AX discrimination task was performed amongst 24 participants making up three groups — naïve listeners of Korean, English L1-Korean L2 learners, and Korean L1 speakers. It was hypothesised that the accuracy scores of participants in correctly discriminating between plosives would be lowest in naïve listeners, and highest in native speakers, and that participants would have higher accuracy ratings for the intervocalic tokens as opposed to the word-initial tokens. Surprisingly, the results showed that English L1-Korean L2 learners had the lowest accuracy ratings out of all three groups, as opposed to the prediction that naïve listeners would have the lowest accuracy ratings due to their lack of interaction with Korean phonology. However, there were a number of methodological issues (discussed in the latter Sections of this paper) that may explain the discrepancies between the predicted results and the results attained.

Plain English Abstract. This research looked at how well people can hear the difference between Korean plosive consonants in word-initial and intervocalic positions. There are different theories in place for how people learn to hear the difference between sounds in foreign languages, and two of these theories (Best’s Perceptual Assimilation Model and Flege’s Speech Learning Model) were used to guide the predictions for this research. English primarily uses voicing to show the difference between stop consonants, but it is more complex in Korean, which raises the question: how does a native English speaker learn how to hear the difference between three very similar consonants in Korean, when they are only hearing the difference between two in English? Twenty-four participants took part in an AX discrimination task across three groups: native English speakers who had never heard Korean before (naïve listeners); native English speakers who were learning Korean; and native Korean speakers. It was predicted that the naïve listeners would find hearing the difference between these Korean consonants the most difficult, the Korean learners would perform slightly better in the task, and the native speakers would have the greatest accuracy in the task. It was also predicted that everyone would perform better when the consonants appeared intervocalically, as opposed to word-initially. Surprisingly, the Korean learners had the least accuracy out of all three groups. However, there were some issues with the way the experiment was designed and set up that may explain why the results were different from the predictions.

Keywords: L2 acquisition; Korean; English; perception; plosives; stop consonants

1 Introduction

Various perceptual models have been created to account for non-native and L2 perception capabilities. Best’s Perceptual Assimilation Model (Best, 1995; Best & Tyler, 2007) (hereafter PAM) and Flege’s Speech Learning Model (Flege, 1995) (hereafter SLM) are utilised in this research to provide a theoretical framework on which to frame the predictions and discussions throughout this research.

Korean is particularly of interest when approaching L2 perception due to the 3-way laryngeal distinction present in their plosives and affricates. While English utilises (primarily) the voiced vs. voiceless distinction in stop perception, Korean word-initial stops are all voiceless. Due to this, other acoustic cues are required in order to segregate the three plosive types — lax, tense, and aspirate. Outwith the laryngeal configuration utilised to describe the phonation types of plosives utilised by Kang

and Lee (2002), VOT and the F0 of the vowel following the plosive are the main discriminatory factors utilised in perception.

While previous research has investigated the perception of Korean plosives, the majority of academic focus has been on the word-initial plosives in Korean (see Kang & Lee, 2002; Holliday, 2018), despite there being distinct phonetic characteristics amongst plosives depending on their position within a word. This research will compare the ability of participants to accurately discriminate between plosives in both word-initial and intervocalic settings.

2 Phonology of Korean Stop Consonants

There has been significant research into the three-way laryngeal distinction, from both articulatory and acoustic perspectives (Hardcastle, 1973; Cho et al., 2002). The table below provides a comprehensive overview of the terms utilised to describe the three-way laryngeal distinction, as well as the transcriptions utilised; the terms captured below are found in Kim (1997), Silva (1991), Cho et al. (2002), Kim and Lotto (2002), Kim and Duanmu (2004), and Shin et al. (2013). The *hangul* (Korean alphabet) examples and romanisations are presented in order of articulation; that is, bilabial, followed by alveolar and then velar.

