THE MORPHOLOGICAL AND MORPHOPHONEMIC AWARENESS

OF COLLEGE-PREPARATION ESL LEARNERS: AN INTEGRATED STUDY

by

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ABSTRACT

The limited research on the morphological and morphophonemic awareness of learners of English as a Second Language has emphasized their problems with Latinate derivatives as purely phonological problems and focused on derivatives as isolated items in the learners' lexica.

My empirical study investigated the morphological and morphophonemic awareness of 32 Grade 12 Cantonese-speaking ESL learners and a comparison group of 32 Grade 12 native speakers of English in the Lower Mainland. The participants were enrolled in regular content area programs in preparation for post-secondary education. Both groups completed language background questionnaires and another questionnaire which assessed their awareness of the different associations between morphologically related words. They also completed tests involving Listening, Pronunciation, Word Analysis, and Semantic Rating of Word Pairs. The tests examined the subjects' phonological, morphological, orthographic, and semantic representations of morphologically related words. The fundamental assumption was that these were dimensions of the learners' lexical competence. On the basis of psycholinguistic evidence, subjects were assumed to associate derivatives with their bases in their mental lexica.

The hypotheses investigated in the study were that the following strategies would be predominant in the performance of the ESL subjects,

i)   the incorporation of base-word pronunciation in the phonological representations of Latinate derivatives in aural recognition;

ii)   the incorporation of base-word pronunciation in the production of Latinate derivatives;

iii)   suffix deletion without spelling change in base-word abstraction from derivatives with non-obvious suffixes; and

iv)   the incorporation of base-word pronunciation in the perception and production of obvious-suffix

Latinate derivatives based on the perceived semantic relatedness between morphologically

related words.

The first three hypotheses were confirmed. The fourth hypothesis was not confirmed; the

spellings of derivatives were used by ESL subjects more as cues for pronunciation than for decoding

meanings. The differences in performance between the two groups in the Listening, Pronunciation,

and Word Analysis Tests and part of the Semantic Rating of Word Pairs Test were statistically

significant. Error types were discussed and accounted for from a psycholinguistic perspective. The

results are to be interpreted as preliminary conclusions due to the restricted test samples used and the

small population studied. However, the findings have practical significance and warrant further

research.

Current theories regarding English morphophonemics are discussed. Some suggestions for

classroom techniques for raising morphological and morphophonemic awareness among learners are

made, on the basis of evidence from psycholinguistic research on word access, recognition, retrieval,

and association.

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Chapter 1

INTRODUCTION TO THE STUDY

Introduction

My empirical study, described and discussed in Chapters 7 and 8, investigated the extent of morphological and morphophonemic awareness among English as a Second Language (ESL) students who were enrolled in regular content area programs in preparation for college or university. Their morphological and morphophonemic awareness was compared with that of native speakers of English (NS) at an equivalent academic level. In this chapter, the rationale for this study is explained. The main objective of the study was to present the problem of morphological and morphophonemic awareness among advanced ESL learners as part of a larger problem of interlanguage lexis, literacy, language awareness, and second language (L2) competence.[1] Another objective was to present the problem of the formal representations of derivatives for ESL learners, namely their morphological structure, semantics, pronunciations, and orthography, and how these aspects of formal representation contributed to learning difficulties. A literature review of the theory and research in these areas of applied linguistics is provided. In Chapter 2, I explain the different aspects of morphological and morphophonemic awareness in the learning of English derivatives and past research in this area is reviewed. In Chapter 3, I explain the relevance of linguistic theories in language teaching. In Chapter 4, three current theories of English morphophonemics are discussed. I discuss and evaluate the relevance of Linell's (1976) theory of phonology and morphophonemics (as they pertain to English derivatives) in Chapter 5, and Aronoff's (1976) theory of word formation in Chapter 6. In Chapter 9, I summarize what learners need to know about English derivatives and suggest some classroom techniques for raising morphological and morphophonemic awareness among learners. In Chapter 10, I explain the contribution of my empirical study to research on ESL lexical competence, specifically morphological and morphophonemic awareness regarding Latinate derivatives.

1.1   Statement of the Problem

Within the normal expectations of teachers and learners, a certain level of L2 competence has to be achieved, ideally in the shortest amount of time possible, so that learners can use the L2 effectively for functional and social purposes. This implies the importance of efficiency in L2 learning so that learners do not waste time feeling lost in the language, and can apply their intelligence and cognitive abilities to the task of language learning. It is now increasingly recognized that explicit formal instruction is valuable because learners, especially cognitively more mature learners, are provided the strategies that empower them to learn language and proceed to creative independence in language use. Empirical studies have supported the effectiveness of form-focused instruction in grammar learning (Pica 1985; Tomasello & Heron 1988; Lightbown & Spada 1990; Liou 1990; Doughty 1991; White 1991; Fotos 1993, 1994; Spada & Lightbown 1993; DeKeyser 1995; Turner & Upshur 1995). An eclectic approach where form and function are both given emphasis is supported by Balcom 1985; Celce-Murcia 1985; Richards 1991; Rivers 1985; Hammerly 1986; James 1986; Harmer 1987; Major 1988; White 1988, 1991; Widdowson 1991; Valette 1992; Brown 1994; DeKeyser 1994; and Poulin 1994. Turner & Upshur's (1995) study of grade 5 learners using short meaningful utterances confirms that grammatical accuracy enhances communicative effectiveness. Focus on form does not mean a return to the teaching of form as an end in itself, but to developing L2 competence. Explicit instruction in form helps learners to organize the input language and so make it more comprehensible, and to confirm or disconfirm their own hypotheses of the TL grammar (Balcom 1985; Richards 1991).

Recent publications in four areas in applied linguistics have prompted my interest in investigating morphological and morphophonemic awareness among ESL learners, viz. language transfer and interlanguage; the teaching of vocabulary and reading; the teaching of vocabulary, listening, and pronunciation; and the role of consciousness in L2 learning. I will discuss the first three areas in this chapter and the role of consciousness in L2 learning in Chapter 2 in connection with morphological and morphophonemic awareness.

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1.2   Language Transfer and Interlanguage

The term 'interlanguage' was first used by Corder (1971) and Selinker (1972) to refer to the learner's internalized system of L2 rules which may be distinct from both the native language (L1) of the learner and the target language (TL). Empirical studies of interlanguage in the 70's and 80's confirm the significance of cross-linguistic influence (Taylor 1975; Ringbom & Palmberg 1977; Schachter & Rutherford 1979; Uljin et al 1981; Altenberg & Vago 1983; Ard & Homburg 1983, 1992; Appel 1984; White 1985; Eckman 1987; Ringbom 1987; Broselow 1992).[2] Where a TL linguistic feature has no correlate in a learner's L1, the learner's interlanguage cannot be accounted for by positive transfer (facilitation) or negative transfer (interference). Hammerly (1991) cites inhibition as a source of learner errors due to their resistance against learning TL rules not found in L1. In my opinion, the inhibition factor explains the absence of the desired TL features in the learner's interlanguage; it does not account for the errors that result from the learner's attempt to apply TL rules to a particular TL feature not found in L1 and these errors cannot be explained by negative transfer. Thus, Schacter's redefinition of language transfer as a constraint rather than a process is useful (1983, 1992). The constraint is that imposed by previous knowledge (of L1 or any other language known by the learner) on the learner's hypothesis testing and linguistic performance in the TL (also Gass 1988). These constraints can be facilitating and limiting. Where the L1 has no rules analogous to the TL rules, the constraints imposed by TL rules are that learners, especially more advanced learners, would construct interlanguage rules by overgeneralizing TL rules. As in L1 acquisition, earlier learned rules are overgeneralized to later linguistic situations which appear to call for the application of earlier rules.

1.2.1   Interlanguage Morphology and Morphophonemics

Singh calls the errors found in interlanguage morphology "illegal extensions of L2 rules" or " L2 induced overgeneralizations" because of the evidence of non-transferability of morphological and morphophonemic rules (Singh 1991) (also Singh 1988b; Singh & Ford 1987; Singh & Martohardjono

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1988). Singh's external evidence from the interlanguage German and French of English speakers, and the interlanguage English of Hindi speakers confirm the overgeneralization of L2 morphological and morphophonemic rules. Andersen (1973) and Wurzel (1977, in Singh 1991) call such errors "adaptive rules." Problems in Hebrew word formation of English and Spanish speakers (Olshtain 1987), the pronunciation of English cognate derivatives of German speakers (Erdman 1973), and the pronunciation of English cognate and non-cognate derivatives of Portuguese speakers (Baptista 1989) confirm errors due to adaptive rules, not L1 transfer. Odlin's (1989:23) claim of transfer "in all linguistic sub-systems, including morphology and syntax" may need re-examination. According to Gass (1988), constraints on language transfer transcend interlingual similarity or dissimilarity as a major constraint is the learner's decision-making processes regarding the potential transferability of linguistic elements.

Studies on interlanguage phonology have emphasized segmental perception and production (Stevens et al 1969; Groto 1971; Johansson 1973; Miyawaki et al 1975; Oyama 1976; Beebe 1980, 1987; Mochizuki 1980; MacKain et al 1981; Sheldon & Strange 1982; Flege & Davidian 1984; Gass 1984 b; Altenberg & Vago 1987; Flege & Hillenbrand 1987; Hecht & Mulford 1987; Hardison 1996; Major & Kim 1996) and syllable structure (Anderson 1987; Broselow 1987 a, b; 1992; Eckman 1987a; Karimi 1987; Sato 1987; Tarone 1987; Stockman & Pluut 1992). Non-native prosody as a factor in accentedness and intelligibility at the sentence level has been investigated by Anderson-Hsieh & Venkatagiri (1994), Munro and Derwing (1994), and Munro (1995). Studies in English interlanguage morphology have focused largely on inflections. The limited studies of interlanguage derivatives have been restricted to the examination of phonological problems in terms of prosody (Erdmann 1973; Baptista 1989; Fokes & Bond 1989), segmentals, and stress shift (Dziubalska-Kolaczyk 1992), and syllable structure (Anani 1989; Mairs 1989). Thus, ESL/EFL learners' interlanguage derivational morphology and morphophonemics in terms of listening and pronunciation and the relationship of their performance to their knowledge of English spelling and word association or lexical competence have been largely overlooked. According to James (1987), an adequate account of the internalization of the L2 sound system would include the learner's conception of the different levels of the sound system of a

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language. Therefore, the acquisition of the morphological formatives as constituents of L2 sound structure should also be examined.[3]

1.3   Vocabulary Development as Part of L2 Competence

The aim of developing L2 competence must necessarily include the development of all aspects of L2 competence that a native speaker may be assumed to have, including lexical competence. Learning of the L2 lexicon entails the learning of all the lexical rules related to it, including word morphology or word formation if such exists in the L2 (Adjemian 1983; Olshtain 1987). While research in L1 vocabulary teaching has been extensive, equivalent research in L2 is much less (Meara 1980, 1984; Carter 1987; Maiguashca 1993; Stoller & Grabe 1993). Vocabulary teaching needs to be included as a key component in developing language competence. My study of the morphological and morphophonemic awareness of high school ESL learners who were preparing for college and university focused on the learners' knowledge of morphologically complex words or derived words or derivatives in the English language because these words are an important part of academic vocabulary as well as everyday vocabulary in a formal school environment.

1.3.1   Teaching L2 Vocabulary

The need for a systematic and principled approach to the teaching of L2 and foreign language vocabulary has been recognized (Hammerly & Sawyer 1975; Meara 1980, 1984, 1987, 1990; Richards 1980; 1991; Hammerly 1982, 1986; Nation 1982, 1983 a, b, 1984, 1986, 1987, 1990, 1993; Xue & Nation 1984; Corson 1985; Carter 1986, 1987a, b; Beheydt 1987a; Carter & McCarthy 1988; McCarthy 1988, 1990; Nation & Coady 1988; Gass 1989; P. Kelly 1990; Lennon 1990; Palmberg 1990; R. Kelly 1991; Laufer 1991, 1992; Huckin et al 1993; Maiguashca 1993; Nation 1993; Stoller & Grabe 1993; Knight 1994; Oxford & Scarcella 1994). However, empirical studies on interlanguage vocabulary is lacking (Mondria & Wit-de-Boer 1991; Koda 1994).

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1.3.2 Holistic Approach to Reading and Incidental Vocabulary Learning

It has been argued that the holistic approach to reading instruction has led to the emphasis on the semantics of larger texts without providing a model for handling vocabulary problems faced by learners (Meara & Ingle 1986; Bensoussan 1992; Haynes 1993). The current emphasis on using authentic texts rather than specially prepared language texts has also shifted the focus from meaning to "message," thus de-emphasizing intentional learning of vocabulary (Knight 1994:285). The holistic approach to reading instruction has been largely influenced by L1 reading research and psychological models of reading. The most significant conclusion from L1 reading research is that incidental vocabulary learning (non-explicit or indirect instruction) from context (using guessing or word inferencing) accounts for a large proportion of vocabulary growth (Sternberg 1987), since explicit instruction alone cannot account for the vast number of words a person knows. Schema theory (Hulse et al 1980; Anderson & Pearson 1984) claims that readers need not depend on the knowledge of every word to comprehend a text, but are able to guess the general meaning by making appropriate assumptions based on the readers' schema, an abstract knowledge structure of the world stored in memory. Collins and Loftus' (1975) concept of priming and spreading activation supports the idea that the recognition and understanding of a given word are aided by preceding words. These assumptions have pedagogical appeal but psycholinguistic research and recent studies in L2 reading have led to a re-examination of these assumptions. Stoller and Grabe (1993) reinterpret incidental learning from context in L1 as not a claim for incidental or implicit learning as an approach to teaching vocabulary, but that incidental learning means that words are gradually learned through a number of exposures in various contexts (ibid:31). A significant factor in schema theory not attended to by proponents of contextual guessing is that if an inappropriate schema is activated, readers may miss the meaning of a text (also Bensoussan 1992).

Since the 1970's, there has been an abundance of literature on the "guessing from context" approach to vocabulary development (Hosenfeld 1977; Johnson 1982; Carrell 1983a, b, 1984a, b,

d; 1987; Carrell & Eisterhold 1983; Carrell & Wallace 1983; Becker 1985; Na & Nation 1985; Nunan 1985; Carter 1987a, b; Huckin & Jin 1987; Carter & McCarthy 1988; Li 1988; Carrell et al 1989; Hwang & Nation 1989; Hammadou 1991; Huckin & Bloch 1993; Oxford & Scarcella 1994). Lately, the limitations of guessing as an approach in reading and developing L2 vocabulary knowledge have been recognized (Haynes 1981, 1993; Mondria & Wit-de-Boer 1989, 1991; Bernhardt 1991a, b; Coady 1993; Dubin & Olshtain 1993; Stein 1993; Stoller & Grabe 1993; Bernhardt & Kamil 1995). L1 readers are able to guess from context because of their knowledge of vocabulary which L2 readers cannot be assumed to have. Jenkins et al (1984), Nagy et al (1985) and Herman et al (1987) confirm that even L1 students are often unable to gather word meaning from context. Na and Nation (1985) concede that contextual guessing is successful only when learners have 95% lexical coverage. Moreover, the effect of learning words in context has been found to be limited to recognition rather than production (Schatz & Baldwin 1986; Williamson 1989; Kelly 1990). Psycholinguistic research has found that subjects have difficulty in recalling contextually related words since the elaborative processing involved in making the semantic connections require considerable attentional resources (Graf & Mandler 1984:566). Activation makes words more accessible, but not necessarily more retrievable (cf. Mondria & Wit-de Boer 1991). According to Jacoby (1983) (also Graf 1980), conceptually driven processing of words (that is, in context) does not aid later perceptual identification of the same word since the reader is not depending on visual evidence of the word. Furthermore, correct guessing induces learners to think they know the word already and this hampers imprinting the word in memory. Guessing induces strong association between context and meaning, and consequently insufficient attention is paid to association between word and meaning. Knight (1994) confirms the difficulty of lexical inferencing among low verbal ability L2 subjects. For Haastrup (1990), bottom-up "guessing" is more effective than top-down guessing when reading in unfamiliar areas.

More recently, Levin and Reves (1994) distinguishes between three kinds of "schemata." The reader's knowledge of the world, or background knowledge of the subject matter of the text, is referred to as "content schemata"; the reader's knowledge of the target language, including skills in

decoding complex words, is referred to as "linguistic schemata"; and the ability to follow the argumentative structure of a text is referred to as "formal schemata." The significance accorded by researchers to content schemata as a major factor for reading success has tended to mask the significance of bottom-up processing in the cognitive activity of reading, or the lack of vocabulary as an obstacle to reading proficiency development (Koda 1994). Levin and Reves' study has confirmed that while content schemata aids reading comprehension, the significance of linguistic schemata outweighs that of content schemata (1994:79). In their study, readers who possess the appropriate linguistic schemata perform better on descriptive, analytical, as well as argumentative texts. Moreover, the subjects also claim that their main difficulty in reading is the large number of unknown words.

Empirical studies of L2 reading have also confirmed that only "local context clues," or cues in close proximity to the problem word, help reading. Global context clues, for which readers have to read forward (forward cues) or go back to the part of the text preceding the problem word (backward cues), are difficult to access and cause confusion (Haynes 1981, 1993; Chern 1993; Dubin & Olshtain 1993). Moreover, global context clues are helpful only when learners are already proficient readers. Haynes and Baker's (1993) study among Chinese college-level ESL readers has shown that context clues can be misused or not used due to impoverished vocabulary knowledge (1993:148; also Perfetti & Lesgold 1977, 1979; Coady et al 1985; Bernhardt 1991, 1992, Knight 1994). Homburg and Spaan (1982), Hawas (1990), and Uljin and Strother (1990) confirm that vocabulary affects reading comprehension more than syntax or syntactic simplification. Strother and Uljin (1987) confirm the significance of word-solving strategies. Ultimately, it is vocabulary knowledge that largely controls semantic processing in reading (Koda 1994).

Many readers read to gain new information and it is therefore important to adapt to unfamiliar situations and to unfamiliar texts in reading. Readers are never going to have all the necessary background knowledge to deal with all the new materials they will be required to read. The development of strategies to make use of linguistic knowledge is thus important and background

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knowledge should not be over-rated as a sufficient condition for reading comprehension (Phillips & Walker 1987). Koda (1994) sees content schemata as passage specific, its applicability to other reading materials being limited. The content schemata approach to reading instruction could in fact delay learner independence (ibid:17). Spiro et al (1987) have also questioned the validity of relying on background knowledge as a strategy in reading comprehension since how this knowledge is organized and applied in new situations is little known. Moreover, cultural knowledge and individual beliefs also affect the construction of meanings of not only individual words but of contextual cues of a text as well (Bensoussan 1992; Stein 1993). The use of contextual cues also fails to narrow in on a word's meaning. Becker's study (1985) among children and adults who are native speakers of English has demonstrated that readers' prior familiarity with the content of the text and their ability to predict are difficult to separate. Consequently, the effect of prior knowledge on the general ability to predict is difficult to detect (1985:162). This has been found to be especially true in L2 reading, as confirmed by Bernhardt's empirical study (1991) of beginning Spanish students of ESL.

Perfetti and McCutchen (1987) make a distinction between comprehending a text and deriving an interpretation of a text. Undoubtedly, the latter is the true goal of reading and requires skills beyond word recognition. However, interpretation or meaning construction cannot proceed without knowing the vocabulary of a text and this is in fact the fundamental principle of literacy (Henderson 1992). Vocabulary knowledge must be viewed as a key to reading and reading skills development (Chall 1987; Henderson 1992). Studies by Deville (1985) and Laufer (1989) confirm that reading comprehension at an acaedemic level requires 95% lexical coverage, below which academic ability cannot aid reading comprehension. Stoller and Grabe (1993) view vocabulary knowledge as both a tool for developing reading ability, and a consequence of reading ability. Therefore, explicit vocabulary instruction must complement wide reading. Chen and Graves' (1995) study of college EFL students confirms that while previewing and providing background knowledge facilitate comprehension of short stories among less confident and competent readers, vocabulary instruction is also needed to help these readers. Rumelhart (1977) and Stahl and Fairbanks (1986) propose an "interactive" model

of effective reading where readers employ both top-down and bottom-up processing.

1.3.3   The Role of Word Morphology in Vocabulary Development

Carter's (1987) typology of the components of vocabulary includes synonymy, antonymy, hyponymy, mathematical problems (solving mathematical problems in the target language) and derivational morphology. A systematic approach to vocabulary teaching would necessarily involve a treatment of these aspects. Hammerly (1982, 1986), Adjemian (1983), and Olshtain (1987) also include word formation rules within the concept of lexical knowledge and recommend their explicit instruction. Word structure vary greatly between languages and these differences would expectedly produce widely different strategies for handling words in speakers of different languages (Meara 1984).

Research in higher level morphological and morphophonemic awareness among ESL learners in terms of perception and production of derived words and their morphological, orthographic, and semantic representations has been very restricted (Maiguashca 1993). Most recent research on vocabulary learning has thus taken the formal representations of words for granted and concentrated instead on the semantic and collocational aspects of vocabulary. As far as derived words are concerned, the examination of ESL learners' "lexical competence" has remained largely unexplored. Oxford and Scarcella's 1994 "research-based approach" for vocabulary instruction for adults makes a brief reference to word form (inflections) and word class clues as a systematic strategy for vocabulary learning, but makes no specific reference to derivational morphology or how this aspect of the linguistic form could be exploited for vocabulary expansion.

Focusing on the semantics of discourse, and consequently, on lexical inferencing from context, has led to the neglect of inferencing of meaning from word structure when such structure is available in the text, and when the latter is much easier and less complex than the former (Laufer & Bensoussan 1982; Drum & Konopak 1987; P. Kelly 1990, R. Kelly 1991). The need to teach ESL

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vocabulary in terms of the discovery of word meaning through internal word structure or morphology, and in terms of relationships among words based on this structure, has been voiced by Bensoussan and Laufer (1984); Haynes (1984); Guarino and Perkins (1986); Perkins et al (1986); Graves (1987); P.Kelly (1990); Lennon (1990); R. Kelly (1991); Moran (1991); Laufer (1992); Wrigley (1993); and Nuessel and Cicogna (1994). According to Nuessel and Cicogna, knowledge and usage of derivational (and inflectional) morphology play a crucial role in lexical control and management since grammatical functions are realized by the formal properties of lexical items. In L1 vocabulary teaching, this aspect is emphasized as part of literacy and reading development.

I conducted a random survey of 15 ESL reading passages at the intermediate and advanced (Test of English As A Foreign Language or TOEFL) levels and five sections out of five chapters of a Transitional Social Studies textbook for Grade 10 ESL students (Canada Revisited by P. Clark and R. McKay, 1992, Arnold Publishing Limited). Lexical density (the proportion of content words out of the total number of words used in the passages or sections) ranged from 51% to 57%. Latinate and non-Latinate derivatives constituted between 28% and 36% of the content words. The proportion of derivatives containing bound morphemes ranged between 11% and 25%, the majority of the passages having not more than 17% of derivatives with bound morphemes. I also observed that except for reading passages written from the "guessing approach to reading," reading passages and content area texts used at the intermediate and advanced levels contained little textual elaboration, minimizing the possibility of relying on contextual clues for reading comprehension. Moreover, repeated tokens of derivative types in a single passage or section ranged from only two to four times. While co-occurence of morphologically and semantically associated words (eg. "colony," "colonial," and "colonists") were found in the Social Studies texts, this was generally not found in other reading passages. The required general academic vocabulary involves about 800 word families (Xue & Nation 1984).

Vocabulary teaching should therefore be aimed at vocabulary-building skills. Instruction in the use of word morphology will enable learners to learn new words independently, providing them with

generalizations needed to construct or deduce word meaning. Chances of being correct are far higher than with contextual guessing (P. Kelly 1990). Studies by Hosenfeld (1977), Bensoussan & Laufer (1984), Haynes (1984, 1993), Laufer & Sim (1985a, b), Parry (1993), and Lawson & Hodben (1996) show that most readers often fail to use morphological cues or to use them effectively for interpreting reading material. While admitting that there are other factors influencing reading performance, Laufer (1992) confirms that vocabulary size predicts reading score, the turning point of ESL vocabulary size for reading comprehension being 3,000 word families (inflections and derivations) or 4,800 words.[4] With this vocabulary size, good L1 readers can be expected to utilize their L1 reading skills in ESL reading. Without this threshold level, ESL reading will be hampered by insufficient vocabulary knowledge (1992:130). Laufer also claims that in reading comprehension, it is not significant whether one word of a word family is known, or the entire family. In most cases, it can be assumed that if the basic word is familiar, then the regular derivatives will be understood too, provided that the morphological rules are known (p.131). (See Nagy 1987 below.) Laufer's analysis of reading test scores shows that the knowledge of 3,000 word families would result in a reading score of 56%, 4,000 in 63%, 5,000 in 70%, and 6,000 in 76%. It is possible that when a learner's knowledge reaches about 7,000 word families, the effect on reading score would decrease and finally level off.

Training in morphology also provides training in awareness of form class. The reader is helped to access meaning by exploiting the redundancy in the representation of words in a text (Guarino & Perkins 1986:80). In Tyler and Nagy's study (1985), native-speaker high school subjects do not decode morphologically complex words for their form class (syntactic parsing) in order to aid them in sentence comprehension, but subjects decode complex words to get at their essential or core meanings through the meanings of the base words. In the case of L2 readers, it can be assumed that word-structure decoding skill, besides facilitating the decoding of word meaning, also facilitates syntactic parsing. This is useful in reading comprehension if syntactic structures differ from those of L1.

Morphology is thus not a purely formal linguistic feature of secondary importance only. It

increases the message's communicability (Crawshaw 1984c). Gu and Johnson (1996) confirm that high test scores among college EFL learners correlate with word structure analysis and skillful dictionary use. Block (1992) confirms that proficient college readers cite word structure and the grammatical approach (form/class) as two of the strategies for solving vocabulary problems in reading. Non-proficient readers indicate that they "try to figure the word out........like all of a sudden switch to another language....Just hope it will clear up" (p. 334). In Chern's study (1993), proficient university-level ESL students use word analysis and contextual cues to derive the meanings of unknown words.

The importance of word association, that is, association between a word's internal structure and its semantics, was voiced as early as 1959 by Deighton. The study of language is the study of the relation of meaning to form (Bybee 1985). Reading involves language specific processes and there are cross-linguistic variations in language processing, an issue which has been largely ignored in L2 reading research until recently (Koda 1994:3). The holistic view of language does not favor the structural view of language and of words in particular. Word structure has not been seen as a significant aspect of a L2 learner's lexical competence, or as a factor affecting reading proficiency. It is possible that learners will transfer L1 strategies for handling L2 words unless explicitly taught L2 word structure and how to handle it. This would lead to L2 words being analyzed and stored in completely inappropriate ways that would not facilitate comprehension, retention, and retrieval. A good example is a morphologically complex English word learned as a single morpheme like a Chinese logograph, without breaking it down into its base and affixes which all contribute to the word's semantic and syntagmatic value. In Koda's study (1990a), L2 morphosyntactic knowledge is one of the major factors differentiating good from poor L2 readers. L2 readers must thus develop the necessary metalinguistic knowledge and verbal processing strategies that aid reading comprehension (Koda 1994:14). Unanalyzed whole words are seemingly difficult to learners because they are longer and more difficult to remember, recall, and produce (spell and pronounce). Blum and Levenston's (1978) study on lexical simplification by ESL learners reveals the use of superordinate terms, approximation, circumlocution, and paraphrase among others, all of which reduce semantic accuracy. The extent to

which morphological simplification might affect the efficacy of communication in content area learning (eg. the use of simple verbs instead of deverbal nominalizations) (Winser 1993) has not been studied.

While studies on L1 morphological awareness of derivatives has been abundant in literacy and psycholinguistics, there has been limited research on ESL learners' formal representations of derivatives. Investigating the following questions might help us undertstand how learners construct meaning from derivatives. Do learners have the same or different formal representations of derivatives from native speakers of the language? For example, do learners perceive the internal structure of words? Do they decode a complex word by breaking it down into component parts, that is, base word and affix? Do they understand that morphologically associated words are also semantically associated? Do they analyze the semantics of derivatives via their morphological structure? Do spelling patterns in derivatives predict or obscure word meanings for learners? Do learners make use of spelling patterns of derivatives for pronunciation or meaning or both? Do learners recognize the variation in word forms appropriate to their syntactic functions? The emphasis on morphological awareness as part of metalinguistic awareness crucial for developing reading ability appears to remain within the domain of L1 literacy, not L2 applied linguistics.[5] According to Haynes (1993), word analysis is a natural strategy in a language that has morphology, and the importance of word-unit analysis needs to be recognized in ESL teaching of reading, while retaining top-down processing.

1.3.4 Teaching of L2 Vocabulary, Pronunciation, and Listening

Except for Service and Kohonen (1995), most publications on the teaching of vocabulary have focused on the semantics of words divorced from their phonological representations. Studies on the effects of listening on L2 word retention has been limited to Kelly (1992) and Hill (1994). This could be partly explained by the influence of Craik and Lockhart's (1972) depths-of-processing theory in L2 vocabulary instruction. (See Brown & Perry 1991.) My present study has also shown that speaking and listening were among the least emphasized skills in ESL instruction in Hong Kong. Recent L1

studies have confirmed that the two specific dimensions of linguistic knowledge -- orthographic and phonological -- independently influence word recognition (Adams 1990; Stanovich 1991; Stanovich & West 1991; Barker et al 1992; in Koda 1994). According to Koda, we could logically expect the same for L2 learners (1994:16). While it is likely that L1 learners have a more developed oral language compared to word recognition in reading, it is likely that for L2 learners, word recognition in reading could be ahead of recognition of phonological form (pronunciation). Systematic examination of this aspect of L2 linguistic knowledge is still lacking (ibid:17).

The relationship between phonological memory and FL vocabulary learning has also not been much studied (Service & Kohonen 1995). Studies by Service (1992) and Service and Kohonen (1995) have confirmed that immediate phonological memory for new words is specifically related to FL vocabulary learning, and this can be brought about by traditional repetition aloud of unfamiliar words (also Kelly 1991; Ellis & Beaton 1993). The formation of stable phonological representations of new words is an important step in learning them. In psycholinguistic research, it has been found that it is not only the semantic interpretation of an event (say, the meaning of a word learned) that is remembered over long term, but also its perceptual data, both visual and auditory (Jacoby 1983; Jacoby et al 1978). This means that processing of a word must include auditory as well as visual processing to enhance learners' memory for later listening, speaking, and reading.

Studies in ESL perception, as those in pronunciation, have emphasized segments rather than morphophonemics (Stevens et al 1969; Mochizuki 1981; MacKain et al 1981; Sheldon & Strange 1982; Hardison 1996). Studies of difficulties in listening at the level of discourse have cited speed of delivery as a problem (Dunkel 1988a; Chung & Dunkel 1992). Vocabulary difficulty also affects L2 listening comprehension (lectures) at the advanced level (Flowerdew & Miller 1992), but this has often been interpreted as difficulty of understanding concepts carried by problem words. Work on listening difficulty has also focused on background knowledge, cultural background, and general discourse structure (Carrell & Eisterhold 1983; Carrell 1984a, d; Connor 1984; Aron 1986; (in Chung & Dunkel

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1992); Chaudron & Richards 1986; DeCarrico & Nattinger 1988; Olsen & Huckin 1990 (in Flowerdew & Miller 1992)). In contrast, Hansen and Jensen (1994) have found that the effect of prior knowledge on listening performance, especially in non-technical subjects, was in fact trivial. Kelly's study (1991) shows that lexical errors rather than syntactic misunderstanding was the major source of errors in listening comprehension.

Studies in cross-linguistic approaches to lexical segmentation has confirmed the problem of lexical segmentation and semantic interpretation in L2 perception in continuous speech stream context (Frauenfelder 1985). According to Eastman (1993), L2 learners rely more heavily on content words in listening than native speakers. Learners whose L1's are syllable-timed rather than stress-timed have problems dealing with unstressed syllables. Moreover, the habit of giving equal stress to all syllables may lead to the habit of reconstituting unstressed syllables to their full form while listening in order to be able to process them as content words. This reconstituting process diverts attention away from recognizing content words, reducing the amount listeners recognize, and delaying progress in listening.

According to Grosjean and Gee (1987), in the perception of continuous speech stream, a stressed syllable initiates lexical search. For an ESL learner from a syllable-timed L1, it may be the stressed syllable and not the initial syllable of a word which is used to look up the mental lexicon, ending up in the wrong word being accessed. Cutler (1986) confirms that even native speakers need information about a derivative (such as, which syllable has primary stress) before they can recognize the word in spoken form. This explains the importance of preserving the base word up to word recognition point so that the listener has enough information to be sure of accessing the base word's lexical entry. From these conclusions, I would assume that in the perception of continuous speech stream, the presence of derivatives would affect L2 listening comprehension. Derivatives whose primary stress may not be the onset syllable would influence the extent of word recognition and the difficulty of lexical segmentation for L2 listeners. As well, where vowel, consonant, or stress shifts

occur from the base words, word recognition and lexical segmentation in continuous speech stream would also be more difficult. In fact, derivational complexity has also been found to affect item difficulty in L2 sentence repetition tasks because of the number of syllables of the derived words and the syntactic complexity of the sentences which contained derivatives (Perkins et al 1986).[7]

According to Frauenfelder, lexical segmentation cannot depend on the sole strategy of using the phonological code to predict the end of each word and the onset of the following one. This strategy has to be used in conjunction with other types of segmentation information, viz. distributional information, relating sound signals to larger domains (for example, a syllable within a word, a word within a sentence, or prefixes and suffixes with respect to words they are attached to, and which can indicate beginning and end points of words) (Frauenfelder 1985:678). These conclusions seem to suggest that, at higher levels of L2 learning, or content learning through L2, and especially in academic settings, one of the factors affecting listening comprehension may be the number of derivatives present in oral discourse, especially Latinate derivatives. The morphophonemic alternations between base and derived words and stress shifts, and the failure to relate unknown derived words to known base words due to phonological alternations in derived words, may affect efficiency in lexical segmentation in continuous speech stream. The teaching of internal word structure of derived words must therefore be accompanied by the teaching of their pronunciation. Anderson-Hsieh et al (1992) and Munro and Derwing (1994) have also shown that non-native pronunciation and intonation affect comprehensibility. Prosody influences the extent of accentedness in non-native speech (Munro 1995). It may be assumed that word level obligatory morphophonemic alternations and stress shifts which contribute to sentence prosody may affect the intelligibility or comprehensibility of L2 speech.

Morley (1991) emphasizes the domains of segmentals, suprasegmentals, and voice quality in the teaching of pronunciation in advanced ESL settings (college, graduate students, and faculty members) to the exclusion of the morphophonemic aspect of the pronunciation of Latinate derivatives

most prevalent in this kind of setting. However, a brief reference is made to how morphological regularity in English spelling can be exploited for pronunciation purposes. Work on the relationship between English orthography and the pronunciation of Latinate derivatives has so far been limited to Dickerson (1987a, b; 1989b; 1992; 1994). The effectiveness of direct instruction of the pronunciation of derivatives through the predictive use of orthography has been confirmed by Dickerson (1987b).

Conclusion

According to N. Ellis (1994), vocabulary acquisition and the understanding of vocabulary are dependent upon training in metacognitive strategies such as word analysis (and inferring meanings from contexts), explicit learning, and memory (depth of processing). Morphological awareness and morphophonemic awareness are significant aspects of L2 lexical competence. At the intermediate and advanced levels, the perception, production, and decoding of derivatives for meaning are significant since they facilitate vocabulary learning and expansion. My empirical study was aimed at examining the rules ESL learners had formulated regarding the morphological and phonological representations of derivatives, their ability to decode derivatives for meaning, and their perception of the semantic associations between morphologically related words. The formal representations of derivatives in learners have implications on the way vocabulary teaching and the teaching of reading is approached. In Chapter 2, I will explain the various aspects of morphological and morphophonemic awareness and review empirical studies that have been conducted among ESL/EFL learners in this area of lexical knowledge.

Notes:

1. The terms "morphological awareness" and "morphophonemic awareness" as part of metalinguistic awareness will be explained in greater detail in Chapter 2. For the present, the term "morphological awareness" refers to awareness among learners of the word structure of derived words, and the term "morphophonemic awareness" refers to the awareness that certain sound changes occur to the base word when affixes are attached, including vowel, consonant, and stress changes. These changes are referred to as "alternations," to use linguistics terminology. The term "morphophonemic" is used here in the general sense of the grammatical factors (morphology) that affect the appearance of morphemes (Crystal 1991).

2. Altenberg & Vago's (1983) study of Hungarian learners of English reveal that low-level L1 phonological rules are not transferred, especially where the TL provides no context for the application of L1 phonological rules. As well, "higher level" L1 phonological rules such as vowel harmony, are not transferred.

3. "Learning" is differentiated from "acquisition" in that the former takes place in the formal context of a classroom, while the latter occurs in a naturalistic and informal environment.

4. Laufer adopts Nation's definition of a "word" to mean word family. eg. knowledge of " observe" subsumes knowledge of "observation," " observable," "observance," and all their inflections. "Pupil," with two different meanings, would be two different words. Laufer's analysis of the relationship between vocabulary and reading scores is based on subjects' scores on two standardized reading tests and two standardized vocabulary tests. The reading tests are Hoger Algemeen Vortgezet Onderwijs (Netherlands) and the Israeli university psychometric entrance test. The vocabulary tests are Vocabulary Levels Test (Nation 1983b) and Eurocentres Vocabulary Test (Meara & Jones 1989).

5. McKay (1993) claims to have proposed a wide range of L2 literacy programs, but such "educational agendas" are limited to developing fundamental abilities in reading and writing for survival purposes, as seen in the programs "Action For Literacy" for homebound learners, "Vietnamese Refugees Program," "Focus On Change" for sole-support mothers, and "Help A Friend Learn English" for elderly shut-in Spanish-speaking minorities. While admitting that literacy is the ability to think and reason, and a tool that enables the learner to think about language, to use language to extend and express knowledge, ideas, and experience, educational agendas for literacy have overlooked the needs of academically oriented L2 learners. McKay (1993) calls for educators to determine the objectives of literacy development for minorities and to provide assistance for developing the kind of literacy students desire, yet she makes no reference to the higher level literacy needed by L2 learners with academically oriented goals.

6. Chomsky and Halle (1968) and most generative phonologists do not refer to alternations in morphologically complex words as "morphophonemics" since they account for alternations as phonological rule application.

7. An example of a test item which contained a derivative (nominalization) and was syntactically complex is "Each culture developed in a manner dictated by its own needs, sources, and ingenuity."

Chapter 2

MORPHOLOGICAL AWARENESS AND MORPHOPHONEMIC AWARENESS[1]

Introduction

Language awareness has been defined in a number of different ways. In Britain, it is particularly associated with an educational movement to make students in schools more conscious of "the nature of language and its role in human life" (Nicholas 1991:78). This view of language awareness supports the idea that increased conscious reflection on language, both by teachers and students, leads to "improved language use" and "better overall education." Language awareness focuses on both making L2 learners aware of their mother tongue intuitions, and increasing their explicit knowledge of what happens in the TL (James & Garrett 1991:16). This awareness also encourages learners to make use of their L1 lexico-grammatical organization which they bring to L2 learning (Hammerly 1982, 1986). The communicative use of language would still be the ultimate goal of language learning; the development of language awareness is to facilitate efficiency in learning and accuracy in communication (Nicholas 1991; also Van Lier, in Hulstijn & Schmidt 1994).

2.1 Role of Consciousness in L2 Learning

In recent years, questions concerning the role of consciousness in L2 learning in general have become a matter of practical concern in applied linguistics. If language awareness facilitates language learning, then consciousness about the nature of language is part of the development of language awareness. Contrary to Krashen's (1981, 1993) claim that acquisition is largely an unconscious process and that the contribution of conscious learning is limited and secondary, there is a growing recognition that explicit instruction (where some sort of rules are being thought about in the learning process) facilitates learning, and that explicit knowledge facilitates the acquisition of implicit knowledge

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(Hulstijn & Schmidt 1994). Instruction provides a cognitive focusing device for learner attention (Van Patten; Harley; N.C. Ellis; Hulstijn & deGraaff; in Hulstijn & Schmidt 1994).

According to Hulstijn and Schmidt, "consciousness" for the learner must mean receiving instruction in and the acquisition of explicit skills necessary for the processing of the semantic and conceptual representations of language (1994:9). Schmidt's redefinition of "consciousness" in language learning which includes paying attention to what is being learned, and awareness of rules or generalizations, is particularly useful (Schmidt 1990, 1993a, 1994). Paying focal attention to what is being learned, or noticing, converts input into intake. Learners are made to form conscious hypotheses about the TL rules concerned (R. Ellis 1993, in Hulstijn & Schmidt 1994). Robinson (1995) complements Schmidt's model of consciousness and noticing by proposing that attentional and processing demands of pedagogical tasks, including detection and rehearsal in short-term memory, prior to encoding in long-term memory, are significant factors affecting the extent of noticing. (Also Jacoby 1983.) Retrieval from long-term memory can result from conceptually driven top-down processing and automatic activation of previously attended information encoded in long-term memory, determined by the interaction of data-driven, bottom-up processing of the specific tasks concerned. In Robinson's model, grammatical knowledge is aided by familiarity with the basic metalinguistic principles for describing structural patterns. Structural analogies help hypothesis testing by directing the learner's attention to the relevant features of the input to be noticed. According to O'Malley and Chamot (1990), explicit training in areas of metalinguistic knowledge is possible. Winser (1991) emphasizes the role of awareness of learning strategies and explicit instruction in developing literacy skills in adults.

2.2   Metalinguistic Awareness

2.2.1   Awareness of Grammatical Form and Function

An important aspect of language awareness, literacy, and language development is

metalinguistic awareness. This comprises attention to two related aspects of language, form or structure, and function (Downing & Leong 1982, Bialystok 1991). Word knowledge, which constitutes the foundation of literacy, comprises awareness of phonemes, syllables, morphemes, and words, and how to map the mental representations of these linguistic units to and from the oral and aural language and their graphemic representations (Henderson 1992; Templeton 1992). Word knowledge also includes the awareness of the internal structure of words for the purpose of developing word recognition strategies (Fischer et al 1985). According to Ellis (1985:8), it is probable that "literacy and language awareness exist in a state of mutual facilitation."

2.2.2 Morphological Awareness

Mattingly (1987) and Leong (1991) refer to morphological awareness as awareness of the "compositional analysis" of words. Traditionally, this view of morphological awareness in literacy involves the recognition of meaning units or morphemes within morphologically complex words in the language.[2] In literacy, morphological awareness involves

a) the recognition of the morphological structure or form of complex or multimorphemic words, that is, base words and affixes or compounds;[3]

b) the awareness of the grammatical function of multimorphemic words. This entails the awareness of the semantic compositionality of derived words as well as their semantic idiosyncracy where applicable, so that "productivity" is the state of being "productive," but the "transmission" of a car does not refer to the act of "transmitting" but to the parts which carry power from the engine to the wheels;[4]

c) the awareness of morphological rules of the TL so that complex multimorphemic words can be generated from monomorphemic words of the lexicon, and their meanings and use understood from their internal structure; and

d) the awareness of the grammatical function of derivatives so that their subcategorization as determined by their syntactic categories and thematic roles in sentences, are understood.

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I would like to add another dimension of morphological awareness from the point of view of linguistic theory (Aronoff 1976, 1994):

e)   the awareness that some morphemes may not have a consistent meaning in different words (such as {re} in "receive" and "reduce", or {mit} in "commit" and remit"). In such words, the semantics of a complex word cannot be derived by compositional analysis. (This is at least true for the average speaker of English, and the average ESL learner need not be expected to delve into the Latin origins of such words. See Chapter 5.)

2.2.3   Morphophonemic Awareness

English orthography primarily represents phonemes with overlapping morphophonemic representions where orthography does not reflect the phonetic alternations of vowels or consonants in the event of affixation. Thus, the orthographic form "magic" is phonemic/phonetic, but the orthographic form "magician" is morphophonemic. The morpheme "magic" is preserved orthographically in "magician," but the phonological representation or phonetic form of "magic" is modified with the final [k] ~ [ʃ] before the suffix -ian. Morphophonemic awareness thus represents a more complex level of metalinguistic awareness than morphological awareness. Morphophonemic awareness may be best explained in terms of reading and orthography, and listening and pronunciation.

a)   In reading, it involves the awareness that in English orthography, morphemes are represented to varying degrees of consistency. Any changes to the phonetic forms of these morphemes in the event of affixation may not result in a corresponding change to their orthographic forms. For example, in "photograph" and "photographer," the base word is preserved completely in orthography. In "permit" and "permission," the base word is only partially preserved in orthographic form. Recognition of the base word of "photographer" would be much easier than that of "permission" due to the absence of orthographic modifications in "photographer." "Magic" and "magician," on the other

hand, involves awareness of the preservation of morpheme identity in the spelling of the derived word in the absence of phoneme-grapheme correspondence.

b)   In oral or aural language, morphophonemic awareness involves the ability to associate a derived word with a base word whose phonological representation within the derived word has been modified from its phonological representation as a base word. This means that despite a different phonological representation of the base word "minor" in the derived word "minority," learners should recognize the morpheme "minor" in the derived word and connect them semantically. In aural language, recognition of the association between the words in the "photograph ~ photographer" pair and the "magic ~ magician" pair would be more difficult than in written language. The recognition of "receive ~ reception" would be more difficult than the above two pairs in both aural and written language. Thus, morphophonemic awareness necessarily presumes morphological awareness.

2.2.4   Morphological Awareness, Morphophonemic Awareness, and English Orthography

Morphophonemic awareness involves the awareness of English orthography as a multi-code system. This is summarized by Albrow (1972) as recognition of the following:

1.   word pairs whose spellings reflect their phonemic forms, morphemic relatedness, and semantic link, such as "sin ~ sinful";

2.   word pairs which are semantically and morphemically related, but whose spellings partly conceal their relatedness, as in "decide ~ decision"; and

3.   word pairs which are semantically or morphemically related and have spellings reflecting the phonemic changes, such as "beast ~ bestial," thus sacrificing their semantic or morphemic link in writing.

These three word pairs represent the increasing order of opaqueness of English orthography in

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base word-derived word pairs. This "differential orthographic complexity" accounts for the increasing order of difficulty in the acquisition of morphologically (and usually semantically as well) related word pairs by learners (Luelsdorff 1987). A full understanding of English orthography involves the discovery and learning of the phonemic as well as the systematic morphophonemic code. I would assume that, for ESL learners, it is this duality of the orthographic code that causes difficulties in the pronunciation, reading, and perception of English derivatives. Difficulty is especially encountered in words whose aural representations (pronunciation) do not match their visual representation (spelling), and those words whose visual and aural representations do not match the visual and aural representations of their bases. I would also assume that if the learners' L1 has a non-alphabetic writing system, is isolating rather than agglutinating, has little or no morphological processes, and consequently, little or no morphophonemic alternations, then the development of morphophonemic awareness is all the more pertinent.[5]

2.3   Research in Morphological and Morphophonemic Awareness in ESL/EFL

Numerous studies have been conducted concerning morphological and morphophonemic awareness among native speakers of English. In the field of psycholinguistics, many of these studies aim at countering the claims made by Chomsky and Halle in **The Sound Pattern of English** (1968). that the historical changes in the English language reflected in the vowel shift rules are part of the linguistic (phonological) competence of contemporary native speakers of the language (Moskowitz 1973; Steinberg 1973; Armbruster 1978; Wheeler 1980; Wheeler & Schumsky 1980; Jaeger 1984, 1986; McCawley 1986; Ohala 1986; Wang & Derwing 1986; Jones 1991). There have also been psycholinguistic studies that aim at explaining the mental representations of derived words, their association with morphologically asociated words, and their retrieval (Murrell & Morton 1974; MacKay 1978; Nagy et al 1989). Other studies attempt to relate these mental representations to reading ability (Rubin et al 1979; Stanners et al. 1979). Literacy studies focus on word knowledge and spelling (Templeton 1979; Fischer et al 1985; Templeton & Scarborough-Franks 1985; Bruck & Waters 1990).

In contrast to the number of studies conducted on all levels of language awareness among native-speakers of English (phonemic, syllabic, morphological, and morphophonemic), studies relating to ESL interlanguage morphology and morphophonemics have been very restricted. In this section I will review empirical research on the morphological and/or morphophonemic awareness of ESL/EFL learners from different language backgrounds.

2.3.1   Erdmann (1973)

Erdmann's study involved native-speakers of German in university and high school (with four years of English). The study examined the pronunciation of English derived words with the suffixes *-al, -able, -ative,* and *-atory.* The primary stress placement of such English words vary from the penultimate to the antepenultimate syllables. Cognate equivalents of these words in German, bearing the corresponding suffixes *-'al, -'abel, -a'tiv,* and *-a'torisch* were examined for their pronunciation by subjects. The German suffixes are stress-fixed so that in multisyllabic words to which these suffixes are attached, the main stress is on the syllables in the suffixes. Some examples are:

	English	German	*Interlanguage English
3-syllable words:	'sedative	seda'tiv	*se'dativ
	'putative	puta'tiv	*pu'tativ
4-syllable words:	de'clarative	deklara'tiv	*decla'rative
	'generative	genera'tiv	*gene'rative
5-syllable words:	an'ticipatory	antizipa'torisch	*antici'patory
	com'pensatory	kompensa'torisch	*compen'satory

Generally, subjects systematically shifted the stress one syllable to the left of the stressed syllable in the German equivalent word, a principled modification of English stress which Erdman

called "pseudo-stress rule." There were no errors in the pronunciation of English bisyllabic words containing the suffix -al where the stress was on the penultimate syllable and on the final syllable in the German cognate (eg. German "glo'bal" and "le'gal" were correctly pronounced as English "global" and "legal"). It was concluded that this interlanguage pseudo-stress rule was not simply transfer of L1 stress rules or approximations of English stress rules, but more the elaborations of L1 rules.

2.3.2   Mairs (1989)

This study of adult Spanish ESL learners tested their pronunciation of 80 multisyllabic words (monomorphemic, derived, and inflected words). Pronunciation was elicited in casual conversation and reading of sentences, paragraphs, and short stories. Mairs concluded that there was negative transfer of L1 stress rules only at the level of phrases and compounds. Stress errors in TL words were neither negative L1 transfer nor adaptations of L1 stress rules. The main source of errors was the internal structure of the syllable in TL words, viz. the series of segments of a rime which violated L1 syllable structure, confirming the Marked Rime Hypothesis. The subjects tended to assign primary stress to syllables containing the VGC (i.e. Vowel-Glide-Consonant) rime not permissible word-finally in Spanish. Errors in word stress were found in all words ending in -VGC# and -VGC + stress-neutral suffix (eg. "orga'nize" and "rea'lize" for -VGC#, and "compli'cated" and "adver'tising" for -VGC+ stress-neutral suffix). Mairs used the periphality condition relating to rime extrametricality to explain the subjects' difficulty with words containing -VGC + stress-neutral suffix such as -or or -er and -ing.

