Mateusz Jekiel

The evolution of English dental fricatives: variation and change

Poznań, 2012

Imię i nazwisko ....

Kierunek i specjalność ....

Numer albumu ....

Instytut Filologii Angielskiej

Promotor ....

1. Oryginalny tytuł pracy dyplomowej

....

....

....

2. Tłumaczenie tytułu pracy dyplomowej

a) na język polski (w przypadku prac napisanych w języku obcym)

....

....

....

b) na język angielski (w przypadku prac napisanych w języku innym niż język angielski)

....

....

....

<div align="center">

Podpis promotora

....

Podpis studenta

....

</div>

Miejsce i data

....

OŚWIADCZENIE

Ja, niżej podpisany/a

....

student/ka Wydziału Neofilologii

Uniwersytetu im. Adama Mickiewicza w Poznaniu

oświadczam,

że przedkładaną pracę dyplomową

pt. ....

napisałem/am samodzielnie.

Oznacza to, że przy pisaniu pracy, poza niezbędnymi konsultacjami, nie korzystałem/am z pomocy innych osób, a w szczególności nie zlecałem/am opracowania rozprawy lub jej istotnych części innym osobom, ani nie odpisywałem/am tej rozprawy lub jej istotnych części od innych osób.

Jednocześnie przyjmuję do wiadomości, że gdyby powyższe oświadczenie okazało się nieprawdziwe, decyzja o wydaniu mi dyplomu zostanie cofnięta.

....

(miejscowość, data)   (czytelny podpis)

Table of contents

List of tables

List of figures

List of abbreviations

AAVE	African American Vernacular English	WGmc	West Germanic
		imp.	imperfect
AmE	American English	ind.	indicative
AN	Anglo-Norman	inf.	infinitive
BrE	British English	pa.	past
EMnE	Early Modern English	part.	past participle
Gmc	Germanic	pl.	plural
IPA	International Phonetic Alphabet	pr.	present
		sg.	singular
ME	Middle English	*	reconstructed or hypothesized form
NGmc	North Germanic		
OE	Old English	>	develops to
ON	Old Norse	<	develops from
PDE	Present-Day English	[ ]	phonetic representation
PGmc	Proto-Germanic	/ /	phonemic representation
PIE	Proto-Indo-European	< >	orthographic representation

Introduction

Non-sibilant dental fricatives /θ/ and /ð/ are highly marked sounds: they are rare in the world's languages, occurring in 43 (7.6%) out of 566 *UPSID* languages (Maddieson 2005: 83), they bear a low functional load (few minimal pairs, e.g. *thigh~thy*) (Smith 2008: 1), are difficult and problematic in first and second language acquisition (Cruttenden 2008: 196-197) and relatively understudied within the field of acoustic phonetics. Moreover, /θ/ and /ð/ undergo sound changes across many modern varieties of English, being replaced by alveolar stops /t/ and /d/ or labio-dentals /f/ and /v/ respectively (Blevins 2006: 11). The aim of this thesis is to outline the history of English dental fricatives and find potential parallels between the present ongoing changes and the past developments that occurred in OE, ME and EMnE.

Although, traditionally, /θ/ and /ð/ in the PDE consonant system are considered as two separate phonemes, studies by Smith (2007, 2010a) show that the phonologization process of these sounds is still incomplete, meaning that they are not in contrastive, but rather in complementary distribution. Hence, the current phonological status of dental fricatives is similar to the one found in OE, when /θ/ was the only voiceless dental fricative phoneme while [ð] was a voiced allophone appearing between voiced sounds (Lass 1994: 71-72). However, while most linguists agree that the phonologization of English dental fricatives took place after the Norman Conquest due to the French influence (Lass 1992: 59), a different explanation is put forward by Laker (2009: 213), who suggests that /θ/ and /ð/ became phonemic as early as in the 5th-6th c. due to Old English-Late British language contact, further complicating the issue of the phonemicisation of these sounds.

A matter of equivalent importance concerns the graphemes, as dental fricatives in OE were represented generally by *thorn* <þ> and *edh* <ð> (used interchangeably for /θ/ and [ð]) but also, in the earliest OE manuscripts, by a digraph <th> (Hogg 1992: 33). Although, in the ME period, the former two symbols were being successfully replaced by <th>

(Bourcier 1981: 128), Barber et al. (2009: 162) argue that <þ> and <ð> remained even until ca 1400. Moreover, studies by Kristensson (1987, 1995, 2001) and Diensberg (1995) show that there was a great deal of variation in ME writing, as the proper symbols for /θ, ð/ were frequently replaced by <t> and <d>, providing a possible link to the current phonological changes.

There are a number of modern varieties of English (e.g. Cockney English, West Midlands English, New York City English or AAVE), where /θ, ð/ are frequently realised as /f, v/ or /t, d/ sounds (Blevins 2006: 11). According to Blevins (2004: 134), the former change, th-fronting, is a perceptually based sound change, due to a strong perceptual similarity between dental and labio-dental fricatives. On the other hand, the latter change, th-stopping, can be also found in OE and ME, due to WGmc strengthening of fricatives (Lass 1994: 76) or pre-sonorant and post-fricative strengthening (Lass 1992: 64).

This thesis is divided into four chapters: (1) a presentation of selected theories of and approaches to sound change (2) the presence of dental fricatives among the world's languages, their phonetic features, production, perception and acquisition issues, (3) a diachronic study of dental fricatives in OE, ME and EMnE, as well as in other Gmc languages and (4) an analysis of the loss of dental fricatives in selected modern varieties of English. The results of this study will hopefully shed light on finding possible parallels between past and present phonological developments, confirming that the current loss of dental fricatives in PDE is not a novelty sound change, but rather a reoccurrence of earlier innovations that took place in the previous stages of the English language.

Chapter 1: Theories of and approaches to sound change

1.1. Introduction

The aim of the first chapter of this thesis it to provide an introduction to both past and present theories of phonological change and outline the current approaches to historical linguistics and studying sound change in progress. Primarily, the presentation and assessment of the available theories and approaches will supply a basis for the key discussion, the evolution of English dental fricatives, covered in the subsequent chapters. The focal points of this chapter are (1) the early views of sound change of the Neogrammarians, the Structuralists and the Generativists, (2) lexical diffusion and (3) the rise of sociolinguistics and its major achievements. The questions that are asked in this chapter are: Is there a parallel between language evolution and biological evolution? Are the achievements of early historical linguistics still applicable? How did language variation gain its merit in the realm of sociolinguistics?

1.2. Language change and evolution

All languages of the world constantly change. According to Labov (1994: 9), if language is regarded as a "system of associations between arbitrary forms and their meanings", language change can be seen as a "disturbance" of these relationships, which may lead to a failure in communication. However, languages are also regarded as diverse entities that are never balanced or stable, what ultimately results in constant linguistic variation (Milroy 1992: 1-3). The academic studies of language change have a long history that exceeds over

two centuries, during which many concepts have been adopted or introduced into the field of historical linguistics. In order to discuss the notion of language change, it is essential to draw a vital analogy: the parallel between biological evolution and language evolution.

The concept of biological evolution has its roots in the second half of the 19th c., as Charles Darwin revolutionised the field of biological studies by publishing *On the Origins of Species* in 1859. The work provided explanations for the rules and mechanisms of selection, variation and inheritance that would ultimately explicate the evolution of biological organisms. Darwin's groundbreaking theory became so popular among scholars that it began to function as a model for outlining new theories in other fields of science. One such field in particular is historical linguistics, and its adopted concept became known as language evolution (Oudeyer, Kaplan 2007: 21). The origins of this school of thought can be traced back to 1863 when August Schleicher implemented similar concepts to those founded in Darwin's work in order to describe the birth and death of languages and presented the relations between them in the form of language trees (Lehmann 1973: 135-136).

Although language evolution is on a parallel with evolutionary biology, the reception of Darwinian ideas by linguists is not unanimous. According to Wells (1987: 42), biological metaphors were commonly used by historical linguists in the early 19th c., but afterwards have become an attribute of an amateur approach. While early linguists studied language change predominantly in terms of progress or decay and saw evolution as a progressive advancement, the modern views are much less biased, as there is no real evidence for classifying linguistic change according to such extremes (McMahon 1994: 324). Indeed, the terms that are of prime importance for language change are the essentials of the Darwinian evolutionary theory, such as *mutation*, *variation* and *natural selection*, which proved to be of great value in the course of historical linguistic studies. However, as Lass (1990: 79) remarks, the borrowing of concepts from other fields of science can only be successful as long as the borrowing is thoroughly understood, otherwise becoming a meagre metaphor of little scientific merit.

1.3. Early views of sound change

The field of evolutionary phonology is vast and throughout the years of studies, a number of theories and ideas came to being. The works of the Neogrammarians, the Structuralists and the Generativists, created solid foundations for present studies of phonological change (McMahon 1994: 14-46). Although contemporary linguists are hardly ever working within just one of these frameworks, it is vital to outline all of the three schools of thought, discuss their primary goals and achievements, as well as their reception by contemporary linguists. Moreover, it will become evident that despite the relative differences between the three schools of sound change, all share similar shortcomings that prevent them from achieving the ultimate goal of revealing the initiation of sound change and its further development across languages.

1.3.1. The Neogrammarians

The Neogrammarians, who began to function in 19th c. Leipzig, were a group of scholars who aimed at reconstructing PIE and explaining the changes that affect languages from the Indo-European family (McMahon 1994: 17-18). Inspired by Darwin's theory of evolution, the Neogrammarians' crowning achievement is undoubtedly the identification of regularity in language change and the establishment of the regularity hypothesis. According to the hypothesis, a sound change is regular, has no exceptions (it affects all words with the same context in a given language and all speakers in the same speech community), is phonetically conditioned and is slow and unobservable (McMahon 1994: 20). Labov (1994: 20) restated the Neogrammarian principle, concluding that "[s]ound change is a change in the phonetic realization of a phoneme, without regard to lexical identity".

Although the Neogrammarian hypothesis has lost much of its former prominence and is now only a mere guideline, it is a prime example of an employment of the comparative method and a theory that did not blindly assumed absolute regularity (Lehmann 1973: 87-88). First of all, the hypothesis exceeded sporadic changes (e.g. dissimilation, haplology, metathesis) (McMahon 1994: 21-22). Secondly, a sound change did not operate on the Neogrammarian principle in all lexical sets, as it excluded nursery and onomatopoetic words (Lehmann 1973: 87). Finally, sound change was restricted to a particular speech

community in a specific place and time (McMahon 1994: 22). Only after meeting all of the above conditions, a sound change can be recognised as a regular and exceptionless entity.

According to Kiparsky (1996: 640) The Neogrammarian school of thought has been much criticised over the past century, mainly for its insufficient empirical basis and lack of consequence, downgrading it to a "mere terminological stipulation". The author claims that the main issue with the Neogrammarian doctrine lies predominantly in the belief of a physiologically motivated sound change:

> [I]f sound changes originate through gradual articulatory shifts which operate blindly without regard for the linguistic system, as the Neogrammarians claimed, why don't their combined effects over millennia yield enormous phonological inventories, which resist any coherent analysis? Moreover, why does no sound change ever operate in such a way as to subvert phonological principles, such as implicational universals and constraints on phonological systems? (Kiparsky 1996: 641).

Despite a large body of criticism, the Neogrammarians, being the pioneers in studying the nature of sound change, blazed a trail in the field of evolutionary phonology. It was the first school of thought that tried to explain similarities between languages by outlining universal principles that govern all IE languages. However, most importantly, the Neogrammarians created solid foundations for one of the most important frameworks in linguistics, which is lexical diffusion.

1.3.2. The Structuralists

The Structuralists, having among themselves such prominent figures like de Saussure, Jakobson, Bloomfield or Hockett, were a new rising group of linguists of the early 20th c. who went beyond the Neogrammarian framework and created a new method for understanding language change. First of all, the Structuralists studied language as a system that comprises of internally connected elements, and in which a sound change cannot take place independently of changes in the lexicon or the syntax (Lehmann 1973: 133-134). Secondly, while the Neogrammarians worked only within the diachronic framework, de Saussure considered synchronic studies to be of more importance, explaining that diachronic methods are actually based on previously established synchronic systems of languages (McMahon 1994: 25). Thirdly, Structuralists claimed that sound changes are driven by two major

notions: economy and symmetry. An economical language is a system that derives "the maximal number of contrasts from the minimal number of features", while a symmetrical language is a system with a visible drive to an orderly structure based on contrasts, e.g. voiced and voiceless counterparts in the English fricative system (McMahon 1994: 30).

Although the ideas introduced by the Structuralists gave an insight into language change and provided an alternative to the Neogrammarian approach, they have also met with strong criticism. According to Milroy (1992: 3), a language is never a stable and a balanced entity, as it is claimed by Saussure, but, on the contrary, it is constantly changing. Moreover, only if a language is "open-ended" (i.e. a language is unstable due to variation), it is possible for a linguistic change to occur (Milroy 1992: 4). Therefore, as language change cannot occur without variation, the belief of the Structuralists in a drive towards uniformity, balance and stability in a language seems to be a false lead in studying the nature of sound change.

1.3.3. The Generativists

The focal point for the Generativists was the juxtaposition of the change of phonemes, as proposed by the Structuralists, with their original idea of the change of rules. According to the Generativists, a phonological change occurs not on the external, perceptible level, but rather on the internal, underlying level, which in fact builds the grammar of a language (McMahon 1994: 34). In other words, entities that undergo changes are the underlying representations that create the system of a language, and, therefore, a phonological change could only occur in the form, order or inventory of rules (i.e. "rules change", not "phonemes change"). By applying this notion, establishing a change between two related languages or varieties required the construction and comparison of systems of rules and underlying forms for each stage or language.

Another vital issue introduced by the Generativists was the idea of simplicity in linguistic change. According to the Generativists, all change must be simplificatory, translating more complex to simpler and more economical grammars. This notion, however, became one of the most debated ideas proposed by this school of thought. According to McMahon (1994: 43-44), the notion of simplicity in language change is not universal, as it is hardly possible to acknowledge such changes as the First Germanic Consonant Shift or

the Great Vowel Shift as a simplification of rules. In fact, even innovation, a core example of a linguistic change proposed by the Generativists, should not be recognised as a simplification, since how rule addition can ever be regarded as a simplification? Moreover, if every linguistic change is a simplification of rules, it would mean that all world's languages that undergo changes had to be very complex at their beginning stage, becoming gradually simpler over time.

1.3.4. The problem of actuation and transmission

The early views of sound change proposed in turn by the Neogrammarians, the Structuralists and the Generativists, despite the differences in their goals, approaches and achievements, have encountered similar problems, ultimately leading us to a similar conclusion. According to McMahon (1994: 44) "they are all more successful at describing *what* happened than *why* it happened". All the three schools of thought failed at explaining the initiation of a change, also known as "the actuation problem", and its further development and expansion, i.e. "the transmission problem". The reason why these problems were not solved lies predominantly in the unnecessary drive towards universal sound laws. Therefore, as McMahon (1994: 45-46) concludes, contemporary linguists should focus on solving intermediate steps and partial problems that are specific to particular languages, instead of searching for universal truths that would account for all linguistic changes.

1.4. Lexical diffusion

During the second half of the 20th c., much attention has been paid to the notion of regularity in sound change and the question of the basic unit of sound change, whether it is a sound or a word. The point of departure was the Neogrammarian belief that sound change is regular and exceptionless. Moreover, since the Neogrammarians also considered sound change as mechanical and phonetically conditioned, they excluded analogical change and dialect borrowing from their regularity hypothesis, what allowed them to reign over other theories of sound change at that time (Labov 1994: 422-423). However, a series of studies from the 60's and 70's brought to light new data that opposed the Neogrammarian school

of thought, revealing that sound change does not always operate on the same rules, nor is it always regular and exceptionless. These evidence gave birth to a new approach in studying language change and, most importantly, a new theory that became known as lexical diffusion (Labov 1994: 423-424).

The principal doctrine of the Neogrammarian controversy holds that sound change is phonetically gradual and lexically abrupt. The earliest contradiction to this argument can be found in Wang (1969), a research based on an analysis of 17 modern Chinese dialects and phonetic transcriptions of over 2,000 morphemes that yielded unexpected results, showing a reverse situation of a phonetically abrupt and lexically gradual sound change. Subsequent studies (Chen and Wang (1975) and Cheng and Wang (1977)) also lead to a similar conclusion. However, despite opposing the Neogrammarian school of thought, the earliest evidence for lexical diffusion did not deny the notion of a regular sound change, as lexical diffusion can eventually develop into as a regular change as well. The key difference between the Neogrammarian sound change and lexical diffusion is not the final outcome, but rather the mechanism of change that operated in the mid-course of both changes (Kiparsky 1996: 640).

Although lexical diffusion is commonly presented as a theory that stands in a direct opposition to the Neogrammarian regularity hypothesis, Labov (1994: 541) argues that the former does not necessarily have to exclude the latter. Instead of resolving the dichotomy of "words change" vs. "phonemes change", the research focuses on an ongoing sound change, and its findings provide evidence for both types of changes. While regular sound change is typical for an initial stage of a linguistic change that results from a "gradual transformation of a single phonetic feature of a phoneme in a continuous space" (e.g. vowel shifts in place of articulation), lexical diffusion happens at a later stage of an internal change and is an outcome of an "abrupt substitution of one phoneme for another in words that contain hat phoneme" (e.g. shortening and lengthening of segments) (Labov 1994: 542-543). Thus, regular sound change and lexical diffusion are two distinct types of sound change that work on different rules and can vary in their outcomes.

The status of lexical diffusion as a sound change is, however, questionable. According to Kiparsky (1996: 641), lexical diffusion, as opposed to regular sound change, is not a type of a sound change, but rather a form of analogy, i.e. lexical diffusion "is driven by the rules of the lexical phonology" and its instances result from analogical change. Moreover, Kiparsky defended the Neogrammarian regularity hypothesis from the objections formed

on the basis of lexical diffusion, confirming that regular sound change is exceptionless and subject to phonetic conditioning. To summarise, lexical diffusion, whether a traditional sound change or analogy, is a groundbreaking theory that provides an answer to the transmission problem, although to some extent incomplete.

1.5. Linguistic variation and sociolinguistics

1.5.1. The recognition of variation and the rise of sociolinguistic study

Linguistic variation had been relatively neglected in the early days of studying language change, as different schools of thought withdrew its concept, both the Structuralists and their idealistic vision of a language as a homogeneous entity, as well as the Generativists and their view of variation as a minor aspect of performance (McMahon 1994: 226). According to Coulmas (1997: 4-5), the pursuit of an ideal, all-embracing theory created the view of language as an abstract entity, while variation had to be discounted "as an imperfection rather than recognizing it as an inherent feature of human behaviour". However, most contemporary historical linguists perceive linguistic variation as "inextricably linked with language change", as numerous studies that took the variationist approach shed light on the transmission and expansion of linguistic change, a subject that was seen as unexplainable in the early linguistic thought (McMahon 1994: 225-6). Hence, a new branch of linguistics had to be acknowledged.

The aim of sociolinguistics is "to study correlations between language use and social structure" and "establish casual links between language and society" (Coulmas 1997: 1-2). Although sociolinguistics deal with a broad area of subjects (e.g. bilingualism, multilingualism), there are two major topics that are of prime concern. The first one is language change, while the second one is language variation. Both subjects are strongly connected to each other and were thoroughly investigated in such works as Milroy (1992), Labov (1994) and Chambers (1994) (Coulmas 1997: 6). Furthermore, sociolinguistic research can also be applied to other, non-linguistic fields, as such studies can "help reduce language-related prejudice", raise the issue of "bilingual education", as well as engage in "language-related problems of professions outside education" (Coulmas 1997: 9-10).