Table 1: Korean consonant labelling terms with examples and transcriptions

Terminology	Variants of Terminology	Examples (<i>Hangul</i>)	Romanisation (Revised Romanisation)	IPA (word-initial)
Lax	Lenis, Plain, Unaspirated, Slightly Aspirated, Occlusive	ㅂ, ㄷ, ㄱ	b, d, g	[p] [t] [k]
Tense	Fortis, Hard, Glottalized, Reinforced	ㅃ, ㄸ, ㄲ	bb, dd, gg	[p̚] [t̚] [k̚] [pʰ] [tʰ] [kʰ] [p*] [t*] [k*] [P] [T] [K]
Aspirate	Voiceless, Aspirated, Heavily Aspirated	ㅍ, ㅌ, ㅋ	p, t, k	[p ^h] [t ^h] [k ^h]

In word-initial position, Korean has no voiced plosives. The lax, tense, and aspirate plosives are all voiceless, and thus voicing is not an acoustic cue that learners can utilise to categorise their perception of these plosives. Instead, listeners primarily utilise VOT and F0 as the acoustic cues that indicate which plosive is being perceived. Originally, there existed both a three-way VOT distinction *and* a three-way F0 distinction of the laryngeal contrasts in standard South Korean plosives. However, a tonogenesis-like change is emerging with a shift to a two-way VOT distinction; in younger Seoul-dialect speakers (particularly female speakers), the VOT values between lax and aspirate plosives are levelling out, while the F0 distinction between plosive types is becoming even more defined (Kang, 2014). The newly-observed two-way VOT distinction is now emerging due to the overlap in VOT values for lax and aspirated plosives; this was observed in the speech data utilised in this study, with word-initial lax and aspirate plosives only having a difference of a few milliseconds in VOT, while F0 values maintained an audible distinction with a difference of over 100Hz (see Table 2 in Section 5.4 for these figures).

This was also further established by Lee and Jongman (2018), who have observed younger Seoul speakers favouring F0 as an acoustic cue, while both older and young South Kyungsang speakers still utilise VOT and F0 as perceptual cues (although the young South Kyungsang speakers did place greater emphasis on F0 as a cue than their older counterparts). This is not to say that VOT and F0 are the only acoustic cues utilised to aid perception of word-initial Korean plosives, however; phonation type (Shin et al., 2013), H1–H2 of the following vowel (Holliday & Kong, 2011), aerodynamic mechanisms and supralaryngeal phonation between Seoul and Cheju speakers (Cho et al., 2002), and phonemic vowel length contrast in the case of the Chonnam dialect (Choi, 2002) have also been observed as acoustic cues utilised for plosive perception.

Comparative to the word-initial plosives, there exists a greater number of acoustic cues, and variation amongst these cues, that can aid perception of the intervocalic plosives. While English learners of Korean typically cannot rely on the voiced/voiceless distinction for word-initial plosives that exist in their L1, they can utilise this distinction for the intervocalic stops. As well as this, Table 2 in Section 5.4 provides the mean VOT and F0 values for the word-initial and intervocalic tokens recorded for this research — one can observe the relatively similar VOT values for word-initial lax and aspirate consonants, in contrast to the very distinct F0, hold period and VOT values for the intervocalic plosives. This is further evidence of the tonogenesis-like sound change happening in Seoul Korean, where VOT values for lax and aspirate word-initial plosives are levelling, and F0 is emerging as a distinct perceptual factor (Kang, 2014).

Word-final plosives were not included in this study, as a plosive in such a position is reduced to its unreleased form, signified with the diacritic [̚]. This also occurs with other types of consonants — for example, the sibilant /s/ is reduced to [t̚], i.e., to the same place of articulation.

3 L2 Acquisition

L2 perception models attempt to delineate the perception, acquisition, and organisation of non-native or L2 phonology in relation to the speaker's L1, particularly in relation to the comparability of sounds between the two languages (Best & Tyler, 2007).

Best's Perceptual Assimilation Model (Best, 1995) theorises that naïve speakers categorise non-native sounds in relation to their similarity (or lack of) to phones in their native language. Study of non-native perception has established that naïve listeners have difficulty in both categorising and discriminating phonemes in non-native languages, particularly when the contrasts to be made for discrimination purposes do not exist in their L1. This is relational to the naïve listener's own L1, with non-native stimuli less similar to the listener's L1 phonology being easier to discriminate or categorise as it does not overlap pre-existing phonological categories the naïve listener has from their L1. Applying this to the following perception experiment, it is expected that discrimination ability is poor in naïve participants as they have not developed the perceptual ability to discriminate the Korean plosives due to their perceived similarity to previously established L1 (in this case, English) categories.