2.3.3   Baptista (1989)

This study of Portuguese-speaking university students of English in Brazil examined their stress problems in multisyllabic words, including monomorphemic words and English-Portuguese cognate and non-cognate derivatives. It was found that English words with different stress patterns from their Portuguese cognates actually caused less difficulty than words with the same stress patterns. As well,

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where derivatives were verbs (such as with -ate and -ize), most errors occurred in final syllables with primary stress. (Where final syllables of verbs required primary stress, scores for correct responses were much higher.) Unlike Matros and Cintra (1966, in Baptista 1989) who cited negative transfer in the pronunciation of Portuguese cognates, Baptista attributed these errors to the subjects' interlanguage rules regarding the TL. The tense vowels of the final syllables of these words in English also explained errors in the pronunciation of words like "contributors" where subjects placed primary stress on the tense penultimate syllable. Another tendency among subjects was to indiscriminately maintain the stress of the root word (I use the term "base word") in the pronunciation of derivatives. The rate of error caused by root word stress was four times higher than errors where subjects placed stress on other syllables (p.13). This showed that the majority of stress errors were caused by the subjects' maintaining the base-word stress in derivatives. Where derivatives did not require stress shifts from the root words, as in those with weak suffixes (-ly or -er, except after Greek elements), correct pronunciation score was 90%. In general, Baptista appeared to account for her subjects' errors in pronunciation as overgeneralization of English stress rules rather than the negative transfer of Portuguese stress rules.

2.3.4 Anani (1989)

This study involved Jordanian undergraduate learners of English and examined their pronunciation of multisyllabic English words. Anani attributed pronunciation errors to negative transfer from L1, Arabic. The fixed stress patterns of Arabic multisyllabic words that have syllable structure corresponding to English multisyllabic words were transferred to these English words. For example, Arabic trisyllabic words with long final syllable (eg. "maga'diir," "Tayya'raat") corresponded with English trisyllabic words with final syllables containing tense vowels. This led to errors in the pronunciation of words like *"subma'rine," *"moder'nize," *"engin'eer," *"photo'graph," *"edu'cate," *"appe'tite," *"sepa'rate," *"para'chute," and *"hesi'tate." Moreover, where Arabic words had the syllable structure of CV-CVC-CV, (as in "ka'milli," "Was'silni,"), their stress pattern was transferred to English words with

similar syllable structure, thus producing "'certainly." While test items consisted mostly of derivatives as well as compounds, Anani examined their pronunciation from their syllable structure rather than morphological structure.

2.3.5   Fokes and Bond (1989)

This study involved five native speakers of five different L1's, viz. Farsi, Japanese, Spanish, Hausa, and Chinese. Subjects were tested for their pronunciation of words in isolation and in sentence context. Test words consisted of two-syllable words (eg. "confess" and "conclude") as well as three-syllable words with affixes (eg. "confession" and "conclusion") and four-syllable words with affixes (eg. "combination" and "competition"). No significant differences were found between native-speaker pronunciation and non-native pronunciation of two-syllable words. With respect to words of more than two syllables, it was found that none of the subjects pronounced these words with the same durational relationships (between stressed and unstressed vowels) as the American native-speaking controls. For the non-native subjects, unstressed vowels were longer while stressed vowels were shorter. Moreover, nonnative-speaker subjects had the greatest difficulty in producing the appropriate stressed and unstressed vowels in four-syllable words. A variety of vowels were produced for stressed vowels, and unstressed vowels were not reduced. Moreover, the subjects' difficulties in pronunciation were associated with types of words (that is, number of syllables) rather than with producing these words in isolation or in sentence context. The authors attributed their pronunciation difficulties to the fact that their L1's were syllable-timed languages rather than stress-timed as English is.

2.3.6   Aiking-Brandenburg, James, and Meijs (1990)

This study examined the suffix-learning strategies of Dutch university students and secondary school students of different ages, in the acquisition of complex words in English. The strategies examined were those of applying rules and analogies, or learning by heart. Test items were

categorized as follows: words of which the base forms and the derived forms had been studied, words of which just the base-forms had been studied, and words of which neither the base forms nor the derived forms had been studied. Suffixes included in the test items were both native English suffixes (-er, -ish, -ness, -ment, -able, and -ed) and Latinate suffixes (-or, -ant, -ify, and -ible). Subjects were required to "make a noun from a verb," "make an adjective from a noun or a verb," or "make a verb from a noun" etc. Answers had to be in written form and spelling had to be correct.

It was concluded that either strategy (whole-word learning or the application of word formation rules) could have been at work. However, there were other findings of significance. Overall scores in all words of all categories increased with educational level, thus confirming the importance of exposure. Scores for regular words (native English suffixes) were always higher than for irregular words (Latinate suffixes). Scores were lowest for unlearned base words and unlearned derived words. Frequency of suffixes was an important factor in the scores, even for university students. However, the authors conceded that the errors made by subjects were due to the lack of knowledge of English word formation rules and spelling rules.

2.3.7 Dziubalska-Kolaczyk (1992)

This study examined the application of word formation rules in English by native speakers of English and ESL learners. Subjects used the suffix -ity to form nouns and -ity nouns to form adjectives, with the application of vowel shift and velar softening. Test items consisted of nonsense words. Subjects were Polish and Austrian university students. The Austrian subjects were all students of linguistics. Controls were American speakers of English, one of whom was an English philologist.

Results showed that for both types of tasks, the Austrian speakers scored higher than English speakers. This was attributed to their linguistic education. Among the English and Polish speakers, scores were perfect for the linguistically educated, and lower for those educated in other areas. It was

concluded that the processes of velar softening and vowel shift were not natural phonological processes and had to be learned as morphological rules by native speakers as well as non-native speakers of English. This explained why both native speakers and ESL learners manifested the same difficulties in the application of these processes in words with -ity. Linguistic education also influenced the application of these rules (cf. Jaeger 1984, 1986; McCawley 1986:5). A native speaker might, however, become aware of these processes through observation and analogy. Analogy was employed as a strategy when consciously manipulating morphological material (p. 419).

2.4   Rationale For My Study

The above review has shown that, except for Aiking-Brandenburg et al (1990) and Dziubalska-Kolaczyk (1982), studies on ESL/EFL learners' knowledge of derivatives have emphasized pronunciation. In Aikung-Brandenburg et al., the focus was on word formation only; in Dziubalska-Kolaczyk, the employment of pseudo-base word might not reflect the real state of learners' morphological and morphophonemic awareness. In general, the emphasis has been that the pronunciation problems in English derivatives are simply phonological problems having to do with segments, syllables, and within-word prosody. Anani (1989), in his examination of syllable structure and pronunciation, did not distinguish multisyllabic monomorphemic words from compounds and derivatives. All these different multisyllabic words were treated as purely phonological units and pronunciation problems stem simply from problems of prosody due to different syllable structures between L1 and L2. Subjects' possible knowledge about the structural representation of derivatives and compounds and how this might affect pronunciation was not taken into account. In general, except for Baptista (1989), the possibility that subjects' phonological problems with derivatives could be related to their mental representations of associated base words has not been explored. This means that derivatives have been treated as though they are isolated items in the learners' L2 lexica, their pronunciation being unrelated to that of other morphologically related words. Consequently, errors in the pronunciation of derivatives are seen as problems in L2 phonology and not in L2 morphology and

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morphophonemics. I think Baptista's conclusion about the source of error in the pronunciation of derivatives, though limited to stress placement, is valid. Morphological relationships between words which are recognized by subjects can be a factor influencing their pronunciation of derivatives. This would be particularly true when L1 and L2 are typologically distant and the likelihood of L1 positive or negative transfer can be discounted and learners have to draw upon their generalizations of TL rules.

Baptista's study had three limitations, however. Firstly, in her examination of the oral production of derivatives (including cognates) by Portuguese-speaking learners of ESL, the oral production of associated base words was not examined. The basis for claiming that errors stemmed from "root-word stress" for the majority of derivatives was therefore absent; it was simply assumed that the learners' base-word phonology would be that of the native speaker. Secondly, only base-word stress was accounted for; the possibility of base-word segments being replicated in derivatives was not investigated. An examination of a greater number of non-cognate derivatives might have revealed different results regarding the effects of base-word segments on the production of derivatives. The third weakness was that she did not examine her subjects' semantic representations of base word-derived word pairs which could be a possible factor affecting the pronunciation of derivatives. This is especially likely in the case where L1 and L2 are typologically related and subjects' awareness of morphological relatedness between L2 words could be expected to be high. Baptista's study included the investigation of the pronunciation of English compounds as well. However, unlike Anani (1989), she did analyze derivatives as a distinct kind of morphologically complex word from compounds.

As stated earlier, learners' knowledge of the semantic and/or morphological relatedness between words could be a factor influencing their aural recognition and oral production of these associated words. Fokes and Bond (1989) concluded that ESL subjects produced a variety of vowels in four-syllable derivatives. The possibility that they were base-word vowels was not explored. In my study I examined ESL subjects' production of base words and their associated derivatives to see if they incorporated base-word vowel and base-word stress in their oral production (and aural reccognition) of

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derivatives. Aiking-Brandenburg et al (1990) investigated learners' interlanguage suffiixation rules. I decided to do the reverse, that is, I examined the strategies used by the subjects in abstracting base words from derivatives. This testing technique had four advantages over the test used by Aiking-Brandenburg et al. Besides testing subjects' recognition of affixes (especially suffixes), it also tested their ability to abstract base words from derivatives which was important for decoding meaning. It also showed whether opaque spelling obscured subjects' ability to abstract base words, and what kinds of strategies involving affixes and spelling changes were used by subjects in abstracting base words. This test would therefore reveal the subjects' morphological and morphophonemic awareness. In my study, ESL learners' performance in listening, pronunciation, word analysis (knowledge of word relatedness and spelling) as well as learners' awareness of the semantic association between morphologically related words were investigated. The objective was to present a more integrated picture than previous studies of ESL learners' performance regarding English derivatives.

In contrast to Baptista's, Erdmann's, and Aiking-Brandenburg et al's subjects, whose L1's were typologically related to English, I selected native speakers of Cantonese as my subjects since Cantonese is typologically distant from English. I will describe this language at the word level as follows:

i)   Cantonese has no morphology (except for compounding) and consequently no morphophonemics;

ii)   Cantonese writing is logographic and therefore does not involve phoneme-grapheme correspondence or morphophonemic representations;

iii)   Cantonese syllable structure is different from English syllable structure (Cantonese syllables have only nasal codas, no reduced nuclei, and no consonant clusters);

iv)   Cantonese is syllable-timed, not stress-timed as English is; and

v)   Cantonese has no cognates with English.[6]

The above features of Cantonese would exclude the possibility of the effects of positive or negative transfer in my subjects' performance in their perception, pronunciation, and word analysis of English

derivatives, as well as their rating of the semantic relatedness between pairs of morphologically associated words. Their performance would depend almost entirely on TL rules they had learned or formulated for themselves. In analyzing the errors of such a group of subjects, I would also be able to determine the possible psycholinguistic processes that would account for learner errors.

Conclusion

The morphological and morphophonemic awareness of ESL learners at the level of derived words has not been well investigated. The investigation of learners' performance on derivatives has been restricted mostly to pronunciation while the relation between phonological performance and formal representations of derivatives and base words has not been examined. Moreover, an integrated perspective of ESL learners' lexica concerning derivatives has not been presented in research as studies have so far restricted their scope of investigation to one aspect of derivatives, phonology or morphology. In addition, semantic representations of morphologically related words in the lexica of learners have not been examined. As explained in Chapter 1, my study was an attempt to examine morphological and morphophonemic awareness of my subjects as part of their L2 competence, that is, lexical competence, in terms of their perception, production, and decoding of derivatives and their recognition of the semantic association of morphologically related words. In addition, I attempted to overcome the limitations of error analysis in interlanguage theory. Besides the description of my subjects' TL "constraints," I attempted to provide a psycholinguistic explanation for my subjects' errors. This allowed me the advantage of determining the similarities, if any, between speakers and learners in their acquisition of learning of Latinate derivatives. Before I describe my study, I will present a brief overview of the relationship between the learner, linguistic theory, and linguistic competence and performance. This discussion will help to support my suggestions for classroom techniques for raising morphological and morphophonemic awareness among ESL learners which I will make in Chapter 9. I will also review three major morphophonemic theories in the linguistics literature and discuss their pedagogical significance.

Notes:

1.	According to Gleason, morphophonemics is "one of the most vexed technical terms in linguistics. In no two systems of linguistic theory is it used in the same way"(Gleason 1965:226). According to Hockett, "Morphophonemics.....subsumes every phase of the phonemic shape of morphemes: the typical shape of alternants, the types of alternations, and the various environmental factors (phonological or grammatical) which elicit one alternant or another of those morphemes which appear in more than one shape" (Hockett 1950:63). The above explanation by Hockett appears to represent the general sense in which the term "morphophonemics" is used in contemporary literature on literacy and applied linguistics. In this thesis, the term "morphophonemics" is used to refer to alternations in derived words, that is, alternations that are induced by morpohology. In Chapters 4, 5, and 6, whether phonological rules induce alternations will be discussed as part of morphophonemic theory. I would also like to add that, for the sake of consistency with research in applied linguistics, literacy, and psycholinguistics, the term "derived" is used here in the sense of the derived word being differentiated from an inflected word. The term "derived" is thus used with no reference to whether a word can possibly be derived from another, or can be merely related. This distinction is discussed in detail by Anderson (1992).

2.	The concept of the morpheme as minimal meaningful unit in the traditional sense has been the one adopted in the literature of applied linguistics and literacy and is used here in this sense. Aronoff's (1976, 1994) discussion of what constitutes a minimal meaningful unit, and hence, a morpheme, is discussed in Chapter 5.

3.	The term "word" is used here in the traditional sense of the minimal free form. Aronoff (1994) replaces his 1976 term "word" with the term "lexeme" in order to avoid confusion with the "phonological word" in prosodic phonology. However, I use the term "word" in its traditional sense for pedagogical convenience.

4.	The semantic compositionality of derived words and compounds has been much debated in the field of morphology in that the meaning of the whole word may not be constituted from the meaning of the parts. However, complex words are mostly semantically compositional rather than non-compositional (Sproat 1992). In terms of literacy and vocabulary development, recognition of semantic compositionality of morphologically complex words would be the first basic aspect to teach or learn.

5.	Evidence indicates that phonemic awareness does not seem to develop in Chinese adults who are not exposed to pinyin (Read et al 1986).

6.	The following comments are based on my personal knowledge of Cantonese and familiarity with Cantonese speakers from Hong Kong. English words present in Hong Kong Cantonese are strictly fairly recent lexical borrowings or loan words comprising mainly of items of cultural significance and those used in modern technology. They are not cognates in the sense that English "lecture," French "lecture," and Spanish "lectura" are cognates since these three are related or cognate languages and Cantonese and English are not. In the case of derivatives borrowed into Cantonese, they are mostly *-er/-or* words and *-ion* words, that is, nouns. Borrowed as unanalyzed whole words, no systematic application of phonological rules (in the sense of stress shifts and segmental alternations) and morphological rules based on Cantonese is likely or possible, as might happen in typologically related languages and L1 and L2 words could be cognates in the sense that I have defined them. From my personal perception, Cantonese speakers, in attempting to produce the stress patterns of multisyllabic English loan words when speaking Cantonese, tend to induce tone into the syllables, where even rising tones are evident in the syllables of some borrowed words. ("Sofa" and "locker" are pronounced with a level tone in the first syllable and a rising tone in the final syllable. Other segmental modifications might also occur.)

Chapter 3

LINGUISTIC THEORIES AND APPLIED LINGUISTICS - THEORETICAL LINGUISTICS AS A BASIS FOR THE TEACHING AND LEARNING OF LANGUAGE

Introduction

In this chapter I will explain the need for a theoretical basis for the teaching and learning of the morphology and morphophonemics of English derivatives. Pedagogy should be based on linguistic theory or theories that are psychologically valid as an explanation or description of a real speaker's grammar regarding this aspect of the language. I will also explain the criteria for selecting a linguistic theory or theories that would help in constructing pedagogical guidelines for this purpose. According to Chomsky (1966), theories in linguistics are not aimed at language pedagogy, and in the last three decades it has been convenient to discard linguistic theories, except for those in sociolinguistics, from the field of language teaching on the grounds of abstractness and complexity. Some variants of generative linguistics which aim at a more plausible representation of human grammar may offer useful insights to language teaching. In Chapter 4, 5, and 6, I will summarize current linguistic theories that have attempted to explain the morphophonemics of English derivatives viz., natural generative phonology (Hooper 1976), lexical phonology (Kiparsky 1982a), prosodic phonology (Szpyra 1989), Linell's (1979) theory of phonology and morphophonemics and Aronoff's (1976) theory of morphology (word formation). Their pedagogical implications will also be explained. Both Linell's and Aronoff's theories are unfortunately not the "latest" in linguistic theorizing in the field of my discussion. Their value lies in their comprehensive explanation of "what goes on in the minds of speakers," so to speak. Their theories offer practical considerations that we may take regarding the teaching and learning of English morphology and morphophonemics.

3.1   Language, the Language Learner, and Linguistic Theories

According to Stern, the choice of an approach to language teaching is determined by the following

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key concepts -- the nature of language, the leaner and the nature of language learning, the language teacher and language teaching, and the context of language learning and use (Stern 1991). Bell formulates the first three concepts in the form of the following questions which makes clear what we must answer before we adopt any approach or theory (1981:18):

1.   What do we believe language is?

2.   How do we believe people learn language?

3.   How can we help people to learn language?

If our answer to Question 1 is that language is a code (with specific organizations) that functions as a vehicle for human communication, and if Question 2 and 3 imply that language is a phenomenon that involves man, his cognitive ability, and his social, cultural, political, and educational environments and needs, then linguistic theories should provide descriptions and explanations that relate plausibly to man's actual capacity for and use of language. This socio-cognitive-functional view of the language user and learner makes it necessary that applied linguistics seeks approaches to language teaching based on linguistic theories that reflect the way people use or learn language. L2 theories need to reflect empirical operations and empirical data (McLaughlin 1990). It is also necessary that applied linguistics presents insights from these linguistic theories in a readily comprehensible manner to language learners.

The trend in mainstream modern linguistics has been increasingly in the direction of language as a static object of abstract analysis, restricted to the enquiry into the forms of language and away from the direction of language as human behavior. To be pedagogically useful and relevant to the description of grammars of natural human languages, linguistic theory should ideally reflect the way people learn language or store linguistic rules and representations of the different aspects of language (such as morphology) in semantic memory (McKoon & Ratcliff 1979:463). In Chomsky's words (1968), transformational-generative grammar aims at describing the grammar of an ideal native speaker-hearer of a language whose grammar is maximally general and reflects the unconscious knowledge of all speakers of the language. Generative linguistics in the tradition of Chomsky has been seen as generally overly

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formalistic, abstract, and mentalistic (Braine 1974; Hooper 1976). Empirical studies in psycholinguistics have confirmed the lack of psychological reality of such a uniform grammar among speakers. (See Chapter 2.)

Linguistic theory that reflects "moderate realism" (Linell 1979:5) that would have offered some hope of restoring the validity of theoretical linguistics within applied linguistics has largely been overlooked. In fact, it may be said that formalism and abstractness in linguistic theory have been instrumental in the over-application of sociolinguistic theory (communication in language use) in current applied linguistics to the neglect of the formal aspects of language. An understanding of the latter facilitates language teaching and learning; at the same time, the application of sociolinguistic principles based on context and needs enhances the effective use of the language in social contexts.

Biological, psychological, and social realities must be taken into account in linguistic theory so that it provides an adequate explanation of how language is understood and used. Thus, Braine (1974) questions the learnability of phonological rules that are maximally general and economical as found in Chomsky and Halle's **The Sound Pattern of English** (1968). As Lass (1984:214). says, a real speaker is neither a linguist nor capable of recapitulating the historical development of sound changes (as claimed by Chomsky & Halle) in his synchronic use of the language.

"Moderate realism" in linguistic theory, such as Linell (1979), reflects the view that speakers may be assumed to have organized knowledge of their language in some specific ways. According to Linell (1979), psychological reality about rules and representations in language is difficult to describe or define and may be best said to refer to that which is behaviorally observable, compatible with what is found in real linguistic performance or "external evidence" such as in learning or acquisition. Lakoff's cognitive phonology (1993), as part of the recent development in cognitive grammar, has begun to reassess generative phonology. In Lakoff's theory, intermediate stages of derivations never occur in the minds of speakers. Lakoff's alternative to generative derivations and rule ordering is a three-level phonological

structure -- morphemic, phonemic, and phonetic. All intermediate stages of derivation which never occur as cognitively real representations or processed cognitively by speakers are unnecessary.

3.2   Theory of Language and Theory of Performance

The primary concern of applied linguistics is learner performance. In aiming to understand the learner, the applied linguist endeavours to look at competence (which is defined as what the learner or speaker knows about the language, and his capacity for knowing or learning that language), through his performance (how and what he learns about or does with language). Therefore, applied linguistics must make a distinction between a theory of language and a theory of performance. While a theory of language (or more accurately, a theory of grammar) must be concerned with economy of description (in terms of rules and notations so that it reflects the maximal generalizations that can be made of the language), a theory of performance must reflect the reality of language learning and use (Bennett 1974:105). For linguistic theories to be adequate pedagogical foundations, linguistic theories should reflect the relationship between competence and performance.

3.2.1   Theory of Performance and the Language User

According to Bennett (1974), a theory of performance must include the following explanations regarding language use :

1)   the way language is internalized by the child or adult, using his capacity for language (including his knowledge of grammaticality and appropriateness);

2)   such phenomena of language use as the encoding of items in terms of memory storage and retrieval, including the understanding or production of sentences or words of different complexity, the memorisation involved in the reproduction of such sentences or words, and the creative use of language (such as creating new words using rules of affixation or compounding in the language);

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3)   the fact that the rules that describe a grammar are, or may be, quite different from those

        that a language speaker uses or knows. Thus, rules used as an essential part of the

        technique of defining complex language phenomena through a limited set of formulae or

        categories may not be those employed by a language user. A theory of performance must

        thus only aim at modelling precisely and explicitly how rules can be learned (or mislearned)

        and used;

4)   the development of knowledge of complex subject matter in a learner as a function of the

        interaction of data and his competence. If language as a code is systematic and rule

        governed (in the sense of being agreed upon and accepted by the community of users),

        then the state of linguistic knowledge in an individual at any one time is a partial and

        developing language system; and

5)   knowledge of language as not purely linguistic, but social. An utterance is made with

        intent and function in mind, according to the pragmatic and semantic requirements of the

        speaker and the social situation.

        Hammerly (1985; forthcoming) offers four characteristics of a good linguistic theory from the

pedagogical point of view. A good linguistic theory defines its concepts precisely, is internally consistent,

makes predictions which are experimentally testable, and contains propositions which are not opaque or

untestable empirically. When a linguisic theory forms the foundation of a pedagogical model, the model

is useful when it facilitates language learning, use, perception and production, and decoding and

understanding (Hammerly 1991:176). A linguistic theory would also take into consideration that neural

processes occur in real time (in which long derivational processes cannot occur) (Braine 1974; Linell

1979; Hammerly 1991; Lakoff 1993).

3.3   Criteria for a Pedagogical Evaluation of Linguistic Theories

        To recapitulate, applied linguistics based on a theory of performance would require a number of

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criteria for evaluating linguistic theories. These criteria may be stated in terms of what the linguistic theories must reflect, viz:

1. that language is a socio-psychological phenomenon;

2. the organization of a real speaker's grammar;

3. the linguistic capacities of a real speaker;

4. the psychological reality of linguistic entities and rules, which in turn implies the learnability and teachability of language;

5. the real speaker's semantic memory, that is, the organized knowledge of a speaker about words and other verbal symbols, meanings and referents and their relations, rules, and formulae for the manipulation of these items (McKoon & Ratcliff 1979:463);

7. the inter-speaker and intra-speaker variability of the grammar (Wheeler & Schumsky (1980);

8. the way a real speaker might reasonably be expected to analyze and establish the rules of his language; and

9. the use of external evidence or empirical evidence that supports the theoretical analysis.

The above criteria will enable us to construct guidelines for any teaching point of language based on sound linguistic theory. Pedagogical guidelines would thus be based on linguistic theories that meet the greatest number of criteria in terms of a theory of performance and may be complemented or enriched by principles from other relevant theories, such as psycholinguistics, sociolinguistics, and education.

These criteria also enable us to arrive at the following principles in language teaching:

1. Language learning involves metalinguistic awareness.

2. Language can be learned and taught explicitly. (See Chapter 1.)

3. If individuals vary in the rate and manner of processing complex subject-matter such as language, the only way to ensure that each learner has access to information about the structure of the language is to present it in an ordered way which makes every relationship fully explicit. This fully explicit model would also account for all the data related to a

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particular aspect of the language which the learner is expected to know at a particcular level of language learning. It is for this purpose that rules are used in language teaching.

4.   The language teacher, by adopting an appropriate approach based on adequate linguistic theories (and other socio-psychological considerations), can bring about "a relatively permanent improvement in L2 learning or behavior through instruction" (Hammerly 1986:48).

Conclusion

For a linguistic theory to be meaningful and applicable in language teaching, its description and explanation need to meet the way a real speaker or learner uses language and manipulates its entities. Its analysis would need to provide the means to make any necessary explanation about the language explicable. For this reason, in Chapter 4, I will discuss current linguistic theories that have attempted to explain English morphophonemics. I will also ascertain their relevance to and suitability for establishing pedagogical guidelines in terms of the above criteria. My discussion of the pedagogical implications of linguistic theories are based on my personal assessment of these theories regarding their usefulness to L2 teachers and learners. This is also true of my discussion of Linell's and Aronoff's theories in Chapters 5 and 6 respectively.

MORPHOPHONEMIC THEORY[1]

Introduction

Crystal's Dictionary of Linguistics and Phonetics (1991) defines morphophonemics as a branch of linguistics referring to the analysis and classification of the phonological factors which affect the appearance of morphemes; or correspondingly, the grammatical factors which affect the appearance of phonemes. This definition reflects the current debate as to whether rules of phonology govern the alternation of phonemes in morphemes; or conversely, it is morphological processes that cause phonemic alternations. In this chapter, I will summarize three major theories of morphophonemics that came after Chomsky and Halle's **The Sound Pattern of English (SPE)** (1968) and evaluate each of them as a possible theoretical model for the teaching of the morphology and morphophonemics of English derived words.

4.1 Morphophonemic Theory

Chomsky and Halle's approach to morphophonemics in **The Sound Pattern of English (SPE)** (1968) is purely phonological, based on the claim that a series phonological rules apply in a fixed order on the segments of the underlying representations of derivatives to derive their surface phonological forms. The rules apply without reference to their base words or the process of affixation. Another weakness was its failure to take into account morphological processes in derivations. Within current generative linguistics, intercomponential analysis is favoured and "morphophonemics" is seen as an interface between phonology and morphology in Natural Generative Phonology (NGP) (Hooper 1976) and Lexical Phonology (Pesetsky 1979; Kiparsky 1982). Prosodic Phonology has also been used to explain morphophonemic alternations in derivatives (Szpyra 1986).

4.1.1 Natural Generative Phonology (NGP)

Proponents of NGP claim that, unlike **SPE**, it is a "concrete phonology" in that all variants of a morpheme must be possible surface forms (Hooper 1976:4). Phonological rules apply to surface forms and involve no extrinsic rule ordering. Only intrinsic rule ordering occurs where a rule applies as long as its structural description is met (also Vennemann 1974). Distinguishing special lexical rules (that express lexical relation between forms) from automatic phonological rules (such as "house ~ hou[z]es"), Hooper posits Via Rules. In the pair of a base word and a related word such as "divine ~ divinity," the alternations in the second syllable of both forms are lexicalized alternations. Both lexical items are entered in their full forms in the lexicon and are linked by a Via Rule, their relation expressed thus:

$$\text{aɪ} \longleftrightarrow \text{ɪ}.$$

Similarly, "serene ~ serenity" would be expressed as:

$$\text{i} \longleftrightarrow \text{ɛ},$$

and "sign ~ signify" as:

$$\text{aɪ} \longleftrightarrow \text{ɪg}.$$

Via Rules may vary from speaker to speaker, and some speakers of English may not have any Via Rules. Moreover, no form is "derived" from another form.

Hooper accounts for Via Rules (and other automatic phonological rules) as originating in phonetically motivated sound changes. The tendency is for the new alternant to move up from a purely phonetic function to a semantic function in the grammar. The reason for this seems to be the desire on the part of speakers to interpret alternations as meaningful where possible, leading to morphologization. Thus, Via Rules do not come into the grammar fully formulated (unless they are borrowed forms); they have an evolutionary development in the history of the language. Therefore, Vowel Shift Rules cannot operate in synchronic grammar.

Hudson, also working within the framework of NGP, presents paradigmatic disjunctive

statements within individual entries consisting of surface affix forms. For instance, the entry for "divine" would be as follows (Hudson 1974, in Durand 1990:149):

$$
\text{div} \begin{bmatrix} \text{I} \\ \\ \text{aɪ} \end{bmatrix} \quad \text{n} \text{-----------}> \quad \begin{bmatrix} /\,\text{I}\,/ \text{----} \{\text{-ation, -atory, ity, -ize}\} \\ \\ \text{elsewhere} \end{bmatrix}
$$
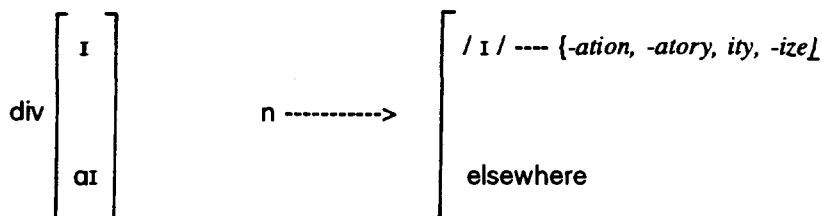
4.1.2 Theoretical Objections to NGP

The two major objections may be summarized as follows:

i) Lack of theoretical basis for Via Rules

Durand (1990:149) argues that Via Rules are vague. Two segments on both sides of

the double ended arrow are not connected by a precise context. As well, if the

speaker can go in either direction as the double ended arrow indicates, then Via Rules

become debatable especially in the case of back-formation which typically proceeds

from clipping rather than returning to the base form, as in "self-destruct" (from "self-

destruction"), not "self-destroy." Dresher(1981) claims that NGP does not provide a

basis on how a child learning the language can possibly arrive at the alternations

between words if there are no real rule basis for these alternations. Kenstowicz and

Kissberth (1979) claim that without rules in the real sense, alternations would appear

to be idiosyncratic. Such a theory would also fail to explain alternations which are

regular and could be formulated economically with rules.

ii) Lack of generalization about the grammar

Durand (1990) also objects to Hudson's disjunctive statements within individual lexical

entries as they reduce all alternations to disjunctive lists without capturing the

grammatical facts of the language. In short, NGP does not explain the mental

organization of phonology, morphology, and the lexicon (Dresher 1981:149).

4.2   Lexical Phonology

In lexical phonology (Kiparsky 1982b), phonological rules act upon morphological constructions so that the morphology-phonology interface represents one essential component of the grammar. Lexical phonology may be summarized as follows:

1.   At the level of each affixation, morphological rules operate to put together morphs for word formation. Then, phonological rules operating at that level are applied, triggered by the particular morphological rule. The new word is put through a morphological operation if another affix is attached, and phonological rules are applied to the new word. Thus, lexical rules are cyclic, following Mascaro's Strict Cyclicity Condition (Mascaro 1976, 1983; in Spencer 1991).

2.   Affixes are attached according to their status or level in the grammar. Affixes belong to two levels, Level (Class) I and Level (Class) II (Siegel 1974). Level I affixes are non-neutral and induce vowel shifts, laxing, and consonant alternations (eg. "sane ~ sanity" where -ity is a Level I affix). Level II affixes are neutral and do not trigger any changes to the base word (eg. "natural ~ naturalness" where -ness is a Level II affix). All Level I affix(es) must attach and the appropriate phonological rules applied before Level II affixes can attach for further application of phonological rules. This is referred to as Affix Ordering Generalization (AOG) (Allen 1978).

      Level I affixes are: -ity, -ation, -al, -ic, -ian, -ify, -ory, -ion, -ive, and -y.

      Level II affixes are: -ful, -ness, -less, -some, and -ing.

      According to AOG, we should correctly derive words like [[[history]ic]al] and not words like *[[[[kind]ness]ic]al].

3.   The output of each layer of derivation must be structure-preserving and phonologically well formed words in the language in terms of segments, syllable structure, and prosodic structure.

4.   The Bracket Erasure Convention (Kiparsky 1982b) requires that internal brackets are erased at the end of each morphological operation or level before the next affix is attached. The morphological and phonological properties internal to the word is not taken into account when the word enters the next level of affixation. Below is Kiparsky's model of lexical phonology:

```
┌─────────────────────────────────────────────────────────┐
│                    Underived lexical items                │
│                              │                            │
│                              ▼                            │
│  Level 1 morphology <------> Level 1 phonology      l     │
│                                                     e     │
│                                                     x     │
│  Level 2 morphology <------> Level 2 phonology      i     │
│                                                     c     │
│                                                     o     │
│  Level n morphology < ----- > Level n phonology     n     │
└─────────────────────────────────────────────────────────┘
            Syntax ─────────► Postlexical phonology
```
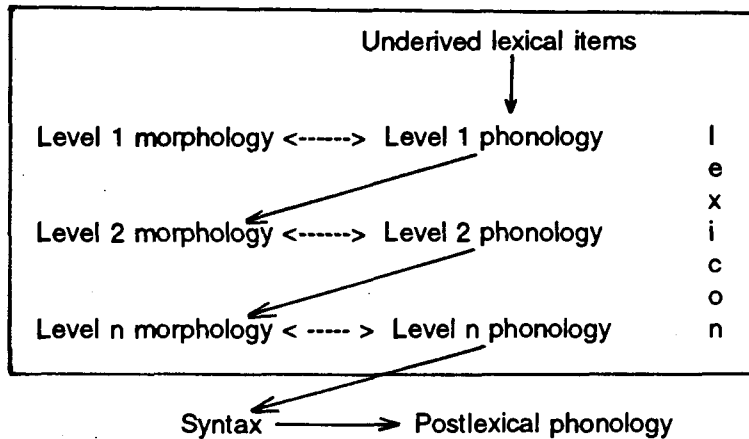
Kiparsky's Model of Lexical Phonology (1982a)

An example of how level ordering of affixes and their phonological rule application work is the following steps in deriving "non-profanity" from "profane":

Underived lexical item	[pro'fen]	
Affixation (Level I)	[pro'fen] [əti]	Cycle 1
Stress Rule	[pro'fen] [əti]	Cycle 2
Trisyllabic Laxing	[pro'fæneti]	Cycle 3
Affixation (Level II)	[non] [pro'fæneti]	Cycle 4

4.2.1   Theoretical Objections to Lexical Phonology

These may be summarized as follows:

I)   Bracketing paradox

This objection has been voiced by Williams (1981a), Strauss (1982b), Pesetsky (1985),

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and Goldsmith (1990). In the word "ungrammaticality," AOG produces the following bracketing:

[un [[[[gramma]N tic]A al]A ity]N]N

where *un*- is attached to the noun "grammaticality," that is, after all Level I affixes have been attached. However, *un*- can only attach to an adjective, not a noun. Kiparsky's solution to the bracketing paradox is "morphological reanalysis" in which bracketing can be rearranged freely, providing selectional restrictions are not violated. This means that *un*- selects an adjective, not a noun. Thus "ungrammaticality" is correctly generated this way:

[[grammatical]A ity]N	Level I
[un [[grammatical]A ity]N]N	Level II
[[un [grammatical]A]A ity]N	Reanalysis

Linguists see reanalysis as an ad hoc solution that weakens the basic principle of lexical phonology since Kiparsky's own Bracket Erasure Convention is violated. There cannot be rebracketing since all internal brackets have been erased before the next level of affixation and "grammaticality" is now a monomorphemic word to which *un*- must be attached.

ii)   Duality of class or level of some affixes

Affixes such as *-ize, -ant, -able, -ary, -age,* and *-ify* can behave as Level I or Level II affixes (Szpyra 1989), as in "sermon ~ sermonize" (no vowel or stress shift; hence Level II) and "Catholic ~ Catholicize" (stress and vowel shift and velar softening; hence Level I) (Goldsmith 1990). Kiparsky's explanation is that "phonological rules operate in tandem with morphology in the lexicon" (Kiparsky 1982b:33). This is an overly simplistic answer since *-ize* is dual only in terms of phonology, and Level I in terms of morphology (Szpyra 1989:51).[2] It attaches only outside Level I affixes and not Level II affixes, as in [[[centre]al]ize], but not *[[[mad]ness]ize]. Another problem affix is *-able,* which is Level I in "divisible" and Level II in "defendable." Aronoff sees *-able*

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as two different but homophonous affixes, -*able* being Level II, and -*ible* being Level I (Aronoff 1976:121-5).[3] The suffixes -*ant/-ent* can be stress-neutral as in "de'fy ~ de'fiant" and stress determining as in "'signify ~ sig'nificant" or even fluctuating, as in "pre'cedent" or " 'precedent." Morphologically, -*ant/-ent* behaves like a Level I affix, often followed by Level I affixes like -*ial*, inducing stress shift, palatalization, and spirantization, as in " 'president ~ presi'dential." Moreover, adjectives with -*ent* also take Level I prefix, as in "incon'venient" and "inco'herent" and not **"uncon'venient" or **"unco'herent".

iii)   **Wrong semantic reading**

There is also the problem of semantic reading of affixed adjectives with the comparative degree suffix -*er* and the prefix -*un* (Pesetsky 1979). In order to save the principle that -*er* is suffixed to monosyllabic and disyllabic bases (a phonological rule), it is necessary to argue that -*er* is attached to "happy," yielding [[happy]A]er]A. Then prefix *un*- is attached, yielding

     [un [[happy]A er]A]A.

The semantic reading of this bracketing is "not more happy." However, the correct meaning for "unhappier" is "more not happy" (or "more unhappy"). The bracketing for this correct semantic reading would be

     [[un [happy]A] er] A

which violates AOG. Reanalysis by rebracketing would violate bracket erasure convention. Though this problem is not applicable to derived words, it serves to demonstrate the difficulties that level ordering and bracketing can entail.

iv)   **Number of levels and cycles**

Halle and Mohanan (1985) and Mohanan (1986) allows rules to be cyclic or non-cyclic, and the principle of level ordering is compromised by a loop option. The uncertainty of

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the number of levels make lexical phonology a questionable theory (Carstairs-McCarthy 1992:79.)[4] Moreover, if a phonological rule can belong to more than one level, then which level and cycle that rule really belongs to cannot be determined (Katamba 1993). Therefore, making the simultaneous claims that rules apply in cyclic fashion and that rules have different properties in terms of their levels nullifies the theory. According to Selkirk (1980), if stress is part of the lexical representation of a word (as psycholinguistic data on malapropisms has confirmed), and if a new word is formed by affixation of an already existing one, then cyclic rule application internal to the word is unmotivated since each word has its own prosodic pattern established as a result of word formation. Two prosodic patterns are needed, not ordered cyclic rules. Bochner (1993) objects to level ordering and cyclic rule application and provides the notion of independently listed lexically related alternate forms, given that the morphological patterns and rules in the speaker's lexicon are not redundancy-free.

v) **Unexplained affix pairs**

Fabb (1988) lists several multiple suffixes where a Level 2 suffix precedes a Level 1 suffix (eg. -abil-ity, -ist-ic, and -ment-al). Level ordering of affixes also fails to rule out a very large number of muliple suffixes that do not exist in the language, since level ordering would allow them as long as they satisfy the ordering requirements, and also satisfy category-based selectional restrictions. According to Fabb, level ordering would restrict the number of possible affix pairs to 459, but in actual language, there are only 50 attested pairs of suffixes. For example, level ordering should allow -ful, a Level 2 suffix to attach to nouns containing Level 1 suffixes to derive adjectives, yet it cannot attach to nouns containing suffixes like -age, -al, -an, -ian, -ion, -ance, -ary, -er, -ism, -ist, -ity, -ment, -ness, -ory, and -y (eg. *"rebellionful," *"modernismful" etc.). The constraint is selectional restrictions as follows:[5]

a)   Many suffixes never attach to an already suffixed word.

b)   Some suffixes attach outside only one other particular suffix.

c)   Some suffixes attach to all the suffixes which we would expect, given

the category-based restriction.

d)   A final set of suffixes attach outside some but not all of the suffixes that

we would expect.

4.3   Prosodic Phonology

According to Booij (1985), the grammar of a language needs to specify how two hierarchies

such as phonology and morphology are related. In autosegmental phonology (Goldsmith 1990), stress

is a prosody, that is, a phonological element that is not an inherent feature of segments, but rather

the property of an entire word, hopping from one syllable to another when Level I affixes are added to

the word (as in " 'democrat ~ demo'cratic"). In prosodic phonology, the phonological word (or p-word,

marked by "ɯ"), with its notion of the metrical foot, is differentiated from the morphological word. The

p-word represents the interaction between the phonological and morphological components of the

grammar (Nespor & Vogel 1986). The morphological component provides the "object" for the

phonological component to operate on (Halle & Vergnaud 1987).

Szpyra (1989) explains the morphophonemics of English Latinate derivatives within what she

calls a seperational framework based on morphology and prosodic phonology. Both the morphology

and phonology components of the grammar contribute to the surface forms of these words. Word

formation rules (WFR's) create morphological structure. Then, these fully bracketed morphological

words are mapped onto phonological structure, with readjustments made to syllables and feet when

necessary. The phonological structure of a morphological word is marked by parentheses denoting the

edges of p-words (or phonological words) in the morphological word. (See below.) The resulting

structure may contain units (syllables and p-words) that may not correspond to morphological

constituents. Class I and Class II affixes have different prosodic qualities and thus have different

phonological status.[6] Class I affixes form p-words together with the base, whereas Class II affixes

form separate p-words. We get nine different prosodic words from the same six morphological words:

(purity)   (un)   (natural)
ω   .   ω   ω

(musician)   (kind) (ness)
ω   ω   ω

(hindrance)   (hinder) (er)
ω   ω   ω

For the word "ungrammaticality," the surface phonetic form would be derived thus:

Morphological bracketing: [[[un+] [grammatical] A] A +ity]N

P-word parentheses: (([[[un+]) ([grammatical] A] A +ity]N)
                      ω   ω

In this way, morphological bracketing is preserved, while the p-word parentheses prevents the

paradox that poses a problem in lexical phonology.

Returning to the problem of dual affixes like -ize, -ant/-ent, and -ance/-ence which are Class I

morphologically but dual class phonologically, Szpyra argues that they enter the morphological

derivation as Class I bracketless affixes. However, they have to be differentiated for phonological rules

to apply and the mechanism is rebracketing. This is a kind of lexically specified adjustment rules so that

they can function in phonology as separate p-words.

In the examples with the problem affix -ize, morphologically Class I since -ation can be

attached to it, but phonologically dual since it can be either stress determining (" 'synonym" ~

"sy'nonimize") or stress neutral (" 'alcohol" ~ " 'alcoholize"). There will be one p-word in "synonymize,"

but "alcoholize" will have to be rebracketed so that -ize can be a separate p-word. The procedure

would be:

            [[alcohol]N +ize]V ------> [[alcohol]N [+ize]]V

Now, this rebracketed morphological form will be mapped on to phonological parentheses rule to obtain

the correct phonological form (that is, no change to the base):

            ([[alcohol]N)   (+[ize]]V)
                  ω   ω

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Szpyra claims many advantages to her separationational framework:

1. It can handle both the morphological and phonological properties of affixes.

2. It prevents the problem of bracketing paradox posed by dual affixes.

3. It is economical since morphological word boundary and morpheme boundary are now superfluous if p-units and morphological units are isomorphic. If word boundaries coincide with syllable boundaries, then the former can be replaced by the latter in the formulation of phonological rules where syllable structure provides greater adequacy (1989:237). The traditional word boundary is not required.[6]

4. If some phonological rule needs to differentiate the p-word and the morphological word boundary, it can do so by referring to the morphological bracketing. The + symbol is preserved for the purpose of distinguishing them easily from free morphemes, besides indicating on which side of an item an affix is appended.

4.3.1 Theoretical Objections to Prosodic Analysis

I have not been able to find any theoretical objections to Szpyra's prosodic analysis of derivatives, though there has been objections to Aronoff and Sridhar's (1983, 1987) version of prosodic phonology where the prefix un- was reanalyzed as a clitic to the word "grammaticality" in "ungrammaticality" and does not resolve the bracketing paradox problem (Spencer 1991). However, personally, I think Szpyra's "prosodic solution" to dual affixes such as -ize is not a solution, but an ad hoc device to make morphpological structure fit phonological structure when necessary. This objection may be explained as follows:

I) Morphological rebracketing

If -ize is morphologically Class I in both "synonymize" and "alcoholize," then these two words should both have the same morphological bracketing before they enter the phonological component for p-word parentheses. This means that there should be no

morphological rebracketing within the morphological component as this would result in

two different morphological structures for the same affix. Therefore, rebracketing (with

parentheses) should occur only after the word enters the phonological component for

adjustment. It is not clear how this could be accomplished. This shows that in

Szpyra's model, morphological bracketing or rebracketing must meet the structural

requirements of the phonological component. The phonological component can

arbitrarily change the structure of the output of the morphological component when

necessary, such as by eliminating morphological boundaries. On the other hand, the

morphological component cannot feed the phonological component with a structure that

is without the boundaries that are needed as p-word boundaries. In other words,

morphological structure must satisfy phonological structure even before its entry into the

phonological component of the grammar.

ii) **Superfluousness of morphology**

If morphological boundaries are necessary in some instances, and superfluous in

others, and if morphological boundaries must change to meet the requirements of

phonological structure, then the morphological component of the grammar cannot

figure with the same degree of significance as the phonological component in a

framework that claims to be "separational." Moreover, if the morphological component

of the grammar is to provide the "object" for the phonological component to operate on,

as claimed by Halle and Vergnaud (1988), then the morphological structure has to be

preserved until after its entry into the phonological component.

4.4   **Pedagogical Evaluation of Generative Theories of Phonology**

Before I evaluate the pedagogical value of the above theories, I would like to reiterate a

comment from Hammerly (1991a:180). If a linguistic rule applies 95% of the time, or even 80%, it is

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useful. If 100% descriptive precision cannot be obtained, and if the exceptions can be satisfactorily explained, a theory need not be discredited or discarded. These considerations would make all the theories useful in some way. Weaknesses in the theories which linguists debate about need not trouble language practitioners as these are exceptions to the useful economical generalizations offered. Chomsky (1966) himself has said that transformational-generative (TG) grammar is not intended for language teachers and how people learn, store, retrieve or use linguistic rules in performance are empirical questions which a theory of grammar does not intend to answer. Nevertheless, rule generalization is always useful in language learning and those aimed at maximal generalization may provide useful rules in learning derivatives. However, according to Stemberger (1985:144-145), language processing is a form of cognitive functioning dependent on the neural organization of the brain. He provides three useful maxims which we may apply in language teaching and learning:

a)   maximize the simplicity of units and processes; it is the number of units and processes that are required to interact and interconnect that makes up the complexity of a learning problem;

b)   minimize the distinction between units; and

c)   minimize the use of copying and short-term memory buffers; complexity is added to the system every time a set of activated units must be copied into a temporary memory store. In most instances, the speaker merely activates the units stored in long-term memory.

Another consideration is that there is evidence of human capacity for rote learning, including phonological learning. Braine (1974) offers the following options for human language learning strategy. If we can remember thousands of names (of people, places, and things which are monomorphemic), then we can also have the capacity to acquire full phonological forms for many derivatives as if they were monomorphemic words, regardless of the lexical redundancy involved. Simplicity of retrieval would be the resulting advantage. Moreover, human learners are also capable of perceiving patterns (by analogy) when these patterns occur frequently enough in the language. These patterns would make storage in memory less economical than rules (eg. the same affix such as *-ize* or *-ant/-ent* may have different phonological effects on the base). The assumption that human language learners would

employ both rules and patterns in language learning is therefore a plausible one. This means that some degree of optimization of both kinds of economy, viz. lexical redundancy in memory and simplicity of retrieval, is a plausible learning strategy.

According to Braine (1974:298), if a linguistic theory is based on the premise that human language learning device is built to minimize redundancy at all costs, without regard to the psychological reality of the representations or rules involved and the complexity affecting retrieval, such a theory is basically uninteresting. Such a theory would also not be useful for language teaching (Hammerly 1986, 1991:176) because, in general, psychological factors in language learning are not the primary concerns in theory formulation in generative phonology of the Chomskyan tradition. On the other hand, learning language rules and formulating representations of the different levels of linguistic constituents (syntax, word formation etc.) do require some form of mental analysis. I will consider how far the above theories of generative phonology can help learners and teachers analyze and thus learn the morphology and morphophonemics of derivatives.

4.4.1   Natural Generative Phonology

i)   Lack of rule generalization

To the extent that all phonological representations are surface forms, NGP offers psychological reality for rule learning. However, Via Rules postulated for base word and derived word pairs provide no underlying principle for a linguistic rule (relating two segments in alternations) and constitutes a pedagogical weakness. From the teaching point of view, there has to be some rules or patterns that must be provided by Via Rules for them to be useful. This would amount to learning all the Via Rules between alternations in the numerous word pairs of the language, without some basic organizing principle or pattern. Neither Hooper (1976) nor Hudson (1974) offers any theoretical basis for the association of two segments, except for the fact that they are lexically related. No reference is made to word formation rules, nor to morphological

relatedness, and hence semantic relatedness. Therefore, NGP does not offer an integrated theory of morphology and morphophonemics for vocabulary building.

ii) Too many paradigms without generalized rules or patterns

Hudson's disjunctive paradigm cannot offer enough pedagogical generalizations or patterns as there is no clear statement of the alternations involved with words of common roots or stems. There would be too numerous paradigms to learn.

iii) Rejection of a phonemic level

Hooper also rejects a fully specified phonemic level as unnatural, as only the phonetic level is natural. This theoretical principle does not help make NGP a good pedagogical model. Phonemic contrasts are real to speakers and language learners and phonemic contrasts should be recognized in the early stages of language learning. Phonetic realizations may involve allophones which learners would also have to learn as mere allophones. In the case of allomorphy in morphologically derived words, morphophonemic alternations have to be defined in terms of word-formation rules.

iv) Rejection of word level phonetic representation

Hooper also claims that the phonetic representation of a word in isolation cannot be taken as the basic form. To a language learner, vocabulary building involves learning of words as individual words, though they should also be learned in context as well so that their meanings and usage are better appreciated. For a learner encountering a derived word for the first time, the pronunciation of the word should be treated in isolation so that the learner grasps the phonemics, phonetics, morphophonemics, and morphology involved. Then the other aspects of pronunciation like word sandhi would be filled in when the word is uttered in the context of other words in which it occurs.

