A MULTI-DIMENSIONAL MODEL

OF

MODERN BRITISH ENGLISH PHONOLOGY

by

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PRESENTED

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Dedicated to my mother and my father.

ABSTRACT

Modern British English words could be analyzed and studied, diachronically or synchronically, from different branches or schools of linguistics or from different disciplines. Phonologically, the analysis and study of Modern British English words are mainly on their pronunciations, syllabifications and word stresses, which were studied broadly and deeply by the predecessors who had fruitful research achievements and rich research experiences. And confined by social and historical reasons, their researches still need to be further analyzed to make a supplement or an improvement. Nowadays, the phonological study gradually has been tending to be interdisciplinary and synthesis. Then, Optimality Theory (OT for short), which was born in 1990s, was the combination of phonology and cognitive science. And it becomes popular in linguistic field after its birth. OT, which is the latest development of generative grammar, and is the improvement and development of classical generative phonology, defines language as a system of conflicting forces with constraint and constraint hierarchy ($\mathcal{H}$) as its core. It is not only used in phonology, but also in syntax, semantics, historical linguistics, first language acquisition, child language acquisition, foreign language learning, information processing of human brain imitated by computer and social linguistics. OT has been being vital in explaining the linguistic phenomenon, being a universal linguistic theory. But, the theory had some problems in analyzing and studying linguistic phenomenon. As a result, Comparative Markedness Theory, Correspondence Theory, Stochastic Optimality Theory, and OT with Candidate Chains were born to help to improve the Optimality Theory. And, it still has thorny problems in analyzing pronunciations, word stresses or even syllabifications of Modern British English (Modern BrE for short) words. And, those problems are not satisfactorily solved in the theoretical framework of OT. **A Multi-Dimensional Model of Modern BrE Phonology** (**MD Model of Modern BrE Phonology** for short) was constructed to analyze, study and explain pronunciations, syllabifications and word stresses in Modern BrE which could not be settled in the theoretical framework of OT alone.

Three questions will be answered in this research. First, which are the constraints of pronunciations, syllabifications and word stresses in Modern BrE words and how are they ranked? Second, is the theoretical framework of OT qualified in answering

those questions? Third, is the **MD Model of Moder**n **BrE Phonology** of assistant of OT in explaining those questions?

This thesis has five chapters.

In the first chapter, the introduction, the topic of this research, data-collection, organization and significance of the thesis would be given.

Literature review and approach of this research is in Chapter 2. By an investigation on the internet such as http://www.cnki.net, http://www.google.cn, http://www.sciencedirect.com, and the history of Chinese and Western linguistic research, it is known that pronunciations, syllabifications or word stresses of Modern BrE had been studied from different branches or schools of linguistics (besides Optimality Theory) or from different disciplines. And, it seems that a synthesis study of phonology in Modern BrE by Optimality Theory (OT) is seldom seen at home and abroad. Meanwhile, OT is restrained in solving Modern BrE pronunciations in its own theoretical framework. Therefore, under the guidance of SUCCESSION, REFERENCE, SUSPICION, HYPOTHESIS, EXPLORATION and VERIFICATION, **MD Model of Modern BrE Phonology** is hypothesized as the approach of this thesis.

Chapter 3 is the OT analysis of Modern BrE words in *A-/a-* ending in vowels phonologically. First, these words are described in syllabifications and word stresses. Then, syllabifications and word stresses will be analyzed in OT to find out the constraints and constraint hierarchies. And the pronunciations of these words could not be explained satisfactorily in the theoretical framework of OT. It is said in this research that it could be done with the assistant of **MD Model of Modern BrE Phonology**.

A Modern BrE word *acacia* is taken as the example to explain its pronunciation, as well as its syllabification and word stress in **MD Model of Modern BrE Phonology**. After that, how to operate the model is introduced. And, this is the content of Chapter 4.

The conclusion and prospect is in Chapter 5. The **MD Model of Modern BrE Phonology** which is aimed at phonology with the characteristics of cross-disciplinary, synthesis and entirety, broadens, deepens and strengthens OT in explaining phonology and makes a little contribution to OT. Phonological study of Modern BrE is a part of the study of Modern BrE. It is not only an essential composition of Indo-European phonological study and phonological study of human natural language, but also is a

reference from which Chinese phonological study could draw. In a word, this research has an important significance theoretically and practically. Finally, it is hypothesized that a **Multi-Dimensional Model of Phonology** (**MD Model of Phonology** for short) that might be applied to other languages based at the **MD Model of Modern BrE Phonology**.

There is no end to learning. The **MD Model of Modern BrE Phonology** still needs to be improved and developed in later study and research, and needs to be testified by more phonological facts.

Key Words: Modern British English Phonology; Multi-Dimensional Model of Modern BrE Phonology; Constraint and Constraint Hierarchy; Optimality Theory; Multi-Dimensional Model of Phonology

Contents

Chapter 1 Introduction

One said, "τὸ γὰρ ζητεῖν ἄρα καὶ τὸ μανθάνειν ἀνάμνησις ὅλον ἐστίν" (Leeb 2006:143)[1]. Some may agree with what he or she said, and the others may not. It is what Plato (427-347 BC), an Ancient Greek philosopher, said about 2400 years ago. Without the discussion of content in this sentence herein, as it is generally impossible (or probably unrealistically) for most of people at present to refer to the one who spoke that in original language (here, it refers to Classical Greek), then one would like to share his/her opinion with others in written or spoken form of one's own language. In Classical Greek, the name of that Ancient Greek philosopher is written as Πλάτων, pronouncing as /pláto:n/[2]; in Latin, it is written as Platō(n), pronouncing as /'plato:(n)/; in Modern British English (Modern BrE for short), it is written as *Plato*, pronouncing as /'pleɪtəʊ/; In Modern French, it is written as *Platon*, pronouncing as /platɔ̃/; in Modern Chinese, it is written as 柏拉图, pronouncing as bǎilātú. From the above examples, it could be seen that those languages have their own spoken and written forms[3] to refer to the same Ancient Greek philosopher.

Let's take *Plato* in Modern BrE as the example. What interest the author are the discrepancies in their pronunciations and the similarities in their syllabifications and word stresses, compared with Latin; and the discrepancies in their pronunciations and word stresses and the similarities in their syllabifications, compared with Classical Greek. Which reason causes their differences and similarities? ···Although these questions had or have been solved, and they still need to be further analyzed to make improvement and supplement for the deficiency of former researches confined by social and historical reasons. And, those questions will be answered in a **Multi-Dimensional Model of Modern British English Phonology** (**MD Model of Modern BrE Phonology** for short) in this thesis.

1.1 Topic of the Thesis and Data-Collection

In this thesis, Modern BrE words, as the topic of the thesis, will be investigated

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[1] This sentence, in original Greek, means that *all research and study is to remember*.
[2] The symbol ' ´ ' means that it is acute in Classical Greek. And it is also used in representing its pronunciation. One could see the relavant introduction of word stress in Classsical Greek in any books concerned with the grammar of Classical Greek.
[3] Definitely, there are languages that have the same in spoken form or/and written form in referring to that philosopher.

phonologically, *e.g.* pronunciations, syllabifications and word stresses. There are thousands of words in Modern BrE. Therefore, it is impossible to study all the Modern BrE words in this short thesis. Concretely, those words in *A-/a-* ending in vowels[4] will be taken as the examples to be studied herein.

Then, the research data could be collected in two ways. One is from dictionaries, besides monolingual dictionaries, or bilingual dictionaries, or multilingual dictionaries, or even glossaries; the other is from the actual linguistic data, including spoken data or written data. The advantage of the latter lies in that the data might be updated to reflect the words in a language. And sometimes the words are repetitive in the latter. It is undesirable and unrealistic to choose the latter as dictionaries had done this work. So, data-collection from dictionaries is preferable in this thesis. Modern BrE words, which should be representative, could not be collected in professional ones or specialized ones. Therefore, *Pocket Oxford English-Dictionary* (New Edition) (Thompson, D 2000:1-63) (POECD for short) which is one of the most authoritative ones in the world and has 65,000 entries is more suitable to have a general and representative impression of words in Modern BrE.

1.2 Organization of the Thesis

This thesis has five chapters.

In the first chapter, the introduction, the topic of this research, data-collection, organization and significance of the thesis would be given.

Literature review and approach of this research is in Chapter 2. By an investigation on the internet such as http://www.cnki.net, http://www.google.cn, http://www.sciencedirect.com, and the history of Chinese and Western linguistic research, it is known that pronunciations, syllabifications or word stresses of Modern BrE had been studied from different branches or schools of linguistics (besides Optimality Theory) or from different disciplines. And, it seems that a synthesis study of phonology in Modern BrE by Optimality Theory (OT) is seldom seen at home and abroad. Meanwhile, OT is restrained in solving Modern BrE pronunciations in its own theoretical framework. Therefore, under the guidance of "SUCCESSION, REFERENCE, SUSPICION, HYPOTHESIS, EXPLORATION and

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[4] Words ending in vowels are equivalent to open syllable. Though open syllable in many languages refers to words ending in vowels, we would like to use words ending in vowels instead of open syllables in the thesis to avoid confusion because of two kinds of open syllables in English – absolute open syllable (like *banana*) which is equivalent to words ending in vowels, and relative open syllable (like *name*) which is not.

VERIFICATION" (Lu Jianming 2005:5), **MD Model of Modern BrE Phonology** is hypothesized as the approach of this thesis.

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1.3 Significance

The significance of the thesis is concluded in the following:

1. The constraints and constraint hierarchies of syllabifications and word stresses are found in Modern BrE words in *A-/a-* ending vowels in the framework of OT. By them, it would be clearly seen which factors impact Modern BrE words phonologically.

2. OT will be supplemented, modified or improved by **MD Model of Modern BrE Phonology**. Assisted by the model, what a modern language is alike and how they are changed could be clearly and generally illustrated.

3. The model, which is not only applied to Modern BrE, but also to other languages, contributes to phonology researches.

4. In linguistic teaching, as schema is effective in teaching from cognition, it could be used to have a visual image to make students to have a better understanding of what a modern language is alike and how they are changed.

Chapter 2 Literature Review and Approach of this Research

A general review was made from two aspects covering researches on the internet or in the books or in documents at home and abroad, one is from the internet---http://www.cnki.net/, http://www.google.cn, and http://www.sciencedirect.com; the other is from the History of Chinese and Western Linguistics.

As the background, development, basic framework, core idea, (operation) procedure and (operation) method of OT (Wang Jialing 1995; Li Bing 1998; Jiang Ping 2005; Ma Qiuwu 2008) have been introduced and discussed at home and abroad. The introduction of OT is directly quoted from *Linguistics: An Advanced Course Book* (Hu Zhuanglin & Jiang Wangqi 2002:109-113) with a little modification. And **MD Model of Modern BrE Phonology** would be the approach of this thesis in OT.

2.1 Literature Review

Words, which have been explored hundreds of years, could be studied diachronically or synchronically from different branches of linguistics, such as phonology, morphology, syntax, semantics, pragmatics, stylistics, translation and second language acquisition, or from different schools of linguistics, such as traditional linguistics, historical comparative linguistic, structuralist linguistics, generative linguistics, social linguistics, psycholinguistics, neurolinguistics, functional linguistics, cognitive linguistics and corpus linguistics, or from different disciplines. Whichever one is used in studying words could be useful in approaching the rules or nature of words.

Focused on title, theme, content and keyword in http://www.cnki.net/, the keywords like *English*, *Modern British English*, *pronunciation*, *syllable*, *syllabification*, *word stress* and *Optimality Theory* are searched among journals, Ph.Dissertations, M.A Theses, conference papers to find some relevant researches concerned with this research. It could be seen that though English and those linguistic phenomenon have studied, discussed or mentioned in journals, Ph.Dissertations, M.A Theses, conference papers, it is relatively less to study Modern BrE words phonologically from OT. The review is also done in http://www.google.cn. And a database of OT was found in The Rutgers Optimality Archive (http://roa.rutgers.edu/index.php3) in which there is a few papers concerned with this research. Lastly, the research is also done in http://www.sciencedirect.com. As a

whole, this research is workable after a general review of this research on the Internet.

Traditional Chinese linguistics and Western linguistics (especially 19th century comparative-historical linguistics) both had studied words ending in vowels. Chinese phonology, as one of the most important branches in traditional Chinese linguistics, studies the structure and evolvement of sound. And, Chinese rhymes consist of *yunmu* and *shengmu*. Here, the study of rhyme, especially the thymes of vowels are very similar to that of this research. Some terms in traditional Chinese phonology, like 尾韵, 无韵尾, 阴声韵 and 开尾韵母, are equivalent to words ending in vowels.

In western linguistics, words studied from phonology have experienced historical linguistic, structuralism, generative phonology, and so on.

In China, there is a book – *A Study of English Phonological System* by Zhang Jisheng which might be the first book on English phonology systematically and theoretically. While, at abroad, especially Europe and America, there are more books on English phonology. And there are many books, such as *Optimality Theory and Language Change* published at abroad.

Because, there are plenty of researches concerned with English words phonologically at home and abroad. And it is impossible to mention them in detail in this short literature review.

As is known, words from phonology have been studied broadly and deeply in previous researches. Why the author still chooses this topic to make a research will be answered in the next section.

2.2 Rationale for Selecting the Topic of this Thesis

Humboldt once said: "However much in it we may fix and embody, dismember and dissect, there always remains something unknown left over in it, and precisely this which escapes treatment is that wherein the unity and breath of a living thing resides." (Humboldt 2008:51)

Phenomenally, synchronic study of a language, as a characteristic in Modern linguistic researches, has its advantages and weakness. The deficiency of it, the author thinks, lies in that one might be confused or puzzled at its diversity, complexity or even contradiction in a language facts from a synchronic view. Taking the Modern BrE words in *A-/a-* ending in vowels as an example, their syllabifications are influenced, singly or mutually, by phonotactic, morphology, etymology and word stress; their word stresses have some contradictions; their pronunciations are not

identical with their written forms. Fortunately, on the shoulders of former and present researchers, it might be possible to have a chance to know what the sound was like or pronounced in certain period of the past, as they did their best to reconstruct the past sound with a great detail.

Theoretically, their explanations are from various perspectives, such as regional influences, or language contact, or culture impact and so on. While the theoretical framework of OT or its modification and supplementation is unqualified in explaining the linguistic facts that are found in pronunciations, syllabifications and word stresses in Modern BrE words.

That gives a hint that a model acting as the formalization of words studied from phonology and drawing support from the theoretical framework of OT is used to solve those questions of Modern BrE words unsettled by synchronic study.

That is why *A Multi-Dimensional Model of Modern British English Phonology* selected as the topic of this thesis. And we would like to mix, or combine, or synthesize fruitfulness and shining-points of the past researches in analyzing linguistic data. In the next section, **MD Model of Modern BrE Phonology** will be introduced after a brief view of OT.

2.3 Approach of this Research

2.3.1 Optimality Theory

2.3.1.1 Brief Introduction

As what is written in *Linguistics: An Advanced Course Book* ((Hu Zhuanglin & Jiang Wangqi 2002:109-113)), "OPTIMALITY THEORY (OT) was developed by Prince and Smolensky (1993) and has been the leading model of phonological research in the past decade. OT presents a very different view of phonological studies and is now also used in the study of syntax and language acquisition. This is a **CONSTRAINT-BASED APPROACH** instead of the **DERIVATIONAL APPROACH** as inaugurated by Chomsky & Halle (1968) in their **SPE**. The derivational approach normally takes the form "X becomes Y in the context of Z" ($X \rightarrow Y/\_Z\_$). For example, the following rules are typical of **DERIVATIONAL RULES** as we have seen so far:

    a. Devoicing: A voiced abstruent becomes voiceless after a voiceless obstruent.

    b. ə-insertion: Insert [ə] between two adjacent sibilants in the same word.

The constraint-based approach is based on the following assumptions:

1) Constraints are universal.

2) Languages differ in the importance they attach to the various constraints so the phonology of a language is given by the ranking of the set of universal constraints.

3) Constraints may be contradictory and violated – the higher ranked one has priority.

The constraints take the following format:

a. ***SIBSIB**: Sequences of sibilants are prohibited within the word.

b. **MAX-IO**: Deletion of segments is prohibited.

c. **DEP-IO**: Insertion of segments is prohibited.

d. ***αVOICE-αVOICE**: Sequences of obstruents within the syllable must agree for voicing.

e. **IDENT-IO**: A segment in the input is identical to the corresponding segment in the output.

The OT grammar consists of three components:

LEXICON: contain lexical representations (or underlying forms) of morphemes, which form the input to:

GENERATOR: generates output candidates for some input, and submits these to:

EVALUATOR: Such a grammar is an input-output mechanism:

Gen (**input**) → {$cand_1$, $cand_2$, …$cand_n$}

Eval {$cand_1$, $cand_2$, …$cand_n$} → **output**

 (Kager, 1999:19)

Which is shown in Fig.1.
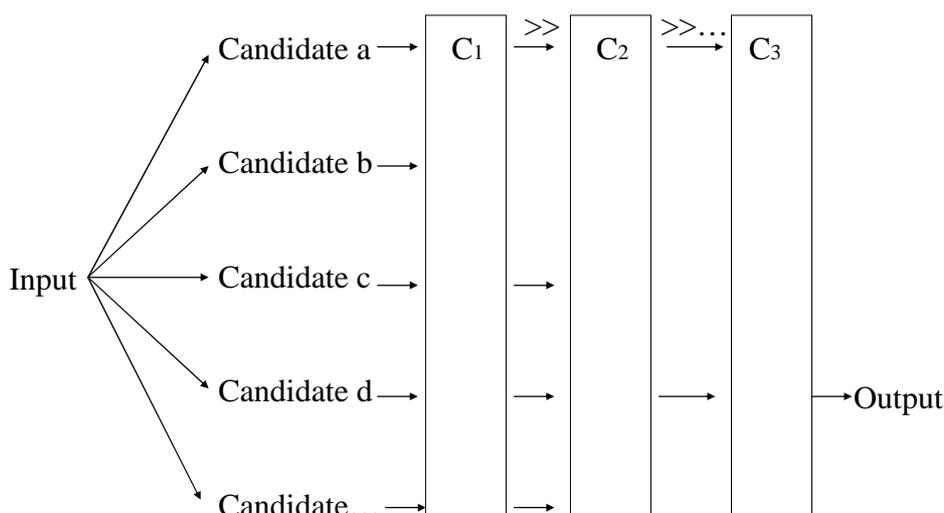
Fig.2.1 Mapping of input to output in OT (Source: Kager, 1999:8)

There are two types of constraints:

1) **MARKEDNESS CONSTRAINTS**: require that output forms meet some criterion of structural well-formedness. They take the form of prohibitions of marked phonological structures.

2) **FAITHFULNESS CONSTRAINTS**: requires that outputs preserve the properties of their basic (lexical) forms, requiring some kind of similarity between the output and its input.

Other examples of markedness constraints include:

    a. Vowels must not be nasal.

    b. Syllables must not have codas.

    c. Obstruents must not be voiced in coda position.

    d. Sonorants must be voiced.

    e. Syllables must have onsets.

    f. Obstruents must be voiced after nasals.

Other examples of faithfulness constraints are:

    a. The output must preserve all segments present in the input.

    b. The output must preserve the linear order of segments in the input.

    c. Output segments must have counterparts in the input.

    d. Output segments and input segments must share values for [voice].

Some basic notions of OT are:

1) **UNIVERSALITY**: constraints are universal.

2) **VIOLABILITY**: constraints are violable, but violation must be minimal.

3) **OPTIMALITY**: an output is "optimal" when it incurs the least serious violations of a set of constraints, taking into account their hierarchical ranking.

4) **DOMINATION**: the higher-ranked of a pair of conflicting constraints takes precedence over the lower-ranked one.

The ranking of constraints can be demonstrated by a tableau demonstrated in Fig.2:"

Fig2.2 A tableau of simple domination

Input: //		Constraint 1	Constraint 2
Output	a. ☞ Candidate [a]		*
	b. Candidate [b]	*!	

"Symbols commonly used in the tableau are the followings:

'//', slashes refer to input form;

'[]', square brackets refer to output candidates (and sometime it is used in the tableau);

'☞', figure-like index refers to the optimal candidate;

'>>', arrow (read as 'dominates') refers to relation of hierarchy of constraints. The constraints in the left of the ">>" are important to those in the right;

'*', asterisk refers to violate the constraint. And the number of "*" means that how many times do the candidate violate the constraint;

'!', exclamation mark refers to fatal violation of constraint, causing the candidate to be eliminated." (Jiang Ping 2005:300)

"The optimal candidate is marked by the index '☞'. This candidate is (2a), which has no violation of the higher-ranked constraint C_1, a constraint violated by its competitor (2b). Note that the optimal candidate (8a) is actually not impeccable itself: it has a violation of C_2, but this flaw is insignificant to the outcome. Although the pattern of violations for C_2 is the revere of that for C_1, this does not help candidate b. Its violation of C_1 is already fatal, indicated by the accompanying exclamation mark '!' and the shading of cells whose violation content is no longer relevant. In sum, candidate (2a) is optimal as *no candidate* is available that fares better, satisfying *both constraints* at the same time. A violation of C_2 is taken for granted, as long as C_1 can be satisfied." (Kager 2001:13)

2.3.1.2 Scope of Linguistic Research and Recently Developments in OT

After *Optimality Theory: Constraint Interaction in Generative Grammar*, as the fundamental work of OT, which had been written by Alan Prince and Paul Smolensky.

It is not only used in phonology, but also in syntax, semantics, historical linguistics, first language acquisition, child language acquisition, foreign language learning, information processing of human brain imitated by computer and social linguistics. OT has been being vital in explaining the linguistic phenomenon, and is a universal linguistic theory (Jiang Ping 2005; Ma Qiuwu 2008).