Flege's (1995) Speech Learning Model (SLM) postulates that L2 learners can establish new phonetic categories for L2 sounds if the said sound differs phonetically from the closest L1 sound, and if this sound is discernible as an L2 learner. However, as Korean plosives are relatively similar to English plosives (as opposed to a language that utilises, for example, clicks) it can be assumed based on SLM that new phonetic categories would not be created. However, SLM also says that L2 learners have the ability to create long-term memory categories concerning the identification of 'language-specific aspects' (Flege, 1995). If this is taken as true, L2 Korean learners would be able to create specific phonetic categories to accommodate the perception of varying VOT and/or F0 values of Korean plosives.

4 Research Questions and Hypotheses

The following research questions and hypotheses were collated based on the research outlined in previous Sections.

RQ₁ – How does perceptual ability vary between naïve listeners of Korean, English L1-Korean L2 learners and Korean L1 speakers?

H₁ – Naïve listeners will show the greatest difficulty in distinguishing between word-initial plosives in natural (non-manipulated) tokens. Learners may have difficulty but not to the extent of naïve listeners.

H₂ – Naïve listeners will show the greatest inability in distinguishing between intervocalic plosives in natural (non-manipulated) tokens. Learners may have difficulty but not to the extent of naïve listeners. However, these results will not be as extreme as those for the word-initial discrimination task.

RQ₂ – What acoustic cues do learners favour to aid perception, focussing on VOT and F0 in this research?

H₃ – Naïve, learners, and native listeners will have difficulty in distinguishing between word-initial plosives when F0 has been manipulated. F0 manipulation will have the greatest effect on correct perception (as opposed to VOT).

H₄ – Naïve, learners, and native listeners may have difficulty in distinguishing between manipulated intervocalic tokens (such as between intervocalic lax and tense with VOT manipulation), but not to the extent of the word-initial manipulated discrimination tasks.

5 Methodology

5.1 Participants

All subjects were recruited through snowball sampling and online calls for participants shared by email and on various Korean Culture/Language online groups based at Scottish universities.

The speaker who volunteered to record their speech for the experimental stimuli was a 21-year-old South Korean female. She had spent over half her life in the Gangnam area of Seoul, the capital city of South Korea, and has had significant exposure and use of the standard Seoul Korean dialect.

Twenty-four participants took part in the perception experiment: seven native Korean speakers (3M/4F, mean age 29.1, S.D. 5.3), nine English L1-Korean L2 learners (0M/9F, mean age 22, S.D. 3.5) and eight English L1 with limited-to-no exposure to the Korean language (4M/4F, mean age 23.6, S.D. 2.8). All participants were over 18 years old to comply with ethical guidance, and no participants reported having hearing difficulties.

5.2 Materials

Materials consisted of a word list comprised of 18 CVC and VCV words (3 places of articulation × 3 laryngeal contrasts × 2 word positions) as shown in Appendices One and Two. The CVC words were chosen as they all share the same VC context /an/ and are all words that exist in Korean. The VCV words /a_a/, where _ is replaced by the chosen plosive, were chosen as this context produced the greatest number of real Korean words. A small number of VCV words were pseudowords, but this was

unavoidable. This allowed for consistency between the CVC and VCV words as they share the same vowel context.

5.3 Recording

Recordings were made in a sound-proof booth using a Beyerdynamic Opus 55.18 MK II neck-worn microphone connected to an ART USB Mix Three Channel pre-amplifier. Recordings were made stereophonically directly into Praat 6.1.09 (Boersma & Weenik, 2020) and were recording at a 44.1kHz sampling rate. The recordings were then converted to monoaural in Praat. Word list recordings were then cut into individual tokens, present 108 tokens. Naturally-produced tokens were favoured over utilising artificially generated tokens for this experiment, as Thomas (2002) observed that participants perform better in speech perception experiments when natural tokens are utilised.

The participant was given the opportunity to read the word list provided beforehand to acquaint herself with the pseudowords (see Appendices One and Two). She was then instructed to read the word list a total of 6 times — three recordings prompted to be natural speech, and three prompted to have the speaker level their tone. While the tone-levelling attempt was made in order to observe whether the participant could produce tokens with F0 naturalised between the varying laryngeal contrasts, it was unsuccessful, and these tokens were later excluded from the experiment data.