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v) **Lack of rules for word formation**

There is no account of how, in the process of morphologization, formatives are selected in relation to their base and affix(es), or how they are combined that would constitute word formation rules in the language. It may be said that the advantages of NGP as a pedagogical model end with its concreteness -- non-abstract rules govern surface forms. They can tell the teacher or learner nothing about two related lexical items except that the sound in one is alternated with another sound in the related word. Nothing about the nature of the lexical relationship is evident. The only recourse for the learner is spelling rules or orthography, which, as we have seen in Chapter 2, requires the understanding of how they work. Moreover, as far as the morphophonemics of most Latinate derivatives is concerned, spelling rules are useful only in written language, not as much in oral language. As well, Hooper's claim that Via Rules are phonetically motivated rules that led to morphologization (as it became more meaning-based for speakers than merely phonetic) undermines the importance of derivational morphology.

4.4.2 **Lexical Phonology**

i) **Complexity of cycles**

Though we are dealing with well-formed words at every step of the derivation, the complexity of lexical phonology lies in its rules regarding cycles. Learning to pronounce a derivative does not require the learner to change one phonological aspect of the word at a time, until he gets to the desired pronunciation of the word. The teacher models and the learner repeats the word in its correct full surface form. The number of cycles involved in rule application makes the process of arriving at the correct pronunciation confusing, even though the idea of levels of affixes is useful to a certain extent in teaching morphological derivations. Using levels and cycles in the application of phonological rules is unrealistic for teaching or learning a word's phonological representation.

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ii)   Inconsistency of level or class of affixes

The number of levels in lexical phonology need not trouble us since it is generally recognized

that there are two classes (or levels) of derivational suffixes. However, the duality of class of

some affixes (such as *-ize* and *-ent/-ant*) within one component of the grammar (phonolgy),

and the fact that they belong to only one level in another component of the grammar

(morphology), makes level ordering a complicated matter in terms of teaching. However,

some useful insights may be gained regarding the general ordering of affixes. Level I contains

more idiosyncratic word formation processes while Level II has more general ones. As far as

meaning is concerned, Level I affixes tend to be semantically less coherent (in the sense of

being less predictable) than Level II ones. Thus, X-*less* (level II) means without X, as in

"fatherless" or "pitiliess." On the other hand, X-*ous* (Level I affix) can mean "abounding in,"

"full of," "characterized by," or "of the nature of."

iii)   Bracket erasure

Pedagogically, if the bracket erasure convention is carried out, then a polyaffixed word

cannot be broken up to demonstrate earlier stages of affixation. In the word

"industrialization," we cannot show learners that the word consists of [industry (base) +

al + ize + ation]. The word can only be explained as [industrialize + ation], even if

students do not already know the lexical functions of *-al* and *-ize*, or that they are

suffixes. This would not constitute a sound teaching method for word formation.

Bracket erasure and level ordering would prevent a learner from distinguishing between

a monomorphemic word and a word containing an affix (Fabb 1988:538).

iv)   Lack of statement about morphological rules

Lexical phonology attributes purely phonological effects to affixes, in terms of whether

they are stress-determining or stress neutral, or whether they bring about neutralization

of segments. There is no morpholexical information about affixes. Allomorphy entails

morpheme identity and this relationship among allomorphs is not captured in lexical phonology/morphology and cannot be revealed to the learner. Information about morpheme identity and word families facilitates the learning and categorization of morphological rules. Learning can be more economical and efficient as a result. While morpholexical rules are important as they restrict the syntactic category of the output, no morpholexical rules are stated in lexical phonology that make clear the functions of Level I or Level II affixes. In word learning, morpholexical rules are more useful than rules of level ordering, and they prevent problems like bracketing paradox or semantic ambiguity. Morpholexical rules do not require the procedure of reanalysis which only serves to confuse learners. Pedagogically, there is no big problem with "ungrammaticality" if analyzed simply as "affix -un to adjective "grammatical," then affix -ity to adjective "ungrammatical" to make it a noun. There is no need for strict adherence to level ordering as the theory of lexical phonology dictates and so painfully tries to defend. Affix ordering provides only a rough guide to the rules of word formation in the language, though a useful one. Nevertheless, in language teaching, rules have to be clear but simple and non-contradictory. If lexical phonology was used as a model for teaching derivations and their pronunciation there would be too many examples that have to be labelled "idiosyncratic" due to bracketing paradoxes and wrong semantic readings. If exceptions have to be explained by means which are very complex, or if they contravene what learners have already been taught (as reanalysis would do), then such rules are not going to be useful.

The insights stated above are only indirect as they are more the products of the principles of the theory than direct theoretical statements. In my view, lexical phonology accounts for only the phonological forms of morphologically derived words, not their semantics and morphological structure. These pedagogical considerations make it an unsuitable model for teachng English derivatives.

4.4.3   Prosodic Phonology

i)   Effectiveness for teaching pronunciation and intonation

Prosodic phonology accounts very neatly for the stress patterns of derivatives and would be very useful as a guide to correct pronunciation, intonation, and syllabification. A teacher has two options: teach the morphological structure (bracket the words and affixes) and then the phonological structure. The second step can be accomplished either by letting students "hear" the phonological structure (clapping, exaggerated intonation etc.) or by providing the phonological structure visually by putting down parentheses and "ω" in the appropriate p-word boundaries in the word. Clapping or exaggerated intonation is a much sounder procedure than denoting p-word boundaries for the reasons explained in ii) below.

ii)   Blurring of morphological structure and meaning

The phonological and morphological structure of a complex word can be "grossly incompatible," and the latter is typically irrelevant to metrical grouping (Liberman & Prince 1977:298). Therefore, letting learners "see" two kinds of boundaries, p-word and morphological boundaries (especially when they are not isomorphic), is likely to confuse them and also blur the formal and semantic significance of morphological boundaries. Compare:

$$([un])\quad([stable])$$
$$\omega\qquad\quad\omega$$

with   ([in]stabil[ity])
                              ω

The physical mapping of morphological structure on to phonological structure in a derivative that consists of only one p-word would blur the morphological structure which is more meaningful to the learner than phonological structure. For "compartmentalization," if

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morphological bracketing is followed by prosodic bracketing (with parentheses), learners
would see :

$$[(compart) \quad (ment] \ al]) \quad ([iz][ation])$$
$$\omega \qquad\qquad \omega \qquad\qquad \omega$$

This formal representation (Spzyra 1989:195) would be very confusing, and the

tendency would be for learners to "see" the p-words more than the morphological

formatives due to the visual saliency of p-word boundaries. All the p-words in this case

are actually meaningless units, except for "-mental" which would provide a terribly

mistaken meaning for the whole word. A more meaningful representation for the

learner is [compartment +al +ize + ation], presented visually. Therefore,

phonological structure or prosody should only be "heard."

iii) **Dominance of phonology over morphology**

Szpyra advocates the erasure of all morphological bracketing after the p-word has been

mapped on to the phonological word if they are isomorphic units since morphological

bracketing is now redundant. Word-internal boundaries are erased in favour of syllable

boundaries because "syllable structure provides greater adequacy" and "the concept of

the p-word renders superfluous the use of the word and the morpheme" (p.237).

These conclusions imply the greater importance of prosodic boundaries and prosodic

units compared with morphological boundaries and morphological units. However, for

language learners, the word is a more significant unit than the syllable, unless the

syllable constitutes a word. Within a word, the morpheme is more significant than the

syllable, which is only a sound structure, not a meaning structure. Prosodic analysis

is not as meaningful to a learner as morphological analysis is. If morphological bracket

erasures are carried out in teaching, much meaning is lost.

iv)   Syllable as a structural unit

There are psycholinguistic arguments against the syllable as a structural unit.
Traditionally, the syllable has been defined in pronunciational terms. Even so, there
has not been general acceptance among linguists regarding syllabic structure (eg.
"lo/cal," "po/lice," but "hon/est," "hos/tage," and even "hos/stage," and "hon/nest"
(Kahn 1976, in Taft 1985). Moreover, syllabification depends on whether the word is
spoken slowly or quickly (Bell 1975). According to Taft (1985), given these difficulties
in specifying syllabic structure of a word, it would not be reasonable to assume that
syllabic structure is directly represented in lexical memory. In addition, if a word is
represented morphologically within the speaker's lexicon as psycholinguistic
experiments have shown, then the morphological structure of "actor" is [act + or] is
stored rather than the syllabic structure is "ac/tor." It is also logical to assume that
the syllable is not important in the visual recognition of words (Taft 1985). Moreover,
morphological relationships between words (word families) play a significant role in
word recognition in the case of of polymorphemic words (Murrell & Morton 1974;
Stanners et al 1979; Taft 1985; and Nagy et al 1989). Since visual word recognition
is also important especially in reading, prosodic phonology cannot form the theoretical
basis for develoiping morphological and morphophonemic awareness since focusing on
syllabic structure may hinder learners' recognition of morphemes in words.

Prosodic phonology is an invaluable aid only in the teaching of pronunciation and intonation of
derivatives, but not morphology and morphophonemics. Since the derived word enters the
phonological component all ready made for prosodic mapping, nothing can be learned about how
morphology (affixation) contributes to its prosodic structure. In terms of morphology and
morphophonemics, prosodic phonology contributes less to teaching and learning than does lexical
phonology. However, as far as the psychological reality of prosodic rules is concerned, the mental
mapping of prosodic boundaries on to morphological structure is plausible.

Conclusion

According to Aronoff (1994), the problem with generative phonology, as far as morphophonemics is concerned, is the theoretical principle of "reductionism" in contemporary linguistics. This approach cannot account for all the significant aspects of the grammar, or assign significance to aspects of specific components of the grammar. As found in my discussion of Szpyra's 1989 prosodic model, where a claim is made for the separation of morphology and phonology, phonology appears to be the primary constituent of the grammar. Dressler (1985:333) states that morphological indexicality is higher and more valued by the learner than phonological (segmental) indexicality. Morphology has higher semiotic precedence over phonology since morphemes have meaning and function, phonemes do not, and syllables may not. The study of morphologically complex words is basically the study of word structure, word formation, and its attendant rules and meanings, as well as their pronunciations. Generative phonology overlooks an important and what Aronoff (1994:165) calls a "necessary" aspect of the grammar of English, morphology. (Also Beard 1995.) It is therefore necessary to base our pedagogical principles on a theory of morphology as well as a theory of phonology, as learners need to learn about the morphology of English derived words and their pronunciation. Keeping in mind Stemberger's (1985) maxims regarding cognitive functioning in language processing, we need to examine a theory of morphology as well as a theory of phonology that give plausible accounts of how speakers and learners may arrive at the connection between two words that involve allomorphy. These theories should also reflect a reasonable account of a speaker's grammar and the psychological factors that affect learning, such as the human capacity for rules and patterns and the formal representations of derived words. To this end, I will present Linell's (1979, 1980, 1982) theory of phonology in Chapter 5, and Aronoff's theory of morphology (1976, 1994) in Chapter 6.

Notes:

1. For the sake of convenience and consistency, I use the term "morphophonemics" in the traditional sense, even when referring to **SPE** and other theories of generative phonology. Chomsky and Halle reject the use of the term "morphophonemic" as there is no such level of representation in the grammar and the grammar is not constrained by such rules (1968: 11).

2. Szpyra (1989) provides a good account of the numerous inconsistencies regarding Level I and II affixes.

3. This will be discussed in greater detail in Chapter 6.

4. Kiparsky (1982b) recognizes three levels, regular inflection, irregular inflection, and derivation. Kiparsky (1983) recognizes two levels, regular morphology and irregular morphology which includes compounding. Halle and Mohanan (1985) recognize four levels which are irregular derivation and inflection, regular derivation, compounding, and regular inflection.

5. Fabb's notion of selectional restriction of suffixes has the advantage of not requiring bracket erasure since all internal brackets are visible to all suffixes. Moreover, the problem of bracketing paradox is avoided. Only the shape of the suffix morpheme determines whether another suffix can attach to it or not, provided that category restrictions are met.

6. Szpyra uses the terms "class" for affixes and "level" for affix ordering. I use these terms in the same way when discussing her theory.

Chapter 5

LINELL'S THEORY OF MORPHOLOGICAL OPERATIONS AND PHONETIC PLANS

Introduction

It has been seen in Chapter 4 that, theoretically, morphophonemic alternations in derivatives cannot be successfully treated in the phonology component of the grammar, nor as an interaction of phonological and morphological rules. In this chapter I will present Linell's theory of language perception and production, including that of derivatives. I will also present the reasons for accepting Linell's theory of the phonological and morphological representations of derivatives. Although Linell's theory of phonology (1979) was intended as a challenge to the abstractness of **SPE** (Chomsky & Halle 1968), I consider Linell's approach to phonology, morphology, and morphophonemics as the most acceptable in terms of explaining the acquisition and learning of these linguistic entities.[1] His assumptions have also been supported by empirical research (Jaeger 1984, 1986; McCawley 1986; Wang & Derwing 1986; Jones 1991).

5.1 A Psychologically Real Speaker's Grammar

Linell's theory is based on what he considers to be a psychologically real speaker's grammar which would reasonably account for a speaker's linguistic capabilities, language being viewed as a socio-psychological phenomenon (Linell 1979:1).[2] According to Linell, covert psychological abilities underlie a speaker's linguistic practice (Linell 1979:9). Thus, our notion of grammar must meet two conditions:[3]

1) The conventions of a language are determinate. The grammar must generate all and only the grammatical utterances of the language, and assign to these their correct pronunciations, meanings, and grammatical properties.

2)   The grammar must reflect the competent speaker's way of organizing his knowledge of

his language. The internal structure of the grammar must be isomorphic to the

speaker's underlying psychological structure (what different forms, and in particular,

what different lexical units, there are), properties of the forms, relations between and

generalizations over the forms and derivative capacity (what forms can be derived and

what the properties and interrelations of these are).

Insofar as morphology and morphophonology are concerned, the most important aspect of the

speaker's communicative competence is his ability to form new word forms and construct their

"phonetic plans" (or phonological forms or phonological representations), that is, to pronounce them.

As far as morphophonemics is concerned, Linell argues against a generative theory of phonology that

must meet the theoretical requirements of descriptive and explanatory economy. In Linell's theory,

some word forms or surface forms are chosen as primes from which other possible word forms are

derived by means of morphological operations, and conditioned by rules. The rules are not complex

extrinsically ordered ones, but simply refer to the conditions under which certain linguistic operations

are carried out.

5.2   A Speaker's Lexicon

Lexical entries are word forms, stems, and phrases. Word forms in the lexicon are

differentiated from one another by surface phonemic contrasts and prosody. Having surface word

forms and stems in the lexicon does not mean that all word forms are lexicalized.[4] Some

polymorphemic forms such as derivatives are stored as such, especially those with idiosyncratic

meanings, and are not decomposed either in comprehending or in memorizing sentences (also Kintsch

1974:240 in Linell 1979:79). Most forms, especially those of productive patterns, are (re)created

through morphological operations from base forms and stems. Linell's view is close to the traditional

one of the lexicon containing concrete surface word or base forms and/or stems.[5] Polymorphemic word

forms like compounds and larger structures like phrases are also stored.

Individual variation in the lexica of different speakers is to be expected.   This has been

supported by empirical studies involving native speakers' suffixation strategies and their recognition of

morpheme boundaries (Wheeler 1980; Wheeler & Schumsky 1980; Jones 1991).

5.3   Morphophonological Rules

Morphological operations involving allomorphy are governed by syntactic, semantic, and

lexical categories (Linell 1979:143). Morphophonological rules or Morphophonological Rules Proper

(MRP's) (or what I refer to as morphophonemic rules) account for the morphophonological (or

morphophonemic) alternations in the language as a result of morphological operations. According to

Linell, MRP's are not phonotactically motivated rules. "Serenity" could very well be pronounced

[sə'rinɪtɪ] (just like there is no vowel shift between "caprice" and "capricious"). It is simply that

[sə'rinɪtɪ] happens not to be the word associated with "serene." Vowel shifts are typical examples of

MRP's and they are in fact "applicationally dependent rules" (that is, dependent on morphological

operations) (Linell 1979:137). In this sense, morphophonological rules should be integrated with the

morphological rather than the phonological component of the grammar.   Of similar theoretical viewpoint

are Singh (1989, 1991); Singh & Ford (1987); Singh & Martohardjono (1988); Dziubalska-Kolaczyk

(1992); and Malicka-Kleparska (1992).

Another aspect of MRP's is that, being the residue of earlier historical sound changes in the

language, they cannot constitute the synchronic linguistic competence of the speaker, since the

speaker has no access to the historical facts of his language (Linell 1979:4). MRP's are obligatory

rules nevertheless. The psychological validity of opaque rules, such as the ordered phonological rules

of **SPE** which are difficult to learn or which can hardly be learned at all, is questionable (Linell

1979:185; also Derwing 1973; Braine 1974; Vennemann 1974a). Empirical studies on the vowel shift

rules confirm that they were learned through spelling rules in school, and are not part of the native

speaker's innate linguistic competence as assumed in **SPE** (Moskowitz 1973; Steinberg 1973;

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Armbruster 1978; Jaeger 1980, 1984, 1986; McCawley 1986; Wang & Derwing 1986; Jones 1991).

Bybee and Moder's (1983) empirical study involving strong verbs suggest that speakers resort to schemas or associations among lexical items based on phonological properties such as the initial consonants, the vowel and final consonants determining the likelihood of membership in a verb class. These phonological properties are of course properties of surface forms. Bybee and Moder's claim also amounts to the same claim made by Linell, that is, that alternations may also be recognised by means of analogy.[6] Thus, Linell's assumption regarding MRP's is well-founded.

5.4 Morphological Operations as Psychological Processes

Morphological operations involve intended goals, that is, the construction of a new word form with certain intended properties. Operations are real behavioral events in the sense that they are, and can be, performed by speakers. Rules are conditions governing these performances. In the case of affixation, speakers simply operate on concrete word forms, and the morphological operation consists merely of the addition of affixes to these concrete forms according to morpholexical rules. Where the relations between certain surface forms are regular, the morphological operation simply involves analogy. One would agree with Linell that this view of regular relations between surface forms is more realistic than the Chomskyan generative account of morphological productivity in terms of derivation by complex ordered rules from abstract forms for every derived word (Linell 1979:129). (We may also assume the same argument against the levels and cyclical rules of lexical phonology.)

Morphological operations are seen as behavioral units which include the morpholexical rules for word formation plus adjustments performed according to MRP's. Morphological operations producing a related word pair such as "sane ~ sanity" should be differentiated from those which produce word pairs which have some phonological and semantic similarities like "foul ~ filth," or etymologically related pairs like "hide ~ hideous." According to Linell, such associations are only peripheral in the grammar

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and are non-functional in the sense that they are not used as productive grammatical processes in word formation. Similarly, words related only in meaning, such as "old ~ age" and "big ~ size," should be treated as paradigms, different from the morphological operations under discussion.

5.4.1 Phonological Representations in Morphological Operations

According to Linell, only the the input form ("operand") and the output form ("resultant") of a morphological operation are psychologically real. This means that the only phonological forms that are involved in the morphological operation within a speaker are the input form and the output form (also Lakoff 1993). For example, in the morphological operation producing "sanity" from the base form "sane," the whole operation consists of three aspects (Linell 1979:133)

1   Operand (input): /seyn/

2   Morpholexical rule: seyn + ɪti (i.e. make noun from adjective by adding

         suffix -ity)

3.   Morphophonological rules:

      Trisyllabic Laxing Rule:(i)   senɪti

      Vowel Shift Rule: (ii)   sænɪti

      Surface phonetic form: ['sænɪti]

According to Linell, for the speaker, phonological forms exist only for /seyn/ and /'sænɪtɪ/. No intermediate step-wise phonological representations are needed for (i) and (ii) and, consequently, no analytical descriptions are required. Nor is "seyn + ɪti" a phonological form for "sanity." It is only a convenient way of showing the information that "sanity" is constructed from /seyn/ and /-ɪtɪ/. A child or language learner can learn to pronounce "sanity" as [sænɪti] without being aware of the VSR or TSL Rule, but by external evidence (listening to others), by analogy through recognizing other similar word pairs, or by spelling rules.[7]

More recently, Stump's (1991) paradigm-based theory of morphosemantic mismatches,

proposed as a solution to Pesetsky's bracketing paradox, also lends support to Linell's theory that morphological expressions involve morphological operations in which there is a formal relationship between two surface forms, the input expression ("root") and the output expression. Stump identifies both the input and the output as words in a paradigm. The formal relationship between the root of a paradigm and the words in the paradigm are defined by a set of morpholexical rules governing category change or category preservation of words or compounds (Stump 1991:712, 723). Williams (1994) also supports the theory of word paradigms and derivational rules. Williams attributes speakers and learners with the ability and inclination to look for paradigms in surface forms.

It is clear that Linell's theory of morphological operations governed by morpholexical rules has two advantages. It expresses the relationship between surface forms without the structural problem of bracketing paradoxes. There is no need for abstract underlying units, complex extrinsically ordered rules, complex cyclical rules and levels, and intermediate phonological forms. An advantage over Hooper's and Hudson's natural phonology is that there is a reference to morpholexical rules, and not just paradigmatic connections.

5.5 Morphophonemic Awareness from the Perspective of a Speaker's "Expression Plan"

In Linell's theory, the act of producing an utterance involves construction and execution of the intended utterance according to an expression plan (Linell 1982:41). In the case of a derived word being intended for pronunciation, the process would involve the constructing of the derived word and its execution or pronunciation. If a derived word does not exist as a ready-made lexical item in the speaker's lexicon, he has to go about constructing the derived word form using the lexical building blocks in his lexicon, and guided by morphological rules (and MRP's, if applicable) of the language. The next stage, its execution, involves the act of pronouncing the sound signals of the word form that has been constructed. Pronunciation is seen as phonetic behavior determined by a phonetic plan which consists of selecting certain phonetic properties and prosodic patterns for the word form. Thus,

the phonetic plan provides the word form in question with its linguistic identity or the speaker's

phonological representation of the derived word (Linell 1979:42).

5.6 Word-based Phonology and Morphology

5.6.1 Word Forms as Primes for Morphological Operations

The input of morphological operations are concrete word forms or parts of word forms (base,

as well as base and affix in certain cases such as those with idiosyncratic meanings). Morphological

operations consist of the addition of affixes to the uninflected surface forms according to certain

morphological rules.[8] Though grammatical affixes serve as part of the input for morphological

operations, they are not primes for morphological operations. They are not syntactically free forms,

nor are their meanings predictable in the way those of word forms are. The meanings of grammatical

morphemes are syncategorematic and operational, that is, it makes sense only if the grammatical

morpheme is combined with a word form. (For example, the meaning of the noun-forming suffix -ion is

different in "congregation" and "discussion".) Of course, the meaning of word forms is also dependent

on the whole utterance or phrase context.

5.6.2 Morphological Operations and Morpheme Identity

Linell sees a speaker's recognition of morpheme identity or the relation between the variants of

a morpheme as psychologically real. This morpheme identity is based on phonological, semantic, and

perhaps morphological similarity, without there being an abstract underlying phonological form common

to all variants. When a speaker has established a morpheme identity relation (which may have been

arrived at unconsciously), this relation may be extended to new pairs or sets of items by analogy.

Children often create new words via analogical extension. Sturtevant's (1947; in Linell 1979:162)

example from his young son is well-known: "ear: irrigate", "nose: nosigate".[9] Regular and systematic

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relations are easily recognizable, such as inflectional forms (plural and past tense formations) in English. They become useful to the language user and learner, leading to the development of morphological operations (Linell 1979:162). We may assume this for derivatives as well.

5.6.3   Conditions on Morpheme Identity

In Linell's theory, the human capacity for recognizing the relatedness between words correlates with the opaqueness of this relationship. This means that recognition of morpheme identity depends on the relative clarity and obscurity of semantic or phonetic relatedness between pairs of items. (Also Derwing 1973:124; Derwing & Baker 1977.) Thus, item pairs like "friend ~ befriend," "tame ~ timid," "reside ~ residue," and "sister ~ sorority" represent morpheme identity of increasing obscurity in terms of phonetics and semantics. Psycholinguistic experiments have shown that morphemes form stronger lexical access codes than syllables and syllabic letter groupings (Taft 1975, 1976; in Taft 1985). Murrel and Morton (1974), MacKay 1978), Rubin et al (1979), and Bradley (1980) also confirm that speed of recognition of the relatedness between derived words from the same bases correlates with the degree of transparency of morpheme identity (spelling and sound changes).

Since there are inter-speaker and intra-speaker variation in the lexicon, there would presumably be great variation in the extent of morpheme identity recognition between individuals (Linell 1979:164). This is particularly true of those morpheme identity associations which are not evident in regular grammatical systems. Marginal morpheme identities (such as "moon ~ menstrual" or "month ~ menstrual") may be unknown to speakers and seldom or never exploited for commmunicative purposes. This is confirmed in empirical studies by McCawley (1986), Freyd & Baron (1982), and Nagy et al (1989). Morphophonemic alternations between word forms closely related phonetically and semantically are more obvious and speakers extract the alternations by analogy. In the case of affixes, particularly suffixes, allomorphy also displays alternations from which speakers may extract regularities, as in *-able, -ible; -tion, -ation, -ition;* and *-ous, -uous,* and *-ious.*

5.7   The Nature of Phonetic Plans or Phonological Representations

For Linell, a "plan" is identified with the speaker's phonological representation. "Plan" refers to the observable words and prosodic patterns actually spoken. It implies that the speaker produces a vocal behavior in a structured, planned, or intended manner, fitting certain language-specific rules and conditions. This is similar to Kaye's (1989:164) cognitive view of phonological representations and phonological features (eg. +coronal) are not part of our (mental) phonological representations (p. 38).

5.7.1   Linguistic Contents of Phonetic Plans

According to Linell, there are several arguments against the psychological reality of an exhaustive analysis of sound shapes in terms of segments. In fact, larger sound shapes such as syllables and word forms, not single segments, are observed in sound signals as they carry meaning and are communicative units. Word forms are preferred over syllable units in listening tasks. Syllables are only articulatory primes or perceptual decision units (also Studdert-Kennedy 1976). Similarly, morphs are not phonetic units but are merged with other morphs to make up word forms. For laymen, illiterate native speakers of a language, and pre-school children, word forms are more intuitively intelligible than morphemes (also Sapir 1921; Teleman 1974; in Linell 1979). In real language use, speakers intend to produce, and listeners listen for, words as language units, not just syllables or morphemes. Thus, the primary linguistic contents of phonetic plans (and the primes for morphological operations) are surface word forms, not segments, bound morphs, or syllables. (Also Aronoff 1976.)

5.8   Linell's Theory as the Theoretical Basis of Morphological and Morphophonemic Instruction

According to Ard (1989), the most important insight of Linell's model is that L2 speakers construct phonological representations of the L2, just as native speakers construct them. Unless

properly taught, learners' phonological representations may not conform to the norms of a native speaker. In my opinion, there is far more theoretical and practical significance in Linell's model of phonology (and morphophonemics) than what Ard has emphasized. From the pedagogical point of view, Linell's theory provides the following insights about language learning and use:

1. The speaker's (and learner's) lexicon consists of concrete words forms that can be pronounced or manipulated orally.

2. Word forms are primes for morphological operations. Affixes are formatives and constitute part of the word formation process. Thus, learners learn complex derivatives starting from words in the language, not morphs. This is particularly important in the case of Latinate derivatives where the morphological breakdown of the word is impossible simply because neither affix nor bound stem bears any meaning by itself, or has consistent meaning in all the words it occurs in (eg. {re} + {mit}). (See Aronoff Chapter 6.)

3. There is inter-individual and intra-individiual variation in the lexica. Different learners would have different conceptualizations of derivatives, or are at different stages of conceptualizing the way morphology and morphophonemics work.

4. Word formation is a linguistic behavior. This means that a learner learns to build new words by attaching affixes to base words according to affix selection rules or morpholexical rules (such as "attach -ity to Adjective to form Noun").

5. There is no need to refer to the obligatory erasure of boundaries resulting in problems of level ordering and bracketing paradox. Learners need only morpholexical rules such as "add the suffix -ity to the adjective "ungrammatical" to form the noun "ungrammaticality."

6. Related words can be stated in terms of a paradigm involving input and output expressions (in the sense of Stump (1991)) and morpholexical rules. Vocabulary learning can be facilitated by recognizing morpheme identity or "word families." The principle can be extended to allomorphy in affixes, as in -ous, -ious, and -uous.

7. Morphophonemic alternations are part of morphological operations, and the pronunciation of words involving alternations has to be learned as the required surface phonetic forms. The

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learner needs to learn only the actual pronunciation of the surface form of the final derived word, not that of the intermediate steps of derivation.

8. Vowel alternations are diachronic elements in synchronic grammar which are not part of a speaker's competence. L1 speakers learn these alternations (by analogy or by explication) and it would be even more true for L2 learners. Any alternations not reflected in the orthography have to be presented very explicitly.

9. L2 learners would have to learn to construct appropriate phonological representations of derivatives. This means that the teacher will model the pronunciation of the word based on phonemic contrasts, prosody, and major allophones and also by a natural rendition of the word, for example, with reductions or weakenings, etc. to demonstrate its actual pronunciation in normal speech.

10. Like an average English native speaker, learners may not recognize the association between etymologically related but semantically distant derivatives and would store them as seperate lexical items. This also means that these associated words need not be dealt with until advanced levels.

Conclusion

Psycholinguistic experiments as well as studies in L1 acquisition regarding morphology and morphophonemics have so far not demonstrated capacities in human language processing that are beyond those postulated by Linell. In terms of theoretical linguistics, Linell's theory may be seen as one within generative grammar that can provide a language practitioner with the philosophical, psychological, and theoretical bases for morphophonemics instruction. Lakoff's (1993) "cognitively real" phonology seems to indicate a movement towards the kind of phonology and morphophonemics expressed by Linell. In Chapter 6, I will explain Aronoff's theory of word formation which complements Linell's theory of phonology and morphological operations.

Notes:

1. I use the term "morphophonemic" in the sense that it has been used throughout this thesis. However, where specific reference is made to Linell's arguments or discussion, his term "morphophonological" is used. The two terms are treated as equivalents.

2. This functional view is also part of Dressler's natural morphology and phonology (Dressler 1985:279).

3. This view is shared by Derwing (1973) and Derwing and Baker (1976) (in Linell 1979:5).

4. This was proposed by Vennemann (1974b). Linell's view seems more realistic.

5. "Stem" here is to be distinguished from Aronoff's (1994) use of the term to refer to Latin stems.

6. This view of morphological "analogues" is supported by Ohala (1974).

7. This view is supported by Moskowitz (1973), Ohala (1974a), and Steinberg & Krohn (1975).

8. This resembles what Aronoff calls word formation rule (WFR) (Aronoff 1976).

9. My own example comes from a conversation with a tradesman. He used the word "guesstimate" for assessing costs which I presumed was analogized from "estimate".

Chapter 6

ARONOFF'S THEORY OF WORD FORMATION[1]

Introduction

According to Aronoff (1994:165), morphology is apparently unnecessary in the description of

language since many languages do not have morphology and languages that do have morphology vary

considerably in their morphological structure and complexity. The Chomskyan generative approach has

been to ignore morphology as a component of language, and to treat it as part of phonology or syntax,

since the latter two are universal components of languages. Aronoff is of the view that if a language

has morphology, then our task is to examine it and understand it as morphology and not as something

else (ibid:166). All morphologies must be learnable, and theories of morphology must reflect this

reality. In this chapter, I summarize Aronoff's (1976) theory of English morphology. In contrast to

more recent theories such as Pesetsky's quantifier raising theory (1985), Sproat's mapping principle

(1988), Anderson's a-morphous morphology (1992), and Raffelsiefen's non-configurational approach

(1992), Aronoff's theory appears to be a reasonable description of human morphological competence.

Morphophonemics is seen as belonging to the morphology component of the grammar, not phonology.

(Also Fischer-Jorgensen 1975; Linell 1979, 1980, 1982; Dressler 1985; Anshen & Aronoff 1988;

Malicka-Kleparska 1992; Singh 1988b, 1989, 1991; Dziubalska-Kolazyk 1992; and Bochner 1993.)

6.1   Aronoff's Theory of Word Formation

6.1.1   A Speaker's Morphological Capacities

In Aronoff's theory of morphology, the basic assumption is that the list of words at a

speaker's command is not closed. The speaker always has the capacity to make up new words, and a

morphological theory should define what sort of new words the speaker can form. The regular rules used for making up new words are called word formation rules (WFR's). Idiosyncratic irregularities in word formation and their semantics which are due to drift over time are not a characteristic of new words which a speaker forms. A native speaker recognizes new words he has never heard before as words of his language, and has intuitions about their structure and meaning (also Anshen & Aronoff 1988). Therefore, a theory of morphology must also account for the regularities of the structure of words in the language. The capacity for recognizing new derived words produced by morphological rules is evidenced in Aronoff and Schvaneveldt (1978), Anshen and Aronoff (1981, 1988) and other psycholinguistic studies mentioned in Chapter 4. The capacity for word formation must also imply the capacity for morphological decomposition, empirically confirmed by Taft and Forster (1975), Stanners et al. (1979), Bradley (1980), Lukatela et al. (1980), and Anshen and Aronoff (1988).

6.1.2   Word-Based Morphology

According to Aronoff, a word-based or lexicalist hypothesis is necessary in English morphology. This is because some so-called "morphemes" are not meaningful in the traditional sense of morphemes. For example, with the stem {duce}, there is some connection of meaning between the words "induce" and "deduce," but no clear connection of meaning between these two words and the word "reduce." Aronoff concludes that the same bound stem occurs in different verbs with different prefixes but not with the same sense, and that the sense of the stem is in fact determined by the individual verb (1976:12). Aronoff (1994:34) claims that Latinate stems have, in fact, no semantic value in Latin itself as they are purely sound forms.

Aronoff also claims that the same prefix combining with different bound stems, lacks cosistency in meaning as well. Thus, re- may share the common sense of "back" in words like "resume," "refer," "remit," and "repel," but not in "receive." If the prefix re- and the stem {duce} have no fixed meanings, then there is no principled way to deduce the meaning of "reduce" by segmenting this word

into prefix and stem. According to Denning and Leben (1995), understanding words consisting of bound stems and affixes may require metaphorical extension. Aronoff's argument is that, for a real speaker, the minimal sign in the English language is the word (Aronoff 1976:10, 1992). The word refers to a "lexeme" in Matthews' sense (Matthews 1974). A lexeme is a (potential or actual) decontextualized vocabulary word, a member of a major lexical category: (N)oun, (V)erb, (A)djective or (Adv)erb (Aronoff 1976, 1994). Thus, in English, words, not morphemes or phrases, form the basic units for morphological operations. "A new word is formed by applying a regular rule to a single already existing word" (1976:21). WFR's are regular rules to derive meaningful words from meaningful bases. Both the new word and the existing one are members of major lexical categories.

Aronoff's word-based hypothesis coincides with Linell's (1979) and Singh and Martohardjono's (1988) notion of words as primes for morphological operations, as well as Dressler's (1988) notion of words as primary signs. In English, stem-based morphology coexists with word-based morphology, but stem-based morphological rules (as in "in-sipid," "in-trepid," and "lu-cid") are not productive as new words are formed from existing words rather than stems. In psycholinguistic experiments subjects have always produced related words, not morphemes (Murrel & Morton 1974; McKay 1978; Stanners et al 1979; Wheeler & Schumsky 1980; Jones 1991). Aronoff's word-based hypothesis is also the basis of English computational morphology (Sproat 1992; also Byrd et al. 1986; Church 1986; in Sproat 1992.). Sproat observes that since on-line dictionaries in English invariably give word-form entries rather than roots, a word-based morphology makes a lot of sense (1992:199). Similarly, initial learning of English vocabulary and learning to use an English dictionary is approached through words, not bound stems and roots. Word-based morphology is also supported by Bochner (1993).

6.1.3 Evidence for Word Theory

Many stems in English do not constitute words (eg. "incision," "incisive," "incisor" but **"incise"; "revulsive," "revulsion," but **"revulse") (Aronoff 1976:29). This fact might be direct

counterevidence to the word-based theory of morphology. What these stems have in common is that they take the same affixes. Because of their considerable number, they cannot be regarded as accidental gaps in the language. Martin (1972) has argued that in the above paradigm, the forms X-ive, X-ory and X-or are derived from X-ion, in the sense that they rarely occcur without an -ion form. The word "aggressive" is formed from the noun "aggression" (not *"agress"). The former does not contain the latter (on the surface at least), as word theory would imply. There is no word that contains the affixes -ion-ive. According to Aronoff, the notion "one word formed from another" must therefore be more abstract than mere surface concatenation.

6.1.4 Assumptions About the Lexicon

WFR's are rules for generating words to be stored in the lexicon and are part of the grammar of the language. According to Aronoff, these WFR's are separate from the syntactic and phonological rules. WFR's do not apply every time the speaker of a language speaks. They are rules for making up new words which may be added to the speaker's lexicon. They are once-only rules, unlike rules of syntax or phonology which must apply in the derivation of every sentence (Aronoff 1976:22). Certain morphologically complex words which are not derived by the application of productive rules are stored in the mental lexicon, while others are constructed as needed (p.23). In Aronoff's model, the lexicon would contain words and WFR's which would also determine the phonological forms of derivatives.

6.1.5 Semantic Compositionality

According to Aronoff, the semantics of a derivative, if the word has long been in existence in the language, will seldom be of neat compositionality. The divergence is not between the derivative and the base, but rather between the meaning of the derivative and the expected meaning, given the independently occurring meaning of the base. The divergence of "transmission" (of a car) consists in the fact that it does not mean "the act of transmitting" (the expected meaning). Aronoff's central claim

is that relatedness of form is prior to relatedness of meaning (Aronoff 1976:33). Shared allomorphy

between words with the same bound stem is more likely (eg. "commit ~ commission" and "emit ~

emission") than shared meaning of the bound stem in different words.

6.2   Word Formation Rules (WFR's)

6.2.1   The Nature of WFR's

According to Aronoff,   WFR's have two functions: they form "new" words and they account for

the internal structure of already existing words. (This theory is consistent with MacKay's (1978) findings

on lexical retrieval and derivational processes.) A WFR specifies the set of words or "base" on which it

can operate, the unique phonological operation performed on the base (the pronunciation), and

finally, the syntactic category, the subcategorization frame, and the semantic reading of the output

word.[2] The WFR that forms the word "boyhood" may be represented thus:

[boy] N --- [[boy] N + hood] N "the quality of being a boy"

[-abstract]   [-abstract] [+abstract]

A WFR refers to the syntactic, semantic, morphological, and phonological properties of words, but not

to syntactic, semantic, or phonological rules. In other words, WFR's have access only to the lexicon,

but not to other components of the grammar. This means that WFR's operate entirely in the lexicon.

Another implication of the theory is that there is a basic distinction between "word" and "affix."

Words carry "categorical" information; affixes carry "relational" information. In the case of affixes, the

suffix -ous may carry the meaning of "having or possessing" (as in "tetrapterous" which means having

four wings), but "disastrous" or "miraculous" does not mean "having a disaster" or "having a miracle."

Defining the meanings of suffixes like -ic and -ive is also problematical. (Also Jackendoff 1975.)

Affix morphemes, especially suffixes, should therefore be regarded as grammatical morphemes,

functioning to change the syntactic class of a word.

6.2.2   Bracketing

According to Aronoff,   a new word is always formed by performing some operation on an already existing one, involving the addition of some affix to the word in most cases. This means that the new word will contain the old, the meaning of the new word being a compositional function of the meaning of the old word it contains. Members of major lexical categories are always labelled (N, V, Adj., Adv.).   Since all regular WFR's operate on such labelled words, and since there is no reason to assume that these labels are erased in the course of the application of a WFR, WFR's will, unless otherwise constrained, produce labelled bracketings in their output. Only morphological bracketing is possible (Aronoff 1976:25). Moreover, every new word, if it is derived by a regular rule, must have internal structure which also means it must have internal brackets. The word "readability" will have the following internal structure and labelled bracketing where both the category of the input and output are specified:

[[[read]V + able]A + ity]N

When a base undergoes several WFR's, all of the structure built up in the derivation is preserved. The internal structure of the output is required in order to establish general conditions on WFR's, such as Adjacency Condition, and to provide the information necessary for the operation of Readjustment Rules.

6.2.3   Restrictions on WFR's

There are certain syntactic, semantic, phonological, and morphological restrictions on the base so that the output of a WFR is a well-formed word. These restrictions constitute the word derivation rules of English.

a)   Syntactic and semantic restrictions:

The suffix -able can only attach to verbs, not to nouns or adjectives (for example,

[wash + able] but not *[black + able]. The subcategorization feature of the verb is

[+transitive] (thus, *[seem + able]). The prefix *un-* cannot attach to adjectives with negative semantic content (*[un + bad], *[un + evil]).[3]

b)   Phonological restrictions:

The phonological shape of the base determines the suffix it can take. Adjectives with final /t/ or /d/ can take suffix *-en* to form verbs ([bright + en] and [hard + en], but * [calm + en]. Words like "toughen," "freshen," and "weaken" date back to an earlier period. In the last 200 years, only adjectives ending in dentals have been formed from this rule (Marchand 1969:272). This is not a phonological rule as this condition does not apply in other English words that do not involve affixation (*"calmen" but "common"). As well, phonotactic rules forbid the occurrence of two coronal fricatives in adjacent syllables, producing "impeachment" rather than *"impeachation."[4]

c)   Morphological restrictions:

This may be broadly stated in Bloomfield's terms: normal (that is, native) roots combine with normal affixes while learned (that is, borrowed) roots combine with learned affixes (Bloomfield 1933:252). Aronoff uses the term [+ Latinate]. Thus, we get "vivacity" and "felicity," and not *"strongity" and *"widity." Aronoff observes that the suffix *-ness* may attach to both [+ Latinate] and [-Latinate] words as in "commonness" and "happiness." In addition, certain affixes have preference for certain types of words. Thus *-ity* also attaches to bases with X-*ic*, X-*al*, X-*able*, and X-*id* to obtain words like "specificity," globality," "readability," and "lucidity" (also Fabb 1988). Specifically, Aronoff's "linear contiguity" hypothesis states that a suffix is sensitive to the last morpheme of the base while a prefix is sensitive to the first morpheme (1976:52). In the case of the suffix *-al*, it cannot attach to bases of the structure [[X] V-ment] N (eg. "ornamental" but *"employmental"). However, we get words like "excremental" and "incremental." These may be argued to be derived from the Verb bases "excrete" and "increase," but involving obstruent deletion before *-ment*. This means that the resulting structure without the final obstruent is not strictly a verb and that there is a structural constraint regarding the attachment of *-al* to bases of [[X] V -ment]. This constitutes the constraint on the

structure of the base at the point of the application of the WFR. Normally, -al attaches quite

freely to other deverbal abstract nominals like "preferential," or "organizational."

6.2.4 Unitary Base Hypothesis (UBH)

UBH refers to the "one affix, one rule" hypothesis. If the affix -able attaches to nouns ("fashion

~ fashionable") as well as verbs ("accept ~ acceptable"), then they are two different homophonous

affixes and two separate WFR's (Aronoff 1976:48). Aronoff provides the following arguments:

a)   The denominalized adjective always takes the nominalizing affix -ness ("fashionableness") and

        not -ity ("*fashionability"); the deverbal adjective takes either -ness ("acceptableness") or -ity

        ("acceptability").

b)   The semantics of the deverbal adjective is distinct from that of the denominal adjective. The

        former means "capable of being X-ed" (where X is the base, as in "acceptable"), while the

        latter means "characterized by X" (where X is the base, as in "fashionable").

c)   The semantics of a word can be ambiguous. "Fashionable" can mean either "characterized by

        fashion or in fashion," or "capable of being fashioned."

6.2.5 No Ordering of WFR's

According to Aronoff, the following reasons explain why there is no extrinsic ordering of WFR's:

a)   The application of any one WFR on a word forms another word. There are no intermediate

        abstract stages and WFR's do not take us from one level of the grammar to the next level.

        Ordering of WFR's is therefore unlikely (1976:57). As well, extrinsic ordering would mean that

        speakers are always required to carry out derivational processes for complex words, which is

        also unlikely (Aronoff 1976:56). (Also Linell 1976; Lakoff 1993.)

b)   In the case of words with multiple or adjacent affixes, ordering is not possible. This

        can be seen in the following examples:

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"organizational" --- *-ation* precedes *-al*

"industrialize" --- *-al* precedes *-ize*

"industrialization" --- *-ize* precedes *-ation*

If extrinsic ordering applied, *-ize* would never precede *-ation*. (However, abstract features like +[Latinate] need to apply.)

c) The distribution of affixes is not complementary. There are coexisting forms where different affixes can attach to the same base as in "approval" and "approbation."

6.3 Phonological Operation

The phonological operation is part of and simultaneous with the WFR. The word is formed entire, as a completely phonological entity prior to all the rules of phonology. The WFR's are not part of the rules of the phonological component of the grammar (Aronoff 1976:72). Whatever "phonological conditions" there are that are associated with affixation are simply phonotactic rules (eg. **"drudgish").

6.3.1 Adjustment Rules

Aronoff's Adjustment Rules refer to what were traditionally referred to as "morphophonemic rules" in the sense that they are applied in certain morphemes or classes of morphemes, or in the environment of certain morphemes or classes of morphemes (Aronoff 1976:87). They change the segmental shapes of morphemes, but they are not phonological rules. Adjustment Rules consist of two types, Truncation Rules (TR's) and Allomorphy Rules (AR's).

a) Truncation Rules (TR's)

A TR deletes a morpheme which is internal to an affix in the following manner:[5]

[root] + A] X + B] Y

  1   2   3 -----> 1 $\emptyset$ 3

where X and Y are major lexical categories.

An example of a truncation is as follows:

[[nomin + *ate*] V + *ee*]N ------ nominee
        ∅

(where V is +transitive and takes +animate object.)

With only one exception to this rule with suffix *-ant* (as in " deodorize ~ deodorant"), 95 items

belong to this morphological class (Walker 1936; in Aronoff 1976:90). This makes the rule

productive. TR applies only to verbs with syllabic roots. This means that we get "inflate ~

inflatant" since the verb cannot be [infl + ate] which would give us the root */ fl /. The root

should therefore be {flate}. In this case, <-ate> is not a separate morpheme, but part of

{flate}. Thus we get "inflate ~ inflatant" and not *"inflant." Similarly, we get "inflatable" and not

*"inflable."

b) **Allomorphy Rules (AR's)**

AR's state that a root or an affix always takes a given shape in a given morphological

environment and there are no lexical exceptions (Aronoff 1976:110). AR's apply on

morphemes, not segments (Aronoff 1976:113). In English derived words, allomorphy occurs

in roots as well as in affixes.

i)   Root allomorphy

Root allomorphy occurs with Latinate roots such as {ceive}, {sorb}, and {sume} (p.102).

These are marked morphemes without meanings which determine the form of their suffixes,

without exception. In the following example,

"invert ~ inversion" [invɜ-ʒən]

"insert ~ insertion" [insɜ-ʃən]

where the [ʒ] and the [ʃ] correspond to the word-final /t/. The only difference between the

two pairs of words is that one root has /v/ while the other has /s/. The AR changes the root's

last consonant /t/ in the two cases. Aronoff proposes the AR where /t/ becomes [ʒ] before

-ion in words with {vert} roots, and [ʃ] before *-ion* with {sert} roots.

Aronoff differentiates between AR's and phonological rules in a principled manner by defining

three restrictions for AR's (Aronoff 1976:98):

a)   An AR (but not phonological rules) brings about a phonological change, but only applies to

certain morphemes in the immediate environment of certain other morphemes.

b)   An AR cannot introduce segments that are not also underlying segments of the language.

c)   AR's (like TR's) apply before phonological rules. In the examples below, the change from [d]

in the root to [s] is a rule of allomorphy rather than phonology (palatalization), since not all the

words ending in <nd> can have the [d] changed to [s] with the suffix -ible.

defend -   defendable, defensible

extend -   extendable, extensible

commend -   commendable, but *commensible

amend -   amendable, but *amensible

Therefore, the shape of the root {tend}, {fend} or {mend} determines whether the final /d/

of the root changes or not before the suffix. Other examples involve words with roots {duce}

and {ceive}, where the -ion suffix produces root allomorphy {duct} and {cept} respectively

(Aronoff 1976:103).

ii)   Affix allomorphy

Aronoff provides a detailed treatment of the suffix -ion which has at least five allomorphs,

-ation, -ition, ution, -ion, -tion and their distribution is morphologically governed (Aronoff

1976:98 -105.) Only -ation and -ution will be discussed here. The suffix -ation is productive.

Walker (1936; in Aronoff 1976:99) lists 2000 words with this ending, which is 4% of all words

listed in the dictionary. In its active use as a WFR, -ation is a deverbal abstract action nominal

suffix, with both active and passive senses (eg. "fascinate ~ fascination," "relegate ~

relegation"). Wherever conditions of the bases are not met for the other variants, -ation is

attached. However, words ending in coronal fricatives (except /s/ and /z/) do not take -ation for

phonotactic reasons. Stems ending in various classes of segments and clusters take -ation :

labials --   perturbation, formation, usurpation

coronals --	accusation, consultation, revelation, degradation, explanation,
	commendation, sensation, declaration
velars --	provocation, purgation, prolongation

The suffix *-ation* attaches only to Latinate stems. Since there are very few Latinate stems with final vowels, there are few examples of *-ation* after vowels (eg. "vary ~ variation").

The suffix *-ution* is attached to verbs such as "solve," "resolve," "revolve," and "dissolve," producing "solution," "resolution," "revolution," and "dissolution." One possible explanation is that since /v/ is non-coronal, the affix is *-tion*, and another rule changes /v/ to /u/, producing *-ution*. Another explanation is to posit *-ution* as the suffix, followed by the dropping of the /v/. Aronoff admits that there are no empirical grounds for deciding between the two explanations.

6.4 Boundary Paradox

Where a problem exists in a phonological approach, the boundary paradox poses no problem in a morphological approach. According to phonological analysis, [analyze # abil + ity] constitutes a bracketing paradox because the Level II affix *-able* cannot precede the Level I affix *-ity*. Morphologically, *-ity* can attach to "analyzable" since this word has a legitimate base form for the suffix *-ity*. (Also Fabb 1988).