1.5.2. Variation and variables

According to Milroy and Milroy (1997: 47), the main reason why language variation was excluded from the early linguistic thought was the fact that "linguistic theorizing has been largely based on *standardized* forms of languages". A turning point was undoubtedly the work of William Labov, *The Social Stratification of English in New York City* ([1966] 2006), as the methods and techniques that were applied in this study led to the rise of the variationist paradigm, an empirical approach based on collecting authentic speech samples and proving that linguistic variability can be presented as a structured entity. According to Labov (1972: 1-2), variation can be a result of a range of diverse processes, such as assimilation, analogy, borrowing, "or any number of processes in which the language system interacts with the physiological or psychological characteristics of the individual".

In order to investigate linguistic variation, it is essential to identify a set of speaker variables in order to establish the relationships between linguistic and social categories (Milroy and Milroy 1997: 50). Following the Labovian tradition, the most common social variable is the socioeconomic (social) class, followed by social networks developed by Milroy (1980), age (Eckert 1997) and gender (Wodak and Benke 1997). Moreover, another factor that has to be taken into account is the degree of formality in speech. As different speech conditions can invoke different linguistic variables, Labov proposed five different styles: casual (the least formal), careful, passage reading and word-list reading (the most formal) and compared them with the socioeconomic variables (Bright 1997: 86).

1.5.3. The history of sociolinguistics

According to Le Page (16-17), the origins of sociolinguistics can be found in Samuel Johnson's *Dictionary* from 1755, one of the first attempts to regularise the English language, followed by a late 19th c. *English Dialect Dictionary* by Joseph Wright. McMahon (1994: 227-228) states that the most pioneering work is an early study by Wenker concerning the Second Germanic Consonant Shift and the boundary that it creates between High and Low German. Wenker's study in a form of a questionnaire covered ca 50,000 locations around Düsseldorf between 1877 and 1887. Although the initial aim of finding a single isogloss that would divide High from Low German was not achieved, the discovery of the "Rhenish

Fan" yielded significant results and allowed to form vital conclusions regarding the transmission problem. Wenker's work not only confirms that sound change is not "instantaneous, phonetically gradual and lexically abrupt" but, most importantly, it proves that "linguistic change is not purely linguistic, but instead may depend on social, political and environmental factors" (McMahon 1994: 228-229).

Until the second half of the 20th c., diachronic studies were limited by "evidentiary limitations to post-hoc analysis of the end-products of language change" (Guy 2003: 369). Undoubtedly, a groundbreaking moment in this field came with the pioneering studies by William Labov in Martha's Vineyard (1963) and New York City (1966) that proved a possible investigation of an ongoing sound change and "the social and linguistic mechanisms of change" (Guy 2003: 369). The acknowledgment of the significance of linguistic variation allowed for acquiring new types of data and evidence, as well as improving the descriptive adequacy of a language change in progress. Moreover, it brought a "new perspective on the linguistic mechanisms of change" as the linguistic processes that result in change are "diachronic extensions of variable processes that are extant in synchronic usage and synchronic grammar" (Guy 2003: 370). Such an assumption, in turn, lead to the rise of a new theory that focused on the relationship between synchronic and diachronic studies, known as the uniformitarian principle.

1.5.4. The uniformitarian principle

The theory in question was described, discussed and applied by many historical linguists in various studies and research. Janda and Joseph (2003: 22) invoke several descriptions of the uniformitarian principle by various linguists: "the forces operating to produce linguistic change today are of the same kind and order of magnitude as those which operated in the past" (Labov 1972: 275); "knowledge of processes that operated in the past can be inferred by observing ongoing processes in the present" (Christy 1983: ix); "[t]he general processes and principles which can be noticed in observable history are applicable in all stages of language history" (Hock 1991b: 630). Nevertheless, the most vital point of this theory is the strong connection between synchronic and diachronic studies, as past linguistic processes can be explained by ongoing changes in language and vice versa. Hence, it makes the uniformitarian principle a very practical theory, as studying present linguistic

changes is readily accessible, whereas examining historical developments needs to be based on reconstructed or hypothesised forms.

1.6. Summary

By the end of this chapter I have covered the essential theories of and approaches to sound change. The objective of the first chapter of this thesis was by no means a thorough discussion on the history of studying language change, but providing an outline and a basis for the main discussion in the following chapters. Moreover, it is possible to answer the first three questions that have been raised in the introductory paragraph: (1) Is there a parallel between language evolution and biological evolution? (2) Are the achievements of early historical linguistics still applicable? (3) How did language variation gain its merit in the realm of sociolinguistics?

Indeed, the parallel between language evolution and biological evolution is present, although linguists are not unanimous in establishing the extent of this relationship. It is probably the safest to follow Blevins (2004: 18), agreeing that the parallel between biological and linguistic evolution should be viewed primarily in a metaphorical sense, as languages are learned, and not genetically transmitted entities, and it is impossible to draw a one-to-one correspondence between the two scientific dominions.

After outlining the works of the first three schools of sound change, the Neogrammarians, the Structuralists and the Generativists, it can be summarised that, despite the differences between their approaches, all encounter similar problems in defining the origins of sound change (actuation) and the rules of its spreading (transmission). Although, in current linguistic studies, the early views of sound change are hardly ever used, it was the Neogrammarian regularity hypothesis that served as a point of departure for lexical diffusion. Hence, in spite of their shortcomings, the views of the early historical linguists can prove to be a useful and valuable source of information for a contemporary linguist.

The acknowledgement of the importance of linguistic variation is probably one of the most vital aspects for contemporary linguistic studies. Following Milroy (1992: 3), the fact that "no real language state is a perfectly balanced and stable structure" ultimately leads to constant linguistic variation that has an undeniable bearing on any language. Therefore, an insightful study of variables is of key importance for modern linguistics.

Chapter 2: Universal properties of dental fricatives

2.1. Introduction

The primary objective of this chapter is to outline the key features and universal characteristics of dental fricatives. The main issues that will be covered are (1) the presence of dental fricatives in world's languages, (2) the acoustic and voicing analysis and (3) the key aspects of production, perception and acquisition. The questions that are asked in this chapter are: What is the current status of dental fricatives? Is the phonologization of dental fricatives complete? What are the unique features of these sounds?

2.2. Dental fricatives and phonetic terminology

The standard English consonant system comprises of two types of dental fricatives: a voiceless dental fricative and a voiced dental fricative, represented in the IPA by /θ/ and /ð/ respectively and both denoted in the English alphabet by <th>. However, the term *dental fricative* is not solely restricted to English /θ/ and /ð/ sounds, as dental fricatives are also present in other languages of the world and vary in pronunciation from their English representations (e.g. Polish sibilant dental fricatives /s/ and /z/). Both BrE and AmE /θ/ and /ð/ sounds are *non-sibilant fricatives* in which the turbulence is generated at the *dental* (BrE) or *interdental* (AmE) constriction (Ladefoged and Maddieson 1996: 144). Therefore, English /θ/ and /ð/ are to be properly named as *non-sibilant (inter-)dental fricatives*. However, for the sake of coherence and simplicity, the term *dental fricatives* will always denote English /θ/ and /ð/ sounds throughout this thesis, unless otherwise stated.

2.3. Dental fricatives in world's languages

Dental fricatives are sounds to be considered as highly marked: "they are rare in the languages of the world and learned late by children" (Dubois and Horvath 2004: 411). From 451 *UPSID*[1] languages, only 32 have either or both voiced and voiceless dental fricatives and only 22 have the voiced dental fricative without a voiceless counterpart (Maddieson and Precoda 1990). Another significant database is *The World Atlas Of Language Structures* (Haspelmath et al. 2005), which is by far one of the most complete and thorough catalogues of sounds from over 2560 languages of the world. According to Maddieson (2005: 82-83), 'th' sounds[2] occur in 43 (7.6%) out of the 566 languages surveyed. Although such a result makes 'th' sounds one of the most uncommon sounds across the world's languages[3], their distribution is virtually worldwide:

> ['Th' sounds] are found in languages as varied in location and family affiliation as Modern Greek, Albanian, Spanish and English (Indo-European), Kabardian (Northwest Caucasian), Meadow Mari and Nganasan (Uralic), Burmese and Sgaw Karen (Sino-Tibetan), Lakkia and Yay (Tai-Kadai), Swahili and Moro (Niger-Congo), Dahalo (Afro-Asiatic), Berta and Murle (Nilo-Saharan), Fijian, Yapese and Drehu (Austronesian), Ngiyambaa (Pama-Nyungan), Rotokas (West Bougainville), Aleut (Eskimo-Aleut), Chipewyan (Athapaskan), Acoma (Keresan), Maricopa (Yuman), Cubeo (Tucanoan), Huastec (Mayan), Mixtec languages and Mezquital Otomí (Oto-Manguean), Amahuaca (Panoan), Tacana (Tacanan), Cochabamba Quechua and Mapudungun (Araucanian) (Maddieson 2005: 83).
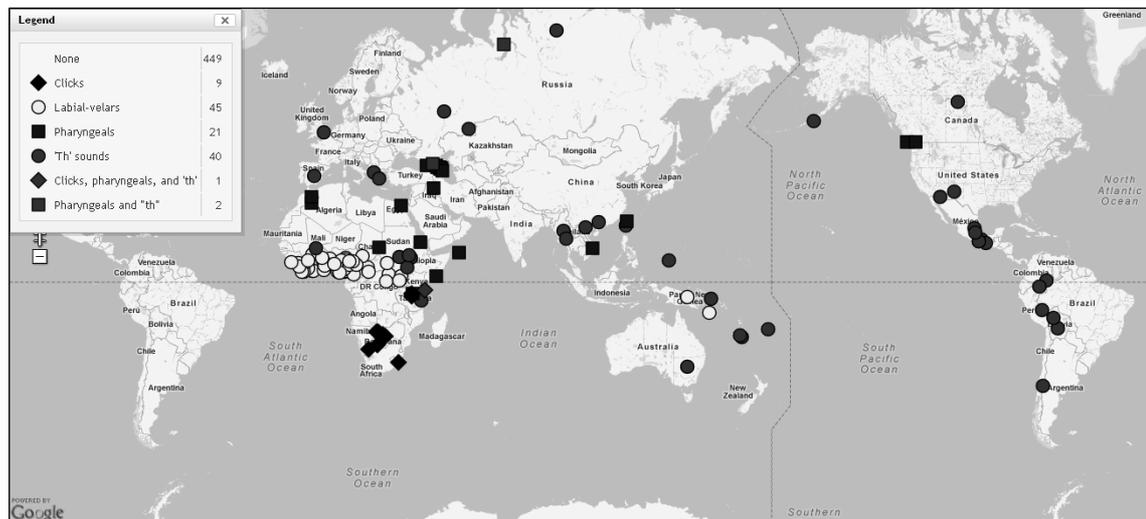
Figure 1. Presence of uncommon consonants (after Maddieson 2011).

---

[1] *The UCLA* (University of California, Los Angeles) *Phonological Segment Inventory Database* is an online database on the phonological systems of world's languages compiled by Maddieson and Precoda (1990).
[2] Here, 'th' sounds cover non-sibilant dental and alveolar fricatives (Maddieson 2005: 83).
[3] Other uncommon classes of consonants are labial-velars, occurring in 45 (8%) languages surveyed, pharyngeal consonants, present in 23 (4.1%), and clicks, occurring only in 10 (1.8%) (Maddieson 2005: 82-83).

Figure 1 illustrates the geographic distribution of four different types of uncommon consonant sounds: clicks, labial-velars, pharyngeals and 'th' sounds. According to the data, dental fricatives are the least uniform in their distribution, whereas clicks (Southern and East Africa) or labial-velars (West and Central Africa, Papua New Guinea) cover very specific areas. Maddieson (2005: 83) claims that the "compact geographical distribution" of clicks and labial-velars, as opposed to 'th' sounds, stems from the evolution of these consonants within the sound systems, which was "influenced by hearing these sounds in other languages spoken in the same area". Furthermore, all of the above-mentioned consonants are also regarded as complex (i.e. difficult in acquisition, production and perception), hence their rarity among the world's languages. To account for this phenomenon, Lindblom and Maddieson (1988) propose the size principle:

> According to the "size principle" (...) smaller consonant inventories will tend to contain only those consonants which are in various ways inherently simpler (perhaps because they involve smaller movements to pronounce them, or are easier for a listener to distinguish from other sounds). Consonants which are inherently more complex will be found in larger inventories (Maddieson 2005: 11).

Evidence for the size principle are presented in Table 1, which demonstrates the percentage of languages that have at least one of the above-mentioned consonants (here called "special") in their inventory and classifies them according to their consonant inventory size. As the proportion of special consonants increases with each increase in the overall consonant inventory size, the predictions outlined by Lindblom and Maddieson are confirmed.

Table 1. Languages with special consonants by consonant inventory size (after Maddieson 2005: 83).

Consonant inventory size class	Percent with any of the special consonants
small	8.7%
moderately small	13.1%
average	22.1%
moderately large	27.4%
large	40.7%

2.4. Acoustic analysis of dental fricatives

Dental fricatives, in comparison to other sounds of the world's languages, are relatively understudied within the field of acoustic phonetics, as the acoustic measurements for /θ/ and /ð/ are difficult to take and the sounds themselves are "perceptually weak" and easily confused with labio-dental fricatives /f/ and /v/ (Smith 2007: 2). Indeed, such difficulties result predominantly from the spectral characteristics of dental fricatives. In order to clarify such confusions, it is vital to perform an acoustic analysis of these sounds and examine the most crucial factor that affects their recognition, which is voicing.

2.4.1. Spectrogram analysis
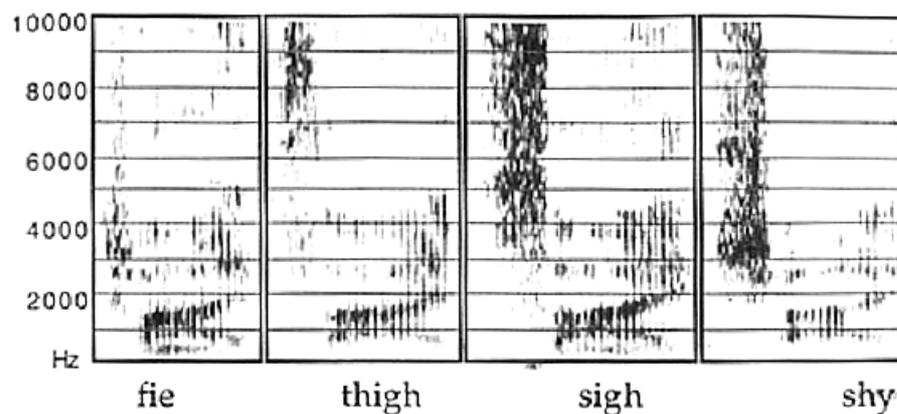
Figure 2. Spectrograms of voiceless fricatives /f, θ, s, ʃ/ (after Ladefoged 2001a: 55).

According to the spectrogram analysis presented in Figure 2, the noise of the voiceless dental fricative /θ/ in the word *thigh* spreads predominantly in the higher frequency range of over 8,000 Hz. In comparison, the noise intensity in the voiceless labio-dental fricative /f/ in the word *fie* focuses primarily in the range from 3,000 to 4,000 Hz. According to Ladefoged (2001a: 55), although both sounds are acoustically similar and not very loud, the main difference lies in the formant movement of their following vowels. The second formant in the word *thigh* remains at 1,250 Hz, while in the word *fie* it begins at a lower frequency of 1,200 Hz and moves upwards. Furthermore, the fourth formant is above 4,000 Hz in the word *thigh* and below that frequency in the word *fie* (Ladefoged 2001a: 55-56).

Similarly for voiced counterparts, "the second formants are much higher around /ð/ than around /v/" in pairs of words like *whether* and *ever* (Ladefoged 2001b, 183).

Thomas (2011: 101) compares different places of articulation and their effects on the first three formants which are observable in vowel transitions and summarises that for the dental place of articulation, F_1 is generally lowered, F_2 is raised next to a back rounded vowel or lowered next to a front one, while F_3 is slightly raised unless next to a high front vowel. Moreover, Thomas (2011: 104) also points out that dental fricatives can be distinguished from the labio-dentals by calculating "a locus equation for the analysed consonants", concluding that the former "show a higher y-intercept but a lower slope" than the latter sounds. Furthermore, after measuring the difference between the second formant at the vowel centre and at the vowel onset or offset, the results for the back and rounded vowels are "positive next to an interdental and close to zero next to a labio-dental" fricative.

2.4.2. Voicing analysis

Traditionally, it is assumed that the presence or absence of glottal pulses is sufficient enough in order to distinguish between voiced and voiceless fricatives such as /θ/ and /ð/. However, studies by Denes (1955) and Raphael (1971) show that vowel duration is another key factor that has a major influence on the fricative's voicing characteristics and the perception of dental fricatives. According to these findings, the duration of a word-final fricative and the preceding vowel can be "manipulated" by the speaker and, consequently, voicing can be achieved by producing a longer vowel and a shorter fricative or vice-versa to achieve voicelessness. Hence, the voicing feature of fricatives is not a categorical, but rather a continuous variable, where the presence or absence of phonation is not the only salient acoustic parameter.

A study by Smith (2007) attempts to assess the above-mentioned findings by performing an acoustic analysis of voicing in AmE dental fricatives. The database is a set of pre-recorded sociolinguistic interviews of AmE native speakers and the method used was an acoustic analysis of the duration of friction of dental and labio-dental fricative sounds measured in Praat[4]. Figures 3 and 4 present the amount of *voice bar* (not to confuse with a

---

[4] Praat is an acoustic analysis software developed by Boersma and Weenink ([1995] 2011).

simple phonological category [+voice]) found in the recorded tokens. By comparing both figures, it can be stated that the voicing of dental fricatives is highly unstable and much less clear than of labio-dentals, manifesting a strong tendency for variation, a feature which is unusual for phonemes with a phonological distinction based on voicing:

[T]here is much greater variation in both /θ/ and /ð/. The two box plots overlap to such a degree that predicting phoneme based on voicing in this case would not be much better than chance. The median values are different, with /θ/ at about 20% voiced, and /ð/ at about 45%. But the range of maximum and minimum values, excluding outliers, overlaps from 0% to about 65%. This is much greater than the variation for /f/ and /v/ (Smith 2007: 5-6).
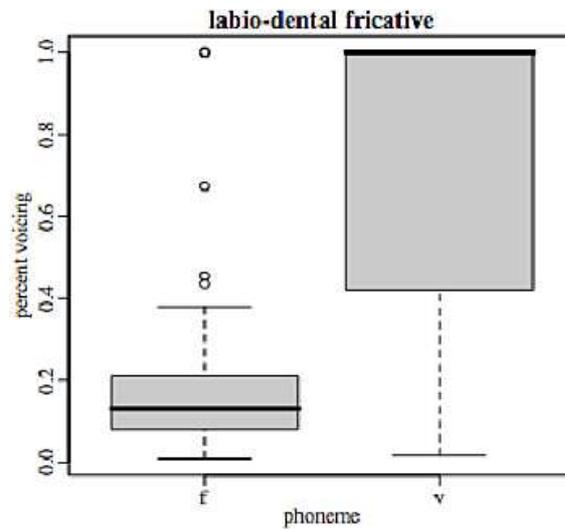
Figure 3. Percentage of voice bar found in /f/ and /v/ (after Smith 2007: 5).
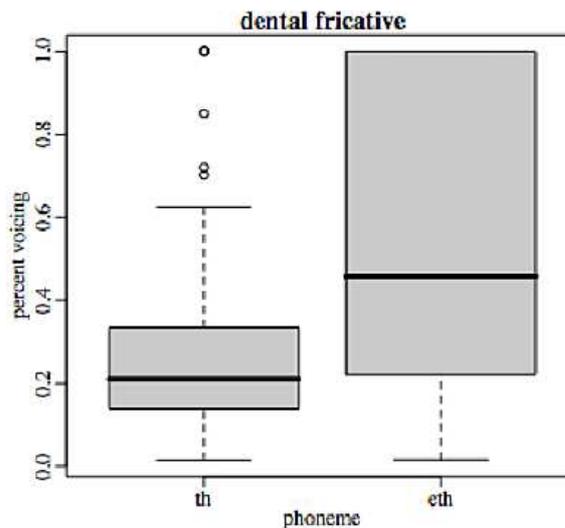
Figure 4. Percentage of voice bar found in /θ/ and /ð/ (after Smith 2007: 6).