5.4 Analysis of Recordings

VOT was measured for both word-initial and intervocalic tokens. The hold period between the end of the first vowel and the burst of the plosive was measured; this was only necessary for the intervocalic tokens. F0 was measured for all tokens and was measured at the first glottal pulse as seen on the spectrogram in Praat. The mean measurements for VOT, F0 and, where applicable, hold period length are shown below:

Table 2: *Mean acoustic measurements*

Consonant Position	Consonant Type	Hold Period (ms)	VOT (ms)	F0 (Hz) at onset of following vowel
Word-initial	Lax	-	103	161
	Tense	-	15	251
	Aspirate	-	99	266
Intervocalic	Lax	93	17	207
	Tense	271	15	230
	Aspirate	233	58	245

5.5 Manipulation of Recordings

Manipulated tokens were created to allow for the use of a token that had one property (either VOT or F0) consistent with another type of token, e.g., a lax base token with the VOT of a tense token. This would allow for the observation of the manipulation of particular acoustic cues on perceptual ability in

comparison to perceptual ability of natural tokens. Tokens to be manipulated were chosen based on how close they lay to the average VOT and F0 figures for tokens collected for this experiment.

VOT was manipulated utilising the ‘cross-splicing’ method; that is, copying the VOT of Token A, and deleting the original VOT of Token B, and replacing the original VOT of Token B with the new VOT of Token A. When cutting out the VOT, the start and end of each selected section was moved to the nearest zero crossing.

F0 was manipulated following the directions in Will Styler’s Praat manual (Styler, 2020). Where Token A was shorter in duration than Token B, the duration difference between the two files was calculated and added into the Token A as silence, so the pitch tiers would match the onset of voicing. Once the manipulation was complete, this silence was removed, and the token reverted to its original duration. Where Token A to be manipulated was longer than Token B, Token B had the difference in duration calculated and added in as silence, as above. For the intervocalic tokens, where factors such as the hold period had to be taken into account, the difference between the hold period *plus* the VOT was calculated between Token A and B. In whatever token this was shortest, the difference was then added in as silence, as above, and the same manipulation technique was followed as in the Praat manual mentioned at the beginning of this paragraph (Styler, 2020). However, as in the VCV context the vowel preceding the consonant varies in length dependant on the consonant used, the manipulated pitch tiers were manually adjusted to fit the length of the vowel where required — the frequency of each pitch pulse to be manipulated was locked on its vertical axis, so the frequency would not be altered, but the pulse could be moved horizontally to be aligned within the vowel duration.

5.6 Experiment Procedure

Participants were provided with an information sheet detailing the experiment procedure and their data rights. They were then given a consent form and questionnaires (see Appendices Three–Five). All participants were asked to fill out a demographic and linguistic questionnaire before the experiment began — demographic information was included in Section 5.1 (see Appendices Three–Five for questionnaires).

Korean L1 participants were asked about the locations where they had previously grown up and lived in South Korea, in order to allow for any discussion of perceptual variation that may have arisen with participants being exposed to non-standard varieties of Korean. Previous acoustic studies (Choi, 2002; Holliday & Kong, 2011) have shown that cues utilised in discriminating Korean plosives are subject to dialectal variation. However, the majority of participants came from the region in and around Seoul, where the standard form of Korean is spoken. As well as this, as the standard Seoul dialect is utilised in most forms of standard media, participants will have had significant exposure to perception of this dialect.

The English L1-Korean L2 learners had a number of questions to answer pertaining to their individual experiences of learning Korean (see Appendix Four). A simplified form of the Interagency Language Roundtable scale was utilised (excluding the ‘0’ score, as it was assumed that learners would at least be above the ‘no proficiency’ rating), and the participants rated themselves from 1–5, 1 being ‘beginner’ and 5 being ‘fluent’ (Interagency Language Roundtable, n.d.). No participant rated themselves above ‘3’. Four participants rated their proficiency as ‘1’, three participants as ‘2’ and two participants as ‘3’.

The Korean L2 learners’ learning duration varied from five months to four years, however one participant did not provide a numerical answer on their questionnaire (they answered that they studied ‘a little bit, on and off’). Learning modes included being self-taught, formal university tuition, and language immersion in South Korea, with a number of participants selecting a combination of learning

modes — for example, one participant chose a combination of self-taught, formal (in-person) language classes, and language immersion.