6.5 Distributional Arguments for Word-Based Derivations

The word-based hypothesis implies that a new class of word X is formed from another existing word of class Y, which means that for every word X¹ from X, there will be an existing word Y¹ from Y but not vice-versa. (There may be accidental gaps, "due to the vagaries of history" (Aronoff 1976:115). Therefore, for every noun ending with *-ness*, there will be a corresponding adjective, but we may not find, for every adjective, a corresponding noun ending with *-ness*. The distribution argument is useful when it is difficult to decide which word is the base form and which is the derivative when both forms

have affixes. X-*istic* (eg. "imperialistic") seems to be derived from the noun of the form X-*ist* ("imperialist"). Using the distribution argument above, it means that for every X-*istic* adjectival form, there should be a corresponding X-*ist* noun form. Walker (1936; in Aronoff 1976:118) lists 145 words ending with -*istic*, 28 of which do not have the corresponding -*ist* form (eg. "characteristic," "anachronistic"). However, for the words with -*istic* which have a corresponding X-*ist* form, there are also a corresponding X-*ism* form. Thus, for a given -*ist* word, the -*istic* form cannot exist without there being a corresponding -*ism* form. On the other hand, one can form a word X-*istic* for a given word X-*ism*, even when its X-*ist* form does not exist. This means that, according to distributional evidence, X-*ism* is the base for X-*istic*, even if on the surface, -*ic* seems to attach to -*ist*. This solution is not without problems, since the suffixation of -*ic* to -*ism* will yield -*ismic* rather than the expected -*istic*. We would need a rule that says m ----t /s----+ -*ic*. (also true in "sarcasm ~ sarcastic"). This shows that phonological transparency adding -*ic* to -*ist* to obtain -*istic* is surface concatenation, and cannot be the primary tool of morphology (p.121). There is a certain level of abstraction involved.

6.6   Theoretical Objections to Aronoff's Word Formation Theory

a)   Allen (1978)

Allen argues against Aronoff's word-based hypothesis, claiming that affixes can also attach to phrases which are lexicalized, that is, mini-idioms of the language (p.238). The suffix -*ish* can attach to adjective phrases and the suffix -*ness* to noun phrases like "blue-and-blackness" and "blood-and-thunderish." However, Dressler (1985) counter-claims that such lexicalized or opaque phrases can be bases of only a few suffixes (-*er*, -*able*, -*ish*, and -*ness*), and they are restricted occasionalisms, not accepted neologisms.

b)   Scalise (1986)

Scalise argues for a modified unitary base hypothesis, since contrary to Aronoff's Unitary

Base Hypothesis, many English prefixes attach to three syntactic categories (p.138). Prefixes should be distinguished from suffixes in that prefixes do not have the "single syntactic feature restriction." Prefixes like *inter-, co-, dis-* and *pre-* can attach to adjectives, nouns, and verbs, as in "international," "interstate," and "interweave." This does not constitute a serious challenge for our purpose since the Unitary Base Hypothesis holds generally for suffixes and also because prefixes do not affect the phonetic forms of the output of WFR's.

c) **Anderson (1992)**

Anderson argues for an a-morphous morphology. This means that morphological structure arises only when explicitly stipulated in the structural change of a morphological operation. Complex words will only have phonological and semantic structure, and syntactic properties. We should therefore treat the morphology of derivatives as a matter of the relation of words, and the further step of attributing additional internal form to these words is in fact unnecessary (1992:291).

d) **Raffelsiefen (1992)**

Raffelsiefen's non-configurational approach to derived words also argues against preserving the internal structure of words. Morphological operations are functions that relate phonological expressions (1992:140). If the attachment of a later affix is a function of the preceding affix in the case of truly productive affixation rules (that is, where there is no idiosyncracies in semantics), then there is no need to show the internal structure that exists between the two affixes. In this type of analysis, two kinds of pairs are generated: "predict ~ predictable" and "predict ~ predictability," instead of "predict~ predictable" followed by "predictable ~ predictability." Similarly, *-ize* can always be followed by *-ation*. Related pairs generated would be "urban ~ urbanization" rather than "urban ~ urbanize," "urbanize ~ urbanization." As well, in the analysis of a derivative such as "recognizability" as [[recogniize]V + able]A + ity]N], the category V may not matter, since it already constitutes the domain of [recognizable]A

upon the application of -ity (1992:149). Raffelsiefen also argues against Aronoff's analysis of **"employmental" which is based on the constraint that -al cannot be attached to -ment if the base is a verb. In Raffelsiefen's analysis, the attachment of -al is a function of the peceding -ment, not "employ". In any case, the attachment of -ment cancels out the syntactic category of "employ" as a verb, and "employ" becomes part of the domain of -ment, which makes the syntactic category of Verb irrelevant (1992:154).

Raffelsiefen also argues that Aronoff's account of -ation is oversimplified. The suffix -ation is not as unrestricted as Aronoff claims. We get "perturbation" but **"disturbation," "consultation" but **"insultation," or "explanation" but **"remanation" (from "remain"). According to Raffelsiefen, it is impossible to specify a domain for this suffix. Verbs that take -ation are in fact "fossilized" or lexicalized. They cannot be accounted for by blocking either, (an explanation used by Aronoff for **"gloriosity" due to the alreading existing noun "glory") since several of these verbs lack a derived nominal other than X-ing (as in "remaining" or "deserving").

Challenges regarding boundaries and bracketing can be countered by Aronoff's own notion of these linguistic devices. Within Aronoff's theory, boundaries are structural entities inserted between elements by rules (Aronoff 1976:122). If they are purely structural entities, they have no phonological substance in themselves, nor meanings. Their significance lies in the way they affect phonological and semantic processes, such as stress. Unlike morphemes or words, boundaries are only elements of linguistic structure. Whether brackets are erased or not as part of morphological processes, or are preserved to denote the syntactic categories of internal words, is a matter of preference of structural presentation. Internal brackets are preserved to indicate structure and nothing else.

In my opinion, in both Anderson's and Raffelsiefen's theories, the nature and significance of the morphological component of the grammar seem ill-defined. If their analyses are indeed morphological, then derivations cannot be mere "functions of phonological expressions," to use

Raffelsiefen's words; nor can they be mere expressions of relations between words, as claimed by Anderson (1992). After all, morphology refers to word structure; if there is multiple affixation, then all the parts of this complex word structure must be recognized as domains of the analysis, including the syntactic categories involved. Anderson and Raffelsiefen clearly ignore the significance of morphological decomposition of words by speakers as a significant aspect of a speaker's competence.[6]

6.7   Pedagogical Implications

The pedagogical implications of Aronoff's theory of morphology are similar to those of Linell's theory of phonology and morphology. I will discuss further implications below:

1.   If speakers have the capacity to recognize and make up new words according to regular WFR's, then WFR's are learnable units of language and should be taught to learners.

2.   WFR's state specifically the syntactic categories of bases and outputs on the attachment of certain affixes. In Cantonese, words have fluid syntactic categories which are determined by word order rather than affixation. WFR's and affixes as described by Aronoff afford an effective means of helping Cantonese learners recognize the syntactic categories of English words and their significance in word formation and sentence formation.

3.   WFR's capture the relatedness between words which share common bases (morpheme identity). Awareness of word relatedness facilitates the development of vocabulary, lexical decoding, and reading ability in ESL learners.

4.   Derivatives with bound morphemes need not be broken up morphologically and can be treated as whole words, especially at the earlier stages of learning. Explanations involving metaphorical extension are difficult for learners first encountering morphology. Inconsistency of meaning of the same bound stem and the same affix in different words also cause further confusion. This does not mean that the learning of Latinate stems is unnecessary, but such examination of complex words can be delayed till the advanced level. Even then, the need for

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metaphorical extension of meaning must be made clear to advanced learners.

5.   If internal brackets are not erased, the internal word structure is preserved. Knowing the

internal word structure is as important as knowing the phonetic forms of the derived words. It

also means that the teacher can go as far back as the learner needs, to examine the structure

of a word with multiple affixes. There is no specific point in the word where further analysis is

impossible because of the stipulation that the boundaries of a lexical unit are determined by

brackets at a particular cycle or level (as in lexical phonology), or that an affix is now part of a

word and cannot be broken up for analysis (as in Raffelsiefen 1992), or simply that internal

morphological structure is irrelevant (as in Anderson 1992). Moreover, in the case of multiple

affixation, recognizing two or more adjacent affixes as separate entities helps learners to

discover the morphological compositionality of derivatives and reduces the difficulty of

identifying the essential meaning contained in the base word.

6.   Without ordering of WFR's, learning is very much simplified. Recognizing affixation patterns in

multiple affixes as those outlined in Aronoff's linear contiguity condition and distribution (eg.

-ist-ic, -ize-ation, -ment-al, and *-ic-ism*) is much easier than learning the application of ordered

rules, whether morphological or phonological. Moreover, WFR's make specifications about

the syntactic categories of bases which help in determining the order in which the affixes must

be attached.

7.   Treating the different phonological shapes of bases and affixes as a phenomenon of allomorphy

rather than as segmental alternations provides more reality to a learner. Recognizing and

remembering the phonological shapes of larger units like bases and affixes is easier than doing

the same for alternating segments because bases and affixes are more meaningful units than

segments. Without direct reference to word paradigms, Aronoff's theory provides several

useful paradigms according to shapes of roots which makes learning efficient. The significance

of word paradigms in word learning is supported by Williams (1994).

8.   When word structure is properly understood, the semantics of a derivative is more evident to a

learner since the ability of abstracting bases from surrounding affixes is crucial in abstracting

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the essential meanings of derivatives. Any idiosyncrasies in the semantics of derivatives can be explained as they occur.

9. Abstractness is limited to only a few instances where segmental alternations are necessary, as in the case where the -ism-ic ending becomes -ist-ic in final phonetic form. Unless very detailed morphological understanding is required by a very advanced learner, this kind of alternation need not be explained. The learner may assume the more transparent relation between -ist and -ist-ic as in "imperialist ~ imperialistic" rather than "imperialism ~ imperialistic" without serious consequences to his knowledge of English morphology.

10. Learning word formation enables the learner to utilize English orthography to advantage. The relatedness between words can be recognized directly from the orthography since the nature of word structure is understood.

11. Aronoff's theory also enables the teacher to posit several rules of thumb which would not violate morphological principles as would happen if other theories were adopted. WFR specifications of syntactic categories of inputs and outputs and the condition of linear contiguity of affixes will ensure that the derived word is morphologically well-formed. Strata rules and level ordering of affixes (as in lexical phonology) become unnecessary and consequently, the problem of bracketing paradox does not arise.

12. Aronoff admits no empirical grounds for explaining the suffixes -ution and -ition. A pragmatic approach to linguistic theory would mean that either solution could be of pedagogical value, as long as conditions for the application of rules and the rules themselves can be understood.

13. Speakers and learners may have intuitive organizations of English morphology which do not reflect the neat bracketing found in Aronoff's theory since boundaries between stems and affixes have been found to be varied for different native speakers (Wheeler & Schumsky 1980). This does not detract value from Aronoff's theory as a model for teaching English morphology.

14. Not of least significance is the fact that Aronoff's WFR's are linear representations which also reflect the left-right asymmetry in morphological processing, confirmed by Segui and Zubizarreta's study (1985).[7] **SPE**, lexical phonology, and later morphological theories have

provided us with top-down segmental processing, plenary and tree-type representations, complete with loops, hops, and domain maps such as those of Kiparsky, Spencer, Anderson, Raffelsiefen, Sproat, and Pesetsky mentioned above. In some of their representations, linear order of morphemes or internal word structure are in fact irrelevant.

Conclusion

Aronoff's <u>Word Formation in Generative Grammar</u> (1976) represents the most detailed work on English Latinate derivatives. More recently, Bochner's (1993) Lexical Relatedness Morphology reflects much of Aronoff's arguments for word-based morphology. The primary value of Aronoff's word-based theory of derivational morphology is that it reflects the general agreement among empirical psycholinguistic models regarding the lexical representation of derived words, their morphological structure, and the grouping together of morphologically related words (Cutler et al 1985). It also reflects most closely the morphological competence of the average native speaker of English and the competence that L2 learners may be able to acquire, that is, word formation (derivations), as well as the recognition of morpheme identity and semantic relatedness between words in a morphological family. (See empirical studies in psycholinguistics by Murrell & Morton 1974, Taft & Forster 1975, Stanners et al 1979, Luketala et al 1980, and Anshen & Aronoff 1988.) Though not explicitly stated by Aronoff, his paradigms of related patterns and patterns in the morphological rule system contrast with the notion of the cyclic application of phonological rules in morphological derivations. This approach is also supported by Bochner (1993). Bochner's claim of redundancy in the lexicon and in the morphological rule system represents a refinement of Aronoff's notions of the basic morphological competence of the native speaker. For pedagogical purposes, Aronoff's theory provides the learner with insights into vocabulary with derivative morphology by providing morpholexical rules and their syntactic classes which spelling rules alone cannot do.

Notes:

1. In Aronoff (1994), the term "word" is replaced by "lexeme" to differentiate the morphoplogical word from the phonological word used in prosodic phonology. However, for the sake of consistency with Aronoff (1976), and for pedagogical reasons, I prefer the term "word".

2. Spencer (1988b) advocates a multilinear or multiplanar representation of allomorphy and claims that the viability of linguistic levels of representation does not depend on our being able to map such representations directly on to psycholinguistic representations, or on our finding direct psycholinguistic evidence for these representations (Spencer 1988b:637). On this account, Spencer's theory (based on Latin) will not be discussed.

3. The area of semantic restrictions is not well developed in Aronoff's theory in general as it was then a relatively undeveloped area in linguistics.

4. Linell claims that phonotactic rules do not come into play in allomorphy, but he was referring only to vowel alternations within the base when an affix is attached as in "serene-serenity." He was not referring to the phonotactics of adjacent base and affix.

5. Siegel (1977) offered a more complex explanation for truncation which required two sets of rules. (See Aronoff 1976: 88-90.) For pedagogical purposes at least, Aronoff's explanation would be more feasible.

6. In fact, Anderson does not accept the analysis that a word with affixes is "derived" from a more basic one without affixes. This is based on his assumption that what is significant is the "relation" between the two words. According to Anderson, this view has the advantage of eliminating the need for an internal word structure which necessitates brackets and boundaries and conflated tiers. In English morphology, most instances of complex words are concatenations of morphemes. In the teaching of English morphology, internal word structure and morphological derivation are convenient and psychologically realistic approaches.

7. As explained by Cutler et al (1985), left-right asymmetry is used in a metaphorical sense, that is, in the sense of temporal ordering rather than spatial. This term would still apply in languages with a right-to-left orthography.

Chapter 7

AN INTEGRATED STUDY OF THE MORPHOLOGICAL AND MORPHOPHONEMIC AWARENESS OF CANTONESE-SPEAKING COLLEGE-PREPARATION ESL STUDENTS

Introduction

In this chapter, I will briefly reiterate the rationale for my integrated study of ESL morphological and morphophonemic awareness. (See 2.4.) I will present my hypotheses regarding my subjects' performance in the aural recognition and production of Latinate derivatives, abstraction of base words from derivatives, and the relation between their semantic recognition of morphologcally associated words and their pronunciation of derivatives. I will also explain the method of my study.

7.1   Rationale for My Study

Language factors that have influenced past research on ESL/EFL learners' formal representations of English multisyllabic words, including derivatives, are

i)   the effects of negative transfer of L1 (Jordanian Arabic) due to similarities in syllable structure between English and L1 (Anani 1989);

ii)   the effects of TL syllable structure which differed from L1 syllable structure (Spanish), resulting in errors in stress assignment (Mairs 1989);

iii)   the negative influence of syllable-timed L1 prosody (Chinese and Hausa) on the pronunciation of stress-timed English derivatives (Fokes & Bond 1989);

iv)   the effects of the number of syllables in English derivatives on their pronunciation (ibid);

v)   the adaptation of stress rules in the L1 (German, Portuguese) cognates on the pronunciation of English derivatives (Erdmann 1973, Baptista 1989 respectively);

vi)   the incorporation of base-word stress by Portuguese L1 speakers in the pronunciation of English Latinate derivatives in cognates and non-cognates (Baptista 1989); and

vii)   the effects of the requirement or non-requirement of spelling change on EFL learners' affixation

        of Latinate and non-Latinate derivatives (Aiking Brandenburg et al (1990).

As explained in 2.4, using native speakers of Cantonese as the subjects of my study would exclude

the effects of negative or positive L1 transfer in their formal representations of English derivatives.

Ruling out the effects of positive and negative transfer had two advantages: psycholinguistic reasons

for the "constraints" imposed by the ESL subjects' knowledge of affixation would need to be explained,

and common patterns of overgeneralization of English Latinate morphological and morphophonemic

rules between ESL learners and NS of English might be found.

        Anani, Mairs, and Baptista do not distinguish among monomorphemic, inflected and derived

words, and compounds. These words are simply multisyllabic phonological units; learners' problems

with derivatives are therefore purely phonological. Any effects of subjects' knowledge of English

spelling, morphology, and semantic associations of morphologically related words on their

pronunciation of derivatives are not taken into account in explaining their phonological problems.

Moreover, in all the studies that involved derivatives, the possible effects of learners' actual

pronunciations of base words on that of associated derivatives have not been investigated. I decided to

examine the possible effects of the semantic and spelling associations made by my subjects between

base words and derivatives on their phonological representations of derivatives. The evidence of

speakers' spelling difficulties with derivatives (Templeton 1979, Templeton & Scarborough-Franks

1985) and morphological boundaries in derivatives imposed by orthography (Wheeler & Schumsky

1980) would also have significance for ESL learners. Therefore, improving on Aiking-Brandenburg et

al's (1990) test of EFL suffixation, I had my subjects abstract base words from derivatives with non-

obvious suffixes. As explained earlier, my test had four advantages over that of Aiking-Brandenburg et

al's test: it confirmed whether ESL learners recognized affixes and whether they made the correct

base-word associations and abstract the base words when presented with derivatives. It also showed

whether spelling prevented them from abstracting base words and it revealed what kind of affix and

spelling manipulation strategies learners employ in abstracting base words from derivatives. Base-word

decoding is important since base words contain the essential meanings of most derivatives. My

Semantic Rating of Word Pairs Test determined the extent of my subjects' awareness of the semantic

relatedness between morphologically related words. It also determined whether my subjects' base-

word vowel and stress patterns in their phonological representations of derivatives were influenced by

their perceived meaning relatedness between words in a pair. The criteria for selecting test words were

important. Dziubalska-Kolazyk (1989) uses pseudo words which fit certain phonological rules in a

particular morphological operation (vowel shift and velar softening with the suffix -ity). Baptista (1989)

uses 128 pseudowords based on stress rules predicted from NS pronunciation of nonsense words and

are "infrequent in classroom conversation" (1989:3). I decided to use existing English derivatives

expected to be familiar to college-preparation learners as this would provide more realistic evidence of

learners' rules regarding base words and associated derivatives. My study is thus a test of ESL

learners' lexical competence with a focus on Latinate derivatives. It is also an integrated investigation

of ESL morphophonemics, going beyond phonology and exploring my subjects' awareness of

morphology, orthography, and their perception of semantic relatedness between morphologically

associated words.

7.2   Hypotheses

As mentioned in 1.2.1, overgeneralization of L2 rules is the strategy of inappropriately applying

L2 rules learned or acquired earlier to new linguistic items. It was also mentioned that unlike

phonological rules, TL morphology and morphophonemic rules are higher-order rules which are seldom

ever transferred from L1 into L2 learning. Interlanguage morphological and morphophonemic rules

result from the constraints imposed by earlier learned TL rules or their overgeneralization. This is

especially true where a TL linguistic item does not have a counterpart in the learner's L1 and the L1

cannot contribute positive or negative transfer. It may also be assumed that learners are exposed to

the more frequent and common non-Latinate derivatives in the earlier stages of ESL learning. Due to

overgeneralization, the required vowel and/or consonant alternations, and/or stress shifts will be

absent in their phonological representations of Latinate derivatives which are acquired later. I assume
this overgeneralization regarding derivatives to be part of the process of linguistic simplification in
interlanguage, as evident in syntax and phonology (Corder 1971, Blum & Levenston 1978).
Psycholinguistic studies on the production of derivatives (eg. saying "professoral" rather than
"professorial") also confirm a real speaker preference for transparent derivations over opaque ones
(Cutler 1980a). Therefore, in pronunciation, I hypothesize that subjects will overgeneralize the
pronunciation rules of non-Latinate derivatives to those of Latinate derivatives. This means that
segmental alternations (especially vowel alternations) and stress shifts required by Latinate derivatives
will not be made correctly by subjects if they have not yet learned to pronounce them correctly.[1] The
dominant strategy for pronouncing a derived form will be to incorporate its base-word pronunciation,
that is, base-word stress pattern and vowel(s). This leads to my first and second hypotheses:

Hypothesis 1:

**In the aural recognition of English Latinate derivatives, the main type of error in the
pronunciation preference of ESL subjects will be base-word vowel and stress pattern (base-word
pronunciation) rather than other types of errors involving segmental alternations and stress
placement.**

Hypothesis 2:

**In the oral production of English Latinate derivatives, the most dominant type of error of ESL
subjects will be the incorporation of base-word vowel and stress pattern (base-word
pronunciation) rather than other types of errors in segmental alternations and stress placement.**

According to Wheeler and Schumsky (1980:31), the English orthographic system is a
significant influence on speakers' phonological analysis and word segmentation when a purely oral
exposure would not be. The more orthographic changes there are accompanying affixation, the more
difficult it is to identify the stem (base word). The base word and the base word-derivative association

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are rendered opaque. Moreover, exposure to derivatives is likely to happen after attainment of literacy and exposure is likely to be in written form. Since ESL learners' exposure to derivatives is likely to be even more book-based than that of native speakers, I am inclined to agree that spelling would influence ESL learners' phonological and morphological representations of derivatives. Spelling would affect the extent of their recognition of base words within Latinate derivatives, depending on whether spelling obscures the stem-suffix boundaries (that is, whether the derivatives have obvious suffixes or non-obvious/uncertain suffixes) (Wheeler & Schumsky 1980). In the task of abstracting base words, the rule of suffix stripping for non-Latinate words will be overgeneralized to Latinate words the subjects do not know. This means that ESL subjects will apply the strategy of suffix stripping to derivatives of Latinate origin without carrying out the necessary spelling changes to the base words. This investigation will also show whether the native-speaker strategy of "ease of analysis" in suffix recognition (Wheeler and Schumsky 1980) applies to ESL learners. This leads to my third hypothesis:

Hypothesis 3:

In a word analysis task, if the base words within English Latinate derivatives (with non-obvious suffixes) are not recognized, the dominant strategy among ESL subjects for abstracting base words will be suffix stripping without spelling changes to the base words rather than other strategies involving suffix stripping, base word manipulation, and/or spelling changes.

It is reasonable to assume that learners use their awareness of the morphological association between words and the orthographic patterns of derivatives to help them abstract base words from derivatives, pronounce derivatives, and decode their meanings. Subjects will more readily recognize base words within obvious-suffix derivatives than within those with non-obvious suffixes. An interesting question regarding obvious-suffix derivatives will be the influence of the subjects' awareness of the semantic relatedness between base words and associated derivatives on their phonological representations of derivatives, that is, whether base-word pronunciation is influenced by obvious base words in the spelling of derivatives. Exploring this question will also help to determine whether subjects

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use spelling as a cue for meaning or for pronunciation or for both. This leads to my fourth hypothesis:

Hypothesis 4:

Among ESL learners, there will be a positive correlation between the rate of recognition of the semantic relatedness between morphologically associated words and the incorporation of base-word pronunciation in the phonological representations of Latinate derivatives with obvious suffixes.

7.3   Method

7.3.1   Subjects:

Sixty-four subjects participated in the study. The study group consisted of 32 native speakers of Cantonese from Hong Kong, referred to here as Group A. The reference group consisted of 32 native speakers of Canadian English, referred to here as Group B. All subjects were enrolled in high school Grade 12 in the Lower Mainland. While 40 students volunteered to participate as Group A subjects, four did not qualify for length of stay in Canada, three did not qualify for the required length of formal ESL instruction in Hong Kong, and one did not complete all parts of the study. While 47 students volunteered to participate as Group B subjects, seven did not qualify as native speakers of English and eight did not complete all parts of the study. Participation was voluntary and subjects were not paid for participation.

Group A ESL subjects were aged between 17;0 and 18;11 (average age=17;6). In Hong Kong, 84.40% of the subjects had attended English-medium schools and 15.63% had attended Chinese-medium schools. Among those from English-medium schools, 84.38% indicated that their teachers spoke mostly in Cantonese during instruction time though textbooks were in English, except for Chinese History and Chinese Literature. For subjects from Chinese-medium schools, ESL was part

of the formal curriculum, but teachers spoke mostly in Cantonese. These subjects had received between eight and eleven years of formal ESL instruction in Hong Kong before arrival in Canada, some having begun ESL instruction in pre-school or kindergarten. The average length of formal ESL instruction in Hong Kong was 10.19 years. The subjects had resided in Canada for between 17 months and 48 months. Mean length of residence in Canada and attending school in Canada was 31.81 months. Subjects arrived in Canada between the ages of 13;0 and 16;8. The average age of arrival in Canada was 15;1. None of the ESL subjects had lived in or learned English in other English-speaking countries. Upon arrival in Canada, all subjects had been tested for English language proficiency by the School District and/or the home school for placement in the ESL/Transitional Content Area Program. All the ESL subjects had gone through the ESL (Language Development) program as well as the Transitional English and Transitional Social Studies program, including Writing Fundamentals, though not all subjects began with ESL Level I in Canada. (Promotion within the ESL and Transitional Programs occurred at specified times during the school year and was contingent on classroom performance and/or scores in exit exams. An ESL student could be promoted one or two levels within an academic year, though the latter was rare.) All subjects were currently enrolled in mostly regular Grade 12 school subjects and 68.75% were enrolled in Regular English 12, while the rest were enrolled in Regular English 11 or Communications 12 (an alternate of English 12) which would enable them to graduate with high school certificates. They were also enrolled in the required second language program, which was either Mandarin or Japanese. The subjects had either completed Social Studies 11 or were currently enrolled in Social Studies 11 or 12. In addition, subjects were enrolled in a variety of content area subjects, including mathematics, the sciences, business studies, computer studies, geography, and art. All subjects indicated that they were headed for post-secondary education and 84.34% were currently preparing for the Test of English as a Foreign Language (TOEFL). Regarding the use of English or Cantonese at school, 71.89% of subjects spoke English and 100% spoke Cantonese. Regarding languages used outside school, 37.50% spoke English while 87.50% spoke Cantonese. In contacts with neighbours, 84.38% spoke English while 46.88% spoke Cantonese. Cantonese was the language spoken at home for 100% of subjects and

only 6.25% spoke English as well as Cantonese. This ESL group represented a sampling of individuals with similar L1 background and a fairly similar ESL exposure and English native-speaker contact.

The native speakers of Canadian English were aged between 17;0 and 18;11 (average age=17;7). They spoke only English to their parents and siblings and spoke only or mostly English outside their homes. Of those who spoke another language outside the home, 15.63% spoke Cantonese, 6.26% spoke Italian, and 3.13% spoke Croatian. In school, the subjects were or had been enrolled in the required second language programs such as French, Italian, Spanish, Mandarin, or Japanese. (The minimum requirement was up to Grade 11.) The subjects were enrolled in Grade 12 and studying regular content area subjects, including English 12. None of the subjects were enrolled in Advanced Placement English or English 12 Honors. All 32 native-speaker subjects indicated that they were college- or university-bound.

Group B served as a reference group for comparison with the Cantonese-speaking ESL subjects who were at an equivalent age and academic level. They represented a cluster sampling of population where familiarity with derivatives used in content area learning and day-to-day school activities may be assumed. Given the small populations and the small number of test items involved in this study, the results can only be interpreted as indicative of tendencies which are likely to have practical significance in language teaching and learning. (See Appendix B for personal details of individual subjects as well as individual scores for Listening, Pronunciation, and Word Analysis Tests.)

7.3.2 Procedure

a)   Briefing and questionnaire

A week before the tests began, potential subjects for both groups were briefed on the purpose

of the study, as well as the questionnaires and test instruments to be used. Reference was made to the pronunciation, listening, spelling, and meanings of words. No reference was made to the specific linguistic aspects of the tests, that is, the morphology and morphophonemics of derivatives. Potential ESL subjects completed Questionnaire 1A and potential NS subjects completed Questionnaire 1B. The responses were screened to eliminate subjects who did not meet the requirements for Cantonese as L1, previous ESL instruction in Hong Kong, length of residence in Canada, and ESL experience in Canada in the case of Group A subjects, and English as L1 in that of Group B subjects. All subjects had to be college- or university-bound. After all four tests had been completed, both groups completed Questionnaire 2 which was aimed at determining the criterion or criteria which subjects used for determining association between base words and related derivatives.

b) Testing

Test instruments consisted of Part 1: Listening (30 items), Part 2: Word Analysis (30 items), Part 3: Pronunciation (120 items, 60 base words and 60 associated derivatives, including the 30 derivatives from the Listening Test), and Part 4: Semantic Rating of Word Pairs. (See Appendix C for Listening Test and Semantic Rating of Word Pairs Test.) The four parts were conducted in the above sequence in order not to sensitize subjects to the linguistic aspects they were being tested on. The pronunciation test was conducted over two days. Subjects were instructed not to use dictionaries or electronic translators, or consult with other subjects in all four tests.

Part 1 (Listening) items consisted of 30 derivatives. Each subject had a 3-minute preview of the test items in a word list which subjects could retain throughout the Listening Test if they wished. Each stimulus item was presented visually on a bright yellow manila card with big black letters while the three different pronunciations of the item (pre-recorded on tape by a native speaker of General Canadian English) were being presented.[2] These three different phonetic forms constituted three of the four choices for each multiple-choice item. The fourth choice for each item was "None of the above."

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Subjects darkened the letter (A, B, C, or D) corresponding to the correct answer on their answer sheets. (Two trials with feedback were done before subjects started the test.) Subjects were instructed to request replays of specific words whenever necessary. No related base words of the derivatives were presented either visually or orally to subjects.

For Part 2 (Word Analysis), subjects were given a list of 30 derivatives and their task was to supply the word which they thought each given derivative "came from." Besides the two examples given on the test sheet ("immigrant ~ immigrate" and "artistic ~ artist"), two other examples were provided orally by the investigator ("carpentry ~ carpenter" and "secretary ~ secret"). A brief explanation was provided in which the investigator used words such as "adjectives," "nouns," and "verbs" but no mention was made of "prefix" or "suffix." The clues, that these words came from "smaller words" and that the spelling of words might change, were given. Except for "destruction" and "civilization," all test items were Latinate derivatives that required spelling changes to their base words, and phonological changes were optional. The investigator wanted to test the frequency of "destroy" and "destruct" as well as "civil" and "civilize" in the subjects' responses. "Destruct," not listed in Carroll, Davies, and Richman (1971), is a fairly new word used mainly in military and computer terminology. Subjects wrote their answers beside the given test items and were allowed up to 20 minutes for the test.

Part 3 (Pronunciation) was conducted in two parts, with a gap of five days between the pronunciation of base words and the pronunciation of associated derivatives. This was to reduce priming effects. The pronunciation of base words of each subject was recorded first, and the base-word pronunciation of all the subjects of each group was recorded before the pronunciation of the associated derivatives was recorded. Each subject was given five minutes to preview the printed list of test words and then called to the test location where he/she read aloud the words from a word list and his/her pronunciation was tape-recorded. Subjects were allowed to self-correct as many times as they wished. The word list was collected from each subject after recording.

Part 4 (Semantic Rating of Word Pairs) was the last test. It consisted of 95 pairs of morphologically associated words. Subjects rated the semantic relatedness between the words in each pair, using the range of (1) to (5), (1) representing "definitely not related in meaning" and (5) representing "definitely related in meaning." Subjects' responses were collected before they completed Questionnaire 2. This was to ensure that subjects were not explicitly informed of the criteria they could use for the semantic rating of word pairs in Test 4; nor could they alter their responses in Test 4.

7.4   Test Instruments: Rationale and Description

7.4.1   Single Word Items in Listening, Pronunciation, and Word Analysis Tests;
Word Pairs in Semantic Rating Test

The equal distribution of suffix types among the test items was not a criterion. All derivatives (and base words used in the tests) were selected for their frequency of everyday usage in school (in administration, counselling, sports and recreation, and student activities) and out of school (general interest, news, and media), as well as for their frequency in content area learning in English, Social Studies, and Science. However, none of the items could be considered "highly technical or specialized." The items were also checked against Carroll, Davies, and Richman's American Heritage Word Frequency Book (1971) for frequency and grade level at which they are first encountered by students in schools. This is because their lexical entries are sampled to represent as nearly as possible the range of required and recommended reading to which students are exposed in school from third through ninth grades in the U.S. The Semantic Rating of Word Pairs Test (containing all test words) and Questionnaire 2 were distributed to four content area teachers for their opinions of word pairs used. They were asked if students in regular content programs who had gone through Transitional Content Area programs would be familiar with the given words upon entry to regular Grade 11 and 12 subject classes. The teachers were reminded that students need not have encountered or been taught the words as associated items (eg. "colony" and "colonial"). Two word pairs (from the Word Analysis Test) were dropped -- "evasion" and "violence." The former was not as frequent in

content area learning and was replaced with "invasion." "Violence" was too easy and was replaced

with "fertility." All four teachers agreed that students could be expected to be familiar with the final lists

of content words selected.[3]

Derived word items for Parts 1 (Listening) and Part 3 (Pronunciation) were also selected based

on three of Carlisle's four types of transformation between base word and derived form, viz.

phonological change unaccompanied by orthographic change, and phonological change accompanied

by orthographic change (Carlisle 1988).[4] This means that all items for the Listening and Pronunciation

Tests required vowel alternations and stress shifts from their bases, and they were:

a)   stress shift and reduction of a vowel or diphthong to a schwa (eg. "explain ~ explanation");

b)   stress shift and expansion of a schwa to a full vowel (eg. "accident ~ accidental"); and

c)   stress shift, vowel reduction, and consonant change (eg. "magic ~ magician").

In addition to Carlisle's three phonological changes above, I added the following:

d)   reduction of a diphthong to a schwa (eg. "combine ~ combination");

e)   expansion of a tense vowel to a diphthong and monophthong (eg. "vary ~ variety"); and

f)   expansion of a glide and a schwa to two vowels (eg. "Christian ~ Christianity").

The Listening Test consisted of four trisyllabic words, 23 4-syllable words, and three 5-syllable

words. The number within parentheses beside each suffix indicates the number of items carrying the

suffix. The suffixes were -ation (8), -ism (1), -ity (7), -al (5), -ty (1), -ial (2),_ -ic (1), -ory (1), -able

(1), -e(s) (1), -ence(s) (1), and -ary (1). Three pronunciations were given for each word, viz. the

correct pronunciation, a pronunciation incorporating base-word vowel(s) and stress pattern, and a

pronunciation incorporating base-word vowel(s) but incorrect stress pattern. The order of presentation

of these three pronunciation types varied for the different test items but the option "None of the Above"

was given as the fourth option for every item.

For the Pronunciation Test, the 60 base words consisted of one monosyllabic word (with 3

vowels), 36 bisyllabic words, 21 trisyllabic words, one 4-syllable word, and one which can be pronounced as a bisyllabic or trisyllabic word ("history"). Derivatives in the Pronunciation Test consisted of 15 trisyllabic words, 40 4-syllable words, and five 5-syllable words. Suffixes were *-ation* (14), *-ity* (13), *-al* (6), *-ial* (4), *-ic* (3), *-ition* (2), *-ical* (2), *-ian* (2), *-ution* (1), *-ar* (1), *-cy* (1), *-y* (1), *-ese* (1), *-er* (1), *-an* (1), *-ary* (1), *e(s)* (1), *-ory* (1), *-able* (1), *-ence(s)* (1), *-ism* (1), and *-ty* (1).

For Part 3 (Word Analysis), the primary criterion for word selection was orthographic change, not phonological change. There were only two items with optional spelling change, "destruction" and "civilization." The reason for their inclusion has been explained above. The suffixes in the words used were *-er* (1), *-(t)ion* (4), *-(s)ion* (2), *-(ss)ion* (1), *-ionist* (1), *-ation* (5), *-ator* (1), *-ity* (3), *-est* (1), *-al* (2), *-ial* (1), *-ous* (1), *-ious* (1), *-cy* (1), *-ent* (1), *-ence* (1), *-ess* (1), *-y* (1), and *-ive* (1).

Part 4 (Semantic Rating Test) consisted of the 60 word pairs of the Pronunciation Test, as well as the 30 words from the Word Analysis Test (paired with their bases by the investigator). In addition to these 90 pairs, each of the words "unity," "destiny," "destroy," "revolution," and "resolution," had an extra pair given, viz. "unit ~ unity" and "unity ~ unite," "destine ~ destination" and "destine ~ destiny," "destroy ~ destruction" and "~~destroy ~ destruct~~," _{destructn ~ destruction} "revolt ~ revolution" and "revolve ~ revolution," and "resolve ~ resolution" and "resolute ~ resolution." A total of 95 word pairs were used, 38 pairs with derivatives containing obvious sufixes (that is, clear stem-suffix boundary) and 57 pairs with non-obvious suffixes.

Before each test, subjects were informed that the test words came from words in everyday usage in and out of school and their content areas in school. For the first three tests, subjects were encouraged to provide responses, that is, to attempt to answer. For Test 4, subjects were informed that the words came from the three earlier tests. They were instructed not to rate a word pair if they did not know the meanings of one or both words of the pair.

7.5   Grading

The investigator graded the pencil and paper tests for Listening, Word Analysis, and Semantic Rating of Word Pairs. The Pronunciation Test was graded by a native speaker of North American English who had undergraduate training in linguistics and the teaching of ESL.[5] The Pronunciation Test showed that both ESL subjects and NS subjects had good sound-grapheme correspondence in English for base words, as evident in the scores for intelligible pronunciation and NS-norm pronunciation for these words. (See Section 8.1.2.)

Pronunciation

In the initial assessment of pronunciation, both base-word pronunciation and derived-word pronunciation were assessed for intelligibility only. Unclear or unintelligible pronunciation or pronunciation that resembled another word in the English language and did not correspond to the target word was classified as "Not Intelligible." If a subject self-corrected or gave more than one pronunciation for a word, the best pronunciation (the clearest and/or the pronunciation with the least number of error features such as stress and segmental errors) was taken to be the pronunciation given by the subject. In the second analysis of pronunciation, the criteria for assessing derived-word pronunciation as acceptable and close to NS norms were as follows :

i)   stress placement must be correct;

ii)   vowel alternation must be of, or judged as close to, educated NS norm by the native-speaker rater; and

iii)   consonant alternation must be of, or judged as close to, educated NS norm by the native-speaker rater.

The term "educated NS norm" refers to the accepted educated NS pronunciation of any regional variety. (There was no noticeable "Australian" or "New Zealander" variety among ESL subjects, though there was a noticeable British influence in their pronunciation (eg. [t] in place of a tap between a stressed and unstressed syllable). In general, prominence of primary stress, vowel duration of tense

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or lax vowels, or the extent of vowel reduction in unstressed syllables in derivatives might not exactly resemble those of NS subjects. The main criterion was that any required segmental alternations and stress shifts must be, for the NS rater, audibly "different" from the related base word, and segments were recognizable as reflecting the correct morphophonemic alternations required in the derivatives.

In counting the number of base words or derivatives that were native-like in production for each subject, both words of a pair, that is, base and associated derivative, need not be intelligible. In assessing the error type in the production of derivatives, both the base word and its associated derivative must be intelligible for each subject. This was to ensure that there was a basis for making any claims for the influence of base-word pronunciation on the production of the associated derivatives. Eight error types were observed in ESL subjects' production of derivatives, each represented by a two-character symbol, the first character representing stress and the second representing vowel:

1) BB : base-word stress pattern and base-word vowel(s) eg. ['græmɚ] ~*['græmə,tɪkəl]

and *[də'mɔkrət] ~ [də'mɔkrəsi]

2) ✓B: correct stress but base-word vowel(s) eg. [,ɪɪ'zaɪn] ~ *[,ɪɪzaɪ'neʃən]

3) BX : base-word stress pattern and incorrect vowel(s) (other than base-word vowel(s))eg.

['stebəl] ~ *['stæbəlɪti]

4) XB : incorrect stress pattern (other than base-word stress pattern) and base-word

vowel(s) eg. [,ɪɪ'zɝv] ~ *[,ɪɪzɝ'veʃən]

5) ✓X : correct stress pattern but incorrect vowel(s) (other than base-word vowel) eg.

['sɪmələ-] ~ *[sɪmə'lɜrəti]

6) X✓ : incorrect stress pattern (other than base-word stress pattern) and correct vowel eg.

[ɪ'kɔnəmi] ~ *[ɪkə,nɔ'mɪkəl]

7) XX : incorrect stress pattern (other than base-word stress pattern) and incorrect

vowel(s) (other than base-word vowel(s)) eg. ['græmɚ] ~ *[,græ'mætɪkəl] or

['græmɚ] ~ *[,græmæ'tɪkəl]

8) C : incorrect consonant eg. ['kɑnfədənt] ~ *[,kɑnfə'dɛntɪəl]

The term "base word" is used in this study to refer to the morphologically simpler word in a word pair. A subject might have learned a derivative before a morphologically simpler form, or might have known a derivative form without knowing its morphologically simpler form, in which case, the derivative form was the "base word" for the particular subject. In order to keep the analysis and discussion simple, I am restricting the use of the term "base word" to refer to the morphologically simpler form of a pair.

For a pronunciation to be categorized as "BB," a subject must have replicated all the vowels as well as the stress pattern of the base word in the associated derivative, except where the final syllable of the base word is [i] and becomes [ɪ] in its associated dervative, as in "economy" ~ "economical." For example, the pair ['græmə-] ~ *['græmətɪkəl] was categorized as "BB" but ['græmə-] ~ *[,græ'mætɪkəl] or ['græmə-] ~ *[,græmæ'tɪkəl] was classified as "XX." In both the latter pairs, since only one vowel in the derivative resembled the two vowels of the base word, the productions could not be rated as "XB." The pair [,n'zɝv ~ ,nzɝ'veʃən] would be rated as "XB" since the stress pattern is incorrect (but unlike that of the base) and all the vowels in the base-word component of the derivative resembled those of the base word. If a subject's production of a derivative was close to native-like, but his or her production of a related base word resembled the base word within the associated derivative, the derivative was rated "NS norm" but the pair was rated "BB." For example, for "democrat" ~ "democracy," the production *[də'mɔkrət] ~ [də'mɔkrəsi] was classified as "BB." If both the stress pattern and vowel alternation(s) were correct but there was an error in consonant alteration, as in *[,kɑnfə'dɛntɪəl], the error was classified as "C." If there were errors in stress and/or vowel, as well as consonant altemation, two error types were recorded for the pair, eg. "XX" and "C" (eg. *['kɑnfɪ,dɛntɪəl]).

Word Analysis Test

For the Word Analysis Test, it was found that, contrary to the required task of providing a morphologically simpler word, both NS and ESL subjects provided responses that were either

morphologically simpler (eg. "commit" for "commission") or more complex (eg. "commissioner") than the given test items. It was decided that any response that was morphologically related to the given test item would be rated correct as long as they were existing English words, and not synonyms. Correct spelling was obligatory. The following strategies were observed among subjects, resulting in non-existing English words:

1)   Strip suffix(es), no spelling change

2)   Strip suffix(es), spelling change

3)   Strip one suffix from a multiple suffix, spelling change

4)   Strip suffix, add (an)other suffix(es), no spelling change

5)   Keep the whole word, add (an)other suffix(es), no spelling change

6)   Keep the whole word, add (an)other suffix(es), spelling change

7)   Strip part of suffix, no spelling change

8)   Strip part of suffix, add another suffix, spelling change

9)   Strip suffix and part of base, no spelling change

10)   Strip part of base/root, no spelling change

11)   Strip suffix and part of base/root, add another suffix, spelling change

12)   Strip part of root, add another suffix, spelling change

13)   Strip part of root, spelling change

14)   Strip prefix, no spelling change

15)   Strip prefix and suffix, no spelling change

16)   Strip prefix and part of root, no spelling change

17)   Supply root, no spelling change

18)   Supply morphologically and/or semantically unrelated word

19)   Supply synonym

(Some subjects supplied the same words as the given test items and some did not supply responses for particular test items.)

Semantic Rating Test

For the Semantic Rating Test, the subjects' Mean Semantic Rating (MSR) for each word pair for each group and the MSR for each group of subjects for all 95 word pairs, were computed. In addition, the word pairs were categorized as follows and their MSR's were computed:

1)   38 word pairs containing obvious-suffix derivatives,

2)   57 word pairs with non-obvious suffix derivatives,

3)   34 word pairs for the Word Analysis Test,

4)   5 word pairs with obvious-suffix derivatives and opaque semantic relations, and

5)   33 word pairs with obvious-suffix derivatives and transparent semantic relations.

7.6   Vocabulary Learning Strategies of ESL Subjects

Questionnaire 1A gathered information from ESL subjects about ESL instruction in Hong Kong and the subjects' ESL learning strategies, especially vocabulary learning strategies. Grammar was rated by 68.75% of ESL subjects as the most emphasized skill, followed by writing (34.38%). Translation was rated by 62.50% of subjects as the least emphasized skill, followed by speaking (53.13%). Reading was rated as the most emphasized skill by 28.13% of subjects, while 25% rated vocabulary study as the most emphasized learning area. Generally, grammar was most emphasized; speaking, reading, and vocabulary instruction were among the least emphasized areas of instruction. Since teachers spoke mostly in Cantonese during formal instruction time, aural and oral experience in ESL learning in Hong Kong had been very limited for most subjects even in English-medium schools. Regarding informal ESL learning strategies, 90.63% of subjects indicated that they watched English TV and movies, 81.25% read English books, 56.25% read English newspapers and magazines, and listened to the radio and songs, and only 15.63% received private tuition.

Among the ESL subjects, 81.25% indicated that they checked unknown words in the dictionary or translator, making this the most dominant strategy for learning word meanings. 75% attempted to

guess word meanings by reading the sentence(s) very carefully. 71.88% asked someone who knew English and 40.63% asked their teachers. 31.25% indicated that they guessed word meanings by stripping affixes. Only 25% would skip unknown words. In general, only 31.25% make use of word structure as a strategy for decoding word meaning, making it the least used strategy in the learning of word meanings.

The dominant strategy for learning word pronunciation was to ask someone who knew English as indicated by 87.50% of subjects, while 81.25% worked out the pronunciation from spelling, 62.50% asked teachers, 53.13% checked dictionaries and translators, and 46.85% worked out the pronunciation by stripping affixes. Responses showed that the number of subjects who used the affix-stripping strategy to get the pronunciation of derivatives (46.85%) was more than those who used this strategy to decode the meaning of derivatives (31.25%). On the whole, among the strategies used for vocabulary learning, affix stripping was the least used. Only 25% of subjects indicated that they would skip words whose pronunciation they did not know, thus indicating that subjects generally wanted to know how to pronounce unfamiliar words. 78.25% indicated that they should know how to pronounce words whose meanings they knew.

Regarding the need for visual representations of words, 75% of ESL subjects indicated that most of the time, they could understand the meanings of words they could not make out aurally if teachers wrote out the words. This showed that visual presentations of words helped subjects to match them with their own phonological representations. Vocabulary was cited as the one main problem in reading by 87.50% of subjects. Only 6.25% cited the length of a passage or story and the length and difficulty of sentences as the main problem in reading. No subjects indicated topic as the main source of reading difficulty.

In Questionnaire 2, two word pairs were used, "comfort ~ comfortable" and "compose ~ component." The former pair represented a pair with phonetic, orthographic, and semantic

transparency; the latter pair represented one with phonetic, orthographic, and semantic opaqueness. Subjects were asked to indicate whether the words in each of the pairs were "related" and to indicate the reason or reasons for their relatedness or non-relatedness, viz. spelling, pronunciation, and/or meaning. Subjects could indicate any number of reasons. Responses showed that ESL subjects demonstrated different levels of awareness of morphological relatedness for the two pairs of words. Morphological awareness was higher for "comfort~comfortable" than for "compose ~ component."

The pair "comfort~comfortable" was rated as related by 90.63% of ESL subjects and the main criterion for relatedness was meaning (81.25%). Only 37.50% indicated that they were related because of their pronunciations, and only 31.25% indicated that they were related because of their spelling. This means that ESL subjects relied most heavily on parallel meanings in base words and associated derivatives (that is, transparent semantic association), not spelling or pronunciation, before they recognize any relatedness between words. For "compose ~ component," only 15.63% of ESL subjects indicated that the words were related, while 71.88% indicated that they were not related and 12.50% were not sure. Of those who indicated "No" or "Not sure," 88.89% indicated the difference in their meanings as the main criterion for their lack of relatedness, 11.11% indicated the difference in their pronunciations and 14.81% indicated the difference in their spellings as reasons for their non-relatedness. Meaning was again the most important criterion for judging word association, not spelling or pronunciation. The recognition of the relatedness between "comfort ~ comfortable" among ESL subjects was five times higher than for the "compose ~ component" pair. This means that most ESL subjects relied heavily on transparent semantic association between words. Metaphorical extension of meaning in a derivative (as in "compose ~ component") was difficult to grasp or not even made.

I hypothesize from the analysis of the above responses that for the majority of ESL subjects, it was likely that semantic recognition of both base words and associated derivatives had to be in place before the recognition of word association, spelling not being exploited for decoding meaning association. Moreover, the meaning association between the words in a pair was rendered opaque to

subjects because of spelling and pronunciation changes between the related words.

It was surprising to find that among NS subjects, meaning was also the main criterion for judging word relatedness. However, NS showed a generally higher level of awareness of word relatedness. While 100% of NS subjects agreed that "comfort ~ comfortable" were related, only 46.88% indicated that "compose ~ component" were related. This latter word pair was rated as definitely not related by 40.63% of NS subjects and 12.25% were not sure. This means that about 50% of NS subjects did not recognize word association when their orthographic and phonetic forms as well as their semantic relatedness made their association opaque. However, awareness of semantic relatedness between this opaque word pair among NS subjects was three times higher than among ESL subjects. The percentage of NS subjects who indicated "NO" for "compose ~ component" was almost 50% less than the percentage of ESL subjects. Though meaning was the main criterion for judging word relatedness, spelling and pronunciation were used as cues for word relatedness to a higher extent among NS subjects than ESL subjects. For "comfort ~ comfortable," 62.50% of NS subjects indicated spelling and 71.88% indicated pronunciation as cues for word relatedness, twice or slightly higher than among ESL subjects. For the "compose ~ component" pair, of the 17 NS subjects who indicated "No" or "Not sure", 100% indicated their difference in meaning as the main reason. Spelling difference was identified as the reason for non-relatedness of this pair by 21.88% while 15.63% indicated pronunciation difference as the reason for lack of relatedness. Though spelling and pronunciation differences should not have accounted for their non-relatedness, the higher percentages for these factors among NS subjects than ESL subjects suggested that NS subjects were more aware of using spelling and pronunciation cues for decoding meaning than ESL subjects.

Morpohophonemic awareness will be examined further in Chapter 8 when I discuss subjects' responses in Test 4.