The reason for such differences between two pairs of fricatives that bear such strong acoustic similarities lies predominantly within their phonetic environments. Figures 5a and b show a comparison of the previous two findings, divided each into two separate categories: 1) "whether there was a voiceless segment, including a pause, immediately adjacent to the dental fricative" and 2) "if the dental fricative was surrounded only by voiced sounds" (Smith 2007: 6). The results show that the amount of variation of voicing in dental fricatives is reduced, most significantly in the voiced /ð/ sound. On the other hand, a parallel investigation for the labio-dental sounds yields opposite results, as the amount of variation of voicing has considerably increased.
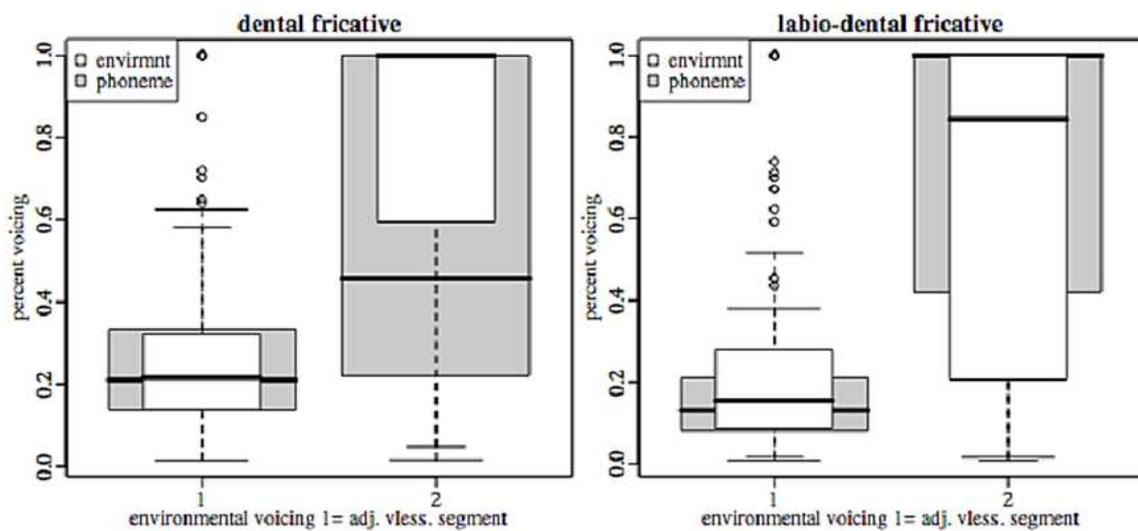
Figures 5a and b. Comparison of percent voicing for environmental conditions compared with phonemic distribution as in Figures 3 and 4 (after Smith 2007: 7).

Scrutinizing both data sets and administrating a partial correlation statistic allows to establish the amount of variation accounted for by phoneme or by environmental conditions, ""partialling out" the variation accounted for by the other factor" (Smith 2007: 7). According to the results presented in Table 2, dental fricatives are better categorized for voicing according to the environment, whereas labio-dental fricatives are better sorted for this feature according to phoneme. Interestingly, the results for dental and labio-dental fricatives are in almost exact opposition to each other, showing that, despite the acoustic similarities, both pair of sounds are very different in terms of voicing distinctions.

Table 2. Partial r² comparing percentage of variation accounted for by phoneme and environment (after Smith 2007: 7).

	r² (% accounted for) by **phoneme**, partialling out environment	r² (% accounted for) by **environment**, partialling out phoneme
dental fricative	.20	.59
labio-dental fricative	.52	.22

Study by Smith (2007) sheds light on the issue of the incomplete phonologization of AmE dental fricatives, as the voicing contrast is not depended on phonation, duration or intensity, but rather on the environments. Moreover, these environments are similar to the "environments which conditioned voicing of the Old English dental fricative". However, Smith (2007: 8) argues that these finding do not negate the phonemic distinction of dental fricatives en bloc, but rather raise the question of voicing as a key distinguishing feature.

2.4.3. The incomplete phonologization of dental fricatives

A subsequent study by Smith (2010a) continues to question the perceptual status of the voicing contrast between /θ/ and /ð/ and the completeness of its phonologization, arguing that AmE dental fricatives are not in contrastive, but rather in complementary distribution. The study comprises of two experiments with a common objective to determine whether /θ/ and /ð/ are perceptually contrastive, comparing the sounds with a corresponding pair of alveolar sibilants /s/ and /z/. The first experiment, "phoneme monitoring", measures the response times and the perceptual contrast between phonemes, while the second one, "identification and discrimination", assesses if listeners can reliably distinguish between stages of voicing in minimal pairs.
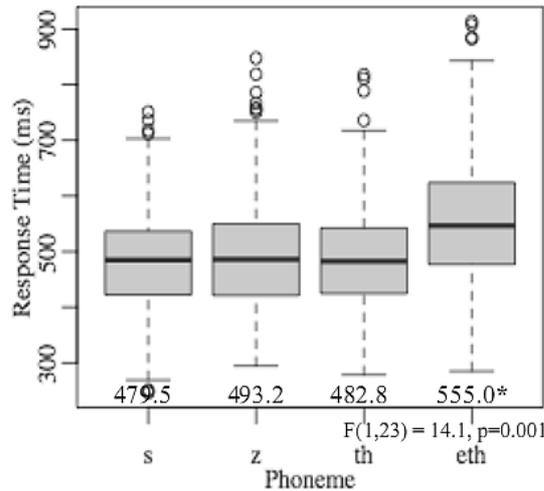
Figure 6. Phoneme monitoring experiment response times (after Smith 2010a: 22).

Table 3. Accuracy rates by target block in the phoneme monitoring experiment (after Smith 2010a: 22).

Target block	Hit rate %	Correct rejection %	Overall accuracy %	Correct rejection minus /f/, /v/ and /ʃ/ %	Overall accuracy minus /f/, /v/, and /ʃ/ %
θ	94.1	43.1	66.6	90.5	92.3
ð	79.5	63.6	76.8	92.8	86.2
s	95.5	81.6	88.4	94.6	95.1
z	97.9	97.6	97.7	97.6	97.7

The "phoneme monitoring" experiment was a perceptual study, where the participants listened to a set of recorded consonant sounds /s, z, θ, ð/ and correctly identify them as fast as possible. The results of the experiment presented both in Figure 6 and Table 3 show a perceptual ambiguity of dental fricatives, as the high error rates across listeners show "poor phoneme discriminability" (Smith 2010a: 22). Moreover, the response times recorded for /ð/ were the slowest of all the four phonemes, suggesting a weak mental representation for this sound and meaning that "the identification is biased toward /θ/ as conceptually primary representation of <th>".

31
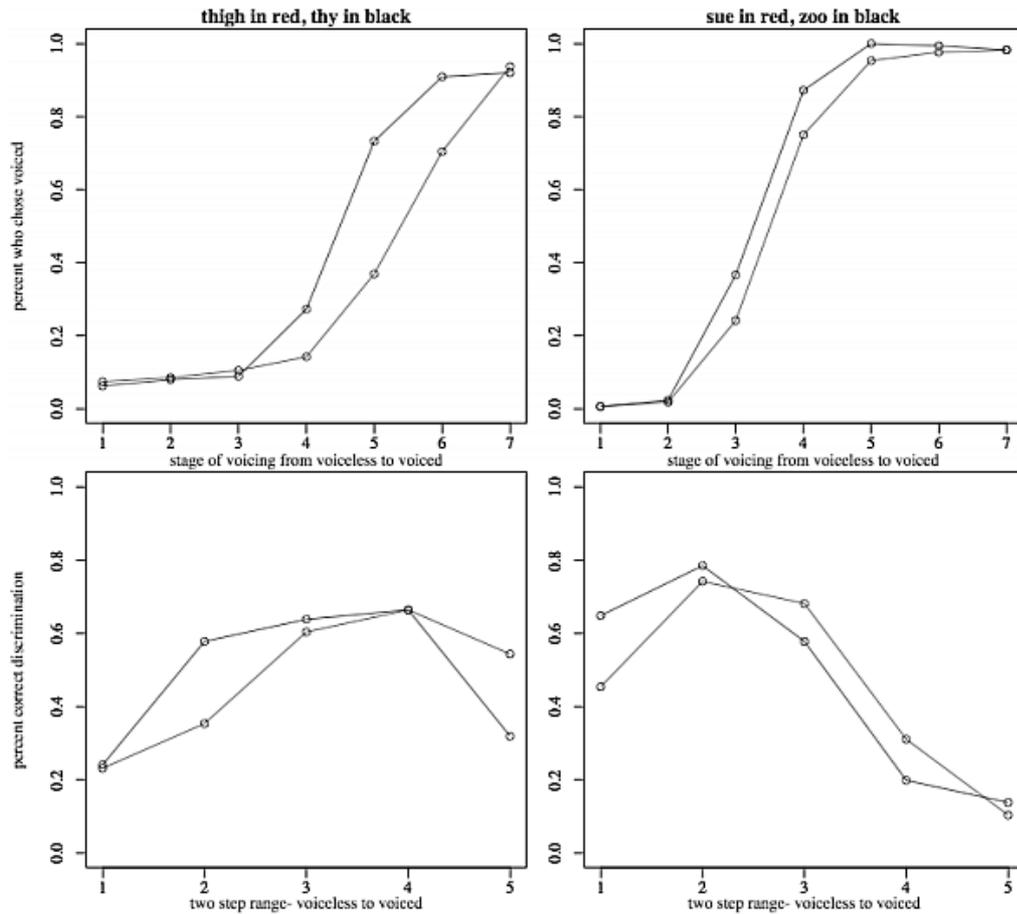
Figure 7. Identification and discrimination experiment (after Smith 2010a: 22).

The "identification and discrimination" experiment was a twofold perceptual study, where the participants had to listen to a "7-step voiceless to voiced continua", a synthesis of words *sue~zoo* and *thigh~thy*. The identification task was to classify each sound either to the *th block* or to the *s-z block* category, while the discrimination task was to decide whether a pair of sounds was "same" or different" (Smith 2010a: 22). The experiment yielded inconclusive results, as the discriminability for words oscillated around 50%. However, according to the findings presented in Figure 7, "[m]ore than 50% of tokens at 66.7% or less voiced were judged to be instances of /θ/", whereas less than 33.3% voice was required for the sound to be recognised as /s/ (Smith 2010a: 22).

To summarise, studies by Smith (2007, 2010a) reveal that the phonologization of AmE dental fricatives is incomplete. A possible explanation for the problematic nature of dental fricatives can be found in the notion of functional load, i.e. "[t]he use made of a linguistic contrast in a system" (Crystal 2008: 201). According to Barber et al. (2009: 45), the contrast between the voiceless and voiced dental fricative carries small functional load,

"there are a few pairs of words that are distinguished from one another solely by this difference, like *wreathe* and *wreath*, and *mouth* (verb) and *mouth* (noun)". Moreover, the distinction between /θ/ and /ð/ is virtually irrelevant in speech and a possible merger of these sounds would not cause much confusion. On the other hand, the author also argues that the generally stable situation of dental fricatives stems from the fact that they are "'well integrated' in the consonant system of English" and belong to a set of fricative pairs, thus they "fall into a familiar pattern" that resists such changes (Barber et al. 2009: 45). However, studies by Smith (2007, 2010a), as well as the numerous cases of loss of dental fricatives found across modern varieties of English that will be discussed in the following chapters reveal that the status of /θ/ and /ð/ sounds is not stable after all and their low functional load can be one of the possible explanations for the ongoing sound changes.

2.5. Production of dental fricatives

The production of English dental fricative sounds /θ/ and /ð/ as described by Cruttenden in *Gimson's Pronunciation of English* (2008):

> The soft palate being raised and the nasal resonator shut off, the tip and rims of the tongue make a light contact with the edge and inner surface of the incisors and a firmer contact with the upper side teeth, so that the air escaping between the forward surface of the tongue and the incisors causes friction (such friction often being very weak in the case of /ð/) (Cruttenden 2008: 195).

The friction for the /θ/ sound is voiceless[5], while for the /ð/ sound it is voiced. Roach (2000: 56) identifies dental fricatives as phonetically problematic entities and questions the classification of the /ð/ sound as a fricative, as the production of this sound includes very little friction noise, and instead, it would be more accurate to classify /ð/ as a weak dental plosive. However, despite the notion proposed by Roach, the classification of dental fricatives remains unchanged.

---

[5] Voiceless dental fricative is also the quietest sound and often functions as a point of reference in measuring the amplitude for other speech sounds in phonetic science (Edwards 2003: 120).

2.5.1. Dental fricatives in British and American English

Dental fricatives are known to be differently pronounced across BrE and AmE speakers. While most BrE speakers have the tip of the tongue "close behind the upper front teeth", AmE speakers commonly "have the tip of the tongue protruding between the upper and lower front teeth" (Ladefoged 2001b: 6). Despite such a variation, /θ/ and /ð/ are still generally acknowledged as dental sounds. However, if there is a need for a distinction, sounds that are produced with the tongue protruding between the teeth (AmE) are also known as interdental.

2.5.2. Dental fricatives in modern varieties of English

Cruttenden (2008: 196) argues that there are no important RP variants of /θ, ð/, mentioning only elision in clusters (e.g. /kləʊz/ 'clothes') and effects of running speech, where /θ, ð/ can be retracted to an alveolar or fronted to a labial articulation. Other common processes are stopping, where [θ] becomes a dental [t̪] or alveolar [t], while [ð] becomes [d̪] or [d][6] respectively (Thomas 2011: 95) and progressive assimilation, where /ð/ becomes similar in manner to the preceding plosive or nasal, but with dental place of articulation, e.g. /get ðəm/ > /get̪t̪əm/ 'get them', /riːd ðiːz/ > /riːd̪d̪iːz/ 'read these' and /ɪn ðə/ > /ɪn̪n̪ə/ 'in the' (Roach 2000: 140).

A large body of evidence gathered in *A Handbook of Varieties of English* (Schneider et al. 2004) and summarised by Blevins (2006: 11) shows that in a "vast majority of English varieties in the British Isles, North America, the Caribbean, the Pacific, Australasia, Africa, and Southeast Asia", /θ, ð/ are often realised as different sounds, such as alveolar stops /t, d/, labio-dental fricatives /f, v/ or affricates /tθ, dð/. The issue of the loss of dental fricatives in modern varieties of English is the focal point of this thesis and covered thoroughly in the fourth chapter.

---

[6] "This process is especially common when there's a linguistic substrate, such as Irish for Irish English or Spanish for Mexican American English" (Thomas 2011: 95).

2.6. Perception of dental fricatives

As discussed earlier in the section on acoustic characteristics of dental fricatives, /θ/ and /ð/ are "perceptually weak" sounds and are easily confused with labio-dentals /f/ and /v/ (Smith 2007: 2). Most studies have not succeeded in identifying consistent acoustic cues for correct identification of dental fricatives, concluding that "[n]either spectral, temporal, nor amplitude properties of the frication noise have shown to reliably distinguish /f/ from /θ/ and /v/ from /ð/" (Jongman et al. 2003: 1). Miller and Nicely (1955) were the first to assume that the distinction between dental and labio-dental fricatives is based on other, non-acoustic information:

> The distinctions between /f/ and /θ/ and between /v/ and /ð/ are among the most difficult for listeners to hear and it seems likely that in most natural situations the differentiation depends more on verbal context and on visual observation of the talker's lips than it does on the acoustic difference (Miller and Nicely 1955: 347).

A study by Jongman et al. (2003) is a continuation of that train of thought, as the authors focused on two types of non-acoustic information for the correct identification of non-sibilant fricatives, namely the semantic and facial information. Two individual experiments were carried out and both yielded significant results, showing that (1) linguistic context effects the perception of the distinction between /f/ and /θ/, and (2) visual information has a strong bearing on the perception of /θ/ and /ð/ sounds (Jongman et al. 2003: 1).

There is a large body of evidence (e.g. Miller and Isard 1963, Garnes and Bond 1976, Connine 1987) proving the importance of linguistic context on correct speech perception, i.e. listeners use contextual (semantic) information when the phonetic information is insufficient. The first part of the study by Jongman et al. (2003) focuses on the effects of linguistic context on the perception of the English fricatives /f, θ, s, ʃ/. The samples used in the study were recordings of 20 minimal-pairs: 10 with /f/ and /θ/ (e.g. *first~thirst*) and 10 with /s/ or /ʃ/ (*suit~shoot*). 20 participants listened to a series of recordings, each set consisting of two context sentences (one congruous, e.g. *the lemonade quenched my thirst*, and one incongruous, e.g. *the top swimmer came in thirst*), followed by the target word (e.g. *thirst*).

After measuring the response accuracy and latency, as presented in Figures 8 and 9 respectively, it was concluded that the linguistic context substantially effects both the correct identification of non-sibilant fricatives and the response times for both non-sibilant and

sibilant fricatives. The perception of /f/ and /θ/ sounds was both more accurate and faster when preceded by a semantically congruous precursor. Moreover, semantic information had also improved the identification of /s/ and /ʃ/ sounds (Jongman et al. 2003: 5).
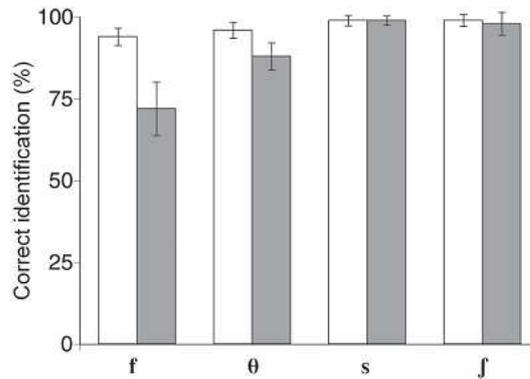
Figure 8. Mean correct identification rates and standard deviations of word-initial /f, θ, s, ʃ/ preceded by a semantically congruous (white bars) or incongruous (grey bars) precursor (after Jongman et al. 2003: 4).
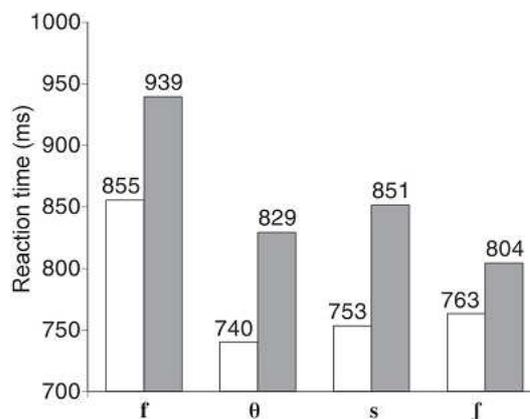
Figure 9. Response latencies for correctly identified word-initial fricatives /f, θ, s, ʃ/ preceded by a semantically congruous (white bars) or incongruous (grey bars) precursor (after Jongman et al. 2003: 4).