The experiment was run on a MacBook Air running OpenSesame ver. 3.2.8 (Mathôt et al., 2011). The experiment consisted of a six-part AX discrimination task, with an additional practice section at the start of the experiment to allow participants to acclimatise themselves to both the controls and format of the experiment. The keys used to indicate responses from participants (the ‘a’ key and the ‘l’ key) were identified with red and green stickers respectively, to allow participants to have a visual cue for their choice. In the event of a participant being colour-blind, the red sticker had a cross to indicate the participant perceived the tokens as ‘different’ and the green sticker had a ‘tick’ to indicate their perception of the tokens as the same. The experiment was divided into six sections as follows:

Table 3: *Experiment sections*

Section Number	Token Type
1	Word-initial (CVC) Natural Tokens
2	Word-initial VOT Manipulated Tokens
3	Word-initial F0 Manipulated Tokens
4	Intervocalic (VCV) Natural Tokens
5	Intervocalic VOT Manipulated Tokens
6	Intervocalic F0 Manipulated Tokens

Participants were instructed to listen to each pair of words through a Sennheiser GSP 302 noise-isolating headset and indicate whether the pair of tokens they heard sounded the same or different by pressing one of two stickered keys mentioned above. Each pair of tokens was played once, resulting in 126 responses. Within each section, all pairs of tokens were randomised. The OpenSesame program recorded participants’ response, reaction time, number of correct answers, overall accuracy score, as well as the details for each response such as whether the tokens for that particular response were natural or manipulated etc.

5.7 Statistical Methodology

The following statistical analyses were run in R Ver 1.2.5033. (R Core Team, 2017). Due to the unbalanced nature of the subject groups in this study, Levene’s Test was performed on the accuracy ratings extracted from each participant’s dataset (Field et al., 2012). All data visualisation was created using ggplot2 (Wickham, 2012).

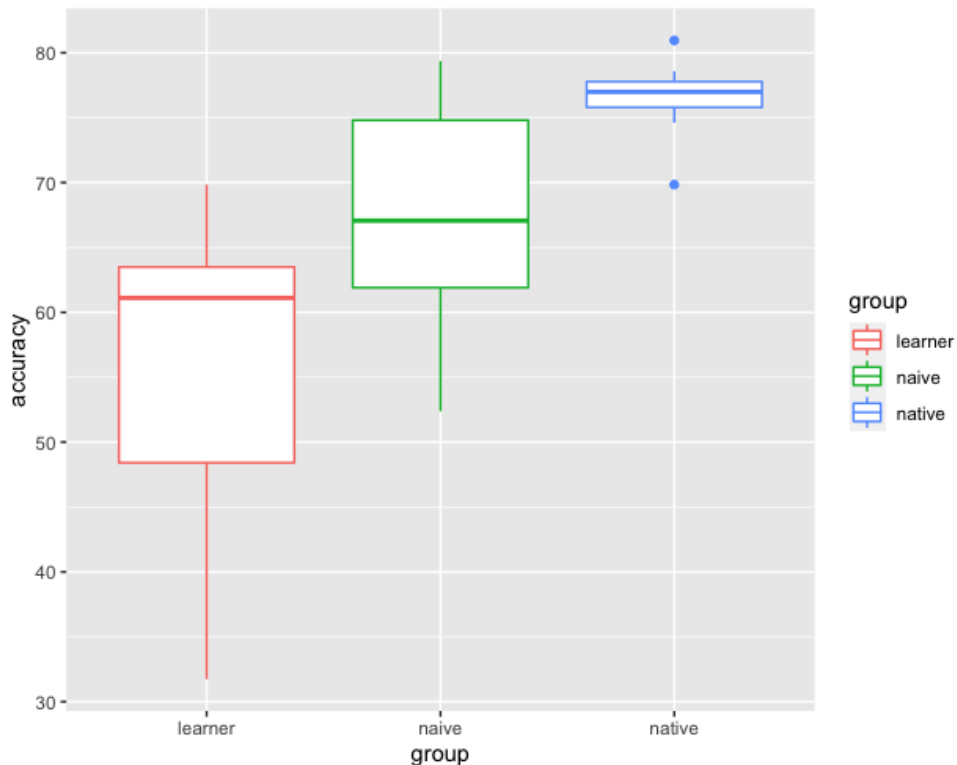
6 Results

As previously mentioned, it was predicted that naïve listeners would have the greatest difficulty with the discrimination task due to the postulates set out in the perception models in Section 3. The table below contains a collation of the average results for each group of participants, organised by token type and word position of the plosive. The accuracy rating (%) is the number of correct responses divided by the total response count, then multiplied by 100 to achieve a percentage score.

