THE PERCEPTION AND PRODUCTION OF SECOND LANGUAGE STRESS:

A CROSS-LINGUISTIC EXPERIMENTAL STUDY

by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This study investigates the effect of native language (L1) stress properties on the second language (L2) acquisition of primary word stress in light of two recent typological hierarchical models of stress: the Stress Deafness Model (SDM) (Peperkamp & Dupoux 2002) and the Stress Typology Model (STM) (Altmann & Vogel 2002). Since research on the L2 performance of a diverse sample of L1s with respect to both perception and production using the same experimental design is virtually non-existent, advanced learners of English from seven distinct L1 groups (Arabic, Chinese, French, Japanese, Korean, Spanish, Turkish), as well as native English speakers participated in perception and production experiments. Novel words of two, three, and four syllables length consisting of only open syllables (CV) were used. In the perception experiment, subjects listened to a large number of tokens of various structures and marked the most stressed syllable; in the production experiment, subjects were asked to read aloud tokens from a subset of the structures.

The results indicate that, on the one hand, learners with predictable stress in their L1 (i.e., Arabic, Turkish, French) had problems perceiving the location of stress but they performed most like the English native speakers in production, who applied a frequency-based common strategy. On the other hand, learners without word-level stress in their L1

(i.e., Chinese, Japanese, Korean) or with unpredictable L1 stress (Spanish) showed almost perfect perception scores; however, their productions were quite different from the control group's. Thus, it was found that good perception does not necessarily underlie good production and vice versa.

While the current findings go contrary to predictions made by the SDM, the STM can explain both the perception as well as the production results. Languages with predictable stress, unpredictable stress, and without stress are included in this hierarchical model with branching parameters. It was found that positive parameter settings impede the perception of L2 stress, while the mere setting of the topmost parameter in the hierarchy (i.e., 'yes/no stress language') and thus experience with stress in the L1 determines the rate of success in production, although L1s with non-predictable stress face further challenges.

Chapter 1

INTRODUCTION

While certain aspects of L2 acquisition, in particular syntax or morphology, have received a lot of attention among researchers (for an overview see, among others, Doughty & Long 2003, Hawkins 2001, White 2003), substantially less focus has been devoted to L2 acquisition of phonology. Within this area, even less interest has been paid to the L2 acquisition of word stress, which did not become the topic of psycholinguistic research until recently. Despite the relative lack of research in this area, it is clear that the acquisition of stress is an important component of second language (L2) acquisition. That is, not only wrong sentence structure or pronunciation of individual sounds, but also incorrect placement of primary stress in L2 words may lead to miscommunication since the misplacement of lexical stress can "precipitate false recognition, often in defiance of segmental evidence" (Cutler 1984:80) (cf. Benrabah (1997) for a collection of examples). This dissertation investigates the second/foreign language acquisition of stress, and thus contributes to this relatively understudied area of L2 acquisition.

What native speakers hear is only the production end of the L2 acquisition; however, it is not clear what L2 learners are actually able to perceive when they are exposed to the L2, either in the classroom or in a naturalistic L2 environment. Since the

perception of stress was found not to correlate with proficiency in other aspects of L2 (Boyle 1987), it seems that otherwise quite proficient learners may still encounter problems with the perception and/or production of word stress. As an indication of how big a challenge stress poses for L2 learners and instructors, it can be noted that several teaching methods have been proposed specifically to facilitate the acquisition of L2 stress (see, for example, Rosse 1999, James and Sherk 1993).

Not much is known about typological factors that may determine the success of L2 acquisition of stress. While it seems obvious that the first language (L1) has some influence on the rate of success in acquiring stress in the L2, it remains unclear which stress properties of the native language actually affect L2 acquisition. To be more precise, according to Peperkamp and Dupoux (2002), the rate of success of perceiving stress differences decreases with increasing regularity of stress assignment in the native language. As for the production of L2 words, learners may either apply a native stress placement strategy to the second language (Archibald 1993), or they may produce stress in a position where it would fall neither in the native nor in the second language (Archibald 1997, Pater 1997). What is not known, however, is if cross-linguistic differences regarding the L2 acquisition of stress can be systematically linked to typological stress properties of the L1 (or, for that matter, to the absence of phonological word stress in the L1). In addition, there is no one typological model than has been tested and can account for the rates of learners' success for L2 stress in both perception and production.

1.1. Perception and Production Experiments

There are no systematic studies to date that investigate both L2 perception and production regarding word stress using a comparable set of items and a variety of L1 groups. In this dissertation, I will present two experiments that systematically investigate (1) the perception and (2) the production of English word stress by L2 speakers of L1s that typologically differ in how stress is assigned in these languages, or that do not have word stress at all. I will address the following specific questions:

- How correctly can L1 speakers of typologically different languages locate primary word stress in English?
- Are (mis)perceptions of primary word stress location correlated with prosodic properties (stress parameter settings) of the L1?
- What strategies do English native speakers use to assign words stress to novel words in production?
- What strategies do L2 learners use to assign stress to novel words in production?
- Is there a correlation between perception and production?
- And, most of all, can typological stress models account for the findings?

The results of the two perception and production experiments shed light on the typological stress factors that have an effect on the L2 acquisition of stress. Most of all, it was found that there are differential rates of success locating primary word stress for speakers of different L1s. Furthermore, the ability to correctly perceive L2 word stress is

directly related to typological settings for stress in the L1. Crucially, there is a direct correlation between the stress parameters of L1 and perception of word stress in L2. The more parameters are positively set for stress in a learner's native language, the more difficulty the learner has with the perception of word stress in the L2. Moreover, English native speakers apply some common strategies when assigning stress to novel words in production, even though stress assignment in this language is generally not predictable based on phonology alone. L2 Learners use a variety of strategies for stress placement in the production of L2 novel words, namely, from non-target-like linear patterns over potential L1 transfer to target-like L2 stress. Finally, good perceptibility of L2 stress does not necessarily lead to good stress placement in production, while poor perceptibility does not necessarily lead to poor production. Experience with word stress and its acoustic correlates in the L1 are a crucial factor for target-like stress placement in the L2.

Two theory-independent typological stress models are being considered: the 'Stress Deafness Model' (Peperkamp & Dupoux 2002) and the 'Stress Typology Model' (Altmann & Vogel 2002). We will argue that while the former cannot account for the results, the latter is able to accommodate both the perception and production results and thus provides insight into which specific L1 stress settings have an impact on the L2 acquisition of stress.

1.2. Organization of the Dissertation

The organization of the dissertation is as follows: Chapter 1 contains a brief introduction. Chapter 2 provides an overview of relevant previous experimental studies regarding the perception and/or production of non-native stress. Chapter 3 presents the experimental approach followed in the current experiments, including the theoretical background with two recent typological models that have been proposed for the perceptibility of (L2) stress or the acquisition thereof. Chapters 4 and 5 contain the two experiments that I conducted on L2 perception and production of stress, respectively. I will present the perception study first, in Chapter 4 (as Experiment 1), and then the production study in Chapter 5 (as Experiment 2). Chapter 6 discusses and synthesizes the results of both studies in relation to each other. The final chapter summarizes the main points and conclusions of this dissertation.

Chapter 2

BACKGROUND: PERCEPTION AND PRODUCTION OF L2 STRESS

While both perception and production of segmental contrasts have received much attention in the L2 literature over the past fifteen years (for an overview, see Eckman et al. 2003, Strange 1995), there are only a small number of studies focusing on L2 stress. Of these, although most are mainly concerned with the production of L2 English stress, several studies also focused on the ability to perceive stress or stress differences by speakers of different first languages.

Early investigations of L2 (English) stress in production are often based on naturalistic or anecdotal data (e.g., Juffs 1990, Shen 1990), or focus on the performance of learners of a single native language (see, for example, Anani 1989, Baptista 1989, Wong 1991). The variability of this type of information, however, does not permit substantial cross-linguistic generalizations. Even in the case of more systematic studies (see, among others, Archibald 1993, Pater 1997 Salsignac 1998), the differences from one study to another make cross-linguistic generalization difficult, as explained in more detail below. Problems also arise with regard to the choice of stimuli – the use of known words introduces the possibility that individual items are simply memorized without the acquisition of a stress rule, while the use of nonce words involves problems related to the

spelling of English and the possible resemblance of the stimuli to morphologically complex items that are subject to different types of stress rules. More recently, it has been suggested that, in addition to the expected strategy of L1 transfer L2 stress placement, we may observe strategies that occur in neither L1 nor L2.

With regard to perception, the latest studies have begun to use structurally varied nonce items in highly structured experiments (e.g., Dupoux & Pallier 1997). Here, one finds that properties of the L1 prosodic system may determine how effectively speakers are able to use stress information in words to discriminate members of minimal pairs (cf. among others Peperkamp & Dupoux 2002).

In the following sections, the most relevant previous experimental studies regarding the production and perception of stress will be presented and put into the context of the current study.

2.1. Production Studies

Among experimental studies regarding the production of L2 stress, differential results can be found. While some investigations conclude that learners transfer patterns or properties of their native language stress system onto L2 items (see, for example, Anani 1989, Archibald 1993, Youssef & Mazurkewich 1998), other studies, mostly using nonce words, report stress placement strategies that exist neither in the L1 nor in the L2 (cf. Pater 1997).

2.1.1. The issue of "stress transfer"

A strong case was made for L1 transfer by Anani (1989) for Jordanian Arabic learners of English. It is reported that these speakers produced real English verbs, nouns, adjectives, adverbs, as well as compounds, mostly in accordance with the Arabic stress pattern and unlike the English control group. Similarly, Youssef and Mazurkewich (1998), who also employed real English words, showed that Egyptian Arabic learners only showed target-like behavior for items where L1 and L2 stress fell on the same position in a word.

In Archibald's (1993) account of Hungarian and Polish L2 learners, production was tested for real English verbs and nouns ranging from two to four syllables with varying syllable weight within these words. The experiment yielded basically the same results for both L1s. That is, no statistically significant difference was found between the two language groups, although tendencies were observed for Hungarian subjects to put the stress closer to the beginning of the word than Polish subjects. This was taken as an indication of transfer of L1 parameter settings onto L2, since Hungarian has regular initial stress and Polish displays stress further to the right.

It should be noted that these claims of transfer are not supported by other studies. Instead, it is argued that L2 learners' misplacement of stress cannot be explained only on the basis of L1 transfer. Data for this position come from ESL learners from a variety of language backgrounds, including Baptista (1989) for Brazilian speakers, Wong (1991) for Cantonese speakers, Peng and Ann (2001) for Spanish, Nigerian and Singapore speakers, Archibald (1997) for Mandarin, Cantonese, and Japanese speakers, and Youssef and

Mazurkewich (1998) for Cairene Arabic learners of English (in cases where L2 stress did not coincide with L1 stress).

On the basis of the parameter model (Dresher and Kaye, 1990) that had been used to interpret the results of the majority of the above studies, these findings were labeled as "parameter missetting", which means that learners selected a parameter setting in their interlanguage that did not correspond to the L1 or the L2 (see van der Pas and Zonnefeld (2004) for a summary and reinterpretation of some of the results within this framework). The motivation, however, for selecting a parameter setting that does not occur in either language and, furthermore, which specific parameter would be misset remains somewhat inconclusive.

2.1.2. The use of nonce words

Although some of the studies mentioned above included some nonce words in addition to real words, few looked at the production of novel words in a systematic way. In order to avoid a possible effect of the level of familiarity with a real word, or of memorized information regarding the stress location in a lexical item, studies with nonce words are often assumed to provide more insight into learners' generalizations, if any, about the phonology of a foreign language. For example, Guion (2005) reports a very high rate of correct stress placement in Korean learners' productions of English known verbs and nouns, but lower correctness scores for nonce words of different lexical classes.

Several recent studies have, therefore, focused on stress production with nonce words of English. For example, Pater (1997) investigated the stress placement patterns for English nonce words by both English native speakers and French learners of English. While this study varied syllable weight within words, it used a rather small set of items. The native English speakers exhibited a stress placement pattern that was basically identical to the Latin stress rule (i.e., stress the penult if heavy; if the penult is light, stress the antepenult). The French L2 learners, however, used one of two strategies: 1) stress the leftmost syllable (quantity-insensitive approach), or 2) stress the leftmost heavy syllable (quantity-sensitive approach). This pattern is striking in that the French learners applied neither an L1 nor a target language strategy. That is, they preferred to stress words closer to the beginning than English native speakers did and ignored the French pattern which makes the final syllable prominent, thereby 'missetting' the stress parameter for English which, according to the English control group, requires stress to be placed on the rightmost possible non-final syllable.

Archibald (1998) further explored the nature of the English stress rule by systematically testing English native speakers. He found a tendency to stress the initial syllable for most items, which did not necessarily mean the rightmost possible non-final syllable (e.g., ***a****convent*, ***in****dumbine*)[1]. In some cases, however, the majority of native speakers favored final stress (*bur****gee***, *ni****dus***). These mixed results might have been due to the small number of subjects (only five), or to the fact that some items used in this

[1] Here and henceforth, syllables in bold print indicate syllables carrying primary stress.

study might have been too similar to existing words and thus triggered analogous stress patterns.

Similar challenges can also be raised in relation to Pater's (1997) study. Examination of his stimuli reveals that some of the words may have allowed for close analogy to existing words, or possibly to interpretations containing derivational morphemes (e.g., *tugumster*, *poedektal*, *aklipter*). In the latter case, speakers may not have considered final stress to be an option if they assumed the presence of an unstressed suffix at the end. Furthermore, some syllables that were classified as light because of containing only a consonant and a lax vowel may actually have contained an ambisyllabic coda consonant in actual production and thus would not exactly have been 'light' syllables like comparable CV syllables without such a coda. For example, the item *kandentala* was pronounced with penultimate stress by native speakers, which would require a closed syllable in this position in production along the lines of *kan-den-**tal**-la* if the vowel was to be lax, thus making the penult syllable heavy. A similar issue arises with the item *paridamee*, where native speakers disagreed between penultimate or antepenultimate stress, yielding potential pronunciation structures like *pa-**rid**-da-mee* or *pa-ri-**dam**-mee*. Finally, the number of items was not very large (twelve words) and thus each type of syllable weight according to the given criteria (heavy or light) only occurred once in each position in a word. Consequently, it is difficult to distinguish real patterns from possible isolated behaviors of individual stimuli.

2.2. Perception Studies

A similar issue arises with real words in perception studies as in production studies. For known words, learners base their responses on stress patterns that they have learned (correctly or incorrectly) for the test words (sometimes even indicated graphically by the teacher), and do not make use of a particular stress rule. Thus, results reported for studies using real words are not very conclusive with regard to the application of some stress rule or active stress placement strategy.

2.2.1. Stress Perception in Real Words

Archibald's (1993) study also tested Hungarian and Polish L2 learners of English regarding their perception of stress using real words. It was found that Hungarians tended to hear stress as being closer to the beginning than Polish subjects. This distinction, however, did not reach statistical significance.

Youssef and Mazurkewich (1998) also investigated the ability of Egyptian Arabic learners of English to perceive L2 stress in real words in addition to their ability to produce stress. The subjects were required to mark stress on a pre-printed list of English words that were presented auditorily. The stimuli consisted of words with four different stress patterns: a) stress on a superheavy final syllable (CVVC or CVCC) (e.g., *compre**hend***), b) stress on the antepenult syllable (e.g., ***re**cognize*), c) stress on a heavy penult syllable (*a**gen**da*), or d) exceptional stress on the antepenult syllable (e.g., ***ca**lendar*). The L2 learners' perception scores were well below the control group of native speakers', except for the one word type with stressed superheavy final syllables.

Thus, Arabic speakers only showed target-like or better performance for items where stress placement in L1 and L2 was the same. It should be noted that the English control group in this perception study did not perform very well for three out of the four structural types used in this study, where they reached only between 66.7 per cent and 77.9 per cent. Only for stressed heavy penult syllables did English speakers display a correctness score of 92.6 per cent. It remains unclear if the inconsistent scores for English native speakers was due to methodological or some other factors.

2.2.2. Cross-linguistic Study

Salsignac (1998) reported a larger study that tested speakers of various native languages (Turkish, Hungarian, Polish, Czech, Russian, Spanish, French) regarding their ability to perceive stress in other languages. The participants listened to words from one language that had the same criterion for primary stress pattern as their native language (for example, Hungarian participants heard Czech and Czech participants heard Hungarian) and one language that had a different criterion for stress assignment (for example, Hungarian and Czech listeners heard French). French speakers were an exception in that they were the only group who heard words from all other six languages. Since the stimuli were from languages unknown to the subjects, they were essentially nonce items for the listeners.

The task was to write down the words, divide them into syllables, and underline any syllable they perceived as being stressed. It was found that the speakers of Spanish and Russian, as well as Polish and Czech, had high correctness scores for all languages

they listened to. By contrast, the speakers of Turkish, Hungarian, and French displayed variable individual behaviors. It is hard to draw conclusions, however, since there were only two participants for each language group and in the latter three languages it turned out that one participant performed well while the other one performed more poorly. Nevertheless, the overall tendency was that speakers of languages with predictable stress on the right edge (Turkish, French) displayed poorer performance for the perception of stress in general, but tended to have higher correctness scores for initial or non-final stresses than for finally stressed words.

While one cannot make strong typological claims based on the performance of two subjects per language group, especially given such a complex task requiring writing down words, dividing them into syllables, and then marking stresses, Salsignac (1998) represents an important contribution. This study avoids the problems inherent in using stimuli that are known by the subjects, and it involves comparison of a larger number of typologically different languages. Unfortunately, however, the items tested could not be kept constant for all participants since the design entailed that they did not all hear the same languages.

2.2.3. Systematic Typological Studies

Several recent studies have investigated the perceptibility of stress on a larger scale with a variety of typologically different languages.

In a series of experiments reported in Dupoux and Pallier (1997), Dupoux et al. (2001) and Peperkamp and Dupoux (2002), nonce words were used that could exist in all

of the L1s of their subjects, who came from a variety of linguistic backgrounds. Strictly speaking, these were not L2 studies since the subjects were not tested in relation to a language they were learning, but rather a more general investigation of the role of L1 in an individual's aptitude to perceive stress differences.

Dupoux and Pallier (1997) reported experiments comparing the discrimination of minimal stress pairs or triplets (e.g., ***fi****dape* vs. *fi****da****pe*; ***bo****pelo* vs. *bo****pe****lo* vs. *bope****lo***) to minimal phoneme pairs with stress location kept constant (e.g., ***fi****dape* vs. ***li****dape*), using ABX and AX paradigms with native speakers of French and Spanish. While the Spanish speakers performed well for all tasks, the ABX task with minimal stress pairs turned out to be significantly more difficult for French than for Spanish native speakers, even if their correctness scores were higher than chance level. They showed, however, no problems with an AX stress discrimination task using recordings from only one speaker (as opposed to different speakers) and performed comparably to the Spanish group.

Dupoux et al. (2001) again tested Spanish and French subjects in a number of experiments on minimal stress pairs (e.g., ***pi****ki* vs. *pi****ki, tu****ku* vs**.** *tu****pu***). The members of each minimal pair were associated with a number key on the computer keyboard (i.e., 1 and 2), and subjects then had to reproduce a randomized two- to six-word sequence containing the members of a pair. The subjects' performance for stress pairs was compared to that for minimal pairs differing in one phoneme with the location of stress kept constant (e.g., ***ku****pi* vs. ***ku****ti*). Dupoux et al. (2001) basically replicated the results of the earlier study reported above using a new methodology.

The findings of these two series of experiments indicated that French speakers were able to detect the difference between members of a minimal pair with contrasting stress. This ability, however, seemed to be based on subtle acoustic cues, and required that the speaker of the items be kept constant. Once another item intervened or different speakers were used, the French subjects performed poorly. Subsequently, Peperkamp and Dupoux (2002) studied Finnish, Hungarian, and Polish speakers. Their experiments compared the performance of these speakers for phonemic contrasts and for stress contrasts using a novel paradigm. Subjects were required to memorize two non-words that either differed in one phonological dimension with stress constant in one position (e.g., place of articulation of one consonant, ***ku****pi* vs. ***ku****ti*) or in location of stress with constant consonants (e.g., ***mi****pa* vs. *mi****pa***), and associate them with different keys on a computer keyboard. They then heard sequences of varying length created from the two non-words and were required to transcribe them using the specified keys on the keyboard. Every non-word within a sequence was followed by the word "OK" to prevent the use of echoic memory. The Finnish and Hungarian subjects made significantly more errors with the stress contrast than with the phonemic contrast. The Polish speakers also made more errors for the stress contrast than for the phonemic contrast, but this result was only marginally significant. The results of this set of studies gave rise to a hierarchical model of stress 'deafness' (to be described in detail in Chapter 3), according to which a speaker's L1 either prepares him/her to perceive stress or causes him/her to fail to perceive it.

In a study designed to investigate L2 stress perception, Altmann and Vogel (2002) examined the ability of L2 learners of English from different L1s to locate primary word stress in English nonce words. In this study, 320 items were tested, consisting of words between two and four syllables length with systematically varied syllables. The syllables were not only classified as light or heavy, but were also distinguished with regard to the kind of vowel (schwa, lax, tense, or diphthong) and the absence or presence of a coda (i.e., $CV_{(schwa)}$, $CV_{(schwa)}C$, $CV_{(lax)}C$, $CV_{(tense)}$, $CV_{(tense)}C$, $CV_{(diphthong)}$). Spanish, Korean, Turkish, Thai, and Chinese L2 learners, among others, as well as English native speakers, listened the words one at a time (e.g., [sʌm.pæw], [bɛn.də.rɛk], [hæl.li.də.vɔj]) and were asked to indicate in the orthographically spelled word on a computer screen (e.g., *sum pow*, *ben de reck*, *hal lee da voy)* where they heard stress in a word.