Relatively speaking, the new-borne, by developing what is positive and discarding what is negative in its former-borne, is much better than the old. Then, later, the new-borne would be modified or supplemented internally, or might be sublated by another new-borne. That is irresistible in developing. In dealing with practical or actual linguistic data, OT shows its advantages in describing and explaining them, than its previous theory, but produces some problems that OT can not solve itself. 'To be, or not to be'? Happily, authors, researchers or others interested in OT have been modifying this theory, refreshing OT with some new theories, models, methods or others under the framework of OT, like Comparative Markedness Theory (McCarthy 2002; Wang Maolin & Gong Qi 2007: 17-23), Correspondence Theory (Kager 2001: 248-252), Sympathy Theory (Zuo Yan 1999: 308-326), Stochastic Optimality Theory (Yang Jun 2007:117-127), and OT with Candidate Chains (Ma Qiuwu 2008:315-328) are born to help to improve the Optimality Theory, giving vitality, vigour and energy to it. But, it still has thorny problems in analyzing pronunciations, word stresses or even syllabifications of Modern BrE words. And, those problems, which are not satisfactorily settled in the theoretical framework of OT, might be solved by **MD Model of Modern BrE Phonology**.

2.3.2 A Multi-Dimensional Model of Modern British English Phonology

"If I have seen further it is by standing on the shoulders of giants."[5]
- Isaac Newton, letter to Robert Hooke, 1676

Based at substantial achievements and fruitful experiences of the former and the present researches, and inspired by संसार[6], a new model called **MD Model of Modern BrE Phonology** would be used in this thesis to describe and explain Modern BrE words in *A-/a-* ending in vowels to reflect their etymology with a synchronic and diachronic view.

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[5] http://en.wikiquote.org/wiki/Isaac_Newton
[6] A Sanskrit word saṃsāra, refers to (of a life) transmigrate eternally within six realms, including paradise, hell and the human world, like an ever-turning wheel. It is quoated from The Contemporary Chinese Dictionary (Chinese-English Edtion) (Dictionary Department, Institute of Linguistics, Chinese Academy of Social Sciences. Beijing: Foreign Language Teaching and Research Press. 2002. p1274)

"McCarthy (2002:10) used the following figure to represent basic structure of OT:" (Jiang Ping 2005:293)

INPUT → GENERATOR → CANDIDATE → EVALUATOR → OUTPUT

Figure 2.3 basic structure of OT

OT regards the input is universal and infinite. From the actual linguistic data of Modern BrE, it is found that Modern BrE words in *A-/a-* ending in vowels[7] coming from Anglo-French, Arabic, Aymara or Quechua, (Classical) Latin, (Classical) Greek, Ecclesiastical Latin, French, Germanic, Hebrew, Italian, Medieval Latin, Mexican Spanish, Middle English, Modern Hebrew, Modern Latin, Late Latin, Old English, Old French, Old Norse, Persian, Romanic, Sanskrit, Sinhalese, Spanish, Spanish and Portuguese and West Germanic[8]. It could be understood that the etymology of Modern BrE will be larger than the above ones if the statistics extends. As a whole, the languages mentioned above could be classified as native (like Old English and Middle English) and non-native (like French, Latin, and Persian and so on). So, the input should consist of two parts: native and non-native. Meanwhile, linguistic researches have two perspectives—diachronic and synchronic, distinguished by de Saussure. Their relations will be shown in the following figure:

Input of Modern BrE

NATIVE

NON—NATIVE

SYNCHRONIC DIACHRONIC

SYNCHRONIC DIACHRONIC
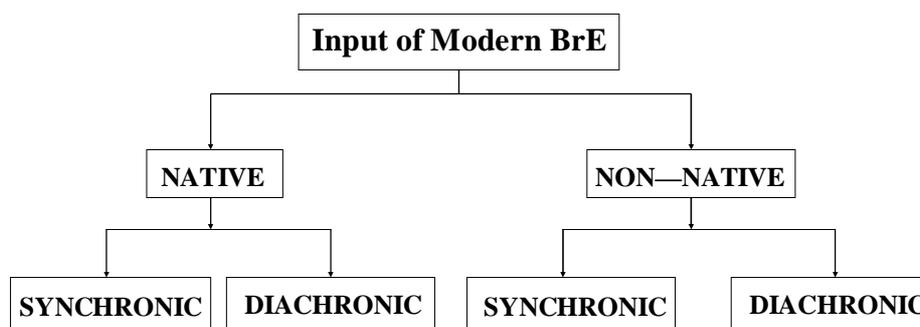
Figure 2.4 the input of Modern BrE words

Generally, English (here it refers to British English) has four periods: Old English, Middle English, Early Modern English and Modern (British) English.

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[7] Modern BrE words in A-/a- ending in vowels in POECD are listed in Appendix.
[8] The etymology of Modern BrE words in A-/a- ending in vowels, based on those collected in POECD, are mainly found in *Concise Oxford English Dictionary* (Ninth Edition) with the reference in other dictionaries such as *Etymology of English*, *Origins: A Short Etymology Dictionary of Modern English* and *The Oxford Dictionary of English Etymology*.

Historical phonetically or phonologically speaking, Modern BrE words are phonological sediment or product of accumulation of English phonological history. For example, if a word which is still in Modern BrE was born in Old English period, it must undergo four periods to be a Modern BrE word; if a word that is still in Modern BrE was born in Middle English period, it must undergo three periods to be a Modern BrE word; if a word which is still in Modern BrE was born in Early Modern English period, it must undergo two periods to be a Modern BrE word; if a word which is still in Modern BrE was born in Modern British English period, it must undergo one periods to be a Modern BrE word. Phonologically, each one has its own rule governing pronunciation, syllabification and word stress. Compared with the other period, some rules may be distinct and others may be the same. The following figure shows it clearly. And the dotted lines below indicate the words might be appeared in any periods, and the real lines refer to that rules they must experience.
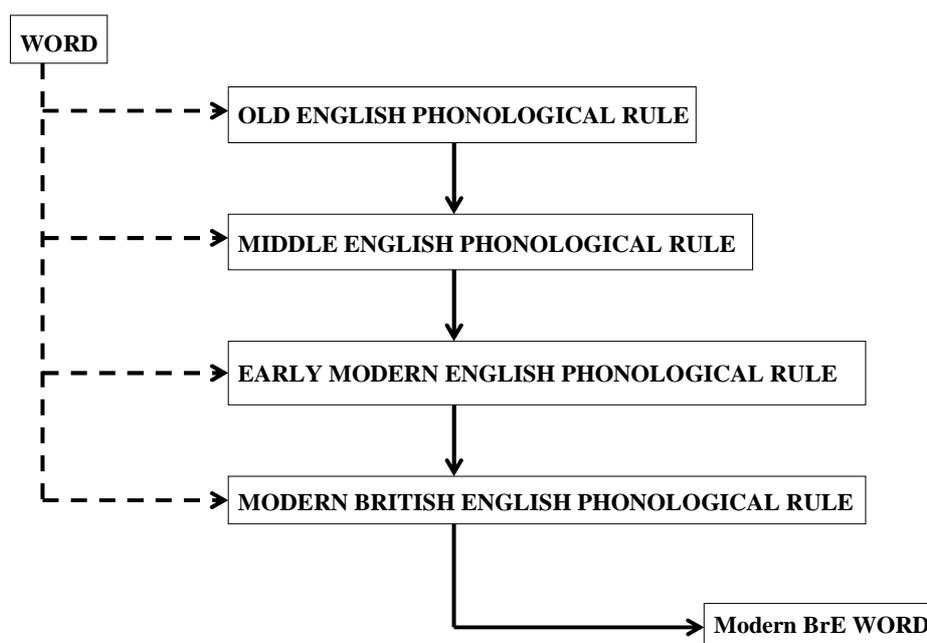
Figure 2.5 how to be Modern BrE words

In OT, the expression of phonological rule is constraints and constraint hierarchy. And the constraint hierarchy is usually symbolized as $\mathcal{H}$ (Ma Qiuwu 2008:31). Merged with Figure 2.4 and Figure 2.5, Figure 2.3 is taken as the theoretical framework to produce a model called **MD Model of Modern BrE Phonology** for short. The following figure will demonstrate what it is like.
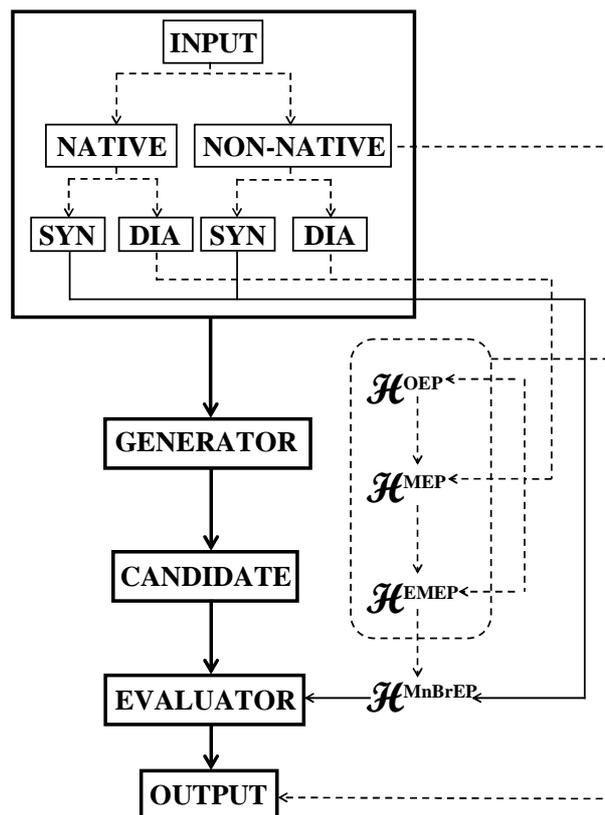
Figure 2.6 Multi-Dimensional Model of Modern BrE Phonology

Basically, the model is the same as the theoretical framework of OT with the addition of **NATIVE**, **NON-NATIVE**, **SYN**, **DIA**, $\mathcal{H}^{OEP}$, $\mathcal{H}^{MEP}$, $\mathcal{H}^{EMEP}$ and $\mathcal{H}^{MnBrEP}$. First, what they refer to is introduced below:

NATIVE: it means that the words which are still in Modern BrE are born natively, coming up in Old English, or Middle English, or Early Modern English, or Modern British English.

NON-NATIVE: it means that the words which are still in Modern BrE are born non-natively, borrowing from other languages, like French, German, Spanish, Sanskrit, Greek, Latin and so on.

SYN: it is the short form of synchrony. And it means that the words whether they are native or non-native, coming up in Modern BrE in Modern times.

DIA: it is the short form of diachrony. And it means that the words whether they are native or non-native, coming up in or brought into Modern BrE in Old English period, or Middle English period, or Early Modern English period, but Modern British English period.

$\mathcal{H}^{OEP}$: it refers to the constraint hierarchy of Old English phonology.

$\mathcal{H}^{MEP}$: it refers to the constraint hierarchy of Middle English phonology.

$\mathcal{H}^{\textbf{EMEP}}$: it refers to the constraint hierarchy of Early Modern English phonology.

$\mathcal{H}^{\textbf{MnBrEP}}$: it refers to the constraint hierarchy of Modern BrE phonology.

And it is argued that this model divides the **INPUT** into two parts, **NATIVE** and **NON-NATIVE**, then further into four sub-parts by **SYN** and **DIA** from that two. Is it against OT which distinguish itself, from Generative Phonology (GP for short), by constraining the output and GP the input. As what is briefly and generally mentioned in discussing Figure 2.4, the actual linguistic data provides a fact that the **INPUT** is composed of what is added herein. Generally, language is not static, but dynamic; language is not closed, but open; language is not isolated, but contacted. Shall we make a conclusion that **INPUT** may has two understandings? One is universal and infinite without constraining is for human natural language, and the other means is consisted of several parts, like native, non-native, synchrony and diachrony, is for one specific or certain language. Certainly, the words appeared in different historical periods of English might be in accordance with the input that OT thinks is universal and infinite. In other words, from the aspect of **NON-NATIVE**, a language probably would not borrow words from other languages in universal or infinite way. Because if A language borrow the needed words from B language, then those words in B language are 'finished products' What A language to do is just to change or preserve them partially or wholly in A's constraint hierarchy. This model takes its latter meaning. The best design of a model, the author thinks, should be the crystallization of actual linguistic data or facts originated from the real language facts.

At the top of the model, there is a big square in bold lines (referring to etymology) of Modern BrE in which **INPUT** is divided into two parts. **NATIVE** which is further divided into **SYN** and **DIA**, and **NON-NATIVE** which is also further divided into **SYN** and **DIA**. The relation between them which is circled in a small square is connected by the arrows '→' which are indicated by the dotted lines below. They are seen as the input entirely, entering into OT's operational procedures, like **GENERATOR**, **CANDIDATE**, **EVALUATOR** and **OUPUT** with each one circled in a small square.

If the input is native or non-native synchronically, without considering **GENERATOR** and **CANDIDATE**, but **EVELUATOR** for OT's sake which would be the key it should undergo $\mathcal{H}^{\textbf{MnBrEP}}$ to make it to be the optimal or real output in Modern BrE. The relation between them is represented by lines below **NATIVE**'s **SYN** and **NON-NATIVE**'s **SYN** joint together to be an arrow pointing to

EVALUATOR through $\mathcal{H}^{\text{MnBrEP}}$.

If the input is native or non-native diachronically, without considering **GENERATOR** and **CANDIDATE**, but **EVELUATOR** for OT's sake which would be the key, it is relatively complex to be the optimal or real output. There are three cases that might happen here. First, if the input was born in Old English period, it must undergo $\mathcal{H}^{\text{OEP}}$, $\mathcal{H}^{\text{MEP}}$, $\mathcal{H}^{\text{EMEP}}$, and $\mathcal{H}^{\text{MnBrEP}}$ to be the optimal or real output in Modern BrE. Second, if the input was born in Middle English period, it must undergo $\mathcal{H}^{\text{MEP}}$, $\mathcal{H}^{\text{EMEP}}$, and $\mathcal{H}^{\text{MnBrEP}}$ to be the optimal or real output in Modern BrE. Third, if the input was born in Early Modern English period, it must undergo $\mathcal{H}^{\text{EMEP}}$ and $\mathcal{H}^{\text{MnBrEP}}$, being the optimal or real output in Modern BrE. The relations between them are represented by dotted lines below **NATIVE**'s **DIA** and **NON-NATIVE**'s **DIA** joint together with the dotted lines of arrows, which points to **EVALUATOR** through $\mathcal{H}^{\text{MnBrEP}}$, showing their orientation diachronically, but separating themselves in a square in lines of dashes (referring to self-evolution of English) in which contains $\mathcal{H}^{\text{OEP}}$, $\mathcal{H}^{\text{MEP}}$, and $\mathcal{H}^{\text{EMEP}}$. What contains in the square could be regarded as variable quantities meaning that words appeared in different historical periods. $\mathcal{H}^{\text{MnBrEP}}$, which is not included in that square, is what the input must or have to experience. So, the line left or right is in bold line to represent certainty. And the lines above it are dotted to represent multi-choices of words coming up or born in English history.

There is another long arrow with dotted lines and line of dashes connecting **NON-NATIVE** and a square with dotted lines concerning $\mathcal{H}^{\text{OEP}}$, $\mathcal{H}^{\text{MEP}}$ and $\mathcal{H}^{\text{EMEP}}$ with **OUTPUT**. Theoretically that means the input might be 'lucky survivor'. Realistically, it means that sound, or syllabification, or word stress preserved singly or mutually, after borrowing words from other languages or producing words internally in its own history, in the output. That is why the dotted linear are used above $\mathcal{H}^{\text{MnBrEP}}$, but not the real line, compared with Figure 2.5.

Finally, the **OUPUT** of the model would produce (optimal or real) Modern BrE words ending in vowels.

The model is still in OT with the consideration of etymology into **INPUT**, the different historical periods of phonological rules in a language into **EVALUATION** and the dotted lines and line of dashes connecting **NON-NATIVE** and **NATIVE**'s **DIA** with **OUTPUT**. That means the input might be 'lucky survivor', theoretically. While how to operate this model will be explained in Chapter Four.

Chapter 3 Optimal Analysis of Modern BrE Words

As far as we know, $\mathcal{H}^{MnBrEP}$ is of importance in **MD Model of Modern BrE Phonology**. Meanwhile, the thesis is around Modern BrE words discussing that model. Then, the phonological constraints and constraint hierarchies[9] need to be found in Modern BrE words in *A-/a-* ending in vowels. There is no doubt that syllabifications and word stresses might be probably analyzed in OT. What about the pronunciations in Modern BrE? Generally speaking, in Old English period, the pronunciations of Old English words were similar or identical with their spellings. And gradually the stable relation between spellings and pronunciations had been changed in English words as the history (of English language) goes forward. One could read any books concerned with history of English to know English history, English evolution and the reason of discrepancies between English spelling and pronunciation, and we will not go further on this issue.

"Almost everyone could read and write in the age when the pronunciation (of Modern BrE) is influenced greatly by spelling." (Massey, F 1990:152) And more and more words are enunciated by their spellings. At present, there is a truth, for historical and etymological reasons, that Modern BrE spellings are still not identical to their pronunciations though some words are not. Certainly, Modern BrE syllabifications and word stresses, which might be explained by constraint and constraint hierarchy in OT, also change diachronically and etymologically. Without tracing their 'ancestors', $\mathcal{H}^{MnBrEP}$ could not be possibly work out. If one wants to find out constraints and constraint hierarchies in Modern BrE words' pronunciations, one has to deal with them historically and etymologically.

In this Chapter, the description of Modern BrE words in *A-/a-* ending in vowels is first shown. After that, OT will be used to find out constraints and constraint hierarchies of Modern BrE syllabifications and word stresses without first taking their pronunciations which will be dealt with in Chapter Four into analysis.

3.1 Description of Modern BrE Words

How to collect data in this thesis is clearly illustrated in 1.1. *Pocket Oxford English-Chinese Dictionary* (New Edition) (POECD), which is favourable, has its

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[9] The phonological constraints and constraint hierarchies refer to the constraints and constraint hierarchies of pronunciations, of syllabifications and of word stresses in Modern BrE words in 'A-/a-' ending in vowels.

authority in the dictionary-compiling, and the words in this dictionary may represent Modern BrE generally. And the data-collection of Modern BrE words is confined to those ones in *A-/a-* ending in vowels.

From the pronunciation symbols used in POECD (Thompson, D 2002: xxiv), it is known that English has 47 phonemes of which 22 are vowels[10] and 25 are consonants[11]. Though English phonemes in different books are different in number or symbolic representation, symbols used in POECD is the criterion herein.

The items collected in POECD, in which the compounds, phrases and words with hyphen are excluded in collecting data, should be words printed in bold type. And, Modern BrE words in *A-/a-* ending in vowels in POECD are all listed in Appendix I.

3.1.1 Syllables and Syllabifications in Modern BrE words

In **MD Model of Modern BrE Phonology**, $\mathcal{H}^{\text{MnBrEP}}$ which plays a key role has three components of which are constraint hierarchies of pronunciations, of syllabifications, and of word stresses in Modern BrE words. And the model should be general and abstracted so that the three sub-divisions of phonological constraint hierarchies is not indicated in it.

"Recent work in phonology makes use of a rather more refined analysis of the syllable in which the vowels and the coda (if there is one) are known as the **thyme**; if you think of rhyming English verse you will see that this works by matching just that part of the last syllable of a line. The rhyme is divided into the **peak** (normally the vowel) and the **coda** (but note that this is *optional*-the rhyme may have no coda, as in a word like 'me'). As we have seen, the syllable may also have an onset, but this is not obligatory. The structure is thus the following." (Roach, P 2000:73)

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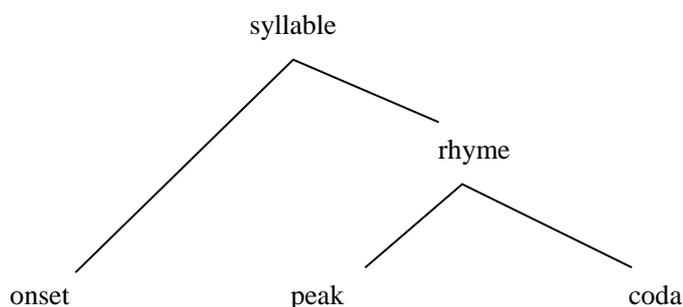
[10] 22 vowels in POECD includes /æ/, /ɑː/, /e/, /ɜː/, /ɪ/, /iː/, /ɒ/, /ɔː/, /ʌ/, /ʊ/, /uː/, /ə/, /aɪ/, /aʊ/, /eɪ/, /əʊ/, /eə/, /ɪə/, /ɔɪ/, /ʊə/, /aɪə/, and /aʊə/.

[11] 25 consonants in POECD are /b/, /d/, /f/, /g/, /h/, /j/, /k/, /l/, /m/, /n/, /p/, /r/, /s/, /t/, /v/, /w/, /z/, /ʃ/, /ʒ/, /θ/, /ð/, /ŋ/, /x/, /tʃ/ and /dʒ/.

Diagram 3.1 syllable structure

"Syllables are often considered the phonological 'building blocks' of words. They can influence the rhythm of a language, its prosody, its poetic meter, its stress patterns, etc." [12]

In *Oxford Concise Companion to the English Language*, syllable is defined as "the smallest unit of SPEECH that normally occurs in isolation, consisting of either a vowel alone (as in the pronunciation of *ah*) or a combination of vowel and consonant(s) (as in the pronunciation of *no*, *on*, and *non*. Some consonants can be pronounced alone (*mmm*, *zzz*), and may or may not be regarded as syllables, but they normally accompany vowels, which tend to occupy the central position in a syllable (the *syllabic position*), as in *pap*, *pep*, *pip*, *pup*. Consonants occupy the margins of syllable, as with *p* in the examples just given. A vowel in the syllable margin is often referred to as a *glide*, as in the *ebb* and *bay*. *Syllabic consonants* occur in the second syllables of words like *middle* and *midden*, replacing a sequence of schwa plus consonant; here, the time needed to pronounce the SCHWA is transferred to the following consonant: for example, in the pronunciation /ˈmidl/ for *middle* and /ˈmidn/ for *midden*. As the example show, a syllabic consonant is marked phonetically with a subscript vertical dash (ˌ)···A syllable standing alone is a *monosyllable*, and may be a word in its own right, as with *a*, *an*, *big*, *car*, *no*, *the*, *yes*. A word containing many syllables is a *polysyllable* or *polysyllabic* word, such as *selectivity* and *utilirarianism*. A *disyllable* or *disyllabic word* has two syllables, a *trisyllable* or *trisyllabic word* has three" (McArthur, T & McArthur, R 2001:594).