Although the contribution of visual information in accurate speech perception was confirmed in earlier works by Sumby and Pollack (1954) and Massaro (1987, 1998), it has not been verified whether such a non-acoustic cue has more or less bearing on specific sounds, such as the non-sibilant dental fricatives. The roots of studying visual information in speech perception can be found in a study by Walden et al. (1977), where facial information allowed the participants with a hearing loss to differentiate dental from labio-dental fricatives. The second experiment by Jongman et al. (2003) is an investigation of the function of visual information in the perception of /f, v, θ, ð/ sounds by normal-hearing participants. Stimuli comprised of 12 fricative-vowel syllables, the speaker was audio- and video-

recorded. The participants were exposed to audiovisual, video and audio materials, and their task was to correctly identify the consonants produced by the speaker in all three conditions.
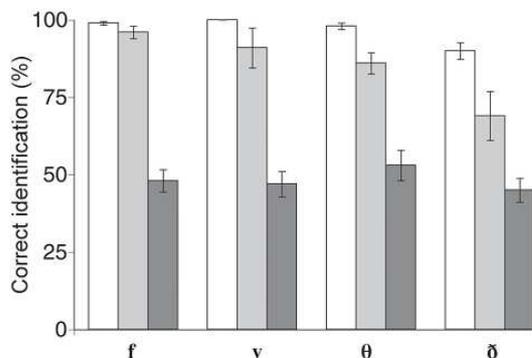
Figure 10. Mean correct identification rates and standard deviations of syllable-initial /f, v, θ, ð/ on the basis of audio and video information combined (white bars), audio information only (light shaded bars), and video information only (dark shaded bars) (after Jongman et al. 2003: 7).
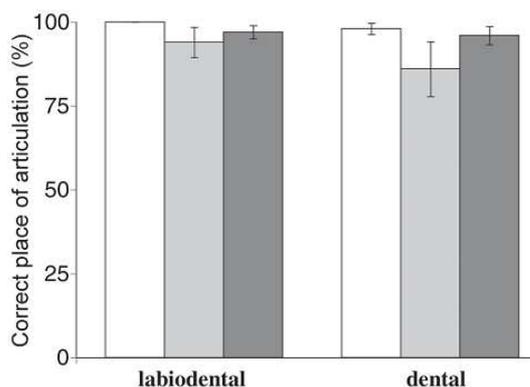
Figure 11. Mean correct identification rates and standard deviations for place of articulation of syllable-initial fricatives on the basis of audio and video information combined (white bars), audio information only (light shaded bars), and video information only (dark shaded bars) (after Jongman et al. 2003: 7).

According to the results presented in Figure 10, the correct identification of fricatives was the best under the audiovisual condition, slightly worse under the auditory one and the worst for the visual alone. However, the poor results in the last condition can be a result of a lack of cues for voicing. Figure 11 shows the correct identification of the place of articulation, without considering the voicing contrast, where the results indicate that the visual information is almost as meaningful as the combination of both audio and visual information.

To conclude, the results of the study by Jongman et al. (2003: 1) yield significant results, revealing that "accurate perception of non-sibilant fricatives derives from a combi-

nation of acoustic, linguistic, and visual information". It is possible to assume that such a complex process is one of the reasons why dental fricatives are so problematic, not only in perception, but also in acquisition, what in turn leads to substitution and sound change.

2.7. Acquisition of dental fricatives

According to Cruttenden (2008: 196-197), dental fricatives are generally acknowledged as problematic sounds in L1 and L2 acquisition. Indeed, this difficultness stems from both acoustic and articulatory features of these sounds. As discussed earlier in this chapter, dental fricatives are perceptually weak sounds and are easily confused with labio-dental fricatives. Apart from their perceptual ambiguity, /θ/ and /ð/ are inherently difficult sounds in production, both for native speakers and learners of English as a foreign language.

2.7.1. Dental fricatives in L1 acquisition

There is a considerable body of research papers covering the issue of the acquisition of English dental fricatives (e.g. Ingram et al. 1980, Polka et al. 2001) which prove that these sounds are one of the most difficult to acquire. Although each individual speaker acquires speech sounds in a unique way and without a uniform pattern, there is still a tendency of acquiring speech sounds in a certain order: in the case of consonants, "[stops] are acquired before fricatives" and "strident fricatives (/f, s/) before the corresponding mellow fricatives (/ð, θ/)" (Macken 1996: 676). According to Ingram et al. (1980: 188), /f/ is one of the first consonants acquired by children, while /θ/, being the most difficult, is acquired last. Moreover, in the early stage of phonological acquisition, fricatives are replaced by stops for each corresponding place of articulation. Eventually, /θ/ is acquired by children at the age of seven, while the voiced counterpart /ð/ at the age of eight (Edwards 2003:120-125).

The fundamental question that needs to be raised in this discussion is whether the difficultness of acquiring dental fricatives is caused by the means of perception or production. According to Babel and McGuire (2010) it is doubtful that dental fricatives are problematic due to articulatory constraints:

Articulatory difficulty is an unlikely reason; coronals are generally considered easier articulatorily due to the high degree of flexibility and precision inherent in the tongue tip and there seems to be no reason why tongue to teeth contact is any more difficult than lower lip to teeth (Babel and McGuire 2010: 3-4).

Therefore, it is more probable that the answer lies in the perceptual ambiguity of these sounds. The results that can be found in Polka et al. (2001) indicate that English-speaking infants have more problems with distinguishing /d/ from /ð/ than /b/ from /v/ (the latter distinction is observable for infants by the age of 12 months). Hence, the production of the dental fricative is variable and overlaps with the production of an alveolar (dental) stop.

2.7.2. Dental fricatives in L2 acquisition

There is a strong body of evidence proving that most non-native speakers of English substitute both /θ/ and /ð/ sounds with acoustically or articulatorily similar sounds from their L1 phonetic inventory, e.g. German and Japanese speakers substitute /θ/ with [s], whereas Russian and Turkish speakers substitute it with [t] (Yildiz 2005), Dutch speakers substitute /θ/ and /ð/ with [t], [f], [s] and [d], [v], [z] respectively (Wester et al. 2007), Polish speakers substitute /θ/ with [t] or [f] and /ð/ with [d] or [v] (Gonet and Pietron 2005).

Although there is a great deal of variability among non-native English speakers, the choices made by them can be explained both phonetically and phonologically. The results presented in the section on acoustic analysis of dental fricatives revealed that /f/ and /v/ bear a strong acoustic similarity to /θ/ and /ð/. Hence the choices made by non-native speakers of English can be explained in terms of speech perception. On the other hand, the alveolar fricatives /s/ and /z/ resemble the dental fricatives phonologically, as only the feature [strident] distinguishes these phonemes.

According to Jenkins (2009: 137), the frequent substitution of /θ/ and /ð/ with other pairs of fricatives results from the fact that these sounds are relatively unimportant for intelligibility. Moreover, there is a common belief among teachers of English as a Second Language that teaching dental fricatives to students is not worthwhile due to the difficulty of mastering these sounds and it is recommended to encourage the learners to replace /θ/ and /ð/ with /f/ and /v/ respectively. However, since the number of L2 speakers of English is overwhelming and is still growing, it would be reasonable to revise this conviction.

2.8. Summary

The issue of universal properties of dental fricatives has been addressed. The main objective of this chapter was to outline the key features of dental fricatives, discuss their worldwide distribution, analyse their acoustic characteristics and investigate the problems with production, perception and acquisition of these sounds. After scrutinising various research on these topics, it is possible to answer the three questions that have been raised in the introductory paragraph: (1) What is the current status of dental fricatives? (2) Is the phonologization of dental fricatives complete? (3) What are the unique features of these sounds?

Studies show that /θ/ and /ð/ are highly marked sounds, i.e. are rare in the world's languages, occurring in 43 (7.6%) out of 566 *UPSID* languages. However, despite the fact that dental fricatives belong to a group of uncommon consonants, their geographic distribution is virtually worldwide, unlike other uncommon sounds, such as clicks or labial-velars. Moreover, the status of dental fricatives is very unstable, as the sounds are subject to variation across many varieties of English and are commonly substituted by alveolar stops /t, d/ and labio-dental fricatives /f, v/, both by native and second language speakers. The loss of dental fricatives in modern varieties of English is thoroughly investigated in the fourth chapter of this thesis.

The unstable status of dental fricatives is also reflected in the incomplete phonologization of AmE /θ/ and /ð/. Studies by Smith (2007, 2010a) reveal that AmE interdental fricatives are not in contrastive, but rather in complementary distribution. Historically, a similar distribution was in OE, where the only dental fricative phoneme was the voiceless /θ/, while /ð/ was a voiced allophone occurring between voiced sounds. The issue of the phonologization of dental fricatives is continued in the third chapter of this thesis.

The uniqueness of dental fricatives is determined by various phonetic and phonological factors. First of all, /θ/ and /ð/ have very unusual phonetic features: they are regarded as "perceptually weak" sounds, i.e. having no consistent acoustic cues that would allow for correct identification. Moreover, study by Jongman et al. (2003: 1) shows that "accurate perception of non-sibilant fricatives derives from a combination of acoustic, linguistic, and visual information". Indeed, such a complex mixture can be the cause of the perceptual ambiguity of these sounds. Finally, dental fricatives are very problematic both in L1 and L2 acquisition. This difficultness is caused by acoustic and articulatory features, hence /θ/ and /ð/ are often replaced by /t/ and /d/ or /f/ and /v/ respectively.

To conclude, dental fricatives are sounds worth studying from a number of reasons: they are rare across world's languages, have an unstable phonological status, are perceptually ambiguous and cause problems both for first and second language speakers alike. In order to fully understand the problematic nature of these sounds, a twofold study is required. The following third chapter of this thesis will be devoted to the historical analysis of /θ/ and /ð/ sounds in English and other Gmc languages. The results will hopefully shed light on the contemporary status of dental fricatives. The fourth chapter will be an investigation of the loss of dental fricatives in selected modern varieties of English. The main goal of this study is to find possible parallels between the historical phonological changes and the contemporary variables that occur in the English language on a worldwide scale.

Chapter 3: Dental fricatives in English and other Germanic languages

3.1. Introduction

The main objective of this chapter is to analyse the presence of dental fricatives throughout the history of the English language, as well as other Gmc languages, by taking the diachronic approach to studying sound change. The focal points are (1) the phonological processes that occurred in OE, ME and EMnE, (2) the number of variables for /θ/ and /ð/ across OE and ME dialects and (3) the phonologization of English dental fricatives. The chapter begins from an outline of the origins of /θ/ and /ð/ in Gmc, followed by a thorough study of the English language and ending on the presence or absence of these sounds in other Gmc languages. The key questions that are asked in this chapter are: Can the unstable nature of English dental fricatives be explained through a historical analysis of these sounds? Can the incomplete phonologization of English dental fricatives be historically justified? Can the loss of dental fricatives in modern varieties of English be compared to the variables present in OE and ME dialects?

3.2. The origins of dental fricatives

3.2.1. Grimm's Law

The appearance of dental fricatives in Gmc languages was explicated first in 1822 by a German philologist, Jacob Grimm[7], whose work describes one of the most fundamental phonological changes in the history of language evolution (Lehmann 1973: 84). Grimm's Law[8] illustrates a sound change[9] that took place in the development of PGmc from PIE and had a major impact on the Gmc system of obstruents (Ringe 2006: 93). The First Germanic Consonant Shift comprises of three shifts: (1) weakening of voiceless stops to voiceless fricatives (PIE */p, t, k/ > PGmc */f, θ, x/, unless preceded by another obstruent, e.g. */s/), (2) strengthening of voiced stops to voiceless stops (PIE */b, d, g/ > PGmc */p, t, k/) and (3) weakening of voiced aspirates to voiced fricatives (PIE */bh, dh, gh/ > PGmc */β, ð, γ/) (Lass and Anderson 1975: 168). All of the three changes that form Grimm's Law are articulatory shifts, as the feature which undergoes the change is the manner of articulation, while the number of contrasts remains the same (Lass 1994: 20).

3.2.2. Verner's Law

A significant linguistic change that defines Gmc languages is the Accent Shift, ultimately leading to the development of the Germanic Stress Rule (Lass 1994: 21). While the accent of PIE was "free", falling on any syllable of a word, the word-accent in Gmc "always fell on the first syllable of the lexical root" without regard to prefixes, syllable structure, word-length or part of speech (Lass 1994: 21-22). Moreover, the Accent Shift occurred after PIE */p, t, k/ > PGmc */f, θ, x/, as it is connected to a set of irregular developments, "exceptions to Grimm's Law" that were described first by Karl Verner in 1875.

---

[7] Actually, Rasmus Rask was the first to propose a link between Germanic and other Indo-European languages in his work published in 1818, four years before Grimm's *Deutsche Grammatik* (Lehmann 1973: 80).
[8] Grimm's Law together with Verner's Law is also referred to by scholars as the 'Germanic Consonant Shift' or the 'First Consonant Shift' (Hoad 2006: 19).
[9] According to Ringe (2006: 93-94), "it remains unclear whether Grimm's Law was (...) a unitary natural sound change or series of changes that need not have occurred together".

According to Verner's Law, once PGmc voiceless fricatives developed from PIE voiceless stops, they became voiced in voiced surroundings (intervocalically) unless they were word-initial or preceded by an accented syllable nucleus (Ringe 2006: 102). Therefore, the voiceless dental fricative phoneme */θ/ became voiced */ð/ in such words as PGmc *sniðan-, *faðēr or *wurðan- (OE sniden, fæder and worden). This change is most noticeable in "pa.part. of all strong verbs and the non-singular (and 2sg.ind.) preterite forms of strong verbs of classes I-III" (Hogg 1992: 70). In later stages, the voiced fricatives that were a product of Verner's Law hardened to voiced stops (e.g. PGmc *mōðor > OE mōdor 'mother') (Lass 1994: 22).

Bloomfield (1965: 357) states that the sound change described by Verner is very common and took place in the history of several languages of the Gmc family. Moreover, he argues that Verner's Law can be interpreted as a "weakening of unvoiced spirants (...) between musical sounds" and points out the importance of acoustic constraints for such a sound change:

> [A]fter a loudly stressed vowel there is a great amount of breath stored up behind the vocal chords, so that their opening for an unvoiced spirant is easier than their closure for a voiced (Bloomfield 1965: 375).

However, the author also states that such an explanation cannot be acknowledged as a universal principle, as in some languages unvoiced spirants remain voiceless between vowels, while in other languages they become voiced despite that the preceding vowel bears a high stress. Nevertheless, the change of the place of the stress had a major influence on the conditioning factors, as the alteration of */θ/ and */ð/ in PGmc (e.g. *['werθonon] 'to become' and *[wurðu'me] 'we became') became "an arbitrary irregularity" after the development of the Accent Shift, similarly to PDE was and were, PGmc *['wase] and *[weːzu'me] (Bloomfield 1965: 375-376).

Lass and Anderson (1975: 150) introduce the term "preference", which is "a specification of the environments favouring and disfavouring certain [sound changes]". This connection between weakening and certain environments is of key importance when discussing Verner's Law. According to their study, "[i]ntervocalic position is a preferred lenition environment". Moreover, only nongeminates undergo weakening in such an environment, which also favours sonorization, while geminates resist lenition, or, otherwise, degeminate (Lass and Anderson 1975: 162).

3.3. Dental fricatives in English

This section is devoted to the presence of dental fricatives throughout the history of the English language. The main objectives are (1) to outline the critical periods in which the dental fricatives were exposed to various phonological changes, (2) summarise the variables in selected English historical dialects and (3) discuss the notion of the phonologization of dental fricatives in the English language. The periods that will be taken into consideration are OE (ca 425-1125), ME (ca 1150-1450) and EMnE (after ca 1450).

3.3.1. Dental fricatives in Old English

3.3.1.1. Old English graphemes

The general OE orthographic representation of a dental fricative, both the voiceless phoneme /θ/ and the voiced allophone [ð], was <þ> (capital form <Þ>) named *thorn* and <ð> (capital form <Ð>) named *edh*[10]. Since the dental fricative was absent from the Latin consonantal inventory and the Roman alphabet had no letter to represent that sound, new symbols had to be adopted and introduced (Irvine 2006: 43). The grapheme <þ> was a borrowing from the Anglo-Saxon runic alphabet *futhorc*, while <ð> was a native innovation[11] (Hogg 1992: 10). Moreover, both <þ> and <ð> symbols were used interchangeably and indiscriminately for the voiceless phoneme and the voiced allophone[12] (Barber et al. 2009: 117).

These symbols, however, were not present in the OE records until the end of the 7th c. (Marsden 2004: xxix). According to Hogg (1992: 33), the dental fricative was initially represented by a digraph <th> or by a letter <d>[13], as the evidence can be found in Bede's

---

[10] The name "thorn" for the letter <þ> was borrowed together with the symbol from the runic alphabet, whereas the name "edh" (or "eth") for the letter <ð> was coined in the 19th c. (Hogg 1992: 10).

[11] According to Marsden (2004: xxix), the graphemes <ð> and <Ð> were formed "by adding a cross-stroke to a <d> written in the Irish way, with a round back".

[12] According to Barber et al. (2009: 117), such a lack of regularity and consistency is understandable, since "native speakers of a language do not usually notice differences between allophones of a single phoneme".

[13] Dental fricative was also, however very rarely, represented by <t>, e.g. in the *Epinal Glossary* (c. 725) and the *Corpus Glossary* (8th c.), e.g. *earbetlicust* 'most troublesome' (Hogg 1992: 33).

Historia Ecclesiastica Gentis Anglorum (8th c.), in early Mercian manuscripts, such as the *Epinal Glossary* (8th c.) and later in *Liber Vitae Dunelmensis* (8th-9th c.). Moreover, the early usage of <th> and <d> corresponds to the later distribution of <þ> and <ð>, where the former grapheme occurred primarily in the initial position of words, whereas the latter predominated in medial and final positions. Lass (1994: 78) also notes <d> spellings for /θ/, appearing in an early version of *Cædmon's Hymn*, arguing that such a change stems from an orthographic unsettling or, what is equally possible, from Continental influence, as /θ/ developed into /d/ in Old High German and Old Low Franconian due to the High German Consonant Shift.

3.3.1.2. West Germanic developments

An important phonological change that has a strong bearing on the distribution of OE [ð] is the WGmc hardening of fricatives, causing "the restoration of a voiced stop system, which was lacking in PGmc and WGmc" (Lass 1994: 76). Due to this sound change, OE [ð] developed into [d] "initially (*dæg*), medially (*medy*), finally (*hrēod*), in gemination (*hreddan*) (...) and after nasals (*findan*)" (1994: 77). According to Hogg (1992: 74), the consequences of this sound change are particularly evident across OE strong verbs with /θ/-/ð/ morphophonemic alteration due to Verner's Law, e.g. OE *weorþan* 'become', pa.pl. *wurdon*, pa.part *worden*". Lass (1994: 73) discusses the case of OE dental fricatives and gives evidence for "two separate fricative voicings at different dates", stating that the [ð] in OE *weorþe* stems from the late voicing of *[θ] > [ð], whereas [d] in OE *wurdon* developed from an early voicing of [θ] > [ð] due to Verner's Law, followed by WGmc hardening of [ð] > [d][14]. The second voicing took place only after an accented syllable (the opposite of Verner's Law) and "must have been historically later than all the processes producing voiced fricatives originally", preventing *weorþan* from having a medial voiced stop (Lass 1994: 74).

---

[14] There is also evidence for "voicing of WGmc */θ/ between */l/ and a following vowel" that took place before the WGmc fricative hardening, e.g. "*fealdan* 'fold', *wilde* 'wild', *wuldor* 'glory'". Voicing is prevented when either the following compound contains /h/, e.g. *Balth-*, or the /lθ/ cluster results from syncopation, e.g. *hǣlþ* 'health' (Hogg 1992: 75).