It was found that speakers of an L1 without stress (Chinese, Korean), either with or without tone, did as well as English native speakers. Learners whose L1 had phonologically predictable word stress (Turkish, Thai) performed worse than the others. The specific syllable structures in syllables with non-schwa vowels did not appear to influence the subjects' perception of stress. Furthermore, stress was more correctly identified if it was located centrally than at the left or right edge in three- and four-syllable words. It was suggested that this last observation may be due to the presence of secondary stress, although the focus of the study was only the placement of primary stress. These findings were used to support a parameter based typological stress model, which is presented in detail in Chapter 3.

2.3. Conclusions

From the stress studies discussed above, a number of different response patterns emerged with respect to L2 stress. In production, (a) L2 speakers could either apply their L1 stress pattern in the L2, (b) they could exhibit target-like behavior, or (c) they could display a strategy regarding stress placement that conforms neither to the L1 nor the L2. In perception, (a) subjects were found to perceive L2 stresses better if they are located where they would also fall in the L1, (b) they could display individual differential behavior, or (c) they could perceive stresses better that do not fall where they would in the L1. Thus, it seems that behaviors were found that supported almost different interpretations, and it is unclear which behaviors to expect in any given set of circumstances. Part of the problem is due to the fact that the different studies tended to use different kinds of structures, experimental designs, and a limited number of subjects and language groups. Furthermore, most studies tested either production or perception, making it impossible to draw any conclusions on a potential correlation between these two abilities.

Indeed, only two studies investigated both the perception and the production of second language word level stress. The results of these two studies, however, could not be more different. Archibald (1993) reported significantly better scores for Hungarian and Polish speakers for the perception of English stress of than for the production. Youssef and Mazurkewich (1998), however, claimed better results for the production than for the perception of English stress by Egyptian Arabic learners of English. Thus, even with only two studies there is no agreement regarding L2 behavior.

It seems clear that, in order to provide some real insight into how L2 learners behave regarding L2 stress and why, a larger and more systematic study is necessary. Specifically, it is necessary to include (a) a variety of typologically different language groups, (b) a somewhat large number of speakers, and (c) a larger set of structures and items to be tested. Given the problems associated with using real words of a language, it is crucial to use nonce words as stimuli in such a study. Moreover, to shed light on the question of the relationship between perception and production, both types of tasks should be carried out by the same participants. The current study regarding the perception and production of English stress attempts to address all these concerns, as is discussed in detail in the following chapters.

Chapter 3

EXPERIMENTAL DESIGN

This chapter provides a detailed description of the considerations involved in the design of the stress perception and production experiments presented in the following two chapters. Before discussing the details of these experiments, aimed at investigating the L2 acquisition of stress of speakers of different languages learning English, however, I first present two recent models pertaining to the perception of stress, since these are crucial for the selection of the languages included in the current experiments. On the basis of these models, as well as the findings of several previous studies, the hypotheses to be tested in the two experiments are presented. Finally, the types of stimulus words used in the experiments are described in detail, with focus on their structures and their appearance in the actual experiments.

3.1. Rationale

As presented in Chapter 2, there have been a number of studies that investigated either the perception or production of L2 stress. Unfortunately, they cannot be conflated to provide a single conclusive picture of L2 learners' general problems with stress due to different experimental approaches, selection of participants, or kinds of stimuli that were

employed. Since it is the goal of the present study to test both the perception as well as the production of stress using a larger set of languages, the selection of languages to be used is of crucial importance for the interpretability and generalizability of the results, and to be able to test competing models for stress learning.

Before discussing the models of stress, it must be noted that the distinction between predictable versus non-predictable stress languages rests on the assumption that it is not possible for phonology alone to predict the stress patterns of all languages. The position adopted here does not exclude the possibility that certain languages may show a greater (or lesser) degree of regularity in stress placement, especially if morphological structure is considered. We claim, however, that languages exist where uniquely phonological considerations are not adequate for the determination of stress placement. In fact, since languages seem to differ with regard to the extent to which they require lexical specification of the location of main stress, it might ultimately be necessary to identify a continuum of the degree of stress predictability.[2]

Previous work shows that different behaviors exist among speakers of different L1s in both perception and production of stress (cf. among others, Altmann & Vogel 2002, Archibald 1993, Pater 1997, Peperkamp & Dupoux 2002, Youssef & Mazurkewich 1998). The fundamental questions are a) what determines the observed differences, and b) how is this information to be incorporated into our models of L2 stress acquisition. Ultimately, the answers to these questions will also provide insight into our general

[2] In this case, it would be necessary to determine how to assess the degree of stress predictability of a language, and what the relevant criteria are for placement of language on the continuum. Such considerations, however, are beyond the scope of the present investigation.

understanding of stress systems, including the possibility mentioned above, that stress may actually be predictable in all languages.

3.2. Defining "stress"

Since the two models presented and discussed below crucially make reference to language characteristics such as 'predictable stress', 'non-predictable stress', and even 'no stress', it is in order to define the term 'stress' in the sense that it will be used throughout this dissertation.

First of all, the only prosodic constituent of concern for stress in this study is the prosodic word, since primary word stress can be encountered in all stress languages. Although "stress degrees are always purely relative and highly variable in their absolute magnitude from speaker to speaker, and even from utterance to another in the usage of the same speaker" (Jakobson and Halle 1956:25), it typically involves a combination of the features pitch, duration, and intensity on a particular syllable of a word (Lehiste 1970). This combination of features causes one syllable within a word to become more 'stressed' or more prominent than others in the same word (Couper-Kuehlen 1986).

Word stress can furthermore be understood as a phonetic effect of foot structure. Typically, this is manifested by greater articulatory care in the pronunciation of stressed syllables, including more effort to produce stressed vowels, even intensity distribution across the frequency spectrum, and longer duration for stressed vowels and consonants

(for English see, among others, Fry 1952, 1955; Beckman 1986; de Jong 1995; Gussenhoven 2004).

Thus identified, word stress typically serves one of two crucial linguistic functions In some languages, stress merely demarcates a word edge, in which case the position of the stressed syllable in a word is regular or predictable (Rietveld 1980). In other languages, however, word stress may have a contrastive function, in which case primary stress is not fixed to a given position and different placement of stress within a word may result in a meaning difference (e.g., Jakobsen and Waugh 1979, Waugh and Monville-Burston 1990).

In the following, languages in which primary word stress serves a purely demarcative function will be labeled as 'predictable stress languages', which means that primary word stress is regular and the position on which stress falls for a given word can be predicted based on phonological characteristics of the word alone (e.g., position of a syllable within the word, syllable weight). In the present study, French, Turkish and Arabic fall into this category. Languages in which stress is contrastive will be labeled as 'non-predictable stress languages' since primary stress is not fixed in one position. Depending on the word and the meaning associated with it, stress will surface on syllables in different positions of a given word. English and Spanish are the languages in the present study that are in this category. This is not to say that there is random stress placement in such languages, but rather that the phonological shape of the word is not the only factor determining the position of the stressed syllable, otherwise there no word pairs contrasting in stress only would be possible.

As opposed to languages with word-level stress as defined above, there is another class of languages where stress does not have either a demarcative or contrastive function on the word level. Instead, we often find that one of the three acoustic correlates of stress mentioned above, namely pitch, is used contrastively. There are two general subcategories among such languages: (a) tone languages (e.g., Mandarin Chinese), where syllables within a word carry lexical tone (Gussenhoven 2004), and (b) pitch-accent languages (e.g., Tokyo Japanese), where a pitch contour spans across the whole word and frequency features alone are responsible for signalling prominence (Beckman 1986), with both types of languages incurring meaning differences for contrasting word pairs. Finally, a language may not use any of the three acoustic characteristics systematically on the word level. This is not to say that such a language never expresses prominence on words in production, but rather that such prominence is, not assigned on the level of the lexical or phonological word. Instead, relative prominence may arise on certain positions postlexically, assigned in relation to higher prosodic constituents, and may shift within one word depending on its position within these constituents. Seoul Korean is the language in the current study that falls in to this category, since prominence in words is argued to be due to boundary tones from the accentual phrase or intonational phrase (e.g., Jun 1996, 2005).

At some abstract level, it might be suggested that all languages have metrical structure and thus can be viewed as constituting a single category in this regard (e.g., Halle & Vergnaud 1987, Idsardi 1992, Hayes 1995). Thus, similar mechanisms would be used to analyze such phenomena as unpredictable stress in English, predictable

stress in French, and tone in Chinese. There are, however, indications (anecdotal and based on the results of the current experiments) that there are differences between languages regarding their L2 stress behavior that cannot be accounted for if, for example, Mandarin Chinese or Seoul Korean would be classed as having predictable word level stress and thus fell into one group with French or Turkish speakers. As will be seen in the discussion of the experiments in Chapters 4 and 5, languages that do not employ the combination of the three factors pitch, duration, and loudness described above for demarcative or contrastive stress on the word level perform differently in L2 tasks than speakers of predictable stress languages, which will be a cross-linguistic division to be assumed throughout this study.

The factor of potential metrical structure for all language types can be neglected for our purposes since this does not necessarily entail that all languages have stress in the understanding that it is used in this study. For example, an account of Tokyo Japanese with metrical structure explaining accentual (tonal) patterns of the language as in Purnell (1997) or Kim (1999) is not of concern to the discussion here since it is not restricted to the word level and only affects pitch phenomena, thus does not involve stress as defined in this dissertation.

3.3. Typological Models

Two models for the perception of word-level stress have been independently proposed and tested in the recent (L2) acquisition literature. Both argue that there are

typologically based differences regarding the perceptibility of stress depending on the type of native language of the speaker.

Before commencing, it should be clarified what is being meant by 'parameters' and 'typology' as they are being used in this dissertation. The term 'parameter' with regard to stress is used in a neutral sense, which means that it not only refers to the parameters promoted by Dresher and Kaye (1990, see below) but rather some property concerning word stress that can be either present or absent in a given language. The models discussed here are typological in the sense that they classify and group languages based on their word stress properties (or parameters) in a hierarchical manner.

Peperkamp and Dupoux (2002), on the one hand, investigated the level of 'stress deafness' of speakers of various languages with predictable stress and promote a hierarchy based on their findings and arguments from the procession of first language acquisition. Altmann and Vogel (2002), on the other hand, following a proposal in Vogel (2000), posit a stress system typology that includes various different types of languages which specifically considers L2 settings and not merely the perceptibility of stress in general. Both models are discussed in detail below since they provide the typological background for the current experiments. A third model, suggested by Dresher and Kaye (1990) will be presented since it has been used to analyze previous studies on the L2 acquisition of stress. It must be noted, however, that the model was originally proposed to account for the L1 acquisition of stress and it involves many detailed parameters in order to potentially generate all possible (not only primary) stress patterns found in natural languages.

3.3.1. "Stress Deafness" Model (SDM)

Peperkamp and Dupoux (2002) (henceforth P&D) propose a hierarchy of languages with predictable stress, which will be referred to here as the "Stress Deafness" Model (SDM). Specifically, P&D claim that the more predictable (along the lines presented in section 3.1.1.) stress is in a language, the poorer is the speakers' ability to discriminate minimal stress pairs (hence "stress deafness") compared to minimal phonemic pairs. Their experiments compared the performance of Finnish (predictable stress on the left edge of a word), Hungarian (predictable left-edge stress as well), and Polish (a language with non-predictable stress) speakers for phonemic contrasts and for stress contrasts using a novel paradigm. Subjects were required to memorize two non-words that either differed in one segmental dimension (e.g., place of articulation of one consonant, *ku**p**i* vs. *ku**t**i*) or in location of stress (e.g., ***mi**pa* vs. *mi**pa***), and associate them with different keys on a computer keyboard. They then heard random sequences of the two non-words and were required to transcribe them using the specified keys on the keyboard. Every sequence was followed by the word "OK" to prevent the use of echoic memory. Finnish and Hungarian subjects made significantly more errors with the stress contrast than with the phonemic contrast. By contrast, for Polish speakers this difference turned out to be only marginally significant.

On these grounds, P&D proposed to categorize languages with predictable stress into a hierarchical classification of 'stress deafness' from Class I (major problems distinguishing stress contrasts) to Class IV (basically no problems distinguishing stress

contrasts), as illustrated in Table 1. According to this classification, the degree of regularity or predictability of stress at utterance edges in a language is claimed to affect native speakers' general ability to perceive stress. It should be noted this hierarchy is theory-independent since it is based on surface-observable patterns and properties alone, and also that it does not make any claims regarding secondary stress.

Table 1: Hierarchy of 'stress deafness' (adapted from Peperkamp & Dupoux 2002)

Class I (e.g., French, Finnish):	regular stress always at an utterance edge (no phrase-final unstressed function words)
Class II (e.g., Fijian[3]?):	regular stress at an utterance edge based on syllable weight: utterance-final if heavy, otherwise penultimate (no phrase-final unstressed function words)
Class III (e.g., Hungarian):	regular stress at utterance edge, except for unstressed function words
Class IV (e.g., Polish):	regular stress pattern for content words, however, not at utterance edge (unless monosyllabic)

P&D argue that the stress parameter (i.e., whether stress is contrastive in a language or not) is set during first language (L1) acquisition. If the language allows children to observe that stress is regular in their language, they will not encode stress information in their phonological representation and thus lose the ability to use this information in the speech stream in the course of L1 acquisition. Accordingly, languages with regular stress that always falls on utterance edges (Class I) yield a higher degree of

'stress deafness' than those that require a) knowledge about syllable weight (Class II), b) the ability to distinguish between function and content words (Class III), or c) the awareness of content word boundaries (Class IV).

It must be noted, however, that this classification has been posited and tested for general perceptual ability only, and is not concerned with issues of second language (L2) acquisition. Furthermore, it is restricted to languages with predictable stress and makes no claims regarding possible differences in behavior of speakers of other types of languages (e.g., tone languages).

In addition, it is not necessarily clear from the hierarchy how certain other languages with predictable stress would be classified. For example, Turkish and Arabic are claimed to have predictable stress patterns, but probably fall into different categories based on their prosodic properties. Turkish is most likely to be classed into the same category as (the historically related) Hungarian (Class III), since it is postulated to have regular stress at the (right) edge of a prosodic word (cf. Kabak & Vogel (2001)for discussion of the stress domain in Turkish). Arabic could be classified in Class II together with Fijian, since stress assignment in Arabic is weight-sensitive, but in the absence of heavy syllables, stress falls at the edge of a word.

While it might be possible to refine the criteria in P&D so all languages with predictable stress can be unambiguously placed in one of their four categories, there are many languages that are not covered by such a model. Specifically, there is no place in their model for stress languages that do not have (phonologically) predictable stress or for

[3] Fijian speakers were not tested.

languages that may not have stress at all, such as certain tone languages. Furthermore, since P&D's model addresses only general perceptual ability, it does not make specific predictions about L2 acquisition. While inferences may be made with regard to L2 learners' ability to perceive stress, it is not clear what relationship this would have with their production. The next model considered, by contrast, explicitly addresses the issues of perception and production of stress in L2 acquisition.

3.3.2. Stress Typology Model (STM)

A somewhat different classification is proposed in Vogel (2000) and modified in Altmann and Vogel (2002) (henceforth A&V). This model, the Stress Typology Model (STM), is based on a typology of stress phenomena. While the STM also uses a notion of a stress parameter similar to P&D, it consists of a binary branching hierarchy regarding the use of stress or other prosodic phenomena (e.g., tone) on the word level. Similar to P&D's model, the STM is also based on surface-observable patterns of each language alone and requires no additional theoretical tools. Similarly, too, it focuses only on primary word stress, and does not address secondary stress.

It should be noted that the STM extends beyond P&D's SDM in that it not only includes languages with predictable stress, but also languages with non-predictable stress, and non-stress languages. Nevertheless, it must be pointed out that this system is compatible with the SDM, which actually provides further possibilities regarding languages with predictable stress, one of the categories included in the STM.

As shown in Figure 1, languages fall into two major groups depending on whether they employ stress on the word level or not.

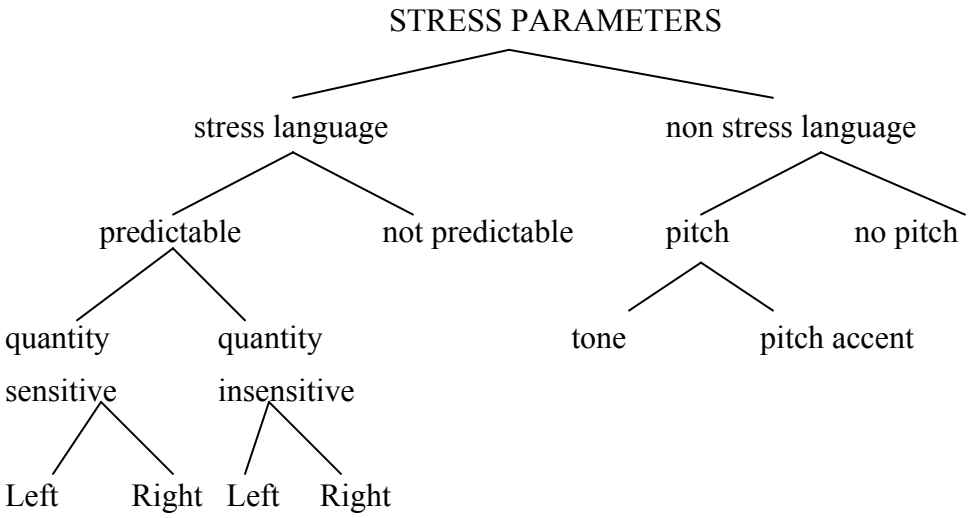

Figure 1: Typology of stress parameters (A&V, following Vogel 2000)

In the case of stress languages, the location of stress within the word may either be predictable (regular) or not. For languages where stress is not predictable in relation to surface phonological structure, it must be lexically specified and requires encoding in the lexical representation of words. By contrast, if stress is phonologically predictable, such a lexical requirement does generally not arise; however, further parameter settings become necessary. In particular, information about which edge of the word is relevant for stress assignment must be provided, and depending on whether the regular assignment of stress requires knowledge about syllable weight, languages are classified as quantity sensitive or insensitive. In addition, the STM takes into consideration languages that do

not have word level stress at all. Such languages either make use of pitch on the word level in some other way, as tone or pitch accent, or they do not make contrastive or demarcative use of such information on the word level at all.

The hierarchical typology presented here predicts different degrees of difficulty regarding the acquisition of primary stress in a certain L2 by speakers of different L1s. Negative settings for any parameter are not considered to have an effect on the success of L2 acquisition of stress in this model. More precisely, the best performance for L2 stress, on the one hand, would be expected by speakers of non-stress L1s, since there are no (positive) L1 parameter settings for stress involved in this model that could possibly interfere with L2 settings. Speakers of L1s with predictable stress, on the other hand, should display the greatest difficulties according to this typology, since there are several positively set stress parameters required to accommodate properties like quantity sensitivity or edge demarcation, which may impede the ability to acquire L2 stress, especially if the L2 has fewer positive settings than the L1. Finally, L1 groups with non-predictable stress would also be predicted to have a higher success rate than L1s with predictable stress.

While pilot research supports the predictions made by the STM with regard to L2 stress perception, its effectiveness in predicting L2 stress production facts has not been previously evaluated (cf. A&V). Thus, the experiments presented below are designed to a) further test the predictions of the STM with regard to L2 stress perception, with the possibility of incorporating further information in the domain of languages with

predictable stress along the lines of P&D's work, and b) determine the relevance of the STM in regard to L2 stress production.

3.3.3 L1 Stress Parameter Model

Dresher and Kaye (1990) (henceforth: D&K) presented an approach to the acquisition of a phonological subsystem, i.e., stress assignment as it is treated in metrical phonology. They employed the Universal Metrical Parameters (based on Hayes 1981) presented in Table XX in the computational model YOUPIE in order to account for the first language acquisition of all possible natural languages as modeled by a computer program for learning stress patterns. The available choice of settings is provided in brackets for each parameter.

Table 2: Dresher and Kaye's (1990) stress parameters

P1:	The word tree is strong on the [left/right]
P2:	Feet are [Binary/Unbounded]
P3:	Feet are built from the [left/right]
P4:	Feet are strong on the [left/right]
P5:	Feet are quantity-sensitive (QS) [yes/no]
P6:	Feet are QS to the [nucleus/rime]
P7:	A strong branch of a foot must itself branch [yes/no]
P8A:	There is an extrametrical syllable [yes/no]
P8:	It is extrametrical on the [left/right]
P9:	A weak foot is defooted in clash [no/yes]
P10:	Feet are non-iterative [no/yes]

These parameters provide the basis for building metrical trees. For example, a setting of P1 for 'right' and P2 for 'binary', as in English, generates languages with primary stress on the final foot. Thus, stress on the antepenultimate syllable would not be possible in such a language without further provision. Such a provision is made in P8A and P8, which have to be set positively for English, since it does display antepenultimate stress. Furthermore, since P2 is set for 'binary', some more detailed parameters regarding foot structure (P3-P7) need to be set. Accordingly, a different combination of parameters yields different languages, however, there are interdependencies between some parameters in the sense that the type of setting for one either suspends another (as in the case of P5 and P6, where 'no' for P5 naturally does not evoke a setting for P6, as well as a prerequisite setting of P2 for 'binary'), or crucially requires further specification (as in the case of setting P8A to 'yes', which then has to be defined in P8). The computer model takes into account the interdependencies between different parameters and thus yields total of 216 possible stress systems (D&K).

While such an approach may yield interesting predictions regarding how stress systems may be learned in L1 acquisition, there is a crucial requirement on the input, the data available to the leaner (or, in this case, the model), which is absolute transparency. The model has no provision for conflicting data, which is, words with identical syllable structure that contrast in stress placement. In such cases, "the learning model will be unable to arrive at a successful setting of parameters" (186). Other modules, for example, an exception analyzer, or a morphological component, need to be consulted, which, however, are not implemented in the model (D&K).