And syllabification is defined as, '**SYLLABICATION**. also **syllabification**. The division of a word into SYLLABLES: either phonologically, in terms of speech sounds, or orthographically, in terms of letters. In orthographically, there may be correspondences with spoken syllables (*native* into *na tive*) and/or with elements of morphological and etymological significance (*nat·ive* from Latin natus born, and *-ive*). The two kinds of division do not always correspond. Neither syllable boundaries in speech nor morphological/etymological elements are always clear-cut, and the fact that the same word may be pronounced differently in different varieties of English can mean a different number of syllables and different syllable boundaries: *medicine* generally pronounced with two syllables in BrE and three in AmE. Nevertheless, orthographic syllabication is straightforward in many words, as with the division of

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[12] http://en.wikipedia.org/wiki/Syllable

postman into *post·man*, which satisfies phonetic, morphological, and etymological criteria in both BrE and AmE. Such a word as *structure* is more problematic: both BrE and AmE phonology dictate *struc·ture*, while morphology and etymology require *struct·ure*.It has been claimed that when such a conflict occurs, AmE favours the phonetic and BrE the morphological and etymological. Rules for syllabication are given in various style manuals: for BrE, *Hart's Rule for Compositors and Readers at the University Press Oxford* (1893: 39th edition, 1983); for AmE, *The Chicago Manual of Style* (13th edition, 1982)'(McArthur 2001:594).

The definition of syllable is also found in *Routledge Dictionary of Language and Linguistics* (Bussmann 2000:467), *The Grand Dictionary of Chinese Language* (Xia Zhengnong 2003:50), *POECD* (Thompson, D 2000:1162), *Cambridge International Dictionary of English (English-Chinese)(CIDE for short)* (Procter, P 2004:1413), *Longman Dictionary of Language Teaching & Applied Linguistics* (Richards, C.J. etc 2000:460-461) and *English Phonetics, Applying It to Communication Better* ((Meng Xianzhong, Cui Xizhi 1999:207)). And, the definition of syllabification is also found in *Longman Dictionary of Language Teaching & Applied Linguistics* (Richards, C.J. etc 2000:460).

Although the role of the syllable as a phonological unit was denied in Chomksy and Halle (1968), a number of researchers both before and after recognized its importance (e.g., Pike and Pike, 1947; Haugen, 1956; Fudge, 1969; Vennemann 1978) (Brown, Keith 2005: 10736)[13].

Evidence for the predictability of syllabification is that minimal pairs involving contrastive syllabification (e.g., V.CV vs. VC.V) are absent altogether in most — if not all — languages. Although exceptions to this generalization have been argued to exit (e.g., in Arrernte, see Breen and Pensalfini, 1999), it nevertheless remains true that in the vast majority of natural languages syllabification contrasts like the one described earlier do not exit (Brown, Keith 2005: 10737)[14].

From the definition of syllable and syllabification, it is known that syllable could be classified from the perspective of orthography and phonology. Syllabification in Modern BrE is sometimes not consistent with its pronunciation. Herein, MD Model of Modern BrE Phonology is discussed. And in this thesis syllable will be studied from phonology. Frankly speaking, syllabification in Modern BrE is not as easy as that in

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[13] Brown, Keith, etc. Encyclopedia of Language and Linguistics (2nd Edition). Elsevier Science Ltd. 2005-12-31 http://www.verycd.com/topics/182905/   p10736
[14] Brown, Keith, etc. Encyclopedia of Language and Linguistics (2nd Edition). Elsevier Science Ltd. 2005-12-31 http://www.verycd.com/topics/182905/   p10737

Spanish or Italian. Fortunately, a dictionary which is found to solve this problem possibly is CIDE in which both orthographic or phonological syllabification and BrE's and AmE's way of syllabification are given. Let's take some examples from CIDE to see their relations as in the following:

Table 3.1 relation of syllabification between orthography and phonology

		orthography	**phonology**
SAMENESS	ashy	ash·y	/ˈæʃ·ɪ/
	amber	am·ber	/ˈæm·bəʳ/
	ashore	a·shore	/əˈʃɔː/
DIFFERENCE	ability	a·bi·li·ty	/əˈbɪl·ɪ·tɪ/
	antiquity	an·ti·qui·ty	/ænˈtik·wə·tɪ/
	auspicious	aus·pi·cious	/ɔːˈspɪʃ·əs/

From the table 3.1, their relations are clearly shown. Some orthographic or phonological forms are the same while others not. Generally, the phonological form is our consideration. And, Modern BrE words in *A-/a-* ending in vowels are based on what have been collected in POECD besides their phonetic symbols and their phonetic transcription, taking the CIDE only as the reference to look up or check out syllabification in Modern BrE.

Syllabically, Modern BrE words in *A-/a-* ending in vowels in POECD has monosyllables (e.g., *are*), disyllables (e.g., *adore*), trisyllables (e.g., *abattoir*), quarisyllables (e.g., *academy*), quinque syllables (e.g., *anniversary*), and six syllables (e.g., *apologetically*) and seven syllables (e.g, artificiality). And, the syllabifications which are found in CIDE are listed in Appendix II.

In the 3.2, we will try to find the constraints and constraint hierarchies of syllabification in Modern BrE words in *A-/a-* ending in vowels.

3.1.2 Word Stressess in Modern BrE words

Phonologically, word stresses in English words is of importance that could distinguish parts of speech. First, the description of word stresses (here, we only take the primary stress into consideration) is shown in the following (σ refers to the

syllable[15]):

Table 3.2 word stresses in Modern BrE words in *A-/a-* ending in vowels

Syllable	Stress	Example
monosyllable	'σ	air
disyllables	'σσ	acre
	σ'σ	acquire
trisyllable	'σσσ	airliner
	σ'σσ	adobe
	σσ'σ	absentee
quarisyllable	'σσσσ	adultery
	σ'σσσ	ability
	σσ'σσ	altogether
quinque syllable	'σσσσσ	arboriculture
	σ'σσσσ	administrator
	σσ'σσσ	anniversary
	σσσ'σσ	abracadabra
six syllables	σσσ'σσσ	acrobatically
	σσσσ'σσ	applicability
seven syllables	σσσσ'σσσ	artificiality

From the table 3.2, it is known that stress in monosyllables is on the first syllable. Stress in disyllables is on either the first syllable or the second syllable. Stress in trisyllable is on the first syllable or the second syllable or the third syllable. Stress in quarisyllable is on the first syllable or the second syllable or the third syllable. Stress in quinque syllable is on the first syllable or the second syllable or the third syllable or the fourth syllable. Stress in six syllables is on the third syllable or the fourth syllable or the fifth syllable. Stress in seven syllables is on the fourth syllable or the fifth syllable. And meanwhile, syllables which have the word stresses in the same positions are arranged in the following:

Table 3.3 word stresses in Modern BrE words in *A-/a-* ending in vowels (2)

Word Stress	Syllable

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[15] Brown, Keith, etc. Encyclopedia of Language and Linguistics (2nd Edition). Elsevier Science Ltd. 2005-12-31 http://www.verycd.com/topics/182905/ p10735

stress on the first syllable	monosyllable
	disyllable
	trisyllable
	quarisyllable
	quinque syllable
stress on the second syllable	disyllable
	trisyllable
	quarisyllable
	quinque syllable
stress on the third syllable	trisyllable
	quarisyllable
	quinque syllable
stress on the fourth syllable	quinque syllable
	six syllable
	seven syllable
stress on the fifth syllable	six syllable
	seven syllable

Then, syllables are rearranged by syllable weight --- heavy syllable (H) and light syllable (L)[16].

Figure 3.1 syllable weight and word stress

monosyllable	H	quarisyllable	**H**LHL	quinque syllable	**H**LLHL
	L		**H**LLL		H**H**LHL
disyllables	**H**L		L**H**HL		L**H**LHL
	HH		L**H**LH		L**H**LLL
	L**H**		L**H**LL		L**H**HLL
	H**H**		H**H**LL		L**H**HHL
trisyllable	**H**HL		HH**H**L		*HLHLL*
	HLH		HH**H**LH		*HLHHL*
	HLL		*HLHL*		*HHHLL*
	HHH		*HLHH*		*HLHLH*
	L**H**L				*HLLHL*

HHL		six syllable	LHLHLL
HHH			HHHHLL
LHH			HHLHLL
HHH			LHLLHH
HLH		seven syllable	HLHLHLL
LHH			

The above table shows that syllable weight in each syllable. Apart from the monosyllable, the others' word stresses that fall on the heavy syllable are represented in bold types. Those syllables fallen on the third or the fourth or the fifth syllable are slanted to indicate that they are not English-born but borrowed word stress or influenced by other languages. And it could be explain be the dotted lines and line of dashes in **MD Model of Modern BrE Phonology**.

In the 3.2, we will try to find the constraints and constraint hierarchies of word stresses in Modern BrE words in *A-/a-* ending in vowels.

3.2 Optimal Analysis of Modern BrE Words

3.2.1 Optimal Analysis of Syllabifications in Modern BrE Words

After some basic knowledge about syllable and syllabification is settled, OT is used to find out constraints and constraint hierarchies of syllabifications in Modern BrE words in *A-/a-* ending in vowels. Some general constraints in OT that are tried to use are adopted, and some others or new constraints are added when the optimal output (or candidate) could not be produced. The followings are the constraints:

(1) **MAX-IO**(Ma Qiuwu 2003:14-15)

Every segment of the input has a correspondent in the output.

(No phonological deletion.)

(2) **DEP-IO**(ibid:14-15)

Every segment of the output has a correspondent in the input.

(Prohibits phonological epenthesis.)

(3) **IDENT-IO(F)** (ibid:14-15)

Output correspondent of an input [γF] segment are also [γF]

(4)　**NO-CODA**(Kager 2001:9-10; 93-94).

　　Syllables must not have codas.

(5)　**ONSET**(ibid:9-10; 93-94).

　　Syllable must have onsets.

　　Constraints MAX-IO，DEP-IO and IDENT-IO are "*faithfulness* constraints (which) require that outputs preserve the properties of their basic (lexical) forms, requiring some kind of similarity between the output and its input" (ibid:10); And constraints NO-NODA and ONSET are "markedness constraints (which) require that output forms meet criterion of structural well-formedness" (ibid:9). And "faithfulness constraints are, strictly speaking, not pure output constraints, since they take into account elements at two levels: input and output. In contrast, markedness constraints never take into account elements in the input. The important thing is, however, that both kinds of constraints refer to the *output* (exclusively so in markedness, and in relation to the input in faithfulness). OT has no constraints that exclusively refer to the input" (ibid:10).

　　At first, the Modern BrE word *acuity* is tried to analyze in OT to know its constraints and constraint hierarchy. The phonetic transcription of *acuity* is /əˈkjuːɪtɪ/ in POECD and its phonological syllabification is /əˈkjuː·ɪ·tɪ/ in CIDE.

Tableau 3.1 acuity

Input: /əkjuːɪtɪ/	NO-CODA	IDENT-IO	MAX-IO	DEP-IO	ONSET
a. ə.kjuː.ɹ.tɪ.					**!
b. ə.kjuː.ɹ.t.			*!		**
c. hə.kjuː.tɪ.			*!	*	
d. əd.k.ɹ.tɪ.	*!		**	*	**
e. ɹ.kjuː.ɹ.tɪ.		*!			**
f. ə.kjuɹ.t.ɹ.					**!
☞ g. ə.kjuɹ.tɪ.					*
h. ə.k.juː.ɹ.tɪ.					***!
i. ək.juː.ɹ.tɪ.	*!				***
☞ j. əkjuːɪtɪ					*
k. əkjuː.ɪtɪ					**!

　　In tableau 3.1, input /əˈkjuːɪtɪ/ produces 11 candidates (here, candidates producing by the GENERATOR will be more than those in tableau 3.1. But only some of them are in the tableau. And this is the same as candidates in the following tableaux.) Because syllables in the input are ending in vowels, NO-CODA is the first

constraint. Then it is followed by IDENT-IO, MAX-IO, DEP-IO and ONSET. As the first syllable in *acuity* begins in a vowel, ONSET is the last constraint to avoid violation of optimal output if it is in other places.

Candidates (1d) and (1i) violating the constraint NO-CODA which is ranked forward in hierarchy are eliminated. (1e) is left out for its violation of the constraint IDENT-IO. (1c) which has been eliminated by MAX-IO violates DEP-IO. (1b) has been eliminated by MAX-IO. (1d) has been eliminated by NO-CODA though it violates MAX-IO for twice and DEP-IO. And there is only one constraint ONSET left in tableau 3.1. (1b), (1d) and (1e) all violate the last constraint, and are eliminated by the former constraints to lose the chance to be the optimal output. Now, only (1a), (1f), (1g), (1h), (1j) and (1k) have not violated the former four constraints. It seems that the optimal output will be produced among them. (1c), eliminated by the former constraint MAX-IO, can not be the optimal output though it does not violate ONSET.

From the tableau 3.1, we could see that (1a), (1f), (1g), (1h), (1j) and (1k) violate ONSET of which (1h) violates three time, (1a), (1f) and (1k) violate twice, and (1g) and (1j) once. Those violating a constraint for twice or three times are eliminated. So, (1g) and (1j) are the 'optimal output'.

As it is clearly shown in CIDE, the phonological syllabification of /əˈkjuːɪtɪ/ is /əˈkjuː·ɪ·tɪ/ which is (1a) in tableau 3.1. And it is impossible to rearrange the constraints to produce the real optimal output as we have tried to. If we put ONSET before MAX-IO or before IDENT-IO, then (1c) would be the 'optimal output'….No matter how we tried, the optimal output is not the one we want. Therefore, a constraint or some constraints that should be added before ONSET will be needed to eliminate (1g) and (1j).

Syllabification in (1g) is /ə.kjuːɪ.tɪ/ and in (1a) /ə.kjuː.ɪ.tɪ/. The first and the last syllable of (1g) and (1a) are the same. And their differences lie in the second syllable. In Modern BrE, there is no diphthong formed by long vowel and short vowel. This phenomenon was exited in Old English, but not in Modern BrE. So, the phonotactic constraint that blocks (1g) to be the 'optimal output' is stated as:

(6) ***V$_L$V$_S$]$_σ$**

No long vowel before tautosyllabic short vowel.

This constraint can violate those having phonetic sequence of a long vowel and a

short vowel in a syllable. It must therefore dominate ONSET.

And, (1j) is just the direct output of input. In syllable, only one peak is allowed whether it is a monophthong, or a diphthong or a triphthong. And the second phonotactic that constraint to blocks (1j) to be the 'optimal output' is:

(7) ***PEAK^N**

Syllables must not have two or more than two peaks.

The constraint is violated when a syllable does have more than one peak. And it is placed before *V_LV_S.

With the help of the two constraints, (1g) and (1j) are successfully eliminated. Then, the optimal output (1a) won in the tableau with a minor violation of ONSET. Tableau 3.2 illustrates this:

Tableau 3.2 acuity

Input: /əkjuːɪtɪ/	NO-CODA	IDENT-IO	MAX-IO	DEP-IO	*V_LV_S	*PEAK^N	ONSET
☞a. ə.kjuː.ɹ.tɪ.							**!
b. ə.kjuː.ɹ.t.			*!				**
c. hə.kjuː.tɪ.			*!	*			
d. əd.k.ɹ.tɪ.	*!		**	*			**
e. ɹ.kjuː.ɹ.tɪ.		*!					**
f. ə.kjuː.ɹ.t.ɹ.							**!
g. ə.kjuː.ɹ.tɪ.					*!		*
h. ə.k.ju:.ɹ.tɪ.							***!
i. ək.ju:.ɹ.tɪ.	*!						***
j. əkjuːɪtɪ						*!	*
k. əkjuː.ɪtɪ						*!	**

From tableau 3.2, we could see that (1g) violates *V_LV_S and is eliminated by this constraint. (1j) is eliminated by *PEAK^N for its violation of this constraint. Surprisingly, *PEAK^N eliminates (1k) as it has more than one peak in a syllable. At last, the optimal output, produced in tableau 3.2, is (1a). And dotted lines indicate that there is no interaction between NO-CODA，IDENT-IO，MAX-IO，DEP-IO，*V_LV_S and *PEAK^N. But, the real line shows that those constraints are interactive with ONSET. Their ranking is given in tableau 3.3:

Tableau 3.3 acuity

Input: /əkjuːɪtɪ/	NO-CODA	IDENT-IO	MAX-IO	DEP-IO	*V_LV_S	*PEAK^N	ONSET
☞ a. ə.kjuː.ɹ.tɪ.							**!

	NO-CODA	IDENT-IO	MAX-IO	DEP-IO	*VLVS	*PEAKN	ONSET
b. ə.kju:.ɪ.t.			*!				**
c. hə.kju:.tɪ.			*!	*			
d. əd.k.ɪ.tɪ.	*!		**	*			**
e. ɪ.kju:.ɪ.tɪ.		*!					**
f. ə.kju:ɪ.t.ɪ.							**!
g. ə.kju:ɪ.tɪ.						*!	*
h. ə.k.ju:.ɪ.tɪ.							***!
i. ək.ju:.ɪ.tɪ.	*!						***
j. əkju:ɪtɪ						*!	*
k. əkju:.ɪtɪ						*!	**

Here, the constraint hierarchy of *acuity* is:

(8)　NO-CODA，IDENT-IO，MAX-IO，DEP-IO，*VLVS，*PEAKN >> ONSET。

Would the constraint hierarchy be the one universal to Modern BrE words in *A-/a-* ending in vowels？The word *activity* is used to testify its feasibility. The phonetic transcription of *activity* is /æk'tɪvɪtɪ/ in POECD and its phonological syllabification is /æk'tɪv·ɪ·tɪ/ in CIDE. Tableau 3.4 illustrates this:

Tableau 3.4 activity

Input: /æktɪvɪtɪ/	NO-CODA	IDENT-IO	MAX-IO	DEP-IO	*VLVS	*PEAKN	ONSET
a. æk.tɪ.vɪ.tɪ	*!						*
b. æ.k.tɪ.vɪ.t			*!				*
c. hæ.tɪ.tɪ			**!*	*			
d. ædk.tɪ.v.tɪ	*!		*	*			*
e. ɪk.tɪ.vɪ.tɪ	*!	*					*
f. æk.tɪv.ɪ.tɪ	**!						**
g. æk.tɪv.ɪ.t.ɪ	**!						***
☞ h. æ.ktɪ.vɪ.tɪ							*
i. ækt.ɪ.vɪ.tɪ	*!						**
j. æktɪvɪtɪ						*!	*
k. æk.tɪ.vɪt.ɪ	**!						**
l. æk.tɪv.ɪt.ɪ	***!						***

Candidates (1a), (1d), (1e), (1f), (1g), (1i), (1k) and (1l) violate the constraint NO-CODA which is ranked forward in hierarchy, are eliminated. (1f), (1g) and (1k) violate it for twice, and (1l) three times. (1e) that violates the constraint IDENT-IO has been left out by the former constraint NO-CODA. (1b) and (1c) that violate MAX-IO for once and three times respectively are eliminated. And (1d) that violates the constraint MAX-IO and IDENT-IO has been left out by the former constraint NO-CODA. No candidates have violated the constraint *VLVS because there is no phonetic sequence of a long vowel and a short vowel in *activity*. In other words, this constraint does not

have practical effect in tableau 3.4. (1j) has been eliminated by *PEAK^N. And there is only one constraint ONSET which has the right to decide which candidate is the optimal output left in tableau 3.4. Except (1c), all candidates violate ONSET in which (1a), (1b), (1d), (1e), (1h) and (1j) violate it for once, (1f) and (1i) twice, and (1g) and (1l) three times. Meanwhile, all the other candidates are eliminated by the previous constraints, except (1h). So, the input /æktɪvɪtɪ/ produces the 'optimal output'——(1h). As it is clearly shown in CIDE, the phonological syllabification of /æk'tɪvɪtɪ/ is /æk'tɪv·ɪ·tɪ/ which is (1f) in tableau 3.4. And rearrangement of the constraints could produce some faked optimal output, but not the real optimal output. Therefore, a constraint or some constraints that should be added before ONSET will be needed to eliminate (1h). In this optimal output, complex coda or onset is not allowed. So, the constraints are as the following:

(9)　***COMPLEX^{ONS}** (Kager 2001:97)

　　Onsets are simple

(10) ***COMPLEX^{COD}** (ibid:97)

　　Codas are simple

Candidate (1h) will be eliminated by ***COMPLEX^{ONS}**. And, constraint ***COMPLEX^{COD}** also can eliminate (1i). Because in the syllabification of *activity*, there are two syllables that have coda. Hence, NO-CODA is placed before ONSET to avoid the elimination of optimal output. While, *V$_L$V$_S$ is deleted for its uselessness here. Then, the two newly added constraints are before NO-CODA. The ranking is shown below:

Tableau 3.5 activity

Input: /æktɪvɪtɪ/	IDENT-IO	MAX-IO	DEP-IO	*PEAK^N	*COMPLEX^{ONS}	*COMPLEX^{COD}	NO-CODA	ONSET
☞ a. æk.tɪ.vɪ.tɪ							*!	*
b. æ.k.tɪ.vɪ.t		*!						*
c. hæ.tɪ.tɪ		**!*	*					
d. ædk.tɪ.v.tɪ			*!			*	*	*
e. ɪk.tɪ.vɪ.tɪ	*!						*	*
f. æk.tɪv.ɪ.tɪ							**!	**
g. æk.tɪv.ɪ.t.ɪ							**!	***
h. æ.ktɪ.vɪ.tɪ					*!			*
i. ækt.ɪ.vɪ.tɪ						*!	*	**
j. æktɪvɪtɪ				*!				*
k. æk.tɪ.vɪt.ɪ							**!	**
l. æk.tɪv.ɪt.ɪ							***!	***

The constraint ***COMPLEX^{ONS}** do help to eliminate (1h), and ***COMPLEX^{COD}** eliminates (1i). In tableau 3.5, NO-CODA dorminates ONSET, apart from those eliminated in the former constraints, (1f), (1g) and (1k) violate NO-CODA for twice, and (1l) for three times. As a result, (1a) becomes an optimal output. The real optimal output is not come up after the ranking is rearranged and two constraints are added.