Table 4: Accuracy ratings (%) from AX discrimination task

	Whole Experiment Accuracy (%)			Natural Tokens Only Accuracy (%)			VOT Manipulated Only Accuracy (%)			F0 Manipulated Only Accuracy (%)		
	All	CVC	VCV	All	CVC	VCV	All	CVC	VCV	All	CVC	VCV
Native	77.0	74.1	79.8	93.9	90.4	96.3	63.9	63.3	64.3	63.1	60.3	65.9
L2 Learners	55.5	47.4	63.5	65.2	57.6	72.8	39.5	22.8	56.2	60.2	63.6	56.8
Naïve Listeners	67.7	65.5	69.8	78.9	75.9	81.9	52.1	43.1	61.1	66.0	71.5	60.4

Looking at the results for the whole experiment accuracy for the participants, a surprising result emerges. The Korean L1 participants, as expected, have the highest accuracy ratings (averaging 77% over the entire experiment), but naïve listeners average at 67.7% while Korean L2 learners average at the lower score of 55.5%. As predicted, participants across all groups achieved higher accuracy ratings when discriminating intervocalic tokens as opposed to word-initial plosives. Please note that the y-axis in Figure 1 does not start at 0.

**Figure 1:** Boxplot of accuracy ratings (%).

As the participant groups had unbalanced numbers, Levene's Test was performed on the accuracy ratings extracted from each participant's dataset. Assuming a 95% confidence interval, regarding the accuracy percentages in the discrimination task, the variances were similar, $F(2, 21) = 3.47$, $p = 0.1689$. As the homogeneity of variance was met, a one-way independent ANOVA was then ran and it was

discovered that there was a significant effect of participant type on accuracy scores, $F(2, 21) = 3.47$, $p < 0.01$, $p = 0.00147$.

7 Discussion

7.1 Evaluation of Main Predictions

This study set out to observe the perceptual ability of English L1-Korean L2 learners in comparison to naïve and native participants when discriminating Korean word-initial and intervocalic plosives. By comparing these learners to native speakers and naïve listeners, it was hoped that the progression from naïve to learner would highlight the acquisition of this perceptual ability, with the native group acting as a control group to observe normal levels of perceptual ability in Korean. As well as this, the acoustic factors of VOT and F0 were to be manipulated to observe their effect on perceptual accuracy. While it was expected that Korean L2 learners would perform better than naïve listeners, this was not the case — Korean L2 learners had overall lower accuracy ratings than all other groups.

The earlier discussion of L2 perception models guided the predictions that naïve listeners would face the greatest difficulty in discrimination between tokens, and that L2 learners would perform better. As seen by the results in Section 6, this was not the case: naïve listeners had a higher average accuracy score than L2 learners, as well as less variation with their results. L2 learners overall had the lowest average accuracy scores, as well as having significant variation with their accuracy results, as seen in Figure 1.

Flege's (1995) Speech Learning Model (SLM) guided the predictions that L2 learners would have developed the categorisation of 'language-specific aspects' to utilise when discriminating acoustic cues such as VOT and F0. The accuracy ratings however showed that this was not the case; L2 learners had the weakest perceptual ability out all of participants. Flege discussed that when the age of the learner is great, i.e., the learner is older (particularly in this study as all learners were adults), the greater difficulty the learner has in creating phonetic categories. It may be that, with the participants in this research, their categories are still in development, particularly as some participants have only been studying for a very short period.

Due to the unexpected but nevertheless interesting results, it can be stated that H_1 and H_2 were not supported, as the results did not follow the accuracy 'slope' predicted with naïve listeners at the bottom and native listeners at the top. This study has shown that adult Korean L2 learners have the greatest difficulty in discriminating between both word-initial and intervocalic plosives.