With regard to the present study, it must be noted that this parameter model has been proposed for the production of stress patterns that can be observed in different languages, and was not intended to account for the perception of stress. Furthermore, an application of these parameters crucially implies claims about secondary stress due to the involvement of foot structure that cannot always be explained by phonological factors alone. For example, in the case of English, there are instances of otherwise similar words that differ with respect to the use of secondary stress (e.g., Adiróndàcks vs. appéndix) or with respect to the placement of secondary stress relative to primary stress (e.g., óxigenàte vs. oríginàte). That is, the parameter model proposed by D&K makes general predictions about secondary stress that cannot always be supported by observation of the surface stress patterns.

It should also be noted that secondary stress within the same word may vary from speaker to speaker. It is, furthermore, problematic to evaluate claims about secondary stress acoustically. That is, it is often very challenging to measure primary stress, due to the interaction of several acoustic properties, and the measurement of secondary stress is at present even more elusive. Thus, the D&K model involves a high level of depth and abstractness that cannot presently be quantified experimentally.

Moreover, the motivation for extrametricality is somewhat controversial (Burzio 1994) and is definitely not easily surface-observable. For second language learners this would be especially problematic (e.g., English underived verbs and adjectives may have extrametrical final consonants, but nouns have extrametrical final syllables).

Finally, as noted above, the parameters cannot account for stress irregularities (e.g. a**gén**da/**cá**lender), differences by syntactic category (English verb/noun pairs such as con**víct**/**cón**vict), or by morphological structure (e.g. **á**nalyze/a**ná**lysis).

Given the lack of clarity with regard to such theoretical claims as extrametricality and secondary stress, even in such a well-studied language as English, application of such mechanisms to L2 acquisition raises serious problems. Indeed, there has been a lack of clarity in interpreting cross-linguistic results based on this model where only primary stress was considered.

While D&K's model involves too much abstractness for a general cross-linguistic approach regarding the L2 acquisition of stress, a number of its more generally applicable parameters concerning primary stress that are surface-observable are being employed in the STM, as illustrated in Table XX, where bolded parameters indicate ones that occur in the STM as well.

Table 3: Parameters being employed by the STM

P1:	**The word tree is strong on the [left/right]**
P2:	Feet are [Binary/Unbounded]
P3:	Feet are built from the [left/right]
P4:	Feet are strong on the [left/right]
P5:	**Feet are quantity-sensitive (QS) [yes/no]**
P6:	Feet are QS to the [nucleus/rime]
P7:	A strong branch of a foot must itself branch [yes/no]
P8A:	There is an extrametrical syllable [yes/no]
P8:	It is extrametrical on the [left/right]
P9:	A weak foot is defooted in clash [no/yes]
P10:	Feet are non-iterative [no/yes]

As can be seen, the most general parameters regarding primary stress are being addressed by the STM as well. Since the current study is concerned with the L2 acquisition of English primary word stress and involves various L1s with differential stress characteristics, only such general parameters as presented in the STM will be addressed in this study in order to have a common denominator for all participating languages. Naturally, no provision is made in D&K's model for prosodic properties other than stress (e.g., tone or pitch accent) or for the level of predictability of stress within a language.

While it would be highly interesting to investigate in detail the applicability of all parameters presented in D&K's model for L2 acquisition in perception as well as in production, this must be left for future undertakings.

3.4. Languages and L1 Stress Properties

Motivated by the classification of languages discussed in the SDM and STM, typologically different languages were selected for the current experiments. As opposed to earlier studies (see Chapter 2), a wide range of language types was included in order to provide insight into the properties that affect the L2 perception and production of stress cross-linguistically. Therefore, not only speakers of languages with predictable stress were recruited for these experiments, but also speakers of languages with unpredictable stress were included, as well as speakers of languages without contrastive stress. Accordingly, speakers of Spanish, French, Arabic, Turkish, Japanese, Chinese, and

Korean were selected for participation in the experiments discussed here. In the following the L1 groups selected for the current study will be introduced and discussed with respect to their stress properties.

3.4.1 Languages

On the basis of the STM, at least one language was chosen to represent each terminal node in the hierarchy where possible.[4] Figure 2 shows the distribution of the languages selected for the experiments (in bold italics) with their corresponding parameter settings in accordance with the stress parameter hierarchy.

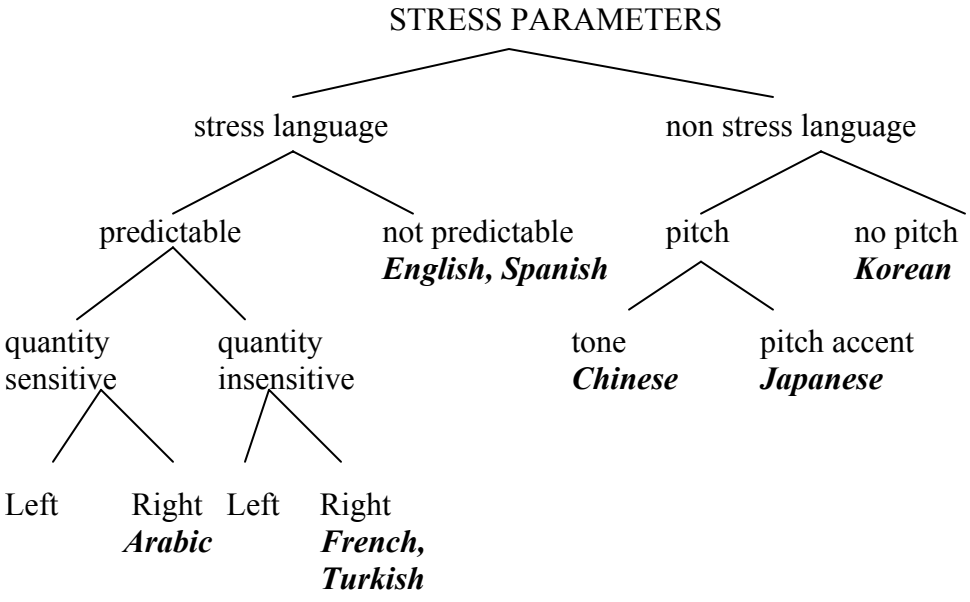

Figure 2: Stress typology model with languages selected for the experiments

Since the experiments in this work were concerned with the perception and production of stress by learners of English as a second language, English is the target language and a group of native English speakers was tested to provide a baseline against which to compare the behavior of the other subjects. One other language with essentially the same type of stress properties as English, that is (phonologically) non-predictable stress, was selected, namely Spanish. For the branch of languages with predictable stress, Arabic was chosen for the quantity-sensitive setting, and French and Turkish for the quantity-insensitive setting. It might seem unnecessary to have two languages for the same settings in the STM; however, here the hierarchy of predictable stress languages put forth by P&D comes into the picture. Recall that this classification, the SDM, was only concerned with predictable stress and thus potentially provides subdivisions of this parameter in Vogel's typology. French, with highly regular stress, is included in Class I in the 'stress deafness' hierarchy. Turkish and Arabic were not mentioned in this hierarchy and thus it can only be speculated into which classes they would be classified (see section 3.3.1. above). Thus, the inclusion of three languages with somewhat different, but predictable, stress properties in the present experiments was intended to further evaluate the predictions made by the SDM. This was felt to be especially important in the cases of Turkish and Arabic, since their classification is not totally clear. The question addressed here is, more precisely, whether speakers of these languages perform in the same way as the French speakers, and thus should be classified in the

[4] It should be noted that the choice of languages was also constrained to some extent by the availability of speakers at the University of Delaware.

same category – or not.

In addition to the languages with different types of stress patterns, several languages without contrastive lexical stress were considered – as these are relevant to the STM, but not to the SDM. Specifically, speakers of Mandarin Chinese and Tokyo Japanese were included, as these languages make crucial use of pitch information, however not as part of stress but rather as contrastive tone or pitch accent, respectively. Seoul Korean was also selected since it not only lacks contrastive stress, but it also fails to exhibit contrastive tone or pitch accent. [5]

3.4.2 Stress Properties of Speakers' L1s

Before discussing the experimental design in more detail, I provide here more specific information about the stress properties of the L1 of the subjects who participated in the present research. It will be recalled from 3.2. that for the present purposes stress is defined here as prosodic prominence on the word level consisting of a combination of the acoustic properties pitch, loudness, and duration; furthermore, stress has a function on the word-level, either demarcative or contrastive.

3.4.2.1 Non-predictable Stress

As already mentioned in the introductory chapter of this dissertation, the location of English stress is not always obvious on the basis of the phonological structure of a

[5] These varieties constitute the standard dialect in each case. There may also be other dialects with somewhat different prosodic phenomena that would be classified differently, however, these were not examined in the present research.

word. This can be seen in noun/verb and noun/adjective pairs such as ***sus**pect / sus**pect*** and ***con**tent / con**tent***, respectively. Other stress anomalies such as *a**gen**da vs. **ca**l**e**ndar*, where the crucial phonological properties of the words are the same, and morphologically induced stress shifts such as in ***a**nalyze / a**na**lysis* also provide evidence that English stress assignment is not predictable on the basis of surface-observable segmental information. Since stress location cannot be determined on phonological properties alone, English is classified in the typology as a language with non-predictable stress.

Spanish is similar to English in the sense that stress placement is very often determined by the morphological structure or syntactic class of a word, and not by phonology alone. For example, there are many pairs where nouns and adjectives have antepenultimate stress but their corresponding verbs carry penultimate stress (*cat**á**logo*[6] 'catalogue (noun, masc., sg.)' – *cata**lo**go* 'I catalogue (verb, 1pers. sg., pres., indic.)', *le**gí**tima* 'legitimate (adj., fem., sg.)' – *legi**ti**ma* '(s)he legitimates (verb, 3pers. sg., pres., indic.)', *in**tér**prete* 'interpreter'(noun, masc./fem., sg.) – *inter**pre**te* '(that) she interprete (verb, 3pers., pres., subj.)'. Furthermore, the language contains numerous minimal pairs that are morphologically unrelated but differ only in word stress, for example ***sá**bana* 'bed sheet (noun, fem., sg.)' versus *sa**ba**na* 'savannah (noun, fem., sg.)' and '***lú**cido* 'lucid (adj., masc., sg.)' versus *lu**ci**do* 'shone (verb, perf. Participle, masc., sg.).[7]

[6] In these and the following set of examples, bold syllables indicate the location of primary stress; accent marks are provided where they appear in Spanish orthography. I would like to thank Marc-Olivier Hinzelin for help with the English glosses.

[7] All Spanish examples are taken from Harris (1965,1992).

Thus, in Spanish, stress has a rather high functional load, and in this respect is comparable to English. Indeed, according to Hayes (1995:96), "main stress in Spanish is phonemic".

It should be noted that when other information is considered, stress can be predicted in many cases by complex rules the character of which, however, is still under debate (Harris 1992). In this view, Spanish is believed to have a default stress pattern that surfaces in the absence of, or whenever it is not overruled by, morphology; however, this is quite rare. Descriptively it can be stated as: stress falls on the penultimate syllable if the word ends in a vowel or one of the consonants –n or –s; otherwise the final syllable receives primary stress (Macpherson 1972). Roca (1992) draws a distinction between verb stress and non-verb stress in Spanish and approaches verb stress as a pure lexical system (i.e., requiring marking in the lexicon) in line with Halle and Vergnaud (1987) with no role for foot construction, while non-verb stress is being analyzed as a covert rhythmic system (with underlying regularity). Crucially, however, reference to the syntactic class or tense needs to be made in the lexical representation of verbs, for example, to make final syllables extrametrical for present tense verb forms. The point that is relevant to the present research, however, is the fact that the location of stress in Spanish words of all kinds cannot be successfully predicted on the grounds of (surface) phonological structure. On these grounds, Spanish is considered to have non-predictable stress in the STM, along with English for the purposes of the present study.

3.4.2.2 Predictable Stress

French, Turkish, and Arabic, by contrast, have highly predictable stress patterns. According to P&D, French is (one of) the most regular stress languages, and word stress placement can be determined in a simple, straightforward way, regardless of the type or length of a word or its internal structure. The following examples illustrate that stress is on the rightmost syllable regardless of word length[8]: ***dors*** 'sleep' (1sg, pres., indic.), *dor**mis*** 'slept' (1sg, simple past.), *dormi**rai*** 'slept' (1sg, fut.). (moved) The weight of the syllable is also not crucial, so French stress is considered to be quantity insensitive. The only condition is that stress may not fall on a final schwa; in this case it would fall on the previous syllable instead, for example in *No**vem**br[ə]* 'November', or *cham**pa**gn[ə]* 'champagne'.

As a result, French word stress is non-contrastive (cf. among others Casagrande 1984, Dell 1985, Demuth& Johnson 2003, Schane 1968, Peperkamp 2004, Tranel 1987). Instead, it can be seen to have a demarcative function, that of denoting the right edge of a word.

In Turkish, primary stress is also very consistently word final. Furthermore, as in French, stress assignment in Turkish is quantity insensitive, and thus serves the demarcative function of identifying the right word edge. For example, it can be seen that as suffixes are added, stress shifts towards the right edge of the word in items such as *ta**ni***

[8] The following examples are presented in orthographic form, not in phonetic transcription.

'know', *tan**ɨ**-**dɨk*** (know-Der) 'acquaintance', *tan**ɨ**-dɨk-**lar*** (know-Der-Pl) 'acquaintances', *tan**ɨ**-dɨk-lar-**ɨm*** (know-Der-Pl-Poss1S) 'my acquaintances').

It should be noted that several clitic-like suffixes, however, do not follow this pattern and it has been proposed that the relevant domain for primary stress assignment in Turkish is the prosodic word, as opposed to the lexical word (cf. Kabak & Vogel 2001), excluding the morphemes in question. Thus, unlike in French, there are certain exceptional cases in which stress is not word-final (or phrase-final) (e.g., *tan**ɨ**-dɨk-lar-**ɨm**-m**ɨ*** (know-Der-Pl-Poss1S-Que) 'my acquaintances?'). Furthermore, it should also be noted that there is a set of words (non-native borrowings and place names, among others) with irregular, non-final stress, for example, ***pe**nalt**ɪ*** 'penalty', *lo**kan**ta* 'restaurant', and *Av**ru**pa* 'Europe' (see Lewis 1967, Inkelas & Orgun 2003, Kabak & Vogel 2001, Kornfilt 1997).

There have been different approaches advanced for handling such cases, such as Kabak & Vogel's (2001) recent proposal they be handled simply by marking the position of the exceptional stress in the lexicon (along the lines Roca (1992) proposes for Spanish verbs). A different approach is found in Inkelas & Orgun (2003) and related works in which special rules are introduced to account for such items. It should be noted, however, that the mechanism used to treat the exceptional items does not directly bear on the present study. What is crucial here is that lexical stress in Turkish is overwhelmingly word final. As in French, it is non-contrastive and serves a demarcative function – identifying the right edge of the (phonological) word. Thus, with regard to the STM, French and Turkish fall into the same category, with predictable right-edge stress.

As mentioned previously, stress is acoustically a combination of pitch, duration and loudness, although the details of how these factors combine and to what extent they vary from one language to another. Based on impressionistic evaluation, it has been suggested that the primary correlate of prominence on the word level in Turkish is pitch (Lewis 1967, Konrot 1981, van der Hulst & van de Weijer 1991), although it may be that loudness is also important (Kornfilt 1997). Duration seems to play a smaller role, if any, as compared to a language such as English where duration is the primary cue for stress. Systematic acoustic measurements are needed, however, in order to assess in more detail the roles of the different physical components of stress in Turkish.

The third language considered here, Arabic has also been generally classified as a language with a predictable stress pattern, albeit a weight-sensitive one. Specifically, stress is assigned to a final super-heavy syllable (i.e., CVVC or CVCC). In cases where there is no final super-heavy syllable, the rightmost heavy syllable (i.e., CVC or CVV) receives primary stress (cf., among others, McCarthy 1979, Wright 1995). This pattern can be restated as marking a word-final consonant as being extrasyllabic, then assigning stress to the rightmost heavy syllable. In words with no heavy syllables, stress will be placed on the first or last syllable, depending on the particular dialect of Arabic.

It would have been desirable to test Arabic speakers from the same geographical region, however, this was not possible given the student population at the University of Delaware, although it should be noted that all the participants were educated in Modern Standard Arabic. The different backgrounds were not considered problematic in the

present study since the primary word stress pattern does not differ in cases in which there is at least one heavy syllable in a word – precisely the case in the stimuli used here (cf., among others, Holes (1984) for Gulf and Saudi Arabian Arabic; Cowell (1964) for Syrian Arabic; McLoughlin (1982) for Levantine Arabic). Al-Ani (1992), furthermore, reports that speakers from different regions (i.e., Sudan, Saudi Arabia, Morocco, Iraq) displayed comparable stress placement patterns when speaking in Standard Arabic, so it was not anticipated that the regional origin of the speakers in the present study would compromise this L1 groups' performance in the production experiment. Experiments containing structures created specifically to test dialect differences, in particular with regard to structures without heavy syllables, would be needed in order to determine whether there might exist more subtle patterns related to a speaker's L1 dialect.

3.4.2.3 No Stress

In Mandarin Chinese and Tokyo Japanese, we do not observe the combination of pitch, duration, and intensity referred to previously as the manifestation of (word) stress. Instead, pitch alone typically provides crucial word level contrasts.

For Mandarin Chinese, four different phonemic tones can be distinguished depending on the pitch contour of a syllable (Duanmu 2000). The same segments may be pronounced with (i) steady, (ii) rising, (iii) falling-rising, or (iv) falling pitch and have completely different meanings (e.g., *ba* (i) 'eight', *ba* (ii) 'to pull out', *ba* (iii) 'to grasp', *ba* (iv) 'to stop'). Loudness and duration do not play an important phonological role at the level of lexical contrast.

It should be noted that the majority of Chinese words are monosyllabic, while longer words result "from a grouping of monosyllables which are independent, usually meaningful morphemes" (Shen 1993:416). Thus, in a basically monosyllabic word inventory, there is no potentially demarcative function that stress can serve. Consequently, it has been a commonly accepted view that rather than exhibiting word level stress, the crucial distinction between syllables in Mandarin Chinese is more one of the presence vs. absence of tone (Van Heuen & Sluijter 1996).

Recently, Duanmu (2000) has argued for the existence of initial stress (based on left-headed feet) on the word level (for alternative views regarding the location of Mandarin stress, see Chao 1968, Chen 2000, Cheng 1973). His argumentation, however, is mainly based on toneless particles, compound or phrase facts, or on historical verse structures that do not directly pertain to the issue of identification of word stress. (See Dell 2004 for a review.) While it is certainly possible that Chinese makes use of metrical structure at some level of its phonological organization, it should be noted that the structures Duanmu focuses on involve domains larger than the word. Furthermore, we do not observe the combination of acoustic properties defined earlier in the definition of (word) stress. Finally, we also do not observe either a contrastive or a demarcative function of word stress. The majority of Chinese words are monosyllabic, while longer words result "from a grouping of monosyllables which are independent, usually meaningful morphemes" (Shen 1993:416). It is thus still unclear what the exact stress facts of Mandarin Chinese are. What is important for the current study is that the potential existence of metrical structure in Mandarin Chinese does not seem to show

stress effects (either demarcative or contrastive) on the word level that can be consistently separated from other factors.

Similarly, in Tokyo Japanese, a specific pitch pattern can distinguish word pairs. Unlike in Chinese, however, what is contrastive is not the pitch pattern itself, but rather its location in a lexical item – the so-called "accented" element. For example, the location of the HL contour distinguishes such items as *iken (HLL[9])* 'differing view' versus *iken (LHL)* 'opinion, and *hashi ga (HLL)* 'chopsticks' versus *hashi ga (LHL)* 'bridge' versus *hashi ga (LHH)* 'edge'). Only one HL contour is allowed in a prosodic word, and the word starts H (except for the first mora always being L unless carrying initial HL) until it reaches the HL accent; the fundamental frequency drops then to L (Beckman 1986, Ito & Mester 2003).

It should be noted that not every syllable has a lexically specified tone in Japanese, as in Chinese, and some words may not have a pitch accent at all. Generally, the pitch frequency remains H throughout if there is no lexically specified pitch-accent in the word at all (Ito & Mester 2003). As in the case of tone in Chinese, duration and intensity do not crucially contribute to the perceptual effects of the pitch accent in Japanese. It should be noted that not every syllable has a lexically specified tone in Japanese, as in Chinese, and some words may not have a pitch accent at all. Furthermore, pitch contours may span more than one syllable in Japanese (cf. Toda 2003). While Japanese is distinct from Chinese in its use of pitch, this is not to say that it is the same as

the languages typically regarded as stress languages. Japanese pitch accent does share the property of "contrast" with such languages as Spanish, Russian, and English, as opposed to languages such as Estonian, Polish, and Turkish, however, the manifestation of this property is fundamentally different (cf. Akamatsu 2000).

Thus, while there may be some level at which metrical structure is present in Japanese, as is claimed for Chinese by Duanmu, what is relevant for the present study is that duration and intensity do not crucially interact with pitch in Japanese, as in languages such as English. On these grounds, Japanese is classified in the present study as a language with pitch accent, as opposed to either stress or tone.

Finally, Seoul Korean differs from all of the abovementioned languages in that it does not make contrastive or demarcative use of any of the components of stress on the word level. McGory (2001) states that "[Seoul] Korean has neither stress nor pitch accent" (2685). Again, this is not to say that metrical structure is absent altogether in Korean, but that if it does exist, it is at a level that is not directly relevant to the present study, since it would be at a level beyond that of the word.