Morphologically, the word *activity* is a compound first formed by a noun *act* and a suffix *–ive*, and then an adjective *active* and a suffix *-ity* being a noun *activity*. From the perspective of word stress, in Modern BrE, two kinds of syllables could be classified by their weight – heavy syllable and light syllable. Word stress prefers to stay on heavy syllables. Notice that the word stress of *activity* /æk'tɪv·ɪ·tɪ/ is on the second syllable which is a heavy syllable. Apart from the morphological reasons, word stress is a key role in dividing a syllable phonologically. A constraint in metrical is used here.

(11)   **WSP**(ibid:155)

Heavy syllables are stressed.

For this reason, the syllabification of activity is VC·**CVC**·V·CV. The ranking is illustrated as the following:

Tableau 3.6 activity

Input: /æk'tɪvɪtɪ/	I-IO	M-IO	D-IO	*VₗVₛ	*Pᴺ	*Cᴼᴺˢ	*Cᶜᴼᴰ	WSP	N-C	O
a. æk.ˈtɪ.vɪ.tɪ								*!	*	*
b. æ.k.ˈtɪ.vɪ.t		*!						*	**	*
c. hæ.ˈtɪ.tɪ		**!*	*					*		
d. ædk.ˈtɪ.v.tɪ			*!				*	*	**	*
e. ɪk.ˈtɪ.vɪ.tɪ	*!							*	*	*
☞ f. æk.ˈtɪv.ɪ.tɪ									**	**
g. æk.ˈtɪv.ɪ.t.ɪ									***!	***
h. æ.kˈtɪ.vɪ.tɪ					*!			*		**
i. æk't.ɪ.vɪ.tɪ						*!		*	*	**
j. æk'tɪvɪtɪ				*!				*		*!
k. æk.ˈtɪ.vɪt.ɪ								*!	**	**
l. æk.ˈtɪv.ɪt.ɪ									***!	***

(1a) that violates WSP is eliminated. So does the candidate (1k). (1b), (1c), (1d), (1e), (1h), (1i), (1j) and (1k) have already eliminated by the previous constraints all violates this constraint. (1f), (1g) and (1l) are competing to be optimal. (1f) violates

No-Coda (N-C) for twice and (1g) and (1l) three times. Then, the output is (1f). And the dotted lines indicates that there is no interaction between IDENT-IO (I-IO), MAX-IO (M-IO)，DEP-IO (D-IO)，*PEAK^N (*P^N), *COMPLEX^{ONS} (*C^{ONS}) and *COMPLEX^{COD} (*C^{COD}). But, there are interactions between WSP, No-Coda and ONSET (O), and the real lines indicate this.

And a constraint *PEAK/C (Hammond 1997:5) is added after *PEAK^N to prevent those candidates having a consonant as a syllable peak. Is the following the constraints and constraint hierarchy to be applied to Modern BrE words in *A-/a-* ending in vowels?

(12) IDENT-IO, MAX-IO，DEP-IO，*PEAK^N, *PEAK/C, *COMPLEX^{ONS}, *COMPLEX^{COD} >> WSP >> No-Coda >> ONSET.

Basically, the above constraint hierarchy might be $\mathcal{H}$ of syllabification in Modern BrE words in *A-/a-* ending in vowels. And, after some specific constraints or re-ranking of some constraints in $\mathcal{H}$ are done, $\mathcal{H}$ of syllabification will be approaching the partially actual constraint hierarchy of syllabification in Modern BrE words in *A-/a-* ending in vowels.

As is said previously, the above constraint WSP just mentioned belongs to metrical requirement[17], and there is another one---etymological requirement. How to represent etymological requirement in constraint or constraint hierarchy or shall we use the **MD Model of Modern BrE Phonology** to solve this problem? Take the word *actually* for example, the phonetic transcription is /ˈæktʃuəlɪ/ and the syllabification is /ˈæk·tʃu·ə·lɪ/. In Modern BrE, there is a diphthong /uə/. Why it is considered /u/ and /ə/ two separate vowels? The Online Etymology Dictionary (of English)[18] provides an answer like,

> "c.1315, "pertaining to an action," from O.Fr. *actuel* "now existing, up to date," from L.L. *actualis* "active," adj. form of L. *actus* (see *act*). The broader sense of "real" (as opposed to *potential, ideal,* etc.) is due to infl. of Fr. *actualite. Actually* in the sense of "as a matter of fact, really" is attested from 1762."

> (Harper, Douglas 2000).

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[17] The relation between syllabification and word stress had found by the former researchers.
[18] http://www.etymonline.com

Could it be understood in this way that there is no diphthong /uə/ when English borrowed the word *actual* from foreign language. And because of this, the syllabification of *actual* was /ˈæk·tʃu·əl/. Indeed, OT analysis of this word by the constraint hierarchy in tableau 3.6 could not produce the optimal output without a constraint *uə]σ which refers to that there is no /u/ before tautosyllabic /ə/. The constraint in OT is universal and violable. Meanwhile, its universality is challenged from language history itself. In certain historical period of English, there is no such diphthong as /uə/, and gradually, Modern BrE has that diphthong /uə/. If we want to have a Modern BrE optimal output, the constraint is placed after ONSET. And, the syllabification of *actual* should be /ˈæk·tʃuəl/ in Modern BrE, but is /ˈæk·tʃu·əl/. Here, it preserves its 'ancestor's' syllable structure' as we can not add *uə]σ to the hierarchy violating the actual phonotactic of Modern BrE which has a diphthong as /uə/.

Here, other principle of constraint in OT is supplemented as diachrony.

A detailed discussion of thorny problems in Modern BrE syllabification from phonology will be in the next section.

The following constraints[19] are what the author found in Modern BrE words in *A-/a-* ending in vowels.

Table 3.4 constraints in syllabifications in Modern BrE words in *A-/a-* ending in vowels

Constraints	Definition	Modern BrE Words
*uæ]σ	No /u/ before tautosyllabic /æ/.	actuality
*ɪæ]σ	No /ɪ/ before tautosyllabic /æ/.	artificiality
*ɪɔ]σ	No /ɪ/ before tautosyllabic /ɔ/.	aetiology
*ɪɔː]σ	No /ɪ/ before tautosyllabic /ɔː/.	aorta
*VᴅVʟ	No diphthong before tautosyllabic longvowel.	aorta
*VsVᴅ	No short vowel before tautosyllabic diphthong.	aviator
*aɪɔ]σ	No tautosyllabic sequence of /aɪ/ and /ɔ/.	autobiography
*eɪɪ]σ	No /eɪ/ before tautosyllabic /ɪ/.	archaically
*[bd	No word-initial sequence of /b/ and /d/.	abductor

---

[19] It must be stated that all constraints are set by the author. And the phonotactics that are not allowed in English syllables are also mentioned in previous papers or books, such as "ps-, ls-, mp-, sb-, sd, sg-, pm-, tn-, gn-, pb-, pt-, lm-" (Zhang Jisheng. 2000:84), "*[np], *[nk], *[mk], *[pk], *[kp], *[tp], *[nf]" (ibid:30), "*pn-, *bn-, *tn-, *dn- (ibid:40), /nskr/" (ibid:69), "[ft], [bs], [rg]" (ibid:63), "*lp-, *rb-, *ns-, *ms-, *rk-, *rg-, *rf-, *rth-, *rsh-, *uq-" (ibid:80), "*sb-, *sd-, *sg-"(ibid:84), "*tl-, *dl-" (ibid:85), "*[pw-], *[bw-], *[fw-], *[θw], *[sr-], *[hr-]" (ibid:88), "*-tr, *-dr, *-km" (ibid:93), "*[tʃ ju:]" (ibid:98), "*[-kpt], *[pt], *[bd]" (ibid:136), "*kt-, *ft-" (ibid:137), "ls-, rp-, wk-" (ibid:147) "*ks-, *tp, *sθ, *mn-, *lr" (ibid:154) and so on.

*[bdʒ	No word-initial sequence of /b/, /d/ and /ʒ/.	abjure
*[bh	No word-initial sequence of /b/ and /h/.	abhore
*[bn	No word-initial sequence of /b/ and /n/.	abnormality
*[bs	No word-initial sequence of /b/ and /s/.	absentee
*[bst	No word-initial sequence of /b/, /s/ and /t/.	abstemiously
*[bstr	No word-initial sequence of /b/, /s/, /t/ and /r/.	abstractedly
*[bz	No word-initial sequence of /b/ and /z/.	absurdity
*[dl	No word-initial sequence of /d/ and /l/.	admittedly
*[dm	No word-initial sequence of /d/ and /m/.	admittedly
*[dv	No word-initial sequence of /d/ and /v/.	adviser
*[ft	No word-initial sequence of /f/ and /t/.	after
*[gz	No word-initial sequence of /g/ and /z/.	auxiliary
*km	No tautosyllabic sequence of /k/ and /m/.	acme
*kn	No tautosyllabic sequence of /k/ and /n/.	acne
*[ks	No word-initial sequence of /k/ and /s/.	accelerator
*[ksj	No word-initial sequence of /k/, /s/ and /j/.	asexuality
*[kst	No word-initial sequence of /k/, /s/ and /t/.	admixture
*[kstʃ	No word-initial sequence of /k/, /s/, /t/ and /ʃ/.	admixture
*[kt	No word-initial sequence of /k/ and /t/.	affectingly
*[kʃ	No word-initial sequence of /k/ and /ʃ/.	auctioneer
*ktʃ	No tautosyllabic sequence of /k/, / t/ and /ʃ/.	actually
*[lb	No word-initial sequence of /l/ and /b/.	albino
*[ld	No word-initial sequence of /l/ and /d/.	alder
*[ldʒ	No word-initial sequence of /l/, /d/ and /ʒ/.	analgesia
*[lg	No word-initial sequence of /l/ and /g/.	alga
*[lf	No word-initial sequence of /l/ and /f/.	alpha
*[lfr	No word-initial sequence of /l/, /f/ and /r/.	alfresco
*[lk	No word-initial sequence of /l/ and /k/.	alchemy
*[lm	No word-initial sequence of /l/ and /m/.	almoner
*[lp	No word-initial sequence of /l/ and /p/.	alpaca
*[ls	No word-initial sequence of /l/ and /s/.	also
*[lt	No word-initial sequence of /l/ and /t/.	altar
*[lð	No word-initial sequence of /l/ and /ð/.	although
*[ltʃ	No word-initial sequence of /l/, /t/ and /ʃ/.	agriculture
*[mb	No word-initial sequence of /m/ and /b/.	akimbo
*[mbl	No word-initial sequence of /m/, /b/ and /l/.	assembly

*[mbr	No word-initial sequence of /m/, /b/ and /r/.	ambrosia
*[mf	No word-initial sequence of /m/ and /f/.	amphora
*[mp	No word-initial sequence of /m/ and /p/.	ampulla
*[mpl	No word-initial sequence of /m/, /p/ and /l/.	amplify
*[mn	No word-initial sequence of /m/ and /n/.	amnesty
*[mtʃ	No word-initial sequence of /m/ and /tʃ/.	armchair
*[nd	No word-initial sequence of /n/ and /d/.	anaconda
*[ndʒ	No word-initial sequence of /n/, /d/ and /ʒ/	angina
*[nk	No word-initial sequence of /n/ and /k/.	avuncular
*[nr	No word-initial sequence of /n/ and /r/.	archdeanconry
*[ns	No word-initial sequence of /n/ and /s/	apprehensively
*[nt	No word-initial sequence of /n/ and /t/.	absentee
*[ntl	No word-initial sequence of /n/, /t/ and /l/.	arrogantly
*[ntr	No word-initial sequence of /n/, /t/ and /r/.	antra
*[ntʃ	No word-initial sequence of /n/, /t/ and /ʃ/.	adventurer
*[nθ	No word-initial sequence of /n/ and /θ/.	anther
*[ŋg	No word-initial sequence of /ŋ/ and /g/	angular
*[ŋgj	No word-initial sequence of /ŋ/, /g/ and /j/.	angular
*[ŋgr	No word-initial sequence of /ŋ/, /g/ and /r/.	angry
*[ŋk	No word-initial sequence of /ŋ/ and /k/.	anchor
*[ŋkʃ	No word-initial sequence of /ŋ/, /k/ and /ʃ/.	anxiously
*ŋkt]	No tautosyllabic sequence of /ŋ/, /k/ and /t/.	acupuncture
*[ŋktʃ	No word-initial sequence of /ŋ/, /k/, /t/ and /ʃ/.	acupuncture
*[ŋl	No word-initial sequence of /ŋ/ and /l/.	affectingly
*[ŋz	No word-initial sequence of /ŋ/ and /z/.	anxiety
*[ph	No word-initial sequence of /p/ and /h/.	amphitheatre
*[ps	No word-initial sequence of /p/ and /s/.	autopsy
*[pt	No word-initial sequence of /d/ and /v/.	adaptor
*[ptl	No word-initial sequence of /p/, /t/ and /l/.	abruptly
*[stʃ	No word-initial sequence of /s/, /t/ and /ʃ/.	admixture
*[sθ	No word-initial sequence of /s/ and /θ/.	aesthetically
*[tl	No word-initial sequence of /t/ and /l/.	antler
*[tm	No word-initial sequence of /t/ and /m/.	atmosphere
*[vl	No word-initial sequence of /v/ and /l/.	apprehensively

*[zm	No word-initial sequence of /z/ and /m/.	abysmally
*[ʃd	No word-initial sequence of /ʃ/ and /d/.	archduchy
*ʃdj	No tautosyllabic sequence of /ʃ/, /d/ and /j/.	archduchy
*[ʃj	No word-initial sequence of /ʃ/ and /j/.	appreciatory
*[ʃk	No word-initial sequence of /ʃ/ and /k/.	Ashkenazi
*[ʃl	No word-initial sequence of /ʃ/ and /l/.	ashlar
*[ʃtr	No word-initial sequence of /ʃ/, /t/ and /t/.	ashtray
*[ʃw	No word-initial sequence of /ʃ/ and /w/.	archway
*[tʃd	No-word-initial sequence of /t/, /ʃ/ and /d/.	archduchy
*[tʃdj	No word-initial sequence of /t/, /ʃ/, /d/ and /j/.	archduchy
*tʃl	No tautosyllabic sequence of /t/, /ʃ/ and /l/.	archly
*[tʃw	No word-initial sequence of /t/, /ʃ/ and /w/.	archway

Notes: ']σ' refers to the right edge of a syllable (Brown, Keith 2005:10700).

Apart from 20.9% of words in Appendix I which are not listed in CIDE, according to the general *ℋ* --- (12) and all the constraints, only 44.8% of Modern BrE words in *A-/a-* ending in vowels could be analyzed. And nearly 34.2% of those words can not be produced the real optimal candidate by them.

3.2.1.1 Thorny Problems on Syllabifications in Modern BrE Words

Actually, syllabification in Modern BrE is really a thorny problem. It is known that syllabification in Modern BrE is in chaos.

It is clearly known that factors which are **phonotactic** (e.g., acme /ˈæk·mɪ/), **etymology** (e.g., actually /ˈæk·tʃu·ə·lɪ/), **morphology** (e.g., auditor /ˈɔ:dɪt·ə/) and **word stress** (e.g., any /ˈen·ɪ/) influence Modern BrE syllabification. And we think that there might be more than one constraint hierarchy in Modern BrE words in *A-/a-* ending in vowels.

Because there are consonant clusters as complex onset in Modern BrE, and the place of *COMPLEX^COD and *COMPLEX^ONS is changed to avoid the elimination of the real optimal output. And one of the constraint hierarchies of Modern BrE syllabifications is shown below.

(13) *ℋ*[1]

MAX-IO，DEP-IO，IDENT-IO，*PEAK^N, *PEAK/C, *uæ]σ, *ɪæ]σ, *ɪɔ]σ, *ɪɔ:]σ, *V_DV_L, *V_SV_D, *aɪɔ]σ, *eɪɪ]σ, *[bd, *[bdʒ, *[bh, *[bn *[bs, *[bst, *[bstr, *[bz, *[dl,

*[dm, *[dv, *[ft, *[gz, *km, *kn, *[ks, *[ksj, *[kst, *[kstʃ, *[kt, *[kʃ, *ktʃ, *[lb, *[ld, *[ldʒ, *[lg, *[lf, *[lfr, *[lk, *[lm, *[lp, *[ls, *[lt, *[lð, *[ltʃ, *[mb, *[mbl, *[mbr, *[mf, *[mp, *[mpl, *[mn, *[mtʃ, *[nd, *[ndʒ, *[nk, *[nr, *[ns, *[nt, *[ntl, *[ntr, *[ntʃ, *[nθ, *[ŋg, *[ŋgj, *[ŋgr, *[ŋk, *[ŋkʃ, *ŋkt] , *[ŋktʃ, *[ŋl, *[ŋz, *[ph, *[ps, *[pt, *[ptl, *[stʃ, *[sθ, *[tl, *[tm, *[vl, *[zm, *[ʃd, *ʃdj, *[ʃj, *[ʃk, *[ʃl, *[ʃtr, *[ʃw, *[tʃd, *[tʃdj, *tʃl, *[tʃw >> *COMPLEX^COD >> NO-CODA >> *COMPLEX^ONS >> ONSET

Almost 44.8% of Modern BrE words in *A-/a-* ending in vowels could be analyzed in $\mathcal{H}^1$, like V (*a*), VV (*are*), V.CV.CV (*arena*), V.CCVC.CV (*archery*), V.CV.CV.CV (*acerbity*), V.CV.CCV.CV (*arbitrary*), V.CV.CCVV.CV.CV (*arbitrarily*) and so on. And the rest will be evaluated in $\mathcal{H}^2$ and $\mathcal{H}^3$.

In $\mathcal{H}^2$, some of the words could be produced in $\mathcal{H}^1$ if WSP is put between *COMPLEX^COD and NO-CODA, like VC.V.CV (*amity*), VC.VC.CV (*avidly*), VC.V (*any*), VC.V.CV (*agony*) and so on.

In $\mathcal{H}^3$, some of the words could be produced in $\mathcal{H}^2$ if a constraint *suffix is place after WSP, like VC.CVC.VC.V (*accessory*). Note that $\mathcal{H}^2$, $\mathcal{H}^3$ sometimes coincide with each other.

And a few words could be evaluated by the above constraint hierarchies with a consideration of etymology. To be in conformity to the real language phenomenon, we would like to use the line between **NON-NATIVE** and **OUPUT** to represent this.

3.2.1.2 Proposal for Reformation of Syllabifications in Modern BrE Words

Syllabifications, in Modern BrE words in *A-/a-* ending in vowels, are influenced by phonetic (or phonotactic), morphology, etymology and word stress wholly or partially.

The proposal here is that phonotactic and word stress should be the one and only one guidance in phonological syllabification. The reasons are illustrated in the following:

1. Syllabification, discussed here, which is phonological unit, should be analyzed in phonology itself.

2. As we know, syllabification could be understood from orthography or phonology. In the former, morphology should be taken into consideration as syllabification is of importance when a word is divided by hyphen in the end of a line. At this point, there is unification. And in the latter, if there are some phonotactics exited in a language, they should be together in phonological syllabification.

3. Some syllabification seems to be the 'historical residue', especially from etymology. Indeed, English which did not have that phonotactic sequence when the word was brought into it has those sequences as diphthongs of Modern BrE after self-developing or self-evolution. Syllabification would be treated equally without 'discrimination'.

Finally, constraint hierarchy in Modern BrE words in *A-/a-* ending vowels in is the following:

(14) MAX-IO，DEP-IO，IDENT-IO，*PEAK/C，*PEAK^N，*uæ]σ, *ɪæ]σ, *ɪɔ]σ, *ɪɔ:]σ, *V$_D$V$_L$, *V$_S$V$_D$, *aɪɔ]σ, *eɪɪ]σ, *[bd, *[bdʒ, *[bh, *[bn *[bs, *[bst, *[bstr, *[bz, *[dl, *[dm, *[dv, *[ft, *[ɡz, *km, *kn, *[ks, *[ksj, *[kst, *[kstʃ, *[kt, *[kʃ, *ktʃ, *[lb, *[ld, *[ldʒ, *[lg, *[lf, *[lfr, *[lk, *[lm, *[lp, *[ls, *[lt, *[lð, *[ltʃ, *[mb, *[mbl, *[mbr, *[mf, *[mp, *[mpl, *[mn, *[mtʃ, *[nd, *[ndʒ, *[nk, *[nr, *[ns, *[nt, *[ntl, *[ntr, *[ntʃ, *[nθ, *[ŋg, *[ŋgj, *[ŋgr, *[ŋk, *[ŋkʃ, *[ŋkt] , *[ŋktʃ, *[ŋl, *[ŋz, *[ph, *[ps, *[pt, *[ptl, *[stʃ, *sθ, *[tl, *[tm, *[vl, *[zm, *[ʃd, *ʃdj, *[ʃj, *[ʃk, *[ʃl, *[ʃtr, *[ʃw, *[tʃd, *[tʃdj, *tʃl, *[tʃw >> *COMPLEX^{COD} >> WSP >> NO-CODA >> *COMPLEX^{ONS} >> ONSET

3.2.2 Optimal Analysis of Word Stresses in Modern BrE Words

In 3.2, Modern BrE words in *A-/a-* ending in vowels are described. And we find that there are some counter-parts in word stress.

Figure 3.2 counterpart of word stress

HH—H**H**	**H**LH—HL**H**
HHL—H**H**L	LH**H**—L**H**H
HLHL—HL**H**L	**H**LLHL—HLL**H**L

The answer for this phenomenon is that word stress in the first syllable and the second syllable is inherent or innate in English, and word stress in other syllables is borrowed from or influenced by other languages.

In analyzing words stress in Modern BrE words in *A-/a-*, *German Word Stress in Optimality Theory* is mainly referenced. Constraint used in analysis of Modern BrE word stress is list below (Fery: 15-16)[20]:

(15) **FOOT-BINARITY** (Prince and Smolensky 1993)

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[20] http://roa.rutgers.edu/files/3010399/roa301fery3.pdf
http://www.hum.uit.no/tidsskrifter/nordlyd/Nordlyd24/Fery.pdf

Feet consist of either two syllables or of one heavy syllable.