H_3 stated that manipulation of F0 would have a greater adverse effect on perceptual ability when discriminating word-initial plosives than manipulation of VOT. Korean L1 participants performed relatively similarly between the two manipulation categories (with only a 3% difference in accuracy ratings, seen in Table 4 in Section 6.2). Korean L2 learners and naïve listeners both performed better when F0 was manipulated than when VOT was manipulated, most likely as VOT is utilised more often in English perception, as opposed to utilising the F0 of the preceding vowel as is used in Korean.

Similarly, H_4 predicted that manipulation of F0 would have a greater adverse effect on perceptual ability when discriminating between tokens in an intervocalic context. All participants performed better in the intervocalic context than in the word-initial context, and again performed better with F0 manipulated tokens than when faced with VOT manipulated tokens. Overall, all participants performed better in the intervocalic section of the experiment than in the word-initial section, most likely due to the extra acoustic features present in an intervocalic context that can influence perception. That is, the vowel length preceding the plosive, and the hold period between the initial vowel and the plosive are both perceptual cues that do not exist in the word-initial context. Thus, H_4 was partially supported, as

participants performed better when discriminating between intervocalic plosives as opposed to word-initial plosives, but they did not follow the pattern predicted that they would have lower accuracy scores when discriminating between F0 manipulated tokens as opposed to VOT manipulated tokens.

7.2 Methodological Issues

A number of methodological limitations may have affected these results.

While the original plan for this research set out to have three equal groups of 10 participants, this was not reflected in the participant recruitment numbers. Due to time constraints and difficulty in recruiting participants, these numbers were not reached. To compensate for this Levene's Test was utilised during the statistical analyses as it provides the ability to analyse groups of varying sample size.

A number of the naïve listener participants were recruited from a mass email sent to English Language and Linguistics students at the University of Glasgow. As some of these students come from a linguistic or specifically phonetic background, they may have been influenced and biased by the more finely detailed perception required from their studies and thus may have been attuned to noticing discrepancies between tokens. As well as this, a few naïve listeners were reported to having listened to/watch Korean pop culture, and this may have provided them with just enough experience of Korean to be able to perceive the discrimination analysed in this study.

The English L1-Korean L2 learners came from a variety of language learning backgrounds, inviting a lot of variation into their participant group. The methods and duration of learning varied a lot between participants, and this lack of consistency may explain the wide variety of accuracy results observed in Table 4 in Section 6.2.

While VOT and F0 are referred to as the primary acoustic cues utilised for Korean plosive perception, they are by no means the sole cues utilised. Other cues, such as H1-H2 of the following vowel (Holliday & Kong, 2011), vowel length, hold period preceding the burst in intervocalic tokens, voicing presence in intervocalic plosives etc., may also have influenced perception and the discrimination of plosives in this study.

8 Conclusion

The collation and discussion of results has shown through this particular piece some surprising yet nevertheless interesting observations of perception capabilities between varying participant groups. While the research carried out in Sections 2 and 3 guided the predictions that naïve listeners would have the lowest accuracy when undertaking the discrimination task, this was not the case. Native listeners performed best in terms of accuracy of perception, which is to be expected, but Korean L2 learners had the lowest accuracy ratings out of all participants with both word-initial and intervocalic stimuli. While the predicted hypotheses were not supported by these results, the results open the doors to further examination of adult L2 perception — if these results are indicative of a large issue in adult L2 acquisition, this is most certainly an obstacle for L2 learners that could be further explored. By placing the L2 learners' results in comparison to both naïve and native listeners, it highlights an intriguing pattern in perceptual ability development.

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10 Appendices

10.1 Appendix One: Word List with Transcriptions and Translations

Word-initial words adapted from Shin et al. (2013). Words with no translation are nonsense words.