In fact, according to Jun (1996) and Ko (1999), when prominence is observed on Korean words does not arise from word-level stress but rather is a by-product of tonal patterns associated with higher-level prosody, the Accentual Phrase (AP). There may be changes in intensity and pitch within prominent (focused) words; however, they are not

[9] The pitch patterns for each expression can be found in parentheses, where H indicates a high tone and L a low tone.

associated with a particular syllable, unlike in English (McGory 1997). The prosodically strongest syllable of a word changes depending on its position within the AP, since a nonword *mamama* is stressed on the second syllable (*ma**ma**ma*) if it is the only word in an AP, however on the first syllable if it is preceded by a monosyllabic word in the AP (*ce **ma**m*ama) (Jun 1995). Accordingly, pitch or tonal contours in standard speech "are related to the intonation contours of utterances, and not to lexical items" (Sohn 1999:197).

Given such properties of Korean prosody, and the ways in which they crucially differ from those of the previously described languages, in the present study Seoul Korean is classified as a non-stress language as well as a language lacking pitch-accent or tone on the word level.

3.4.2.4 Summary

Since the seven languages described above differ typologically regarding if and how they use stress or one of its components as defined earlier in this dissertation, they offer a good way of investigating the influence of the (type of) native language on the acquisition of a second language, in this case English. As discussed in detail below, the behavior of speakers of each of these L1s was compared with the behavior of native English speakers which served as a baseline for the comparison and analysis of the non-native groups in perception as well as production. Table 3 summarizes the languages selected for the present study and provides the parameter settings they incur in the STM as well as their L1 primary stress patterns.

Table 3: Participating L1s and their stress properties

Language	**Settings in STM**	**Stress pattern**
French	Stress language predictable quantity-insensitive right edge	Final syllable of word
Turkish	Stress language predictable Quantity-insensitive right edge	Final syllable of word
Arabic	Stress language predictable Quantity-sensitive right edge	Superheavy final syllable, otherwise rightmost heavy syllable
Spanish	Stress language Non-predictable	---
Mandarin Chinese	Non-stress Pitch tone	---
Tokyo Japanese	Non-stress Pitch Pitch-accent	---
Seoul Korean	Non-stress No pitch	---

3.5 Hypotheses

The main goal of the experiments in this dissertation is to investigate the possible effects of L1 on the treatment of L2 stress by speakers of different L1 groups in both perception and production. Constituting the null hypothesis, all language groups in the experiments will perform alike, that is, like the native speakers of English. Such a scenario would indicate that all of the typologically different L2 groups have successfully

acquired the necessary knowledge regarding English stress in perception and production, and thus there is no effect of (the type of) L1 on L2 in the area of stress.

In case the null hypothesis is not confirmed, we might either find a) individual variation that does not exhibit patterns related to the speakers' L1, or b) groupings of behaviors that correspond to the speakers' L1. If the former is found, we would again interpret the results as showing that the speakers' L1 does not have a specific effect on L2 stress; the only effect would be that of producing results that are non-native but not according to any predictable pattern. If, on the other hand, we find differences in behavior that correlate with different L1s, we may proceed to examine the nature of the effect of the L1 on the stress behavior in L2.

In case there is an effect of (the type of) L1 on L2 stress, a number of possibilities regarding the performance of different language groups may arise.

Regarding the perception of L2 stress, the following hypotheses in (1) can be posited.

(1) Hypotheses for Perception

a) In accordance with the SDM and the STM, speakers of predictable stress languages will have more problems perceiving the location of stress than other language groups. Both models predict a lower success rate for speakers of languages with regular stress assignment in identifying the location of stress. Furthermore, there should be a difference within the members of this type of languages, which is where the two models make different predictions.

b) Following the SDM, there is a hierarchy of stress 'deafness' involving gradient decreasing success with increasing surface-observable regularity of a language. In the present study, French is the most regular stress language in this hierarchy; therefore, French speakers would be expected to perform the worst among the predictable stress languages in this study in perception as well. Turkish and Arabic are not explicitly mentioned in the discussion of the hierarchy; however, their stress patterns are more complex according to the criteria spelled out in the SDM and therefore they should perform worse than French speakers.

By contrast, according to the STM, French and Turkish are located on the same tier of the stress hierarchy and thus share the same stress parameter settings: they are both predictable stress languages with quantity-insensitive stress on the right edge. Arabic, on the other hand, has quantity-sensitive stress on the right edge, meaning that there is one more additional parameter setting involved compared to the other two languages with predictable stress. Thus, Arabic speakers could be expected to perform worse than French or Turkish speakers.

c) As predicted by both the SDM and the STM, speakers of languages with non-predictable stress should have no problem perceiving stress. This is the underlying assumption of the SDM, although not explicitly stated, while the STM classifies all stress languages with non-predictable stress as sharing the same parameter settings. Both models thus would not predict any problems for Spanish speakers, who should perform like the English native speakers.

d) Only the STM makes predictions regarding the performance of speakers of non-stress languages. These languages do not involve any (positive) parameter setting for 'stress' that might interfere with their perception of stress; therefore, they should have no problem with stress, and essentially perform like the English native speakers.

Regarding the production of stress, there is the possibility of differential rates of success of speakers of different languages with L2 stress depending on the type of L1, as well as various individual strategies that could be involved in the performance of the participating language groups regardless of the type of L1, as explained in (2).

(2) Hypotheses for Production

a) Speakers might transfer an L1 strategy onto an L2 task, as described by Archibald (1993) and Anani (1989) for the production of English words by Hungarian or Arabic speakers, respectively. For the current study, this would mean that Turkish, Arabic, French, and also Spanish[10] speakers would be expected to place stress on the final syllable in accordance with stress assignment in their L1.

b) A more general, non-native but also non-target-like strategy might be applied, as found by Pater (1997) and Youssef and Mazurkewich (1998) for the production of English words by French and Arabic learners, respectively.

There is no clear prediction regarding what specific strategies might occur in the current study. Various possibilities exist, for example, the preference to place stress at the left edge, the right edge, stressing the penultimate syllable, and so forth. Following Hyman (1977), a more universal preference to place stress on the right edge may be expected, since this edge is the overwhelmingly preferred location for word stress across the world's languages.

c) Native English speakers pattern together as a group, although English word stress is classified as not predictable. Based on Pater (1997) and Archibald (1998), who found a consistent pattern for native speakers' stress placement for novel words, a similar strategy could be applied by the control group in the current study as well: Stress the rightmost non-final stressable vowel (most likely based on frequency facts in the language).

It will be the aim of the two experiments presented in the following two chapters to determine which model (if any) accounts best for the L2 performance for the perception and production of English stress. Furthermore, it should be noted that the SDM as well as the STM have only been tested for perception so far, thus it will be a crucial contribution of the current study to investigate not only the applicability of the two models to the production of stress, but also to understand better the relationship between

[10] Recall that Spanish ‚default' stress falls on the final syllable if this is open, which is the case with all stimulus items in this study.

perception and production of L2 stress.

3.6 Subjects

Advanced learners of English as a second language from the seven languages presented above were recruited for this study. In order to ensure a homogenous subject pool, participants were either (i) graduate students with a score of 50 or higher in the standardized SPEAK test, an equivalent to the Test of Spoken English administered by the English Language Institute (ELI) of the University of Delaware, or (ii) language students at the ELI that had been placed in the two highest class levels (out of six) for listening and speaking according to the Michigan Test, also administered by the ELI.

Advanced L2 subjects were chosen so as to get a better understanding of how successful learners are able to become for a given task. Choosing less advanced students may have yielded more L1 influence in general, however, it would not have been clear if they can overcome this influence and become sensitive to the L2 stress pattern. Furthermore, it was crucial that the subjects fully understood the instructions and were able to yield somewhat native-like segmental production for novel words in order to allow for structured analyses of stress location and vowel quality in L2.

The native English speakers were all undergraduate students in introductory linguistics courses at the University of Delaware. Participation in the experiments was completely voluntary.

Ten subjects per language group participated in and were analyzed for the study. Each L1 group was kept as homogenous as possible, which means that speakers of the Standard variety of a language were selected where possible. For most languages, this could be achieved: European French, Seoul Korean, Tokyo Japanese, Mandarin (Beijing) Chinese. For three languages (Turkish, Spanish and Arabic), however, it was not possible to find enough subjects from the same metropolitan area. With regard to Turkish and Spanish, no speakers of regional variants with divergent stress patterns were included in the subject pool. Thus, for Turkish, all speakers were either from Istanbul or Izmir, and for Spanish, all speakers were Central American. The Arabic group was the most diverse, with subjects coming from several different countries (Saudi Arabia, Palestine, Yemen, Lebanon, and Egypt). All of the subjects, however, had attended universities in their respective countries where only a standard variety of (Classical) Arabic was spoken, so it is assumed here that the various subjects reflected a homogeneous group with regard to primary stress placement in their language, and should not affect the outcome of the experiments.

3.7. Stimuli

A total of 125 target items for perception and 46 target items for production were created in accordance with the criteria specified in the following sections. Both experiments employed the same kinds of structures; however, the production experiment employed only a subset of those used for perception, which is explained in more detail in

Chapters 4 and 5. Although the structures are comparable for the production and perception tasks, all the individual stimulus items were distinct from each other.

3.7.1. Structures

The words employed in both experiments were all nonce words in accordance with English phonotactic and prosodic restrictions. English orthography was adhered to as well (see section 3.7.2. for more details). The items contained a structured combination of vowel types and stress positions in a word and they were constructed according to the criteria specified in (3).

(3) Criteria for stimulus construction:

a) Each word consisted of two, three, or four syllables.

b) Only open syllables were used (i.e., those not closed by a consonantal segment).

c) Light syllables contained an underlyingly light rhyme (i.e., schwa or lax vowel[11]): Cə or CV, where V indicates a lax vowel.

d) Heavy syllables contained an underlyingly branching rhyme (i.e., tense vowel or diphthong): C<u>V</u>, CVG, where <u>V</u> indicates a tense vowel, and CVG a diphthong.

[11] It should be noted that a lax vowel in a stressed open syllable tends to attract the onset of the following syllable, "making stressed syllables heavy that would otherwise be light" (Giegerich 1992). In the spelling used here, full lax vowels are followed by double consonants, while schwas are followed by only one consonant.

e) The words were consistent with English phonotactics and prosodic restrictions. Thus, there were no instances of i) stressed schwa, ii) final CV syllables with a full lax vowel, iii) words with two initial schwa syllables, or iii) more than two adjacent schwa syllables within a word. Furthermore, words with three or four syllables containing more than one diphthong were excluded because they tend to sound unnatural in English, especially as monomorphemic items.

e) The words were constructed to appear monomorphemic, that is, with no potential prefixes or suffixes.

f) The position of stress was systematically varied in the different types of words for the perception experiment.

It should be noted that there are often restrictions on consonantal contact in clusters or between syllables in different languages. It was thus decided to use only open syllables without consonant clusters to avoid potential differences in this area among the native languages of the L2 subjects that participated in the experiments. Since syllable weight is one of the parameter settings addressed in the present experiments, the heavy syllables contained either a tense vowel or a diphthong. Indeed, these are the structures that are consistently considered to be bimoraic or heavy across languages with syllable weight distinctions, while coda consonants tend to vary more as to whether they are considered moraic or weight-bearing. The light syllable, by contrast, contained either a lax vowel or a schwa.

As mentioned, the location of stress was varied systematically for the perception experiment. In two-syllable words, there are only two possible stress locations, the first

or second syllable. Adding additional syllables also yields additional stress possibilities, with the longest words in this study offering four potentially stressable locations. A limit of four syllables was placed on word length since it is very difficult to find monomorphemic words in English containing more than four syllables. Furthermore, it was felt that the production task would be rendered excessively difficult if the stimuli were extremely long. It should also be noted that the number of possible combinations of syllable type and stress location for inclusion in the perception task would have risen dramatically with longer words. For example, only considering five syllable words with two tense vowels, these vowels could be in (a) the first and second syllables, (b) the second and third syllables, (c) the third and fourth syllables, (d) the fourth and the fifth syllables, (e) the first and the third syllables, (f)the first and the fourth syllables, and so forth. Since diphthongs and lax vowels were also part of the experimental items, the number of possible stimulus items would quickly become unmanageable with longer words.

Tables 3 to 5 provide exhaustive lists of the stimulus types used in this study. Bold print indicates syllables carrying primary stress; hyphens signal syllable boundaries. The vowel types are: V=tense vowel, V=lax vowel, VG=diphthong. Empty cells are due to the restrictions that: (a) no more than one unstressed syllable may occur at the beginning of a word, and (b) no stressed full lax vowel may occur word finally. Furthermore, for items with three or four syllables, words containing more than one diphthong were excluded for reasons mentioned above. Additionally, in an attempt to make the four-syllable words with final stress sound more natural, it was decided to only

consider structures with at most two schwa syllables for eurhythmic reasons. (See Appendix A for a full list of the stimulus structures and items used in the perception study.)

Table 5: Templates for types of two-syllable words

Stress on 1st syllable	Stress on 2nd syllable
CV-Cə	
CV-C<u>V</u>	CV-**C<u>V</u>**
CV-CVG	CV-**CVG**
C<u>V</u>-Cə	Cə-**C<u>V</u>**
C<u>V</u>-C<u>V</u>	C<u>V</u>-**C<u>V</u>**
C<u>V</u>-CVG	CVG-**C<u>V</u>**
CVG-Cə	Cə-**CVG**
CVG-C<u>V</u>	C<u>V</u>- **CVG**
CVG-CVG	CVG-**CVG**

Table 6: Templates for types of three-syllable words

Stress on 1st syllable	Stress on 2nd syllable	Stress on 3rd syllable
CV-Cə-Cə	Cə-**CV**-Cə	
C<u>V</u>-Cə-Cə	Cə-**C<u>V</u>**-Cə	
CVG-Cə-Cə	Cə-**CVG**-Cə	
CV-Cə-C<u>V</u>	Cə-**CV**-C<u>V</u>	CV-Cə-**C<u>V</u>**
C<u>V</u>-Cə-C<u>V</u>	Cə-**C<u>V</u>**-C<u>V</u>	C<u>V</u>-Cə-**C<u>V</u>**
CVG-Cə-C<u>V</u>	Cə-**CVG**-C<u>V</u>	CVG-Cə-**C<u>V</u>**
CV-Cə-CVG	Cə-**CV**-CVG	CV-Cə-**CVG**
C<u>V</u>-Cə-CVG	Cə-**C<u>V</u>**-CVG	C<u>V</u>-Cə-**CVG**
CV-C<u>V</u>-Cə	C<u>V</u>-**CV**-Cə	
C<u>V</u>-C<u>V</u>-Cə	C<u>V</u>-**C<u>V</u>**-Cə	
CVG-C<u>V</u>-Cə	C<u>V</u>-**CVG**-Cə	
CV-CVG-Cə	CVG-**CV**-Cə	
C<u>V</u>-CVG-Cə	CVG-**C<u>V</u>**-Cə	

Table 7: Templates for types of four-syllable words

Stress on 1st syllable	Stress on 2nd syllable	Stress on 3rd syllable	Stress on 4th syllable
CV-C**V**-Cə-C**V**	C**V**-**C**V-Cə-C**V**	C**V**-Cə-**C**V-C**V**	
CV**V**-C**V**-Cə-C**V**	C**V**-**C**V**V**-Cə-C**V**	C**V**-Cə-**C**V**V**-C**V**	
CV**V**-CVG-Cə-C**V**	C**V**-**CVG**-Cə-C**V**	C**V**-Cə-**CVG**-C**V**	
CV-C**V**-Cə-CVG	C**V**-**C**V-Cə-CVG	C**V**-Cə-**C**V-CVG	
CV**V**-C**V**-Cə-CVG	C**V**-**C**V**V**-Cə-CVG	C**V**-Cə-**C**V**V**-CVG	
CV-CVG-Cə-C**V**	CVG-**C**V-Cə-C**V**	CVG-Cə-**C**V-C**V**	
CVG-C**V**-Cə-C**V**	CVG-**C**V**V**-Cə-C**V**	CVG-Cə-**C**V**V**-C**V**	
	Cə-**C**V-Cə-C**V**	C**V**-Cə-**C**V-Cə	
	Cə-**C**V**V**-Cə-C**V**	C**V**-Cə-**C**V**V**-Cə	Cə-C**V**-Cə-**C**V**V**
	Cə-**CVG**-Cə-C**V**	C**V**-Cə-**CVG**-Cə	Cə-CVG-Cə-**C**V**V**
	Cə-**C**V-Cə-CVG	CVG-Cə-**C**V-Cə	
	Cə-**C**V**V**-Cə-CVG	CVG-Cə-**C**V**V**-Cə	Cə-C**V**-Cə-**CVG**
			CVG-Cə- Cə-**C**V**V**
			C**V**-Cə-Cə-**C**V**V**
			C**V**-Cə-Cə-**CVG**

It should be noted that the number of items in the experiments had to be limited, not only to avoid potential fatigue on the side of participants, but also to ensure that there were groups containing a comparable number of items for each stressed position across words of different lengths. Therefore, a total of 125 stimulus items was constructed for use in the perception experiment, determined as demonstrated in (4):

(4) Stimulus Items for Perception

(a) 2-syllable words: *17 types x 2 = 34 tokens*

Two tokens for each type. As shown in Table 3 above, 17 types of words are maximally possible, and two examples for each type were created.

(b) 3-syllable words: *13 types x 1 + 13 types x 1 + 5 types x 3 = 41 tokens*

One token each for the 13 different types with stress on the first or second syllable, 3 tokens for the five types with final stress. As illustrated in Table 4, there is not an equal number of possible type combinations for each stress location; therefore, different numbers of tokens were used to render groups of comparable size for each stressed syllable.

(c) 4-syllable words: *7 types x 2 + 6 types x 2 + 12 types x 2+ 12 types x 1 = 50 tokens*

Two tokens each for the 7 types with initial stress and 6 types with final stress that were considered in Table 5; one token for each of the 12 types with stress on the second or third syllable.

In the production experiment, only a subset of the structures used for the perception experiment was used. The main difference is that only CV syllables with schwa or a tense vowel in the intended pronunciation were employed. To keep the number of items limited and manageable, lax vowels and diphthongs were not considered in the creation of items for production. The same restrictions and variations as for the perception experiment applied as well; however, the words used here were different

tokens of comparable structures. Again, the length of words varied among two, three, and four syllables. Table 5 illustrates the structure types that were considered in the creation of stimuli in the production experiment.

Table 6: Types of items used in production experiment

2-syllable words	**3-syllable words**	**4-syllable words**
Cə-CV	Cə-CV-Cə	Cə-CV-Cə-CV
CV-Cə	CV-Cə-CV	CV-Cə-CV-Cə
CV-CV	CV-CV-Cə	CV-Cə-CV-CV
	CV-Cə-Cə	CV-Cə-Cə-CV
		CV-CV-Cə-CV

The total number of stimulus items included in the production experiment was forty-six nonce words determined as presented in (5).

(5) Stimulus Items for Production

(a) 2-syllable words: *3 types x 5 = 15 tokens*

Three different types of words were used with five tokens for each type. Since there are only three possible combinations of the two vowel types, a higher number of tokens per structure was selected in order to achieve an adequate number of instances of participants' productions of such word types.

(b) 3-syllable words: *4 types x 4 = 16 tokens*

Four different types occur in English, therefore they were selected with four tokens per structure to balance the number of tokens for words of different length.

(c) 4-syllable words: *5 types x 3 = 15 tokens*

Words with two or three tense vowels were chosen. Since a minimum of three tokens per structure was desirable for analysis purposes, five types were selected and three tokens were created for each type.

3.7.2. Spelling

As is well known, English spelling is often not isomorphic to pronunciation, that is, certain (combinations of) letters are not necessarily linked to a specific pronunciation. This is most striking in the case of vowels. For example, the mid back rounded tense vowel [o] can be represented by the letters *oe* as in *toe*, *ow* as in *bow*, *o* as in *no*, or *oa* as in *goal*. On the other hand, a certain spelling can also have several pronunciations, for example *ow* can be pronounced as [o] in *low*, or as the diphthong [aw] in *how*.

In the current study, as in all studies involving the mapping of spelling onto pronunciation in English, it is a major challenge to devise spellings that will yield a consistent interpretation across speakers. For the perception experiment, the spelling was not a problem, since the subjects' focus was on locating the stressed syllable rather than on the spelling of the stimulus items. By contrast, in the production experiment, the goal

was to have the participants' pronunciation of unknown words consistently correspond to the intended structures with specific kinds of vowels and syllable types. Thus a constant spelling was chosen for the display of the stimulus items in the perception as well as the production experiment, except in cases where such a spelling would have yielded an existing word. In these cases, an alternative was used if possible to avoid the introduction of a recognizable word. For example, the tense high front vowel [i] consistently appeared in orthography as *ee* (e.g., *koy-va-lee*, *kee-dey-sa*), or, exceptionally, as *ea* to avoid including existing words within the stimulus items, (e.g., *bea-del-la-zay*, to avoid "bee" in the first syllable). If the same vowel occurred more than once within one item, distinct spellings were used to make it look less repetitive and more native-like (e.g., *mea-soo-fa-nee*).

In some cases, a vowel was excluded from appearing in the study if there was no possible consistent unambiguous spelling available. Such an example is the lax vowel [æ], which is usually spelled as the letter *a*, but this letter also has multiple other possible pronunciations such as [a] in *father*, [e] in *plane*, or [ɔ] in *bald*.