3.3.1.3. Old English phonological processes

During the early stage of proto-OE, dental fricatives that occurred in a /θs/ cluster were subject to assimilation (i.e. "the influence exercised by one sound segment upon the articulation of another, so that the sounds become more alike, or identical" (Crystal 2008: 39)), hence /θs/ > /ss/, e.g. *bliþs > bliss 'bliss' (Hogg 1992: 252-253). Moreover, this change also affected the dental fricative after syncope (i.e. "the deletion of a vowel within a word" (Crystal 2008: 469)), e.g. *cwiðst > cwist 'thou sayest'. According to Hogg (1992: 254), the change occurred "between the period of breaking and that of syncope, perhaps at much the same time as *i*-umlaut", i.e. ca 450-500.

  Another change that affected OE dental fricatives is dissimilation (i.e. "the influence exercised by one sound segment upon the articulation of another, so that the sounds become less alike, or different" (Crystal 2008: 151)), thus /θl, θm/ > /tl, tm/ when preceded by a short vowel, e.g. *boðl > botl 'dwelling', or /θl, θm/ > /dl, dm/ when preceded by a long vowel, e.g. *āðl > ādl 'disease'. The latter change indicates possible early voicing of the dental fricative, hence the actual sound change would be /ðl, ðm/ > /dl, dm/[15] (Hogg 1992: 255). However, there are also cases across OE dialects where occlusion did not occur, e.g. in Anglian (āðle 'disease') or West Saxon (ǣðm 'breath') (1992: 255-256). On the other hand, a special development took place in West Mercian, by which /θl/[16] had metathesized (i.e. the order of sounds altered (Crystal 2008: 303)) to /lθ/ and was immediately occluded to /ld/, e.g. *seld* 'seat', while such forms as *āðle* 'disease' remained unchanged.

  In the late OE period, two phonological changes affected the distribution of /θ/ and [ð]. Firstly, the voiced dental fricative [ð] (< [θ] due to intervocalic voicing) in /θl, θm/ clusters developed to a stop before liquids or nasals, e.g. *ēaðmod > ēadmod* 'humble' (Hogg 1992: 256-257). Secondly, in Northumbrian, "final /θ/ in 3sg.,pl.pr.ind. is often spelled as <s>, indicating a shift to /s/" (1992: 306). This change resulted in a "total confusion of spelling", as various endings, such as *-eð*, *-að*, *-es* and *-as*, appear interchangeably. According to Hogg (1992: 306), "[t]he morphological restriction on these forms indicates that the shift could take place only under favourable morphological conditions".

---

[15] The author also gives another possible answer for this change: "Alternatively one might suggest that the fricative remained unvoiced but not occluded until after the time of voicing between voiced segments. Then occlusion would have to have occurred after such voicing. But this poses equal chronological difficulties" (Hogg 1992: 256).

[16] In early NGmc and WGmc */θl/ > /fl/, e.g. *flēon* 'flee' (Hogg 1992: 75).

3.3.2. Dental fricatives in Middle English

3.3.2.1. Middle English graphemes

During the ME period, the OE runic *thorn* <þ>, although it remained in many written records of that time, was being successfully replaced by the <th> digraph. This was a result of a need to standardise the English writing system by returning to the Latin bases, a trend which started in the 12th c. by OE scribes (Bourcier 1981: 128). The OE symbol *edh* <ð> ceased to be used relatively early in ME (Horobin and Smith 2002: 62). Bourcier (1981) also notes the sporadic use of <d> and <t> for <th> due to Continental influences, predominantly French:

> The twelfth-century return to Latin bases meant both insular characters were increasingly rejected in favour of alternative graphemes, usually *th* (but occasionally in early texts an ambiguous *d* or *t*, because in twelfth-century French these sometimes denoted dental spirants) (Bourcier 1981: 128).

A different statement on this issue is put forward by Barber et al. (2009: 162), who argue that although the <th> digraph gradually replaced the OE graphemes, <ð> appeared in ME manuscripts up to ca 1300, while <þ> remained even until ca 1400. Moreover, "a debased form" of <þ> can still be found as <Y> in pseudo-archaisms, e.g. *Ye Olde Tea Shoppe*, "in which *Ye* is simply a late medieval way of writing *þe*"[17]. Nevertheless, the <th> digraph was gradually replacing the corresponding OE graphemes and by the end of the ME period (ca 1450) both *thorn* <þ> and *edh* <ð> became obsolete.

3.3.2.2. Middle English phonological processes

According to Lass (1992: 64), although the obstruent system throughout the ME period remained relatively unchanged until the 16th and 17th c., "there are individual phonetic changes that redistribute phonemes, and produce the familiar shapes of words that had

---

[17] According to Horobin and Smith (2002: 62), <þ> was often realised in writing as <<y>> (predominantly in Northern ME), making it indistinguishable from <y>. It was also maintained in early printing in a function words (e.g. <<ye>> for *the*).

looked quite different in Old and Early Middle English". Most significantly, the dental fricative phonemes, /θ/ and /ð/, were the most susceptible sounds to these changes. The first phonetic change in question is pre-sonorant strengthening:

> As early as the twelfth century there is evidence of strengthening of [ð] to [d] before /r l n/ as in *spider* < *spīðra*, *fiddle* < *fiðd-* (inflected stem of *fiðele*), *burden* < *byrðn-* (inflected stem of *byrðen*). Strengthening before /l n/ can be considered an assimilation (since /n/ is a (nasal) stop and /l/ has some complete closure) (Lass 1992: 64).

The second significant development is post-fricative strengthening:

> This is a dissimilation: /θ/ > [t] after other fricatives, probably beginning in Late Old English. Familiar examples are *thefte* < *þēofþu*, *nostril* < *nosþyrl*, *height{e}* < *hēhþu*, *drought* <*drūhþu* (...). However early this change may have been, /t/ in many of these words did not become standard until much later (Milton still writes *heighth*), and some modern dialects still have /θ/ at least in *height* and *drought* (Lass 1992: 64).

The third phonetic change is fricative weakening before /Vr/:

> Many words with OE intervocalic /d/ now have /ð/: e.g. *father*, *mother*, *gather*, *hither*, *whither*, *whether* (OE *fader*, *mōdor*, *gaderian*, etc.). Throughout Middle English the <d> spellings predominate, and the change is only attested on a large scale ca 1500 (...); but it must have begun quite early, since geminate /dː/ does not undergo it (*bladder*, *adder*, *fodder* < *blǣddre*, *nǣddre*, *fōddre*); the only explanation for the consistent failure of the process here is that /d/ > [ð] must have occurred while the /d/ : /dː/ contrast was still stable (Lass 1992: 64).

Another development, according to Millward (1988: 126), is the voicing of the dental fricative in lightly stressed function words, e.g. *the*, *then*, *that* and *they*, and explains the change as being driven by ease of articulation, as "voiced consonants require less energy to produce than do unvoiced consonants".

To sum up, ME dental fricatives were undergoing similar phonological changes to those found in OE. The first change, pre-sonorant strengthening, gives similar results to WGmc strengthening, although the OE change was a widespread process, while the ME development was restricted to certain phonological environments. The second change, post-fricative strengthening, is a dissimilation that corresponds to the same process that occurred across OE clusters, i.e. /θl, θm/ > /tl, tm/. On the other hand, the third change, fricative weakening before /Vr/, can be viewed as a return to the original distribution of the voiced dental fricative, before the WGmc development took place.

3.3.2.3. Middle English variation

In ME written records, dental fricatives, both /θ/ and [ð], were represented primarily by <th>, as opposed to the OE *thorn* <þ> and *edh* <ð>. However, there is also a great body of evidence indicating that a significant set of OE words was affected by an ongoing variation that eventually lead to a loss of <th> in their ME counterparts. Kristensson (1987, 1995, 2002) is a thorough survey of ME dialects, an analysis which is based on the spellings of place- and personal names in the Lay Subsidy Rolls[18]. The study encompasses a time frame of 60 years, between 1290 and 1350, and is divided into three different regions: the West Midland, the East Midland and the Southern countries.

The data collected by Kristensson from all the three regions show that the general spelling for /θ/ and [ð] is <th>, while the OE <þ> symbol was rarely found in West Midland records (1987: 192). However, there is a great deal of place- and personal names found in the tax rolls that give evidence for a number of different variables. In the initial position, OE /θ/ appears as /t/ in all the regions due to AN influence, e.g. Nottinghamshire: *Torlaton* (ON *þórleifr*) (1987: 192), Bedfordshire: *Tyngr'* (OE *þing*) (1995: 150) and Somerset: *atte Tete* (OE *þēote*) (2002: 263). A second variable is the change of OE /θ/ into /d/ before /l/, mainly in compounds, e.g. Hampshire: *Edlygh* (OE *hǣð*) (2002: 264) and the change of OE /θ/ and [ð] into /d/, usually in forms prompted by a following /r/, /l/ or /n/, e.g. Oxfordshire: *Codesdone* (OE *Cūðen*) (1987: 193) and Norfolk: *Godriston* (OE *Gūðhere*) (1995: 150). Moreover, there is an occasional change of /rð/ into /rd/, e.g. Shropshire: *Rugwardyn* (OE *worðign*) (1987: 193) and Bedfordshire: *Colmorde* (OE *worð*) (1995: 150). In West and East Midland countries, there was also a loss of medial [ð], possibly caused by AN influence, e.g. Leicestershire *Blaston* (OE *Blēað*) (1987: 192-193) and Northamptonshire: *Blyseworth* (OE *Blīðe*) (1995: 150).

An equally important investigation in this subject is a study by Bernhard Diensberg (1995) concerning the ME spellings <-ed, -et> and <-id, -it> for the expected <-eþ, -eth>. The surviving ME manuscripts of *Ancrene Riwle* (ca 13th-14th c.) give evidence for frequent substitutions of <d, t> for <þ, th> across "the inflectional morphemes of the present indicative of strong and weak verbs" (1995: 81). Diensberg argues that there is a relationship be-

---

[18] The Lay Subsidy Rolls are records of taxation written in England between the 12th and 17th c.. Although early tax rolls were written primarily in Latin, they also contain place- and personal names of great value for studying ME dialects (Blake 2006: 3-4).

tween the irregular spellings found in ME writings and "Early medieval French (including Anglo-French) [which] has <-t> for a voiceless dental fricative"[19] (1995: 83). Furthermore, <dh, th> digraphs were also frequently used in Old French, similarly to early ME <þ> and <ð>. According to the author, although the French language eventually lost its dental fricative, the <d> and <t> spellings for [θ] found in 12th c. Old French manuscripts can explain the same spellings and variants in ME (1995: 84).

Although both studies by Kristensson (1987, 1995, 2002) and Diensberg (1995) are thorough investigations of ME written records and reveal crucial information about ME scribal practice, it is difficult to ascertain whether these changes in spellings give evidence for phonetic changes, phonetic variants or should be simply regarded as spelling errors. Diensberg (1995: 84) notes possible misspellings, e.g. in the Corpus manuscript (ca 1230, West Midland), where <d> bears a strong similarity to <ð>, as well as in the Cleopatra manuscript (ca 1230, West Midland), where he finds scribal errors like *limped* (*limpeð* 'belongs') and *wulled* (*wulleð* 'will'). Parallel cases can also be found across the Nero (ca 1250, Southwest Midland) and Vernon (ca 1380, West Midland) manuscripts.

However, Diensberg (1995: 85-86) also argues that there is a great deal of examples, particularly in the Cleopatra manuscript, that "cannot just be regarded as slips of the pen". Firstly, <t> in <-et> and <-it> forms is unmistakably distinguished in the manuscript, unlike similar to each other <d> and <ð>, and can be found in such variants as *leoset* (*leoseð* 'loses'), *haldet* (*haldeð* pl. imp. 'hold') or *blescit* (*blesceð* pl. imp. 'bless'). Moreover, due to the high frequency of <d> and <ð>, and when "in the light of inverted spellings", it is also possible to identify other variants, e.g. *biginned* (alongside *biginneð* 'begins'), *seid* (besides *seið* 3rd sg. pres. 'says') and *beod* (alongside *beoð* pl. pres. 'are') (1995: 86-87). Diensberg's hypothesis (1995: 90) is that <þ> and <th> (representing a voiced dental spirant) developed to <d> (a voiced dental stop) due to an "irregular and sporadic change", occurring predominantly in "weakly-stressed positions, but not exclusively". Secondly, <-d> > <-t> due to devoicing, primarily across West Midland dialects. Therefore, it is possible to suppose that the transitions from <þ> to <t> and from <ð> to <d> that originated in OE were continually developing throughout the ME period.

---

[19] E.g. the word 'faith' in the *Anglo-Norman Dictionary* has such spelling variants as "*fei, feid, feit, fai(t), feai, fie*; *foi(e), foai*" (Stone et al. 1983: 297 b, as cited in Diensberg 1995: 83).

3.3.3. The phonologization of dental fricatives in English

In OE, /θ/ was the only dental fricative phoneme, while [ð] was an allophone that occurred between voiced sounds (Lass 1994: 71-72). In early written records, both dental fricatives were represented interchangeably by *thorn* <þ> and *edh* <ð> (Smith 2008: 5). At that time, voicing assimilation, as in the case of dental fricatives, was also present for OE labio-dental and alveolar sounds, although orthographically they were represented only by <f> and <s> respectively (Mitchell and Robinson 2001:15). The phonologization[20] of labio-dental and alveolar sounds took place during the Norman Conquest and was caused by two factors: (1) a huge influx of loanwords containing voiced and voiceless counterparts in contrastive positions, and (2) cross-dialect borrowing that showed differences in the distribution of these sounds (Smith 2008: 5-6).

Although the phonologization of labio-dental and alveolar fricatives can be explained due to language contact and differences across dialects, it becomes more difficult when establishing the same phenomenon for dental fricatives. The problem stems from the fact that the French language lacks the voiced dental fricative appearing word-initially (Smith 2008: 6). Moreover, in ME, both /θ/ and [ð] were represented by only one grapheme: <th>. Interestingly, <th> was not a new orthographic symbol, but rather a re-introduced grapheme that reappeared in English after the Norman Conquest. According to Hogg (1992b: 76-77), the <th> digraph appeared first by the end of the 8th c. in early OE manuscripts, as it was borrowed from the Irish and spread by monks who taught Latin. Furthermore, <th> also appeared in the 9th c. Old Saxon, where the grapheme represented only the voiceless dental fricative.

The abandonment of the *thorn* an *edh* symbols and the re-introduction of the <th> grapheme complicates the explanation of the phonologization process of dental fricatives in the history of English. The first explanation was provided by William Bullokar, a 16th c. orthographer, who pointed out that <th> represents two different sounds, albeit he failed in explaining their pronunciation[21] (Smith 2008: 6). However, such a vague description is not sufficient enough for establishing the time-frame for the change in the relationship between dental fricative sounds. In contemporary historical linguistics, Lass (1992: 59) puts forward

---

[20] "A term used in historical phonology for a process whereby sounds which were formerly allophones develop a contrastive status (...) through the loss of their conditioning environments" (Crystal 2008: 365).
[21]William Bullokar also noted that <th> was pronounced as /d/ in Kent and eastern Sussex at that time (Smith 2007: 6).

a hypothesis concerning the time when the phonologization of dental fricatives took place, in which he argues that the voicing of word-initial <th> took place in the 14th c. in function words, basing his assumption on Geoffrey Chaucer's rhymes.

Smith (2008: 6) claims that the voicing of word initial <th> in function words stems from the fact that these are high frequency words, what "may have allowed a larger amount of variation, which became generalized as a voicing contrast". Moreover, the author also points out that these sounds became contrastive after paradigm levelling, which eventually led to a significant decrease of different forms of function words. Undeniably, the English contrast between /θ/ and /ð/ has a very low functional load: there are few minimal pairs[22] and the sounds appear in predictable places, mainly in function words, such as articles, pronouns, particles and conjunctions (e.g. *the*, *they*, *them*, *their*, *either*, *neither*, *either*, *whether*).

According to Horobin and Smith (2002: 67), the phonologization of dental fricatives can be recognised as an "anomalous" case, not only due to the fact that there are few minimal pairs, but also after analysing the place of stress, as the initial dental fricative becomes voiced in function words (e.g. *the*, *this*, *these*), while it remains voiceless across lexical words (e.g. *thing*, *thought*, *thank*). Therefore, the fact that only one symbol, the <th> digraph, represents two different sounds, may not be a matter of coincidence after all.

A different explanation for the phonologization of English dental fricatives is put forward by Laker (2009), who suggests that the phonemicisation of a voice contrast in English fricatives occurred much earlier than ME, most probably between 5th-6th c. through language contact with Late British. Laker (2009: 213-214) lists certain voicing exceptions, where OE /θ/ was not voiced, e.g. in prefixes and suffixes at morpheme boundaries (e.g. *oþ-īewan* 'show') and in verbal roots after unstressed prefixes (e.g. *a-þencan* 'devise'), points out the problematic nature of *-þu* and *-þa* suffixes and concludes after Fulk (2001: 61) that "the distribution of voiced and voiceless varieties cannot be determined on a purely phonological basis, and thus voiced and voiceless fricatives cannot have been allophones in Old English".

According to Laker (2009: 218), during the 5th-6th c., native speakers of Late British acquired a "prehistoric form of Old English as a second language", what resulted in a unique process, in which Late British /θ/ and /ð/ allowed the learners to "interpret the allo-

---

[22] According to Smith 2010b: 2), there are only thirteen minimal pairs for /θ, ð/, half of which has alternate pronunciations (e.g. *mouth~mouth*) or are considered as archaic forms (e.g. *thigh~thy*).

phonic voiced fricative variants of early OE as phonemes". Such a hypothesis is supported by a number of arguments proposed by Laker (2009: 221-222): (1) it explains the early phonemicisation that occurred in OE, (2) language shift is a more probable explanation than lexical borrowing and diffusion, (3) phonemicisation of /θ/ and /ð/ had to occur before apocope, (4) voice contrast in English is more important than in other Gmc languages, (5) there are analogies between PDE and Modern Welsh voicing of fricatives.

Indeed, the phonologization of dental fricatives is a complex phenomenon and is a subject worth researching. Studies by Smith (2007, 2010a, see sections 2.4.2 and 2.4.3 respectively) conclude that the voicing contrast between /θ/ and /ð/ in AmE has not been successfully phonologized. According to the studies, the voiceless dental fricative is still the primary representation of <th> and dominates the conceptual space, while the voiced counterpart is an instance of the former sound. Therefore, the relationship between /θ/ and /ð/ would have to be seen as between allophones and not phonemes: a statement that is an exact opposite of the traditional view of these sounds. Still, it remains to be seen whether such data indicate a state of change or a stable variation across different varieties of English.

To conclude, the phonemicisation of a voice contrast in English dental fricatives most likely took place between 5th-6th c. due to OE-Late British language contact (Laker 2009: 213). However, after the Norman Conquest, the phonemic status of /θ/ and /ð/, unlike /f/ and /v/ or /s/ and /z/, was not reinforced enough due to the French influence, what ultimately resulted in an incomplete phonologization and a "pseudo-phonemic status" of these sounds in PDE. Still, further study is essential in order to put forward a more certain claim.

3.3.4. Dental fricatives in Early Modern English

3.3.4.1. Early Modern English graphemes

According to Millward (1988: 224), while most PDE spelling patterns were established at the beginning of EMnE, *thorn* <þ> was still present at that time, but became similar in shape to <y> in the 17th c. and was used in function words, such as *thou* and *that*. However, both <þ> and <y> were not universal, as <th> was also used and, in some cases, both the OE runic symbol and the digraph were present in the same document, e.g. in *Mr. William*

Shakespeares Comedies, Histories, & Tragedies from 1623. Millward (1988: 224) argues that the old graphemes were "used primarily in abbreviations, to save space in the line".