(16) **ALIGN-FOOT-RIGHT** (McCarthy and Prince 1993b)

Align (Prosodic Word, Right; Foot, Right)

Every Prosodic Word ends with a foot.

(17) **ALIGN-FOOT-LEFT** (McCarthy and Prince 1993b)

Align (Prosodic Word, Left; Foot, Left)

Every Prosodic Word begins with a foot.

(18) **FOOT-FORM(TROCHAIC)** (Prince and Smolensky 1993)

Align (Foot, Left; Head of the foot, Left)

Feet are left-headed.

(19) **NONHEAD**(ə)

Schwa syllables cannot be heads of feet.

(20) **PARSE-SYLLABLE**

Syllables are parsed into feet.

In this MA thesis, the analysis of word stress in disyllable which has four types of word stress --- **H**L, **H**H, L**H** and H**H** which is inherent or innate in English and could be seen as the core in English word stress will be illustrated. And the OT analysis of word stresses in other syllables which also have **H**L, **H**H, L**H** and H**H** (see Figure 3.1) in them will be made in further researches.

Tableau 3.7 **H**L

Input: /a:mə/	FOOT-FORM (TRO)	FT-BIN	ALIGN-FOOT-RIGHT	ALIGN-FOOT-LEFT	PARSE-SYLLABLE
a. (x .) ☞ a:mə					
b. (x) a:mə			*!		*
c. (x) a:mə		*!		*	*
d. (. x) a:mə	*!				

From the above tableau, we could see that the input /a:mə/ has four candidates.

(d) is eliminated by FOOT-FORM (TRO). (c) is eliminated by FT-BIN. (b) is eliminated by ALIGHN-FOOT-RIGHT. (c) also violates ALIGHN-FOOT-LEFT and PARSE-SYLLABLE. (b) also violates PARSE-SYLLABLE. Then the optimal output is (a).

And from our analysis, we find that **HH** has the same constraint hierarchy as **HL**. In the following, how the optimal output of L**H** and H**H** is produced will be shown.

Tableau 3.8 L**H**

Input: /əfa:/	NON-HEAD (ə)	FT-BIN	ALIGN-FOOT-RIGHT	ALIGN-FOOT-LEFT	PARSE-SYLLABLE
a (x .) 　　əfa:	*!				
b. (x) 　　əfa:		*!	*		*
c. (x) 　　əfa:				*!	*
d. (. x) ☞　əfa:					

Compared with **HL** and **HH**, word stress in L**H** is in the second syllable. In the above tableau, the constraint FOOT-FORM (TRO) is replaced by NON-HEAD(ə) without changing the other constraints. From the above tableau, we could see that the input /əfa:/ has four candidates. (a) is eliminated by NON-HEAD(ə). (b) is eliminated by FT-BIN. (c) is eliminated by ALIGHN-FOOT-LEFT. (b) violates ALIGHN-FOOT-RIGHT and PARSE-SYLLABLE. (c) violates PARSE-SYLLABLE. Then the optimal output is (a).

Our analysis has shown that L**H** has the same constraint hierarchy as H**H**. Meanwhile, there are some exceptions, like *although* and *austere*, that could not be produced in the tableau. The word *although* is compounding by *all* and *though*. The word *austere*, in which the word stress should be in the first syllable as it is not a compound or have schwa syllable being its head of feet, etymologically, *austere* (<Latin, austērus <Classical Greek, αὐστηρός) preserves Latin's word stress[21] after English borrowed it in 1330[22] or in other words English borrowed word *austere* form Latin without changing its word stress. This could be explained in the dotted lines and line of dashes connecting **NON-NATIVE** and **OUTPUT**, meaning that only the word stress of this word a 'lucky survivor' but not its sound and syllabification. As is discussed in section 3.2.1, phonotactic, morphology, etymology and word stress are considerable factors in syllabification. Interestingly, the word *austere* is from Latin, which should be etymological in syllabification.

According to tableau 3.7 and 3.8, it is concluded that constraint hierarchy in

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[21] The word stress is in the penultimate if the vowel in penultimate is long.
[22] http://www.etymonline.com

word stress of disyllables is below:

(21) NON-HEAD (ə), FT-BIN, ALIGN-FOOT-RIGHT, ALIGN-FOOT-LEFT, PARSESYLLABLE

3.2.3 Optimal Analysis of Pronunciations in Modern BrE Words?

In some words, their spellings are identical with their pronunciations. But, most of the words are not. The language changes gradually as it is the same that spelling and its pronunciation was gradually diverted though there might be sudden or abrupt changes in history. In the framework of OT, it could not be solved satisfactorily. And **MD Model of Modern BrE Phonology** might solve the problem. In Chapter Four, take a Modern BrE word *acacia* as the example to test the feasibility of that model.

3.3 Summary

In this Chapter, Modern BrE words in *A-/a-* ending in vowels are described from syllabification, words stress. Then, Modern BrE words are analyzed in OT from syllabifications, word stresses. In syllabifications, it is found that phonetic, morphology, etymology and word stress are the factors that influence the syllabication. Except of etymology which could be worked in **MD Model of Modern BrE Phonology**, the other three factors could be solved in OT; in word stresses, it is found that syllable weight, morphology and etymology are the factors that influence word stress. Except of etymology which could be worked in **MD Model of Modern BrE Phonology**, the other two factors could be solved in OT. Lastly, in pronunciation, a few words could be solved in OT but most of the words could not do without **MD Model of Modern BrE Phonology**.

By analyzing Modern BrE words in *A-/a-* in OT from syllabification, words stress and pronunciation, the unsatisfication of OT is revealed. And, **MD Model of Modern BrE Phonology**, which drawing support from OT takes etymology and different historical periods of a language into account, could solve the issue left by OT. And in the next Chapter, the model will be used.

Etymologically and historically linguistically, there are eight cases that will happen in syllabifications, the words stresses and the pronunciations in Modern BrE words in *A-/a-* ending in vowels, theoretically.

Case 1, the syllabification, the word stress and the pronunciation are not changed

altogether;

Case 2, the syllabification, the word stress and the pronunciation are changed wholly;

Case 3, the syllabification is changed, and so do not the word stress and the pronunciation;

Case 4, the word stress is changed, and so do not the syllabification and the pronunciation;

Case 5, the pronunciation is changed, and so do not the syllabification and the word stress;

Case 6, the syllabification and the word stress are changed, and so does not the pronunciation;

Case 7, the syllabification and the pronunciation are changed, and so does not the word stress;

Case 8, the word stress and the pronunciation are changed, and so does not the syllabification;

In above eight cases, those changes could be represented by the real lines in **MD Model of Modern BrE Phonology**; and those unchanges could be represented by the dotted line or line of dashes in **MD Model of Modern BrE Phonology**.

Chapter 4 Analysis of Modern BrE Words in MD Model of Modern BrE Phonology

Modern British English language, being one of the carriers of English culture——a part of western culture which originates from Greek-Roman mythology and Christianity, borrowed many words from Greek and Latin, especially in the Renaissance Period. Certainly, English not only borrowed words from the two languages, but also from other languages. This could be seen in page 12. Followed by self-evolution of English, those words have been a part in English vocabulary. As what are discussed earlier, English words have three levels phonologically, e.g. pronunciation, syllabification and word stress. At the end of Chapter 3, we concluded eight cases, theoretically, that might happen in borrowing words from other languages in English. Herein, **MD Model of Modern BrE Phonology** will be used to analyze Modern BrE words in *A-/a-* ending in vowels.

4.1 Etymological Study of Modern BrE Words

Researches, related to this, may be fruitful in previous studies. And Modern BrE, which is just a specific period in language history, is formed by accumulation of the past. During the process, something is changed, and something may not be changed. What is known to us is that Modern BrE words coming from Latin which is actually from Classical Greek. Therefore, we would like to narrow down the scope of analysis to those words only, and by taking one of those words as an example to prove **MD Model of Modern BrE Phonology** by OT. The words we need are listed below:

Figure 4.1 Modern BrE words of Classical Greek and Latin origin[23]

Classical Greek	Latin	Modern BrE
ἀκακία	acacia	acacia
ἀλληγορία	allēgoria	allegory
ἀμβροσία	ambrosia	ambrosia
ἀναλογία	analogia	analogy
ἀγχόνη	angina	angina

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[23] The etymology are mainly found in *Concise Oxford English Dictionary* (Ninth Edition) with the reference in other dictionaries such as *Etymology of English*, *Origins: A Short Etymology Dictionary of Modern English* and *The Oxford Dictionary of English Etymology*.

ἄλφα	alpha	alpha
ἀντινομία	antinomia	antinomy
ἄρωμα	arōma	aroma
ἀρτηρία	artēria	artery
ἀστρολογία	astrologia	astrology
ἀστρονομία	astronomia	astronomy
αὔρα	aura	aura
ἀλόη	aloē	aloe

The words in figure 4.1 mean that words in Moden BrE's column are from Latin which further comes from Classical Greek. In historical comparative linguistic, it is often expressed in this way, Modern BrE, *acacia*<Latin, *acacia* <Classical Greek, ἀκακία.

Classical Greek or Latin words entered into English in certain period of its history. After their coming, they are under the track of English self-evolution. There is a point that could be clearly known if they were borrowed in Old English period, they were pronounced by Old English phonological rule. After that, they were on the track of change during English history. Attention should be paid here is that three level of English words phonologically --- pronunciation, syllabification and word stress may change or not, according to Eight Cases. It is because this that develops **MD Model of Modern BrE Phonology** to solve this issue that cannot be worked out or reflected in classical framework of OT. Next, we would like to take Modern BrE word *acacia* in figure 4.1 as the example to prove **DIA** in **NON-NATIVE** part of **MD Model of Modern BrE Phonology** which is a part meaning that Modern BrE words are borrowed from other languages diachronically. In the next section, Modern BrE word *acacia* will be analyzed in the model in OT.

4.2 Analysis of Modern BrE Word *acacia* in MD Model of Modern BrE Phonology

As is clearly shown in Etymology of English[24], in 1543 the word *acacia* is borrowed form Latin word *acacia* which is borrowed from Classical Greek ἀκακία. More detailed information of *acacia* is illustrated in the following:

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[24] http://www.etymonline.com

Figure 4.2 Modern BrE word *acacia*

Classical Greek		**Latin**		**Modern BrE**	**Date**
ἀκακία	>	acacia	>	acacia	1543
/akaˈkia/		/aˈkakia/, / aˈkatsia /		/əˈkeɪʃə/	

In figure 4.2, we could see that Classical Greek word ἀκακία is pronounced like /akaˈkia/. The symbol <'> is called smooth breathing, meaning that vowels with this should be pronounced in its own sound. Here, it is sounded like /a/. While, the symbol <´> is acute, referring to a fact that accent is raised. When Latin borrowed this word, it became *acacia* in written for *Kk* which is seldom used but only before *a* in some words, could be replaced by *Cc* in Latin. And in Latin, it is sounded like /aˈkakia/. By rule of word stress in Latin, the stress should be in the antepenultimate if the penultimate is a short vowel. And the sound of the two words is not changed but their word stress. It is known that there is no diphthong /ia/ in both Classical Greek and Latin. That means their syllabification is the same. "In Late Latin, about 4th – 5th century A.D., Cc, which was sounded like /k/ in Classical time, was diversified into two pronunciations, one is that before *i*, *e*, *y*, *ae* and *oe* it is enunciated like /ts/, while it is sounded like /k/ before *a*, *o* and *u*" (Xin Delin 2007:20-21). That is why we provide two phonetic transcriptions of Latin word *acacia*. The second pronunciation in Latin has only changed onset of the third syllable from /k/ to /ts/. After it was brought into English in 1543, when English is in Early Modern English period, being pronouncced as */əˈkɜːtʃɪə/[25]. During the development of English itself, it finally is pronounced as /əˈkeɪʃə/ in Modern BrE. In the following, we would like to analyze it in **MD Model of Modern BrE Phonology** by OT. First, we need to find out the constraints and constraint hierarchy; then, these are proved to be in **MD Model of Modern BrE Phonology**.

Some general constraints IDENT-IO, MAX-IO, DEP-IO, NO-CODA, ONSET in OT (see 3.2.1) we try to use are adopted, and some other or new constraints are added when they can not produce the optimal output (or candidate).

At first, the Classical word ἀκακία is tried to analyze in OT to know its

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[25] The phonetic transcription is what is reconstructed by Early Modern English phonology in books (Li Funing 1991：208-239；Crystal 2005:175-180). So, the asterisk is used to indicate this. How can it be constructed like that? Referenced by Latin and Modern BrE pronunciation of *acacia* and phonetic transcription of Early Modern English words(Li Funing 1991： 239), the word stress of this word might be in the second syllable. Then, *a* in unstressed syllables should be pronounced as /ə/, while a in stressed syllable should be pronounced as /ɜː/. That is the vowels should be like. And what about the consonant, the first consonant *c* should be /k/ for it is before *a* and the second c should be /tʃ/ for it is before *i*. And, /ɪ/ is preserved in it.

constraints and constraint hierarchy in pronunciation, syllabification and word stress. The phonetic transcription of ἀκακία is /aka'kia/. The syllabification of it will be seen first.

Tableau 4.1: Classical Greek – akakia

Input：/akakia/	IDENT-IO	DEP-IO	MAX-IO	NO-CODA	ONSET
a. a.ka.ki.a					**!
b. ak.a.k.ia				*!	***
c. a.ka.k.a			*!		**
d. ha.ka.ki.o	*!	*			*
e. ad.ka.kia		*!		*	*
f. aka.ki.a					**!
g. ad.ka.tsi.a	*!	*		*	**
☞ h. a.ka.kia					*
i. e.ka.ki.a	*!				**
☞ j. akaki.a					*

The input /akakia/ produces many candidates. And 10 candidates (a-j) are listed in the left part below the input in tableau 4.1. IDENT-IO ranks forward in hierarchy to avoid (d), (g) and (i) of which the candidates are not identical with input segment. (d) changes from /a/ in the last syllable in input to /o/; (g) changes /k/ in the third syllable in input to /ts/; (i) changes /a/ in the first syllable in input to /e/. In all, any correspondence unrelated with input segment will be first eliminated to make sure that the input segment might be preserved in candidates. After it, there are two constraints, DEP-IO and MAX-IO, responsible for no phonological epenthesis and no phonological deletion. Then, (e) has /d/ before /a/ in the first syllable to be eliminated by DEP-IO, and (c) violates MAX-IO by deleting /i/ in /ki/ in input to be eliminated. In tableau, (d) and (g), which violate DEP-IO as well, are eliminated by constraint IDENT-IO. And candidates in tableau are eliminated by the former three constraints, except (a), (b), (f), (h) and (j).The optimal output should be no-coda. So, NO-CODA follows DEP-IO and MAX-IO. (b) is eliminated for its violation of NO-CODA. (e) and (g) also violate NO-CODA have been eliminated by former constrains. All candidates are eliminated except (a), (f), (h) and (j). Who is the optimal output is decided by the last constraint ONSET. (a) and (f) violate it for twice and (h) and (j) once. Therefore, the optimal output is (h) and (j) produced in tableau 1. Though (b) violates ONSET for three times, (c), (g) and (i) for twice and (d) and (e) for once, they are not taken into consideration for their elimination by former constraints. From the actual linguistic data, we know the real output should be (a). As a result, it is a necessity to have at least one constraint which must eliminate (f), (h) and (j), and dominates ONSET to make sure

that (a) is the optimal output. In (f), there is VCV in the first syllable like /aka/ which is not allowed in a syllable for there is only one nucleus or peak in a syllable. Consonant between two vowels should either be onset of the following vowel or coda of the preceding vowel. Here, it should be the onset of the following vowel for the constraint NO-CODA will eliminated those having codas. So, does (j) which even has VCVCV in a syllable. And, we will use a constraint *PEAK^N (see 3.2.1) to avoid those syllables having more than one peak.

Indeed, there is no diphthong /ia/ in Classical Greek. And another constraint will be found to eliminate (h).

(28) ***ia**

No phonotactic sequence of /i/ and /a/.

Two new constraints will dominate ONSET. And the following tableau shows its result:

Tableau 4.2: Classical Greek – akakia

Input：/akakia/	IDENT-IO	DEP-IO	MAX-IO	NO-CODA	*ia	PEAK^N	ONSET
☞ a. a.ka.ki.a							**!
b. ak.a.k.ia				*!	*		***
c. a.ka.k.a			*!				**
d. ha.ka.ki.	*!	*					*
e. ad.ka.kia		*!		*	*		*
f. aka.ki.a						*!	**
g. ad.ka.ki.e	*!	*		*			**
h. a.ka.kia					*!		*
i. e.ka.ki.a	*!						**
j. akaki.a						*!	*

With the help of *PEAK^N and *ia, (f), (h) and (j) are successfully eliminated. And finally, the real optimal output is produced that is (a). There is another thing that there is rough breathing <‘> and smooth breathing <’> in word-initial vowel in Classical Greek. This could be seen directly from the symbol used above the vowel. And word-initial vowel in rough breathing will be eliminated by DEP-IO in tableau, truly. So, there is no need to add new constraints to handle with this issue here. Apart from ONSET, the other constraints have no interaction in producing the optimal output. This is shown in tableau 4.3:

Tableau 4.3: Classical Greek – akakia

Input：/akakia/	IDENT-IO	DEP-IO	MAX-IO	NO-CODA	*ia	PEAK^N	ONSET
☞ a. a.ka.ki.a							**!
b. ak.a.k.ia				*!	*		***
c. a.ka.k.a			*!				**
d. ha.ka.ki.	*!	*					*
e. ad.ka.kia		*!		*	*		*
f. aka.ki.a						*!	**
g. ad.ka.ki.e	*!	*		*			**
h. a.ka.kia					*!		*
i. e.ka.ki.a	*!						**
j. akaki.a						*!	*

And a constraint *PEAK/C (Hammond 1997:5) is added after *PEAK^N to prevent those candidates having a consonant as a syllable peak. Now, the constraint hierarchy of syllabification in Classical Greek word ἀκακία is as the following:

(29) IDENT-IO, DEP-IO, MAX-IO, NO-CODA, *ia, *PEAK^N, *PEAK/C >> ONSET.

Because letter and sound are identical in Classical Greek, and the constraint hierarchy of syllabification in Classical Greek word ἀκακία should also be the constraint hierarchy of sound. In word stress, the word is raised in the third syllable. Next, we will analyze its word stress. Every syllable in ἀκακία is light ones. Constrains used here are those in section 3.2.2 in Chapter 3. And **FOOT-BINARITY** and **PARSE-SYLLABLE** will be replaced by

(30) **NOCLASH**(Féry :15-16)[26]

Adjacent heads of feet are prohibited.

(31) **FINAL-HEAD**(ibid :15-16)

Align (Prosodic Word, Right; Head of the Prosodic Word, Right)

The head of a Prosodic Word is right-bounded.

Tableau 4.4: Classical Greek – akakia

Input: /akakia/	NOCLASH	FOOT-FORM(TRO)	FINAL-HEAD	ALIGN-FOOT-RIGHT	ALIGN-FOOT-LEFT

---

a.　　x 　(x .)(x .) ☞aka kia					
b.x 　(x .) 　aka kia			*!	*	
c.　　x 　　(x .) 　aka kia					*!
d.x 　(x .)(x .) 　aka kia			*!		
e.　　x 　(. x)(x .) 　aka kia	*!	*			
f.　　x 　(. x)(x .) 　aka kia	*!	*			
g.　　　x 　(. x)(. x) 　aka kia		**			

From the tableau 4.4, we could know that the hierarchy of word stress in Classical Greek ἀκακία is as the following:

(32) NOCLASH >> FOOT-FORM (TRO) >> FINAL-HEAD >> ALIGN-FOOT-RIGHT >> ALIGH-FOOT-LEFT

After Latin borrow *acacia* from Classical Greek, in early times, as what we discussed above, syllabification and sound are the same with Classical Greek, but not word stress. Only in Late Latin, because of its evolution, *c* in the third syllable is sounded like /ts/. Then, syllabification is still the same but not sound and word stress. So, we just analyze sound and word stress of Latin word *acacia*. The following will show how the sound changed.
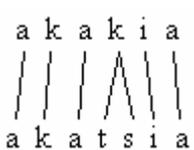
Diagram 4.1

And what causes this change phonologically? The following figure shows the distinctive features of /k/ and /ts/(Hu Zhuanglin & Jiang Wangqi 2002:104).

Figure 4.3 the distinctive features of /k/ and /ts/

	cons	approx	son	cont	strid	nasal	lat	voiced	[PLACE]	ant
/k/	-	-	-	-	+	-	-	-	DORSAL	
/ts/	-	-	-	-/+	+	-	-	-	CORONAL	+/+

From the figure 4.3, we could see that differences between /k/ and /ts/ are mainly in cont, [PLACE] and ant. And the following three constraints[27] might be set to explain this change.

(33) **CORONAL**

The consonant must be coronal.

(34) ***[-cont] & *[-cont]**

The consonant must be continuant.