In certain cases, less conventional orthography had to be selected in order to achieve consistent spelling of certain vowel types and avoid having existing words appear in the stimulus items. An example is the case of the diphthong [æw]. Since there are only three diphthongs in English (i.e., [æw], [ow], [ɔj]), it was highly desirable to have all three of them available for inclusion within words of the same structure type; exclusion of this sound was thus not an option. The pronunciation of [æw], however, does not correspond to one consistent spelling. For example, it can be spelled *ou* as in

noun, or *ow* as in *town*. The choice was thus made to introduce the unambiguous spelling of *auw* for the pronunciation of [æw] (e.g., *loi-gauw*, *ca-vos-sauw*).

Finally, it was necessary to distinguish open syllables with a full lax vowel from syllables with a schwa. The latter were simply represented by a single vowel followed by a single onset consonant in the subsequent syllable, or nothing if word final (e.g., the first and last syllables of *me-noy-sa*). The former, however, were a bit more challenging to represent. It was decided to use double consonants in spelling, that is, one consonant in the coda after the lax vowel and the other one as the onset of the following syllable (e.g., *buf-foy*, *soi-det-ta*) since it was felt that this would signal a full syllable, but not a coda consonant, since geminate consonants do not exist in English.[12]

In both the perception and production studies, furthermore, the words appeared in writing not as one whole word without spaces, but rather they were divided into the syllables they contained. That is, each item was broken up into syllables, to enable subjects to parse the word and according to their intended structures. For perception, this allowed the participants to more easily recognize the possible options for the location of stress. This was considered to be especially important for the Japanese speakers, since they appear to be more sensitive to morae than to syllable structure. With regard to production, the syllable divisions were intended to facilitate the reading of nonce words, especially of the longer items.

[12] While such consonants may be "ambisyllabic" in some analyses, they do not appear to yield (heavy) CVC syllables as in the first syllable of a word such as *candy*.

It should be noted that while a number of the spelling conventions adopted here may appear unusual, informal piloting of sample words to be used in the experiments revealed no problems with the way the words were spelled.

3.8. Summary

Two experiments concerning the perception and production of L2 English stress have been designed to overcome shortcomings of earlier investigations. First, a variety of typologically different languages are being examined, using the same kinds of stimulus items for both the perception and production experiments. Second, and the same subjects are participants in both experiments, which will allow for a reliable comparison of L2 learners' performance for both aspects of L2 acquisition. Furthermore, typological effects on the relative success of L2 acquisition can be analyzed, which enables us to choose between two different typological stress models, SDM and STM, and investigate if their respective predictions find support in the results of the experiments to be presented in the following chapters.

Chapter 4

L2 LEARNERS' PERCEPTION OF ENGLISH STRESS (EXPERIMENT 1)

This is the first of two experiments investigating the perception and production of English primary word stress by second language learners. This chapter investigates whether L2 learners of English are able to locate the position of stress when they hear English nonce words. The perception experiment presented here analyzed differences among speakers of various L1s with regard to the perception of stress. In order to avoid having learners access a stress pattern they might have memorized (either correctly or incorrectly) for an already existing word or an affix, monomorphemic nonce items (i.e., words without apparent affixes) were used in this study. Native speakers of languages belonging to different language families and, crucially for the present study, belonging to distinct groups with regard to their stress properties were tested in order to evaluate the stress models discussed above in Chapter 3.

The same subjects participated in the perception and the production experiments, in this order. The perception experiment was administered first in order to allow participants to become familiar with the way items were presented in the study (in particular, with regard to the way they were split up into syllables and the spelling convention adopted here). In this way, the subjects had the opportunity to listen to

examples of the pronunciation associated with the orthography used in the present experiments. In addition, it provided subjects with the opportunity to listen to the same type of items with stress in different locations, making it easier for them to produce such items when asked to pronounce words in the subsequent experiment. Indeed, as a result, no participant indicated problems reading analogous words in the production part of the study.

4.1. Procedure

The participants were tested individually in a sound-attenuated room. They heard 125 pre-recorded words over headphones and saw them in spelling at the same time on a Macintosh computer screen. Each word was presented in spelling in the center row on the monitor, broken into syllables horizontally in order to help subjects recognize the individual syllables more easily (see (6)). Only one word was on the screen at any given time.

(6)

koo ree

fin nay ba soo

The participants were instructed to listen to each word – presented twice in succession by the Psyscope software – and then mark (by clicking with the mouse directly on the syllable) which syllable they felt had the most stress or prominence. The order of presentation of the items was randomized for each subject. No response was

possible before the end of the second presentation of each word in order to force participants to listen to two full instances of each word and to avoid rushed or accidental responses. The maximum response time for each stimulus item was six seconds. If a participant failed to click on a syllable within this time frame, no response was recorded for this item and the next word was presented. No response, however, occurred very rarely (a total of 22 times). Figure 3 illustrates the experimental procedure.

500 ms → WORD 1 → 1000 m → WORD 1 →
RESPONSE (or 6000 ms timeout) →
500 ms → WORD 2 → 1000 ms → WORD 2 →
RESPONSE (or 6000 ms timeout) etc.

Figure 3: Procedure for perception experiment

Prior to the actual experiments, all subjects received instructions and practice items. Specifically, they read a brief text explaining the procedure and task at hand[13], and then proceeded to a practice section. This included (a) minimal stress pairs (e.g., ***sus****pect* – *sus****pect***) presented on the screen and over headphones, and (b) nonce words with feedback and without feedback as to the location of stress. First, the practice words appeared on the screen and were played to the participants, who were asked to click on the most prominent syllable in their opinion. After this response, a short note appeared

[13] The full transcript of the instructions and practice items is provided in Appendix B.

on the screen, telling the participants, regardless of how they responded, which would have been the correct answer. Then, the same word was presented again to allow subjects to listen again with the knowledge of where the stress was located. This was done in order to help clarify the task in case subjects were still not sure what was meant with 'prominence' or 'stress' in the instructional text. Finally, five nonce words were presented without feedback as practice for the actual experimental procedure. The number of syllables varied from two to four, and the order of these five words was randomized for each subject. None of the practice words occurred in the actual experiment. The subjects' responses were recorded automatically by the software and later transferred into Excel worksheets for further analysis.

4.2. Stimuli

In accordance with the conditions on the creation of stimulus items, a total of 125 nonce words of two, three, or four syllables in length were presented to each participant. (For a detailed description of the conditions on the creation of items, as well as an exhaustive list of word structures used in this experiment, see section 3.7) All of the items had been pronounced by a phonetically trained native speaker of American English and pre-recorded. By way of illustration, Table 6 shows how words with two syllables and primary stress on the first syllable were displayed on the computer screen - the first column. The remaining columns, which were not presented to subjects, show the syllable

structure (word type) and their pronunciation in broad IPA transcription (bold print indicates syllables carrying primary stress; V are tense vowels, V lax vowels).

Table 9: Two-syllable items with initial stress used in perception experiment

Display		Word Type	Pronunciation
mel	la	(**CV**-Cə)	[**mɛ.**lə]
fis	soe	(**CV**-CV)	[**fɪ.**so]
mas	sye	(**CV**-CVG)	[**mæ.**saj]
dea	ma	(**CV**-Cə)	[**di**.mə]
too	ree	(**CV**-CV)	[**tu**.ri]
chee	noy	(**CV**-CVG)	[**či.**nɔj]
ny	da	(**CVG-C**ə)	[**naj.**də]
moy	roo	(**CVG**-CV)	[**mɔj.**ru]
loi	gauw	(**CVG**-CVG)	[**lɔj.**gæw]

4.3. Scoring

For each word, it was first determined if a participant responded correctly or incorrectly, that is, whether stress was indicated on the syllable that was pronounced with stress by the speaker who created the stimuli or on some other syllable. Incorrect responses were further analyzed as to where subjects indicated the location of main

stress. Within each L1 group, subjects' responses were initially labelled by subject and by item, and later analyzed by language group.

4.4. Results

Overall, 94 percent of the English speakers' responses across the 125 items were correct. Looking at the L2 subjects' responses across all items, we can see a clear trend towards an English-like performance by speakers of Japanese, Korean, Chinese, and Spanish (i.e., L1s with no stress or with unpredictable stress), who all performed close to ceiling. Native speakers of Arabic, Turkish, and French (i.e., L1s with predictable stress), however, showed poorer results. Figure 4 illustrates the distribution of mean correct responses by native language (with standard error indicated).[14]

The responses (originally coded as percent correct, or proportion correct) were converted into d-prime values following Signal Detection Theory (Green and Swets 1974, MacMillan and Creelman 1991). Using d-prime values rather than percentages correct for the varying number of response choices across words of different length. For words with two syllables, there are two possible choices and chance performance would mean correct location of stress for 50 percent of the items. For words with three syllables, chance performance would mean around 33 percent, and for words with four syllables 25 per cent. Thus, having a proportion of .50 correct is a much higher feat when there are four choices (as in the four-syllable words), out of which three are incorrect,

[14] An exhaustive list of all subjects' responses in the perception experiment can be found in Appendix E.

than when there are only two choices (as in the two-syllable words), where only one is incorrect. For example, if the first syllable is stressed in the stimulus, listeners have only one incorrect option (i.e., the second syllable) in two-syllable words, but two incorrect options in three-syllable words, and even three incorrect options in four-syllable words. Converting the data into d-prime values for m-interval forced choice (using Table A5.2. in McMillan&Creelman 1991:319-322) provides the means to objectively compare the performance across different word types. They should be interpreted in a way that a d-prime value of 0 indicates chance behavior, while a value of around 3 demeans very good performance.

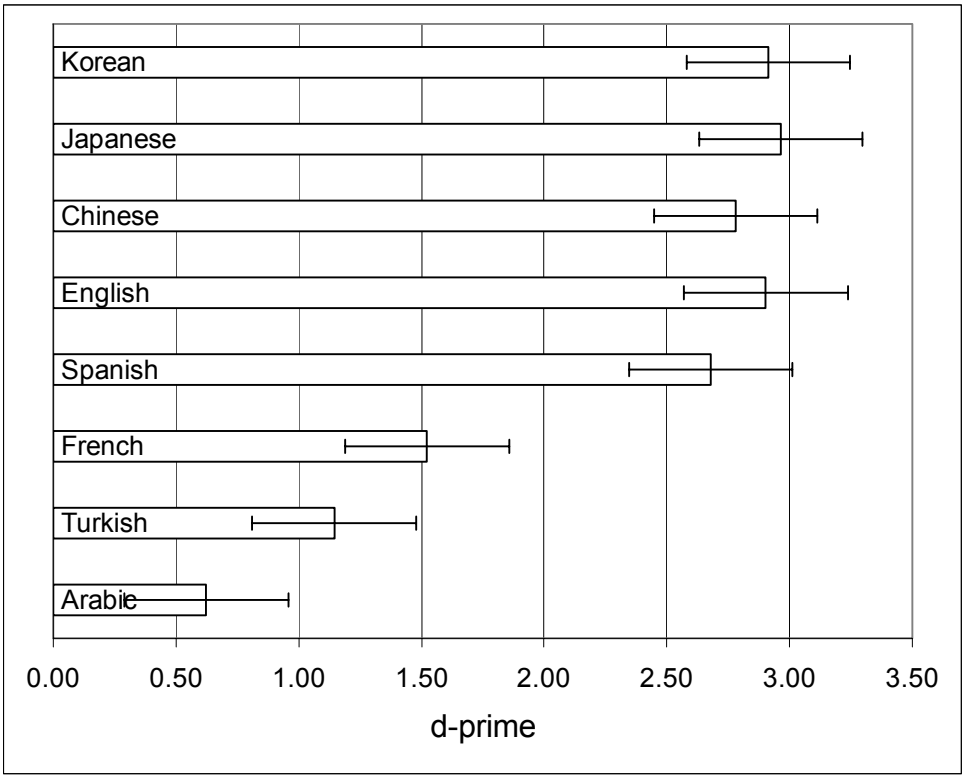

Figure 4: Perception: overall performance by language

The division between the eight participating language groups, as illustrated in Figure 4, is consistent with the predictions made by the STM. That is, as expected, there was a clear distinction between the languages with predictable stress on the one hand and those with either unpredictable or no stress, on the other hand. Specifically, the speakers of languages with predictable stress performed relatively poorly compared to the other subjects. The speakers of Spanish, the language most like English in having phonologically unpredictable stress, performed similarly to the speakers of English. In addition, the speakers of languages without lexical stress also performed extremely well.

In order to find out if the differential overall performance that could be observed descriptively in the data by language group finds statistical support, a one-way ANOVA was run using the JMP5 statistical package. Selecting language as the independent variable and d-prime as the dependent variable, it was confirmed that there is a significant difference ($F(7, 79)=28.17$, $p < .0001$) regarding the performance of the different languages in this experiment.[15]

The Tukey-Kramer HSD post-hoc test reveals that this significant difference in the overall performance between language groups is due to the significantly poorer correctness scores of Arabic, Turkish, and French compared to all other languages ($p<.01$). This means that there is a significant division between (a) predictable stress languages, on the one hand, and (b) languages with non-predictable stress or no stress at all, on the other hand.

In addition, a cluster analysis of the languages' overall performance confirms that all three of the predictable stress languages were significantly different from the other five languages in the current study. Figure 5 illustrates the statistical grouping of the participating languages. No significant difference was found between the Turkish, French, and Arabic scores, however, a gradation regarding the success of identifying stress can be observed when looking at the mean d-prime values in Figure 5, with Arabic speakers being the least successful (mean d' around 0.6), French being the best (mean d' around 1.6), and Turkish speakers ranging in between these two language groups (mean d' around 1.1).

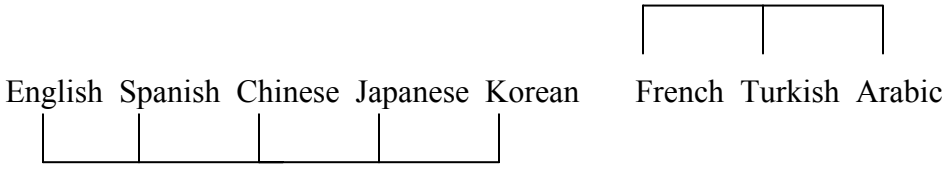

Figure 5: Clustering of languages for overall performance

More detailed analyses in terms of the number of syllables and the location of stress within the stimuli provide further insight into the behavior of the speakers of different languages.

[15] These and all following statistical analyses are presented as tables in Appendix C. I would like to thank Ratna Nandakumar and Willi Nagl, as well as William Idsardi for their input regarding the statistical analysis

4.4.1. Analysis by number of syllables

A more fine-grained analysis of the items by number of syllables provides further information regarding the effect of L1 on English stress perception, as seen in Figure 6.A. For two-syllable words, speakers of non-stress or non-predictable stress languages performed close to ceiling, while L2 learners with predictable stress in their native language showed much less correctness in their responses. A similar picture arises for words with three and four syllables.

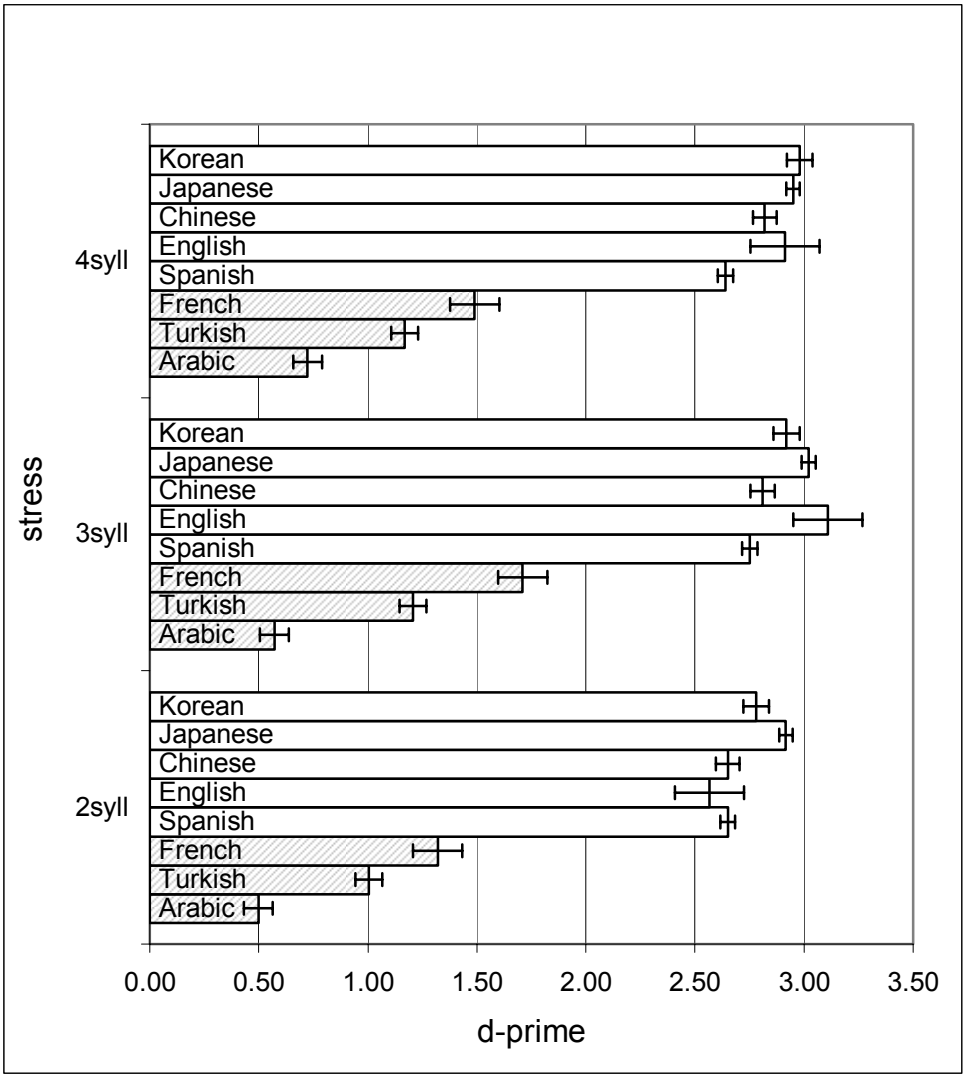

Figure 6A: Perception: performance by word length and language

In order to investigate if the trend for poorer performance of L1s with predictable stress that could be observed for each word length could be sustained statistically, first a Manova was run to test for sphericity of the data. Since the sphericity test was close to significance (Prob<Chisq 0.068), no univariate analysis was possible. It was decided to

run a mixed effects model analysis of repeated measures, with language and word length (number of syllables) as fixed effects and subject as random effect. This analysis indicated a significant effect both for language ($F(7,7)=23.03$), $p< .0001$) and for word length ($F(2,2)=8.88$), $p= .0002$), however not for the interaction between these two factors ($F(14, 14)=.839$, $p= .627$).

First of all, the Tukey HSD revealed that he clustering of languages that was found for the overall results reported above also turned out to be significant across word types: Arabic, Turkish, and French listeners performed significantly ($p <.05$) worse across all words of all lengths than listeners from the other L1s. Second, the factor word length was significant across languages as well, with two-syllable words yielding lower success rates ($p< .05$) than three- or four-syllable words. What this effect may be due to, however, remains open for interpretation. On the one hand, it should be noted that the Least Square Means were not far apart (two syllables: 2.05, three syllables: 2.26, four syllables: 2.21), so that in a study that provides higher statistical power this significance might disappear. Intuitively, on the other hand, it may be feasible that it is easier to locate relative prominence if it is embedded in a longer rhythmic string rather than in a shorter one. Finally, an interaction between language and word length did not reach significance. For convenience, Figure 6B summarizes the perception performance for words of different length by language.

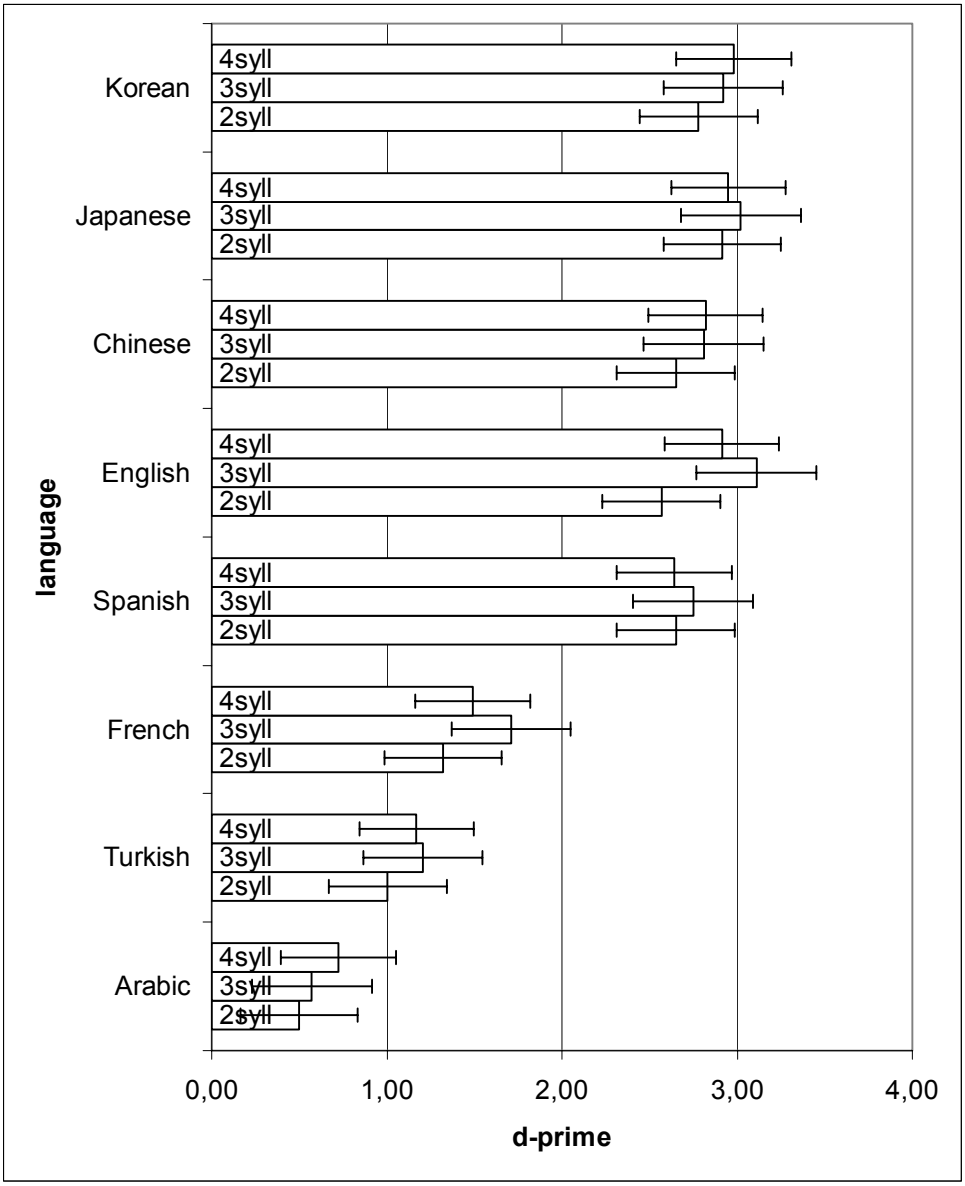

Figure 6B: Perception: performance by language and word length

The statistical analyses indicate, therefore, that the poorer performance of the predictable stress languages and the better performance of the other languages overall was not due to a specific problem with words of a certain length but rather spanned

across all items, regardless of the number of syllables. Thus, the nature of the native language (i.e., having predictable stress in the L1 or not) was the most crucial aspect in determining the perception of stress.