Another significant phenomenon that can be ascribed to the EMnE period is the rise of spelling pronunciations, which was caused by the rapid spread of literacy. According to Millward (1988: 218), this trend can be noticed particularly well across words of Latin and French origin containing a <th> digraph, e.g. *anthem*, *throne*, *author* or *orthography*. While the <th> digraph was used in these words to represent /t/, "English speakers altered their pronunciations", hence /t/ > /θ/. Moreover, this process also affected native words where <th> was a result of compounding, e.g. *Wrentham* or *Waltham* (however, there are exceptions to this rule, e.g. *courthouse*). Interestingly, the change is more widespread in AmE than BrE, e.g. *Anthony* (BrE /æntəni/, AmE /ænθəni/) or *Thames* (BrE /tɛmz/, AmE /θemz/) (Millward 1988: 218).

3.3.4.2. Early Modern English phonological processes

During the EMnE period, the medial voiced alveolar stop /d/ developed into a voiced dental fricative /ð/ when it preceded /r/ and followed the major stress, e.g. OE *fæder* > EMnE *father*, OE *mōdor* > EMnE *mother* (Myers 1966: 170). On the other hand, an opposite change occurred when /ð/ followed /r/ or appeared before /l/, e.g. OE *byrðen* > EMnE *burden* and OE *fiðele* > EMnE *fiddle*, which also has some exceptions, e.g. PDE *farthing* or PDE *further*[23] (Millward 1988: 218). Possibly, the first change can be viewed as a return to the OE distribution of the voiced dental fricative, appearing intervocalically, before the WGmc fricative strengthening took place.

Jones (2006: 252-253) refers to an 18th c. study by Walker ([1791] 1968: 117), who claims that the substitution of [t] for the voiceless dental fricative [θ], as in the word *authority*, stems from an "analogical formation based on Latin correspondences like *auctor* and *auctoritas*". Another 18th c. linguist is Elphinston (1786: 94), who comments on the substitution of [d] for the voiced dental [ð], marking it as a characteristic feature of London deviation, both in spelling and pronunciation, and warns that place-names like *Lethington* and *Nithsdale* will eventually become "*Ledington*" and "*Nidsdale*".

---

[23] Millward (1988: 218) notes that *furder* < *further* was very frequent across EMnE dialects, what indicates a possible change, which was reversed in PDE.

3.4. Dental fricatives in other Germanic languages

According to Bloomfield (1965: 385), English and Icelandic[24] are the only Gmc languages which have not lost dental fricatives /θ/ and /ð/, while different phonological processes have occurred across other Gmc languages, changing the place and manner of articulation or voicing of these sounds. In order to fully understand the individual processes underlying such changes in the distribution of /θ/ and /ð/, a more careful examination of selected Gmc languages is of key importance in this discussion.

3.4.1. Old High German

The phonological processes that occurred in Old High German had essentially reversed both Grimm's and Verner's Law, as the voiceless dental fricative /θ/ > /d/ and the voiced counterpart /ð/ > /t/ (Smith 2008: 11). Such a result stems from a particular chain of events that occurred in this Gmc language. Most probably, /ð/ had first developed to /d/ due to WGmc strengthening, and later, by the end of 8th c., /d/ turned to /t/ as a result of the High German Consonant Shift, a major sound change that differentiated Old High German from other languages from the Gmc family (Robinson 2005: 207-208).

   In writing, /θ/ in initial position was represented by the <th> digraph (e.g. *thenkan*). However, as /θ/ was not subject to the High German Consonant Shift, it can be assumed that the sound represented by <th> was still distinct and retained either or both the dental place of articulation or frication (Smith 2008: 11). Moreover, it was in contrastive distribution with the alveolar fricative /t/, which developed to /s/ or /ts/. In medial and final positions, /θ/ was represented by <d>, apparently denoting the change to a stop /d/. Eventually, during the Middle High German period, <th> appearing initially followed this pattern and also changed to <d>.

---

[24] In Old Icelandic, <þ> was generally used for the voiceless fricative /θ/, while <ð> for the voiced counterpart /ð/. The latter grapheme dropped out from usage due to the complementary distribution of these sounds, was reintroduced in the 17th c. and popularized in the 18th c. by Rasmus Rask. The voicing distinction was eventually standardized in the 20th c. (Smith 2007: 12).

3.4.2. Dutch

In modern standard Dutch, the voiced alveolar fricative [d] appears in initial position in such words as *dik* [dik] 'thick' or *doorn* [doːrn] 'thorn', as well as in *dag* [dax] 'day' and *doen* [duːn] 'do' (Bloomfield 1965: 367). Such a distribution stems from the fact that the PGmc *[θ] developed to [ð] and later hardened to [d] across the Dutch-Germanic area. Furthermore, during the late Middle Ages, this [d] coincided with PGmc *[d], what resulted in a merger, "yielding (in the end) uniformly stop /d/" (De Schutter 1994: 447).

3.4.3. Danish, Swedish and Norwegian

According to Haberland (1994: 320), the Danish [ð] sound, as in *mad* [mað] 'food', is a "soft d" semivowel. Although it is associated with the English voiced dental fricative [ð] or with the Icelandic <ð> grapheme (e.g. *maður* 'man'), it is different from these sounds in terms of phonetics. Danish [ð] is an alveolar voiced sonorant and is acoustically similar to [l], what causes much confusion for non-native learners of Danish.

In most Swedish and Norwegian dialects, the strengthening of fricatives caused the loss of the dental fricative, hence */ð/ > /d/ (e.g. PGmc *tanþ > Swedish *tand* 'tooth') (Smith 2008: 12-13).

3.4.4. Germanic creoles

Across the English-based creoles, such as Bahamian or Gullah, /θ/ and /ð/ are correspondingly replaced by /t/ and /d/. According to Romaine (1994: 588), "[m]arked segments tend to be replaced by unmarked ones", although the author also points out that the lack of such contrast can be also found in Hiberno-English, as well as in "other regional varieties of English which provided input to the Creole", thus it remains inconclusive whether the absence of dental fricatives across Gmc creoles stems exclusively from universal principles. Selected English-based creoles will be discussed in greater detail in the following chapter.

3.5. Summary

The focal point of this chapter was the presence of dental fricatives in the history of the English language. The objects of analysis were the phonological processes and variables that occurred in OE, ME and EMnE. The study covered the origins of the sounds, the changes that occurred in English and the loss of /θ/ and /ð/ in other Gmc languages. After investigating these issues, it is possible to answer the questions that have been raised in the introduction to this chapter: (1) Can the unstable nature of English dental fricatives be explained through a historical analysis of these sounds? (2) Can the incomplete phonologization of English dental fricatives be historically justified? (3) Can the loss of dental fricatives in modern varieties of English be compared to the variables present in OE and ME dialects?

Indeed, the history of English dental fricatives is undeniably a curious one. /θ/ and /ð/ were prone to variation as far back as in OE, when the voiced allophone was affected by WGmc voicing of fricatives, while the voiceless phoneme was subject to assimilation in clusters. Moreover, there is also much puzzlement in the written records, as both sounds were represented not only by <þ> and <ð>, but also by <th>, <t> and <d>. These orthographic quandaries continued in ME and can denote possible variations, as <þ> and <ð> where often substituted not solely by <th>, but also by <t> and <d> respectively. Moreover, ME /θ/ and /ð/ were affected by further phonological changes, such as pre-sonorant and post-fricative strengthening. Even in EMnE, these sounds were still undergoing various changes, e.g. OE *fæder* > EMnE *father* or OE *byrðen* > EMnE *burden*, while in writing, <þ> was often confused with <y>.

The historical analysis of English dental fricatives helps in understanding the ongoing changes of these sounds and explains their problematic and unstable status. In fact, one of the most vital aspects in this discussion is the phonologization of dental fricatives, as the historical approach sheds light on the current status of /θ/ and /ð/. According to Smith (2007, 2010a), AmE interdental fricatives are not in contrastive, but complementary distribution, a similar case to OE, when /θ/ was the only voiceless dental fricative phoneme, while /ð/ was a voiced allophone occurring between voiced sounds. Such revelations show that /θ/ is, in fact, the primary representation of <th> and dominates the conceptual space. Therefore, the widely held belief that /θ/ and /ð/ are in contrastive distribution, similarly to other pairs of English fricatives, needs to be abandoned, at least in AmE.

In modern varieties of English, dental fricatives are often substituted with stops, labio-dental or alveolar fricatives, as well as other pairs of sounds, such as affricates or coronal stops. Although the historical analysis shows that /θ/ and /ð/ changed in many instances into such sounds in the history of the English language, it is difficult to establish the relationship between the past and the present-day developments, as similar phonological processes can have different origins. However, the sheer amount of sound changes that affected dental fricatives in OE, ME and EMnE can explain the current unstable situation of these sounds and shows that modern developments are not novelties, but potential recurrences of previous historical innovations. The following chapter will be a thorough analysis of the loss of dental fricatives in selected modern varieties of English and hopefully will shed some light upon the possible relations of these changes.

Chapter 4: The loss of dental fricatives in selected varieties of English

4.1. Introduction

The fourth chapter of this thesis is a presentation and analysis of selected accents and dialects of English in which the voiceless and voiced dental fricatives are substituted by other pairs of sounds. The selection is inspired by Blevins (2006) and her summary of the loss of /θ/ and /ð/ in modern varieties of English, based on *A Handbook of Varieties of English* (Schneider et al. 2004). The questions that are asked in this chapter are: (1) What are the current substitutions for English dental fricatives? (2) What are the possible reasons for these ongoing sound changes? (3) Is there a parallel between the present loss of dental fricatives in modern varieties of English and the past developments in OE, ME and EMnE?

4.2. The loss of dental fricatives in selected varieties of English

A point of departure for this study is a compilation of different varieties of English that show the loss of dental fricatives, as summarised by Blevins (2006: 11). As presented in Table 4, among the different English dialects and varieties that display this change are: English in Shetland Islands, Irish English, dialects in Southeastern England, Newfoundland English, Maori English, Gullah, Fiji English, New Zealand and Australian English. All of the presented varieties show an ongoing change from dental fricatives /θ/ and /ð/ towards alveolar stops /t/ and /d/, labio-dental fricatives /f/ and /v/ or other sounds such as affricates /tθ/, /dð/ or the alveolar fricative /s/.

Table 4. Loss of /θ, ð/ in modern varieties of English (after Blevins 2006: 11).

Dialect / Variety	Sound change	Complete?	Data source
Shetland	ð > d, θ > t	yes	Melchers (2004: 42)
West Ireland	ð > d, θ > t	yes	Hickey (2004: 74)
Southeastern England	ð > d/#_, θ > f, ð > v elsewhere	yes	Altendorf and Watt (2004: 192)
Newfoundland	ð > dð, d, θ > tθ, t	yes	Clarke (2004: 376)
Maori English	ð > d ð, θ > tθ	variable	Warren and Bauer (2004: 618)
Gullah	ð > d, θ > s, t	yes	Weldon (2004: 402)
Fiji English	ð > d, θ > t	yes	Tent and Mugler (2004: 755)
New Zealand, Australia	ð > v, θ > f	variable	Gordon and Maclagan (2004: 612), Horvath (2004: 637)

In Table 5, the original compilation has been extended by three additional varieties with the attested loss of dental fricatives: West Midlands English (Clark 2004), New York City English (Gordon 2004) and AAVE (Edwards 2004). On the other hand, according to Millward (1988), there are also other examples of similar sound changes that occur in World Englishes, such as Indian English (1988: 341), Singaporean English (1988: 343) or West African English (1988: 346). However, as these varieties are examples of non-native varieties of English, they will not be taken into account.

The original table has been re-edited, the English dialects and varieties have been ordered in terms of their geographical distribution or linguistic status. The order in which the sound changes are presented in the *Sound change* column does not represent the frequency of the changes. The *Complete?* column describes whether the given sound change is complete or whether it represents a possible variable that occurs in the particular dialect or variety. The *Data source* column includes only the primary source taken from *A Handbook of Varieties of English* (Schneider et al. 2004), while each of the following sections is enriched with additional references and source material.

Table 5. Loss of /θ, ð/ in modern varieties of English.

Dialect / Variety	Sound change	Complete?	Data source
The British Isles			
Southeastern English	θ > f ð > v, d / #_	yes	Altendorf and Watt (2004: 192)
West Midlands English	θ > f ð > v	variable	Clark (2004: 158)
Irish English	θ > t̪, t ð > d̪, d	yes	Hickey (2004: 74)
Shetland English	θ > t ð > d	yes	Melchers (2004: 42)
North America			
New York City English	θ > t, tθ ð > d, dð	variable	Gordon (2004: 288)
African American Vernacular English	θ > t, f ð > d, v	yes	Edwards (2004: 388)
Newfoundland English	θ > t, tθ, s ð > d, dð	yes	Clarke (2004: 376)
Australia and New Zealand			
Australian English	θ > f ð > v	variable	Horvath (2004: 637)
New Zealand English	θ > f ð > v	variable	Gordon and Maclagan (2004: 612)
English-based pidgins and creoles			
Maori English	θ > tθ ð > dð	variable	Warren and Bauer (2004: 618)
Fiji English	θ > t ð > d	yes	Tent and Mugler (2004: 755)
Gullah	θ > t, s ð > d	yes	Weldon (2004: 402)

4.2.1. The British Isles

4.2.1.1. Southeastern English

London and Southeastern accents display a sociolinguistic variable known as th-fronting, i.e. /θ/ > /f/ and /ð/ > /v/ (Altendorf and Watt 2004: 192). For the voiceless dental fricative, the change occurs in all positions, e.g. /θɪŋk/ > /fɪŋk/, /ˈsʌmθɪŋ/ > /ˈsʌmfɪŋ/, /maʊθ/ > /maʊf/, while for the voiced counterpart, it takes place in non-initial positions, e.g. /ˈbrʌðə/ > /ˈbrʌvə/, /wɪð/ > /wɪv/. Initially, the voiced dental fricative /ð/ becomes /d/ or zero e.g. /ðə/ > /də/, /ðeɪ/ > /eɪ/ (Hughes and Trudgill 1994: 44). Although th-fronting is a generally acknowledged feature of Cockney, the traditional dialect of the London working class, it also occurs in other English dialects, e.g. in Leeds (Wakelin 1999: 98). Moreover, this variable will also be present in further sections, e.g. in West Midlands English, AAVE and Newfoundland English.

According to Altendorf and Watt (2004: 192), the variants which are the product of th-fronting "have traditionally been socially stigmatised" and are not used by middle-class speakers of London. However, the authors also refer to studies by Williams and Kerswill (1999) and Kerswill (2002) which prove that th-fronting occurs among middle-class speakers in Reading and Milton Keynes. The order in which th-fronting takes place is determined by class and gender: "working-class boys > working-class girls > middle-class boys > middle-class girls", and is still at an early stage. Indeed, a new study is needed in order to determine the current stage and scale of this sound change.

Wells (1982: 328) argues that despite the fact that th-fronting leads to the rise of homophones, e.g. *free* /friː/ and *three* /θriː/ > /friː/, Cockney speakers still have dental fricatives "as items in their (underlying) phonemic inventory", thus they can distinguish these words "given the appropriate social context and motivation".

Th-fronting is a well-attested phenomenon, having its origins in the speech of the London working class, it has been spreading across the country of Great Britain since the 1970's and, as "a feature of younger people's speech", it can be also found in Norwich, Sheffield and Exeter (Trudgill 2004: 32-33).

4.2.1.2. West Midlands English

Geographically, West Midlands is the region that covers the western half of England and includes Birmingham, Coventry, Walsall, West Bromwich and Wolverhampton. Although presently the West Midland dialect is generally associated with modern urban areas, historically, and particularly during the ME period, "it covered a much wider area" (Clark 2004: 134). The most prominent and distinctive dialect is the Black Country dialect, defined as "a working class dialect spoken in the South Staffordshire area of the English Midlands" (Chinn and Thorne 2001: 25, as cited in Clark 2004: 134). The Black Country is relatively small and covers the towns of Dudley, Walsall and Wolverhampton with their surrounding villages. Clark (2004: 135-136) argues that the distinctiveness of this dialect stems from "its relative geographic isolation", and its small and stable population, as there was little migration and no rapid influx of people in the history of the Black Country.

One of the most important studies conducted in West Midlands for the Black Country dialect specifically is by Mathisen (1999), based on recordings of 57 informants collected in Sandwell in 1984. According to this data, there is evidence for the substitution of dental fricatives /θ, ð/ with labio-dentals /f, v/. The variable is present across Sandwell teenagers, mostly males, in some cases it is "nearly categorical" and appears mainly in initial and medial positions, e.g. *free* /friː/ and *brother* /ˈbɹʊvə/, but not in function words (Mathisen 1999: 111). However, since the study was conducted almost three decades ago, a new investigation of the loss of dental fricatives in Sandwell would be vital in order to verify and compare these results to see whether the recorded variables were signs of an ongoing sound change.

When it comes to written evidence, Clark (2004: 158) investigates the Black Country dialect and gives some evidence for /θ/-deletion, e.g. *with* <wi'>, *with her* <wie 'er>, *without* <wi'outen>, /ð/-stopping, e.g. *further* <furder> and rhoticisation of /ð/ to a tap [ɾ], e.g. *Smethwick* <Smerric>. Interestingly, there is no correlation between the findings in writing and the substitution of /θ, ð/ with /f, v/ by Sandwell teenagers. Therefore, there is evidence for more than just one type of loss of dental fricatives that occurs in the Black Country dialect. However, further study is essential to assess the progress of these changes and determine the current status of dental fricatives in West Midlands.

4.2.1.3. Irish English

A characteristic feature that can be found in the western Ireland is the substitution of dental fricatives /θ/ and /ð/ with dental stops /t̪/ and /d̪/ respectively (Hickey 2004: 75-76). In eastern and southern Ireland, on the other hand, /θ/ and /ð/ are correspondingly substituted with alveolar stops /t/ and /d/. The historical background is of key importance for the correct understanding of such phonological changes, as the history of Irish English is indeed a complex subject.

According to Hickey (2004: 69), the history of Irish English can be divided into two different periods. The first period begins with the appearance of English-speaking settlers in the late 12th c. and ends in late 16th c. with a general failure of stabilising the English language in Ireland. The second period starts in the 17th c. and marks the renewed planting of the English language after the Cromwellian campaigns, when new forms of English were introduced, such as Scots in the north of Ireland and the West and North Midlands varieties in the south. At the same time, in Dublin and eastern Ireland, the south-west English features that were introduced in the first period remained.

In Old Irish, /θ/ and /ð/ developed into /h/ and /ɣ/ respectively around 12th-13th c.[25] (Thurneysen 1998: 76-77). Therefore, Irish speakers who were switching to English used the nearest possible corresponding sounds to the English dental fricatives, i.e. the Irish coronal stops (Hickey 2004: 75). /t̪/ and /d̪/ were used in western Ireland, while corresponding /t/ and /d/ were used in eastern and southern parts. However, the western dental pronunciation "has become that of the supraregional variety of Irish English"[26] that originated in Dublin and spread across the other regions. Yet, the Irish speakers of English in Dublin did not use dental, but alveolar stops and it remains unclear how /t̪/ and /d̪/ was introduced in Dublin English. Hickey (2004: 75) hypothesis is that the change in articulation from alveolar to dental can be a result of immigrant influence:

---

[25] According to Thurneysen (1998: 76-77), "the modern pronunciation of *th* as simple *h* is well attested from the 12th century on", while *ð* (Modern Irish *dh*) "came to be pronounced as ɣ (...) about the end of the eleventh century" and the fusion "must have been complete by the thirteenth".

[26] Hickey (2004: 72) describes *supraregionalisation* as "the replacement of salient features of a variety by more standard ones, frequently from an extranational norm (...) to render a variety less locally bound, more acceptable to a wider community".

> One view is that [speakers in Dublin] picked this articulation up from the many immigrants into Dublin in the latter half of the 19th century, because it (i) allowed them to dissociate themselves phonetically from vernacular speakers in the city and (ii) permitted a reversal of homophony in the words *thinker* and *tinker* (Hickey 2004: 75).