Table 5: Word list for recording session

Word (<i>hangeul</i>)	Transcription	Romanisation (RR)	Translation(s)
반	[pan]	ban	Half, class
뺨	[p*an]	bban	To suck/wash - adnominal
판	[p ^h an]	pan	Board
단	[tan]	dan	Just, but, sweet, column, gear
딴	[t*an]	ddan	To pick - adnominal
탄	[t ^h an]	tan	To ride - adnominal
간	[kan]	gan	Liver
깐	[k*an]	ggan	Estimation
칸	[k ^h an]	kan	Box, blank
아바	[aba]	aba	-
아빠	[ap*a]	abba	Dad, daddy (inf.)
아파	[ap ^h a]	apa	It hurts! (from 아프다 – to be hurt, sick, in pain)
아다	[ada]	ada	I know (inf., from 알다)
아따	[at*a]	adda	Well, Ey, Oh! (exclamation)
아타	[at ^h a]	ata	-
아가	[aga]	aga	Baby
아까	[ak*a]	agga	Earlier
아카	[ak ^h a]	aka	-

10.2 Appendix Two: Word List as Presented to Participant

- (1) 반
- (2) 판
- (3) 아카
- (4) 판
- (5) 아따
- (6) 아파
- (7) 단
- (8) 아가
- (9) 탄
- (10) 아다
- (11) 간
- (12) 아빠
- (13) 칸
- (14) 아바
- (15) 칸
- (16) 뺨
- (17) 아까
- (18) 아타

10.3 Appendix Three: Participant Questionnaire — Korean Native Speakers

Age:

Gender: Male / Female / Other / Prefer not to say

Where exactly in Korea did you live? How long did you live there?

For example:

Namyangju-si, Gyeonggi (from birth until age 17)

Gwanak-gu, Seoul (from age 17 until age 21)

Do you speak any other language(s)?

Do you have any hearing difficulties?

Thank you for your time and support!

10.4 Appendix Four: Participant Questionnaire — English L1-Korean L2 Learners

Age:

Gender: Male / Female / Other / Prefer not to say

Where are you from (region of country)?

How long have you been learning Korean?

How do you/did you learn Korean? (Select the answer closest to your own experience):

1. Self-taught
2. 1-to-1 tuition
3. Online classes
4. Formal language classes (such as at school/university)
5. Immersion
6. Other (please write below)

How would you rate your Korean proficiency on a scale of 1-5, 1 being an absolute beginner and 5 being fluent? (Circle your answer)

1 2 3 4 5

Do you have any hearing difficulties?

10.5 Appendix Five: Participant Questionnaire — English L1 Korean Naïve Participants

Age:

Gender: Male / Female / Other / Prefer not to say

Where are you from (region of country)?
e.g., Clydebank, Glasgow

Is English your first language?

Do you speak any other language(s)?

Do you watch/listen to/read any Korean pop culture/literature?
e.g., TV Shows, music etc.

Do you have any hearing difficulties?

About the Author

Emma Laird graduated from the University of Glasgow in 2020 with an MA in English Language and Linguistics, going on to complete an MSc in Speech, Language and Sociolinguistics in September 2021 at the University of Glasgow. Her research interests include Scottish sociophonetics (her MSc

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Reviewing Policies

All submissions to the Journal are subject to a double-blind peer-review process. This means that the reviewers for any manuscript and that manuscript's author are unable to access identifying information about each other. Each paper is first anonymously assessed by the Editorial Committee to ensure its scope meets the reviewing ability of the Journal before it is then passed on to two reviewers who provide in-depth comments through reviewing rounds.

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Artist's Statement

The cover of JoULAB Issue 2 marks a turning point in our selfhood, departing from ULAB's traditional colour scheme of blues and white and expanding into our own colour, a dusty red. In recognition of our connection with ULAB, Issue 2 maintains the original JoULAB blue, fostering visual continuity between the issues. Our red is introduced as a focal point, standing out against the blue to resemble textured highlights and shadows. These colours were chosen thoughtfully, ensuring that their combination would be accessible to all, regardless of any colour vision deficiency. The design of the cover itself was partially inspired by Laszlo Buday's 1964–1967 cover designs for *Canadian Architect*, available [here](#). My design maintains the abstraction of the first but elevates it; instead of an array of gradients, the use of halftone creates a modern but professional appeal. We are a unique journal – the only journal in the world publishing solely undergraduate linguistic research – and it's necessary this come across in our visuals.

Lydia Wiernik
Associate Editor, JoULAB
Archivist, ULAB
University of Edinburgh

Journal of the Undergraduate Linguistics Association of Britain

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