Conclusion

In this empirical study, I have attempted to design a method that would overcome certain weaknesses of earlier studies in the field of morphological and morphophonemic awareness among ESL learners. Adopting a lexical competence approach, I have made sure that morphological and morphophonemic awareness of subjects was treated in such a way that subjects' awareness of related words was taken into account, that is, words were treated as associated items in the subjects' lexica, not isolated items. As well, in contrast to earlier studies which restricted their investigation to pronunciation or affixation, my method was also designed to obtain a more integrated perspective of subjects' knowledge of derivatives, viz. their awareness of word associations in terms of their orthographic, phonological, morphological, and semantic representations. In this study of ESL derivatives, I have designed a method that would also allow me to explore the relationship between advanced literacy and word acquisition in an unrelated L2, a relationship which has not been systematically explored in applied linguistics. I have also used test items that were real words of the English Language and were words which students, at a particular academic level and in a particular ESL setting, were expected to be familiar with. I avoided using pseudo words that fit certain linguistic rules as I wanted to get a realistic picture of my subjects' morphological and morphophonemic awareness. The questionnaires also revealed valuable information of my ESL subjects as language learners in general, and vocabulary learners in particular. Furthermore, Questionnaire 1 shed light on the level of emphasis given for the different skills and areas of ESL learning in ESL instruction in Hong Kong.

Notes:

1. My use of the terms "stress shift" and "alternations" to refer to the segmental changes in words appears contrary to the theories of Linell or Aronoff. I resort to the use of phonological changes for the ease of description, not as a subscription to theories of cyclical application of phonological rules.

2. I am grateful to C. Burgess and J. Wang for their recording of the items for the Pronunciation Test, and to W. Oliver for his recording of an earlier version of this test.

3. I am grateful to L. Baldwin, D. Lintott, L. Metzler, and F. Regan, transitional content and regular content teachers of Science, Social Studies, and English, for their valuable comments.

4. The main focus of Carlisle's study is the spelling of derived words among native speakers of English in grades 4, 6, and 8. She includes a category for orthographic change unaccompanied by phonological change. This was left out in my study.

5. I am grateful to T. Smith for rating the Pronunciation Test and transcribing the pronunciation errors. Broad transcriptions are used.

Chapter 8

RESULTS AND INTERPRETATION

Introduction

In this chapter, I will provide a detailed analysis of the results of my empirical study of the morphological and morphophonemic awareness of high school ESL college-preparation students and discuss their linguistic and pedagogical implications. I will discuss the results of Part 1: Listening Test, Part 3: Pronunciation Test, Part 2: Word Analysis Test, and Part 4: Semantic Rating of Word Pairs Test in this order. The extent to which the hypotheses explained in Chapter 7 (7.2) were supported will also be explained.

8.1   Preliminary Test Results

Table 1 (p. 122) summarizes the performance of the ESL and NS subjects on the Listening, Pronunciation, Word Analysis, and Semantic Rating of Word Pairs Tests. Independent means t-tests (two-tailed) were performed on all four tests. The differences in performance between the two groups in the Listening, Pronunciation, and Word Analysis Tests were statistically significant at $p < 0.01$. In all cases, Group B performed significantly better than Group A. The t-tests showed that the differences between the two groups in Mean Semantic Rating (MSR) for all the 95 word pairs and for the 38 word pairs containing derivatives with obvious suffixes (with opaque and transparent semantic relations) were not statistically significant at $p < 0.01$. However, the t-tests showed that the difference between the two groups for the 33 word pairs containing obvious-suffix derivatives (only those with transparent semantic relations) were statistically significant at $p < 0.01$. The difference between the two groups in MSR for the 57 word pairs containing derivatives with non-obvious suffixes was also statistically significant at the $p < 0.01$.

Table 1: Summary of Test Results For Group A and Group B

| GROUP | LISTENING TEST | WORD ANALYSIS TEST | PRONUNCIATION TEST | | | | SEMANTIC RATING OF WORD PAIRS TEST (MSR=Mean Semantic Rating) | | |
			BASE WORDS (Intelligible)	BASE WORDS (NS Norm)	DERIVED WORDS (Intelligible)	DERIVED WORDS (NS Norm)	MSR 95 word pairs	MSR 38 word pairs obvious suffixes	MSR 57 word pairs non-obvious suffixes
A	649/960 = 67.60%	558/960 = 58.13%	1850/1920 = 96.35%	1443/1920 = 75.16%	1756/1920 = 91.46%	744/1920 = 38.75%	4.0	3.9	4.0
B	910/960 94.79%	869/960 90.52%	1913/1920 99.54%	1903/1920 99.11%	1912/1920 99.58%	1822/1920 94.90%	4.3	4.1	4.4
t(62)	15.40*	13.63*	-3.70*	-16.42*	-5.09*	-21.82*			
t(186)							-1.07		
t(74)								-1.16	
t(112)									-3.71*

Note: *p < 0.01

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8.2   Results of Listening Test

In the following discussion, the abbreviations "BB," "NBB," and "NOTA" are used. "BB" refers to the pronunciation option that contained base-word vowel and stress pattern, NBB (Not BB) refers to the option with correct vowel but incorrect stress pattern, and NOTA refers to the "None of the Above" option. (See Appendix B Tables 2a and 2b for raw scores of both groups.)   Table 3a compares the preference for specific pronunciation types for the Listening Test items of Groups A and B. Tables 3b and 3c show the preference for pronunciation types for individual ESL subjects and NS subjects respectively. (See Appendix D.)   I summarize the results of the Listening Test below.

The mean scores on the Listening Test were 67.60% for ESL subjects and 94.79% for NS subjects.   The ESL mean score was therefore 27.19% lower than that of NS subjects. The difference in performance in the aural recognition of derivatives between ESL and NS subjects was found to be statistically significant, t (62)=15.40 p < 0.01. (See Table 3a.) For ESL subjects, the Listening Test scores ranged between 13 and 25 correct out of 30 test items, that is, between 43.33% and 83.33%. For NS subjects, the scores ranged between 26 and 30, or 86.67% and 100.00%. The range of scores for correct aural recognition was therefore greater for ESL subjects than NS subjects.

For ESL subjects, out of a total of 311 errors in the test, preference for BB was 58.84%, preference for NBB was 31.51%, and preference for NOTA was 9.65%. Therefore, BB errors almost doubled NBB errors. For this group, the average BB preference was 5.72 words per subject compared with the average NBB preference of 3.06 words per subject. BB was therefore the main error type for ESL subjects. The ANOVA test and post hoc Tukey tests showed that for ESL subjects, BB was significantly dominant over NBB and NOTA, [F (3, 93)=401.40, p < 0.01]. (See Table 3b.)

Considering individual ESL subjects, the number of those who favored BB was also higher than the number of those who favored NBB. Of the 32 ESL subjects, 25 of them or 78.13% showed

greater preference for BB than NBB, while only 6 subjects or 18.75% showed greater preference for NBB. (See Table 3b.) Among those who preferred BB, 5 subjects or 20% preferred twice as many BB as NBB, and 11 subjects or 44% had more than twice as many BB errors as NBB errors. One ESL subject had all errors in BB and no errors in NBB. BB was therefore dominant in the ESL subjects' phonological representations.

Considering individual test items, there were 16 out of the 29 test items that had errors (or 53.33% of all test items) for which ESL subjects showed greater preference for BB than NBB. (See Table 3a.) Only one word ("authority") had an equal distribution of BB and NBB errors. For these 16 words, BB exceeded NBB by between one and 28. For the 12 words where NBB was favored over BB, NBB exceeded BB by between one and 12. Therefore, more test items had higher BB preference than NBB. The word with the highest BB preference among ESL subjects was "comparable" for which 90.63% of errors were BB. The lowest BB preference was found for the words "recitation," "references," "popularity," "exploration," "biological," and "confidential." The first three words were also the test items with almost the highest correct scores in the Listening Test, with only 3 errors for "recitation" and "popularity" and two errors for "references." While there were only two words for which no BB preference was found ("combination" and "elementary"), there were six words for which no NBB preference was found ("formality," "references," "prosperity," "desperation," "magnetic," and "nationality"). "Declaration" had the highest NBB preference, which was 66.67% of errors for this word, but this was lower than the 90.63% found for BB for "comparable." NOTA errors made up only 9.65% of all errors for ESL subjects and 37.50% of ESL subjects did not have any NOTA errors. On the whole, preference for BB in the Listening Test was higher than for NBB and NOTA.

For NS subjects, 80% of the 50 errors for the group were BB, 8.00% of errors were NBB and 12.00% were NOTA. (See Table 3c.) The average number of BB words per NS subject was 1.25 and that for NBB was 0.13. The ANOVA test and post hoc Tukey tests also showed that BB was significantly dominant over NBB and NOTA for NS subjects, $[F_{(3, 93)}=8395.11, p < 0.01]$. (See

Table 3c.) For NS subjects, out of 12 test items with errors, 10 test items had BB, with "comparable" representing 40% of all errors in the Listening Test, followed by "recitation" which was 14% of all errors. (See Table 3a.) NOTA made up only 12% of all errors in the Listening Test. On the whole, for NS subjects, preference for BB in the Listening Test was thus higher than for NBB and NOTA.

Discussion

What is fairly clear from the results is that overgeneralizing the rules for the phonological representations of English derivatives of non-Latinate origin is the dominant strategy in the aural recognition of Latinate derivatives for ESL subjects. In the aural recognition of Latinate derivatives, incorporating base-word stress and vowel patterns in associated derivatives was a more common strategy than the strategy of applying other pronunciation rules such as segment alternations or stress shifts.

Therefore, Hypothesis 1, that in the aural recognition of English Latinate derivatives, the main type of error in the pronunciation preference of ESL subjects will be a base-word vowel and stress pattern rather than other types of errors involving stress placement was confirmed. This preference among ESL subjects was found to be statistically significant.

The dominance of BB preference among the NS subjects as well indicated that the incorporation of the base-word stress and vowel patterns in the pronunciation of derivatives was a common strategy for both ESL and NS subjects. This strategy of extending the pronunciation rules for non-Latinate derivatives to Latinate derivatives showed that there was a common pattern of simplification of the pronunciation rules for derivatives among learners and native speakers of English.

The relative difficulty of derivatives based on suffix types was not assessed due to the uneven distribution of suffix types used in the test items. This was because the main objective of the Listening

Test was to test subjects' morphophonemic awareness with familiar or known words rather than words with different suffixes. Moreover, different types of affixes were represented in both BB and NBB errors. However, the limited evidence from the eight words ending with -ation, the seven words ending with -ity, and the five words ending with -al seemed to indicate that words ending with the same suffix posed varying levels of difficulty for ESL subjects. The percentage of ESL subjects who had correct aural recognition of -ation words ranged between 90.63% for "recitation" and 25% for "declaration." The percentage of ESL subjects who had correct aural recognition of -ity words ranged between 90.63% for "nationality" and "popularity" and 53.13% for "Christianity." The percentage of ESL subjects who had correct aural recognition of -al words ranged from 75% for "accidental" and 100% for "political." It might be said that ESL subjects had not yet formed their own phonological rules regarding vowel and stress alternations for derivatives based on specific suffixes. However, though BB preference in aural recognition was higher than that for NBB, the 67.60% score for correct perception and the 31.51% error rate for NBB also showed that subjects were aware, to different extents, of the need for stress shift and vowel alternations in Latinate derivatives. This means that these ESL subjects were beginning to notice stress shifts and vowel alternations in derivatives.

8.3   Results of Pronunciation Test

Below is the summary of the Pronunciation Test results. The abbreviations "IP" and "NS norm" are used. "IP" stands for "intelligible pronunciation" and "NS norm" stands for "acceptable or close to NS norm of pronunciation according to the assessment of the native-speaker rater."

Among ESL subjects, the mean score for base words with IP was 96.35%. The scores ranged between 51 and 60 (out of 60), that is, between 85% and 100%. The mean score for base words with NS norm was 75.16% and the scores ranged between 35 and 54 out of 60, or between 58.33% and 90%. For ESL subjects, the t-test showed that the difference between IP and NS norm for base words was statistically significant, t (31)=-19.50 p < 0.01. For each ESL subject, the average

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number of base words produced with IP was 57.81 and the number with NS norm was 45.09. (See Table 2a.)

. Among ESL subjects, the mean score for derived words with IP was 91.46%. The scores ranged between 38 and 60 (out of 60), or between 63.33% and 100%. The mean score for derived words with NS norm was 38.75%, and the scores ranged between 6 and 37, or between 10% and 61.67%. The t-test showed that the difference between IP and NS norm for derived words was also statistically significant for ESL subjects, t (31)= 24.87 p < 0.01. For each ESL subject, the average number of derived words with IP was 54.88 and that with NS norm was 23.25. (See Table 2a.)

For NS subjects, the mean score for base words with IP was 99.64%, with scores ranging between 57 and 60 (out of 60), that is, between 95% and 100%. The mean score for base words with NS norm was 99.11%. The scores also ranged between 57 and 60, or between 95% and 100%. The t-test was not performed for base word pronunciation (between IP and NS norm) since the lack of variation in subjects' scores did not make the test appropriate. For each NS subject, the average number of base words with IP was 59.78 and that with NS norm was 59.47. (See Table 2b.)

For NS subjects, the mean score for derived words with IP was 99.58%. The scores ranged between 57 and 60 (out of 60), that is 95% and 100%. The mean score for derived words with NS norm was 94.90%. The scores ranged between 54 and 59 (out of 60), or between 90% and 98.33%. The t-test showed that the difference between IP and NS norm for derived words was statistically significant, t (31)=11.76 p < 0.01. For each NS subject, the average number of derived words with IP was 59.75 and that for NS norm was 56.94. (See Table 2b.)

The t-test also showed that the difference in performance in IP of base words between ESL and NS subjects was statistically significant, t (62)=-3.70 p < 0.01. The difference between the two groups in NS norm pronunciation of base words was also statistically significant, t (62)=-16.42 p <0.01.

(See Table 1.) The *t*-test showed that the differences in performance between the ESL and NS subjects in IP of derived words was statistically significant, *t* (62)=-5.09 *p* < 0.01. The difference between the two groups in NS norm of pronunciation of derived words was also statistically significant, *t* (62)=-21.82 *p* < 0.01. (See Table 1 or Table 2a.)

For ESL subjects, 89.95% or 1727 pairs of words (both base word and associated derivative of each pair) had IP out of a possible 1920 pairs. Out of these 1727 intelligible pairs, 1009 pairs or 58.43% contained pronunciation errors, either in the derivatives or the associated base words. The number of pairs with IP for ESL subjects ranged between 37 and 60 (out of 60), or between 61.67% and 100%. Each ESL subject had an average of 31.53 pairs with pronunciation errors. (See Table 4a.)

For NS subjects, 1911 pairs or 99.53% had IP out of a possible 1920 pairs. The number of pairs with IP for subjects ranged between 57 and 59, or between 95% and 98.33%. Out of 1911 intelligible pairs, 84 pairs or 4.40% had errors either in the base word or the derivative. Each NS subject had an average of 2.63 pairs with pronunciation errors. (See Table 4d.)

Among ESL subjects, there were 1009 pairs with intelligible pronunciation for both words in the pair but with pronunciation errors. Out of 1009 pairs with errors, Type 1 (BB) was 44.50% (449 pairs), Type 2 (✓B) was 2.28% (23 pairs), Type 3 (BX) was 1.59% (16 pairs), Type 4 (XB) was 19.43% (196 pairs), Type 5 (✓X) was 6.54% (66 pairs), Type 6 (X✓) was 4.96% (50 pairs), Type 7 (XX) was 19.52% (197 pairs), and Type 8 (C) was 3.67% (37 pairs). The chi-square test performed on the eight error types for frequency distribution showed that the predominance of Type 1 (BB) over the other error types was statistically significant, χ^2 (7)=1195.29 *p* < 0.01. (See Table 4a.)

Among NS subjects, 84 intelligible word pairs contained pronunciation errors. Out of the 84 pairs with errors, Type 1 (BB) was 69.05% (58 pairs), Type 2 (✓B) was 17.86% (15 pairs), Type 3

(BX) was 1.19% (1 pair), Type 4 (XB) was 2.38% (2 pairs), Type 5 (✓X) was 4.76% (4 pairs), Type 6 (X✓) was 3.57% (3 pairs), and Type 7 (XX) was 1.19% (1 pair). There were no Type 8 (C) errors. The chi-square test performed on the eight error types for frequency distribution showed that the predominance of Type 1 (BB) over the other error types was statistically significant, χ^2 (7)=269.07 $p < 0.01$. (See Table 4d.)

Where individual ESL subjects were concerned, Type 1(BB) was also the dominant error type for 29 subjects, that is 90.63%. (See Table 4a.) Where individual test pairs were concerned, among ESL subjects, 36 out of the 60 pairs had Type 1 (BB) as the dominant error type, that is 60.00%. (See Table 4c.)

For NS subjects who had more than one error type, Type 1 (BB) was the dominant error type for 28.13% (9 subjects). Thirty one subjects or 96.88% had at least one BB error. As well, 12 NS subjects or 37.50% had only BB errors. The number of BB errors for individual subjects ranged between zero and six. (See Table 4d.)

For ESL subjects, in the production of the derivatives used in the Listening Test, 872 pairs out of a possible 960 had IP, that is, 90.83%. For each ESL subject, the average number of pairs with IP was 27.25 (out of 30). (See Table 4b.) For these Listening Test items, 451 intelligible word pairs contained pronunciation errors. Out of these 451 pairs with errors, Type 1 (BB) was 49.89% (225 pairs), Type 2 (✓B) was 0.89% (4 pairs), Type 3 (BX) was 0.67% (3 pairs), Type 4 (XB) was 17.29% (78 pairs), Type 5 (✓X) was 7.32% (33 pairs), Type 6 (X✓) was 5.54% (25 pairs), Type 7 (XX) was 15.74% (71 pairs), and Type 8 (C) was 4.21% (19 pairs). (See Table 4c.) The chi-square test performed on the eight error types for frequency distribution showed that Type 1 (BB) was predominant over the other error types. The predominance of Type 1 (BB) was statistically significant, χ^2 (7) =661.67 $p < 0.01$. (See Table 4b.)

Among NS subjects, the chi-square test performed on the eight error types also showed that for the Listening Test items, Type 1 (BB) was also predominant over the other error types. This predominance was statistically significant, χ^2 (7) =180.33 $p < 0.01$. (See Table 4e.)

Where individual ESL subjects were concerned, Type 1 (BB) was the dominant error in the pronunciation of Listening Test items for 30 subjects, that is, 93.75%. (See Table 4b.) Among ESL subjects, 19 out of 30 pairs or 63.33% (where derivatives were from the Listening Test) had Type 1 (BB) as the dominant error type in pronunciation. (See Table 4c.) For ESL subjects, the mean score for aural recognition of NS norm of the 30 derivatives was 67.60%, while their production with NS norm was 44.79%. The aural recognition of NS norm for derivatives was significantly higher than NS norm for their production, t (31)=-8.11 $p < 0.01$. On the average, an ESL subject aurally recognized the NS norm of 20.28 derivatives out of 30, while producing only 13.44 derivatives according to NS norm. (See Table 3b.) Only one ESL subject performed better in NS norm in production (19 out of 30 words or 63.33%) than in NS norm in perception (16 out of 30 words or 53.33%). (See Table 3b.) Among ESL subjects, 20 out of the 30 test items (66.67%) had a higher rate of BB in Pronunciation than in Listening. (See Tables 3a.)

For NS subjects, the t-test showed that the difference between aural recognition and production of derivatives according to NS norm was not statistically significant, t (31)=- 0.32 $p < 0.01$ or $p < 0.05$. (See Table 3c).

Discussion

For ESL subjects, BB preference for the Pronunciation Test as a whole, and for the pronunciation of the 30 Listening Test items was significantly dominant over the other error types. In addition, their performance in the aural recognition of 30 derivatives according to NS norm was significantly better than that in their production according to NS norm. This difference was found to be

not statistically significant for NS subjects.

The results of this Pronunciation Test indicated that incorporating the base-word vowel and stress pattern (or BB) into the pronunciation of derivatives was a significantly dominant pronunciation strategy for both ESL and NS subjects. This finding was similar to that of Cutler (1981a) for native speakers of English. In Cutler's study, subjects also adopted the strategy of stressing a base-word on the syllable which bears stress in the derivative form, as in [mə'dʒɛsti ~ mə'dʒɛstɪk]. This was referred to as "reverse strategy." In my study, reverse strategy was also found in 16 word pairs, giving a total of 75 pairs among all ESL subjects. I categorized "reverse strategy" pronunciation under BB and they made up 16.70% of all BB type errors. These word pairs were "economy ~ economical," "commerce ~ commercial," "minor ~ minority," "comedy ~ comedian," "majesty ~ majestic," "colony ~ colonial," "prior ~ priority," "democrat ~ democracy," "industry ~ industrial," "politics ~ political," "refer ~ references," "prosper ~ prosperity," "major ~ majority," "desperate ~ desperation," "magnet ~ magnetic," and "origin ~ aborigines." Reverse strategy was not common among my NS subjects, making up only 3.45% of all BB error type for this group. (Only two instances were found for one word pair, "majesty ~ majestic.") According to Cutler, a possible explanation is that subjects acquire the derived forms before the base-word forms and pronounce the base words according to the base-word portions of the derivatives. Thus, among my subjects, especially the ESL subjects, BB errors might contain a correctly pronounced base word and an incorrectly pronounced derivative, or an incorrectly pronounced base word and a correctly pronounced derivative, with the former more frequent than the latter.

For the Pronunciation Test as a whole, BB was the most common error type. In BB errors, subjects used the rules for non-Latinate derivatives in constructing their phonological representations of Latinate derivatives. The dominance of BB errors in the pronunciation of derivatives was found to be statistically significant among ESL subjects as a group (44.50% of all errors), as individuals (90.63% of all ESL subjects), and among individual test pairs (60.00% of 60 pairs). In the production of the

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Listening Test derivatives, the most common error was also Type 1 (BB) for the group (49.89% of all error types for Listening Test items), for individual subjects (93.75% of all ESL subjects), and for individual test pairs (63.33% of 30 test pairs). Therefore, the results of the Pronunciation Test for ESL subjects as a whole showed that BB pronunciation was the dominant error type in the production of Latinate derivatives.

Therefore, Hypothesis 2, that among ESL subjects, the most dominant error type in the pronunciation of derivatives was the incorporation of base-word vowel and stress patterns rather than any other types of errors, was confirmed. The dominance of this error type was found to be statistically significant.

BB errors were also significantly more common than the other error types in the pronunciation of derivatives among NS subjects. Type 1 (BB) was 75.00% of all pronunciation errors in the Listening Test items. Other error types ranged between 0.00% and 16.67%. For the Pronunciation Test as a whole, 69.05% of errors were BB, while other error types ranged between 0.00% and 17.86%.

I would like to comment on other interesting observations in the pronunciation of ESL subjects. Besides BB errors, a number of productions involved either base word stress or base-word vowels. The former (Type 3 (BX)) made up 1.59% of errors, but the latter (Types 2 (✓B) and 4 (XB)) constituted 21.71% of errors. Therefore, contrary to Baptista (1989), errors incorporating base-word vowels (totalling 66.21%) were more frequent than those incorporating base-word stress (46.09%). (Surprisingly, for NS subjects, Types 2 and 4 were 20.24% vs. 1.19% for Type 3.) For ESL subjects, excluding BB errors, base-word stress (Type 3 (BX), 1.59%) was also less common than other incorrect stress (Type 4 (XB) 19.43% or Type 7 (XX) 19.52%). In Type 4 (XB), subjects used incorrect stress (different from base-word stress) and base-word vowel, as in "admire ~ admiration" [,æd'mɑr ~ 'ædmɑ,reʃən]. Incorrect stress was due to the failure to reduce the antepenultimate syllable of the derivative and placing primary stress on the initial syllable instead of the penultimate syllable. In Type

7 (XX), both stress and vowel alternations were incorrect but not BB, as in "democrat ~ democracy" ['dɪmokræt ~ dɪ,mɔ'kresi]. For the derivative, subjects failed to reduce the penultimate syllable and carried over the full vowel of the final syllable of the base into the derivative, giving it primary stress.

Sometimes, ESL subjects produced the correct vowels, but placed the primary stress on the wrong syllable (Type 6 (X✓)) but this constituted only 4.96% of errors. This error type was found in "inclination," "composition," "revolution," "Japanese," "combination," "recitation," "preparation," "reservation," "aborigines," and "declaration." The onset syllable was given primary stress instead of secondary stress, as in ['dɛkləreʃən]. This error was very random among NS subjects, constituting only 3.57% of errors. It was interesting to note that where ESL subjects preferred, in a perception task, correct vowel alternations with incorrect primary stress placement, (NBB preference was 31.51%), their production of correct vowels with incorrect stress pattern was much lower (Type 6 (X✓), 4.96%). This could be due to their ability to aurally recognize the need for vowel reduction in unstressed syllables but the prevalence of unreduced vowels in unstressed syllables affected their production.

On a positive note, errors that did not involve BB showed that ESL subjects were beginning to make vowel and stress shifts in derivatives, producing words that had different vowel and stress patterns from their base words, albeit with errors. The second highest error type among ESL subjects was XX (Type 7, 19.52%). This was closely followed by XB (Type 4, 19.43%). That ESL subjects were shifting the primary stress from the base word to a syllable in the suffix was also noteworthy. The following percentages show the rate of shift of primary stress to the suffix out of the total number of errors for the particular word pairs : "resignation" (73.68%), "exploration" (72.73%), "composition" (70.37%), "combination" (58.82%), "declaration" (42.86%), "inclination" (42.31%), "perspiration" (36.36%), "revolution" (33.33%), "admiration" (33.33%), "proclamation" (33.33%), "recitation" (30%), "preparation" (30%), explanation" (29.41%), "reservation" (28.57%), "competition" (16.66%), "exclamation" (9.52%), and "Japanese" (4.55%). In the production of these words, subjects might

have failed to make vowel reductions in some words, as in [ˌproklɪˈmeʃən]. Some ESL subjects were therefore able to produce derivatives with correct primary stress placement, but errors occurred due to the failure to reduce unstressed vowels.

As far as the items for the Listening Test were concerned, ESL subjects as a group performed better in aural recognition than in production for the same test items. While the mean score was 67.60% for Listening, the mean score for NS norm of pronunciation was only 44.79%. This could be due to the testing strategy, that is, providing only two incorrect pronunciation options. However, this was offset by the "None of the Above" option and subjects could have selected this if the given options did not fit their phonological representations of the given test items. Of the 30 items used in the Listening Test, 29 had higher scores in the Listening Test than in the Pronunciation Test. Only "declaration" had a higher score of 25% for the Pronunciation Test and a lower score of 12.50% for the Listening Test. Of the items with higher scores for the Listening Test than the Pronunciation Test, the difference between the scores for the two tests ranged between 3.13% for "mechanism," "authority," "comparable," and "accidental," and 78.13% for "political." Only one ESL subject performed better in production than in perception, the difference in score being only 10% (3 words). As a group, the aural recognition of the NS norm of pronunciation for derivatives averaged at 7.22 words more than their NS-norm production.

Better performance in aural recognition than in production could be explained by the fact that an aural recognition task was inherently easier than the task of orally producing words without imitating a given model. (Moreover, the rate of aural recognition of a similar set of words might not be as high in the context of continuous speech stream.) While no BB preference was found for two words in the Listening Test ("combination" and "political"), two subjects had BB pronunciation for "combination" and 12 subjects had BB pronunciation for "political." It must be stated that while the BB options given in the Listening Test always contained the correct pronunciation of base-word portions of the given derivatives, (eg. ˈpolətɪks - ˈpolətɪkəl), the BB errors of subjects' production might not. Twenty out of 30

words (66.67%) had a higher rate of BB in pronunciation than in listening, and all these words had higher scores for NS norms on the Listening Test than in NS norms on the Pronunciation Test. However, the mean scores for intelligible pronunciation of derivatives (91.46%) were higher than the mean scores for NS norms in Listening (67.60%).

Errors in the production of some derivatives among some NS subjects, such as "comparable", "recitation," "admiration," and "telegraphy," showed that vowel and stress shifts were not natural. This means that even native speakers have to learn their phonological representations as confirmed in studies in L1 (Steinberg 1973; Jaeger 1984, 1986; McCawley 1986; Ohala 1986; Wang & Derwing 1986; Dziubalska-Kolaczyk 1992). Where NS recognized the required stress shifts, the natural reduction of unstressed syllables was carried out, resulting in fewer errors than among ESL subjects who did not reduce unstressed syllables.

Consonant errors were infrequent among ESL subjects as only 37 pairs or 3.67% of all word pairs with errors involved consonant errors. There were 12 pairs where vowel and stress patterns were correct and only consonant alternations were incorrect. Twelve tokens of "influential," "confidential," and "accidental" contained only consonant errors. Consonant errors consisted of either pronouncing the final consonant of the base in the derivative as in [ɪnfluənsəl], or pronouncing the orthographic <t> before the suffix, as in [ɪnfluəntəl], or pronouncing both the final base word consonant and the orthographic <t> of the derivative, as in [ɪfluənstəl]. Similarly, subjects produced [kʃ] preceding the suffix -ian for "magician." Consonant errors were not found among NS subjects. The consonant cluster [st] in "Christian" and "Christianity" was spirantized into [stʃ] by NS subjects but was pronounced as [st] by ESL subjects. Errors in dental-nasal clusters such as [dm] in "admire - admiration" were infrequent among ESL subjects. Other phonological differences between ESL and NS subjects were the production of two clear vowels by most of the ESL subjects for the suffix -ian [ɪən] compared with NS [ən]. Most ESL subjects pronounced "Newton" with a clear final syllable, while most NS subjects produced it with a glottal stop and/or syllabic n̩. Most ESL subjects did not produce taps between a

stressed and reduced vowel, as in "metal." This showed that ESL subjects treated English orthography as a phonetic representation more than NS subjects did.

8.4   Results of Word Analysis Test

Both NS and ESL subjects supplied synonyms, unrelated words, and the given test words as responses in the Word Analysis Test. The possibility of the subjects' not understanding the task was unlikely, as no ESL subjects scored below 43.33%, and every ESL subject did display instances of word structure manipulation. (See Table 5a.)   Non-existing English words, unrelated or synonymous words, or words corresponding to the given test items were rated as incorrect. (See Table 5b.) The results of the Word Analysis Test are summarized below.

The mean score for ESL subjects on the Word Analysis Test was 58.13%. The scores ranged between 10 and 26 (out of 30), that is, between 33.33% and 86.67% . (See Table 2a.) The mean score for NS subjects on the Word Analysis Test was 90.52% and the scores ranged between 23 and 30, that is, between 76.67% and 100%. (See Table 2b.) The t-test showed that the difference between the performance of the two groups was statistically significant, t (62)=13.63 p < 0.01. (See Table 1.)

ESL subjects could abstract base words or supply morphologically related words at an average of 17.44 words for the 30 given derivatives. On the other hand, NS subjects could abstract or supply an average of 27.16 base words or morphologically related words for the given 30 derivatives. (See Table 5a.)

ESL subjects employed 18 strategies in the test. Strategy 1, stripping suffix(es) without spelling change made up 36.63% of all errors.   A chi-square test performed on the Strategies   1 to 17 (those involving word structure manipulation) for frequency distribution showed that Strategy 1 was

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predominant over the other 16 strategies. This predominance was statistically significant, χ^2 (16)=792.20 p < 0.01. (See Table 5b.)

Among ESL subjects, Strategy 2, stripping suffix(es) with spelling change was the second most common strategy, making up 14.53% of errors. Among the subjects, 71.88% had more Strategy 1 errors than Strategy 2 errors and 25% had only Strategy 1 errors. The number of Strategy 1 errors ranged between zero and 13. The number of Strategy 2 errors ranged between zero and 4. (See Table 5c.)

NS subjects employed 9 strategies. Strategies 1 and 3 (stripping suffix(es) without spelling change and stripping a suffix from a multiple suffix respectively) were the two dominant strategies, each making up 26.87% of errors. The chi-square test performed on the 17 strategies for frequency distribution showed Strategies 1 and 3 to be predominant over the other strategies. This predominance was statistically significant, χ^2 (16)=165.75 p < 0.01. (See Table 5b.) For individual subjects, errors ranged between zero and three. (See Table 5d.) The second most common strategy among NS subjects was Strategy 11 (stripping suffix and part of base or root, adding another suffix with spelling change) which was 19.40%. (See Table 5d.)

The rate of supplying the same word as the given test items or supplying unrelated or synonymous words was five times higher among ESL subjects than among NS subjects.

Discussion

The difference in performance between ESL subjects and NS subjects in the Word Analysis Test was found to be statistically significant. For ESL subjects, among the 17 strategies (involving word structure manipulation) employed in the test, that of suffix stripping without spelling change was significantly dominant. For NS subjects, two strategies, stripping suffix(es) without spelling change

and stripping one suffix from a multiple suffix, were equally dominant. They were also dominant among the nine strategies employed. Their dominance was also statistically significant.

In the above two strategies mentioned, "spelling change" refers to orthographic adjustments made by subjects to the given test item in the process of abstracting a base word. For example, given "reception," a subject did not make spelling change if the response was *"recept" but a spelling change was made if the response was *"recepte." Thus, the term "spelling change" does not refer to responses where another suffix was used to replace the stripped suffix. (This will be discussed later.)

In order to test for subjects' ability to make the necessary spelling changes to the base, derivatives used in the Word Analysis Test were those with unclear or non-obvious stem-suffix boundaries. Only two words, "destruction" and "unity" had a clear or obvious stem-suffix boundary, but their associated base words could have orthographic change or no orthographic change ("destroy" or "destruct" and "unite" or "unit"). According to Wheeler and Schumsky (1980), for words with unclear boundaries, the most dominant strategy of abstracting base words among speakers is that of "Stem-Suffix," that is "look for the stem and everything else is suffix." This is followed by the strategy of "Suffix Extension Strategy" where subjects extend the stem-suffix strategy to a derivative which has a suffix resembling closely the known suffix of a word, for example, -al in "cultural" is extended to "sensual." The third strategy is "No-Suffix," where a speaker fails to recognize a suffix because the derivative was acquired earlier as a whole and indivisible unit and never analyzed subsequently. Speakers tend to use the easiest analysis, but it does not mean "do nothing"; it means that the Stem-Suffix Strategy and Suffix-Extension Strategy are used first before No-Suffix Strategy.

Wheeler and Schumsky's findings among native speakers of English seem to explain the strategies that ESL subjects employed in this study, namely, look for the stem and strip the suffix (and sometimes, prefix), or extend this rule to other words (eg, "destruct" but *"contamin," and *"commiss"). This explains the dominance of the strategy of no spelling change in the test. It was

also possible that subjects who had semantic or morphological connections between words in their internal lexicon failed to apply their knowledge on demand.

For ESL subjects, among all the strategies employed, simple suffix-stripping without spelling change (Strategy 1) made up 33.51% of errors (126 out of a total of 376 errors), making this the significantly dominant strategy in the test. The number of errors for Strategy 1 ranged between zero and 13, and between zero and 4 for Strategy 2. Among ESL subjects, 71.88% had more Strategy 1 errors than Strategy 2 errors. Between these two strategies, 25% of subjects had Strategy 1 errors only but no subjects had Strategy 2 errors only. Among ESL subjects, Strategy 1 also involved the greatest number of test items, that is, 24 out of 30 items. The number of errors in this strategy ranged between one and 22 tokens, the largest number occurring for "reception." If the strategies of supplying synonyms, unrelated words, or the same words as test items were excluded from the analysis (as these responses did not really involve word structure manipulation), the total number of errors was 344. Simple suffix stripping without spelling change was still the most dominant strategy, that is, 36.63%. (For NS subjects, Strategy 1 was 26.87% of errors, the number of errors ranging between zero and 3. Suffix stripping without spelling change was also the significantly dominant strategy among NS subjects. The item "reception" had the highest error rate for both groups.)

Thus, Hypothesis 3, that among ESL subjects, if the base words within English Latinate derivatives (with non-obvious suffixes) are not recognized, the dominant strategy for abstracting base words from the derivatives will be suffix stripping without spelling changes to the base words rather than other strategies involving suffix stripping, base-word manipulation, and/or spelling changes. The dominance of suffix stripping without spelling change was found to be statistically significant. Therefore, this hypothesis was confirmed.

I will now examine other strategies, some of which did not involve base-word abstraction but involved other morphological manipulations of test items. In some of these strategies, spelling

changes were either made or not made. For example, no spelling changes were found in Strategies 4, 5, 7, 9, 10, 14, 15, and 16. For example, * "messenge" for "messenger" was rated "strip part of suffix, no spelling change" and *"mobilition" for "mobility" was rated "strip suffix, supply another suffix, no spelling change." However, these strategies were far less common (82/344 or 23.84% for ESL subjects) compared with Strategy 1, simple suffix stripping without spelling changes. For all the strategies that did not involve spelling changes, (including Strategy 1), there were 175 errors out of 344, or 50.87%. On the other hand, besides Strategy 2, strategies that involved affix stripping with or without the addition of (an)other affix(es) but with spelling changes were Strategies 3, 6, 8, 11, 12, and 13. (For example, *"conversate" for "conversation" was rated "strip suffix from multiple suffix, spelling change." *"Conquence" for "conquest" was rated "strip part of root, add another suffix, spelling change.") Altogether, the strategies that involved spelling changes made up 145 errors out of 344 errors (Strategies 1 - 17), or 42.15%. Sometimes, subjects kept the whole word and added (an)other suffix(es). There were more words without spelling changes (Strategy 5, 11 words, 4.07% of errors, eg. *"decisionation," *"conquestion," *"commissional," "remedialation," *"respiratorize," *"opponenter," *"opponential" and *"contaminationer") than words with spelling changes (Strategy 6, 1 word, 0.29%, *"vacancial"). In Strategy 4 where subjects stripped the suffix and added another suffix, 27 out of the 33 responses involved strictly no spelling change up to the point where a suffix is stripped and another one is attached (eg. "contamination ~ *contaminer," and "commission ~ *commisser," "mobility ~ *mobilition," and "extremity ~ *extremy"). Responses that involved no spelling changes to the bases in the given derivatives, or to the "bases" contained in subjects' non-existing English words totalled 58.72% of errors. Therefore, ESL subjects avoided spelling changes as much as possible.

In correct responses, the majority of ESL subjects also tended to employ the simplest strategies, that is, suffix stripping without orthographic changes. This was seen in the responses for "destruction" (65.63% for "destruct" but 15.63% for "destroy"). Similarly, for "unity," 71.88% were "unit," and 21.88% for the other four response types combined ("unite," "unities," "united," and "union"). For "civilization," 53.33% of correct responses were "civil" while 46.67% were "civilize."

Where orthographic changes were made by ESL subjects, most of the words with the highest scores for correct responses involved some orthographic changes to the final letters of the base word as in "decide ~ decision" (81.25%), "determine ~ determination" (93.75%), "fertile ~ fertility" (75%), "mobile ~ mobility" (68.75%) and "reduce ~ reduction" (71.88%). Words that had the lowest scores were those that required changes to the orthographic vowel as well as consonant of the bound "root" morphemes, rather than simply stripping the given suffix and making the necessary orthographic consonant changes to the ends of words (as above). The scores were 15.63% for "destroy ~ destruction," 12.50% for "receive ~ reception," and 18.75% for "suspect ~ suspicious." Except for "success ~ succeed" (50% correct), orthographic (and phonetic) modification which involved vowel as well as consonant adjustments to the bound morphemes of derivatives rendered opaque the base words in these derivatives. For these words, ESL subjects adopted the strategy of keeping the whole derivative and adding another suffix, as in "successor" and "successful," "receptionist" and "receptive," and "destructive" and "destructor." For "destruction," the responses "destruct," "destructive," and "destructor" (78.13%) involved greater ease of analysis than "destroy" (15.63%). Keeping the whole word and adding another suffix seemed to comply with the strategy of "ease of analysis" found among native speakers of English (Wheeler & Schumsky 1980:30). (For "conquest," prefix stripping and leaving the "root" ("quest") intact was also relatively frequent (21.88%).

While spelling changes were made in Strategies 2, 3, 6, 8, 11. 12, and 13, two of them did not involve the use of real affixes (Strategies 2 and 13 or 15.69%), being merely orthographic manipulations. Those that involved real affix manipulation (with or without spelling changes) were Strategies 3, 4, 5, 6, 8, 11, 12, 14, 15, and 16. These errors totalled 41.28% of errors for ESL subjects and 55.22% of NS subjects' errors. In other words, NS subjects were engaged in real affix manipulation more than ESL subjects. In short, for both ESL and NS subjects, spelling changes were more accompanied by word-structure manipulations (i.e. manipulating affixes) than not. However, the rate of word-structure manipulation was higher for NS subjects than for ESL subjects.

Shortening the multiple suffix *-ation* to *-ate* (Strategy #3) was 11.63% for ESL subjects and 26.87% for NS subjects. Concatenating affixes that violated the rules of selectional restriction in Latinate words (Fabb 1988) was found among ESL subjects but not among NS subjects. For example, ESL subjects supplied multiple suffixes such as *-ent-er* (*"opponenter"), *-ion-ation* (*"decisionation"), *-ial-ation* (*"remedialation"), and *-ent-ion* (*"opponention"). This showed that ESL subjects had a lower awareness of adjacency rules of suffixes than NS subjects, which is also confirmed in Aiking-Brandenburg et al. (1990). However, ESL subjects also supplied some words that complied with the adjacency rules of suffixes, though they resulted in non-existing English words, eg. *-ion-al* in *"commissional," *-or-ize* in *"respiratorize," *-ial-ly* in *"remedially," *-ion-er* in *"contaminationer," *-y-al* in *"vacancial," and *-ent-ial* in *"opponential." These errors could be due to the overgeneralization of the applicability of multiple suffixes to words among ESL subjects. These errors were not found among NS subjects, showing that ESL subjects had a weaker vocabulary than NS subjects.

Of the 30 items in the Word Analysis Test, 20 items contained both prefixes and suffixes. (The words "messenger," "mobility," "numerous," "vacancy," "civilization," "fertility," "unity," and "abolition" had no prefixes while "conquest" and "success" had no suffixes.) For these 20 test items, ESL subjects had 256 errors (with or without spelling changes). Of these 256 errors, 242 errors (or 94.53%) involved suffix manipulation, while 14 errors (or 5.47%) involved prefix manipulation. As well, of the 17 strategies involving word structure manipulation among ESL subjects, 12 strategies involved suffix manipulation while only three strategies involved prefix manipulation. For the same 20 test items, NS subjects had 58 errors found in seven strategies and 57 of these errors (or 98.28%) involved suffix manipulation. Only one error involved prefix manipulation where the subject also stripped the suffix and supplied the root ({vid} for "evidence." Cutler's (1980a) and Segui and Zubizarreta's (1985) studies confirm that among NS of English, suffixes receive more attention than prefixes in word processing. According to Segui and Zubizarreta (1985), NS subjects treat the end part of a suffixed word as a perceptual unit. Both the ESL and NS subjects in my study showed the same tendency. Though the strategies described in Table 5b resulted in non-existing English words, they were positive in their

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indication that ESL subjects were aware that "words contained stems and suffixes, and some spelling changes take place in certain base words when the suffixes were removed."

No ESL subjects supplied "roots" (such as {mit} for "commission", {duce} for "reduction"), and only one NS subject did so for one test item ({vid} for "evidence"). That subjects supplied the same words as the given test items could be explained by the possibility that subjects failed to recall the required word in the same morphological family on demand, or simply did not see the divisibility of the words (Wheeler & Schumsky 1980). In the case of supplying unrelated words, among ESL subjects, 29 out of the 30 words supplied (96.67%) were words which had orthographic or phonetic resemblance to the given words (eg. "conversation - *conserve" and "invasion ~ invent"). This was also found in 50% of NS subjects' responses which were unrelated words. Orthographic confusion is a common problem confirmed in L1 literacy studies.

8.5   Results of Semantic Rating of Word Pairs Test

Out of the 95 word pairs in the Semantic Rating of Word Pairs Test, ESL subjects did not rate a total of 21 word pairs and NS subjects did not rate a total of 3 word pairs. In the following discussion, the abbreviation MSR refers to the "mean semantic rating" for each word pair by subjects, and DSR refers to "recognition of definite semantic relatedness, that is, 5." The MSR of 3.0 (described as "somewhat related" in the questionnaire or mid-point between 1 and 5) and below was the criterion for semantic opaqueness/semi-opaqueness. The following is a summary of the subjects' responses in the Semantic Rating of Word Pairs Test.

The MSR for all the 95 word pairs in Questionnaire 2 was generally lower for ESL subjects than that for NS subjects, being 4.0 and 4.3 respectively. ESL subjects had lower MSR than NS subjects for 76 out of the 95 word pairs. The difference in the MSR between the two groups for the 95 word pairs was not statistically significant, t (186)=-1.07 p < 0.01 or p < 0.05. (See Table 6a.)

Table 6a contains 38 derivatives with obvious suffixes (marked *, with 35 words from the Pronunciation Test and 3 from the Word Analysis Test). The suffixes were *-ity, -ic, -ical, -ence(s), -ial, -ion, -ory, -ation, -er, -y, -ian,* and *-ary.* In all these words, the base words were preserved in the spelling of the derivatives, including those which had orthographic changes that followed the same rule in non-Latinate words, that is, word final <y> becomes <i> before a suffix. For the 38 word pairs containing derivatives with obvious suffixes, the MSR was 3.9 for ESL subjects and 4.1 for NS subjects. The t-test showed that this difference was not statistically significant, $t(74) = -1.16$ $p < 0.01$ or $p < 0.05$. (See Table 6a.) This means that we may assume that the semantic relations of associated words was generally evident to ESL subjects.

The 38 word pairs that contained obvious-suffix derivatives were further analyzed according to subjects' ratings for opaque or transparent semantic relations, an MSR of 3 (mid-point) and below being taken as the criterion for opaque/semi-opaque semantic relations. (See Table 6b.) Of these 38 obvious-suffix pairs, five pairs were rated as semantically opaque/semi-opaque by ESL subjects (called Type A). The five pairs were "author ~ authority," "origin ~ aborigines," "family ~ familiar," "minor ~ minority," and "element ~ elementary." For these 5 pairs, the MSR was 2.4 for ESL subjects and 2.9 for NS subjects. (Because of the small number of words, a t-test was not performed.) Only the first three of these pairs were rated as opaque by NS subjects. However, of these three pairs, one pair, "author ~ authority," had a slightly higher MSR among ESL subjects than among NS subjects (2.2 vs. 2.0). For the remaining 33 word pairs that were rated as semantically transparent by ESL subjects (called Type B), the MSR was significantly lower among ESL subjects than among NS subjects (4.1 vs. 4.3). The MSR of 23 word pairs was lower for ESL subjects than NS subjects. The t-test performed on the MSR of the 33 pairs with obvious-suffix derivatives and transparent semantic relations (Type B) showed that there was a statistically significant difference between the two groups, $t(64) = -72.38$ $p < 0.01$. (See Table 6b.) Therefore, it is clear that the MSR of ESL subjects was generally lower than that of NS subjects for word pairs with obvious-suffix derivatives that had opaque semantic relations as well as those that had transparent semantic relations.

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For the 57 word pairs containing derivatives with non-obvious suffixes, the MSR was 4.0 for ESL subjects and 4.4 for NS subjects. The t-test showed that this difference between the two groups was statistically significant, t (112)=-3.71 p < 0.01. (See Table 6a.)

For the 34 word pairs (with 32 derivatives containing non-obvious suffixes) from the Word Analysis Test, the MSR was 3.9 for ESL subjects and 4.4 for NS subjects. The difference was statistically significant, t (66)=-3.87 p < 0.01. (See Table 6a.)

Therefore, the MSR was generally lower among ESL subjects than among NS subjects for word pairs containing obvious-suffix derivatives as well as derivatives containing non-obvious suffixes. Thus, derivatives containing obvious suffixes and non-obvious suffixes were generally more difficult for ESL subjects than NS subjects.

According to Wheeler and Schumsky (1980) and Cutler (1981), if a derivative contains obvious suffix(es), the recognition of the stem and the suffix(es) is easier. The spelling of obvious-suffix derivatives might have been used by ESL subjects in two ways, viz. as a cue for meaning relations between base words and associated derivatives and for the pronunciation of the base-word portions of the associated derivatives. Therefore, I investigated the effect of DSR of 38 word pairs containing obvious-suffix derivatives on the rate of BB for these words in the Listening Test and the Pronunciation Test. I used DSR or "definitely related in meaning" for the following comparisons as it would show that subjects were definitely sure the words in a pair were semantically related. (See Table 6b.)

Two Pearson's Correlation Coefficient Tests were computed. The first was to determine whether the perceived semantic relatedness between two words in a pair, as reflected in the DSR scores, was related to the frequency of BB in the aural recognition of derivatives in the Listening Test. The second was to determine whether the perceived semantic relatedness between two words in a pair, as reflected in the DSR scores, was related to the frequency of BB in the Pronunciation Test.

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These relationships might be expected if the subjects were using semantic relatedness as a strategy for determining the phonological representations of derivatives.

There were 16 obvious-suffix words in the Listening Test The Pearson's Correlation Coefficient Test showed that there was no correlation between DSR and BB in the Listening Test, $r=0.005$. (See Table 6b.) For the semantically opaque/semi-opaque pairs (Type A), DSR was slightly higher than the preference for BB in perception, averages being 18.71% and 16.70% respectively. For the semantically transparent word pairs (Type B), the average DSR was about four times higher (60.51%) than the average of BB preference in perception (15.15%). For the Listening Test as a whole (30 words), the average of BB preference was less than one third (15.44%) of the average DSR (52.10%). There was a very low negative correlation between DSR and BB in the Listening Test as a whole, $r=-0.130$. This correlation was not statistically significant at $p < 0.01$ or $p < 0.05$.

There were 35 obvious-suffix words in the Pronunciation Test. The Pearson's Correlation Coefficient Test showed that there was a very low negative correlation between DSR and BB in the Pronunciation Test, $r=-0.153$. (See Table 6b.) This correlation was not statistically significant at $p < 0.01$ or $p < 0.05$. There was a very low positive correlation between DSR and BB in the Pronunciation Test as a whole (60 words), $r=0.297$, but this correlation was also not statistically significant at $p < 0.01$ or $p < 0.05$.

The production of the five semantically opaque derivatives (Type A, MSR of 3.0 or below) showed the average BB to be more than twice as high as the average DSR, being 39.52% and 18.71%. respectively. On the other hand, in the production of the 30 semantically transparent derivatives (Type B), the average BB was slightly lower than the average DSR, being 58.34% and 62.49% respectively. On the whole, for both semantically opaque and transparent word pairs (Types A and B), the average DSR was slightly higher than the average BB in the production of obvious-suffix

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derivatives, being 56.23% and 55.65% respectively.

Discussion

Spelling is a key factor to how speakers segment words, since exposure to derivatives is primarily in written form (Wheeler & Schumsky 1980; Bruck & Waters 1990; Templeton & Scarborough-Franks 1985). Dependence on written forms can be assumed to be greater among learners than native speakers of English. This is because learners have limited exposure to oral English in their home countries and most learners tend to avoid oral discussions in academic situations, preferring to read content materials instead. As mentioned earlier, Wheeler and Schumsky (1980) and Cutler (1981) confirm that derivatives containing obvious suffixes help speakers' recognition of the base words while uncertain suffixes which require phonetic or spelling changes to the base hinder base-word recognition. If spelling makes obvious-suffix derivatives easily decoded for their stems, their semantic relatedness will presumably be easily recognized.