According to Hickey (2004: 92), "the distinction between dental and alveolar stops is sociolinguistically significant in Ireland", as the use of /t/ and /d/ for /t̪/ and /d̪/ respectively is "highly stigmatised". Table 6 presents the geographical distribution of dental and alveolar stops for /θ, ð/ in Ireland:

Table 6. Lexical sets and representative values in Irish English (/θ, ð/) (after Hickey 2004: 92).

Lexical set	Rural Northern	Popular Dublin	Fashionable Dublin	Rural South-West / West	Supraregional Southern
THIN	θ	t	t̪	t	t̪
BREATHE	ð	d	d̪	d	d̪

There are also other examples of the loss of dental fricatives that can be found in Ireland, e.g. in Derry English, a variety spoken in the city of Derry (or Londonderry) in Northern Ireland, two vernacular innovations occurred, in one of which [ð] dropped, giving a null variant, and in the other, a more recent one, it developed into a lateral [l] (Hickey 2004: 89).

Indeed, the loss of dental fricatives in Irish English is a complex phenomenon, as there are various historical origins for different phonological changes, and the richness of different varieties found in Ireland complicates this issue as well. While some of the presented changes are continuations of previous historical developments, there are also more recent changes that occur in Irish English.

4.2.1.4. Shetland English

According to Melchers (2004: 42), dental fricatives in Shetland English are affected by th-stopping, i.e. /θ/ and /ð/ are substituted by /t/ and /d/ respectively. Such a change may have resulted from either an independent innovation or contact with Norway, as the same phonological change occurred in mainland Scandinavia. However, Melchers (2004: 42) also points out that this change took place after the rule of Vikings in the Northern Isles, what complicates its correct dating.

4.2.2. North America

4.2.2.1. New York City English

In New York City, as well as in Philadelphia and other northern cities of the United States of America, interdental fricatives are frequently realised as stops, alveolar fricatives or affricates (Gordon 2004: 288-298). These phonological changes occur predominantly in the speech of the urban working class of these cities. In a trailblazing study, Labov ([1966] 2006: 36) analyses the social variables for interdental fricatives present in New York City and argues that /θ/ and /ð/ are often substituted with /t/ and /d/ or /tθ/ and /dð/ respectively. Moreover, while interdental fricatives are considered as prestige forms, the substitution of these sounds with stops is commonly stigmatised.

When discussing AmE interdental fricatives, Labov refers to Babbitt (1896), claiming that his findings and arguments, although from the end of the 19th c., are still applicable. First of all, Babbitt describes /θ/ and /ð/ as social variables that are often realised by native speakers as stops or affricates. Secondly, although there is no phonetic rule for these substitutions, he assumes that they may be related to frequency, e.g. the definite article *the* and pronouns *this* and *that* are frequently pronounced with a stop, while the interdental fricative remains in less frequent words. Finally, not only the variables found by Babbitt at the close of the 19th c. correlate with those recorded by Labov in the 60's of the 20th c., but they also share the same social significance and "show little indication of linguistic change in progress" (Labov 2006: 237-238).

According to Labov (2006: 233), although New Yorkers often use stops and affricates for the interdental fricative sounds, native speakers who rely primarily on these variants are in the minority. By comparing different social classes and age groups, Labov (2006: 233-234) reveals that the younger groups from the lower working class use the stigmatised variables less than their older counterparts, what leads to the conclusion that the change in the social significance of /θ/ and /ð/ is not in progress. Therefore, the variation of interdental fricatives in New York City English can be acknowledged as stable.

4.2.2.2. African American Vernacular English

AAVE is a variety of English spoken mainly by working-class African Americans in urban areas which originated from a combination of historical English dialects and native African languages (Edwards, 2004: 383). The most characteristic feature of middle class African Americans is style-shifting, i.e. while being usually bi-dialectal in AAE and Standard AmE, they use the selected variety "in appropriate social context". According to Green (2002: 117), a frequent sound change found in AAVE is the substitution of interdental fricatives with labio-dental and alveolar equivalents, an example of a systematic change, where the choice of the substituting sounds is based on their phonetic properties and which appear in predictable, non-random places.

Green (2002: 118-119) proposes three generalisations on the substitution of inter-dental fricatives in AAVE: (1) /θ, ð/ are substituted by /t, d/ or /f, v/, (2) /t/ and /f/ replace /θ/ in medial and final positions (e.g. *with* /wɪt, wɪf/), but not initial (e.g. *think* /θɪŋk/), (3) /ð/ is replaced by /d/ in all positions (e.g. *these* /diz/) or by /v/ in medial and final positions (e.g. *mother* /mʌvə/, *smooth* /smuv/). Moreover, the author argues that these are not "lazy substitutions", as they are used according to strict rules and in "well-defined environments" (2002: 119). Furthermore, the fact that /θ/ remains in initial position indicates that speakers of AAVE can produce these sounds and do not substitute interdental fricatives globally.

4.2.2.3. Newfoundland English

In Newfoundland and Labrador, the easternmost province of Canada which comprises of the island Newfoundland and the mainland Labrador, dental fricatives /θ/ and /ð/ are often substituted in casual speech by alveolar stops [t] and [d] or affricates [tθ] and [dð] respectively (Clarke 2004: 376). The stop realisation for the voiced dental fricative (e.g. *the* /də/) is common among lower- and middle-class urban speakers. As far as the countryside is concerned, the traditional speakers of the Irish-settled Avalon realise dental and post-dental variants, both stops and fricatives, retaining the phonemic contrast with alveolar /t/ and /d/ sounds, while speakers from South West England use labio-dental [f] and [v] variants non-initially. Other recorded variables are the stigmatised [s] for /θ/ and the deletion of medial /ð/, e.g. in *a'r* 'either' and *na'r* 'neither' (Clarke 2004: 376).

4.2.3. Australia and New Zealand

4.2.3.1. Australian English

In Australian English, /θ/ and /ð/ are often substituted by [f] and [v] respectively (Horvath 2004: 637). Although it is an attested and widespread phenomenon, labiodentals are not recognised as common variables for Australian English dental fricatives. While the study by Horvath shows that the frequency use of [f] for [θ] is very low (below 5%), "the social distribution was unusual in that it was one of the consonant variables that never occurred in Cultivated [Australian English]".

4.2.3.2. New Zealand English

According to Gordon and Maclagan (2004: 608), in New Zealand English, the voiceless dental fricative /θ/ shows significant social class differentiation. Th-fronting occurs predominantly across the lower social class speakers, while it is stigmatised by speakers from the higher social classes who avoid this variable in formal context. However, the substitution of /θ/ and /ð/ by [f] and [v] is "spreading rapidly among younger speakers from the lower social classes" (Gordon and Maclagan 2004: 612). Moreover, the first word that undergoes this change across speakers is *with*, possibly due to the fact that in New Zealand English it already has two variables, i.e. /wɪθ/ and /wɪð/, and these variables created the right conditions and enabled the occurrence of /wɪf/ and /wɪv/ as new variables. Furthermore, in writing, children in New Zealand frequently transfer these pronunciation variables to their orthography, writing *the* and *them* as *ve* and *vem* respectively (Gordon and Maclagan 2004: 612).

4.2.4. English-based pidgins and creoles

4.2.4.1. Gullah

Gullah is a creole language that can be found on the islands off the coasts of Georgia and South Carolina, spoken by African-American descendants of slaves brought to North America in the 18th-19th c. (Davis 1983: 114). The earliest accounts on Gullah were neither linguistic nor credible, describing the language as a result of the speakers' "intellectual indolence, or laziness, mental and physical" (Bennett 1908), later dialectologists argued that it was a "descendant from the midland and southern English dialects" (Johnson 1930: 17) or an African variety (Van Sertima 1976). However, according to Weldon (2004: 393), Gullah should be regarded as a result of "language contact between African and English varieties spoken during the Atlantic slave-trading era", as African slaves of that time spoke "a variety of mutually non-intelligible languages" and had to communicate both with each other, as well as with their masters. Hence, Gullah is a combination of the language of slave traders, plantation owners and West African languages.

According to Turner (1971: 128), in Gullah, /θ/ and /ð/ are substituted by [t] and [d] respectively. Moreover, several variables can be found for these changes: for the voiceless dental fricative, dental /t̪/ appears initially, post-alveolar /t/ before front and back vowels and retroflex /t/ in medial positions, while for the voiced counterpart, the retroflex flap [ɽ] appears between vowels and medially before /l/. Moreover, as Weldon (2004: 402) states, this change is still present across contemporary Gullah speakers, e.g. in "*mouth*, *north*, *thought*, *the*, *than*, *then*, etc.", although, in this study, an alveolar fricative [s] appears instead of the expected [t], as found in such words as "*bath*, *cloth*, and, variably, *north*".

4.2.4.2. Maori English

Maori English is a variety of New Zealand English whose speakers are descendants of Polynesian explorers who arrived in New Zealand ca 925 (Warren and Bauer 2004: 614). Language contact occurred after the arrival of the early European settlers and English became the language of trade and negotiation. Although the English ultimately outnumbered the Maori speakers, the latter group still has an influence on New Zealand English.

In Maori English, the dental fricatives are frequently substituted by affricates [tθ] and [dð]. Interestingly, according to Warren and Bauer (2004: 618), since Maori has only ten consonants, /p, t, k, m, n, ŋ, f, h, r, w/, the choice of labio-dentals would be more expected than he introduction of affricates which are absent from the Maori consonant inventory.

4.2.4.3. Fiji English

Fiji, a group of over 300 islands in the southern Pacific Ocean, was settled by speakers of Austronesian languages ca 1000 BC. From the beginning of the 19th c. onwards, extensive language contact between the natives and English colonists gave rise to Fiji English (Tent and Mugler 2004: 750). Tent and Mugler (2004: 777) argue that Fiji English is "not a homogenous variety but a group of co-existent systems or a series of continua". Contemporary, BrE is the official language of Fiji and functions as a "standard, superordinate language (...)[,] shows "substratum" influences, mostly from Fijian and Fiji Hindi (...) [and] is used for most (...) communication between speakers of different native languages" (2004: 753).

Most Fiji English speakers substitute /θ/ and /ð/ with /t/ and /d/ respectively, e.g. *think* /tiŋk/, *bath* /bat/, *this* /dɪs/, *brother* /bradə/ (Tent and Mugler 2004: 755). Moreover, word-initial /θ/ is realised as an aspirated dental stops [t̪ʰ] (Tent and Mugler 2004: 766).

4.3. Summary

After the analysis of the selected English accents and dialects, it is possible to state that the presence of dental fricatives across modern varieties of English is not uniform. In order to discuss these variables in detail and in the proper order, it would be appropriate to remind the three questions that have been raised in the introductory paragraph: (1) What are the current substitutions for English dental fricatives? (2) What are the possible reasons for these ongoing sound changes? (3) Is there a parallel between the present loss of dental fricatives in modern varieties of English and the past developments in OE, ME and EMnE?

Dental fricatives /θ/ and /ð/ are often substituted by labio-dentals /f/ and /v/, alveolar stops /t/ and /d/ or affricates /tθ/ and /dð/ respectively. The most common phonological change is th-stopping, as it is present in seven out of twelve discussed varieties, followed by th-fronting present in five varieties. The least frequent changes are /θ, ð/ > /tθ, dð/, present in three dialects and /θ/ > /s/, occurring in one dialect only. Obviously, such a way of calculating sound changes will not shed any light on this issue, as it is erroneous to put an equation mark between different English varieties. Indeed, it will be more accurate to conclude that the most common substitutions for /θ, ð/ are /f, v/ and /t, d/, as both changes can be ascribed to two cultural centres, i.e. th-fronting to London and th-stopping to New York, from which they have expanded into other areas. However, while the loss of /θ, ð/ in New York is stable and doesn't show a linguistic change in progress, th-fronting is gradually spreading over new areas on the British Isles and beyond.

Certainly, it is impossible to find one universal explanation for the loss of dental fricatives in modern varieties of English. According to Blevins (2006: 12), the substitution of /θ, ð/ with /f, v/ stems from misperception, since both pairs of sounds are acoustically similar and, as a result, the process can be regarded as a "perceptually based sound change" (Blevins 2004: 134-135). On the other hand, the realisation of dental fricatives as alveolar or dental stops is a result of retraction in casual speech and can be regarded as a simplification, a change driven by ease of articulation. Therefore, both changes can be explained by means of speech perception and production. However, the latter change should not be perceived as a modern innovation, as similar processes occurred in the past and can be found in OE and ME, as well as in other Gmc languages.

When searching for parallels between the present loss of dental fricatives in English varieties and the past phonological processes, th-stopping stands out in this discussion: (1)

OE /ð/ > OE /d/ due to WGmc strengthening (Lass 1994: 76), (2) OE /θ, ð/ are irregularly represented by <t> and <d> (Hogg 1992: 33), (3) OE /θ, ð/ > ME /t, d/ due to pre-sonorant and post-fricative strengthening (Lass 1992: 64), (4) ME /θ, ð/ are frequently represented by <t, d> (Kristensson 1987, 1995, 2002). Furthermore, similar results can be also found across other Gmc languages, e.g. in High German, Danish, Swedish or Norwegian, where dental fricatives changed into alveolar stops. On the other hand, there is scarce evidence for th-fronting in the previous stages of English or in other Gmc languages (however, it does not mean that the change did not occur earlier at all).

To summarise, the evidence found in the analysis of dental fricatives in OE and ME and the comparison of these findings with the changes in modern varieties of English leads us to the conclusion that the current substitution of /θ, ð/ with /t, d/ or /t̪, d̪/ should not be viewed as a modern innovation, but rather as a reoccurrence of previous phonological processes, while the realisation of /θ, ð/ as /f, v/ can be regarded as a fairly new sound change that lacks any historically credible predecessors, at least in the history of English and other Gmc languages. Moreover, this study also explains why th-stopping is a more stable change, whereas th-fronting is still progressive and probably will affect more varieties of English in the future.

Discussion and Conclusion

English non-sibilant dental fricatives are sounds worth studying, both for a phonetician, as well as for a historical linguist. First of all, /θ/ and /ð/ are uncommon types of consonants that are rare in the world's languages, although their geographic distribution is virtually worldwide and can be found across different language families. Secondly, the acoustic analysis of these sounds proves that they are perceptually weak, easily confused with /f, v/ and show a great deal of variation in voicing. Thirdly, the studies on the production, perception and acquisition of these sounds show that /θ, ð/ are difficult to master, both for native and second language speakers, and are frequently realised as /t, d/, /t̪, d̪/, /f, v/ or /tθ, dð/ across many English dialects.

Two key issues were investigated: the incomplete phonologization of dental fricatives and the loss of dental fricatives in modern varieties of English. The study was, as well, twofold, comprising of a historical analysis of /θ, ð/ in English, as well as in other selected Gmc languages, and the investigation of the loss of /θ, ð/ in selected modern varieties of English. The aim of the study was to find possible parallels between the present sound changes and the past phonological developments in order to explain the current status of dental fricatives.

Studies by Smith (2007, 2010a) show that the phonologization of AmE interdental fricatives is incomplete and their distribution is not contrastive, but rather complementary, similar to OE, where /θ/ was the only dental fricative phoneme and [ð] was a voiced allophone appearing between voiced sounds. Although many historical linguists agree that the phonemicisation of /θ, ð/ occurred in ME after the French influence (Lass 1992: 59), study by Laker (2009: 213) challenge this widely held belief, assuming that /θ/ and /ð/ became phonemic much earlier, in 5th-6th c. due to OE-Late British language contact. Indeed, such a

train of thought would suggest that /θ, ð/ were separate phonemes for the most part of OE and ME. Moreover, it seems that the French influence did not have such a profound effect on English dental fricatives: instead of reinforcing the phonemic distribution, as in the case of other pairs of English fricatives, the lack of a word-initial voiced /ð/ in French weakened the earlier established /θ/-/ð/ split, ultimately leaving these sounds in the current "pseudo-phonemic" state.

The notion of functional load can also support the incomplete phonemicisation of these sounds. Barber (2009: 45) argues that the small functional load of /θ, ð/ means that the voicing distinction is virtually irrelevant and a possible merger would not cause much confusion. Indeed, /θ, ð/ appear in few minimal pairs, in predictable places and predominantly in function words, what might constitute a possible change in the voicing and distribution of these sounds. Accordingly to such reasoning, Smith (2010b: 1) states that "if there is no environment in which the sounds might contrast, there is not necessarily reason to believe that speakers perceive a contrast". In other words, the sheer number of words and their predictable distribution influences the current status of dental fricatives. Hence, it can be reaffirmed after Smith (2010b) that the phonologization of English dental fricatives is incomplete, although further study is suggested in this field, particularly to verify the scope of this status across other English dialects.

The loss of dental fricatives in modern varieties of English is another subject worth studying. /θ, ð/ are substituted by /t, d/ or /f, v/ by many speakers of vernacular dialects (e.g. Southeastern English, New York City English or AAVE), by learners of English as a second language and by children, who usually acquire dental fricatives after mastering other speech sounds. According to Wolfram and Schilling-Estes (1998: 37), the relationship between these facts led linguists to an "erroneous conclusion that vernacular dialects are (...) imperfectly learned versions of the standard variety". On the contrary, such a change should be viewed primarily as a natural process and can be explained both in terms of perception and production.

According to Blevins (2004: 134-135), th-fronting that occurs in many modern English dialects (e.g. Southeastern English, West Midlands English, Australian English, New Zealand English) is an example of a "perceptually based sound change". Although a shift of /θ/ > /f/ "seems odd from an articulatory perspective" (coronal, non-apical, non-strident > labial strident), is "natural when viewed from the point of view of speech perception". This argument is reinforced by studies discussed in Chapter 2 of this thesis (Miller

and Nicely 1955, Jongman et al. 2003, Smith 2007). Moreover, Blevins (2004: 134) points out that th-fronting is also present in other languages, even outside the Gmc family, e.g. in a Northern Italian dialect Veneto, word-initial [θ] and [f] are in free variation, while in an Austronesian language Rotuman, /*t/ > /θ/ > /f/.

Th-stopping, on the other hand, is a sound change that could be explained in terms of articulation. As the realisation of dental fricatives as stops is common across many urban dialects (e.g. New York City English, AAVE), it can be assumed that in casual speech, /θ, ð/ are retracted to such an extent that they eventually become /t, d/ or /t̪, d̪/. Most importantly, however, the results of this study show that th-stopping is not a novelty sound change, but rather a reoccurrence of previous phonological innovations that can be traced back to OE and ME dialects and can be also found in the history of other Gmc languages. Furthermore, the results of the historical analysis of dental fricatives coincide with the status of both phonological changes, th-stopping and th-fronting, in PDE. While the former sound change is considered as stable and can be traced back to earlier stages of the English language, the latter could not be found in earlier forms and it is still a progressive change that expands into new dialects worldwide.

Another explanation for the ongoing sound changes can be reflected in a theory by Bichakijan (1988), who argues that languages do not undergo unsystematic and isolated processes, but evolve in the direction of earlier acquired features:

> [M]ellow fricatives (...) are transient sounds, which usually emerge as the direct output or byproduct of paedomorphic processes such as deaspiration or degemination, and which promptly undergo subsequent changes: the problematic segments are either effected or replaced with optimal items (cf. the Continental West Germanic *d* for θ, the non-Castilian *s* for θ (...)). It shows that, while the output may need minor adjustment, the general direction of phonological evolution is definitely towards early-acquired features (Bichakjian 1988: 86).

In other words, perhaps the ongoing loss of /θ, ð/ is an attempt to reverse Grimm's Law, just as it occurred in the history of other Gmc languages. Although such a justification is appealing, it will remain as an open case for future studies.