(35) ***[-ant]**

The consonant must be anterior

Because the Latin words *acacia*, now, is not identical with its earlier form, and the constraint IDENT-IO will be drawn back to put it before ONSET in accordance with tableau 4.3, and further, the new constraints causing sound change must dominate IDENT-IO. As is illustrated in the following tableau:

Tableau 4.5: Latin – acacia

Input：/akakia/	DEP-IO	MAX-IO	NO-CODA	*ia	CORONAL	*[-cont] & *[-cont]	*[-ant]	IDENT-IO	ONSET
☞ a. a.ka.**tsi**.a						*		*	*
b. ak.a.**ts**.ia			*!	*		*		*	***
c. a.ka.**ts**.a		*!				*		*	**
d. ha.ka.**tsi**.a	*!					*		*	*
e. ad.ka.**tsi**a	*!		*	*		*		*	*
f. a. hka.**tsi**a	*!			*		*		*	
g. a.kad.**tsi**.a	*!		*			*		*	**
h. a.ka.**ts**ia				*!		*		*	*

---

i. a.ka.**ki**.a					*!	*!		*
j. ak.a.**k**.ia			*!	*	*	*		***
k. a.a.**k**.i		*!*	*		*	*		***
l. a.ka.**ki**. ha	*!				*	*		*
m. a.ka.**ki**ad	*!		*	*	*	*		*
n. ta.ka.**ki**a	*!			*	*	*		
o. al.ka.**ki**.a	*!		*		*	*		**
p. a.ka.**ki**a				*!	*	*		*

The input /akakia/ produces many candidates. And 16 candidates (a-p) are listed in the left part below the input in tableau 4.5. DEP-IO ranks higher in hierarchy to avoid (d), (e), (f), (g), (l), (m), (n) and (o) of which the candidates have epenthesis in them. (d) has /h/ before /a/ in the first syllable; there is /d/ after /a/ in the first syllable in (e); /f/ inserts /h/ before the second syllable; (g) has /d/ after the second syllable; (l) has /h/ before the last syllable; (m) adds /d/ at the last syllable acting as coda; (n) has /t/ before the first syllable; (o) adds /l/ at the first syllable acting as coda. Compared with input segment, those candidates all have epenthesis in them, causing them to be eliminated. MAX-IO is a constraint that does not allow deletion of the input segment in the output segment. Therefore, (c), which violates this constraint for it loses /i/ of the input, is eliminated. And (k) deletes /k/ and /a/ of the input and violates MAX-IO twice, being eliminated. And, NO-CODA, which follows DEP-IO and MAX-IO, is a constraint that does not allow syllables have codas. Because of this, (b) that puts /k/, which should be onset of the second syllable, into the first syllable as coda and (j) are eliminated. (e), (g), (k), (m) and (o) also violate NO-CODA, and unfortunately were eliminated by the former constraints. Though it was in Late Latin, there was still no diphthong as /ia/. The constraint *ia avoids and eliminate those candidates having such fake diphthong like (h), (m), (n) and (p) of which (b), (e), (f), (j), (m) and (n) were eliminated by the former constraints. After the evaluation of four constraints, 14 candidates were already eliminated, except (a) and (i). The difference between them lies in the onset of the third syllable, (a) is /k/ and (i) is /ts/. The former is early

pronunciation and the latter, before *i*, is enunciated as /ts/ in Late Latin. That reflected consonant change. And the above three constraints (CORONAL, *[-cont] & *[-cont] and *[-ant]) are used, after DEP-IO, MAX-IO and NO-CODA, to cause the consonant before *i* to be changed from /k/ to /ts/. We just put CORONAL before the other two constraints for its domination. All the candidates having /k/ in bold line violate CORONAL, and are eliminated. Then candidate (a) is survived in competing for optimal output with (j). And 16 candidates all violate *[-cont] & *[-cont]. Except (a), the other 15 candidates have been eliminated by the former constraint dominated *[-cont] & *[-cont]. As a result, (a) is the optimal output. Though no candidate violates the constraint *[-ant], and the candidates having consonant change violate IDENT-IO, and all candidates violate ONSET for once, or twice, or three times, except (n) and (f), they all cannot affect (a) to be the optimal output, for the other candidates have already been eliminated by constraints before *[-cont] & *[-cont].

It seems that there is no interaction between the four constraints. So, the dotted lines between them are used to represent their relation. And the following three constraints are indispensable in sound change. We used the real line to represent the interaction between CORONAL and *[-cont] & *[-cont], and dotted line to represent no-interaction between *[-cont] & *[-cont] and *[-ant]. Though, the last two constraints have less effect in producing the optimal output in the tableau 5, there still have interaction represented by the real line.

Then, we have the constraint hierarchy of consonant change in Late Latin as in the following:

(36) DEP-IO，MAX-IO，NO-CODA，*ia>>CORONAL>>*[-cont]&*[-cont]，*[-ant]>> IDENT-IO>>ONSET

From the distinctive features of consonant, we could know that /t/, /d/. /s/, /z/, /n/, /l/ and /r/, and their combinations could be produce in three constraints (CORONAL, *[-cont] & *[-cont] and *[-ant]) causing the consonant change. So, some constraints will be added before CORONAL to avoid this happen. First, we would like see the constraints to avoid their combination, *ls]σ, *ns]σ, *zs]σ, *ds]σ, *td]σ, *tz]σ, *tn]σ. *tl]σ, *dt]σ, *ds]σ, *dz]σ, *dn]σ, *dl]σ, *sd]σ, *sz]σ, *sn]σ, *sl]σ, *sr]σ, *zt]σ, *zd]σ, *zs]σ, *zn]σ, *zl]σ, *zr]σ, *nt]σ, *nd]σ, *ns]σ, *nz]σ, *nl]σ, *nr]σ, *lt]σ, *ld]σ, *ls]σ, *lz]σ, *ln]σ, *lr]σ, *rt]σ, *rd]σ, *rs]σ, *rz]σ, *rn]σ and *rl]σ. All the constraints mean

that there is no such phonotactic sequence in Latin. Luckily, there is phonotactic sequence in Latin, /tr/, /dr/ and /st/. Then, *[+nasal] and *[+approx] could eliminate those constraints above have the phoneme /n/ and /tr/ and /dr/. Meanwhile, /st/ could be eliminated by the constraint AFFRICATES, meaning that consonants must be affricates, which might also try to avoid their single appearance. Second, there must be constraints to avoid such candidates /a.k.a.tsi.a/ or /aka.tsi.a/ in the tableau. Then, constraints like *PEAK/C (Hammond 1997:5) which means that syllable must have peak and *PEAK^N are need. The former new constraints causing or avoiding consonant changed are before CORONAL, and the last two constraints are after *ia. Therefore, the hierarchy which is the one to cause *acacia* having consonant change in Late Latin is re-ranked as in the following:

(37) DEP-IO，MAX-IO，NO-CODA，*ia, *PEAK/C, *PEAK^N >> *ls]σ, *zs]σ, *ds]σ, *td]σ, *tz]σ, *tl]σ, *dt]σ, *ds]σ, *dz]σ, *dl]σ, *sd]σ, *sz]σ, *sl]σ, *sr]σ, *zt]σ, *zd]σ, *zs]σ, *zl]σ, *zr]σ, *lt]σ, *ld]σ, *ls]σ, lz]σ, *lr]σ, *rt]σ, *rd]σ, *rs]σ, *rz]σ, *rl]σ, *[+nasal], *[+approx], AFFRICATES, CORONAL >> *[-cont]&*[-cont]，*[-ant]>> IDENT-IO >> ONSET

As what we mentioned above, in 1543, English borrowed *acacia* from Latin word *acacia*. The following will show how they are different in pronunciation.
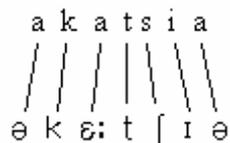
Diagram 4.2

There has a great change in sound between Late Latin and Early Modern English. The first and the last phoneme changed from /a/ to /ə/; the third phoneme changed from /a/ to /ɛ:/; the fifth phoneme changed from /s/ to /ʃ/, while the rest was not changed. The following figure shows the distinctive features of /a/, /ə/ and /ɛ:/ (Hu Zhuanglin & Jiang Wangqi 2002:104).

Figure 4.4 the distinctive features of /a/, /ə/ and /ɛ:/

	high	low	back	round	ATR	long
/a/	-	+	-	-		-
/ə/	-	-	-	-	-	-
/ɛ:/	-	-	-	-	-	+

From the figure 4.4, we could see that differences between /a/, /ə/ and /ɛ:/ are mainly in low and long. And the following two constraints might be set to explain this change.

(38) ***[+low]** (Ma Qiuwu 2001:248)

The vowels must not be low.

(39) ***[+long]**

The vowels must not be long.

And the following figure shows the distinctive features of /s/ and /ʃ/(Hu Zhuanglin & Jiang Wangqi 2002:104).

Figure 4.5 the distinctive features of /s/ and /ʃ/

	cons	approx	son	cont	strid	nasal	lat	voiced	[PLACE]	ant
/s/	+	-	-	+	+	-	-	-	DORSAL	+
/ʃ/	+	-	-	+	+	-	-	-	DORSAL	-

From the figure 4.5, we could see that the difference between /s/ and /ʃ/ is mainly on ant which is the constraint *[-ant] we just used before. But there is a problem here that the real output might be eliminated if we use *[-ant] because /ʃ/ violates this constraint. And we still used a constraint AFFRICATES in analyzing *acacia* in Late Latin. /s/ and /ʃ/ differentiate in place of articulation; the former is alveolar while the latter is post-alveolar. So, a constraint POST-(c), which means that the consonants must be posted, will be used to distinguish /s/ and /ʃ/. The constraints and constraint hierarchy is illustrated in the following to see how English word *acacia* borrowed from Latin word acacia changed in Early Modern English period.

Tableau 4.6: English (Early Modern English) - */əˈkɛ:tʃɪə/

Input：akatsia	DEP-IO	MAX-IO	NO-CODA	*[+low]	WSP	*[+long]	*ɪə	POST-(C)	IDENT-IO	ONSET
1. **a**.k**a**.tsi.**a**				***!	*			*		**
2. **a**.k**a**.tsi**a**				***!	*			*		*
3. k**a**.tsi.**a**		*!		**	*			*		*
4. **a**.k.tsi.**a**				**!	*			*		**
5. **a**.k**a**.**k**.**a**		*!	*	***	*			*	*	**
6. **a**.k**a**.tsi		*!		**	*			*		*

7. a.ka.k.a		*!	*	***	*			*	*	**
8. ad.ka.tsi.a	*!		*	***	*			*		**
☞9. ə.kɛː.tʃɪ.ə						*			****	**
10. ə.kɛː.tʃɪə						*	*!		****	*
11. a.kɛː.tʃɪ.ə				*!		*			***	**
12. a.kɛː.tʃɪə				*!		*			***	*
13. ə.ka.tʃɪ.ə				*!	*				***	*
14. ə.ka.tʃɪə				*!	*				**	*
15. ə.kɛː.tʃɪ.a				*!		*			***	**
16. ə.kɛː.tʃɪa				*!		*			***	*
17. a.kɛː.tʃɪ..a				**!		*			**	*
18. a.kɛː.tʃɪ.a				**!		*			**	*
19. a.katʃɪ.ə				**!	*				**	**
20. a.katʃɪə				**!	*				**	*
21. a.ka.tʃɪ.a				***!	*				*	**
22. a.ka.tʃɪa				***!	*				*	*
23. ə.kɛː.tsɪ.ə						*		*!	***	**
24. ə.kɛː.tsɪə						*	*!	*	***	*
25. a.kɛː.tsɪ.ə				*!		*		*	***	**
26. a.kɛː.tsɪə				*!		**		*	***	*
27. ə.ka.tsɪ.ə				*!	*			*	**	**
28. ə.ka.tsɪə				*!	*			*	**	*
29. ə.kɛː.tsɪ.a				*!		*		*	**	**
30. ə.kɛː.tsɪa				*!		*		*	**	*
31. a.kɛː.tsɪ..a				**!		*		*	*	**
32. a.kɛː.tsɪ.a				**!		*		*	*	**
33. a.katsɪ.ə				**!	*			*	*	**
34. a.katsɪə				**!	*			*	*	*
35. əː.kɛː.tʃɪ.ə						**!				**
36. əː.kɛː.tʃɪ.əː						***!				**
37. əː.kɛː.tʃɪ:.əː						****!				
38. ə.kɛː.tsɪ.ə						*		*!	***	**

39. ə.kɛ.tʃɪ.əː				*!	*			**

The input /akatsia/ produces so many candidates that we use numbers to refer to them not alphabet. And 39 candidates (1-39) are listed in the left part below the input in tableau 6. The constraint IDENT-IO is still drawn back before ONSET to avoid the elimination of the real optimal output because of dramatic sound changes of *acacia* in English when it was borrowed from Latin in Early Modern English period. DEP-IO ranks higher in hierarchy to avoid (8) of which the candidates have epenthesis in it. (8) has /d/ after /a/ in the first syllable as its coda. And any candidate, which has epenthesis in it, will be eliminated by this constraint. Then, MAX-IO is a constraint that does not allow deletion of the input segment in the output segment. Therefore, (3), (5), (6) and (7), which violate this constraint, for (3) deletes the first segment /a/ of the input, (5) loses the fifth segment /i/ in the input, (6) misses the last segment /a/ in the input, are eliminated. And, NO-CODA, which follows DEP-IO and MAX-IO, is a constraint that does not allow syllables have codas. Because of this, (5) and (7) that the third syllable is /k/ without nucleus, and (8) that has /d/ as coda in the first syllable because of epenthesis, violate this constraint but were already eliminated by former violated constraints. Now, after the first three constraints, phonologically structural correct candidates, which are waited to be tested and changed in sound in the following constraints, survive. And a constraint *[+low], which means the vowels must be low, eliminates (1), (2), (4), (11), (12), (13), (14), (15), (16), (17), (18), (19), (20), (21), (22), (25), (26), (27), (28), (29), (30), (31), (32), (33) and (34). This constraint is for all vowels in bold line in candidates, and those which have less violation or no violation survive. (11), (12), (13), (14), (15), (16), (25), (26), (27), (28), (29) and (30) which have an /a/ in them violate it for once, (4), (17), (18), (19), (20), (31), (32), (33) and (34) which have two /a/ in them violate it for twice, and (1), (2), (21) and (22) which have three /a/ violate it for three times. Though (3) and (6) violate it for twice, and (5), (7) and (8) violate it for three times, they have already been eliminated by the former violated constraints. Now, there are 8 candidates left among 38 candidates, and they are (9), (10), (22), (24), (35), (36), (37) and (38). And the constraint *[+long] that is the same in violation as *[+low]. The real optimal output has a long vowel, which means that a candidate with no violation wins. Therefore, a metrical constraint WSP (heavy syllables are stress) will be inserted between *[+low] and *[+long] to make sure that the candidates have no long vowels or have long

vowels in other syllables but not the second syllable win in the tableau. And it is impossible to set all metrical constraints in tableau 6. It is known that heavy syllables are stressed in English, and syllables have long vowels or diphthong could be seen as heavy ones and syllable have short vowels or closed syllable are light ones. The word stress of *acacia* in English is in the second syllable. In accordance with WSP, heavy syllable must have long vowels. WSP eliminates candidate like (39) that has no long vowel in the second syllable which is the word stress stands and eliminated (40) and (41) that their long vowels are not in the stressed syllable. Let's go back to *[+long] after WSP. (9), (10), (22), (24), and (38) violate it for once, and (35) violates for twice, and (36) violates it for three times, and (37) violates it for four times. Those candidates have more than one long vowel, or long vowel that is not in the stressed syllable are eliminated by WSP and *[+long]. Then, (9), (10), (23), (24) and (38) survive because of only a violation of *[+long], and that is permissible for the real optimal output must have a long vowel. *[+long] in this context is a have-to violation. Well, the survivor is among the five candidates. The optimal output will be only produced in the hands of the following constraints. It is said there is no diphthong like /ɪə/ in Early Modern English. And, a constraint *ɪə, which means that there is no phonotactic sequence /ɪ/ and /ə/. Among them, (10) and (24) having /ɪə/ are eliminated. After *ɪə, a constraint POST-(c), which means that the consonants must be post-alveolar, eliminates the candidates (23), (24) and (38) that have alveolar /s/ in them. Till now, all candidates were eliminated, except (9) which is the optimal output. The last two constraints IDENT-IO and ONSET have no effect in producing optimal output, whether the candidates violate them or not.

It seems that there is no interaction between the first three constraints, so do the constraints *[+low] and WSP, and the constraints *[+long], *ɪə and POST-(c), and the constraints IDENT-IO and ONSET. So, we use the dotted lines to represent their relation. But, there is interaction between them. And the real lines are used to represent their relation. As a result, the constraint hierarchy in sound and syllabification of English word *acacia* borrowed from (Late) Latin in Early Modern English period is illustrated in the following:

(40) DEP-IO, MAX-IO, NO-CODA >> *[+low], WSP >> *[+long], *ɪə, POST-(c) >> IDENT-IO, ONSET

The word *acacia* has four syllables in Early Modern English, and in its word stress it is clearly seen that in Latin *acacia* has word stress in the second syllable which is the same in English which has a preference to have word stress in the first and the second syllable so that word stress of the Latin word *acacia* is one of the two preferences English has just entered into English without changing the word stress.

Referenced by tableau 4.6, the syllabification of *acacia* in Early Modern English should be as the following:

(41) IDENT-IO >> DEP-IO, MAX-IO, NO-CODA *ɪə >> ONSET

It should be re-asserted that the sound and syllabification of the Latin word *acacia* was changed when it was bought into English in Early Modern English, and the word stress of this word was not changed because of English preferences. Shall we conclude that a language prefers to change what is unlike in that language and preserves what is like or similar in that language?

Here, the change in sound and syllabification is symbolized as the bold line in the model and the preservation of word stress is symbolized as the dotted line and the line of dashes.

Once the Latin word *acacia* entered into English in Early Modern English period, in the early time, it had something connected with its origin, and after it experienced the phonology of Early Modern English, its sound was totally changed, and its syllabification and word stress were the same as the Latin were. History develops as well as language, accompanied by loss and gain of word. *acacia* is one of the lucky ones that is still used in Modern BrE. Here, we could see the word *acacia* was sounded as */əˈkɜːtʃɪə/ in Early Modern English and is enunciated like /əˈkeɪʃə/ Modern BrE. This change is finished in the square with dotted lines concerning $\mathcal{H}^{OEP}$, $\mathcal{H}^{MEP}$, $\mathcal{H}^{EMEP}$ and $\mathcal{H}^{MnBrEP}$. Meanwhile, its sound and syllabification were changed but not word stress. The following will illustrate how they are changed in sound.

ə k ɛː t ʃ ɪ ə

ə k ɛ ɪ ʃ ə

Diagram 4.3

From the diagram 4.3, we could see that there is a change in Early Modern

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English and Modern BrE in sound. The third segment /ɛ:/ as a long vowel in Eearly Modern English had become a diphthong /ɛɪ/ in Modern BrE, and the fourth and fifth segments /tʃ/ had been one /ʃ/, and the last two /ɪə/ had join to be a schwa /ə/, while the rest was not changed. The following figure shows the distinctive features of /ɛ/ and /ɛɪ/ (Hu Zhuanglin & Jiang Wangqi 2002:104).

Figure 4.6 the distinctive features of /ɛ/ and /ɛɪ/

	high & high	low & low	back & back	round & round	ATR & ATR	long & long
/ɛ:/	-	-	-	-	-	+
/ɛɪ/	-/+	-/-	-/-	-/-	-	-/-

From the figure 4.6, we could see that /ɛ/ and /ɛɪ/ are mainly differentiated in high&high and long. And the following constraints to be set will explain this change.

(42) ***[+high]&*[+high]**

The vowels must not be high.

(43) ***[+long]**

The vowels must not be long.

The next figure will show the distinctive feature of /ʃ/ and /tʃ/ (Hu Zhuanglin & Jiang Wangqi 2002:104).

Figure 4.7 the distinctive feature of /ʃ/ and /tʃ/

	cons	approx	son	cont	strid	nasal	lat	voiced	[PLACE]	ant
/ʃ/	+	-	-	+	+	-	-	-	DORSAL	-
/tʃ/	+	-	-	-/+	+	-	-	-	CORONAL	-

From the figure 4.7, we could see that cont and [PLACE] cause the discrepancy between /ʃ/ and /tʃ/. And the following constraints[28] to be set will explain this change.

(44) ***[-cont]**

The consonants must be continuant.

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[28] It is stated that the constraints are set by the author. And some of these constraints might be found out by other researchers. Because of limited resources on the author's hands, if some of these constraints found out by other author previously, please let me know and I will make the citations.

(45) **DORSAL**

The consonants must be dorsal.

With the help these newly constraints, the constraint hierarchy caused the change of *acacia* from Early Modern English to Modern BrE is shown in the following.

Tableau 4.7: Modern BrE /əkɛɪʃə/

Input: /əkɛ:tʃɪə/	NO-CODA	*[+long]	*[+high]&*[+high]	*[-cont]	DORSAL	*DPa*H	DEP-IO	IDENT-IO	ONSET	MAX-IO
a.ə.kɛ:.tʃɪ.ə		*!	*	*	*				**	
b.ə.kɛ:.tʃɪə		*!	*	*	*				*	
c. ə.keɪ.ʃɪə			*			*!	*	**	*	*
d.ə.keɪ.ʃɪ.ə			*				*	**	**!	*
☞e.ə.keɪ.ʃə			*				*	**	*	**!
f. ə.keɪ.tʃə				*!	*			*	*	

The input /əkɛ:tʃɪə/ has as less candidates as those of the above tableau, because Early Modern English as a barrier eliminated all possible candidates, and giving tiny opportunity in Modern BrE having more candidates. And there are an epenthesis and a deletion of segment between the input and the real optimal output. Also, the real optimal output is not identical with the input. Therefore, DEP-IO, MAX-IO and IDENT-IO have to be drawn back before ONSET to avoid the elimination of the real one. NO-CODA as the first constraint is to eliminate those syllables has codas. Luckily, there is no candidate in tableau 7 violate it. Early Modern English's way of pronouncing *acacia* is all eliminated by *[+long] because (a) and (b) have long vowels in them. *[+high]&*[+high] is a constraint used in diphthong. All candidates violate it because there are /ɪ/ which have the feature of [*high]. (a) and (b) were eliminated because of their violations of the former highly ranked constraints. And (c), (d) and (e) violate *[+high]&*[+high] as well. As discussed above, this is a have-to-violate constraint. The three candidates who could be the survivor would be in the hands of the latter constraints. Since there is a segment /t/ in (a), (b) and (f), though they violate *[-cont], and in the same way, there is /tʃ/ in (a), (b) and (f) which is coronal but not dorsal violates DORSAL. But (a) and (b) were already eliminated.

Only (f) that also violates DORSAL was eliminated by *[-cont]. After the constraint DORSAL, there is a constraint

(46) ***DIPHTHONG&POSTALVEOLAR&*[+high]** (*DPa*H)

No word sequence of diphthong, postalveolar and high vowels.