The results of the Semantic Rating of Word Pairs Test (for pairs containing obvious-suffix derivatives) showed that neither of the correlations between DSR and BB in the Listening Test and between DSR and BB in the Pronunciation Test was statistically significant. The effect of DSR on the preference for BB in the phonological representations of derivatives was therefore unclear. Not recognizing the semantic relations between two morphologically related words did not prevent ESL subjects from incorporating BB in their phonological representations of derivatives; nor did high DSR lead to a higher rate of BB preference. For example, for the semantically opaque pairs, while DSR for "author ~ authority" was 25%, BB was 12.50% for Listening and 50% for Pronunciation; while DSR for "origin ~ aborigines" was 15.63%, BB was 37.59% for Listening and 45% for Pronunciation. For the semantically transparent pairs, while DSR for "invent ~ inventory" was 34.38%, BB was 75% in Listening and 100% in Pronunciation. Similarly, DSR for "Japan ~ Japanese" was 86.67% while BB was 38.18% in Pronunciation.

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A number of factors could have influenced subjects' pronunciation of obvious-suffix words.

Lower BB pronunciation could be due to higher familiarity with and higher frequency of a word and not

due to subjects' lower rate of DSR. The data seemed to suggest that, generally, for ESL subjects,

meaning relatedness between base words and derivatives was not used as a primary cue for the

phonological representations of derivatives, but spelling was. Stated differently, spelling seemed to

have been used more as a cue for the pronunciation of morphologically associated words (that is,

pronounce the base-word portion of the derivative like the base word), than as a cue for the

meaning relatedness between words, although spelling would suggest meaning relatedness. This

seemed to explain the lower MSR and DSR for ESL subjects than NS subjects, and the significant

preference for BB pronunciation among ESL subjects. (In Questionnaire 1A, 81.25% of ESL subjects

had indicated that they worked out pronunciation from spelling, and 46.85% by stripping affixes.

Neither of these strategies would work well for the pronunciation of Latinate derivatives. On the other

hand, only 31.25% of ESL subjects indicated that they worked out the meanings of words by stripping

affixes when this strategy for decoding the meanings of derivatives would be effective in most cases.)

According to Stemberger (1985), an error in word production with the stress and vowel

patterns of a derivationally related word is caused by the shared representation of the words in the

speaker's lexicon; for ESL subjects, the shared representation appeared to be mainly the orthographic

representation rather than the semantic representation.

**Thus, Hypothesis 4, that among ESL subjects, there will be a positive correlation
between the rate of recognition of semantic relatedness between morphologically associated
words and the incorporation of base-word pronunciation in the phonological representations of
Latinate derivatives with obvious suffixes, was not confirmed.**

I will now consider responses for "unity," "destruction," and "remedial" by ESL subjects in the

Word Analysis Test. For "unity," 76.67% of correct responses were "unit," an orthographically simpler

strategy than "unite," and "union" (6.67% for both words). However, DSR was 36.67% for "unity ~ unite" and 40% for "unity ~ unit." DSR for "destruct ~ destruction" was 46.88% and 43.75% for "destroy ~ destruction." Among the ESL subjects, 15.63% acknowledged that they did not know the meanings of one or both of the words for the "destruct ~ destruction" pair (no response in the Semantic Rating of Word Pairs Test). Yet, 70% of correct responses in the Word Analysis Test were "destruct" while only 16.67% was "destroy." "Destruct" was orthographically simpler than "destroy." It was likely that for some subjects, the affix was stripped to abstract "destruct" without the meaning of "destruct" in mind. While DSR for "remedy -remedial" was 53.13%, only 28.13% scored correct in the Word Analysis Test. On the whole, DSR was very much higher than scores for correct base words supplied for derivatives with non-obvious suffixes (eg. "prescribe ~ prescription," and "abolish ~ abolition"). This could be because the task of recognizing semantic relatedness between words was easier when both words were visually presented than when subjects had to recall the associated words on demand. It could also be due to subjects' failure to make the correct spelling changes.

My Word Analysis Test confirmed a significant difference between ESL and NS subjects in their ability to abstract base-words from derivatives with non-obvious suffixes, or to supply morphologically related words. My Semantic Rating of Word Pairs Test also revealed that, generally, there was a significant difference between the two groups in MSR of derivatives containing both obvious and non-obvious suffixes. This would imply that learners had difficulty in abstracting or recognizing base words within derivatives to obtain their core meanings, the difficulty increasing with orthographic complexity. It could also be due to the lack of practice in decoding and inability to recall. The former is a likely reason since less than 31.25% of ESL subjects had indicated that they stripped affixes to obtain the meanings of words, compared with 75% who guessed word meanings by reading the sentence(s) very carefully. Moreover, metaphorical extension of the base word meanings in derivatives is sometimes necessary, eg. "prior ~ priority." This might have caused problems for ESL subjects. The above analysis shows that ESL learners' understanding of morphologically related words in terms of semantic, orthographic, and phonological representations warrants further investigation.

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8.6   Linguistic and Pedagogical Implications

The results of this integrated study of the morphological and morphophonemic awareness of college-preparation ESL learners have many linguistic and pedagogical implications. Many common patterns in the acquisition of Latinate derivatives were found between learners and native speakers of English, which I will explain below.

8.6.1   Linguistic Implications

For speakers and learners of English, a derivative comes from another word, not its etymological root, confirming a word-based morphology among learners and native speakers. (Only one NS subject supplied {vid} for "evidence" and no ESL subjects supplied roots.)

The process of morphological decomposition in speakers and learners is psychologically real, as evident in the dominance of the strategy of affix stripping in word analysis. Suffix stripping is much more evident than prefix stripping for both speakers and learners.

Morphologically related words have different levels of semantic transparency for speakers and learners. Semantic distance influences speakers' and learners' recognition of semantic relations between two morphologically associated words. Thus, for the words "prescription," "conversation," and "explanation," the responses "prescribe," "converse," and "explain" are found but not "scribe," "verse," and "plain."

Ease of morphological analysis influences base-word abstraction. From the limited evidence here, it is likely that complexity lies not with the fact that a derivative contains a bound morpheme (since the word is the prime), but the fact that the bound morpheme has to be orthographically modified in both vowel and consonant. Thus, "decide ~ decision" was easier than "destroy ~

destruction," "suspect ~ suspicion," and "receive ~ reception."

Problems with higher level rules for Latinate derivatives among Cantonese ESL learners are not only errors of phonology as earlier research has emphasized. They are also errors of morphophonemics, due to overgeneralization of rules for non-Latinate words, strategies of analogy, ease of analysis, and the lack of understanding of the English orthographic principle. In written language, the overgeneralization of the rule of suffix stripping for non-Latinate words to Latinate words leads to the strategy of "no orthographic change." In constructing the phonological representations of Latinate derivatives, this overgeneralization leads to the dominant strategy of incorporating base-word pronunciation in the pronunciation of Latinate derivatives.

Deducing from the subjects' phonological representations of derivatives, it may be assumed that the morphological representation of a derived word for learners and speakers is a linear representation of "base word + suffix."

Native speakers' phonological competence regarding Latinate derivatives includes the natural process of vowel reduction of unstressed syllables, but not vowel alternations and stress shifts resulting from affixation.

For most ESL learners, the orthographic representations of Latinate derivatives are mainly cues for pronunciation, not for decoding semantic relations between morphologically associated words.

8.6.2   Pedagogical Implications

The study of Latinate derivatives would have to be synchronic rather than diachronic in approach. The contemporary senses of derivatives would be the meanings which learners have to learn. (Also Kelly 1991.) This would make the learning of derivatives easier for learners. The learning

of the historical and etymological associations between morphologically related words can be postponed to more advanced stages of language learning or specialized study.

In single-word context, learners are more likely to be better able to aurally recognize derivatives than to produce them correctly. Pronunciation practice would continue at the intermediate and advanced levels whenever new words are encountered.

Learners are able to analogize about derivatives, as seen in their affix stripping and affix concatenation strategies. This would be exploited in the learning and teaching of the pronunciation and spelling of derivatives by presenting patterns or paradigms in derivatives.

Learners have difficulty in abstracting base words from derivatives with non-obvious suffixes and may not be able to decode the meanings of these derivatives. Even obvious-suffix derivatives may pose difficulty. Learners may not be aware of the parallel meanings in associated words because they do not strip affixes to decode meaning. They would need explicit instruction on how to decode the meanings of derivatives by stripping affixes and by recognizing spelling changes.

Vocabulary was identified as the main problem in reading by 87.5% of the ESL subjects in this study. If non-contextualized word decoding does not occur in a word-learning situation or does not transfer automatically to a reading comprehension situation, learners would need to be taught and reminded to use word-decoding strategies to aid reading comprehension.

Derivatives (especially those with free morphemes) make up between 28% and 36% of content words in reading materials and transitional content textbooks. (See Section 1.3.3.) Derivatives and their associated words, including word formation rules, would therefore be important aspects of vocabulary study.

Conclusion

This empirical study presents an integrated perspective on my ESL subjects' interlanguage morphology and morphophonemics regarding Latinate derivatives. I investigated the possible morphological, phonological, semantic, and orthographic associations among words made by grade 12 Cantonese-speaking ESL learners who were college- or university-bound. Three of the four hypotheses proposed for the study were supported; the findings regarding the fourth hypothesis were linguistically and pedagogically interesting. The differences in the performance between ESL subjects and NS subjects on the Listening, Pronunciation, and Word Analysis Tests and part of the Semantic Rating of Word Pairs Test were statistically significant. I included a discussion of how my subjects handled derivatives in terms of their formal representations and semantic representations as these are important aspects of advanced literacy and vocabulary learning or acquisition. The inter-group and intra-individual variation in the different modalities of performance indicated that when examining interlanguage morphology and morphophonemics, the different TL skills have to be separated. As far as Latinate derivatives are concerned, dominant patterns of overgeneralization among ESL subjects in the aural recognition and oral production of derivatives and suffix stripping in base-word abstraction were found to resemble those commonly made by native speakers of English. Besides the dominant patterns of overgeneralization, a wide variety of idiosyncratic rules was found among learners. The results of this study confirmed that there was a statistically significant difference in the morphological awareness and morphophonemic awareness of college-preparation ESL students and NS students.

Chapter 9

WHAT ESL LEARNERS NEED TO KNOW ABOUT ENGLISH DERIVATIVES – SOME SUGGESTIONS FOR RAISING MORPHOLOGICAL AND MORPHOPHONEMIC AWARENESS AMONG LEARNERS

Introduction

In this chapter I will summarize the features of English derivatives that ESL learners at the intermediate and advanced levels ought to know so that they will become more like native speakers of the language at an equivalent age and academic level. I will also present some suggestions regarding classroom techniques for dealing with English Latinate derivatives so that learners become aware of the phonological, morphological, semantic, and orthographic aspects of Latinate derivatives.

9.1   What College-Preparation ESL Learners Need to Know About English Derivatives

On the whole, college-preparation ESL learners need to be aware of various aspects of English derivatives such as spelling, pronunciation (vowel, consonant, and stress shifts), word structure, affixation rules, meaning association with base words, and syntactic classes as determined by suffix types. Awareness of these aspects would help these learners become more native-like in their strategies in dealing with and using English Latinate derivatives which they are expected to be familiar with at their academic levels. In the following summary of these aspects of English derivatives, I will use "classroom terminology" as far as possible as part of the explanations learners should receive in instruction:

1.   English words with prefixes and suffixes are of two types, "true English words" and words borrowed from Latin and Greek. The borrowed words are usually "learned" words because they refer to ideas in advanced areas of learning or knowledge such as science, politics, literature, and government. They are also more commonly used in formal contexts. True English words have true English prefixes and suffixes such as *un-*, *under-*, *over-*, *-ful*, *-less*

-ish, and *-ness*. Learned words have Latin or Greek prefixes and suffixes such as *con-*, *ab-*, *di-*, *in-*, *-ion*, *-ation*, *-ity*, *-ional*, *-ium*, and *-ia*. (Bloomfield 1933). When we use *-ness* in a true English word (Noun) (as in "happiness"), we would use *-ity*, *-ation*, *-ion* etc. in a learned word (Noun) (as in "jubilation").

2. True English words with prefixes and suffixes do not have spelling changes to their base-word portions (except for <y> becoming <i> before a suffix). They also do not have changes in the pronunciation of their base-word portions. (Example: ['hæpi] ~ ['hæpɪnəs])

3. Not all learned words with prefixes and suffixes have spelling changes to their base words, but almost all of them have pronunciation changes to their base-word portions. An example of a learned word with a suffix that has no spelling changes to its base-word portion but has pronunciation changes to its base-word portion is "prosperity" from "prosper," pronounced ['prɑspə˞] ~ [ˌprɑs'pɛrəti] (North American). An example of a learned word with a suffix that has spelling changes as well as pronunciation changes to its base-word portion is "revolution" from "revolt." Pronunciation changes involve vowel change and/or consonant change and/or stress shift.

4. As in all English words with or without prefixes and/or suffixes, unstressed syllables need to be "glossed over" quickly in pronunciation (that is, reduced). Therefore, not every syllable is pronounced clearly as in Cantonese.

5. All words with prefixes and suffixes have meaning connections with their base words. In true English words, the meaning connections are very clear (eg. "hope ~ hopeful"). In most learned words, the meaning connections are also very clear (eg. "combine ~ combination"), but in some, they are not very clear (eg. "author ~ authority"). They were clearly connected in meaning long ago but not now. It is important to know how these words are used now.

6. In Cantonese, words do not change in their "shapes" (in writing or pronunciation), but they move about in a sentence in order to fit their role as nouns, verbs, or adjectives. English words move about in a sentence and they also take suffixes to fit their roles in sentences.

7. There are rules concerning which suffixes to use for making nouns from verbs and adjectives from nouns etc. (eg. add -ive to a verb to make it adjective).

8. Most of the time, true English suffixes are added to words after learned suffixes (eg.-ive-ness, and -ious-ness).

9. There are rules concerning which suffixes go together (eg. -ion-al, ate-ive, able-ity, but not *-ion-ive, *-ism-ive, and *-ity-ious.)

10. There are certain patterns in the spelling and pronunciation of learned words (eg. "describe ~ description" and "prescribe ~ prescription," "produce ~ production" and "reduce ~ reduction."

11. The base word in a word with prefix(es) and/or suffix(es) contains the core meaning of the word. Looking for the base word within a word with prefix(es) and suffix(es) helps in finding the meaning of the word.

12. Using learned words with prefixes and suffixes whenever appropriate makes communication in academic content areas more effective than using ordinary everyday words. Compare: "The Roman Empire became bigger and stronger and there was more trade among the people of the provinces" with "The expansion of the Roman Empire resulted in the growth of trade among the provinces."

9.2 The Significance of Morphological and Morphophonemic Awareness Among ESL Learners

Winser's (1991; 1993) "register model" of language instruction emphasizes expression of content knowledge in appropriate language. Effective communication is systematically related to the linguistic features of the language; choice of words is as significant as discourse structure. In writing, there is more use of nouns and nominalizations to replace the verbs of speech (Winser 1993:110) and the morphological features of English vocabulary can be exploited as a resource for making meaning in reading and writing in content areas. Acquiring an L2 means acquiring the efficient native-like strategies for processing and using the language, According to Fraser (1992:65), routine daily oral

communication may make little demand for analyzed knowledge of language (such as word or sentence structure) but the literacy functions of reading and writing demand higher levels of analyzed knowledge of the L2 code. Moreover, Nagy and Anderson's (1984) summary of derivatives makes their understanding worthwhile for learners:

i) semantically transparent derivatives are far more frequent than opaque derivatives and morphologically simpler words;

ii) orthographically transparent derivatives are twice as many as opaque ones;

iii) derivatives, unlike morphologically simple words, are stable in meaning, not varying much according to the context in which they occur.

The implications are that derivatives are important vocabulary items and fluent access to known vocabulary (such as derivatives) is necessary in order for learners to benefit from knowing it (Mezynski 1983). Derivatives need not pose problems if learners know how to segment them into meaningful units. Moreover, Oswalt (1973) confirms between 90% and 98% predictability of pronunciation rules for derivatives with 27 Latinate suffixes while others vary between 50% and 85%. Dickerson (1987; 1989; 1990; 1992; 1994) confirms that the pronunciation of Latinate derivatives can be predicted by using two stress rules (Weak Stress Rule and Strong Stress Rule) and dividing word endings (suffixes) into two groups, weak endings (which follow the weak Stress Rule) and strong endings (which follow the Strong Stress Rule). The weak endings are *-able, -al, -en, -ous, -ive, -ure, -ary,* and *-ory.* The strong endings are -iV(owel) (eg. *-ion, -ial*), iC(onsonant) (eg. *-ical, -ible*), -uV(owel) (eg. *-ual, -uent*), and -uC(onsonant) (eg. *-ular*). The stress and vowel patterns of 10,000 words with strong iV(owel) endings can be predicted using the Strong Stress Rule. This makes learning less difficult than learners would think, that is, if they know how to identify base words and affixes. Besides direct teaching of high frequency vocabulary, Nation (1993) also emphasizes training in vocabulary learning strategies, and the encouragement of activities that lead to indirect vocabulary learning. The frequency of derivatives in academic English would make it necessary for learners to learn about derivatives, how to

code and decode them for meaning, and how to use them. Academic vocabulary is essential for academic success (Xue & Nation 1984; Corson 1985). Derivatives form an important part of academic vocabulary. Beheydt (1987a) points out that what is notably missing in pedagogical theory regarding L2 vocabulary teaching is a systematically elaborated strategy for vocabulary acquisition based on the findings of linguistics and learning psychology. Word-structure awareness would increase lexical competence among learners.

9.2.1 Some Techniques for Raising Morphological and Morphophonemic Awareness Among ESL Learners

Below, I suggest some techniques of verbal processing for increasing learners' morphological and morphophonemic awareness in conjunction with reading. The techniques are based on the implications of L1 literacy and psycholinguistic research and my own findings from this study regarding learners' lexical behavior with derivatives. The strategies are also in accord with Robinson's (1995) model of awareness and noticing, where use is made of the learners' elaborative processing of data and rehearsal or practice. The techniques suggested may not be new; they are meant to remind language teachers that strategies that help learners learn are useful and also enable learners to process words on their own.

1. At the intermediate levels of instruction, as soon as derivational prefixes and suffixes are encountered, thee 12 Anglo-Saxon prefixes and 19 suffixes should be introduced.[1] Later, as more affixes are encountered, Latin and Greek affixes should also be taught. Since these are greater in number, they would not be brought in all at once. For a start, the most common 15 Latin and four Greek prefixes would be taught, leaving the rest to a more advanced level of learning.[2] As for suffixes, the most common 19 Latin suffixes and 6 Greek suffixes would be taught.[3] At secondary school level, these would be sufficient for reading and writing purposes.

For most practical or advanced general academic reading purposes, 36 common Latin and Greek prefixes and 43 suffixes are sufficient.[4]

2. Activation of the base word is a necessary step in the processing of the derived form.[5] In most cases, the base word and its derivations have parallel meanings. If the meaning of the base word is semantically distant from the derived word, the meanings of both the base word and the derived form would be explained, as in "authority – author." It is possible that learners encounter derivatives without having encountered their base words. Whenever a derivative is encountered in a text, the teacher would help learners access its base word so that the meaning of the derivative is made clear, and their semantic relatedness, orthographic connection, and morphological structure can be explained. Learners would access base words by stripping affixes. Getting the essential or core meaning of the complex word from its base helps the reader to get going with the decoding of the meaning of a text. The teacher would explain any idiosyncracies in the meanings of derivatives. For example, in the context of cars, "transmission" is not the act of transmitting energy but refers to the parts of the car that carry power from the engine to the wheels to produce movement. Where the form of a derivative takes morphological ending of another class (eg. "sickly" and "lonely"), these exceptions would also be explained.

3. Tables are visually effective in aiding the syntactic categorization of words. Awareness of the parts of speech would also help learners in syntactic processing in reading (and writing.)[6]

4. Students would construct several types of word association to strengthen the association and improve their memory representations.[7] Types of association are base word-derived word association, word paradigm (containing different derivatives from the same base word or containing base word and derivatives with the same morphological shapes), and pronunciation relationships between morphologically related words.

5. Perceptual processing (accoustic and visual) increases later perceptual identification and and memory.[8] In word decoding, the teacher would visually demonstrate how much of the orignial base-word spelling is preserved in the process of changing it to a derivative by writing out all

new words presented. In addition, morphological structure and spelling change and the addition or deletion of affixes would be presented visually. Visual presentations can take the form of bracketing, drawing boxes around base words to abstract them out of derivatives, and cancelling and replacing letters etc. to demonstrate spelling change. Visual presentation of a string of base word and affix(es) would be linear (see below). When demonstrating the relatedness between two or three words, these words would be written one on top of or below another, preserving the linear arrangement of the base and affixes.

|MONSTᴇR|oᴜs| |ITY|

|MONSTᴇR|oUS|

eg. |MONSTER|
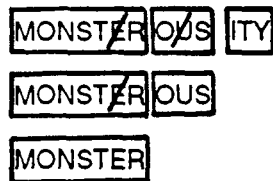
6. The pronunciation of a derivative would be learned along with its visual representation and meaning to increase memory and improve recall.[9] The teacher would present the base-word and derivative visually before presenting their pronunciation. The teacher would also model the pronunciation, drawing learners' attention to stressed and reduced syllables, and students would repeat these words aloud. Some class time would be allocated to the practice of pronunciation and aural recognition of new words. Students would also practice pronunciation and aural recognition of derivatives in the context of sentences and longer discourse.

7. In the earlier lessons, students would use class time for actively processing words, abstracting base words from derivatives, starting with word forms that involve no orthographic and no phonological change and progressing to those involving spelling and/or phonological change.

8. Word processing exercises would start with words with single affixes and progress to those with multiple affixes. If a derivative from a text is used as stimulus, students would determine its part of speech before abstracting the base and looking for its other parts of speech.

9. If a derivative is encountered for which other forms are not required at a particular stage of learning because they are infrequent or not useful, only the base and the given derivative would be needed. The internal word structure would be presented visually as part of the word's perceptual features :

eg. REPEL⊄ ENT

The orthographic principle behind the presence of the two <l>'s in the derivative and the dropping of the second <l> before the suffix -ent would be explained.

10. If the text contains a base form only, (eg. "celebrate"), frequent and useful derivatives would be brought in, for example, "celebration" and "celebrity."

11. To avoid overloading and confusion, not all possible derivatives of a given base would be introduced. For example, "crime," has several morphologically related words like "criminally," "criminality," "criminology," "incriminate," "crimination," "criminatory," "criminologist," "criminological," and "criminologically". Only derivatives that are useful at a particular level of learning, or likely to be encountered by learners, would be presented.

12. Derivatives containing bound morphemes would be treated as semantic and morphological wholes, except at very advanced levels.[10] However, a couple of more useful or frequent words that have the same bound stem and take the same affixes for different parts of speech would be presented as paradigms and tabulated (eg. {duce} -- "produce - production," "introduce - introduction," "induce - induction," "reduce - reduction," "seduce - seduction."

13. The teacher would teach affixation rules (eg. nominalization and deverbalization) by providing rules of thumb -- shorter or everyday words or Anglo-Saxon words take Anglo-Saxon affixes; important-sounding words (of Latinate origin) take Latinate affixes. In more advanced classes, the order of the most common multiple affixes would be taught, eg. -al-ity, -al-ism, -al-ist, -ive-ness, -iv-ity, -ion-al, and -ion-al-ist.

14. Using different derivatives of the same word at sentence or short text levels would help learners control the use of different derivative forms in writing and reading (syntactic decoding) and listening (anticipating different forms at different positions in a sentence). More proficient students would be assigned sentence-making activities. Less proficient students make many errors in sentence construction, or use these words inappropriately and text or sentence completion exercises would be more suitable.

Eg.: The bomb explodes in thirty seconds. The explosion can cause a lot of damage.

(explode)

15. Identification of the part of speech of a given derivative in a sentence context is useful, since a syntactic rule and a particular morphological pattern learned together would be more effective.

16. Tasks that require learners to define the meanings of words involve the highest level of expression of word knowledge (Curtis 1987). These would be avoided because of the level of abstractness involved (eg. "the state of being......," " the act of.....," "the quality of being....") I think such definitions are difficult and not particularly useful. Matching a derivative with a given definition would be a more valid task.

17. Dictionary work would be encouraged, especially for low verbal ability students (Knight 1994).[11] This may require looking up the meanings of particular words, or looking for a particular word that fits a given meaning (the teacher could provide cues like the first one or two letters of the word, or the number of letters in the word etc.), or looking for the different parts of speech of a word. In the case of derivatives, students would be encouraged to attempt decoding before resorting to the dictionary. Working with a dictionary would give learners exposure to different derivatives as they are bound to come across them in their word search.

18. The teacher would be selective of vocabulary exercises which would be primarily aimed at the learning of new vocabulary, that is, vocabulary expansion. "Breaking the code" and unscrambling a string of letters to make up other words might not help vocabulary expansion since learners are picking out words they already know, have retained, and can recall. If such exercises were used for the sake of variety, students would work in pairs or small groups where better students help weaker students learn new words. However, such activities are useful as a reinforcement exercise after new vocabulary items have been introduced. Arranging words in alphabetical order, an activity found in some intermediate or advanced level textbooks, would not be useful at this level.

19. Providing synonyms, antonyms, or analogies strengthens meaning association. The teacher would remind learners to provide words with the corresponding form classes.

20. Learners would develop systematic vocabulary learning strategies by making entries in a

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notebook with pages marked in alphabetical order like a dictionary and recording word forms according to the four parts of speech. Meanings would be recorded beside the words, in L2 or with L1 equivalents and sample sentences if necessary.

21.   The teacher would be selective of reading texts, starting with passages that have some textual elaboration such as semantic (and lexical) redundancy, and progressing to passages that contain less redundancy and elaboration and require more word processing for meaning. However, the teacher would not emphasize the strategy of "guessing" from context. The teacher would also select reading texts that contain specific comprehension questions that test vocabulary knowledge and as well as deductive inferencing.

22.   Writing would be integrated into a reading and vocabulary unit. Learners would start with single-paragraph writing, using and incorporating new vocabulary into the writing, paying special attention to word forms. The teacher would have students read aloud to the class their writing, and publish their writing (displayed in class).

23.   In an intermediate ESL class, the teacher would incorporate the reading of some content area texts that are appropriate to the linguistic level of students.

Conclusion

According to Bialystok (1991:116), two essential components of the development of language proficiency are the development of the mental representations of language based on its formal structures and the development of control of linguistic processing. The latter guides the learner to pay selective attention to particular representations of language for the purpose of performing in a particular context, resulting in more fluent and more accurate performance. Explicit instruction of the appropriate linguistic structures and the strategies for handling these structures at a specific level of L2 learning would help learners develop their language proficiency. Learners ought to be made aware of these structures and the need to apply such strategies in the process of developing L2 skills. The results of my empirical study have demonstrated that there is a significant difference between ESL

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learners and native speakers of English (at an equivalent age and academic level) in their performance in aural recognition and pronunciation of derivatives, recognition of meaning association between morphologically related words, and base-word abstraction from derivatives. Raising learners' awareness of English morphology and morphophonemics would help them handle appropriately the derivatives that they encounter. This is especially important when there are no counterparts in L1 and L1 word handling strategies would be inappropriate, and when overgeneralizations of TL rules are inappropriate as well. Direct teaching of derivatives involves explicit explanation and practice that focus on such words as linguistic items. The suggestions I have made for raising learners' awareness of the different aspects of derivatives are aimed at what Schouten-Van Parreren (1981b in Beheydt 1987a:65) calls "real activity" during learning where a diversity of word treatment shows relationships among parts of words. According to Beheydt (1987a), such real activity helps learners to develop a "feel" for the syntactic and morphological potential of words while at the same time fostering mental processing of words which facilitates subsequent recall. The semantization of words is stimulated by repetitive, elaborative, mental practice with their paradigmatic and syntagmatic characteristics. In my opinion, such activities are valuable because they become self-directed vocabulary learning strategies of ESL learners and would lead to vocabulary expansion.

Notes:

1. The 12 Anglo-Saxon prefixes are: *fore-, un-, up-, down-, over-, under-, mis-, out-, a-, be-, with-, for-.*
    The 19 common Anglo-Saxon suffixes are: *-ment, -ness, -ed, -ing, -y, -ly, -er, -less, -ful, -ish, -like, -some, -ful, -al, -hood, -age, -ling, -let, -dom, -worthy.*

2. The 15 most common Latin prefixes are:_*non-, post-, pro-, trans-, de-, re-, pre-, inter-, co-, dis-, ex-, in-, sub-, em-, super-.* The following four Greek prefixes are also frequent: *anti-, pro-, pros-, hyper-.*

3. The most common 19 Latin suffixes are: *-al, -ance, -ant, -ible, -ence, -ent, -eous, -fic, -ize, -fy, -ion, -ity, -ve, -ment, -or, -ous, -ty, -uous, -ure.*
    The 6 most common Greek suffixes are: *-ic, -ics, -ical, -ite, -ism, -ist.*

4. In addition to the Latin and Greek prefixes mentioned above, the following should make up the most common 36 non-Anglo-Saxon prefixes sufficient for general non-specialized reading: *ab-, ad-, ambi-, ante-, circum-, com-, extra-, en-* (Latin), *amphi-, dia-, syn-, peri-, para-, pros-, epi-, endo-, exo-* (Greek).
    In addition to the above-mentioned non-Anglo-Saxon suffixes, the following are sufficient for general non-specialized reading: *-acious, -alia, -ane, -ary, -ate, -cide, -eous, -ferous, -ile, -mony, -uous, -ulous, -tude, -nal (Latin), -oid, -ia, -sis, -ma* (Greek).

5. See Murrell & Morton (1974); Taft & Forster (1975); Stanners et al (1979); Luketala et al (1980); and Anshen & Aronoff (1988).

6. See Nagy & Anderson (1984).

7. See Bradley & Glenberg (1983) and Jacoby (1983).

8. See Jacoby (1983) and Masson (1984).

9. See Masson (1984), Dickerson (1987), Kelly (1992), Hill (1994), and Gu & Johnson (1996).

10. See Rubin et al. (1975).

11. According to Oxford and Scarcella (1994), dictionary work is not particularly useful since dictionaries provide typical meanings of words rather than atypical meanings and functions required by particular contexts. This is true only for monomorphemic words. Morphologically complex words are stable in meaning and dictionary work would be beneficial. Gu & Johnson's (1996) study confirms skilful dictionary use together with word structure analysis among readers with high test scores.

Chapter 10

CONCLUSION – SIGNIFICANCE OF MY EMPIRICAL STUDY IN RESEARCH ON ESL MORPHOLOGICAL AND MORPHOPHONEMIC AWARENESS AND ESL LEXICAL COMPETENCE

Introduction

In this concluding chapter, I will summarize the significance of my empirical study and the contribution of my research to the field of applied linguistics in the area of interlanguage vocabulary, specifically, ESL morphology and morphophonemics.

10.1   Significance of My Empirical Study

Meara, in 1984, pointed out that interlanguage theory had had very little to say about the lexical behavior of non-native speakers of a language, and the limited number of studies had taken a very restricted view of the problem. (See Kellerman 1978a.) Nearly a decade later, Maiguashca (1993) reiterates the same problem. Furthermore, my literature review on the topics of research on ESL learners' interlanguage and vocabulary up to 1996 has not shown an emphasis on the area of derivative morphology and morphophonemics in L2 learning or acquisition. According to Meara (1984), past research in vocabulary acquisition has also taken place within the framework of interlanguage theory and error analysis. This approach has resulted in taxonomies of errors that fail to predict the types of errors that occur, explain why they occur, or explain the differences in the handling of lexis between learners and native speakers of a language. (See Ringbom 1987.) In my opinion, Schacter's (1983, 1992) redefinition of language transfer as a constraint rather than a process is useful, but appealing to constraint (what the learner knows and do not know about the TL) cannot account for the specific error types of learners in the linguistic aspects of the TL that have no analogues in the L1.

Levenston (1979) listed five "fundamental issues" in L2 vocabulary acquisition research, two of which have aroused my interest, viz.

i)   how far is the acquisition of vocabulary the same in L1 and L2, and

ii)   what is the relationship between active/productive and passive/receptive knowledge of vocabulary?

Monsell (1985:149) explains the formal properties of a literate person's mental lexicon and how these properties interact in language perception and production. The formal properties are reflected in Meara's (1984) crude model of what a learner's lexicon is like, viz. the phonological, orthographic, and morphological representations of words, and whether these representations are fully spelled out. According to Meara (1984), Beheydt (1987a), and Maiguashca (1993), the findings of psycholinguistic research on L1 reading, word recognition, and word storage have been largely neglected in L2 vocabulary research. My literature review has also shown that the issues raised by Levenston concerning learners' vocabulary learning and acquisition, and learners' comprehension of word semantics in reading instruction have also been neglected. The other formal representations mentioned by Meara (1984) above) have also remained unexamined. It is clear that among the issues in interlanguage and ESL reading and vocabulary, the acquisition and learning of English Latinate derivatives among advanced learners has been largely unexplored in applied linguistics. (See 2.3.)

The method of investigation reported in this thesis represents a departure from previous research on ESL learners' awareness of Latinate derivatives in several ways. Previous studies have treated derivatives as simply phonological units and have not differentiated derivatives from other multisyllabic words (inflected words, compounds, and even monomorphemic words). I have isolated Latinate derivatives from other multisyllabic and multimorphemic words. I have also attempted to present learners' problems with Latinate derivatives as problems of vocabulary learning, that is, problems of "lexical competence," not problems of phonology or pronunciation alone, as most research in this area has done. Learning derivatives is an important part of vocabulary expansion. Adopting the "lexical competence" approach has led me to examine the different aspects that learners'

knowledge of derivatives entails -- orthographic principle, awareness of sound changes between associated words and meaning associations between words, word decoding strategies, as well as the bases used by learners for making associations between morphologically related words. These are also important aspects of advanced literacy in ESL, a field which has hardly been explored. By examining these aspects of learners' understanding of English Latinate derivatives, I believe I have fulfilled three objectives of this study which previous research has not done, viz. presenting an integrated picture of ESL learners' morphological and morphophonemic awareness; presenting learners' lexical representations of derivatives as associated items with base words (not isolated items in their lexica); and presenting the error patterns in the phonology and orthography of learners' interlanguage lexis.

The fulfilment of the third objective also means that I have attempted to deal with the issues raised by Meara above, viz. the formal representations of learners' vocabulary and the limitations of error analysis and constraint within the framework of interlanguage theory. I have examined my subjects' morphological, phonological, and orthographic representations of Latinate derivatives. Besides describing errors in these representations, I have accounted for them by explaining the possible psycholinguistic factors and factors related to literacy development in relation to the different aspects of Latinate derivatives. These factors are the phonological, semantic, and orthographic complexity of derivatives which have been identified as factors influencing L1 vocabulary learning or acquisition (Templeton 1985).

Furthermore, in my study, I have used existing English words and focused on the lexica of school-going college-preparation ESL learners. I have selected base words and derivatives that are expected to be frequent in high school administration, content area learning and counselling, and everyday words in sports, media, and recreation. This is in contrast to Dziubalska-Kolazyk (1992) and Baptista (1989) who employ pseudo words that fit certain phonological rules in certain morphological operations. The rules also reflect those used by native speakers in pseudo words. According to

Henderson (1985:31), "(S)tudies requiring oral reading or suffixation of pseudowords have shown at best highly imperfect application of rules. Studies requiring suffixation of real words have shown effects consistent with generation by rule." By using real English words familiar to learners at a particular academic level and in a particular setting, I am confident I have presented a more realistic perspective of learners' morphological and morphophonemic awareness than previous studies have done.

Another significant contribution of my empirical study is towards research on the issue of language transfer in interlanguage morphology and morphophonemics. The general concensus in theoretical linguistics is that overgeneralizations in TL morphology and morphophonemics are based on TL rules, not L1 rules. While the influence of an unrelated L1 has been confirmed in L2 studies on interlanguage phonology of derivatives (Anani 1989), the absence of influence of L1's which have cognates with English (Erdman 1973; Baptista 1989) and L1's which have no cognates with English (Olshtain 1987) has also been confirmed. These conclusions appear conflicting. By using Cantonese subjects, whose L1 is unrelated to English, I have been able to exclude the effects of positive or negative L1 transfer and, to some extent, determine the possible psycholinguistic principles behind learners' interlanguage morphological and morphophonemic rules. In the process of doing this, I have been able to find some answers to Levenston's first question, in the sense of how the acquisition of English Latinate derivatives is similar between speakers and learners. I have been able to determine that, in areas where a linguistic counterpart is missing from the L1, learners fall back on earlier learned strategies in TL processing, some of which are similar to those of native speakers. This was found in dominant strategies like incorporating base-word pronunciation in the phonological representations of derivatives and adopting the least complex strategies in base-word abstraction from derivatives. In response to Koda's (1990a) question about how speakers and learners handle and store words, I would say that where ESL learners have begun to develop morphological and morphophonemic awareness, dominant strategies of word analysis and storage correspond to the common heuristics of word learning and ease of analysis. However, these strategies result in more misapplication and errors among learners than speakers. Orthographic complexity influences both

learners' and native speakers' processing of derivatives. To recognize semantic relatedness between words, learners are more dependent than speakers on transparent meaning associations and transparent spelling patterns.

My tests could not really provide answers to Levenston's question concerning learners' active and passive vocabulary in terms of what they knew and what they could use. However, the tests did reveal significant differences in their performance in different modalities and test tasks. There were more significant differences between ESL and NS subjects in active production tasks (pronunciation and word abstraction), than in passive tasks (aural recognition and semantic recognition).

My literature review has included discussions on the issues of interlanguage, the relationship between vocabulary and reading, and between vocabulary and listening comprehension and pronunciation. I have included these issues in my discussion so that learners' problems with Latinate derivatives can be better appreciated as those of lexical competence. In my thesis, I have also included a discussion of linguistic theories that are relevant to the understanding of English morphology and morphophonemics and which may help us understand how learners and speakers handle English derivatives.

Conclusion

In this thesis, I have investigated the lexical competence of college-preparation ESL learners in terms of their morphological and morphophonemic awareness. My lexical competence approach to learners' problems with the formal representations of Latinate derivatives has provided an integrated perspective on this aspect of interlanguage vocabulary and literacy. While the hypotheses regarding my subjects' performance on the tests are based on my interpretation of past research in interlanguage, I have gone beyond the restricting taxononmies of error analysis in interlanguage theory and accounted for my subjects' errors from a psycholinguistic perspective. In addition, I have discussed these related

issues within the framework of what I, as an ESL learner and teacher, would accept as reasonable linguistic theories and theories of language learning. In the present decade, the renewed interest in consciousness in learning, language awareness, and the awareness that empowering learners with a knowledge of the linguistic system helps them to master what they have to learn through the TL (Ely 1993) are strong indications that a balanced approach to language teaching methodology is now becoming a guiding principle. Lexical competence is crucial for advanced literacy to enable learners to function adequately in the L2 academic culture. In educational settings, at the heart of mastering the L2 linguistic system is the learning of its vocabulary system, its semantic and formal properties, and how these properties can be exploited in the understanding and expression of meaning of context. A unified approach to spelling and vocabulary development would help increase morphological and morphophoinemic awareness among college-preparation ESL learners.

APPENDIX A

QUESTIONNAIRES

QUESTIONAIRE 1 A

Name: ....

Grade: ....

Date of birth: ....

Date of arrival in Canada: (Month and Year) ....

Native language: ....

Answer all questions in Sections I and II.

A. SECTION I:

1. Did you attend an English-medium school or a Chinese-medium school in Hong Kong?
    (Check ✓ ONE only):
    [   ] English-medium
    [   ] Chinese-medium

    In Hong Kong, did your teachers TEACH and SPEAK MOSTLY in English or Cantonese?
    (Check ✓ ONE only):
    [   ] Cantonese
    [   ] English

2. Did you learn English in Hong Kong?   YES/NO

    If YES, for how many years did you learn English? ....

3. What skills did your school(s) in Hong Kong emphasize in ESL?
    (Write M for "TWO" most emphasized skills. Write "L" for TWO least emphasized skills.)
    [   ] Listening
    [   ] Speaking
    [   ] Reading
    [   ] Writing
    [   ] Grammar
    [   ] Vocabulary
    [   ] Translation

4. Have you studied in other English-speaking countries besides Canada?   YES/NO
    If YES, name the country/countries: ....
    For how long? (Months/Years)...

5. List all the ESL and Transitional classes you attended in Canada:
    ....

6. List all classes you are attending at present:
    ....

7. Name the language or languages you speak at present
    with your friends in school : ....
    with your friends outside school : ....
    with your neighbours: ....
    with your family at home : ....

8.   Besides attending school, how have you been learning English? (Please check ✓.)
      [   ] watching TV and movies
      [   ] reading books
      [   ] reading newspapers, magazines, and comics
      [   ] listening to the radio or songs
      [   ] attending private tuition

SECTION II :

For Questions 1 - 6, circle YES or NO:

1.   When you are reading and you don't know the meaning of a word, what do you do?
      A. skip it   YES   NO
      B. check with the dictionary/translator   YES   NO
      C. guess the meaning of the word by reading the sentence
          or sentences very carefully   YES   NO
      D. work out the meaning of the word by looking for its prefix(es)
          and suffix(es) if present   YES   NO
      E. ask the teacher   YES   NO
      F. ask someone who knows English   YES   NO

2.   When you come across a word you cannot pronounce, what do you do?
      A. skip it   YES   NO
      B. check with the dictionary/translator   YES   NO
      C. work out the pronunciation from the spelling   YES   NO
      D. check if I can pronounce the word without its suffix(es)   YES   NO
      E. ask the teacher   YES   NO
      F. ask someone who knows English   YES   NO

3.   Sometimes, I can't understand a word I hear, but when the teacher
      writes it out I will understand its meaning.   YES   NO

4.   I should learn to pronounce words correctly if I know their meanings.   YES   NO

5.   Are you preparing for TOEFL this year?
      YES   NO

6.   Do you intend to go to college or university after graduating from high school?
      YES   NO

7.   (Check ONE only ✓):
      When you are reading, what is the MAIN reason for not understanding what you read?

      [   ] Vocabulary
      [   ] Topic
      [   ] Length of a passage or story
      [   ] Length and difficulty of sentences in the passage or story

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QUESTIONNAIRE 1B

Name: ....
Grade: ....
Date of birth: ....

Please complete this questionnaire by circling YES or NO for each of the following questions:

1.   Do you speak English ALL the time?   YES   NO

2.   Do you speak English MOST of the time?   YES   NO

3.   Do you speak English to BOTH your parents?   YES   NO

4.   Do you speak English to only ONE of your parents?   YES   NO

5.   Do you speak English with NEITHER of your parents?   YES   NO

6.   Do you speak ONLY ENGLISH with your brothers
     and sisters?   YES   NO

7.   If you live with a guardian, do you speak
     ONLY ENGLISH with him/her?   YES   NO

8.   Do you plan to attend a college or university after
     graduating from high school?   YES   NO

QUESTIONNAIRE 2

Name: ....

Read the instructions and questions carefully before you answer:

FOR QUESTION 1, CHECK ONLY ONE ANSWER, (a), (b), OR (c):

1.   The words "comfort" and "comfortable" are related.

(a)   YES
(b)   NO
(c)   NOT SURE

IF YOUR ANSWER TO QUESTION 1 is "YES" OR "NOT SURE," GO ON TO QUESTION 2.
IF YOUR ANSWER TO QUESTION 1 IS "NO," GO ON TO QUESTION 3.

FOR QUESTION 2, YOU MAY CHECK MORE THAN ONE ANSWER.

2.   The words "comfort" and "comfortable" are related because of

(a)   their spellings
(b)   their pronunciations
(c)   their meanings

IF YOU ANSWERED QUESTION 2, GO ON TO QUESTION 3.

FOR QUESTION 3, CHECK ONLY ONE ANSWER, (a), (b), OR (c).

3.   The words "compose" and "component" are related.

(a)   YES
(b)   NO
(c)   NOT SURE

IF YOUR ANSWER TO QUESTION 3 is "NO" OR "NOT SURE," GO ON TO QUESTION 4.

FOR QUESTION 4, YOU MAY CHECK MORE THAN ONE ANSWER.

4.   The words "compose" and "component" are not related because

(a)   their spellings are different
(b)   their pronunciations are different
(c)   their meanings are different

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APPENDIX B

PERSONAL DETAILS AND RAW SCORES OF SUBJECTS

Table 2a: Group A: ESL Personal Details and Test Scores

SUBJECT	AGE	A of A	LENGTH OF RESI-DENCE IN MONTHS	ESL INSTRUCT-ION IN HONG KONG IN YEARS	TEST SCORES					
					LISTEN-ING TEST [30]	WORD ANALYSIS TEST [30]	PRONUNCIATION TEST			
							Base Words Intelligible [60]	Base Words NS Norm [60]	Derived Words Intelligible [60]	Derived Words NS Norm [60]
1	17;6	14;5	37	9	23	20	60	52	60	25
2	18;1	15;9	28	10	25	19	59	47	59	27
3	17;10	15;6	28	10	20	26	60	46	58	22
4	18;2	15;7	36	9	18	20	59	47	57	12
5	17;7	15;6	25	9	21	25	59	52	60	31
6	17;8	14;7	37	9	18	13	53	36	48	12
7	18;3	16;0	27	12	24	14	52	39	52	25
8	18;0	14;0	48	11	21	16	60	54	55	33
9	17;0	14;2	32	9	16	18	59	49	59	36
10	17;1	14;10	27	10	22	18	60	49	59	37
11	17;6	13;0	48	10	24	17	59	49	57	34
12	18;11	16;1	34	13	20	18	60	50	58	25
13	17;6	14;3	39	10	19	15	60	45	60	29
14	17;2	13;11	39	10	23	16	60	46	58	27
15	17;1	15;1	24	10	20	24	60	47	58	31
16	17;5	15;2	27	10	20	17	54	43	46	28
17	18;1	16;8	17	10	22	14	55	40	45	18
18	17;2	13;2	48	8	22	17	60	40	58	19
19	17;3	15;10	17	13	25	19	57	47	59	36
20	18;1	16;8	17	11	21	18	59	50	59	29
21	17;0	14;9	27	10	20	21	60	50	60	24
22	17;8	13;0	48	11	23	12	51	40	38	6
23	17;0	14;7	29	11	13	10	55	36	48	12
24	17;0	14;7	29	9	16	16	54	45	53	12
25	18;4	16;1	27	9	19	15	57	42	53	17
26	17;0	15;7	17	12	22	23	59	47	57	25
27	17;0	15;1	23	9	17	19	59	48	52	34
28	17;0	13;7	41	11	20	16	60	45	54	19
29	17;0	13;7	41	11	18	16	57	41	48	16
30	17;0	13;0	48	8	17	16	57	35	55	15
31	17;0	14;0	36	10	18	14	60	44	59	16
32	17;1	15;8	17	12	22	16	56	42	54	12
TOTAL			1018	326	649	558	1850	1443	1756	744
%					67.60	58.13	96.35	75.16	91.46	38.75
Average	17;6	15;1	31.81	10.19	20.28	17.44	57.81	45.09	54.88	23.25

Group A Pronunciation Test:

Base Words (Intelligible) vs. Base Words (NS Norm) :   t (31) = 19.50 p < 0.01

Derived Words Intelligible vs.Derived Words (NS Norm) : t (31) = 24.87 p < 0.01

Group A vs. Group B Pronunciation Test:

Base Words(NS Norm) :   t (62) = -16.42 p < 0.01

Derived Words (NS Norm) : t (62) = -21.82 p < 0.01

Note: A of A = Age of Arrival in Canada

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Table 2b: Group B: Native Speakers of English (NS) Test Scores

SUBJECT	AGE	LISTENING TEST [30]	WORD ANALYSIS TEST [30]	PRONUNCIATION TEST			
				Base Words Intelligibility [60]	Base Words NS Norm [60]	Derived Words Intelligibility [60]	Derived Words NS Norm [60]
1	17;2	29	30	60	60	60	59
2	17;4	30	28	60	60	60	58
3	17;4	29	24	60	60	60	58
4	17;1	30	29	60	60	60	58
5	17;4	28	28	60	60	60	56
6	17;5	30	30	60	59	60	59
7	17;7	30	28	60	59	60	58
8	17;2	29	25	59	59	60	58
9	17;6	28	28	60	60	60	57
10	17;1	30	29	60	59	59	57
11	17;6	28	27	60	60	59	55
12	17;5;	29	28	60	60	60	58
13	17;11	28	26	60	59	59	55
14	17;0	27	26	60	59	60	54
15	17;1	28	28	60	60	60	58
16	17;1	26	25	58	58	57	54
17	17;1	28	26	60	60	60	56
18	17;1	28	27	60	60	60	59
19	17;5	29	26	59	59	60	58
20	17;7	28	25	60	60	60	58
21	17;7	29	24	60	60	60	56
22	18;0	27	27	60	59	60	56
23	17;3	29	29	60	60	60	57
24	17;4	29	29	60	59	60	57
25	17;7	28	27	60	60	60	57
26	17;2	28	29	60	59	60	56
27	18;5	27	27	60	59	59	57
28	17;2	29	27	60	60	60	59
29	16;11	28	27	60	60	60	56
30	17;5	27	29	60	60	60	54
31	17;10	29	28	60	59	60	57
32	17;0	28	23	57	57	59	57
TOTAL		910	869	1913	1903	1912	1822
%		94.79	90.52	99.64	99.11	99.58	94.90
Average	17;7	28.44	27.16	59.78	59.47	59.75	56.94

Group B Pronunciation Test:

Base Words (Intelligible) vs. Base Words (NS Norm) :   N.A.

Derived Words (Intelligilible) vs. Derived Words (NS Norm) : t (31) = 11.76 p < 0.01

APPENDIX C

TEST 1:   LISTENING TEST MULTIPLE-CHOICE ITEMS

TEST 4:   SEMANTIC RATING OF WORD PAIRS TEST

PART 1 : LISTENING TEST

Instructions to subjects:

There are 30 words in this test. You will see each word written on a yellow card. Then you will hear three different pronunciations for the word. Listen carefully and select the correct pronunciation for each word. Then darken the corresponding letter on your answer sheet.