Based on the results of the statistical analyses for the perception of L2 stress, it is obvious that there is a two-way distinction across the participating L1s: predictable-stress languages versus others. It should be noted here that this clear two-way split, however, cannot be maintained for the production of L2 stress, as will be presented in detail in Chapter 5.

4.4.2. Analysis by location of stress

Turning now to the internal structure of the stimuli, we must determine whether there were differences based on the location of stress within a word. The graphs in Figure 7A and 7B illustrate the results for two-syllable words with final versus penultimate primary stress. Here and in the following discussion, percentage correct of responses will be presented (Figure 7A) in addition to the d-prime values (Figure 7B), since positions within words of the same length will be the focus of analysis and thus the probabilities for each position within the word are the same and can be compared without further provisions. The percentages are more descriptively transparent and allow us to see at first glance how close to ceiling certain language groups actually performed. The reader must be warned, however, that the percentage scores should not be used for cross-references between the performance for words of different lengths. For that purpose, d-primes are reported here as well. Three separate repeated measures tests were run on the

d-prime scores to statistically evaluate the results for the different stress positions within two-, three-, and four-syllable words, respectively.

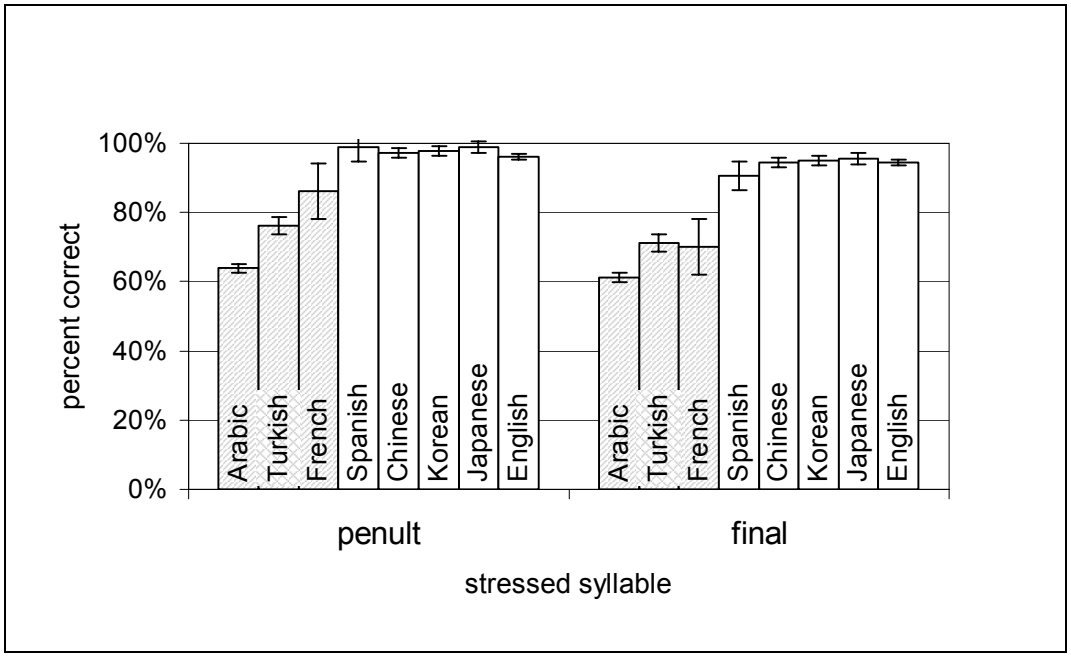

Figure 7A: Perception: performance for two-syllable words (percent correct)

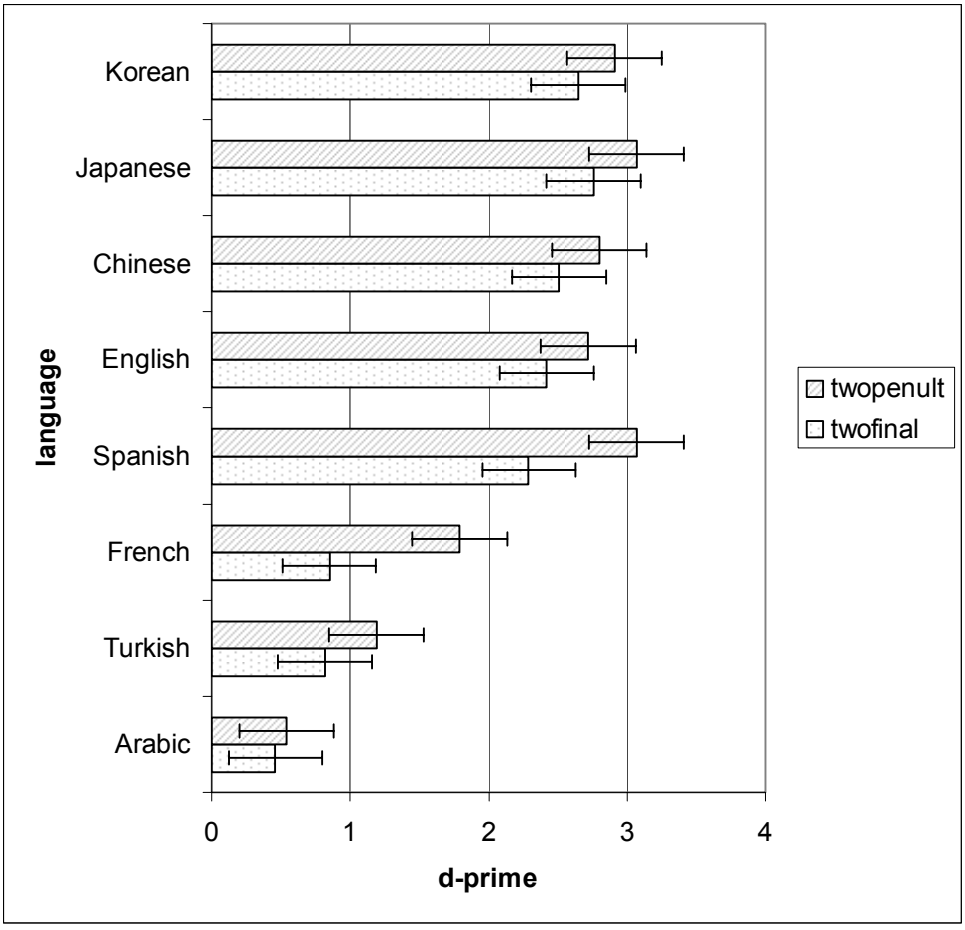

Figure 7B: Perception: performance for two-syllable words (d-prime)

There was a significant effect of language ($F(7, 7)= 14.773$, $p< .0001$) and of position ($F(1, 1)= 7.281$, $p= 0008$), however, no significance for the interaction of the two factors ($F(7, 7)= 3.162$, $p=.6440$). Again, for both positions within the word, the three predictable stress languages (Arabic, Turkish, French) performed significantly worse ($p< .05$) than the other five, which have correctness scores of over 90 percent for each

position. Furthermore, final stress was significantly more difficult to locate than penult (in this case, initial) stress for all language groups ($p < .05$).

Examination of the three-syllable words confirms this picture, as can be seen in Figures 8A and 8B. As before, the speakers of the three predictable stress languages can be observed to have lower scores than the speakers of the other five languages for these types of words as well.

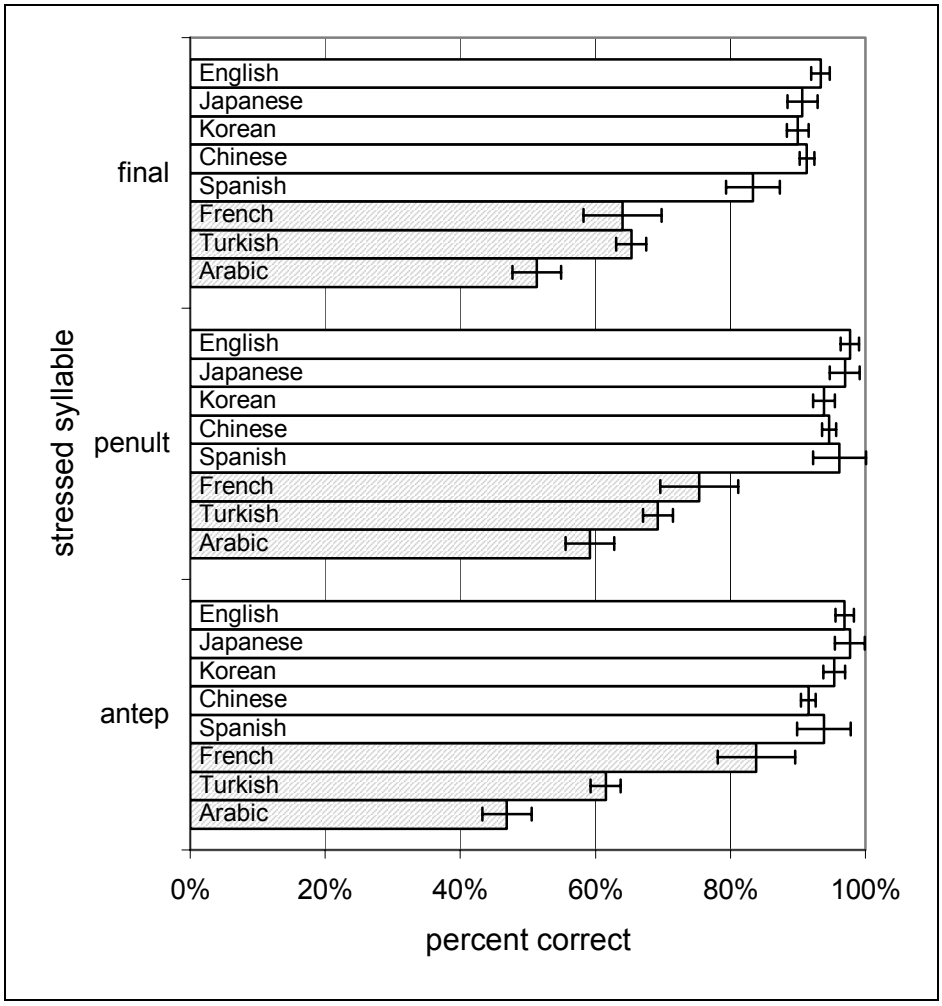

Figure 8A: Perception: performance for three-syllable words (percent correct)

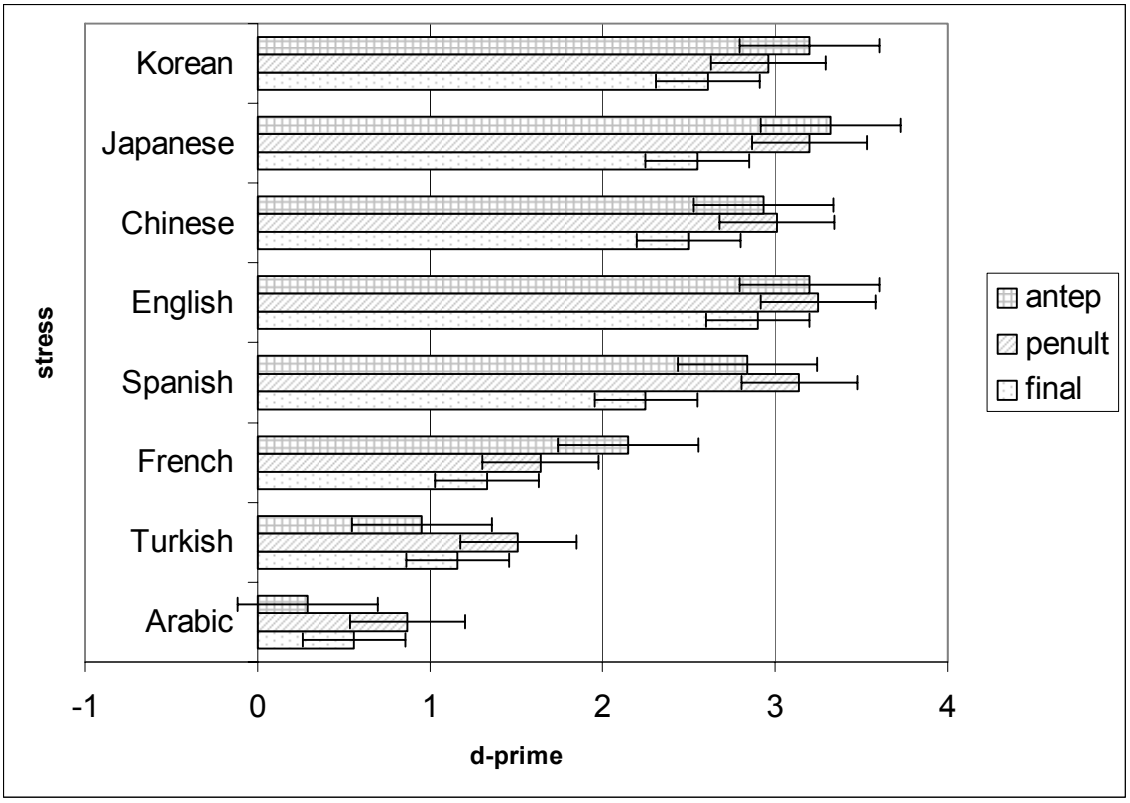

Figure 8B: Perception: performance for three-syllable words (d-prime)

Statistical analysis revealed, again, a significant effect for language ($F(7,7)= 9.158$, $p< .0001$) and stress position ($F(1,1)= 6.240$, $p=.0023$). For language, however, we do not find the two-way distinction of predictable stress language and others; rather, a cluster of four groupings emerged that were interconnected. Although the French, Arabic, and Turkish form one group and Chinese, Japanese, Korean, Spanish, and English another group, there are two subclusters that connect these two main groups (see Appendix C 3.2.2.1.2 for the exact clusters). Thus, language does not provide a basis for argumentation for different stress positions in three-syllable words. Analysis of the effect

of position of stress within these words, however, revealed that there were significantly more problems locating stress on the final syllable than on the other two (penult and antepenult). It should be noted that among the languages with predictable stress, the French group showed higher correctness scores for initial (in this case, antepenultimate (= antep)) stress compared to stressed syllables further to the right. By contrast, especially Arabic and Turkish speakers, but to a lesser degree also the others, displayed their best performance for stress on the penultimate syllable. Of note, too, is that the Spanish speakers' correctness decreased by almost ten percent for stressed final syllables, possibly due to the relative infrequency of this stress pattern in their L1 for words with final open syllables (i.e., vowel-final words are over one hundred times more likely to have penult stress than final stress, as reported in Eddington 2000).

The four-syllable words provided a similar scenario as the three-syllable words, although not exactly the same. Again we observed the distinction between the cluster of the five relatively high scoring languages versus the other three languages, and again statistical tests indicate significant effects for language ($F(7,7)=$, $p< .0001$) and for position ($F3,3)=$, $p< .0001$.), but not for their interaction ($F(21,21)= .914$, $p= .5734$). A similar clustering of groups emerged as for three-syllable words (see Appendix C 3.3.2.1.2), and it was more difficult ($p< .05$) to locate stress on the final or initial (preantepenult) syllable than on either one of the two medial syllables (penult and antepenult) for all languages, as illustrated descriptively in Figures 9A and B.

Descriptively, the French and Turkish speakers performed at a similar lower correctness level again, while the Arabic subjects seemed to show relatively good

performance for penultimate stress (65 percent correct, d'=1.47) compared to the other positions. Yet, generally they still had the hardest time locating stress out of all the languages, only barely reaching the next best language (Turkish) with their highest score, as can be seen in Figures 9A and 9B. Even if statistically the predictable stress languages formed the lowest subgroup in the clusters, Turkish and French were associated with Japanese (as the lowest of the other languages regarding performance for all stressed syllables) and thus linked to a higher cluster, Arabic performance only clustered with the predictable stress languages and not with Japanese.

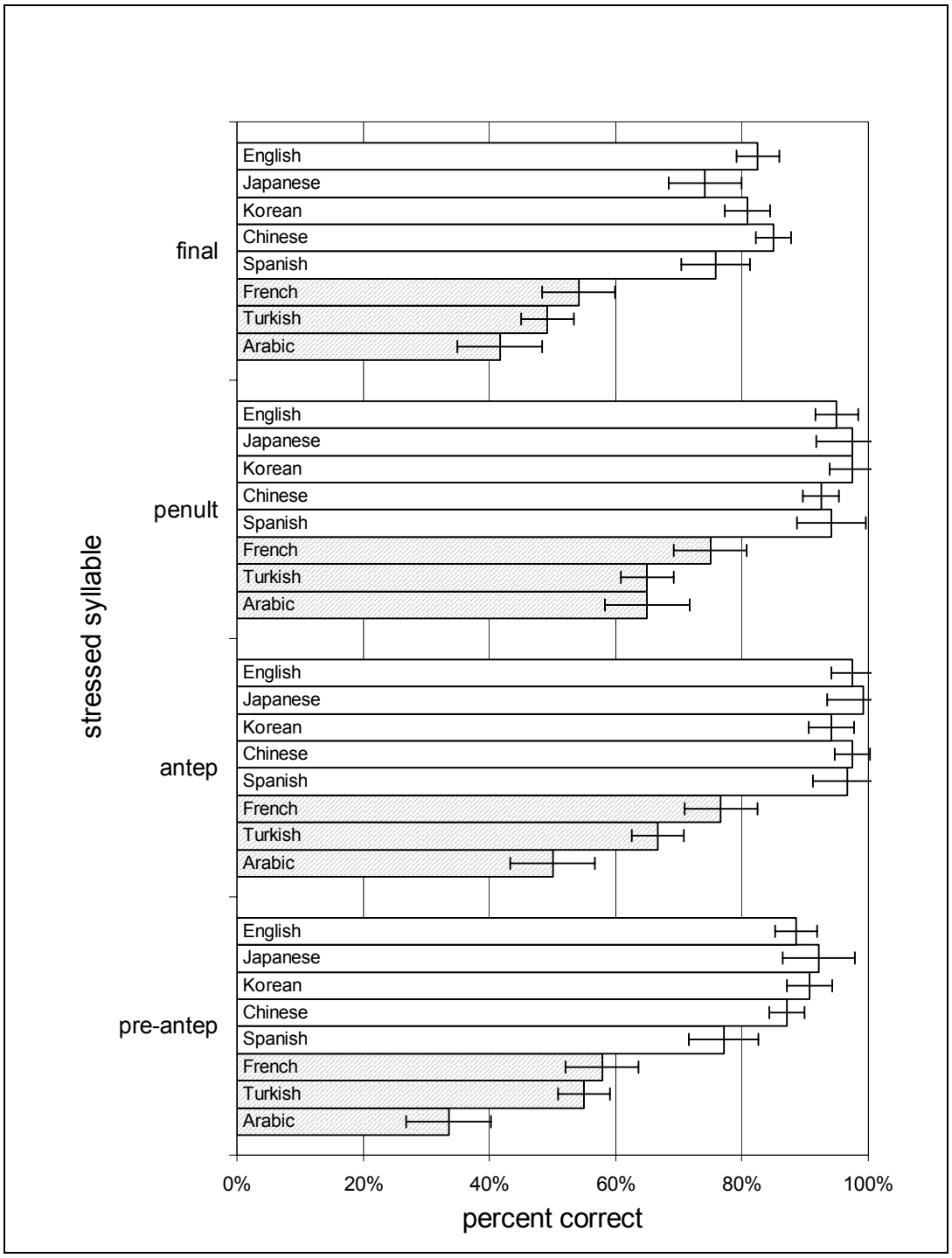

Figure 9A: Perception: performance for four-syllable words (percent correct)