So, (c) that violates it is eliminated. Compared with the input, (c), (d) and (e), that have /ɛɪ/ in them, take an epenthesis. And that makes them violate DEP-IO. The two candidates (d) and (e) here have tie so that the optimal output could not be produce here. And in the cell of IDENT-IO, (c), (d) and (e) all violate it for twice and (f) once. But, (a) and (b), though they do not violate this constraint, were eliminated by highly ranked constraints. Here, (c) and (d) still have the same in violations. Just look at the following constraint ONSET, without taking those candidates already eliminated into consideration, the first and the last syllable in (d) only have nucleus but not onset, causing (d) to violate it for twice. And only the first syllable in (e) has nucleus, leading (e) to violate it for once. As a result, the optimal output is produced here. That is (e) for its less violation of ONSET. While, (c), (d) and (e), that have /ʃ/ in them, take a deletion. And that makes them violate MAX-IO, (c) and (d) for once and (e) for twice. (d) has less violation in MAX-IO, which it was eliminated by the constraint ONSET which dominates MAX-IO to make sure that the optimal output is (e) but not (d).

We found that there are no interaction between *[-cont], DORSAL and *DPa*H, and DEP-IO, IDENT-IO and ONSET. But the rest ones have interaction. So, the dotted lines are to be used in representing no-interaction, and the real line in interaction. The constraint hierarchy of English word *acacia* become Modern BrE word through its self-evolution since Early Modern English is illustrated as in the following.

(47) NO-CODA >> *[+long] >> *[+high]&*[+high] >> *[-cont], DORSAL, *DPa*H >> DEP-IO, IDENT-IO, ONSET >> MAX-IO

The syllabification of Modern BrE word is what we have done in Chapter 3, with a little modification, is shown in the following.

(48) IDENT-IO, DEP-IO, MAX-IO >> NO-CODA >> ONSET

And the word stress of Modern BrE word *acacia* just preserves the word stress of Early Modern British English.

4.3 Operational Procedures in Multi-Dimensional Model of Modern BrE Phonology

It is probably impossible to introduce every part in that model with examples in this thesis. So, in the above section 3.3, *acacia*, taken as an example among the Modern BrE words in *A-/a-* ending in vowels, are analyzed diachronically and etymologically in **MD Model of Modern BrE Phonology**. Actually, how to operate the model has been brief discussed in section 2.3 in Chapter Two. The operational procedures in **MD Model of Modern BrE Phonology** are in detail as the following:

1. The first step is to identify etymology of Modern BrE words. Then, one could find in **INPUT** to which part do they belong.

2. If the word was **NATIVE** or **NON-NATIVE** synchronically, one should follow the line below them pointed to $\mathcal{H}^{\text{MnBrEP}}$ directly. Here, constraitnts and constraint hierarchy in Modern BrE phonology must be found as the word is only evaluated by it. Attention should be paid here. There might be something unchanged in word that is **NON-NATIVE**, or in other words, the word from **NON-NATIVE** cannot be evaluated wholly or partially by $\mathcal{H}^{\text{MnBrEP}}$. At that moment, the dotted lines and line of dashes connected **NON-NATIVE** with **OUTPUT** will be efficient.

3. If the word was **NATIVE** or **NON-NATIVE** diachronically, one should know when did the word appeared in English or was brought into English. After that, one should follow the line below them pointed to that square with dotted lines directly. There are three situations might happen here. First, if the input is born in Old English period, it must undergo $\mathcal{H}^{\text{OEP}}$, $\mathcal{H}^{\text{MEP}}$, $\mathcal{H}^{\text{EMEP}}$, and $\mathcal{H}^{\text{MnBrEP}}$ to be the optimal or real output in Modern BrE; second, if the input is born in Middle English period, it must undergo $\mathcal{H}^{\text{MEP}}$, $\mathcal{H}^{\text{EMEP}}$, and $\mathcal{H}^{\text{MnBrEP}}$ to be the optimal or real output in Modern BrE; third, if the input is born in Early Modern English period, it must undergo $\mathcal{H}^{\text{EMEP}}$ and $\mathcal{H}^{\text{MnBrEP}}$, being the optimal or real output in Modern BrE. The relations between them are represented by lines below **NATIVE**'s **DIA** and **NON-NATIVE**'s **DIA** joint together with the dotted lines of arrows, which points to **EVALUATOR** through $\mathcal{H}^{\text{MnBrEP}}$, showing their orientation diachronically, but separating themselves in a square in lines of dashes (referring to self-evolution of English) in which contains $\mathcal{H}^{\text{OEP}}$, $\mathcal{H}^{\text{MEP}}$, and $\mathcal{H}^{\text{EMEP}}$. There might be something unchanged in word that is

NATIVE or **NON-NATIVE**, or in other words, the word from **NATIVE** or **NON-NATIVE** cannot be evaluated wholly or partially by $\mathcal{H}^{\text{OEP}}$, or $\mathcal{H}^{\text{MEP}}$, **or** $\mathcal{H}^{\text{EMEP}}$, **or** $\mathcal{H}^{\text{MnBrEP}}$. At that moment, the dotted lines and line of dashes connected **NON-NATIVE** and that square with dotted lines with **OUTPUT** will be efficient.

4.4 Summary

In this Chapter, description of Modern BrE words in *A-/a-* ending in vowels compared with Classical Greek and Latin etymologically is first given. Then, *acacia*, taken as an example among the Modern BrE words in *A-/a-* ending in vowels, are analyzed diachronically and etymologically in **MD Model of Modern BrE Phonology**. After that, operational procedures of that model are shown.

Chapter 5 Conclusion and Prospect

In this thesis, three questions were elucidated in this research. First, which are the constraints of pronunciation, syllabification and word stress in Modern BrE and how are they ranked; Second, is the theoretical framework of OT qualified in answering those questions; Third, is the **MD Model of Modern BrE Phonology** of assistant of OT in explaining those questions.

By analyzing Modern BrE words in *A-/a-* in OT from syllabification, word stress and pronunciation, the constraints and their ranking are found in syllabification which is influenced by phonotactic, morphology, etymology and word stress, in word stress which is also influenced by etymology. And the pronunciation dealt with in OT revealed the theory's disadvantage. And, **MD Model of Modern BrE Phonology**, which drawing support from OT takes etymology and different historical periods of a language into account, could solve the issue left by OT. Herein, the Modern BrE word *acacia*, as the example, is explained in **MD Model of Modern BrE Phonology**.

The **MD Model of Modern BrE Phonology**, borrowed the theoretical framework of OT combined with etymology and historical linguistics, was constructed by the author cooperated with his supervisor Prof. Jiang. As a result, the thesis mainly focuses on two points, the linguistic phenomenon and the model. The former could explain the latter; and the latter could formalize or generalize or abstractize the former. And more phenomenons from Chinese phonology or other languages' phonology will be needed to prove the model as it is only testified by Modern BrE words in *A-/a-* ending in vowels. Meanwhile, other linguistic data will be explained in this model, and that calls for a change in the model.

MD Model of Modern BrE Phonology could not only be applied in analysis of Modern BrE words indeed, but also in other languages. A modified version of it will be done here to meet the need for analyzing other languages. Most parts of it will be preserved with only some adaptations. One is that a square with dotted lines concerning **NON–NATIVE** which is composed of **SYN** and **DIA**. As there are thousands of human languages in this planet, some languages might do not borrow word from other languages. Or, some languages may borrow words from other languages synchronically or diachronically, but not synchronically and diachronically. So, this part is relatively optional. But, **NATIVE** is kept for words in a language are formed by days. Meanwhile, the lines below **SYN** and **DIA** are changed from the real

lines to the dotted lines to represent this. A square with dotted line near the **EVALUATOR** is changed to $\mathcal{H}^{\text{DPLP}}$ which means that diachronic development of a language's phonology or different historical periods of a language's phonology. The model is as the following:
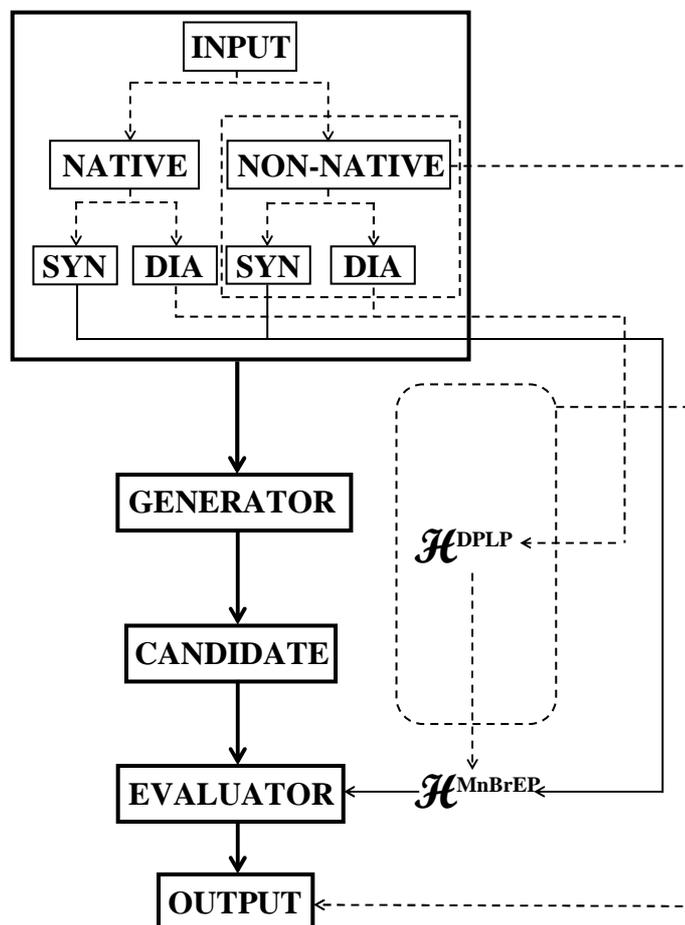
Figure 5.1 Multi-Dimensional Model of Phonology

In traditional Chinese philosophy, the world is a material, composed of *yin* and *yang* which are antitheses or mutual correlations to each other. Their unity of opposites, as the basic reason, make everything in natural phenomenon incur, develop, change and distinct[29]. *Yin* is the symbol for the gentle, while *yang* for the strong. Language sometimes is featured by *yin* and *yang*. *Yin*, language so weak and fragile that any elements of other languages might come to the other languages without obstacles; and *yang*, language is obligatory and rule-governed that every word must be its rule-like. In **MD Model of Phonology**, yin as the dotted or the lines of dashes and yang as the real line are cooperated to produce the real optimal output of Modern BrE. It is these that cause diversity, complexity or even contradiction in linguistic

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[29] http://baike.baidu.com/view/188.htm

phenomenon of Modern BrE words. In the next period of this research, **MD Model of Phonology** will be examined by more linguistic facts.

The significance of the thesis is concluded in the following:

1. The constraints and constraint hierarchy are found in Modern BrE words in *A-/a-* ending vowels in the framework of OT. By them, it would be clearly seen which factors impact Modern BrE words phonologically.

2. OT will be supplemented, modified or improved, in a certain sense, by **MD Model of Modern BrE Phonology**. Supported from the model, what a modern language is alike and how they are changed could be clearly and generally illustrated.

3. The model is not only applied to Modern BrE, but also to other languages, contributing to phonology researches.

4. In linguistic teaching, as schema is effective in teaching from cognition, it could be used to have a visual image to make students better understood of what a modern language is alike and how they are changed without remembering description in a great detail.

There is no end to learning. The **MD Model of (Modern BrE) Phonology** still needs to be improved and developed in further study and research, and needs to be testified by more phonological facts.

This thesis might have a lot of mistakes or errors that the author could not find them out because of the author's limited learning and research experience. The author would be grateful for your criticism, comment and suggestion to this thesis.

Acknowledgements

I would like to appreciate my supervisor Prof. JIANG Ping from the bottom of my heart. And this research was started with a question --- "are there any syllables in English that must not have codas" asked by her in teaching Modern Linguistics on Nov. 9, 2006. Meanwhile, it is her encouragement, support and help that inspired me to develop the **MD Model of (Modern BrE) Phonology** which is a fruit that had dozens of communications and discussions with her. And what is of importance is that the academic achievements I have now could not do without her guidance.

Thanks to Prof LIU Tianlun, Prof. YUAN Pinghua, Prof. WANG Zhengqi, Prof. YUAN Xuesheng and Prof. GUO Xiaoyan, I learned more from your classes; thanks to the teachers worked in Library in School of Foreign Languages. Since, every time, they helped and allowed me to borrow many books than that is permitted; thanks to my friends who understand and encourage me; thanks to my computer, printer and books that gave me a hand in thesis-writing.

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I would like to offer thanks to Dr. QU for I would not be M.A without his help in academy and in life.

Finally, I would like to dedicate this thesis to my dear parents.

Li Bin
Dec 18, 2008

Appendix I:

Modern British English words in 'A-/a-' ending in vowels in POECD

A	abuser	acidly
a	abusively	acme
abattoir	abysmally	acne
abbacy	acacia	acoustically
abbé	academia	acquire
abbey	academically	acre
abductor	academy / Academy	acrider
abhor	accelerator	acridity
ability	acceptability	acrimony
abjure	acceptably	acrobatically
abler	accessibility	actively
ably	accessory	activity
abnormality	accidentally	actor
abnormally	accompany	actuality
Abo / abo	accordingly	actually
abominably	accountability	actuary
aborigine / Aborigine	accountancy	acuity
abracadabra	accrue	acupuncture
abruptly	accumulator	acutely
abscissa	accuracy	acuter
abscissae	accurately	adagio
absentee	accusatory	adamantly
absently	acellular	adaptor
absolutely	acerbity	addenda
abstemiously	achier	adder
abstractedly	achromatically	additionally
absurdity	achy	addressee
absurdly	acidify	adequacy
abundantly	acidity	adequately

adhere	afar	ahoy
adieu	affability	aimlessly
adiposity	affably	air
adjacency	affair	aircrew
adjudicator	affectingly	airer
adjure	affectionately	airier
administer	affinity	airily
administrator	affray	airliner
admirably	aficionado	airscrew
Admiralty	afore	airway
admire	Afrikaner	airworthy
admirer	Afro	airy
admiringly	after	ajar
admittedly	afterglow	Akela
admixture	agave	akimbo
admonitory	agency	alabaster
ado	agenda	alacrity
adobe	aggressively	alarmingly
adore	aggressor	albino
adorer	aggro	alchemy
adulterer	agility	alder
adultery	agitator	aleatory
adventure	aglow	alfalfa
adventurer	ago	alfresco
adversary	agony	alga
adversely	agoraphobia	algae
adversity	agree	algebra
advisability	agreeably	alibi
advisedly	agriculture	alimentary
adviser / advisor	agrimony	alimony
advisory	agronomy	alkali
advocacy	ague	alkalinity
aesthetically	ah	Allah
aetiology	aha	allay

allegedly	amateur	analgesia
allegory	amatory	analogy
allegretto	ambassador	anarchy
allegro	amber	anathema
alleluia	ambiguity	anatomy
allergy	ambrosia	ancestor
alley	ambulatory	ancestry
alligator	amenity	anchor
allotropy	amiably	anchovy
allow	amicably	ancillary
alloy	amir	andante
allure	amity	anemometer
alluvia	ammeter	anemone
ally /Ally	ammo	anew
almighty	ammonia	angelica
almoner	amnesia	angelically
aloe	amnesty	anger
alpaca	amnia	angina
alpha	amoeba	angler
already	amour	angora
also	ampere	angostura
altar	amphitheatre	angrier
alter	amphora	angrily
alternately	amphorae	angry
alternatively	ampler	angular
alternator	amplifier	angularity
although	amplify	animality
altimeter	amply	animosity
alto	ampulla	annatto / anatto
altogether	ampullae	anniversary
alumina	amputee	announcer
alumna	anaconda	annoy
alumnae	anaemia	annually
alumni	anaesthesia	annuity

annular	aorta	aquilegia
anomaly	Apache	arbiter
anonymity	apathy	arbitrarily
anorexia	aperture	arbitrary
another	aphasia	arbitrator
answer	aphelia	arbor
ante	apiary	arboreta
anteater	apiculture	arboriculture
antechamber	Apocrypha / apocrypha	arbour
antenna	apogee	archaeology
antennae	apologetically	archaically
anterior	apologia	archdeaconry
anther	apology	archduchy
anthology	apoplexy	archeology
anthropology	apostasy	archer
anti	apostrophe	archery
antibody	apothecary	archipelago
anticipatory	apparently	architecture
antimacassar	appear	archly
antimatter	appendectomy	archway
antimony	appendicectomy	ardently
antinomy	appetizer / appetiser	ardour
antipathy	applicability	are
antiquary	applicator	area
antiquity	appliqué	arena
antler	apply	areola
antra	appointee	areolae
anxiety	appreciatory	areolar
anxiously	apprehensively	argosy
any	appro	argot
anybody	appropriately	arguably
anyhow	approximately	argue
anyway	apropos	aria
anywhere	aqua	aridity

aristocracy	Ashkenazi	astronomically
armada / Armada	ashlar	astronomy
armadillo	ashore	astutely
armature	ashtray	asunder
armchair	ashy	asymmetry
armour	asininity	ataxia
armourer	askew	atelier
armoury	asperity	athletically
army	asphyxia	atmosphere
arnica	aspidistra	atomizer / atomiser
aroma	aspirator	atonality
aromatherapy	aspire	atria
arpeggio	assagai / assegai	atrociously
array	assay	atrocity
arrester	assembler	atrophy
arrogantly	assembly	attaché
arrow	assenter	attacker
artery	assertively	attar
artfully	assessor	attendee
articular	assiduity	attentively
articulately	assiduously	attire
artier	assignee	attorney
artificer	assigner / assignor	attractively
artificiality	assimilator	atypically
artificially	assure	aubrietia / aubretia
artillery	assuredly	auctioneer
artistically	aster	audacity
artistry	asthma	audibility
artlessly	astir	audibly
arty	astray	audio
asafoetida	astringency	auditor
ascendancy	astrologer	auditory
asexually	astrology	auger
ashier	astronomer	augur

augury	avenue
auntie / aunty	aver
aura	Avesta
aurally	aviary
aureola	aviator
auricula	avidity
auricular	avidly
aurora	avocado
aurorae	avow
Aussie	avowedly
austere	avuncular
austerer	aware
austerity	away
autarchy	awe
autarky	aweigh
authentically	awfully
authenticity	awry
author	ayatollah
authority	aye
auto	azalea
autobiographer	azure
autobiography	
autocracy	
autocratically	
Autocue	
automatically	
automata	
autonomy	
autopsy	
autostrada	
auxiliary	
availability	
avatar	
Ave	

Appendix II:

Syllabification of Modern BrE words in 'A-/a-' ending in vowels in CIDE

Syllables	Syllabifications	Examples
monosyllables	V	are
	VV	air
disyllables	V.CV	adore
	V.CVV	ago
	V.CCV	agree
	V.CVVV	attire
	V.CCCV	askew
	V.CCVV	aglow
	V.CCVVV	acquire
	V.CCCVV	astray
	VV.CV	airy
	VV.CVV	airway
	VV.CCV	aircrew
	VV.CCCV	airscrew
	VC.V	azure
	VC.VV	arrow
	VC.CV	acme
	VC.CVV	also
	VC.CCV	ampler
	VC.CCVV	armchair
	VCC.CV	antler
	VCC.CVV	archway
trisyllables	V.CV.V	aria
	V.CV.VV	audio
	V.CV.CV	arena
	V.CV.CCV	auditory
	V.CV.CCCV	artistry
	V.CVV.CV	adobe
	V.CVV.CCV	Autocue
	V.CVC.V	another

	V.CVC.VV		attaché
	V.CVC.CV		adaptor
	V.CVC.CVV		akimbo
	V.CVC.CCV		assembler
	V.CCV.CV		archery
	V.C(V)CC.CV		ardently
	V.CVVC.CV		appointee
	V.CCVC.V		aggressor
	V.CCVC.CV		agenda
	V.CCCV.CV		astutely
	V.CCVCC.CV		abruptly
	VV.V.CV		aorta
	VV.CV.V		area
	VV.CV.CV		airworthy
	VV.CVV.CV		airliner
trisyllables	VV.CCVC.CV		agency
	VC.V.CV		agony
	VC.V.CVV		alibi
	VC.V.CCV		allergy
	VC.VC.CV		avidly
	VC.CV.CV		angora
	VC.CV.CVV		albino
	VC.CV.CCV		adversely
	VC.CV.CCVV		afterglow
	VC.CVC.V		alpaca
	VC.C(V)C.CV		absentee
	VC.CVC.CV		alfalfa
	VC.CV.CCVV / VC.CVC.CVV	/	atmosphere
	VC.CVC.CCV		adventure
	VC.CVV.CV		adviser
	VC.CCV.CV		anchovy
	VC.CCV.CCV		algebra
	VC.CVVV.CV		admirer
	VC.C(V)CC.CV		absently
	VC.CVCC.CCV		admixture
	VC.CCVV.CV		angina
	VC.CCVC.CVV		alfresco

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trisyllables	VCC.V.CV	anteater
	VCC.CV.CCV	anxiously
	VVC.CV.CCV	aimlessly
	V.CV.CV.V	anaemia
	V.CV.CV.CV	amenity
	V.CV.CVC.VV	armadillo
	V.CV.CVC.CV	assuredly
	V.CV.CVC.CCV	architecture
	V.CV.CCV.CV	arbitrary
	V.CV.CCV.CCV	acoustically
	V.CV.CCVV.CV	arbitrator
	V.CVV.V.CCV	archaically
	V.CVV.VC.CV	avowedly
	V.CVV.CV.V	ammonia
	V.CVC.V.CV	ability
	V.CVC.V.CVV	acidify
quarisyllables	V.CVC.V.CCV	analogy
	V.CVC.CV.CV	adulterer
	V.CVC.CV.CCV	artistically
	V.CVC.VC.V	?artillery
	V.CVC.VCC.CV	apparently
	V.CVC.C(V)C.V	adultery
	V.CVC.CVC.V	abysmally
	V.CVC.C(V)C.CV	ascendancy
	V.CVC.CVC.CV	attentively
	V.CVC.C(V)CC.CV	abundantly
	V.CVC.CCV.CV	apostrophe
	V.CVCC.V.VV	arpeggio
	V.CVCC.VC.CV	allegedly
	V.CCV.V.CV	acuity
	V.CCV.V.CCV	agreeably
	V.CCV.CV.CCV	accusatory
	V.CCV.CVC.CV	abusively
	V.CVVC.C(V)C.CV	accountancy
	V.CCVV.CV.CCV	atrociously
	V.CCVC.V.CV	asperity
	V.CCVC.VC.CV	aggressively
	V.CCVC.CCV.CV	attractively