To conclude, the main objective of this thesis, to find possible parallels between the present and the past phonological processes on the example of English non-sibilant dental fricatives /θ/ and /ð/, has been reached. The link is certainly present, albeit the complete knowledge of the mechanisms of such phonological changes and the understanding of such uncommon sounds as dental fricatives is still waiting to be unravelled.

References

Altendorf, Ulrike and Dominic Watt. 2004. "The Dialects in the South of England: Phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 178-203.

Babbitt, E. H. 1896. "The English of the lower classes in New York City and vicinity", *Dialect Notes* 1: 457-464.

Babel, Molly and Grant McGuire. 2010. A cross-modal account for synchronic and diachronic patterns of /f/ and /θ/ in English. (http://faculty.arts.ubc.ca/mbabel/Babel&McGuire_f-th_Resub_final.pdf) (date of access: 21 Jan. 2012).

Barber, Charles, Joan C. Beal and Philip A. Shaw. 2009. *The English language: a historical introduction*. (2nd edition.) Cambridge: Cambridge University Press.

Bennett, John. 1908. "Gullah: A Negro Patois", *South Atlantic Quarterly* 7: 332-347.

Bichakijan, Bernard H. 1988. *Evolution in Language*. Singapore: Karoma Publishers.

Blake, Norman. 2006. "Introduction", in: Norman Blake (ed.), *The Cambridge History of the English Language.* Vol. 2: *1066-1476*. (4th edition.) Cambridge: Cambridge University Press, 1-22.

Blevins, Juliette. 2004. *Evolutionary Phonology*. Cambridge: Cambridge University Press.

Bloomfield, Leonard. 1965. "Language", in: Harry Hoijer (ed.), *Language History*. New York: Holt, Rinehart and Winston, 357-385.

Boersma, Paul and David Weenink. [1995] 2011. Praat: doing phonetics by computer (Version 5.3) [Computer program]. Retrieved October 21, 2011, from http://www.praat.org/.

Bourcier, Georges. 1981. *History of the English language*. (Translated by C. Clark). Cheltenham: Stanley Thornes.

Bright, William. 1997. "Social Factors in Language Change", in: Florian Coulmas (ed.), *The Handbook of Sociolinguistics*. Oxford: Blackwell, 81-91.

Chambers, J. K. 1994. *Sociolinguistic Theory*. Oxford: Blackwell.

Chen, Matthew Y. and William S. Y. Wang. 1975. "Sound change: actuation and implementation", *Language* 51, 2: 255-281.

Cheng, C. C. and William S. Y. Wang. 1977. Tone change in Chao-zhou Chinese: a study in lexical diffusion [Project on Linguistic Analysis, 12. Berkeley: University of California Phonology Laboratory.].

Chinn, Carl and Steve Thorne (eds.). 2001. *Proper Brummie: A Dictionary of Birmingham Words and Phrases*. Studley, Warks: Brewin Books.

Christy, T. Craig. 1983. *Uniformitarianism in Linguistics*. Amsterdam: John Benjamins.

Clark, Urszula. 2004. "The English West Midlands: phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 134-162.

Clarke, Sandra. 2004. "Newfoundland English: Phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 366-383.

Connine, C. M. 1987. "Constraints on interactive processes in auditory word recognition: The role of sentence context", *Journal of Memory and Language* 16: 527-538.

Coulmas, Florian. 1997. "Introduction", in: Florian Coulmas (ed.), *The Handbook of Sociolinguistics*. Oxford: Blackwell, 1-12.

Cruttenden, Alan. 2008. *Gimson's Pronunciation of English*. (7th edition.) London: Hodder Education.

Crystal, David. 2008. *A Dictionary of Linguistics and Phonetics*. (6th edition.) Oxford: Blackwell.

Davis, Lawrence M. 1983. *English Dialectology: An Introduction*. Alabama: The University of Alabama Press.

Denes, P. 1955. "Effect of duration on the perception of voicing", *Journal of the Acoustic Society of America* 27: 761-764.

De Schutter, Georges. 1994. "Dutch", in: Ekkehard König and Johan van der Auwera (eds.), *The Germanic Languages*. London: Routledge, 439-477.

Diensberg, Bernhard. 1995. "Anglo-French and Medieval scribal practice: The case of Middle English <-ed, -et> and <-id, -it> for common <-eþ, -eth>", in: Jacek Fisiak (ed.), *Linguistic Change under Contact Conditions*. Berlin: Mouton de Gruyter, 81-95.

Dubois, Sylvie and Barbara M. Horvath. 2004. "Cajun Vernacular English: Phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 407-416.

Eckert, Penelope. 1997. "Age as a Sociolinguistic Variable", in: Florian Coulmas (ed.), *The Handbook of Sociolinguistics*. Oxford: Blackwell, 151-167.

Edwards, Harold T. 2003. *Applied Phonetics: The sounds of American English*. (3rd edition.) New York: Thomson-Delmar Learning.

Edwards, Walter F. 2004. "African American Vernacular English: phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 383-392.

Elphinston, J. 1786. *Propriety Ascertained in her Picture, or Inglish Speech and Spelling Rendered Mutual Guides, Secure Alike from Distant, and from Domestic, Error*. London.

Fulk, Robert D. 2001. "Conditions for the voicing of Old English fricatives, I: Phonology", *Interdisciplinary Journal for Germanic Linguistics and Semiotic Analysis* 6, 1: 55-77.

Garnes, S. and Z. S. Bond. 1976. "The relationship between semantic expectation and acoustic information", *Phonologica* 3: 285-293.

Gonet, Wiktor and Grzegorz Pietron. 2005. "English interdental fricatives in the speech of Polish learners of English", *Neofilologia* 8: 73-92.

Gordon, Elizabeth and Margaret Maclagan. 2004. "Regional and Social Differences in New Zealand Phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R.

Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 603-613.

Gordon, Matthew J. 2004. "New York, Philadelphia, and other northern cities: phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 282-299.

Green, Lisa J. 2002. *African American English*. New York: Cambridge University Press.

Guy, Gregory R. 2003. "Variationist Approaches to Phonological Change", in: Brian D. Joseph and Richard D. Janda (eds.), *The Handbook of Historical Linguistics*. Oxford: Blackwell, 369-400.

Haberland, Hartmut. 1994. "Danish", in: Ekkehard König and Johan van der Auwera (eds.), *The Germanic Languages*. London: Routledge, 313-348.

Hickey, Raymond. 2004. "Irish English: Phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 68-97.

Hoad, Terry. 2006. "Preliminaries: Before English", in: Lynda Mugglestone (ed.), *The Oxford History of English*. New York: Oxford University Press, 7-31.

Hock, Henrich H. 1991. "Initial strengthening", in: Wolfgang U. Dressler, Hans C. Luschützky, Oskar E. Pfeiffer, and John R. Rennison (eds.), *Phonologica 1988: Proceedings of the 6th International Phonology Meeting*. Cambridge: Cambridge University Press, 630.

Hogg, Richard. 1992. *A Grammar of Old English*. Vol. 1: *Phonology*. Oxford: Blackwell.

Hogg, Richard. 1992. "Chapter 3: Phonology and Morphology", in: Richard Hogg (ed.), *The Cambridge History of the English Language.* Vol. 1: *The Beginnings to 1066*. Cambridge: Cambridge University Press, 67-167.

Horobin, Simon and Jeremy Smith. 2002. *An Introduction to Middle English*. Cornwall: Edinburgh University Press.

Horvath, Barbara M. 2004. "Australian English: Phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 625-644.

Hughes, Arthur and Peter Trudgill. 1994. *English Accents and Dialects*. (2nd edition.) London: Edward Arnold.

Ingram, David. 1980. "The Acquisition of Word-Initial Fricatives and Affricates in English by Children between 2 and 6 years", in: Yeni-Komshian, James, Kavanagh and Ferguson (eds.), *Child Phonology*. Vol. 1: *Production*. New York: Academic Press, 169-192.

Irvine, Susan. 2006. "Beginnings and Transitions: Old English", in: Lynda Mugglestone (ed.), *The Oxford History of English*. New York: Oxford University Press, 32-60.

Janda, Richard D. and Brian D. Joseph. 2003. "On Language, Change, and Language Change-Or, Of History, Linguistics, and Historical Linguistics", in: Brian D. Joseph and Richard D. Janda (eds.), *The Handbook of Historical Linguistics*. Oxford: Blackwell, 3-180.

Jenkins, Jennifer. 2009. *The Phonology of English as an International Language*. Hong Kong: Oxford University Press.

Johnson, Guy. 1930. *Folk Culture on St. Helena Island, South Carolina*. Chapel Hill: University of North Carolina Press.

Jones, Charles. 2006. *English Pronunciation in the Eighteenth and Nineteenth Centuries*. New York: Palgrave Macmillan.

Jongman, Allard, Yue Wang and Brian H. Kim. 2003. "Contributions of Semantic and Facial Information to Perception of Nonsibilant Fricatives", *Journal of Speech, Language, and Hearing Research* 46: 1-11.

Kiparsky, Paul. 1996. "The Phonological Basis of Sound Change", in: John Goldsmith (ed.), *The Handbook of Phonological Theory*. Oxford: Blackwell, 640-670.

Kristensson, Gillis. 1987. *A Survey of Middle English Dialects 1290-1350: the West Midland Countries*. Lund: Lund University Press.

Kristensson, Gillis. 1995. *A Survey of Middle English Dialects 1290-1350: the East Midland Countries*. Lund: Lund University Press.

Kristensson, Gillis. 2002. *A Survey of Middle English Dialects 1290-1350: the Southern Countries*. Vol. 2: *Diphthongs and Consonants*. Lund: Lund University Press.

Labov, William. 1963. "The social motivation of a sound change", *Word* 19: 273-309.

Labov, William. 1972. *Sociolinguistic Patterns*. University of Pennsylvania Press: Philadelphia.

Labov, William. 1994. *Principles of Linguistic Change*. Vol. 2: *Internal Factors*. Oxford: Blackwell.

Labov, William. [1966] 2006. *The Social Stratification of English in New York City*. (2nd edition.) New York: Cambridge University Press.

Ladefoged, Peter and Ian Maddieson. 1996. *The Sounds of the World's Languages*. Oxford: Blackwell.

Ladefoged, Peter. 2001. *Vowels and Consonants: An Introduction to the Sounds of Languages*. Oxford: Blackwell.

Ladefoged, Peter. 2001. *A Course in Phonetics*. (4th edition.) Boston: Heinle & Heinle, Thomson Learning.

Laker, Stephen. 2009. "An explanation for the early phonemicisation of a voice contrast in English fricatives", *English Language and Linguistics* 13, 2: 213-226.

Lass, Roger and John M. Anderson. 1975. *Old English Phonology*. Cambridge: Cambridge University Press.

Lass, Roger. 1990. "How to do things with junk: exaptation in language evolution", *Journal of Linguistics* 26: 79-102.

Lass, Roger. 1992. "Chapter 2: Phonology and Morphology", in: Norman Blake (ed.), *The Cambridge History of the English Language*. Vol. 2: *1066-1476*. Cambridge: Cambridge University Press, 23-155.

Lass, Roger. 1994. *Old English: A historical linguistic companion*. Cambridge: Cambridge University Press.

Lehmann, Winfred P. 1973. *Historical Linguistics: An Introduction*. (2nd edition.) Holt, New York: Rinehart and Winston.

Le Page, R. B. 1997. "The Evolution of a Sociolinguistic Theory of Language", in: Florian Coulmas (ed.), *The Handbook of Sociolinguistics*. Oxford: Blackwell, 15-32.

Lindblom, Björn and Ian Maddieson. 1988. "Phonetic Universals in Consonant Systems", in: C. Li and L. M. Hyman (eds.), *Language, Speech and Mind*. London: Routledge, 62-78.

Macken, Marlys A. 1996. "Phonological Acquisition", in: John Goldsmith (ed.), *The Handbook of Phonological Theory*. Oxford: Blackwell, 671-696.

Maddieson, Ian and Kristin Precoda. 1990. *The UCLA Phonological Segment Inventory Database*. (http://web.phonetik.uni-frankfurt.de/upsid.html) (date of access: 12 Oct. 2011).

Maddieson, Ian. 2005. "Presence of Uncommon Consonants", in: Martin Haspelmath, Matthew S. Dryer, David Gil and Bernard Comrie (eds.), *The World Atlas of Language Structures*. Oxford: Oxford University Press, 82-83.

Maddieson, Ian. 2011. "Presence of Uncommon Consonants", in: Martin Haspelmath, Matthew S. Dryer (eds.), *The World Atlas of Language Structures Online*. (http://wals.info/chapter/19) (date of access: 12 Oct. 2011).

Marsden, Richard. 2004. *The Cambridge Old English Reader*. Cambridge: Cambridge University Press.

Massaro, Dominic. 1987. *Speech perception by ear and eye: A paradigm for psychological inquiry*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Massaro, Dominic. 1998. *Perceiving talking faces: From speech perception to a behaveioral principle*. Cambridge: MIT Press.

Mathisen, Anne Grethe. 1999. "Sandwell, West Midlands: ambiguous perspectives on gender patterns and models of change", in: Paul Foulkes and Gerard Docherty (eds.), *Urban Voices: Accent Studies in the British Isles*. Bristol: Arnold, 107-123.

McMahon, April M. S. 1994. *Understanding Language Change*. Cambridge: Cambridge University Press.

Melchers, Gunnel. 2004. "English Spoken in Orkney and Shetland: Phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 35-46.

Miller, George and Patricia Nicely. 1955. "An analysis of perceptual confusions among some English consonants", *Journal of the Acoustical Society of America* 27: 338-352.

Miller, George and Stephen Isard. 1963. "Some perceptual consequences of linguistic rules", *Journal of Verbal Learning and Verbal Behavior* 2: 217-228.

Millward, C. M. 1988. *A Biography of the English Language*. Orlando: Harcourt Brace Jovanovich College Publishers.

Milroy, Lesley. 1980. *Language and social networks*. London: University Park Press.

Milroy, James. 1992. *Linguistic Variation & Change*. Oxford: Blackwell.

Milroy, James and Lesley Milroy. 1997. "Varieties and Variation", in: Florian Coulmas (ed.), *The Handbook of Sociolinguistics*. Oxford: Blackwell, 47-64.

Mitchell, Bruce and Fred C. Robinson. 2001. *A Guide to Old English*. (6th edition.) Oxford: Blackwell.

Myers, L. M. 1966. *The Roots of Modern English*. Boston: Little, Brown and Company.

Oudeyer, Pierre-Yves and Frédéric Kaplan. 2007. "Language evolution as a Darwinian process: computational studies", *Cognitive Processing International Quarterly of Cognitive Science* 8: 21-35.

Polka, Linda, Connie Colantonio and Megha Sundara. 2001. "A cross-language comparison of /d/-/ð/ perception: Evidence for a new developmental pattern", *Journal of the Acoustical Society of America* 109, 5: 2190-2201.

Raphael, Lawrence. 1971. Vowel duration as a cue to the perceptual separation of cognate sounds in American English [Doctoral dissertation, City University of New York.].

Ringe, Don. 2006. *From Proto-Indo-European to Proto-Germanic: A Linguistic History of English*. Vol. 1. New York: Oxford University Press.

Roach, Peter. 2000. *English Phonetics and Phonology: A practical course*. (3rd edition.) Cambridge: Cambridge University Press.

Robinson, Orrin W. 2005. *Old English and its Closest Relatives: A Survey of the Earliest Germanic Languages*. London: Routledge.

Smith, Bridget. 2007. An acoustic analysis of voicing in American English dental fricatives. (http://www.ling.ohio-state.edu/~bsmith/docs/SmithQP1.pdf) (date of access: 12 Oct. 2011).

Smith, Bridget. 2008. Dental fricatives and stops in Germanic: deriving diachronic processes from synchronic variation. (http://www.ling.ohio-state.edu/~bsmith/SmithNEW8May.pdf) (date of access: 12 Oct. 2011).

Smith, Bridget. 2010. The incomplete phonologization of the non-sibilant dental fricatives in American English. (http://www.ling.ohio-state.edu/~bsmith/docs/barcelona.pdf) (date of access: 21 Feb. 2012).

Smith, Bridget. 2010. Eth and Theta: A tale of two phonemes. (http://www.ling.ohio-state.edu//~bsmith/docs/2QP_v2.pdf) (date of access: 21 Feb. 2012).

Stone, Louise, T. B. W. Reid and William Rothwell (eds.). 1977-1992. *Anglo-Norman Dictionary*. London: The Modern Humanities Research Association.

Sumby, W. H. and I. Pollack. 1954. "Visual contributions to speech intelligibility in noise", *Journal of the Acoustical Society of America* 26: 212-215.

Tent, Jan and France Mugler. 2004. "Fiji English", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 750-779.

Thomas, Erik R. 2011. *Sociophonetics: An Introduction*. Basingstoke: Pelgrave Macmillan.

Thurneysen, Rudolf. 1998. *A Grammar of Old Irish*. (Translated by D. A. Binchy and Osborn Bergin.) (Revised and enlarged edition.) Dublin: e-print Ltd.

Trudgill, Peter. 2004. *Dialects*. (2nd edition.) Cornwall: Routledge.

Turner, Lorenzo D. 1971. "Notes on the Sounds and Vocabulary of Gullah", in: Juanita V. Williamson and Virginia M. Burke (eds.), *A Various Language: Perspectives on American Dialects*. New York: Holt, Rinehart and Winston, 128.

Van Sertima, Ivan. 1976. "My Gullah brother and I: Exploration into a community's language and myth through its oral tradition", in: Deborah S. Harrison and Tom Trabasso (eds.), *Black English: A seminar*. Hillsdale NJ: Lawrence Erlbaum, 123-146.

Wakelin, Martyn F. 1999. *English Dialects: An Introduction*. (Revised edition.) London: The Athlone Press.

Walden, B., R. Prosek, A. Montgomery, C. Scherr and C. Jones. 1977. "Effects of training on the visual recognition of consonants", *Journal of Speech and Hearing Research* 20: 130-145.

Walker, J. [1968] 1971. "A Critical Pronouncing Dictionary", in: R. C. Alston (ed.), *English Linguistics 1500-1800*. Menston: The Scolar Press, 117.

Wang, William S. Y. 1969. "Competing changes as cause of residue", *Language* 45, 1: 9-25.

Warren, Paul and Laurie Bauer. 2004. "Maori English: Phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 614-624.

Weldon, Tracey L. 2004. "Gullah: Phonology", in: E. W. Schneider, K. Burridge, B. Kortmann, R. Mesthrie and C. Upton (eds.), *A Handbook of Varieties of English*. Vol. 1: *Phonology*. Berlin: Mouton de Gruyter, 393-406.

Wells, J. C. 1982. *Accents of English*. Vol. 2: *The British Isles*. Cambridge: Cambridge University Press.

Wells, Rulon S. 1987. "The life and growth of language: Metaphors in biology and linguistics", in: Henry M. Hoenigswald and Linda F. Wiener (eds.), *Biological metaphor and cladistic classification: An interdisciplinary perspective*. London: Frances Pinter, 39-72.

Wester, Femke, Dicky Gilbers and Wander Lowie. 2007. "Substitution of dental fricatives in English by Dutch L2 speakers", *Language Sciences* 29: 477-491.

Wodak, Ruth and Gertraud Benke. 1997. "Gender as a Sociolinguistic Variable: New Perspectives on Variation Studies", in: Florian Coulmas (ed.), *The Handbook of Sociolinguistics*. Oxford: Blackwell, 127-150.

Wolfram, Walt and Natalie Schilling-Estes. 1998. *American English: Dialects and Variation*. Cornwall: Blackwell Publishers.

Yildiz, Yasemin. 2005. The Acquisition of English interdentals by Turkish learners: explaining age effects in L2 phonology [Paper presented at 10th Essex Graduate Conference in Linguistics, University of Essex.].