Transcription of multiple-choice items recorded on tape:

1. COMBINATION
A. ['kɑmbə,neʃən]
B. [,kɑmbə'neʃən]
C. [kəm'bɑɪ,neʃən]
D. None of the above

2. AUTHORITY
A. [ə,θɔ'rɪti]
B. ['ɔθərəti]
C. [ə'θɔrəti]
D. None of the above

3. EXPLANATION
A. [,ɪks'plenəʃən]
B. [,ɛksplə'neʃən]
C. ['ɛksplə,neʃən]
D. None of the above

4. POLITICAL
A. ['pɑlɪ,tɪkḷ]
B. [pə'lɪtɪkḷ]
C. [pəlɪ'tɪkḷ]
D. None of the above

5. VARIETY
A. ['və,rɪəti]
B. [və,rɑɪ'ɜ:ti]
C. [və'rɑɪəti]
D. None of the above

6. RECITATION
A. ['rɛsə,teʃən]
B. [,rɪ'sɑɪteʃən]
C. [,rɛsə'teʃən]
D. None of the above

7. CHRISTIANITY
A. [,krɪstɪ'ænəti]
B. ['krɪs,tɪænəti]
C. ['krɪstʃjənəti]
D. None of the above

8. BIOLOGICAL
A. ['bɑɪɑlə,dʒɪkḷ]
B. [,bɑɪ'ɑlədʒɪkḷ]
C. [,bɑɪɑ'lɑdʒɪkḷ]
D. None of tthe above

9. FORMALITY
A. ['fɔr,mæləti]
B. ['fɔrmələti]
C. [fɔr'mæləti]
D. None of the above

10. REFERENCES
A. ['rɛfrənsɪz]
B. [,rɪ'fɜrənsɪz]
C. [,rɛ'frɜrənsɪz
D. None of the above

11. PROSPERITY
A. ['prɑspɛrəti]
B. [,prɑs'pɛrəti]
C. ['prɑspərəti]
D. None of the above

12. MECHANISM
A. ['mɛkənɪzəm]
B. [,mɛkə'nɪzəm]
C. [mə'kænɪzəm]
D. None of the above

13. PREPARATION
A. [,prɛpə'reʃən]
B. ['prɛpə,reʃən]
C. [,prɪ'pæreʃən]
D. None of the above

14. CONFIDENTIAL
A. [,kɑnfə'dɛnʃəl] .
B. ['kɑnfədənʃəl
C. ['kɑnfə,dɛnʃəl]
D. None of the above

15. GRAMMATICAL
A. ['græmətɪkl]
B. ['græ,mætɪkl]
C. [grə'mætɪkl]
D. None of the above

16. INFLUENTIAL
A. ['ɪnfluənʃəl]
B. ['ɪnflu,ɛnʃəl]
C. [' ,ɪnflu'ɛnʃəl]
D. None of the above

17. MAJORITY
A. ['medʒərəti]
B. [mə'dʒɔrəti]
C. ['mɜ,dʒɔrəti]
D. None of the above

18. DESPERATION
A. [,dɛspə'reʃən]
B. ['dɛspərɪʃən]
C. [,dɛs'pɑreʃən]
D. None of the above

19. MAGNETIC
A [,mæg'nɛDɪk]
B. ['mægnəDɪk]
C. ['mæg,nɛDɪk]
D. None of the above

20. NATIONALITY
A. ['næʃə,næləti]
B. [,næʃə'næləti]
C. ['næʃənələti]
D. None of the above

21. RESERVATION
A ['rɛzɚveʃən]
B. [,rɛzɚ'veʃən]
C. [rɪ'zɝveʃən]
D. None of the above

22. CONTINENTAL
A. ['kɑntənentl]
B. ['kɑntə,nɛntl]
C. [,kɑntə'nɛntl]
D. None of the above

23. EXPLORATION
A. [ɪksplə'reʃən]
B. [,ɪks'plɔ,reʃən]
C. ['ɛksplərəʃən]
D. None of the above

24. ABORIGINES
A. [,æ'bɔrədʒɪniz]
B. ['æbərɪdʒə,niz]
C. [,æbə'rɪdʒə,niz]
D. None of the above

25. POPULARITY
A.. ['pɑpjələrəti]
B. [,pɑpjə'lærəti]
C. ['pɑpjə,lærəti]
D None of the above.

26. INVENTORY
A.. ['ɪnvən,tɔri]
B. [ɪn'vɛn,tɔri]
C. [,ɪnvən'tɔri]
D. None of the above

27. DECLARATION
A. [dɪ'klæ,reʃən]
B. ['dɛklə,reʃən]
C. [,dɛklə'reʃən]
D. None of the above

28. COMPARABLE
A. [kəm'pærəbl]
B. ['kɑmpərəbl]
C. [,kɑmpə'rebl]
D. None of the above

29. ACCIDENTAL
A.. ['æksə,dɛntl]
B. [,æksə'dɛntl]
C. ['æksədəntl]
D. None of the above

30. ELEMENTARY
A. ['ɛləməntri]
B. [,ɛlə'mɛntri]
C. ['ɛlə,mɛntri]
D. None of the above

PART 4: SEMANTIC RATING OF WORD PAIRS TEST

Name: ....

Instructions:

There are 95 pairs of words below. Rate how closely each pair of words are RELATED IN MEANING, using the range of 1 to 5.

1. Circle 1 if a pair of words are DEFINITELY NOT RELATED IN MEANING.
2. Circle 5 if a pair of words are DEFINITELY RELATED IN MEANING.
3. Circle 3 if a pair of words are SOMEWHAT RELATED IN MEANING.
4. Circle 4 if a pair of words are MORE THAN SOMEWHAT RELATED BUT NOT DEFINITELY RELATED IN MEANING.
5. Circle 2 if a pair of words are LESS THAN SOMEWHAT RELATED BUT NOT DEFINITELY UNRELATED IN MEANING.

WORD PAIR	1 Definitely not related in meaning	2	3	4	5 Definitely related in meaning
1. combine - combination	1	2	3	4	5
2. author - authority	1	2	3	4	5
3. explain - explanation	1	2	3	4	5
4. politics - political	1	2	3	4	5
5. vary - variety	1	2	3	4	5
6. recite - recitation	1	2	3	4	5
7. Christian - Christianity	1	2	3	4	5
8. biology - biological	1	2	3	4	5
9. formal - formality	1	2	3	4	5
10. refer - references	1	2	3	4	5
11. prosper - prosperity	1	2	3	4	5
12. mechanic - mechanism	1	2	3	4	5
13. prepare - preparation	1	2	3	4	5
14. confident - confidential	1	2	3	4	5
15. grammar - grammatical	1	2	3	4	5
16. influence - influential	1	2	3	4	5
17. major - majority	1	2	3	4	5
18. desperate - desperation	1	2	3	4	5
19. magnet - magnetic	1	2	3	4	5
20. national - nationality	1	2	3	4	5
21. reserve - reservation	1	2	3	4	5
22. continent - continental	1	2	3	4	5
23. explore - exploration	1	2	3	4	5
24. origin - aborigines	1	2	3	4	5
25. popular - popularity	1	2	3	4	5
26. invent - inventory	1	2	3	4	5
27. declare - declaration	1	2	3	4	5
28. compare - comparable	1	2	3	4	5
29. accident - accidental	1	2	3	4	5
30. element - elementary	1	2	3	4	5
31. similar- similarity	1	2	3	4	5
32 incline - inclination	1	2	3	4	5
33. economy - economical	1	2	3	4	5
34. history - historical	1	2	3	4	5
35. commerce - commercial	1	2	3	4	5
36. compose - composition	1	2	3	4	5
37. resign - resignation	1	2	3	4	5
38. minor - minority	1	2	3	4	5
39. revolve - revolution	1	2	3	4	5

40. exclaim - exclamation	1	2	3	4	5
41. metal - metallic	1	2	3	4	5
42. admire - admiration	1	2	3	4	5
43. stable - stability	1	2	3	4	5
44. comedy - comedian	1	2	3	4	5
45. compete - competition	1	2	3	4	5
46. majesty - majestic	1	2	3	4	5
47. photograph - photographer	1	2	3	4	5
48. colony - colonial	1	2	3	4	5
49. Japan - Japanese	1	2	3	4	5
50. hospital - hospitality	1	2	3	4	5
51. telegraph - telegraphy	1	2	3	4	5
52. unit - unity	1	2	3	4	5
53. valid - validity	1	2	3	4	5
54. perspire - perspiration	1	2	3	4	5
55. prior - priority	1	2	3	4	5
56. magic - magician	1	2	3	4	5
57. proclaim - proclamation	1	2	3	4	5
58. democrat - democracy	1	2	3	4	5
59. industry - industrial	1	2	3	4	5
60. family - familiar	1	2	3	4	5
61. revolt -revolution	1	2	3	4	5
62. message - messanger	1	2	3	4	5
63. destroy - destruction	1	2	3	4	5
64. receive - reception	1	2	3	4	5
65. mobile - mobility	1	2	3	4	5
66. conquer - conquest	1	2	3	4	5
67. commit - commission	1	2	3	4	5
68. respire - respirator	1	2	3	4	5
69. contaminate - contamination	1	2	3	4	5
70. reduca - reduction	1	2	3	4	5
71. resolve - resolution	1	2	3	4	5
72. Newton - Newtonian	1	2	3	4	5
73. destine - destination	1	2	3	4	5
74. converse - conversation	1	2	3	4	5
75. collide - collision	1	2	3	4	5
76. number - numerous	1	2	3	4	5
77. remedy - remedial	1	2	3	4	5
78. vacant - vacancy	1	2	3	4	5
79. civilize - civilization	1	2	3	4	5
80. evident - evidence	1	2	3	4	5
81. abolish - abolition	1	2	3	4	5
82. succeed - success	1	2	3	4	5
83. determined - determination	1	2	3	4	5
84. unite - unity	1	2	3	4	5
85. decide - decision	1	2	3	4	5
86. invade - invasion	1	2	3	4	5
87. fertile - fertility	1	2	3	4	5
88. suspect - suspicious	1	2	3	4	5
89. oppose - opponent	1	2	3	4	5
90. destiny - destination	1	2	3	4	5
91. defend - defensive	1	2	3	4	5
92. extreme - extremity	1	2	3	4	5
93. resolute - resolution	1	2	3	4	5
94. prescribe - prescription	1	2	3	4	5
95. destruct - destruction	1	2	3	4	5

APPENDIX D

TABLES

Table 3a: Groups A and B: Results of Listening Test by Words

Note:
For Tables 3a and 3b:
BB = Base-word vowel and Base-word stress
NBB = not BB; correct vowel but incorrect stress
NOTA = None of the Above
(Results of Pronunciation Test of Listening Test items are included for comparison.)

WORD	PRONUNCIATION NS Norm		LISTENING NS Norm		LISTENING BB		LISTENING NBB		LISTENING NOTA	
	Gr. A ESL	Gr. B NS	Gr. A ESL	Gr. B NS	Gr. A ESL	Gr. B NS	Gr. A ESL	Gr. B NS	Gr. A ESL	Gr. B NS
1. combination	13	32	20	32	0	0	12	0	0	0
2. authority	21	32	22	32	4	0	4	0	2	0
3. explanation	14	31	24	32	2	0	6	0	0	0
4. political	7	31	32	32	0	0	0	0	0	0
5. variety	12	32	23	32	7	0	2	0	0	0
6. recitation	11	22	29	25	1	7	2	0	0	0
7. Christianity	12	32	17	32	11	0	3	0	1	0
8. biological	29	31	25	32	1	0	6	0	0	0
9. formality	10	32	26	32	4	0	0	0	2	0
10. references	27	32	30	31	1	1	0	0	1	0
11. prosperity	9	32	24	32	6	0	0	0	2	0
12. mechanism	1	31	3	30	23	2	4	0	2	0
13. preparation	12	32	14	29	8	0	9	2	1	1
14. confidential	23	32	26	32	1	0	3	0	2	0
15. grammatical	6	32	26	32	3	0	2	0	1	0
16. influential	11	32	20	31	6	0	3	1	3	0
17. majority	16	32	25	32	2	0	4	0	1	0
18. desperation	12	32	21	29	9	3	0	0	2	0
19. magnetic	26	32	27	32	5	0	0	0	0	0
20. nationality	26	32	29	32	3	0	0	0	0	0
21. reservation	8	32	19	31	2	1	8	0	3	0
22. continental	18	32	27	31	3	1	2	0	0	0
23. exploration	10	31	27	28	1	3	3	0	1	1
24. aborigines	1	30	17	31	12	0	2	0	1	1
25. popularity	21	32	29	31	1	0	2	0	0	1
26. inventory	3	25	7	30	24	2	1	0	0	0
27. declaration	8	31	4	32	10	0	16	0	2	0
28. comparable	0	5	1	11	29	20	1	1	1	0
29. accidental	23	32	24	32	4	0	2	0	2	0
30. elementary	29	32	31	30	0	0	1	0	0	2
TOTAL	**419**	**908**	**649**	**910**	**183**	**40**	**98**	**4**	**30**	**6**
% out of 960	**43.65**	**94.58**	**67.60**	**94.79**						
Gr. A % out of 311 errors					**58.84**		**31.51**		**9.65**	
Gr. B % out of 50 errors						**80.00**		**8.00**		**12.00**
AVERAGE	**13.09**	**28.38**	**20.28**	**28.44**	**5.72**	**1.25**	**3.06**	**0.13**	**0.94**	**0.19**

Group A Listening (NS Norm) vs. Group B Listening (NS Norm): t (62) = 15.40 p < 0.01

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Table 3b: Group A: Results of Listening Test: Pronunciation Type Preference by Subject

SUBJECT	PRONUNCIATION NS Norm	LISTENING NS Norm	LISTENING BB	LISTENING NBB	LISTENING NOTA
1	14	23	1	5	1
2	15	25	3	2	0
3	14	20	6	3	1
4	7	18	7	5	0
5	17	21	5	4	0
6	7	18	7	5	0
7	14	24	3	3	0
8	20	21	6	3	0
9	19	16	6	4	4
10	17	22	7	1	0
11	21	24	5	1	0
12	14	20	6	4	0
13	19	19	9	2	0
14	13	23	4	2	1
15	16	20	2	4	4
16	17	20	7	2	1
17	8	22	7	1	0
18	11	22	8	0	0
19	19	25	2	3	0
20	17	21	4	5	0
21	13	20	8	2	0
22	3	23	3	4	0
23	8	13	6	3	8
24	6	16	9	3	2
25	13	19	9	2	0
26	17	22	5	2	1
27	19	17	8	5	0
28	10	20	6	4	0
29	12	18	8	4	0
30	10	17	5	6	2
31	12	18	4	3	5
32	8	22	7	1	0
TOTAL	430	649	183	98	30
% out of 960	44.79	67.60			
% out of 311 errors			58.84	31.51	9.65
AVERAGE	13.44	20.28	5.72	3.06	0.94

Group A: Pronunciation Type Preference (Type BB vs. NBB vs. NOTA): [F (3,93) = 401.4 , p < 0.01]
Group A: Listening NS Norm vs. Pronunciation NS Norm: t=(31) -8.111 p < 0.01

Table 3c: Group B: Results of Listening Test: Pronunciation Type Preference by Subject

SUBJECT	PRONUNCIATION Derived Words 30 NS Norm	LISTENING Derived Words 30 NS Norm	LISTENING Derived Words 30 BB	LISTENING Derived Words 30 NBB	LISTENING Derived Words 30 NOTA
1	28	29	1	0	0
2	28	30	0	0	0
3	29	29	1	0	0
4	29	30	0	0	0
5	28	28	2	0	0
6	28	30	0	0	0
7	29	30	0	0	0
8	29	29	0	1	0
9	28	28	1	1	0
10	29	30	0	0	0
11	28	28	2	0	0
12	29	29	0	0	1
13	29	28	2	0	0
14	28	27	3	0	0
15	29	28	1	0	1
16	28	26	4	0	0
17	28	28	2	0	0
18	28	28	1	1	0
19	30	29	0	0	1
20	28	28	2	0	0
21	29	29	1	0	0
22	28	27	2	0	1
23	29	29	1	0	0
24	28	29	1	0	0
25	29	28	2	0	0
26	29	28	2	0	0
27	29	27	1	0	2
28	29	29	1	0	0
29	27	28	2	0	0
30	27	27	3	0	0
31	29	29	1	0	0
32	25	28	1	1	0
TOTAL	908	910	40	4	6
% out of 960	94.58	94.79			
% out of 50 errors			80.00	8.00	12.00
AVERAGE	28.38	28.44	1.25	0.13	0.19

Group B: Pronunciation Type Preference (Type BB vs. NBB vs. NOTA):   [F (3, 93) = 8395.11 p < 0.01]
Group B: Listening NS Norm vs. Pronunciation NS Norm   t=(31) -0.32

Table 4a: Group A: Results of Pronunciation Test by Subject and Error Types
(Note: both words in a pair were intelligible)

SUBJECT	INTELLIGIBLE PAIRS OF WORDS	TYPE 1 BB	TYPE 2 √B	TYPE 3 BX	TYPE 4 XB	TYPE 5 √X	TYPE 6 X√	TYPE 7 XX	TYPE 8 C
1	60	8	0	1	10	1	9	7	0
2	58	10	3	0	14	1	1	5	0
3	58	8	0	0	18	3	5	2	1
4	57	31	1	1	5	3	0	5	0
5	59	6	0	0	4	1	6	12	0
6	45	19	0	0	5	2	1	3	1
7	51	18	0	0	4	1	0	2	2
8	55	12	0	0	7	1	0	3	1
9	58	8	2	0	4	1	2	7	0
10	59	12	0	0	7	2	0	2	1
11	56	9	0	1	5	3	1	4	0
12	58	13	2	2	4	6	1	7	1
13	60	13	0	0	7	2	0	9	0
14	58	19	0	1	3	0	0	8	2
15	58	7	3	0	7	3	1	8	0
16	45	11	0	0	1	2	0	3	2
17	41	17	0	0	5	1	1	2	1
18	58	15	2	0	11	3	0	11	1
19	57	9	0	0	3	1	1	8	0
20	58	12	1	0	4	5	2	3	2
21	59	10	0	0	7	2	4	14	1
22	37	18	1	2	6	0	1	2	1
23	46	17	0	1	5	4	0	6	3
24	50	24	2	2	4	2	1	3	2
25	52	19	0	1	5	2	1	6	1
26	57	7	0	0	6	2	5	11	1
27	51	14	0	0	0	1	0	3	
28	54	16	1	2	7	2	0	7	2
29	48	14	1	0	8	1	0	7	3
30	53	18	0	1	5	3	5	8	4
31	59	14	2	1	9	2	2	12	2
32	52	21	2	0	6	3	0	7	2
TOTAL	1727	449	23	16	196	66	50	197	37
%	89.95	44.50	2.28	1.59	19.43	6.54	4.96	19.52	3.67
AVERAGE	53.97	14.03	0.72	0.5	6.13	2.06	1.56	6.16	1.16

Note: Percentages of error types are calculated out of the 1009 word pairs with errors (12 of these pairs had consonant errors only).

Group A: Frequency distribution of error types in Pronunciation Test: χ^2 (7)=1195.29 p < 0.01
(Type 1 (BB) is significantly predominant over other error types.)

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Table 4b: **Group A:** **Results of Pronunciation Test by Subject and Error Types**
(Listening Test Items Only)
Note: both words in a pair were intelligible)

SUBJECT	INTELLIGIBLE PAIRS OF WORDS	TYPE 1 BB	TYPE 2 √B	TYPE 3 BX	TYPE 4 XB	TYPE 5 √X	TYPE 6 X√	TYPE 7 XX	TYPE 8 C	NS NORM PRONUN-CIATION
1	30	6	0	1	2	1	3	3	0	14
2	28	6	0	0	5	1	0	3	0	15
3	29	5	0	0	5	1	3	2	0	14
4	28	16	0	1	2	0	0	1	0	7
5	30	4	0	0	2	1	3	2	0	17
6	21	7	0	0	2	2	1	2	1	7
7	26	11	0	0	1	0	0	1	1	14
8	28	4	0	0	3	0	0	1	1	20
9	29	5	0	0	3	0	1	3	0	19
10	30	5	0	0	5	1	0	2	1	17
11	28	4	0	0	1	1	1	0	0	21
12	29	6	0	0	2	4	1	2	1	14
13	30	6	0	0	2	1	0	2	0	19
14	29	9	1	0	1	0	0	5	0	13
15	29	5	0	0	2	2	0	2	0	16
16	20	4	0	0	0	1	0	0	1	17
17	20	7	0	0	4	1	1	0	0	8
18	29	6	1	0	5	2	0	4	0	11
19	29	6	0	0	0	0	1	3	0	19
20	28	5	0	0	1	1	2	0	2	17
21	30	6	0	0	2	0	3	6	0	13
22	19	10	0	0	3	0	0	0	0	3
23	26	10	0	0	1	2	0	4	1	8
24	27	13	1	1	3	2	0	1	2	6
25	27	8	0	0	3	1	0	2	0	13
26	30	3	0	0	2	1	2	5	0	17
27	27	7	0	0	0	0	0	1	0	19
28	26	7	0	0	4	2	0	2	2	10
29	25	10	0	0	1	0	0	2	1	12
30	28	9	0	0	4	1	3	2	2	10
31	29	6	0	0	4	2	0	5	2	12
32	28	9	1	0	3	2	0	3	1	8
TOTAL	872	225	4	3	78	33	25	71	19	430
%	90.83	49.89	0.89	0.67	17.29	7.32	5.54	15.74	4.21	44.79
AVERAGE	27.25	7.03	0.13	0.09	2.44	1.03	0.78	2.22	0.59	13.44

Note: Percentages of error types are calculated out of 451 word pairs with errors (12 of these pairs had consonant
errors only.)

Group A: Frequency distribution of error types in Pronunciation Test (30 Listening Test items only): χ^2 (7)=661.67 p < 0.01
(Type 1 (BB) is significantly predominant over the other error types.)

Table 4c: Group A: Results of Pronunciation Test by Word Pairs and Error Types

WORD PAIR	TYPE 1 BB	TYPE 2 √B	TYPE 3 BX	TYPE 4 XB	TYPE 5 √X	TYPE 6 X√	TYPE 7 XX	TYPE 8 C
1. similar- similarity	2	0	0	0	4	2	0	0
2. incline - inclination	9	0	0	11	0	4	1	0
3. economy - economical	8	0	0	4	0	0	6	0
4. history - historical	7	0	0	0	2	0	0	0
5. commerce - commercial	11	0	1	6	0	0	9	5
6. compose - composition	2	0	0	25	0	0	0	0
7. resign - resignation	4	14	0	0	0	1	0	0
8. minor - minority	4	0	0	0	3	0	0	0
9. revolt - revolution	0	0	0	2	0	3	1	0
10. exclaim - exclamation	2	0	0	6	0	1	13	0
11. metal - metallic	9	0	0	0	1	0	7	0
12. admire - admiration	4	0	6	9	0	1	2	0
13. stable - stability	9	0	0	1	0	0	21	0
14. comedy - comedian	8	0	0	0	0	0	15	0
15. compete - competition	1	1	0	2	0	7	0	0
16. majesty - majestic	15	0	0	0	1	0	4	0
17. photograph - photographer	17	0	0	2	0	0	3	0
18. colony - colonial	10	0	0	0	0	0	5	0
19. Japan - Japanese	8	0	0	3	0	6	6	0
20. hospital - hospitality	8	0	0	0	6	0	0	0
21. telegraph - telegraphy	17	0	0	4	0	0	0	0
22. Newton - Newtonian	7	0	0	0	11	0	2	0
23. valid - validity	9	0	1	6	0	0	2	0
24. perspire - perspiration	2	0	1	4	0	0	4	0
25. prior - priority	5	1	0	0	2	0	1	0
26. magic - magician	8	0	0	14	0	0	1	13
27. proclaim - proclamation	4	0	3	13	0	0	6	0
28. democrat - democracy	11	0	1	2	0	0	4	0
29. industry - industrial	13	3	0	0	2	0	2	0
30. family - familiar	10	0	0	4	1	0	11	0
TOTAL	**224**	**19**	**13**	**118**	**33**	**25**	**126**	**18**
% (out of 558 pairs with errors)	**40.14**	**3.41**	**2.33**	**21.15**	**5.91**	**4.48**	**22.58**	**3.23**
AVERAGE	**7.00**	**0.59**	**0.41**	**3.69**	**1.03**	**0.78**	**3.94**	**0.56**
31. combine - combination	2	0	0	9	0	5	0	0
32. author - authority	5	0	0	0	1	0	2	0
33. explain - explanation	2	0	0	6	0	0	9	0
34. politics - political	12	0	0	4	0	0	5	0
35. vary - variety	0	0	0	0	0	0	16	0
36. recite - recitation	2	0	1	3	0	2	2	0
37. Christian - Christianity	11	0	0	6	2	0	1	0
38. biology - biological	1	0	0	0	0	1	0	0
39. formal - formality	9	0	0	4	8	0	0	0
40. refer - references	4	0	0	0	0	0	1	0
41. prosper - prosperity	7	0	0	0	13	0	0	0
42. mechanic - mechanism	27	0	0	0	0	0	0	1
43. prepare - preparation	10	0	1	6	0	3	0	0
44. confident - confidential	1	0	0	0	1	1	0	6
45. grammar - grammatical	4	0	0	0	0	0	20	1

46. influence - influential	6	0	0	1	0	0	0	6
47. major - majority	6	0	0	0	0	0	9	0
48. desperate - desperation	9	1	0	0	3	0	2	0
49. magnet - magnetic	2	1	0	0	1	0	0	0
50. national - nationality	4	0	1	0	1	0	0	0
51. reserve - reservation	8	0	0	6	0	7	0	0
52. continent - continental	4	0	0	0	0	1	0	2
53. explore - exploration	5	0	0	16	0	0	0	0
54. origin - aborigines	9	0	0	7	0	1	4	0
55. popular - popularity	4	1	0	0	3	0	0	0
56. invent - inventory	28	0	0	0	0	0	0	0
57. declare - declaration	9	0	0	9	0	3	0	0
58. compare - comparable	31	0	0	1	0	0	0	0
59. accident - accidental	2	1	0	0	0	1	0	3
60. element - elementary	1	0	0	0	0	0	0	0
TOTAL	225	4	3	78	33	25	71	19
% (out of 451pairs with errors)	49.89	0.89	0.67	17.29	7.32	5.54	15.74	4.21
AVERAGE	7.03	0.13	0.09	2.44	1.03	0.78	2.22	0.59
GRAND TOTAL	449	23	16	196	66	50	197	37
% (out of 1009 pairs with errors)	44.50	2.28	1.59	19.43	6.54	4.96	19.52	3.67
AVERAGE	14.03	0.72	0.50	6.13	2.06	1.56	6.16	1.16

Note: For #1-30 the 558 pairs with errors might or might not contain consonant errors.

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Table 4d: Group B: Results of Pronunciation Test by Subject and Error Types
(Note: both words in a pair were intelligible)

SUBJECT	INTELLIGIBLE PAIRS OF WORDS	TYPE 1 BB	TYPE 2 ✓B	TYPE 3 BX	TYPE 4 XB	TYPE 5 ✓X	TYPE 6 X✓	TYPE 7 XX	TYPE 8 C
1	60	1	0	0	1	0	0	0	0
2	60	0	0	0	0	0	2	0	0
3	60	2	0	0	0	0	0	0	0
4	60	2	0	0	0	0	0	0	0
5	60	2	2	0	0	0	0	0	0
6	60	2	0	0	0	0	0	0	0
7	60	1	1	0	0	0	0	0	0
8	59	1	0	0	0	1	0	0	0
9	60	1	0	0	0	2	0	0	0
10	60	1	1	0	0	0	0	0	0
11	59	2	1	0	0	0	0	0	0
12	60	1	0	0	0	0	0	0	0
13	60	2	1	0	0	0	0	0	0
14	60	6	0	0	0	0	0	0	0
15	60	2	0	0	0	0	0	0	0
16	59	3	1	0	0	0	0	0	0
17	59	2	1	0	0	0	0	0	0
18	60	3	0	0	0	1	0	0	0
19	60	1	0	0	0	0	0	0	0
20	60	1	1	0	0	0	0	0	0
21	60	0	1	0	1	0	0	1	0
22	60	4	0	0	0	0	0	0	0
23	60	1	0	0	0	0	0	0	0
24	60	3	0	0	0	0	1	0	0
25	60	2	0	1	0	0	0	0	0
26	60	2	1	0	0	0	0	0	0
27	59	1	0	0	0	0	0	0	0
28	60	1	0	0	0	0	0	0	0
29	60	1	2	0	0	0	0	0	0
30	60	4	1	0	0	0	0	0	0
31	60	1	0	0	0	0	0	0	0
32	56	2	1	0	0	0	0	0	0
TOTAL	1911	58	15	1	2	4	3	1	0
%	99.53	69.05	17.86	1.19	2.38	4.76	3.57	1.19	0
AVERAGE	59.72	1.81	0.47	0.03	0.06	0.13	0.09	0.03	0

Note: Percentages of error types are calculated out of 84 pairs with errors.

Group B: Frequency distribution of error types in Pronunciation Test: χ^2 (7)=269.07 p < 0.01
    (Type 1 (BB) is significantly predominant over other error types.)

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Table 4e: Group B: Results of Pronunciation Test by Subject and Error Types
(Listening Test Items Only)
(Note: both words in a pair were intelligible)

SUBJECT	INTELLIGIBLE PAIRS OF WORDS	TYPE 1 BB	TYPE 2 √B	TYPE 3 BX	TYPE 4 XB	TYPE 5 √X	TYPE 6 X√	TYPE 7 XX	TYPE 8 C
1	30	1	0	0	1	0	0	0	0
2	30	0	0	0	0	0	2	0	0
3	30	1	0	0	0	0	0	0	0
4	30	1	0	0	0	0	0	0	0
5	30	1	1	0	0	0	0	0	0
6	30	2	0	0	0	0	0	0	0
7	30	1	0	0	0	0	0	0	0
8	30	1	0	0	0	0	0	0	0
9	30	0	0	0	0	0	0	0	0
10	30	0	0	0	0	0	0	0	0
11	29	1	1	0	0	0	0	0	0
12	30	1	0	0	0	0	0	0	0
13	30	1	0	0	0	0	0	0	0
14	30	2	0	0	0	0	0	0	0
15	30	2	0	0	0	0	0	0	0
16	29	2	0	0	0	0	0	0	0
17	30	1	1	0	0	0	0	0	0
18	30	2	0	0	0	0	0	0	0
19	30	0	0	0	0	0	0	0	0
20	30	1	1	0	0	0	0	0	0
21	30	0	0	0	0	0	0	0	0
22	30	2	0	0	0	0	0	0	0
23	30	1	0	0	0	0	0	0	0
24	30	2	0	0	0	0	1	0	0
25	30	1	0	0	0	0	0	0	0
26	30	1	0	0	0	0	0	0	0
27	30	1	0	0	0	0	0	0	0
28	30	1	0	0	0	0	0	0	0
29	30	1	2	0	0	0	0	0	0
30	30	3	1	0	0	0	0	0	0
31	30	1	0	0	0	0	0	0	0
32	27	1	1	0	0	0	0	0	0
TOTAL	955	36.00	8	0	1	0	3	0	0
%	99.48	75.00	16.67	0.00	2.08	0.00	6.25	0	0
AVERAGE	29.84	1.13	0.25	0.00	0.03	0.00	0.09	0	0

Note: Percentages of error types are calculated out of 48 pairs with errors.

Group B: Pronunciation Error Types by Word Pairs for Listening Test Items only: $\chi^2 (7)=180.33$ p < 0.01
(Type 1 (BB) is significantly predominant over other error types.)

Table 4f: Group B: Results of Pronunciation Test by Word Pairs and Error Types

WORD PAIR	TYPE 1 BB	TYPE 2 √B	TYPE 3 BX	TYPE 4 XB	TYPE 5 √X	TYPE 6 X√	TYPE 7 XX	TYPE 8 C
1. similar- similarity	0	0	0	0	0	0	0	0
2. incline - inclination	0	3	0	1	0	0	1	0
3. economy - economical	0	0	0	0	0	0	0	0
4. history - historical	0	0	0	0	0	0	0	0
5. commerce - commercial	0	0	0	0	0	0	0	0
6. compose - composition	0	0	0	0	0	0	0	0
7. resign - resignation	0	1	0	0	0	0	0	0
8. minor - minority	0	0	0	0	0	0	0	0
9. revolt - revolution	0	0	0	0	0	0	0	0
10. exclaim - exclamation	0	0	0	0	0	0	0	0
11. metal - metallic	0	0	0	0	0	0	0	0
12. admire - admiration	1	3	0	0	0	0	0	0
13. stable - stability	0	0	0	0	0	0	0	0
14. comedy - comedian	0	0	0	0	0	0	0	0
15. compete - competition	0	0	0	0	0	0	0	0
16. majesty - majestic	2	0	0	0	0	0	0	0
17. photograph - photographer	1	0	0	0	0	0	0	0
18. colony - colonial	0	0	1	0	0	0	0	0
19. Japan - Japanese	0	0	0	0	0	0	0	0
20. hospital - hospitality	0	0	0	0	0	0	0	0
21. telegraph - telegraphy	13	0	0	0	3	0	0	0
22. Newton - Newtonian	2	0	0	0	0	0	0	0
23. valid - validity	3	0	0	0	0	0	0	0
24. perspire - perspiration	0	0	0	0	0	0	0	0
25. prior - priority	0	0	0	0	1	0	0	0
26. magic - magician	0	0	0	0	0	0	0	0
27. proclaim - proclamation	0	0	0	0	0	0	0	0
28. democrat - democracy	0	0	0	0	0	0	0	0
29. industry - industrial	0	0	0	0	0	0	0	0
30. family - familiar	0	0	0	0	0	0	0	0
TOTAL	22	7	1	1	4	0	1	0
% (out of 36 pairs with errors)	61.11	19.44	2.78	2.78	11.11	0.00	2.78	0.00
AVERAGE	0.69	0.22	0.03	0.03	0.13	0.00	0.03	0.00
31. combine - combination	0	0	0	0	0	0	0	0
32. author - authority	0	0	0	0	0	0	0	0
33. explain - explanation	0	0	0	0	0	0	0	0
34. politics - political	0	0	0	0	0	0	0	0
35. vary - variety	0	0	0	0	0	0	0	0
36. recite - recitation	2	7	0	0	0	1	0	0
37. Christian - Christianity	0	0	0	0	0	0	0	0
38. biology - biological	0	0	0	0	0	0	0	0
39. formal - formality	0	0	0	0	0	0	0	0
40. refer - references	0	0	0	0	0	0	0	0
41. prosper - prosperity	0	0	0	0	0	0	0	0
42. mechanic - mechanism	1	0	0	0	0	0	0	0
43. prepare - preparation	0	0	0	0	0	0	0	0
44. confident - confidential	0	0	0	0	0	0	0	0
45. grammar - grammatical	0	0	0	0	0	0	0	0

46. influence - influential	0	0	0	0	0	0	0	0
47. major - majority	0	0	0	0	0	0	0	0
48. desperate - desperation	0	0	0	0	0	0	0	0
49. magnet - magnetic	0	0	0	0	0	0	0	0
50. national - nationality	0	0	0	0	0	0	0	0
51. reserve - reservation	0	0	0	0	0	0	0	0
52. continent - continental	0	0	0	0	0	0	0	0
53. explore - exploration	0	0	0	1	0	0	0	0
54. origin - aborigines	1	0	0	0	0	2	0	0
55. popular - popularity	0	0	0	0	0	0	0	0
56. invent - inventory	6	0	0	0	0	0	0	0
57. declare - declaration	0	1	0	0	0	0	0	0
58. compare - comparable	26	0	0	0	0	0	0	0
59. accident - accidental	0	0	0	0	0	0	0	0
60. elment - elementary	0	0	0	0	0	0	0	0
TOTAL	**36**	**8**	**0**	**1**	**0**	**3**	**0**	**0**
% (out of 48 pairs with errors)	**79.17**	**16.67**	**0.00**	**2.08**	**0.00**	**6.25**	**0.00**	**0.00**
AVERAGE	**1.06**	**0.25**	**0.00**	**0.03**	**0.00**	**0.09**	**0.00**	**0.00**
GRAND TOTAL	**58**	**15**	**1**	**2**	**4**	**3**	**1**	**0**
% (out of 84 pairs with errors)	**69.05**	**17.86**	**1.19**	**2.38**	**4.76**	**3.57**	**1.19**	**0.00**
AVERAGE	**1.81**	**0.47**	**0.03**	**0.06**	**0.13**	**0.09**	**0.03**	**0.00**

Table 4g: **Group A and Group B: Transcription of Pronunciation According to Error Types of Word Pairs**

ERROR TYPE	TRANSCRIPTION	Gp. A ESL	Gp. B NS
TYPE 1 (BB)			
1. similar - similarity	'sɪmələ - 'sɪmələrəti	2	0
2. incline - inclination	ˌɪn'klɑɪn - ˌɪn'klɑɪneʃən	6	0
	ˌɪn'klen - ˌɪn'klenəʃen	1	0
	'ɪnˌklɑɪn - 'ɪnˌklɑɪneʃən	2	0
3. economy - economical	ɪˌkɔ'nɔmi - ɪˌkɔ'nɔmɪkəl	3	0
	ˌɪkə'nɔmi - ˌɪkə'nɔmɪkəl	5	0
4. history - historical	'hɪstri - 'hɪstrɪkəl	5	0
	'hɪstri - 'hɪstriəl	1	0
	'hɪstəri - 'hɪstərɪkəl	1	0
5. commerce - commercial	ˌkɔ'mɚs - ˌkɔ'mɚʃɪəl	3	0
	ˌkɔ'mɚs - ˌkɔ'mɚsɪəl	2	0
	ˌkɔ'mɚs - ˌkɔ'mɚkɪəl	1	0
	ˌkɔ'mɜs - ˌkɔ'mɜʃɪəl	5	0
6. compose - composition	ˌkɔmpos - ˌkɔm'posɪʃən	2	0
7. resign - resignation	ˌrɪ'sɑɪn - ˌrɪ'sɑɪneʃən	4	0
8. minor - minority	'mɑɪnə - 'mɑɪnərəti	1	0
	'mɑɪnə - 'mɑɪnərɪti	1	0
	mɪ'nɔr - mɪ'nɔrɪti	2	0
10. exclaim - exclamation	ɛks'klem - ɛks'klemeʃən	1	0
	ɛks'klɑɪm - ɛks'klɑɪmeʃən	1	0
11. metal - metallic	'mɛtəl - 'mɛtəlɪk	8	0
	'mɪtɑl - 'mɪtɑlɪk	1	0
12. admire - admiration	ˌæd'mɑɪr - ˌæd'mɑɪreʃən	3	1
	ˌæd'mɪə - ˌæd'mɪəreʃən	1	0
13. stable - stability	'stebəl - 'stebəlɪti	8	0
	'stebəl - 'stebəlɑɪti	1	0
14. comedy - comedian	'kɔmədi - 'kɔməˌdiən	6	0
	ˌkɔ'mɪdi - ˌkɔ'mɪdiən	2	0
15. compete - competition	ˌkɔm'pɪt - ˌkɔm'pɪtɪʃən	1	0
16. majesty - majestic	'mædʒəsti - 'mædʒəstɪk	4	0
	ˌmæ'dʒɜsti - ˌmæ'dʒɜstɪk	3	0
	ˌmæ'dʒɛsti - ˌmæ'dʒɛstɪk	4	0
	ˌmɑ'dʒɛsti - ˌmɑ'dʒɛstɪk	1	0
	mə'dʒɛsti - mə'dʒɛstɪk	2	2
	'medʒəsti - 'medʒəstɪk	1	0

17. photograph - photographer	'foto,graf - 'foto,grafɚ	2	0
	'foto,græf - 'foto,græfɚ	2	0
	'fotə,græf - 'fotə,græfɚ	8	1
	'fotə,graf - 'fotə,grafɚ	2	0
	'fotə,græf - 'fotə,grafə	3	0
18. colony - colonial	'kɔləni - 'kɔləniəl	3	0
	'kɔləni - 'kɔlənɪəl	5	0
	,kɔ'loni - ,kɔ'lonɪəl	1	0
	'ko,loni - 'ko,lonɪəl	1	0
19. Japan - Japanese	ʤæ'pæn - ʤæ'pænis	6	0
	ʤə'pæn - ʤə'pænis	2	0
20. hospital - hospitality	'hɔspɪtəl - 'hɔspɪtəlɪti	3	0
	'hɔspɪtəl - 'hɔspɪtələti	4	0
	,hɔs'pɪtəl - ,hɔs'pɪtələti	1	0
21. telegraph - telegraphy	'tɛlə,graf - 'tɛlə,grafi	5	0
	'tɛlə,græf - 'tɛlə,græfi	12	13
22. Newton - Newtonian	'nɪutən - 'nɪutənɪən	6	2
	'nɪu,tɔn - 'nɪu,tɔnɪən	1	0
23. valid - validity	'vælɪd - 'vælɪdɪti	4	0
	'vælɪd - 'vælɪdəti	2	3
	'vælɪd - 'vælɪdti	1	0
	'velɪd - 'velɪdəti	1	0
24. perspire - perspiration	pɚs'paɪr - pɚs'paɪreʃən	1	0
	'pɜs,paɪ - 'pɜs,paɪreʃən	1	0
25. prior - priority	praɪ'ɔr - praɪ'ɔrɪti	2	0
	prɪ'ɔ - prɪ'ɔrɪti	1	0
	prɪ'ɔr - prɪ'ɔrəti	1	0
	prɪ'ɝ - prɪ'ɝrɪti	1	0
26. magic - magician	'mæʤɪk - 'mæʤɪʃən	1	0
	'mæʤɪk - 'mæʤɪkən	7	0
27. proclaim - proclamation	,pro'klem - ,pro'klemeʃən	1	0
	,pro'klaɪm - ,pro'klaɪmeʃən	1	0
	,pro'klæm - ,pro'klæmeʃən	2	0
28. democrat - democratic	dɪ'mokrət - dɪ'mokrəsi	1	0
	dɪ'mokret - dɪ'mokresi	1	0
	dɪ'mɔkret - dɪ'mɔkresi	3	0
	'dɛmɔ,kræt - 'dɛmɔ,kræsi	1	0
	də'mokrət - də'mokrəsi	5	0
29. industry - industrial	ɪn'dʌstri - ɪn'dʌstrɪəl	6	0
	'ɪndəstri - 'ɪndəstrɪəl	7	0
30. family - familiar	'fæməli - 'fæməlɪɚ	6	0
	'fæməli - 'fæməlɪə	4	0
31. combine - combination	,kɔm'baɪn - ,kɔm'baɪneʃən	1	0
	kəm'baɪn - kəm'baɪneʃən	1	0

32. author - authority	'ɒθɚ - 'ɒθɛɪti	3	0
	'ɔθə - 'ɔθə,rɑɪti	1	0
	'ɔθɚ - 'ɔθə,ɪti	1	0
33. explain - explanation	,ɛks'plen - ,ɛks'plenəʃən	2	0
34. politics - political	,pɔ'lɪtɪks - ,pɔ'lɪtɪkəl	2	0
	'pɔlətɪks - 'pɔlətɪkəl	1	0
	,po'lɪtɪks - ,po'lɪtɪkəl	7	0
	,po'lɛtɪks - ,po'lɛtɪkəl	1	0
	pə'lɪtɪks - pə'lɪtɪkəl	1	0
36. recite - recitation	,rɪ'sɑɪt - ,rɪ'sɑɪtəʃən	0	2
	'rɪ,sɜt - 'rɪ,sɜtəʃən	1	0
	'resɪt - 'resɪtəʃən	1	0
37. Christian - Christianity	'krɪstɪən - 'krɪstɪənɪti	6	0
	'krɪstɪən - 'krɪstɪənəti	3	0
	'krɪstɪən - 'krɪstɪənəlɪti	2	0
38. biology - biological	,bɑɪ'ɔlədʒi - ,bɑɪ'ɔlədʒɪkəl	1	0
39. formal - formality	'fɔməl - 'fɔməlɪti	2	0
	'fɔrməl - 'fɔrmələti	5	0
	'fɔməl - 'fɔrməlɪti	2	0
40. refer - references	'rɪfɚ - 'rɪfərənsəs	1	0
	rɪ'fɝ - rɪ'fɝrənsəs	3	0
41. prosper - prosperity	'prospɚ - 'prospərɪti	1	0
	pros'pɝ - pros'pɝrɪti	3	0
	pros'pɝ - 'prospɝrəti	1	0
	,prɔs'pɝ - ,prɔs'pɝrəti	1	0
	,prɔs'pɑɪ - ,prɔs'pɑɪrɪti	1	0
42. mechanic - mechanism	,mɛ'kænɪk - ,mɛ'kænɪsəm	10	1
	,mɛ'kænɪk - ,mɛ'kænɪzəm	2	0
	mə'kænɪk - mə'kænɪsəm	14	0
	mə'kænɪk - mə'tʃænɪsəm	1	0
43. prepare - preparation	prɪ'pær - prɪ'pærəʃən	7	0
	prɪ'pæ - prɪ'pærəʃən	3	0
44. confident - confidential	'kɒnfədənt - 'kɒnfədəntəl	1	0
45. grammar - grammatical	'græmɚ - 'græmətɪkəl	3	0
	'græmə - 'græmətɪsəl	1	0
46. influence - influential	ɪn'fluəns - ɪn'fluənstəl	1	0
	ɪn'fluəns - ɪn'fluənʃəl	2	0
	ɪn'fluəns - ɪn'fluəntəl	2	0
	'ɪnfluəns - 'ɪnfluənʃəl	1	0
47. major - majority	'medʒɚ - 'medʒɛrɪti	2	0
	'medʒə - 'medʒɛrɪti	2	0
	'medʒɚ - 'medʒərəti	1	0
	,mæ'dʒɔr - ,mæ'dʒɔrəti	1	0

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48. desperate - desperation	'dɛspəret - 'dɛspəreʃən	3	0
	'dɛspərət - 'dɛspəreʃən	1	0
	dɪspə'ret - dɪspə'reʃən	3	0
	dɪsp'ret - dɪsp'reʃən	1	0
	,dɪspə'ret - ,dɪspə'reʃən	1	0
49. magnet - magnetic	,mæg'nɛt - ,mæg'nɛtɪk	2	0
50. national - nationality	'neʃənəl - 'neʃənəlɪti	1	0
	'næʃənəl - 'næʃənəlɪti	1	0
	'næʃənəl - 'næʃənələti	2	0
51. reserve - reservation	rɪ'sɜˑv - rɪ'sɜˑveʃən	3	0
	rɪ'sɜv - rɪ'sɜveʃən	5	0
52. continent - continental	'kɔntənənt - 'kɔntənəntəl	2	0
	,kɔn'tɪnənt - ,kɔn'tɪnəntəl	1	0
	,kɑn'tɪnənt - ,kɑn'tɪnəntəl	1	0
53. explore - exploration	,ɛks'plɔr - ,ɛks'plɔreʃən	3	0
	,ɛks'plɔ - ,ɛks'plɔreʃən	2	0
54. origin - aborigines	ɔ'rɪdʒɪn - ,æbɔ'rɪdʒɪnis	3	0
	'ɔrədʒən - ,æb'ɔrədʒənis	5	1
	ɔ'rɛdʒɪn - ,æbɔ'rɛdʒɪnis	1	0
55. popular - popularity	'pɑpjulɚ - 'pɑpjulərɪti	1	0
	'pɔpələɚ - 'pɔpələrɪti	2	0
	pɔpələ - 'pɔpələrɪti	1	0
56. invent - inventory	ɪn'vɛnt - ɪn'vɛntɔri	3	5
	ɪn'vɛnt - ɪn'vɛntəri	20	0
	ɪn'vɛnt - ɪn'vɛntri	5	1
57. declare - declaration	dɪ'klær - dɪ'klæreʃən	6	0
	dɪ'klæ - dɪ'klæreʃən	3	0
58. compare - comparable	,kɔm'pær - ,kɔm'pærəbəl	5	0
	kəm'pær - kəm'pærəbəl	13	26
	,kɔm'pæ - ,kɔm'pærəbəl	6	0
	kəm'pæ - kəm'pærəbəl	7	0
59. accident - accidental	'æksədənt - 'æksədəntəl	2	0
60. element - elementary	'ɛləmənt - 'ɛləməntri	1	0
TOTAL		**449/1009**	**58/84**
Type 2 (✓B)			
2. incline - inclination	,ɪn'klaɪn - ɪnklaɪ'neʃən	0	3
7. resign - resignation	,rɪ'saɪn - rɪ,saɪ'neʃən	14	1
12. admire - admiration	,æd'maɪr - ,ædmaɪ'reʃən	0	3
15. compete - competition	'kɔmpət - ,kɔmpə'tɪʃən	1	0
25. prior - priority	'praɪɔr - ,praɪ'ɔrɪti	3	0

29. industry - industrial	'ɪndʌstri - ɪn'dʌstrɪəl	2	0
36. recite - recitation	,rɪ'saɪt - rɪsaɪ'teʃən	0	7
48. desperate - desperation	'dɪspə,ret - dɪspə'reʃən	1	0
49. magnet - magnetic	'mæg,nɛt - ,mæg'nɛtɪk	1	0
55. popular - popularity	'pɒpjulɚ - ,pɒpju'lɜrti	1	0
57. declare - declaration	dɪ'klær - dɪklæ'reʃən	0	1
59. accident - accidental	'æksədɛnt - ,æksə'dɛntəl	1	0
TOTAL		23/1009	15/84
Type 3 (BX)			
5. commerce - commercial	,kɔ'mɪɚs - ,kɔ'mɜrʃɪəl	1	0
12. admire - admiration	,æd'mɑr - ,æd'mɑɪreʃən	1	0
	,æd'mɪɚ - ,æd'mɛreʃən	1	0
	,æd'mɪɚ - ,æd'mɪreʃən	2	0
	,æd'mɑɪ - ,æd'mæreʃən	1	0
	,æd'mɜr - ,æd'mɑɪreʃən	1	0
18. colony - colonial	'kɒləni - 'kɒlənɑɪəl	0	1
23. valid - validity	'vɜrlɪd - 'vælɪdɪti	1	0
24. perspire - perspiration	pɚs'pɑɪr - pɚs'pɜreʃən	1	0
27. proclaim - proclamation	pro'klem - pro'klæmeʃən	2	0
	pro'klɑɪm - pro'klæmeʃən	1	0
28. democrat - democratic	dɪ'mɔkræt - dɪ'mokresi	1	0
36. recite - recitation	,rɪ'saɪt - rɛ'sɜteʃən	1	0
43. prepare - preparation	prɪ'pær - prɪ'pɑreʃən	1	0
50. national - nationality	'næʃənəl - 'neʃənəlɪti	1	0
TOTAL		16/1009	1/83
TYPE 4 (XB)			
2. incline - inclination	,ɪn'klɑɪn - ɪn,klɑɪ'neʃən	10	0
	'ɪn,klɑɪn - ɪn,klɑɪ'neʃən	1	0
	,ɪn'klɑɪn - 'ɪnklɑɪneʃən	0	1
3. economy - economical	ɪ'kɔnɔmi - ɪkɔ'nɔmɪkəl	3	0
	ɪ'kɔnomi - ɪkɔ'nomɪkəl	1	0
5. commerce - commercial	'kɔmɜrs - ,kɔ'mɜrʃɪəl	4	0
	'kɔmɜs - ,kɔ'mɜrʃɪəl	2	0