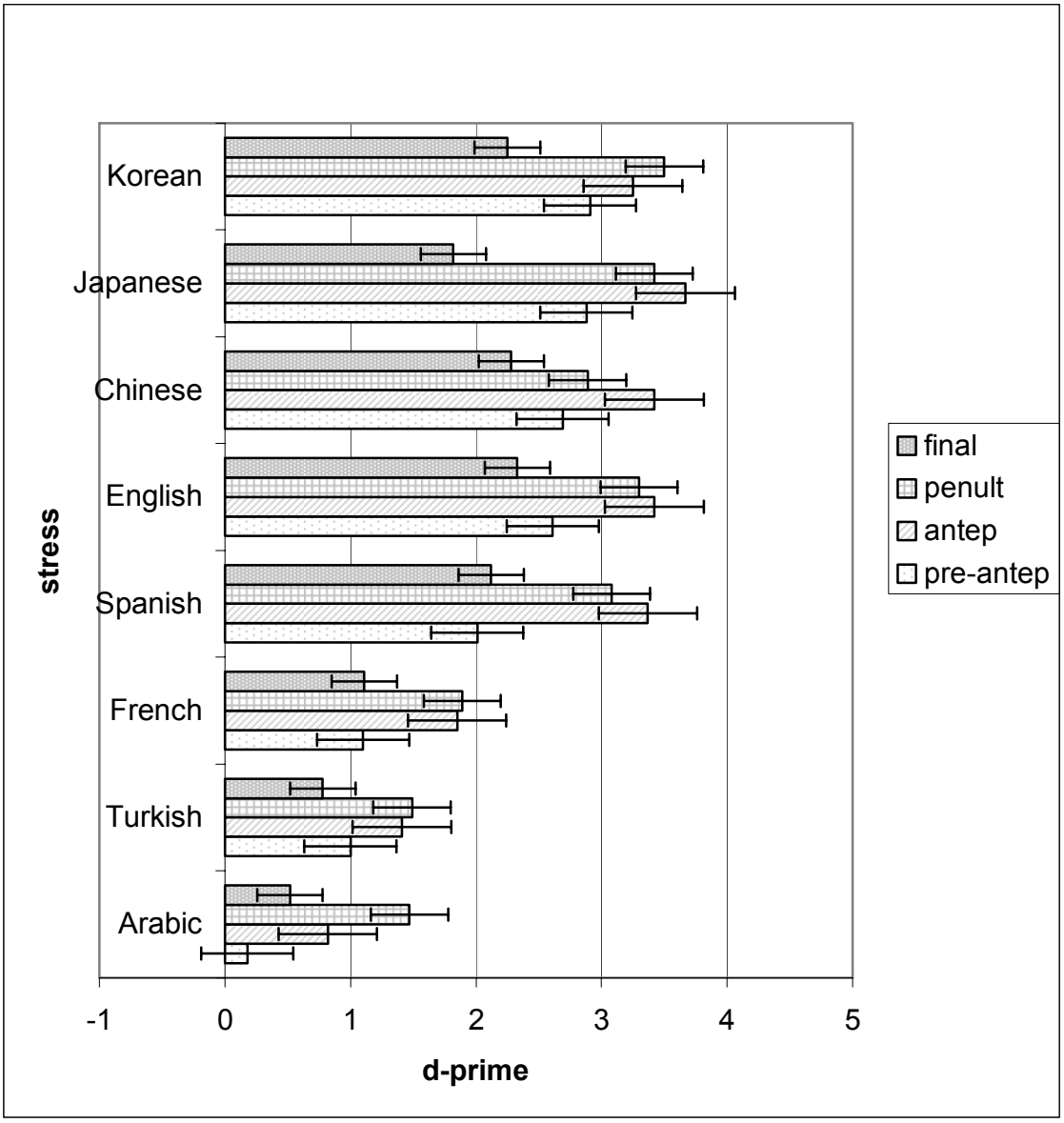

Figure 9B: Perception: performance for four-syllable words (d-prime)

4.5. Discussion

The results of the perception experiment provided insight on several levels and pertaining to different issues raised earlier in this dissertation and thus warrant further elaboration.

4.5.1. Language Types

Speakers of L1s with predictable word stress displayed significantly lower scores for the perception of L2 stress than all other languages across all word types. Arabic, Turkish, and French speakers thus had a harder time locating word stress in novel L2 items than Spanish, Chinese, Japanese, and Korean speakers across words of different lengths. The English control group performed close to ceiling, as expected. A simple two-way distinction emerged, indicating that the ability to locate word stress in an L2 perceptually can be predicted based on one sole property of an L1, namely the presence or absence of regular word stress.

Considering the position of stress within words of different lengths, it must be concluded that speakers of L1s with predictable stress also had the most problems perceiving stress regardless where in the word it was located (clear tendency present for 3- and 4-syllable words, significant for 2-syllable words). For all languages, it was significantly more difficult to locate stress on the final syllable for 2- and 3- syllable words, and on the first (preantepenult) or final syllable for 4-syllable words.

4.5.2. Stress Models

4.5.2.1. Stress Deafness Model

The perception results fall in line with the general prediction made by the SDM (Peperkamp&Dupoux 2002) that speakers of predictable stress languages have problems hearing stress compared to speakers of L1s where stress is not predictable. Just looking at the two-way division between languages with predictable stress, which showed poor performance, and all other languages, which showed more target-like performance, it seems that, in general, the SDM is all that is needed to account for L2 stress facts: predictable stress languages are somewhat 'stress deaf', while all other languages have no problems. This is intriguing, since the SDM is based on experiments testing pure physical perception, which does not appear to differ from L2 perception by advanced learners. Extensive experience with an L2 does not seem to improve the ability to perceive stress, at least not in comparison with speakers of languages without predictable stress. Since the tasks differed greatly in nature, the correctness scores in the present study cannot be readily compared with the ones put forth supporting the SDM. It will be seen in the next chapter, however, that such a two-way distinction will not be sufficient to account for the production results.

The SDM would furthermore imply, however, that native speakers of French, as a highly regular stress language belonging to Class I, have more problems than speakers of Arabic or Turkish, languages which belong to a higher class than French according to

their criteria[16]. It was found in the current study, however, that there was no significant difference between the performance of Arabic, Turkish, and French speakers. Descriptively, it can be stated that actually Arabic speakers had the hardest time perceiving the location of stress compared to speakers of the other two predictable stress L1s, with consistently lower success rates across word types and structures, while French speakers had the least problems out of this group, although this distinction did not reach significance. In any case, the hierarchy of 'stress deafness' presented in the SDM cannot be substantiated by the perception results in this study.

4.5.2.2. Stress Typology Model

The STM (Altmann&Vogel 2002) provides a basis for evaluating the performance of all language groups in the current experiment individually. In accordance with the SDM, this model also includes a division between L1s with predictable versus non-predictable stress. Thus, differential performance of these language groups would also be expected, however the STM has a broader focus than the SDM in that it also allows for further discussion of the performance of language types not mentioned in the SDM, and it also implies a different subdivision within the group of predictable languages.

On the one hand, starting out with the three predictable L1s, the French group would be expected to generally perform better than the Arabic group, since Arabic requires one more parameter setting than French does (i.e., Quantity Sensitivity). It

[16] Peperkamp & Dupoux (2002) does not explicitly mention these two languages. Since they do not always have stress at an utterance edge, they would fall into different classes than French, which they classify into Class I, as a language with the most regular stress and thus with a higher index for 'stress deafness' than any of the other classes in their hierarchy.

should be recalled that the STM crucially distinguishes between positive and negative parameter settings. That is, in this model, negative parameter values are considered not to actually require any specific setting – only positive ones do (cf. Altmann & Vogel 2002). Even if weight (vowel type, i.e., tense, diphthong, or lax) did not appear to affect the performance of the Arabic group in the present study, it may still be a factor in perception, but one that would need more subtle methods to identify. After all, a tendency could be observed for the Arabic learners to perform worse than the other two predictable stress language groups, even if it did not reach statistical significance. The Turkish group, however, overall performed quite similarly to the French group, which would also be expected according to the STM, since French and Turkish require the same parameter settings, and thus should not show different success rates in the perception of stress. Slight individual differences could be found in the better performance of the French group for initial stress in two- and three-syllable words compared to the other predictable stress languages, but these are still far below the other language groups.

The group of five languages that performed close to ceiling, on the other hand, consisted of English (the control group) and Spanish, both languages with phonologically non-predictable stress systems, and the non-stress languages Chinese, Japanese, and Korean. Therefore, this group is not homogenous regarding the stress properties of its members in the STM. Thus, it is not merely a two-way distinction between languages with predictable stress and non-predictable stress, as in the SDM, but rather a patterning together of two typologically distinct groups, namely non-stress languages and non-predictable stress languages compared to predictable stress languages. Although this

distinction does not show an effect in the perception of L2 stress, it may become important for other L2 stress tasks (i.e., production).

It can therefore be stated that only the presence (or positive setting) of predictable stress in the native language seems to have a detrimental influence on the listeners' ability to identify the location of primary stress in a word, as displayed in the results of the Arabic, Turkish, and French speakers. Chinese, Japanese, Korean, Spanish, and English do not involve any positive parameter settings according to this model and pattern together in the perception of stress, thus indicating that the STM provides the more appropriate predictions for the results of this perception study.

4.5.3. Eurhythmy

As described above, in the case of four-syllable words, all the languages involved in this experiment showed significantly better scores for stress on the penult or antepenult syllable than on the left or right edge. It is interesting that a similar result was not found for three-syllable words, where only final (and not initial) stress triggered lower perception scores. While this may be due to the length of the words and thus indicate a memory issue rather than a phonological one, another possibility also exists.

That is, these patterns may reflect a eurhythmic preference for a secondary stress in longer words. It has been observed that English displays a tendency to favor one or two unstressed syllables after a stressed one (Giegerich 1992). Thus, if primary stress falls on the first (i.e., leftmost) syllable in four-syllable words, there must be at least one secondary stress somewhere to its right. For three-syllable words this is not required. In

this way, alternating stress patterns are achieved and lapses of more than one syllable at the beginning of a word or more than two syllables within the word are avoided.

An analogous situation arises with primary stress on the final syllable for three- and four-syllable words, requiring at least one secondary stress somewhere to the left of the main stress. The possible presence of such additionally stressed syllables may weaken the saliency of primary stress on the edges of four-syllable words and thus account for the poorer performance in perception across language groups compared to their performance on shorter words.

Accordingly, a similar effect is predicted for even longer words (five syllables or more), which were not included in this study. As for primary stress on the second or third syllable in four-syllable words, there is potential for secondary stress to the right or the left; however, it is not required. Finally, it might have simply been easier for the subjects to detect the saliency of the stressed syllable in relation to the rest of the word if it was embedded and thus closer to the other syllables rather than at the beginning or the end.

An account based on the occurrence of secondary stress can, however, not cover the case of two-syllable words, where final stress was found to be significantly more difficult to locate for all language groups than initial stress.. For lack of a more founded explanation, it can only be suggested that this might have been due to less clear production of stress in the prerecorded items. Further investigation of the exact acoustic instantiation of stress in each of the recorded word types and structures is necessary, which, however, would exceed the scope of the current study at this point.

4.5.4. Quantity Sensitivity

Finally, one additional result merits further discussion. As mentioned in section 4.4.2, Arabic speakers displayed a surprisingly high correctness score for penultimate stress in four-syllable words compared to other positions. A more in-depth analysis of the Arabic listeners' responses for all four-syllable words, however, reveals that they also had a quite high number of incorrect 'penultimate' responses, which means that they tended to click on the penult syllable when actually some other syllable had primary stress in these longest words.

As discussed above in section 3.1.2.2., Arabic has a predictable weight-sensitive stress system and thus L2 learners of English whose L1 is Arabic may show L1 interference in perception for syllables containing different kinds of vowels. In such a case, we would expect them to detect stress better if it was on a heavy syllable compared to a light one and, potentially, also an effect of the position of stressed syllable within a word. The Arabic subjects' correctness scores for responses for different stress positions and types of stressed vowel across all items however, indicate no difference between the saliency of stressed lax, tense, or diphthong vowels. That is, stress on a lax vowel was located correctly in 51.5 percent of the cases across subjects (165 correct responses out of 320 total instances), on a tense vowel 51.6 percent (294 out of 570), and on a diphthong 56.7 percent (204 out of 360).

Further investigation of the different stress positions within words provides more fine-grained information regarding the performance of Arabic speakers in the perception

of English stress. For final stress, the scores for tense and diphthong vowels are comparable (note that lax vowels did not occur in this position). For penult and pre-antepenult stress, on the one hand, diphthong and lax vowels received the same or similar scores. For syllables with stress on the antepenult syllable, on the other hand, tense and lax vowels were responded to with the same level of correctness. As can be seen in Table 8, the scores are highest overall if the penultimate syllable was stressed.

Table 10: Arabic speakers' correct responses for different stressed vowel types by position

	final	penult	antepenult	pre-antepenult
lax	n/a	63.56%	46.00%	30.00%
tense	52.27%	58.78%	46.00%	38.33%
diphthong	50.00%	68.33%	56.67%	30.00%

In general, syllables with lax vowels should definitely be considered light, while syllables with tense and/or diphthong vowels should be heavy. Based on the table above, the performance for stressed lax vowels was not poorer than that for tense or diphthong vowels in any position; on the contrary, it was never worse than both of these for any given position. Taken together, these responses indicate that the Arabic group had a general preference to choose the penultimate syllable in four-syllable words, regardless of the position of primary stress. It should be noted that no other language group in the present experiment exhibited such a strategy. Therefore, we can conclude that no effect of weight of the stressed syllable on the Arabic speakers' performance in this experiment

could be determined and thus a comparison across all language groups and word types is legitimate.

4.5.5. Parameters

The results of the present perception study confirm and extend the findings of the pilot study in Altmann and Vogel (2000) with a larger number of languages and subjects. As was shown, the setting of "predictable" compared to "unpredictable" stress distinguishes the success rates of French, Arabic, and Turkish learners versus Spanish (and English as the control group) speakers, since this is the only setting in which these two groups of languages differ. The proposal that only positive parameter settings may be detrimental to stress perception, as mentioned above, is also strikingly observed in the results of the speakers of non-stress languages, who performed extremely well, and patterned with the speakers of unpredictable stress languages. Indeed, these languages do not have any parameter settings regarding stress and thus do not have properties that may interfere with the success in L2 stress perception. In other words, negative settings do not appear to affect perception of stress.

It should be noted, in addition, that other types of settings, such as the contrastive phonological use of pitch or tone or neither of these, did not affect the performance of speakers of the languages with these properties. We can interpret this as an indication that negative settings constitute a type of default that does not require any active parameter setting by learners in the L1 acquisition process. In a sense, these can be seen as "coming for free". Positive settings, by contrast, require some active setting during

first language acquisition resulting in a hindrance in the L2 perception of stress, and thus leading to a negative effect on second language learning in the area of stress.

4.6. Summary

The results of the perception study presented in this chapter lead to the conclusion that the type of native language has a direct effect on the perception of stress in a second language. Speakers of languages with predictable stress consistently performed more poorly in the perception of stress than others, with some gradation of correctness between languages within this group. Learners from L1s without stress settings (i.e., non-stress languages) or with non-predictable stress, however, had no problems locating the position of stress in perception. A simple two-way division between languages with predictable stress and without it may seem reasonable to explain the perception results. However, it will be shown in the next chapter that there is more to the L2 acquisition of stress than can be seen based on perception alone.

These findings are consistent with the specific parameters presented in the STM and their corresponding predictions, as well as the effect of positive versus negative parameter settings. The hierarchy of difficulty with the perception of stress presented in the SDM, however, could only be supported in the most general sense. That is, there is clearly stress deafness associated with predictable stress in one's L1. However, speakers of an L1 falling into the highest deafness class in the SDM (i.e., French) descriptively displayed the best success rates in the perception of L2 stress among the three predictable stress L1s included in this study. Therefore, the more specific groupings established by

the SDM could not be upheld based on the results of the current perception experiment while the predictions made by the STM were found to be fully supported.

Chapter 5

EXPERIMENT 2 – L2 LEARNERS' PRODUCTION OF ENGLISH STRESS

English L2 learners are known to often misplace stress in the pronunciation of English words. In fact, such behavior may not only cause a detectable foreign accent in an L2, but sometimes incorrect stress placement even causes L2 speakers to not be understood or misunderstood by native speakers of the L2. For example, the word *normally* stressed on the second syllable by an Indian L2 learner was perceived by English native speakers to mean *no money*; stress on the first syllable in *upset* was interpreted as *absent*, or stress on the second syllable in *written* as *retain* (Benrabah 1997:161). Thus, stressing a word in the wrong place may even lead to a communication breakdown. However, finding the appropriate syllable within a word that should be stressed is not the only challenge awaiting the learner – stress must also be expressed acoustically in a way that it is being perceived as stress by the listener.

Often, an L2 learner's mispronunciations, including incorrect stress placement, allow for guesses as to this person's native language. This indicates that there may be certain common strategies regarding stress placement that members of the same L1 group apply when pronouncing English words. In this study, it will be investigated what such strategies might be.

The same subjects who participated in the perception study also completed this production experiment, administered after a short break on the same day as the perception experiment. This permitted the investigation of a potential relationship between the subjects' performance across the two tasks. Furthermore, since the items used in this production task are of the same structure as the items used in the perception task, it is possible to compare a) the perception of word stress and its production for comparable items and b) the production of tokens of the same type of syllable structure by English learners with various native languages.

5.1. Procedure

Participants were seated in a sound-attenuated room and given a list of words in possible English orthography on paper and asked to read each word aloud twice. Two different randomly ordered lists were used and only one word was visible at a time. By requiring each subject to pronounce each word twice, the subjects got a chance to monitor their own production and, if necessary, change it if they felt the need. For each item, only the second pronunciation for each subject was transcribed and analyzed. The subjects were told that the items were all possible English words that they probably had not come across before. Their pronunciation was recorded into a Macintosh computer using a microphone and later transcribed by two trained linguists.

Preceding the actual experiment, each participant had a practice session with 10 words that did not occur as actual test items. This was done in order to familiarize the

subjects with the task and to be sure the microphone was operating properly. No feedback was given.

5.2. Stimuli

For this production experiment, the stimuli were 46 nonce words that did not occur in the perception experiment. They were created following essentially the same principles used for the perception study (cf. Chapter 3). The main difference is that only syllables with schwa or a tense vowel in the intended production are used here, due to the inherent lack of clarity in English orthography. It seemed that it would be possible to achieve more control over the responses if only two vowel types were represented (cf. Section 3.3.2. above for more details on orthographic representation). All the test items consisted of combinations of open syllables and varied in length from two to four syllables. As in the perception experiment, only combinations of types of syllables that actually occur in English were used.

Each subject was given one of the two randomized lists containing a total of 46 target items. Each list of stimuli consisted of a) five tokens for each two-syllable structure (total 15 tokens), b) four tokens for each three-syllable structure (total 16 tokens), and c) three tokens for each four-syllable structure (total 15 tokens). The structures used are presented in Table 9, together with the coding for analysis (S=schwa, T=tense vowel) and one sample item per structure to illustrate how the words were

presented to the participants. An exhaustive list of all tokens for these structures can be found in Appendix D.

Table 11: Types of items used in production study

2-syllable words	**3-syllable words**	**4-syllable words**
Cə-CV le•soo	Cə-CV-Cə da•boo•va	Cə-CV-Cə-CV ma•ley•da•zee
CV-Cə chee•la	CV-Cə-CV mee•ga•noo	CV-Cə-CV-Cə pey•sa•doa•ba
CV-CV noo•dee	CV-CV-Cə toa•nee•ma	CV-Cə-CV-CV vee•na•doo•rey
	CV-Cə-Cə fay•se•na	CV-Cə-Cə-CV mey•ze•la•noe
		CV-CV-Cə-CV soa•loo•da•mee

The participants saw the items divided into syllables, similarly to the perception experiment. In this experiment, a divider (dot) was added between syllables, as shown in the examples in (7), in order to facilitate the participants' reading of the items.

(7) noo • dee

sa • foa • na

roo • la • doa • ney

5.3. Scoring

Two linguists skilled at perceiving stress transcribed the recordings. One was a native speaker of American English, the other one (the author) near-native. The transcriptions were detailed such that stress placement as well as vowel quality, and thus syllable weight could be identified. The inter-transcriber reliability was over 90 percent and cases of inconsistent transcriptions of items were discussed and a consensus was reached for each word. Every word was transcribed, even if the actual syllable structure that a subject produced was not the same as the intended structure. If subjects produced a structure that was different from the intended structure for a given item but corresponded to some other intended structure, this item was counted as a token of the other structure and grouped accordingly. For example, item *le-soo* has the intended structure Cə-CV. Subject Kor-8, on the one hand, produced instead a word with the structure CV- CV, which was then pooled with other items that were pronounced with this structure (intended or not). Subject Kor-9, on the other hand, produced a structure CV-CV for the same item, which could not be used in the overall analysis since lax vowels were not included in the intended structures and there were too few cases of CV-CV in the data to create a new structure for analysis.

5.4. Results

It should be noted that the results reported here and discussed in this section and the subsequent chapters are the actual pronunciations of the participants. Not all subjects produced the intended number of tokens for any given type of word, so the number of realizations across groups is not necessarily the same. For example, some subjects may have altered the quality of a vowel from an intended schwa to a lax or a tense vowel, or from an intended tense vowel to a diphthong. Thus, there would be a higher number of tokens for a particular structure, and a lower number for the intended structure; occasionally even a new structure was created. Given such variability in the results, percentages will be reported in order to have a standardized measure for the purposes of comparison. Further statistical analysis is not possible under the present conditions.

The first general observation is that no subjects placed primary stress on schwa syllables in production. Therefore, only words containing more than one stressable (i.e., tense) vowel will be analyzed and discussed in the following, since only for these is it possible to discern the speakers' preferences. That is, it was only necessary for a speaker to make an active decision regarding the possible pronunciation of an item if there are at least two possible positions that can be potentially stressed.