	V.CCCVC.V.CV	astronomy
	V.CCCVC.V.CCV	astrology
	V.CCCVC.CC(V)C.CV	astringency
	VC.V.CV.CV	alleluia
	VC.V.CV.CVV	avocado
	VC.V.CV.CCV	amicably
	VC.V.CVV.CV	alligator
	VC.V.CVC.V	anybody
	VC.V.CVC.CV	alabaster
	VC.V.CVCC.CV	adamantly
	VC.V.CCV.CV	adequacy
	VC.V.CCVC.CV	apoplexy
quarisyllables	VC.CV.V.CV	annually
	VC.CV.V.CCV	arguably
	VC.CV.CV.V	amnesia
	VC.CV.CV.CV	accuracy
	VC.CV.CV.CCV	admirably
	VC.CV.CVV.CV	alternator
	VC.CV.C(V)C.V	abnormally
	VC.CV.CVC.V	altogether
	VC.CV.CVC.CV	Admiralty
	VC.CV.CVC.CCV	agriculture
	VC.CV.CVCC.CCV	acupuncture
	VC.CV.CCVC.CV	antechamber
	VC.CV.CCVV.CV	antiquary
	VC.CV.CCCV.CV	angostura
	VC.CVV.V.CV	anxiety
	VC.CVV.CV.V	anterior
	VC.CVV.CVC.V	?advisory
	VC.CVC.V.CV	activity
	VC.CVC.V.CCV	administer
	VC.CVC.VC.V	accessory
	VC.CVC.VC.CV	admittedly
	VC.CVC.CV.CCV	acceptably
	VC.CVC.CCV.CV	adventurer
	VC.CVV.CVC.CV	advisedly
	VC.CCV.V.CV	actually
	VC.CCV.CVV.V	amplifier

	VC.CCVV.CV.V	ambrosia
	VC.CCVC.V.CV	angelica
	VC.CCVC.V.CCV	angelically
	VC.CVVV.CVC.CV	admiringly
quarisyllables	VC.CCCVC.CVC.CV	abstractedly
	VV.V.CVC.V	ayatollah
	VV.CV.V.CV	apiary
	VV.CV.V.CCV	amiably
	VV.CV.VV.CV	aviator
	VCC.V.CVV.CV	agitator
	V.CV.V.CVC.CV	assuredly
	V.CV.VC.V.CCV	archaeology
	V.CV.CVC.V.CVV	archipelago
	V.CV.CVC.V.CCV	automatically
quinque syllables	V.CV.CVC.(V)C.V	artificially
	V.CV.CCVV.CV.CV	arbitrarily
	V.CV.CCVC.V.CCV	autocratically
	V.CVC.V.CV.CCV	abominally
	V.CVC.(V)C.(V)C.V	additionally
	V.CVC.CV.V.CCV	assiduously
	V.CVC.CV.CVC.CV	articulately
	V.CVC.CVC.V.CV	authenticity
	V.CVC.C(V)C.VC.CV	affectionately
	V.CCV.CV.CVV.CV	adjudicator
	V.CCV.CCV.CVV.CV	accumulator
	V.CCVV.CCV.VC.CV	appropriately
	V.CCVC.CV.CVC.CV	approximately
	VC.V.CV.CV.V	academia
	VC.V.CV.CVC.V	anniversary
	VC.V.CVV.CCV.V	apologia
	VC.V.CVC.V.CV	animosity
	VC.V.CVC.V.CCV	academically
	VC.V.CVC.CV.V	anorexia
	VC.V.CVC.CVC.V	alimentary
	VC.V.CVCC.V.CV	Aborigine
	VC.V.CCVC.CV.CV	aristocracy
	VC.VC.VC.V.CV	anonymity
	VC.VC.CV.CV.V	anaesthesia

	VC.VC.CVC.CV.CV	appendectomy
	VC.CV.CV.CVC.V	antimacassar
	VC.CV.CV.CVC.CV	abracadabra
	VC.CV.CVV.CV.V	agoraphobia
	VC.CV.CVC.C(V)C.V	accidentally
quinque syllables	VC.CV.CVC.CVC.CV	apprehensively
	VC.CV.CCV.V.CV	ambiguity
	VC.CVC.V.(V)C.V	auxiliary
	VC.CVC.V.C(V)C.V	admonitory
	VC.CVC.V.CVV.CV	accelerator
	VC.CVC.V.CCCVV.CV	administrator
	VC.CCV.VC.V.CV	actuality
	VC.CCV.CVC.V.CCV	anthropology
	VV.CVC.CCV.VC.CV	asexually
six syllables	V.CVC.V.CV.V.CCV	apologetically
	V.CVV.CV.CVC.V.CV	aromatherapy
	V.CVV.CVV.VC.CV.CV	autobiography
	V.CVV.CV.CVC.V.CV	availability
	VC.CVV.CV.CVC.V.CV	advisability
	VC.CVC.CV.CVC.C.CV	acceptability
	VC.CVC.V.CVC.V.CV	accessibility
	V.CVVC.CV.CVC.V.CV	accountability
	V.CVC.V.V.CV.CVV	aficionado
seven syllables	V.CV.CVC.V.VC.V.CCV	artificiality

Notes:

1. V refers to monophthong, VV refers to diphthong; C refers to consonant, CC or CCCrefers to consonant clusters in coda or onset. And (V) refers to vowel which could be pronounced or could not be pronunced.

2. In syllabification, CIDE (Cambridge International Dictionary of Engilsh) is the reference book. Once there is difference between CIDE and POECD in phonetic transcription, we would like to use the phonetic transcriptioins in POECD and syllabification in CIDE.

3. Nearly 20.9% of words in Appendix I could not found their syllabifications in CIDE. Generally, syllabifications listed above are representative and comprehensive.

References

Allen, J.H. and Greenough, J.B.. *New Latin Grammar for schools and colleges*. Greenough, J.B. edts. Boston: Ginn & Company, 1903. < http://www.textkit.com >.

Bao, Qing（葆青）.《实用英语语音学》[M]. 北京：高等教育出版社，1994. (1998 重印)

Bao, Zhiming（包智明）. 新加坡英语的几个语法特点. http://profile.nus.edu.sg/fass/ellbaozm/OnSgE.pdf

Bennet, C.E. *A Latin Grammar*. U.S.A.: Allyn and Bacon, 1895. < http://www.textkit.com >.

Brown, Keith, etc. *Encyclopedia of Language and Linguistics* (2nd Edition). Elsevier Science Ltd. 2005-12-31 http://www.verycd.com/topics/182905/p10743

Bussmann, H. *Routledge Dictionary of Language and Linguistics*. translated and edited by Trauth, G.P. & Kazzazi, K. Beijing: Foreign Language Teaching and Reseach Press, 2000.

Chen, Lizhong（陈立中）.《湘语与吴语音韵比较研究》[M]. 北京：中国社会科学出版社，2004.

Chen, Hangzhu（陈杭柱）.《德语简史》[M]. 北京：外语教学与研究出版社，2000.

Chen, Mingyuan（陈明远）.《语言文字的信息处理》[M]. 现代化知识文库. 上海：知识出版社，1982.

Chen, Shaofeng（陈少风）.《生物学拉丁语基础》[M]. 北京：中国轻工业出版社，2007.

Clark, J. & Yallop, C. *An Introduction to Phonetics and Phonology* [M]. Beijing: Foreign Language Teaching and Research Press, 2000.

Collar, W.C & Daniel, M.G. *The Beginner's Latin Book*. Boston: Ginn & Company,1891.
< http://www.textkit.com >.

Collins Latin Dictionary & Grammar. Great Britain: HarperCollins Publishers, 1997.

Cristal, David *Pronouncing Shakespeare: The Globe Experiment* UK: Cambridge University Press, 2005

D'ooge, B.L. *Latin for Beginners*. Boston: Ginn & Company, 1911. < http://www.textkit.com >.

Fennell, B.A. *A History of English: A Sociolinguistic Approach* [M]. Beijing: Peking University Press, 2005.

Féry, Caroline. *German Word Stress in Optimaltiy Theory*. [ROA-301, http://roa.rutgers.edu/files/301-0399/roa-301-fery-3.pdf] & http://www.hum.uit.no/tidsskrifter/nordlyd/Nordlyd24/Fery.pdf

Freeborn, D. *From Old English to Standard English* [M]. Beijing: Foreign Language Teaching and Reseach Press, 2000.

Gao, Jianping & Gao, Xiaomei & Cheng, Shuming（高建平，高晓梅，程树铭）.《汉语发展史》[M]. 黑龙江：哈尔滨工程大学出版社，2007.

Guo, Xi & Sheng, Lin（郭熙，盛林）.《普通语言学研究导引》[M]. 大学研究型课程专业系列教材. 江苏：南京大学出版社，2006.

Goodwin, W.W. *Greek Grammar* (revised and enlarged). Boston: Ginn &Company, 1900.
< http://www.textkit.com >.

Gu, Qiwen（顾企文）.《科技拉丁语教程》[M]. 安徽：中国科学技术大学出版社，1990.

Gussenhoven, C., Jacobs, H. *Understanding Phonology* [M]. Beijing: Foreign Language Teaching and Research Press, 2001.

Hammond, Michael. *Parsing in OT*. [ROA-222, http://roa.rutgers.edu/files/222-1097/222-1097-HAMMOND-0-0.PDF]

Harper, Douglas. *Online Etymology Dictionary*[OL]. http://www.etymonline.com, Nov, 2000

He, Guangqiang（何广铿）.《英语语音学基础实用教程》[M]. 基础英语教材系列. 广东：暨南大学出版社，2003.

He, Jiuying（何九盈）.《中国古代语言学史》（新增订本）[M]. 北京：北京大学出版社，2006.

Holt, D. E (ed.). *Optimality Theory and Language Change*. The Netherlands: Kluwer Academic Publishers, 2003.

Hu, Zhuanglin（胡壮麟）.《语言学教程》（修订本）[M]. 北京：北京大学出版社，2001.

Hu, Zhuanglin & Jiang, Wangqi（胡壮麟，姜望琪）.《语言学高级教程》[M]. 北京：北京大学出版社，2002.

Hua, Shao（华邵）.《语言经纬》[M]. 北京：商务印书馆，2003.

Huang, Borong & Liao, Xudong（黄伯荣 廖序东）.《现代汉语上册》2 版(增订本)[M]. 北京：高等教育出版社，1997.

Humboldt, W.von. *On the Diversity of Human Language Construction and its Influence on the Mental Development of the Human Species*. translated by Peter Heath. Beijing: Beijing World Publishing Corporation, 2008.

Humboldt, W.V.（（德）威廉•冯•洪堡特）.《论人类语言结构的差异及其对人类精神发展的影响》[M]. 汉译世界学术名著丛书. 姚小平 译. 北京：商务印书馆，2002.

Hudson, G. *Essential Introductary Linguistics* [M]. Beijing: Peking University Press, 2005.

Jiang, Meng（姜孟）. 优选论评介[J]. 四川外语学院学报 2003（6）：91-94.

Jiang, Ping（蒋平）. 优选论与汉语音系研究[A]. 刘丹青. 语言学前沿与汉语研究[C]. 上海：上海教育出版社，2005，292-311.

Jiang, Ping & Li, Bin. *Glossary of Modern British English classified by the final phonemes*. English Department, School of Foreign Languages, Nanchang University, 2007.

Jiang, Ping & Li, Bin: Corpus I: Words in 'A-/a-'Classified by the Final Phonemes across Languages (inside academic material). English Department, Shool of Foreign Languages, Nanchang Univeristy, 2007.

Jiang, Ping & Li, Bin: Corpus II: Words in 'A-/a-'Classified by the Syllables across Languages (inside academic material). English Department, Shool of Foreign Languages, Nanchang Univeristy, 2007.

Jiang, Ping & Li, Bin: Corpus III: Words in 'A-/a-'Classified by the Relation between Final Phonemes and their Preceding Phonemes across Languages (inside academic material). English Department, Shool of Foreign Languages, Nanchang Univeristy, 2007.

Kager, R. *Optimality Theory* [M]. Beijing: Foreign Language Teaching and Research Press, 2001.

Knowles, G. *A Cultural History of the English Language* [M]. Beijing: Peking University Press, 2004.

Leeb, Leopold（雷立柏）.《拉丁成语辞典》. 北京：宗教文化出版社，2006.

Li, Bin.（李斌） 古希腊语、拉丁语和现代英国英语无尾音的研究[R]. 第二届江西省研究生学术研讨会. 2008.5.24 江西师范大学.

Li, Bing.（李兵） 优选论中的音系晦暗性：问题与发展[J]. 外语教学研究. 2005（3）：170-178.

Li, Funing（李赋宁）.《英语史》[M]. 北京：商务印书馆，1991.

Lin, Tao & Geng, Zhensheng（林焘，耿振生）.《音韵学概要》[M]. 北京：商务印书馆，2004.

Liu, Danqing（刘丹青）.《语言学前沿和汉语研究》[C]. 上海：上海教育出版社，2005.

Liu, Hongmei & Wu, Chuantao（刘红梅，武传涛）.《实用汉语语音》[M]. 实用现代汉语丛书. 安徽：安徽教育出版社，2003.

Liu, Runqing 刘润清.《西方语言学流派》[M]. 北京：外语教学与研究出版社，2002.

Liu, Xiaofeng（刘小枫）.《凯若斯：古希腊语文教程》（上册）[M]. 上海：华东师范大学出版社，2005.

Liu, Yihuan（刘以焕）.《古希腊语言文字语法简说》[M]. 上海：上海人民出版社，2005.

Lu, Jianming（陆俭明）.《语言学前沿与汉语研究》序. 刘丹青 主编. 上海：上海教育出版社，2005

Luo, Changpei & Wang Jun（罗常培，王均）.《普通语言学纲要》（修订本）[M]. 商务印书馆文库. 北京：商务印书馆，2002.

Luo, Niansheng & Shui, Jianfu（罗念生,水建馥）.《古希腊语汉语词典》（第一版）[M]. 北京：商务印书馆，2004.

Ma, Qiuwu.（马秋武）《优选论与汉语普通话的音节组构》[M]. 天津：南开大学出版社，2003.

Ma, Qiuwu.（马秋武） 优选论的表层制约条件以及制约条件等级的普遍性——从普通话的音节组构谈起[J]. 外语学刊 2004（2）：89-92.

Ma, Qiuwu.（马秋武） 普通话舌尖元音的优选论分析[A]. 新世纪的现代语音学——第五届全国现代语音学学术会议论文集[C]，2001，246-250

Ma, Qiuwu.（马秋武）《优选论》[M]. 上海：上海教育出版社，2008.

Massey, F. Concise History of the English Language [M]. translated by Shui, Tiantong. Beijing: Foreign Language Teaching and Research Press, 1990.

McArthur, T & McArthur. *Oxford Concise Companion to the English Language*. Shanghai: Shanghai Foreign Language Education Press, 2001.

McCarthy, J. Comparative Markedness. 2002. [ROA-489, http://roa.rutgers.edu/view.php3?id=745]

Meng, Xianzhong & Cui, Xizhi & Deng, Yingchao （孟宪忠,崔希智,邓英超）.《英语语音学》(修订本)[M]. 上海：华东师范大学出版社，1999.（2000 重印）

Misker, Jan M.V. & Anderson, John R. *Combining Optimality Theory and a Cognitive Architecture*. [ROA-588, http://roa.rutgers.edu/files/588-0303/588-0303-MISKER-0-0.PDF].

Onions, C.T.. *The Oxford Dictionary of English Etymology*. USA: Oxford University Press, 1966.

Oxford Latin Dictionary. U.K.: Oxford University Press，1968.

< http://lib.verycd.com/2006/09/07/0000119001.html >.

Partridge, Eric. Origins: A Short Etymology Dictionary of Modern English. London: Routledge & Kegan Paul, 1958.

Prince, Alan & Smolensky, Paul *Otimality Theory: Constraint Interaction in Generative Grammar*. [ROA-537, http://roa.rutgers.edu/view.php3?id=845]

Procter,P. *Cambridge International Dictionary of English with Chinese Translation*. Shanghai: Shanghai Foreign Language Education Press, 2004.

Qiu, Ke'an（裘克安）.《英语与英国文化》[M]. 湖南：湖南教育出版社，1993.

Richard, C.G & Platt, John & Plati, Heidi. *Longman Dictionary of Language Teaching & Applied Linguistics*.Beijing: Foreign Language Teaching and Research Press, 2000.

Roach, P. *English Phonetics and Phonology: A Practical Course* [M]. Beijing: Foreign Language Teaching and Research Press, 2000.

Roach, P. *Phonetics* [M]. Shanghai: Shanghai Foreign Language Education Press, 2003.

Robins, R.H. *General Linguistics* [M]. Beijing: Foreign Language Teaching and Research Press, 2000.

Robins, R.H. *A Short History of Linguistics* [M]. Beijing: Foreign Language Teaching and Research Press, 2001.

Saussure, F. General Linguistics [M]. Beijing: Foreign Language Teaching and Research Press, 2001.

Schendl, H. *Historical Linguistics* [M]. Shanghai: Shanghai Foreign Language Education Press, 2003.

Shen, Jiaxuan（沈家煊）. 《西方最新语言学理论译介》丛书 · 序. 上海：上海教育出版社，2008.

Smyth, Herbert Weir. *A Greek Grammar for Colleges*. U.S.A.: American Book Company，1920.

<http://www.textkit.com >.

Thompson, D. *Pocket Oxford English-Chinese Dictionary*. New Edition. Beijing: Foreign Language Teaching and Research Press, 2002.

Thompson, D. *The Concise Oxford Dictionary*. Ninth Edition. Beijing: Foreign Language Teaching and Research Press,2001.

Trask, R.L.《历史语言学》[M]. 周流溪 导读. 北京：外语教学与研究出版社，2000.

Wang, Dechun（王德春）. 语言学分科和多角度研究语言[J]. 外国语. 1996（6）：27-30.

Wang Jialing（王嘉龄）. 优选论与功能主义[J]. 外语教学与研究. 2002（1）：30-34.

Wang, Maolin & Gong, Qi（王茂林，宫齐）. 优选论的最新发展——比较标记理论[J]. 外国语. 2007(3): 17-23.

Wang, Shiyuan 王士元，彭刚.《语言，语音与技术》[M]. 中国当代语言学丛书. 上海：上海教育出版社，2006.

White, J. W. *The First Greek Book*. Boston: Ginn & Company, 1896. <http://www.textkit.com >.

Wu, Qi'an.（吴安其）《历史语言学》[M]. 上海：上海教育出版社，2006.

Wu, Hongyan（吴红岩）. OT 方案下的英语音节划分[J]. 广东外语外贸大学学报. 2003（4）：47-50.

Xia, Zhengnong（夏征农）.《大辞海•语言学卷》[M]. 上海：辞书出版社，2003.

Xiao, Yuan（肖原）.《拉丁语基础》[M]. 北京：商务印书馆，1983.

Xin, Delin（信德麟）.《拉丁语和希腊语》[M]. 北京：外国教学与研究出版社，2007.

Xu, Daming（徐大明）.《语言变异与变化》[M].《西方最新语言学理论译介》丛书. 上海：上海教育出版社，2006.

Xu, Liejiong（徐烈炯）.《当代国外语言学：学科综述》[M]. 现代语言学系列. 许威汉 主编. 河南：河南人民出版社，1993.

Xu, Xueping & Piao, Zhehao（徐学萍 朴哲浩）. 优选论与汉语重叠词的声调变化[J]. 燕山大学学报. 2003（2）：79-85.

Xu, Yulong.（许余龙）《对比语言学概论》[M]. 上海：上海外语教育出版社，1992（2001 重印）.

Yang Jun（杨军）. 概率性优选论[J]. 当代语言学. 2007(2): 117-127.

Yang, Yunsheng.（杨云升）《英语重音研究》[M]. 上海：复旦大学出版社，2006.

Yu, Chuanfu.（於传福）《医药用拉丁文手册》[M]. 浙江：浙江科学技术出版社，1985.

Zhang, Jisheng.（张吉生） 优选论与汉语外来语的音节可接受性[J]. 解放军外国语学院学报. 2003(4):7-12.

Zhang, Jisheng.（张吉生） 再论汉语外来语音节可接受性的优选分析[J]. 外国语. 2006(2):25-32

Zhang, Jisheng.（张吉生）《英语音系系统研究》[M]. 重庆：重庆出版社，2000

Zhang, Fengtong.（张凤桐）《英国英语语音学和音系学》[M].3 版(修订版). 四川：四川大学出版社，2002.

Zhao, Zhongde（赵忠德）.《英汉汉英语言学词汇手册》. 辽宁：辽宁教育出版社，2004.

Zhao, Zhongde（赵忠德）.《音系学》[M]. 语言学系列丛书. 上海：上海外语教育出版社，2005.

Zheng, Lixin & Gu, Jiazu（郑立新，顾嘉祖）.《美国英语与美国文化》[M]. 湖南；湖南教育出版社，1993.

Zhou, Youguang（周有光）.《世界文字发展史》[M]. 世纪文库. 上海：上海教育出版社，2003.

Zhu, Lin（朱麟）. 英语与汉语节奏模式的对比[J]. 第七届中国语音学学术会议暨语音学前沿问题国际论坛. 2006.10.20-22. 中国北京.

Zuo, Yan（左岩）. 优选论的最新进展之一——共感理论[J]. 现代外语. 1999(3): 308-329.

Websites:

[1] http://www.cnki.net/index.htm

[2] http://www.google.cn

[3] http://www.sciencedirect.com

[4] http://bbs.gxsd.com.cn/

[5] http://en.wikipedia.org/wiki/Academic_American_Encyclopedia

[6] http://baike.baidu.com/

[7] http://www.textkit.com/

[8] http://www.verycd.com/

[9] http://roa.rutgers.edu/index.php3

[10] http://www.archive.org/index.php

[11] http://www.aerospaceweb.org/question/history/q0162b.shtml

[12] http://en.wikipedia.org/wiki/Syllable