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6. compose - composition	ˌkɔmˈpos - ˈkɔmposɪʃən	2	0
	ˌkɔmˈpos - ˌkɔmpoˈsɪʃən	18	0
	ˈkɔmpos - ˌkɔmpoˈsɪʃən	1	0
	kəmˈpos - kəmpoˈsɪʃən	4	0
9. revolt - revolution	rɪˈvolt - ˈrɪrɪvoluʃən	1	0
	rɪˈvolt - ˌrɪrɪvoˈluʃən	1	0
10. exclaim - exclamation	ɛksˈklem - ɛkskleˈmeʃən	4	0
	ɛksˈklɑm - ɛksklɑˈmeʃən	1	0
	ɛksˈklæm - ɛksklæˈmeʃən	1	0
12. admire - admiration	ˌædˈmɑɪr - ˌædmɑɪˈreʃən	5	0
	ˌædˈmɑɪ - ˌædmɑɪˈreʃən	2	0
	ˌædˈmɑɪ - ˈædmɑɪreʃən	2	0
13. stable - stability	ˈstebəl - ˌstebəlˈbɪlɪti	1	0
15. compete - competition	ˌkɔmˈpɪt - ˌkɔmpɪˈtɪʃən	2	0
17. photograph - photographer	ˈfotoˌgræf - ˌfotoˈgræfə	2	0
19. Japan - Japanese	dʒəˈpæn - dʒəpæˈnis	1	0
	ˌdʒæˈpæn - ˈdʒæpænis	2	0
21. telegraph - telegraphy	ˈtɛləˌgræf - tɛləˈgræfi	3	0
	ˈtɛlɪˌgræf - tɛlɪˈgræfi	1	0
23. valid - validity	ˈvælɪd - væˈlɪdɪti	6	0
24. perspire - perspiration	pɚˈspɑɪr - pɚsˌpɑɪˈreʃən	2	0
	pəsˈpɑɪ - pəsˌpɑɪˈreʃən	2	0
26. magic - magician	ˈmædʒɪk - ˌmæˈdʒɪʃən	9	0
	ˈmædʒɪk - ˌmæˈdʒɪkən	3	0
	ˈmædʒɪk - ˌmæˈdʒɪkʃən	2	0
27. proclaim - proclamation	ˌproˈklem - ˌprokleˈmeʃən	5	0
	ˌproˈklem - ˈproklemeʃən	4	0
	ˌproˈklɑɪm - ˌproklɑɪˈmeʃən	2	0
	ˈproˌklɑɪm - ˌproklɑɪˈmeʃən	1	0
	ˈproklɑm - ˌproklɑˈmeʃən	1	0
28. democrat - democracy	ˈdɛmoˌkret - ˌdɛˈmɔkresi	1	0
	ˈdɛmokret - ˌdɛmoˈkresi	1	0
31. combine - combination	ˌkɔmˈbɑɪn - ˌkɔmbɑɪˈneʃən	5	0
	kəmˈbɑɪn - kəmbɑɪˈneʃən	4	0
33. explain - explanation	ˌɛksˈplen - ˌɛkspleˈneʃən	4	0
	ˌɛksˈplen - ˈɛkspleneʃən	1	0
34. politics - political	ˈpɔlɪtɪks - ˌpɔˈlɪtɪkəl	5	0
	ˌpɔˈlɪtɪks - ˌpɔˈlɪtɪkəl	1	0
36. recite - recitation	ˌrɪˈsɑɪt - ˌrɪsɑɪˈteʃən	3	0

37. Christian - Christianity	'krɪstɪən - ˌkrɪstɪə'nɪti	1	0
	krɪstɪ'æn - 'krɪstɪæneti	1	0
	'krɪstɪən - 'krɪstɪənælɪti	4	0
39. formal - formality	'fɔrməl - ˌfɔrmə'lɛti	2	0
	'fɔməl - ˌfɔmə'læreti	1	0
	'fɔrməl - ˌfɔrmə'læreti	1	0
43. prepare - preparation	prɪ'pær - ˌprɪpæ'reʃən	3	0
	prɪ'pæ - ˌprɪpæ'reʃən	3	0
46. influence - influential	ɪn'fluəns - 'influentəl	1	0
51. reserve - reservation	rɪ'sɜv - ˌrɪsɜ'veʃən	4	0
	rɪ'sɜv - ˌrɪs'ɜveʃən	2	0
53. explore - exploration	ˌɛks'plɔr - ˌɛksplɔ'reʃən	10	0
	ˌɛks'plɔ - ˌɛksplɔ'reʃən	6	0
	ˌɛks'plɔr - 'ɛksplɔreʃən	0	1
54. origin - aborigines	'ɔrɪʤɪn - ˌæbɔ'rɪʤɪnis	2	0
	ɔ'rɪʤɪn - ˌæbɔ'rɪʤɪnis	1	0
	ɔ'rɪʤɪn - æ'borɪʤɪnis	2	0
	ɔ'rɪʤɪn - ˌæbɔ'rɪʤənis	1	0
	ɔ'rɪʤɪn - æ'borɪʤɪnis	1	0
57. declare - declaration	dɪ'klær - dɪklæ'reʃən	6	0
	dɪ'klæ - dɪklæ'reʃən	3	0
TOTAL		**196/1009**	**2/84**
TYPE 5 (✓X)			
1. similar - similarity	'sɪmələ - sɪmə'lɜrəti	2	0
	'sɪmələ - sɪmə'lɜrəti	2	0
4. history - historical	'hɪstri - hɪs'tɜrikəl	2	0
8. minor - minority	'maɪnə - ˌmaɪ'narəti	1	0
	'maɪnə - ˌmaɪ'nɜrɪti	2	0
11. metal - metallic	'mɛtəl - mə'talɪk	1	0
20. hospital - hospitality	'hɔspɪtəl - ˌhɔspɪ'tɔlɪti	6	0
21. telegraph - telegraphy	'tɛləˌgræf - tə'legrəfi	0	1
	'tɛləˌgræf - tə'lɪgrəfi	0	2
22. Newton - Newtonian	'nɪutən - ˌnɪu'tɜnɪən	3	0
	'nɪutən - ˌnɪu'tɜnɪən	8	0
25. prior - priority	'prɪə - ˌprɪ'ɔrəti	2	0
	'praɪə - ˌprɪ'ɔrəti	0	1
29. industry - industrial	'ɪndəstri - ɪn'dɜstrɪəl	1	0
	ɪn'dʌstri - ɪn'dɜstrɪəl	1	0
30. family - familiar	'fæməli - ˌfæ'mɛlɪə	1	0

32. author - authority	'ɔθɚ - ,ɔ'θɜrəti	1	0
37. Christian - Christianity	Krɪstɪən - Krɪs'tɪɜnəti	2	0
39. formal - formality	'fɔrməl - ,fɔr'mɜlɪti	3	0
	'fɔrməl - ,fɔ'mɜlɪti	3	0
	'fɔrməl - ,fɔr'mɪləti	1	0
	'fɔrməl - ,fɔr'mɑləti	1	0
41. prosper - prosperity	'prɑspɚ - ,pros'pɜrɪti	3	0
	'prɔspɚ - pros'pɜrɪti	2	0
	'prɑspɚ - ,pros'pɛrəti	3	0
	'prɔspɚ - ,pros'pɜrəti	1	0
	'prɔspɚ - ,prɔ s'pɜrəti	1	0
	,prɔs'pɑɪr - ,prɔs'pɜrəti	1	0
	'prɔspə - pros'pɜrɪti	2	0
44. confident - confidential	'kɔnfədənt - ,kɔnfə'dɜnʃɪəl	1	0
48. desperate - desperation	'dɛspəret - dɪspə'reʃən	1	0
	'dɛspərət - dɪspə'reʃən	2	0
49. magnet - magnetic	'mægnət - ,mæg'nɪtɪk	1	0
55. popular - popularity	'pɑpjəlɚ - ,pɑpə'lɜrɪti	2	0
	'pɔpələ - ,pɑpə'lɜrɪti	1	0
TOTAL		**66/1009**	**4/84**
TYPE 6 (X✓)			
1. similar - similarity	'sɪmələ - 'sɪmələærəti	2	0
2. incline - inclination	'ɪn,klaɪn - 'ɪnklɪneʃən	4	0
7. resign - resignation	,rɪ'saɪn - 'rɛsɪgneʃən	1	0
9. revolt - revolution	rɪ'volt - 'rɛvəluʃən	2	0
	rɛ'volt - 'rɛvəluʃən	1	0
10. exclaim - exclamation	ɛs'klem - 'ɛkskləmeʃən	1	0
12. admire - admiration	,æd'maɪr - 'ædməreʃən	1	0
15. compete - competition	,kɔm'pit - 'kɔmpətɪʃən	5	0
	'kɔmpit - 'kɔmpətɪʃən	1.	0
	kəm'pit - 'kɔmpətɪʃən	1	0
19. Japan - Japanese	,dʒæ'pæn - 'dʒæpənis	4	0
	dʒə'pæn - 'dʒæpənis	2	0
31. combine - combination	,kɔm'baɪn - 'kɔmbəneʃən	4	0
	kəm'baɪn - 'kɔmbəneʃən	1	0
36. recite - recitation	,rɪ'saɪt - 'rɛsəteʃən	2	1
38. bioloogy - biological	,baɪ'ɔlədʒi - ,baɪ'ɔlɔdʒɪkəl	1	0
43. prepare - preparation	prɪ'pær - 'prɛpəreʃən	3	0

44. confident - confidential	'kɔnfədənt - 'kɔnfə,dɛnʃɪəl	1	0
51. reserve - reservation	rɪ'sɜv - 'rɛsə-veʃən rɪ'sɜv - 'rɛsəveʃən	4 3	0 0
54. origin - aborigines	ɔ'rɪdʒɪn - ,æ'bɔrɪdʒənis 'ɔredʒən - 'æberɪdʒənis	1 0	0 2
57. declare - declaration	də'klær - dɛklə'reʃən	3	0
59. accident - accidental	'æksədənt - 'æksədɛntəl	1	0
TOTAL		**50/1009**	**3/84**
TYPE 7 (XX)			
2. incline - inclination	,ɪn'klen - ɪnklɑɪ'neʃən	1	1
3. economy - economical	ɪ'kɔnəmi - ɪkɔ'nɔmɪkəl ɪ'kɔnomi - ɪ,kɔ'nɔmɪkəl ,ɪ'kɔnəmi - ,ɪko'nomɪkəl ɪ'kɔnəmi - ɪ'kɔ,nɔmɪkəl	3 1 1 1	0 0 0 0
5. commerce - commercial	,kɔ'mɜs - ,kɔ'mɛʃəl ,kɔ'mɜs - ,kɔ'mɜʃɪəl ,kɔ'mɜs - ,kɔ'mɜ sɪəl ,kɔ'mɜs - ,kɔ'mɜʃɪəl ,kɔ'mɜs - ,kɔ'mɜsɪəl	2 2 2 2 1	0 0 0 0 0
9. revolt - revolution	rɪ'volt - rɪ,vo'luʃən rɪ'volt - rɪ,vɔ'luʃən	1 1	0 0
10. exclaim - exclamation	ɛks'klem - ,ɛksklæ'meʃən ɛks'klɑɪm - ,ɛksklæ'meʃən 'ɛksklem - ɛksklæ'meʃən ɛks'klem - ɛksklɑ'meʃən ɛks'klɑɪm - ɛkskle'meʃən	8 2 1 1 1	0 0 0 0 0
11. metal - metallic	'mɛtəl - 'mɛtælɪk 'mɛtəl - mɛ'tɜlɪk 'mɛtəl - mɛ'tælɪk	1 2 4	0 0 0
12. admire - admiration	e'mɪə- - ,ædmɑɪ'reʃən	2	0
13. stable - stability	'stebəl - ,stæ'bɪlɪti 'stebəl - ,ste'bɪlɪti 'stebəl - 'stebɪləti 'stebəl - ,stæbɪ'lɪti 'stebəl - 'stæbɪləti 'stebəl - 'stæbɪlɪti	9 8 1 1 1 1	0 0 0 0 0 0
14. comedy - comeddian	'kɔmədi - ,kɔ'midiən ,kɔ'midi - ,kɔ'mɛdiən 'kɔmdi - ,kɔ'midiən 'kɔmədi - ,kɔ'mediən	11 1 2 1	0 0 0 0

16. majesty - majestic	'mædʒesti - ˌmæ'dʒɜstɪk	1	0
	ˌmɑ'dʒɜsti - ˌmɑ'dʒɛstɪk	1	0
	'mæ'dʒesti - ˌmæ'dʒɛstɪk	1	0
	ˌmæ'dʒɜsti - ˌmæ'dʒɛstɪk	1	0
17. photograph - photographer	'foto,græf - ˌfo'tɑgræfɚ	1	0
	'fote,græf - ˌfo'tɑgræfɚ	1	0
	'fote,græf - foto'græfe	1	0
18. colony - colonial	'kɔleni - kɔ'lɔniel	2	0
	'kɔleni - ko'lone	1	0
	ˌkɔ'loni - ˌkɔ'lɔniel	1	0
	'kɔleni - kɔ'leniel	1	0
19. Japan - Japanese	dʒe'pæn - dʒæ'pænis	5	0
	ˌdʒæ'pæn - 'dʒæpenis	1	0
22. Newton - Newtonian	'nɪuten - 'nɪutonien	1	0
	'nɪuten - 'nɪutɔnien	1	0
23. valid - validity	'vælɪd - ˌvɑ'lɪdeti	2	0
24. perspire - perspiration	pɚs'pɑɪɚ - pɚs,pɛ'reʃen	1	0
	pɚs'pɑɪr - pɚs'pɜreʃen	2	0
	pes'pɑɪe - 'pɜspereʃen	1	0
25. prior - priority	'prɪɚ - prɪ'ɔreti	1	0
27. proclaim - proclamation	ˌpro'klem - ˌproklæ'meʃen	3	0
	ˌpro'klɑɪm - ˌproklæ'meʃen	2	0
	ˌpro'klem - 'prɔklæmeʃen	1	0
28. democrat - democracy	'dɛmokræt - ˌdɪ'mɔkresi	1	0
	'dɛmokret - ˌdɛ'mɔkresi	1	0
	'dɪmokræt - dɪˌmɔ'kresi	1	0
	ˌdɛ'mokret - ˌdɛmo'kræsi	1	0
29. industry - industrial	'ɪndʌstri - 'ɪndestriel	1	0
	'ɪndestri - 'ɪndʌstriel	1	0
30. family - familiar	'fæmeli - ˌfæ'mɪlɪɚ	7	0
	'fæmeli - ˌfæ'mɪlie	4	0
32. author - authority	'ɔθɚ - 'ɔθɔrɪti	1	0
	'ɔθɚ - ɔ'θɔreti	1	0
33. explain - explanation	ˌɛks'plen - ˌɛksplæ'neʃen	9	0
34. politics - political	ˌpɔ'letɪks - ˌpo'lɪtɪkel	4	0
	'pɔletɪks - ˌpɔ'lɜtɪkel	1	0
35. vary - variety	'veri - 'vereti	2	0
	'væri - 'væreti	8	0
	'vɑri - 'vɑreti	1	0
	'vɑri - vɑ'rɜti	1	0
	'væri - ˌvɑrɪ'ɜti	1	0
	'væri - ˌvɑɪr'ɜti	1	0
	'væri - 'væriɪeti	2	0

36. recite - recitation	‚rɪ'saɪt - ‚rɛsaɪ'teʃən	1	0
	‚rɪ'saɪt - ‚rɪsɪ'teʃən	1	0
40. refer - references	rɪ'fɝ - rɪfə'rɛnsəs	1	0
45. grammar - grammatical	'græmɚ - ‚græ'mætɪkəl	11	0
	'græmɚ - 'græmætɪkəl	1	0
	'græmɚ - ‚græ'mɜtɪkəl	2	0
	'græmə - ‚græ'mætɪkəl	6	0
47. major - majority	'medʒɚ - ‚mæ'dʒɔɪti	1	0
	'medʒɚ - ‚mæ'dʒɔɪti	2	0
	'medʒɚ - me'dʒɔrəti	1	0
	'madʒɚ - ‚ma'dʒɔɪti	1	0
	'medʒɚ -‚mæ'dʒɔrəti	1	0
	'medʒɚ -‚mæ'dʒɜrəti	1	0
	'medʒɚ - ‚ma'dʒɔrəti	2	0
48. desperate - desperation	dɪspə'ret - dɪs'pɜreʃən	1	0
	dɪs'pɜret - 'dɪspəreʃən	1	0
54. origin - aborigines	ɔ'rɪdʒɪn - ‚æbɔ'rɪdʒənis	2	0
	ɔ'rɪdʒɪn - ‚æbɔrɪ'dʒɪnis	1	0
	ɔ'rɪdʒɪn - ‚æ'bɜrɪdʒənis	1	0
TOTAL		**197/1009**	**1/84**
Type 8 (C)			
44. confident - confidential	'kɒnfədənt - ‚kɒnfə'dɛntəl	5	0
46. influence - influential	'ɪnfluəns - ɪnflu'ɛntəl	1	0
	'ɪnfluəns - ɪnflu'ɛnsəl	1	0
52. conttinent - continental	'kɔntənənt - ‚kɔntə'nɛnʃəl	2	0
59. accident - accidental	'æksədənt - ‚æksə'dɛnʃəl	1	0
	'æksədənt - ‚æksə'dɛnʃɪəl	2	0
Others with vowel and stress errors already listed above		25	0
TOTAL		**37/1009**	**0/84**
GRAND TOTAL		**1009**	**84**
% out of 1727 recognized pairs		**58.43%**	
% out of 1911 recognized pairs			**4.40%**
AVERAGE (error pairs per subject)		**31.53**	**2.63**

Table 5a: Group A and Group B: Results of Word Analysis Test by Words

Derivative and Associated Words Supplied		Group A (ESL)			Group B (NS)		
		Correct	Incorrect	No Answer / same word	Correct	Incorrect	No Answer / same word
1. messenger	- message	25	7	0	32	0	0
2. destruction	- destruct	21	2	0	22	0	0
	- destroy	5	0	0	9	0	0
	- destructive	1	0	0	1	0	0
	- destructor	3	0	0	0	0	0
3. reception	- receive	4	24	1	19	9	0
	- receipt	2	0	0	3	0	0
	- receptionist	1	0	0	0	0	0
	- receptive	0	0	0	1	0	0
4. mobility	- mobile	22	10	0	32	0	0
5. conquest	- conquer	10	13	2	28	0	0
	- quest	7	0	0	4	0	0
6. commission	- commit	4	17	3	2	21	2
	- mission	7	0	0	6	0	0
	- commissioner	1	0	0	0	0	0
	- committee	0	0	0	1	0	0
7. respirator	- respire	12	17	0	19	10	0
	- respiration	3	0	0	2	0	0
	- respiratory	0	0	0	1	0	0
8. contamination	- contaminate	16	16	0	29	2	0
	- contaminated	0	0	0	1	0	0
9. reduction	- reduce	23	9	0	30	2	0
10. prescription	- prescribe	3	28	1	30	2	0
11. decision	- decide	26	6	0	31	1	0
12. resolution	- resolute	13	2	0	2	3	0
	- resolve	8	0	0	25	0	0
	- solution	9	0	0	2	0	0
13. conversation	- converse	16	16	0	26	6	0
14. collision	- collide	15	13	2	32	0	0
	- collides	1	0	0	0	0	0
	- collided	1	0	0	0	0	0
15. numerous	- number	27	3	1	26	3	0
	- numeric	1	0	0	0	0	0
	- numerical	0	0	0	1	0	0
	- numeral	0	0	0	1	0	0
	- numerate	0	0	0	1	0	0
16. remedial	- remedy	9	23	0	26	4	1
	- mediate	0	0	0	1	0	0
17. vacancy	- vacant	11	19	1	31	1	0
	- vacation	1	0	0	0	0	0
18. civilization	- civilize	14	2	0	14	0	0
	- civilize	16	0	0	14	0	0
	- civilized	0	0	0	3	0	0
	- civilians	0	0	0	1	0	0

19. evidence	- evident	17	13	2	26	5	1
20. abolition	- abolish	1	29	2	26	5	0
	-abort	0	0	0	1	0	0
21. success	- succeed	16	3	4	30	2	0
	- successful	8	0	0	0	0	0
	- successor	1	0	0	0	0	0
22. determination	- determine	26	1	1	26	0	0
	- determinate	4	0	0	2	0	0
	- determined	0	0	0	4	0	0
23. unity	- unite	2	2	0	26	3	0
	- union	2	0	0	0	0	0
	- unit	23	0	0	3	0	0
	- united	1	0	0	0	0	0
	- unities	2	0	0	0	0	0
24. invasion	- invade	10	21	0	31	1	0
	- invasive	1	0	0	0	0	0
25. fertility	- fertile	22	8	0	32	0	0
	- fertilise	2	0	0	0	0	0
26. suspicious	- suspect	6	21	3	24	1	0
	- suspicion	2	0	0	7	0	0
27. opponent	- oppose	8	13	2	23	1	0
	- opposite	9	0	0	5	0	0
	- opposition	0	0	0	2	0	0
	- opposed	0	0	0	1	0	0
28. destination	- destiny	2	22	0	12	4	0
	- destine	8	0	0	13	0	0
	- destined	0	0	0	3	0	0
29. defensive	- defend	13	2	1	12	0	0
	- defence	10	0	0	4	0	0
	- defense	6	0	0	16	0	0
30. extremity	- extreme	16	14	0	31	1	0
	- extremely	2	0	0	0	0	0
TOTAL		558	376	26	869	87	4
%		58.13	39.17	2.71	90.52	9.06	0.42
AVERAGE		17.44	11.75	0.81	27.16	2.72	0.13

Group A vs. Group B: Word Analysis Test : t (62) = 13.63 p < 0.01

Table 5b: Group A and Group B: Results of Word Analysis Test by Strategy Types
(Responses are morphologically or semantically unrelated to give derivatives, or are non-existing English words)

Strategy Types	Derivatives and Subjects' Responses		Group A (ESL)	Group B (NS)
1. Strip suffix(es), no spelling change	1. messenger	- messeng	2	0
	3. reception	- recept	22	8
	4. mobility	- mobil	2	0
	6. commission	- commis	2	1
		- commiss	6	2
	7. respirator	- respirat	3	0
		- respir	1	0
	8. contamination	- contam	1	0
		- contamin	6	1
	9. reduction	- reduct	8	2
	10. prescription	- prescript	19	2
		- prescrip	1	0
	11. decision	- deci	1	0
		- decis	1	0
	13. conversation	- conversa	1	0
		- convers	1	0
	14. collision	- collis	2	0
	15. numerous	- numer	3	1
	16. remedial	- remed	1	0
	17. vacancy	- vacan	8	0
	19. evidence	- evid	6	0
	20. abolition	- abolit	4	0
	22. determination	- determin	1	0
	24. invasion	- invas	1	0
	25. fertility	- fertil	2	0
		- fertil	2	0
	26. suspicious	- suspic	4	0
		- suspi	1	0
	27. opponent	- oppon	2	0
	28. destination	- destin	0	1
		- destinat	2	0
	29. defensive	- defen	1	0
	30. extremity	- extrem	9	0
	TOTAL		126	18
	%		36.63	26.87
	AVERAGE ERRORS PER SUBJECT		3.94	0.56
2. Strip suffix(es), spelling change	2. destruction	- destructe	1	0
	3. reception	- recepte	1	0
	4. mobility	- moble	1	0
		- mobel	1	0
		- moblie	1	0
	8. contamination	- contamine	5	1
	10. prescription	- prescripte	4	0
		- prescripe	1	0
	14. collision	- collid	1	0
	15. numerous	- numerat	0	2
	16. remedial	- remede	2	1
	17. vacancy	- vacanm	1	0
		- vacane	1	0
	20. abolition	- abolie	1	0
		- abole	1	2

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	24. invasion	- invate	4	0
		- invase	10	0
		- invad	1	0
		- invast	1	0
		- invant	1	0
	26. suspicion	- suspicse	1	0
		- suspice	3	0
		- suspicice	1	0
		- suspicis	1	0
		- suspise	0	1
	27. opponent	- oppond	1	0
		- oppont	2	0
	28. destination	- destince	1	0
		- destint	1	0
		- destand	0	1
	TOTAL		50	8
	%		14.53	11.94
	AVERAGE ERRORS PER SUBJECT		1.56	0.25
3. Strip one suffix from multiple suffix, spelling change	7. respirator	- respirate	11	10
	13. conversation	- conversate	9	4
	17. vacancy	- vacance	4	1
	18. civilization	- civilizate	1	0
	28. destination	- destinate	15	3
	TOTAL		40	18
	%		11.63	26.87
	AVERAGE ERRORS PER SUBJECT		1.25	0.56
4. Strip suffix(es), add (an)nother suffix(es), no spelling change	2. destruction	- destructure	1	0
	3. reception	- recepted	0	1
	4. mobility	- mobiliter	1	0
		- mobily	1	0
		- mobilition	1	0
		- mobal	1	0
	6. commission	- commissed	1	0
		- commisser	1	1
		- commisseur	0	1
	8. contamination	- contaminer	1	0
	9. reduction	- reducty	1	0
	10. prescription	- prescriped	1	0
	12. resolution	- resolutee	1	0
		- resoluted	1	0
	16. remedial	- remediate	2	2
		- remedic	2	0
	17. vacancy	- vacantion	1	0
	18. civilization	- civilizen	1	0
	20. abolition	- abolity	2	0
		- abolitate	1	1
	25. fertility	- fertization	1	0
		- fertory	1	0
		- fertily	1	0
		- ferty	1	0
	26. suspicious	- suspicy	2	0
	27. opponent	- opponment	1	0
		- oppontial	1	0
	28. destination	- destinative	1	0
		- destinal	1	0
	29. defensive	- defension	1	0
	30. extremity	- extremy	1	0

			33	6
	%		9.59	8.96
	AVERAGE ERRORS			
	PER SUBJECT		1.03	0.19
5. Retain whole word, add (an) other suffix(es), no spelling change	5. conquest	- conquestion	2	0
		- conquester	1	0
	6. commission	- commissional	2	0
	7. respirator	- respiratorize	1	0
	8. contamination	- contaminationer	1	0
	11. decision	- decisionation	1	0
	16. remedial	- remedialation	1	0
		- remedially	1	0
	27. opponent	- opponential	1	0
		- opponention	2	0
		- opponenter	1	0
	TOTAL		14	0
	%		4.07	0.00
	AVERAGE ERRORS			
	PER SUBJECT		0.44	0.00
6. Retain whole word, add suffix, spelling change	17. vacancy	- vacancial	1	0
	TOTAL		1	0
	%		0.29	0.00
	AVERAGE ERRORS			
	PER SUBJECT		0.03	0.00
7. Strip part of suffix, no spelling change	1. messenger	- messenge	5	0
	19. evidence	- evide	2	3
		- eviden	2	0
	27. opponent	- oppone	2	0
	TOTAL		11	3
	%		3.20	4.48
	AVERAGE ERRORS			
	PER SUBJECT		0.34	0.09
8. Strip part of suffix, add another suffix, spelling change	19. evidence	- evidenation	1	0
		- evidencial	1	0
	26. suspicious	- suspiciourize	1	0
	TOTAL		3	0
	%		0.87	0.00
	AVERAGE ERRORS			
	PER SUBJECT		0.09	0.00
9. Strip suffix and part of base, no spelling change	30. extremity	- extre	2	0
	TOTAL		2	0
	%		0.58	0.00
	AVERAGE ERRORS			
	PER SUBJECT		0.06	0
10. Strip part of base/root, no spelling change	5. conquest	- conque	4	0
	16. remedial	- reme	1	0
	17. vacancy	- cancy	2	0
	21. success	- succ	1	0
		- succes	1	0
	TOTAL		9	0
	%		2.62	0.00
	AVERAGE ERRORS			
	PER SUBJECT		0.28	0
11. Strip suffix and part of base/root, add (an)other suffix(es), spelling change	6. commission	- commise	2	3
		- commish	0	7
	8. contamination	- contament	1	0
	11. decision	- decise	2	1
	14. collision	- collise	5	0
		- collize	1	0

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		- collist	1	0
		- colly	1	0
	20. abolition	- abolite	16	1
		- abolize	1	0
		- abolise	1	0
		- abolites	1	0
		- abolities	1	0
		- abolide	0	1
	23. unity	- uny	1	0
	TOTAL		34	13
	%		9.88	19.40
	AVERAGE ERRORS PER SUBJECT		1.06	0.41
12. Strip part of root, add (an)other suffix(es), spelling change	5. conquest	- conquence	3	0
		- conqued	1	0
	TOTAL		4	0
	%		1.16	0.00
	AVERAGE ERRORS PER SUBJECT		0.13	0.00
13. Strip part of root, spelling change	5. conquest	- conqure	2	0
	21. success	- succi	1	0
	TOTAL		3	0
	%		0.87	0.00
	AVERAGE ERRORS PER SUBJECT		0.09	0.00
14. Strip prefix, no spelling change	3. reception	- ception	1	0
	13. conversation	- versation	1	0
	16. remedial	- medial	7	0
	24. invasion	- vasion	2	0
	26. suspicious	- picious	1	0
	TOTAL		12	0
	%		3.49	0.00
	AVERAGE ERRORS PER SUBJECT		0.38	0.00
15. Strip prefix and suffix, no spelling change	7. respirator	- spirat	1	0
	TOTAL		1	0
	%		0.29	0.00
	AVERAGE ERRORS PER SUBJECT		0.03	0.00
16. Strip prefix and part of root, no spelling change	8. contamination	- amination	1	0
	TOTAL		1	0
	%		0.29	0.00
	AVERAGE ERRORS PER SUBJECT		0.03	0.00
17. Strip prefix and suffix, supply root, no spelling change	19. evidence	- vid	0	1
	TOTAL		0	1
	%		0.00	1.49
	AVERAGE ERRORS PER SUBJECT		0.00	0.03
18. Supply un-related word	4. mobility	- technology	1	0
	6. commission	- comment	3	0
		- commence	0	2
		- commerce	0	1
		- common	0	1
		- command	0	1
		- alligator	0	1
	10. prescription	- description	2	0
	11. decision	- design	1	0
	13. conversation	- convert	1	1

		- coventry	1	0
		- conserve	0	1
	14. collision	- collie	1	0
		- collusion	1	0
	15. numerous	- one	0	1
	16. remedial	- media	3	0
		- remember	2	0
		- remain	1	0
		- loser	0	1
		- mediocre	0	1
	17. vacancy	- various	1	0
	19. evidence	- even	1	0
	21. success	- sex	0	1
	23. unity	- until	1	0
	24. invasion	- invent	1	0
	26. suspicious	- suspense	5	0
		- surprise	1	0
	27. opponent	- kungfu	0	1
	28. destination	- distinct	1	0
	30. extremity	- extra	2	0
		- ninja	0	1
	TOTAL		**30**	**14**
	AVERAGE ERRORS			
	PER SUBJECT		**0.94**	**0.44**
19. Supply synonym	3. reception	- telephone operator	1	0
	12. resolution	- result	0	3
	13. conversation	- communicate	1	0
	23. unity	- one	0	3
	TOTAL		**2**	**6**
	AVERAGE ERRORS			
	PER SUBJECT		**0.06**	**0.19**
	GRAND TOTAL:		**376**	**87**
	AVERAGE OF TOTAL			
	ERRORS PER SUBJECT:		**11.75**	**2.72**

Note: % of each Strategy Type is calculated out of the total number of errors for all the test items from Strategy 1 to Strategy 17
(errors involving word structure manipulation or spelling manipulation only).
(Group A: 344 errors; Group B: 67 errors)

Group A: Frequency distribution of error types in Word Analysis Test: χ^2 (16)=792.20 p < 0.01
(Strategy 1 (strip suffix, spelling change) is significantly predominant over the other error types.)

Group B: Frequency distribution of error types in Word Analysis Test: χ^2 (16)=165.75 p < 0.01
(Strategy 1 (strip suffix, no spelling change) and Strategy 3 (strip one suffix from a multiple suffix, spelling change)
are significantly predominant over the other error types.)

Table 5c: Group A: Word Analysis Test: Two Main Strategies by Subject

SUBJECT	Strategy 1 Suffix stripping, no spelling change	% of Total Errors	Strategy 2 Suffix stripping, spelling change	% of Total Errors
1	0	0.00	3	30.00
2	6	46.15	0	0.00
3	0	0.00	1	25.00
4	3	30.00	1	10.00
5	1	20.00	0	0.00
6	1	5.88	3	17.65
7	6	37.50	4	25.00
8	8	57.14	3	21.43
9	1	8.33	4	33.33
10	2	16.67	1	8.33
11	3	23.08	0	0.00
12	5	41.67	1	8.33
13	4	26.67	2	13.33
14	4	28.57	4	28.57
15	2	33.33	0	0.00
16	2	15.38	2	15.38
17	10	62.50	0	0.00
18	1	7.69	1	7.69
19	2	18.18	3	27.27
20	4	33.33	0	0.00
21	4	44.44	0	0.00
22	9	50.00	0	0.00
23	7	35.00	3	15.00
24	4	28.57	3	21.43
25	7	46.67	0	0.00
26	4	57.14	2	28.57
27	3	27.27	1	9.09
28	3	21.43	1	7.14
29	13	92.86	0	0.00
30	3	21.43	2	14.29
31	1	6.25	4	25.00
32	3	21.43	1	7.14
TOTAL	126	36.63%	50	14.53%
AVERAGE per subject	3.94		1.56	

Table 5d: Group B: Word Analysis Test: Three Main Strategies by Subject

Subject	Stratety 1 Suffix Stripping, No Spelling Change	Percent of Total Errors	Strategy 3 Strip One Suffix From Multiple Suffix, Spelling Change	Percent of Total Errors	Strategy 11 Strip Suffix, Add Another Suffix, Spelling Change	Percent of Total Errors
1	0	0.00%	0	0.00%	0	0.00%
2	0	0.00%	0	0.00%	0	0.00%
3	1	1.49%	2	2.99%	0	0.00%
4	0	0.00%	0	0.00%	1	1.49%
5	0	0.00%	0	0.00%	0	0.00%
6	0	0.00%	0	0.00%	0	0.00%
7	0	0.00%	1	1.49%	1	1.49%
8	3	4.48%	0	0.00%	0	0.00%
9	0	0.00%	0	0.00%	0	0.00%
10	0	0.00%	0	0.00%	1	1.49%
11	1	1.49%	1	1.49%	1	1.49%
12	0	0.00%	0	0.00%	1	1.49%
13	1	1.49%	1	1.49%	0	0.00%
14	3	4.48%	0	0.00%	0	0.00%
15	1	1.49%	0	0.00%	1	1.49%
16	0	0.00%	1	1.49%	2	2.99%
17	2	2.99%	1	1.49%	0	0.00%
18	0	0.00%	1	1.49%	1	1.49%
19	1	1.49%	1	1.49%	1	1.49%
20	0	0.00%	0	0.00%	0	0.00%
21	1	1.49%	1	1.49%	0	0.00%
22	1	1.49%	1	1.49%	1	1.49%
23	0	0.00%	0	0.00%	0	0.00%
24	0	0.00%	0	0.00%	0	0.00%
25	1	1.49%	2	2.99%	0	0.00%
26	0	0.00%	0	0.00%	0	0.00%
27	1	1.49%	0	0.00%	0	0.00%
28	0	0.00%	2	2.99%	1	1.49%
29	0	0.00%	0	0.00%	1	1.49%
30	1	1.49%	0	0.00%	0	0.00%
31	0	0.00%	0	0.00%	0	0.00%
32	0	0.00%	3	4.48%	0	0.00%
TOTAL	18	26.87%	18	26.87%	13	19.40%
AVERAGE per subject	0.56		0.56		0.41	

Table 6a: Group A and Group B: Semantic Rating of Word Pairs Test (95 Word Pairs)

WORD PAIR	SEMANTIC RELATEDNESS BETWEEN MORPHOLOGICALLY ASSOCIATED WORDS											
	1 Definitely not related in meaning		2		3		4		5 Definitely related in meaning		Mean Semantic Rating (MSR)	
	Gr. A	Gr. B	Gr. A	Gr. B	Gr. A	Gr. B	Gr. A	Gr. B	Gr. A	Gr. B	Gr. A	Gr. B
	ESL	NS	ESL	NS	ESL	NS	ESL	NS	ESL	NS	ESL	NS
1. combine - combination	0	1	0	1	1	0	4	9	27	21	4.8	4.5
2.* author - authority	19	4	2	25	0	1	2	2	8	0	2.2	2.0
3. explain - explanation	0	0	0	0	1	0	2	3	29	29	4.9	4.9
4. politics - political	0	0	0	1	4	4	5	6	23	21	4.6	4.5
5. vary - variety	4	3	3	1	3	3	7	8	15	17	3.8	4.1
6. recite - recitation	2	2	1	4	6	4	8	9	15	13	4.0	3.8
7.* Christian - Christianity	1	0	0	0	2	0	5	5	24	27	4.6	4.8
8.* biology - biological	0	0	0	1	2	1	4	5	26	25	4.8	4.7
9.* formal - formality	4	3	2	3	3	4	6	1	17	21	3.9	4.1
10.*refer - references	7	0	2	5	3	3	6	8	13	16	3.4	4.1
11.* prosper - prosperity	3	0	3	0	3	0	5	7	17	25	3.8	4.8
12. mechanic - mechanism	1	6	1	5	5	5	6	8	19	8	4.3	3.2
13. prepare - preparation	1	0	0	0	0	0	2	4	29	28	4.8	4.9
14.* confident - confidential	6	4	2	3	4	3	5	7	15	15	3.7	3.8
15. grammar - grammatical	2	0	2	0	2	4	5	7	21	21	4.3	4.5
16. influence - influential	3	0	2	1	4	0	6	7	17	24	4.0	4.7
17.* major - majority	3	3	1	5	3	7	2	7	23	10	4.3	3.5
18. desperate - desperation	2	0	1	1	3	3	3	9	23	19	4.4	4.4
19.* magnet - magnetic	2	0	1	0	2	1	3	9	24	21	4.4	4.5
20.* national - nationality	5	3	0	2	3	3	6	4	18	20	4.0	4.1
21. reserve - reservation	3	0	2	0	3	5	5	7	18	20	3.9	4.5
22. *continent - continental	3	2	0	2	2	2	6	9	21	17	4.3	4.2
23. explore - exploration	1	0	1	0	3	0	6	6	21	26	4.4	4.8
24. *origin - aborigines	15	13	5	2	6	6	1	7	5	3	2.3	2.4
25.* popular - popularity	5	0	1	0	5	1	2	6	19	24	3.9	4.6
26.* invent - inventory	3	6	2	0	8	5	8	2	11	19	3.7	3.9
27. declare - declaration	0	0	0	1	4	5	6	9	21	17	4.4	4.3
28. compare - comparable	0	0	1	0	4	0	5	8	22	24	4.5	4.8
29.* accident - accidental	1	0	2	0	4	2	3	8	22	22	4.3	4.6
30.*element - elementary	17	2	2	0	4	6	1	22	8	2	2.4	3.7
31*. similar- similarity	2	0	0	0	3	0	4	6	23	26	4.4	4.8
32 incline - inclination	2	2	2	1	7	2	4	10	17	17	4.0	4.2
33.* economy - economical	2	1	0	2	2	6	4	3	24	20	4.5	4.2
34.* history - historical	0	0	0	2	2	0	4	7	26	23	4.8	4.6
35. commerce - commercial	8	4	4	5	2	6	4	7	14	10	3.4	3.4
36. compose - composition	7	2	4	1	3	2	3	7	15	19	3.5	4.2
37.* resign - resignation	3	1	2	0	5	3	3	5	19	23	4.0	4.5
38.* minor - minority	12	3	3	2	5	7	4	6	8	14	2.8	3.8
39. revolve - revolution	7	3	3	3	1	8	4	9	16	9	3.5	3.6
40. exclaim - exclamation	2	0	1	0	3	6	5	7	20	19	4.2	4.4
41.* metal - metallic	2	1	1	0	4	5	6	4	19	22	4.2	4.4

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42. admire - admiration	0	0	2	0	6	0	2	6	22	26	4.4	4.8
43. stable - stability	1	1	2	0	2	2	5	4	22	25	4.4	4.6
44.* comedy - comedian	2	0	1	0	8	0	10	6	11	26	3.8	4.8
45. compete - competition	4	0	1	0	1	0	6	7	20	25	4.2	4.8
46.* majesty - majestic	3	1	0	4	5	4	6	8	18	15	4.1	4.0
47.* photograph - photographer	3	1	2	0	1	0	9	10	17	21	4.1	4.6
48.* colony - colonial	5	1	0	4	3	4	8	8	16	15	3.9	4.0
49.* Japan - Japanese	0	0	1	0	0	1	5	5	26	26	4.8	4.8
50.* hospital - hospitality	6	5	3	4	5	5	6	8	12	10	3.5	3.4
51.* telegraph - telegraphy	0	2	1	2	4	9	6	5	21	14	4.5	3.8
52.* unit - unity	8	0	0	8	6	9	5	4	12	11	3.3	3.6
53.* valid - validity	2	1	0	0	6	7	5	6	19	18	4.2	4.3
54. perspire - perspiration	0	1	3	0	3	1	4	6	22	24	4.4	4.6
55. *prior - priority	1	3	2	7	4	10	7	3	18	9	4.2	3.3
56.* magic - magician	2	0	2	2	2	2	5	2	21	26	4.3	4.6
57. proclaim - proclamation	3	0	2	1	2	5	5	5	20	21	4.2	4.4
58. democrat - democracy	4	1	5	5	6	3	4	7	13	17	3.5	4.2
59.* industry - industrial	0	0	0	0	0	0	5	7	27	25	4.8	4.8
60.* family - familiar	19	17	1	2	4	2	2	5	6	6	2.2	2.4
61. revolt -revolution	12	4	5	5	0	5	4	4	10	14	2.8	3.6
62. message - messenger	4	0	2	3	0	4	7	3	19	22	4.1	4.4
63. destroy - destruction	9	0	1	0	5	1	3	3	14	28	3.4	4.8
64. receive - reception	8	0	5	3	6	9	5	5	8	15	3.0	4.0
65. mobile - mobility	2	0	1	0	10	3	4	6	15	23	3.9	4.6
66. conquer - conquest	2	0	3	2	7	5	6	6	14	19	3.8	4.3
67. commit - commission	8	2	1	13	4	4	4	4	14	9	3.4	3.2
68. respire - respirator	1	2	4	3	5	5	4	4	18	18	4.1	4.0
69. contaminate - contamination	0	0	0	1	4	1	4	1	24	29	4.6	4.8
70. reduce - reduction	1	0	2	0	0	0	5	4	24	28	4.5	4.9
71. resolve - resolution	5	0	4	1	4	3	4	7	15	21	3.6	4.5
72.*Newton - Newtonian	8	3	3	1	7	9	4	4	10	15	3.2	3.8
73. destine - destination	2	2	3	2	6	7	6	6	15	15	3.9	3.9
74. converse - conversation	7	1	4	2	3	3	4	7	14	19	3.4	4.3
75. collide - collision	5	0	1	0	4	1	5	1	17	30	3.9	4.9
76. number - numerous	4	1	4	0	2	7	6	7	16	17	3.8	4.2
77.*remedy - remedial	1	3	0	4	10	6	3	7	17	12	4.0	3.7
78. vacant - vacancy	2	1	6	0	6	1	3	5	14	25	3.6	4.7
79. civilize - civilization	0	0	1	2	3	4	5	8	23	18	4.6	4.3
80. evident - evidence	0	2	1	2	2	5	8	7	20	16	4.4	4.0
81. abolish - abolition	4	2	4	3	7	2	6	5	10	20	3.3	4.2
82. succeed - success	4	0	2	0	1	2	2	8	23	22	4.2	4.6
83. determine - determination	0	0	1	0	0	1	4	7	27	24	4.8	4.7
84. unite - unity	7	0	1	2	7	2	5	3	11	25	3.3	4.6
85. decide - decision	0	0	0	0	2	0	3	5	27	27	4.8	4.8
86. invade - invasion	3	0	2	0	4	0	6	4	17	28	4.0	4.9
87. fertile - fertility	1	1	1	1	2	1	9	6	19	23	4.4	4.5
88. suspect - suspicious	5	2	3	0	4	3	5	11	15	16	3.7	4.2
89. oppose - opponent	3	0	3	2	9	3	3	11	14	16	3.7	4.3
90. destiny - destination	7	4	4	7	5	3	2	6	14	11	3.4	3.3
91. defend - defensive	1	1	2	0	0	3	5	8	24	20	4.5	4.4
92. extreme - extremity	1	1	1	1	5	5	10	5	15	20	4.2	4.3
93. resolute - resolution	5	0	1	3	3	6	4	6	18	17	3.8	4.2
94. prescribe - prescription	4	0	4	0	1	4	6	8	17	20	3.9	4.5
95.*destruct - destruction	1	0	0	0	3	1	8	6	15	26	3.7	4.9

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TOTAL	350	135	167	181	343	306	457	590	1702	1825		
% out of 3040	11.51	4.44	5.49	5.95	11.28	10.07	15.03	19.41	55.99	60.03		
Average per Subject	10.94	4.22	5.22	5.66	10.72	9.56	14.28	18.44	53.19	57.03		
Mean Semantic Rating (95 word pairs)											4.0	4.3
Mean Semantic Rating (38 obvious-suffix pairs)											3.9	4.1
Mean Semantic Rating (57 non-obvious suffix pairs)											4.0	4.4
Mean Semantic Rating (34 Word Analysis pairs)											3.9	4.4

Group A vs. Group B: Mean Semantic Rating (MSR):

Mean Semantic Rating for 95 word pairs: t (186)=-1.07

Mean Semantic Rating for 38 word pairs with obvious-suffix words* :   t (74) = -1.16

Mean Semantic Rating for 57 word pairs with non-obvious-suffix words: t (112) = -3.71 p < 0.01

Mean Semantic Rating for 34 word pairs for Word Analysis Test: t (64) =-3.87 p < 0.01

Note. No response for Group A was 21 and Group B was 3

Table 6b: Group A Obvious-Suffix Words - Semantic Rating Test, Base-Word Pronunciation Preference in Listening and Pronunciation Tests, and Base-Words Responses in Word Analysis Test

WORD PAIR	Mean Semantic Rating (MSR) Group B (NS)	Mean Semantic Rating (MSR) Group A (ESL)	Semantic Rating (5) (DSR) Group A (ESL)	BB in Listening (out of total # of possible errors for words) Group A (ESL)	BB in Pronunciation (out of total # of word pairs recognized for words Group (ESL)
Type A: Opaque/Semi-Opaque Semantic Relation					
2. ** author - authority	2.0	2.2	25.00%	12.50%	50.00%
24. **origin - aborigines	2.4	2.3	15.63%	37.59%	45.00%
30. **element - elementary	3.7	2.4	6.25%	0.00%	0.03%
38. minor- minority	3.8	2.8	26.67%		57.14%
60. family - familiar	2.4	2.2	20.00%		45.45%
AVERAGE (Type A words)			18.71%	16.70%	39.52%
MSR	**2.9**	**2.4**			
TYPE B: Transparent Semantic Relation					
7. **Christian - Christianity	4.8	4.6	75.00%	34.38%	61.11%
8. **biology - biological	4.7	4.8	86.67%	0.00%	100.00%
9. **formal - formality	4.1	3.9	53.13%	12.50%	45.00%
10.**refer - references	4.1	3.9	40.63%	3.13%	90.00%
11. **prosper - prosperity	4.8	3.8	53.13%	18.75%	35.00%
14. **confident - confidential	3.8	3.7	46.88%	3.13%	33.33%
17. **major - majority	3.5	4.3	71.88%	0.00%	40.00%
19. **magnet - magnetic	4.5	4.4	75.00%	15.63%	40.00%
20. **national - nationality	4.1	4.0	56.25%	9.38%	90.00%
22. **continent - continental	4.2	4.3	65.63%	9.38%	100.00%
25. **popular - popularity	4.6	3.9	59.36%	3.13%	50.00%
26. **invent - inventory	3.9	3.7	34.38%	75.00%	100.00%
29. **accident - accidental	4.6	4.3	68.75%	12.50%	66.67%
50. hospital - hospitality	3.4	3.5	40.00%		57.14%
55. prior - priority	3.3	4.2	60.00%		50.00%
AVERAGE (Type B words above)			59.11%	15.15%	63.88%
AVERAGE (Type B Listening items only)			60.51%	15.15%	
AVERAGE (Type A & B) all listening items**			52.10%	15.44%	
31. similar - similarity	4.8	4.4	76.67%		40.00%
33. economy - economical	4.2	4.5	80.00%		47.06%
34. history - historical	4.6	4.8	86.67%		77.77%
37. resign - resignation	4.5	4.0	63.33%		21.05%
41. metal - metallic	4.4	4.2	63.33%		52.94%
44. comedy - comedian	4.8	3.8	36.67%		33.33%
46. majesty - majestic	4.0	4.1	60.00%		75.00%
47. photograph - photographer	4.6	4.1	56.67%		70.83%
48. colony - colonial	4.0	3.9	53.33%		66.67%

49. Japan - Japanese	4.8	4.8	86.67%		38.18%
51. telegraph - telegraphy	3.8	4.5	70.00%		80.95%
53. valid - validity	4.3	4.2	63.33%		50.00%
56. magic - magician	4.6	4.3	70.00%		34.78%
59. industry - industrial	4.8	4.8	90.00%		68.42%
72. Newton - Newtonian	3.8	3.2	31.25%		35.00%
AVERAGE (all Type B words Pronunciation items)			62.49%		58.34%
AVERAGE (Type A & B all Pronunciation items)			56.23%		55.65%
77. remedy - remedial	3.7	4.0	53.13%		
84. unit - unity	4.6	3.3	34.38%		
95. destruct - destruction	4.9	3.7	46.88%		
AVERAGE Word Analysis items			44.80%		
AVERAGE (all obvious-suffix Type B words)	4.3	4.1	60.88%		58.34%
AVERAGE (all obvious-suffix Type A & B words)	4.1	3.9	40.60%		56.26%

Group A vs. Group B: Mean Semantic Rating (MSR):

Mean Semantic Rating for all 38 obvious suffix words (Types A and B) : t (74) = -1.16

Mean Semantic Rating for 33 obvious-sufix words (Type B) :   t (64)=-72.38 p < 0.01

Mean Semantic Rating for 57 word pairs with non-obvious suffixes: t (112) = -3.71 p < 0.01.   (From Table 6a.)

Group A: DSR (5) vs. BB Preference in Pronunciation and Listening:

DSR (5) vs. BB in Pronunciation Test (60 words):   r =0.297

DSR (5) vs. BB in Listening Test (30 words)   r =0.130

DSR (5) vs. BB in Listening Test (16 obvious-suffix words):   r =0.005

DSR (5) vs. BB in Pronunciation Test (35 obvious-suffix words): r =-0.153

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