In the current experiment, the English and French groups performed exactly alike for two-syllable words containing two tense vowels (C<u>V</u>-C<u>V</u>). Both showed a preference for stressing the first syllable rather than the second one (English 67.9 percent, French 67.2 percent). The Turkish, Spanish, and Arabic learners were undecided; however, non-stress language speakers (Chinese, Korean, Japanese) clearly favored the final syllable

with 71.1 percent, 64.0 percent, and 58.9 percent, respectively. The graph in Figure 10 illustrates the choices of each language group for this word type.

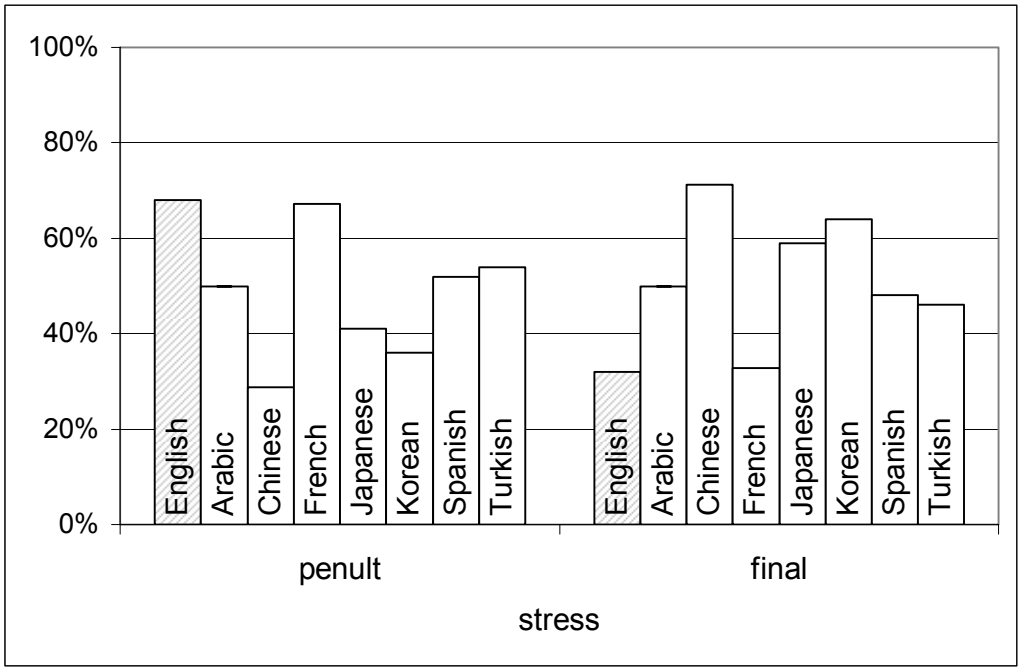

Figure 10: Production CV-CV

With regard to three-syllable words, the structures considered are those with two tense vowels and a schwa syllable: CV-Cə-CV and CV-CV-Cə structures. In the case of the CV-Cə-CV structure, English native speakers clearly preferred to stress the initial (= antepenult, in this case) syllable (87.1 percent). As illustrated in Figure 11, French (68.8 percent), Turkish (63.3 percent), and Arabic (62.5 percent) L2 learners showed a somewhat similar tendency to the English group in that the majority of responses carried initial stress. Again the Japanese and Chinese speakers strongly preferred stress on the

final syllable with 74.4 percent and 70.6 percent, respectively. The Korean and Spanish speakers, however, were somewhat undecided, although the Spanish group had a slight preference for final stress (57.6 percent).

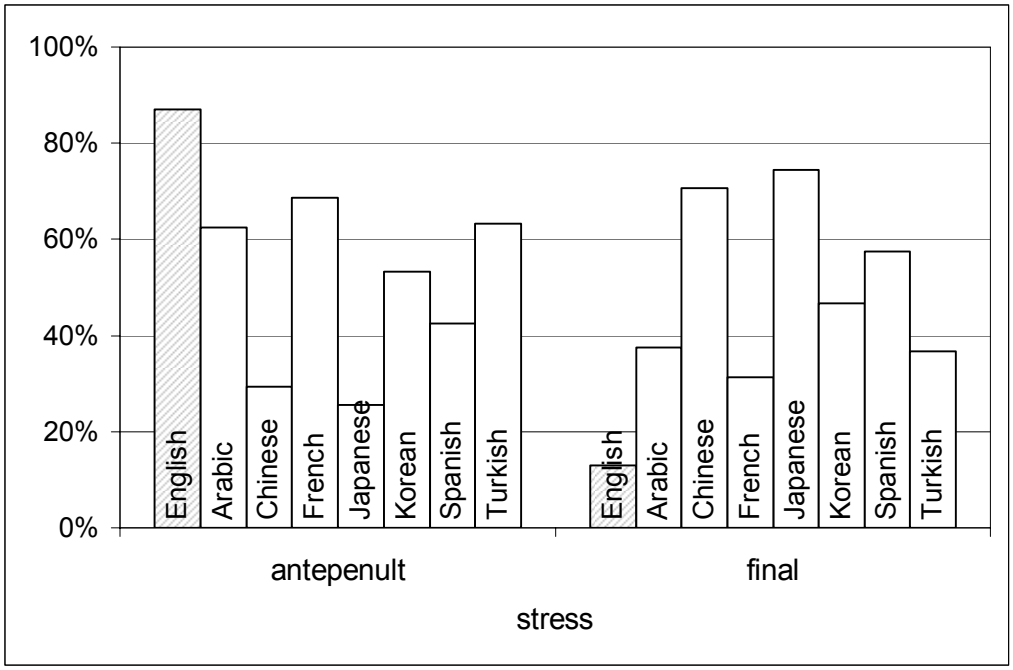

Figure 11: Production CV- Cə-CV

By contrast, in the case of the CV-CV- Cə structure, the speakers of all the languages showed the same preference as English speakers: penultimate stress. That is, all speakers had a strong tendency for placing stress on the penultimate syllable rather than on the antepenultimate (or, in this case, initial) one, as presented in Figure 12. English speakers favored this pattern in approximately 79.1 percent of the cases, while

the other languages ranged from around 70 percent (French, Turkish, Korean, Arabic, Spanish) up to over 80 or 90 percent (Chinese, Japanese) for this stress pattern.

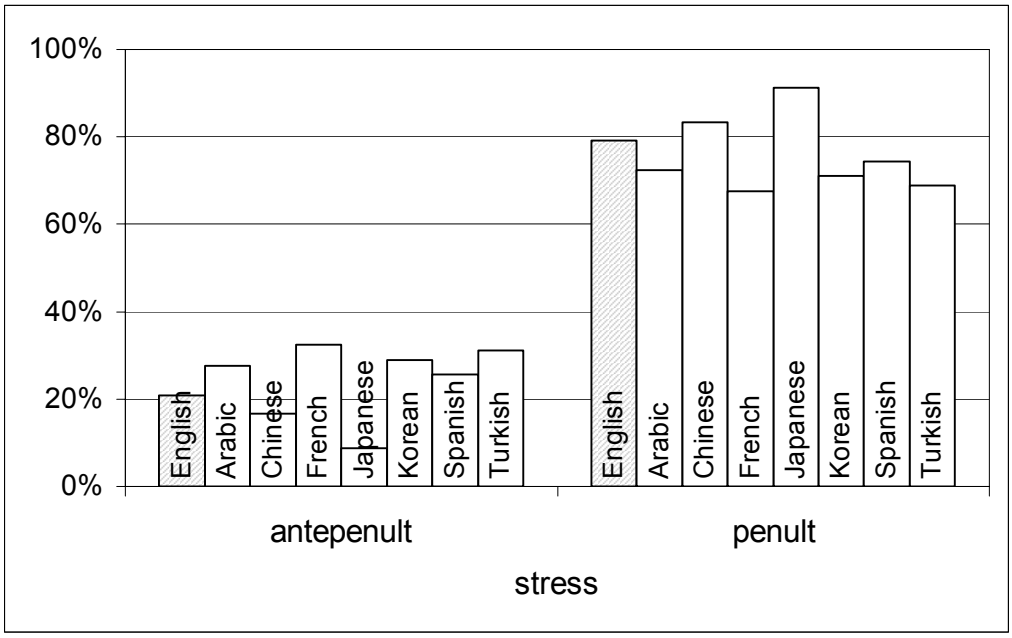

Figure 12: Production CV-CV-Cə

Finally, words containing four syllables need to be considered. Starting with words with two tense vowels again, there were three structures that are of concern here: Cə-CV-Cə-CV, CV-Cə-CV-Cə, and CV-Cə-Cə-CV. The graph in Figure 13 illustrates that, for the structure Cə-CV-Cə-CV, English speakers strongly preferred stress on the leftmost (here: antepenult) tense vowel (80.8 percent), as opposed to the final syllable. Of the other languages, only Turkish (75.0 percent) and Japanese (66.7 percent) showed a

similarly clear preference. Arabic, French, and Korean speakers seemed somewhat undecided, while Chinese speakers displayed a stronger tendency (65.2 percent) towards stress on the rightmost tense vowel, which was the final syllable in this case.

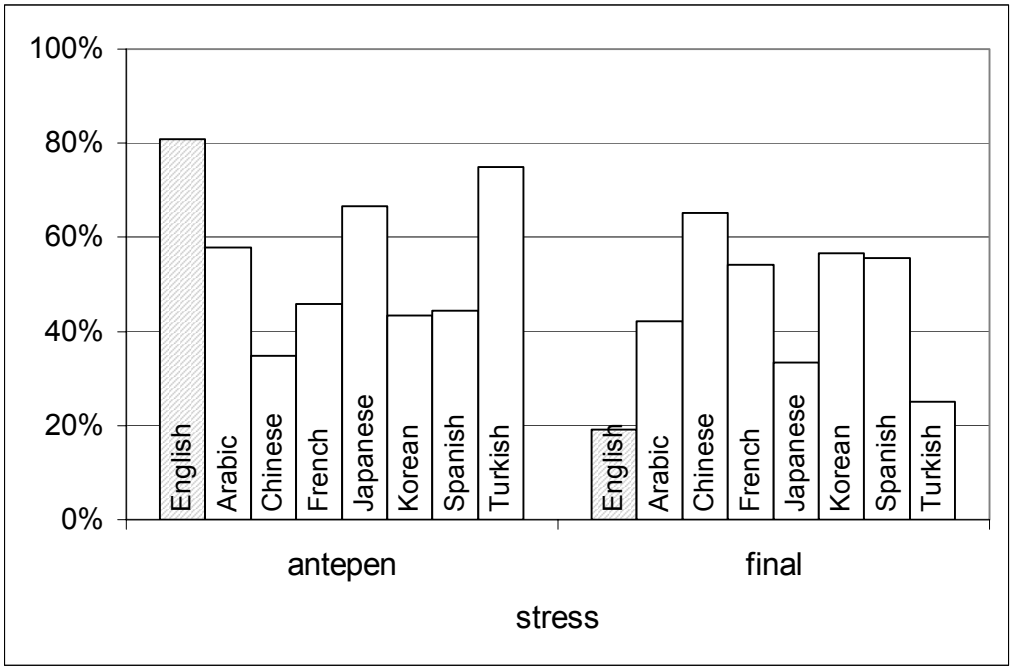

Figure 13: Production Cə-CV-Cə-CV

Reversing the order of vowel types renders the structure CV-Cə-CV-Cə. The graph in Figure 14 illustrates that stress on the initial syllable was never produced in the English group (0 percent) and final stress was preferred in 100 percent of tokens of this structure. Speakers of all the other languages patterned with the native speakers in this

regard, since they showed an overwhelming preference for avoiding initial stress, preferring to stress the penultimate syllable instead.

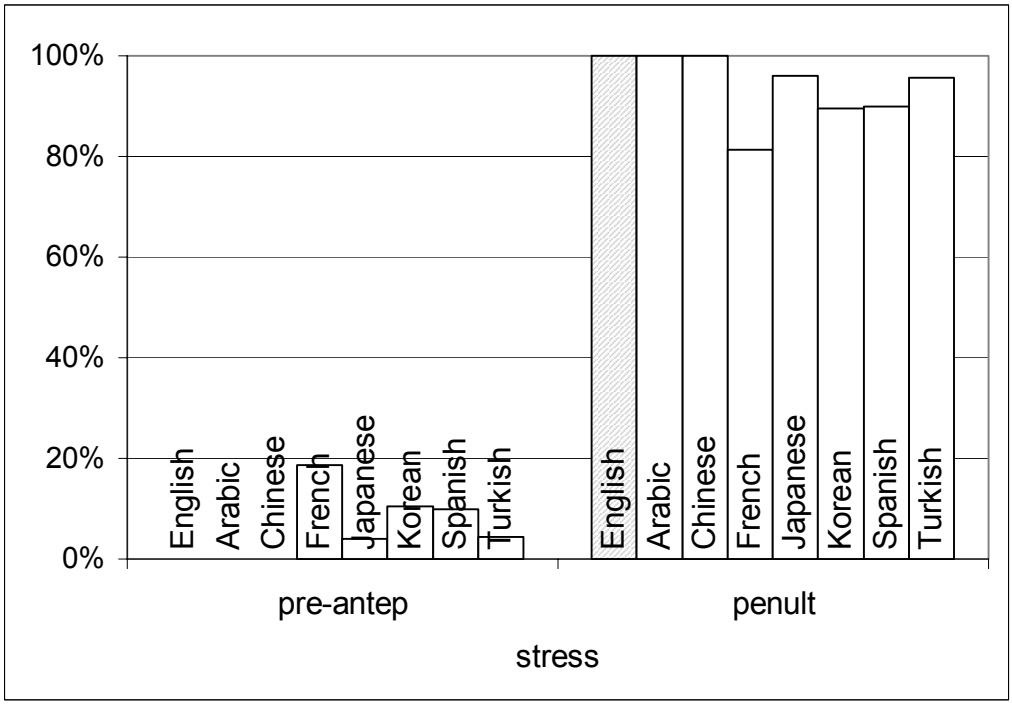

Figure 14: Production CV-Cə-CV-Cə

The third structure of four-syllable words with two schwa vowels was the word type CV-Cə-Cə-CV. Although there were three tokens of this structure in the intended pronunciation, and thus 30 expected productions of this category, only a total of six items of this word type were produced by the English native speakers. These came from only four subjects, so in fact, the majority of the native speakers did not produce such a

structure. It is thus not meaningful to compare the productions of the speakers of the other languages with the English control group in this case.

What can be presented for the sake of completeness, however, are the productions of this structure across L2 learners from different L1s. In order to represent the majority of subjects of a given language group, only languages will be considered where six or more speakers actually provided at least one token of this word type. Thus, in addition to English, the Arabic group (with only two subjects producing one token each), is also excluded from analysis here. Figure 15 illustrates the production of words of the structural type CV-Cə-Cə-CV by language groups that did meet the criterion.

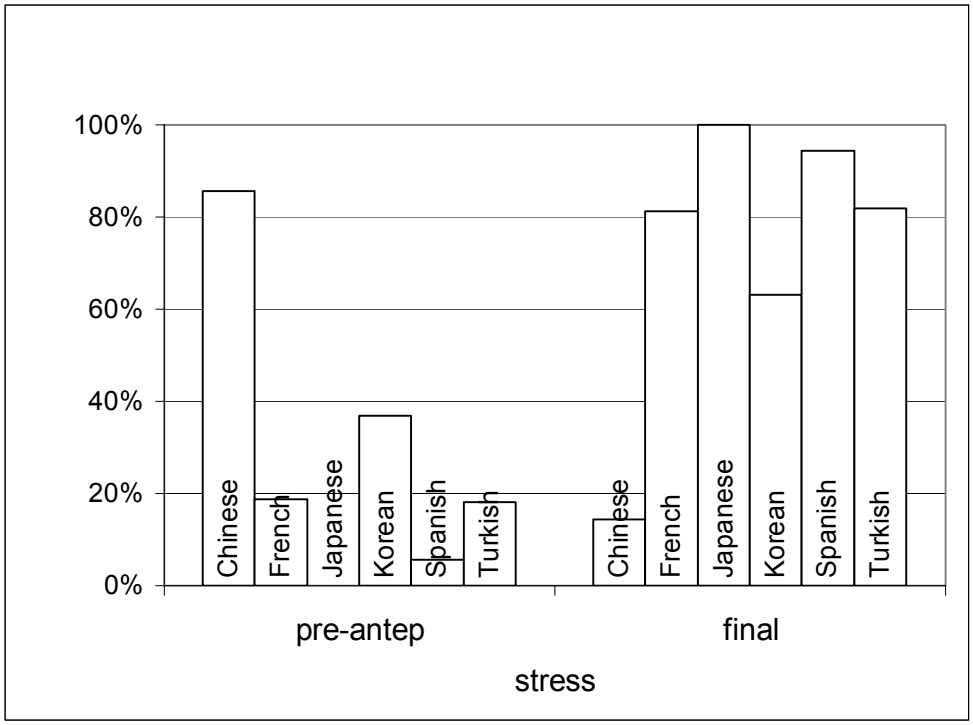

Figure 15: Production CV-Cə-Cə-CV

For this word type, the final syllable was by far the preferred location for stress across all languages groups (Japanese 100 percent, Spanish 94.4 percent, Turkish 81.8 percent, French 81.3 percent), however, less so for Korean speakers (63.2 percent). An exception to this pattern were Chinese learners, who strongly favored (85.7 percent) initial (here: pre-antepenultimate) stress. It should be noted that the four English subjects that did produce this structure all agreed on final stress for such items.

Let us now consider words with the largest number of full vowels in the production study, namely four-syllable items with three tense vowels and one schwa: CV-CV-Cə-CV and CV-Cə-CV-CV structures. For the former structural type, as presented in Figure 16, stress on the initial syllable was for no language group a popular choice. The English group strongly (80.0 percent) preferred antepenult stress, and only the three predictable stress languages Turkish (70.8 percent), French (60.0 percent), and Arabic (55.0 percent) followed the same pattern. The other groups more (Chinese 72.7 percent) or less (Korean 46.2 percent, Japanese 54.8 percent, Spanish 59.3 percent) strongly favored stressing the final syllable out of the three possible options.

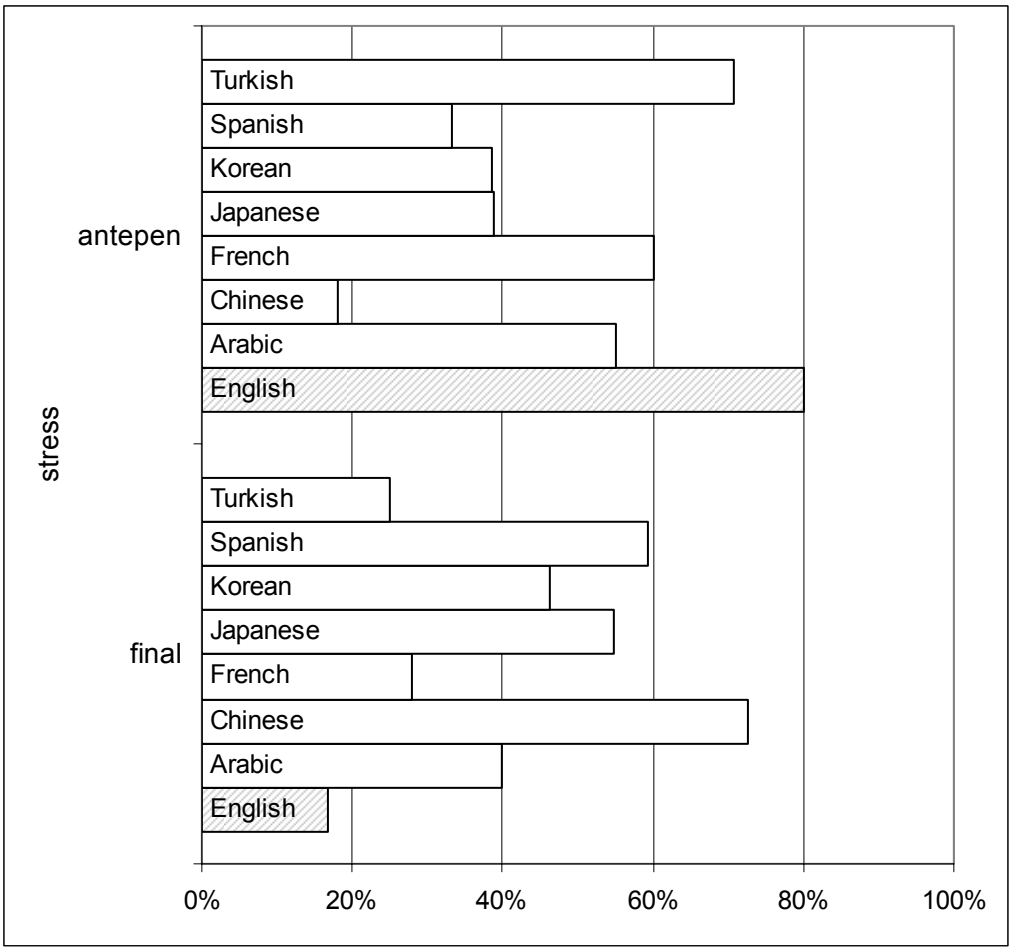

Figure 16: Production CV-CV-Cə-CV

Finally, the structure CV-Cə-CV-CV needs to be mentioned. As shown in the graph in Figure 17, almost all the English speakers (90.0 percent) favored stressing the penultimate syllable for such items. None of the other languages came close to the native speakers' clear preference. Most L2 speakers, however, agreed with the English speakers in avoiding initial stress for these types of words, except for Korean and French speakers, where the first and second syllable received somewhat similar stress scores. The

language closest to English performance was Turkish (59.3 percent for penultimate stress), with Japanese (50.0 percent) trailing not too far behind. What is interesting, however, is that many language groups favored final stress for this structure, as we can see in the scores for this position for Spanish (85.8 percent), Arabic (57.1 percent), French (54.2 percent), and Korean (50.0 percent)[17].

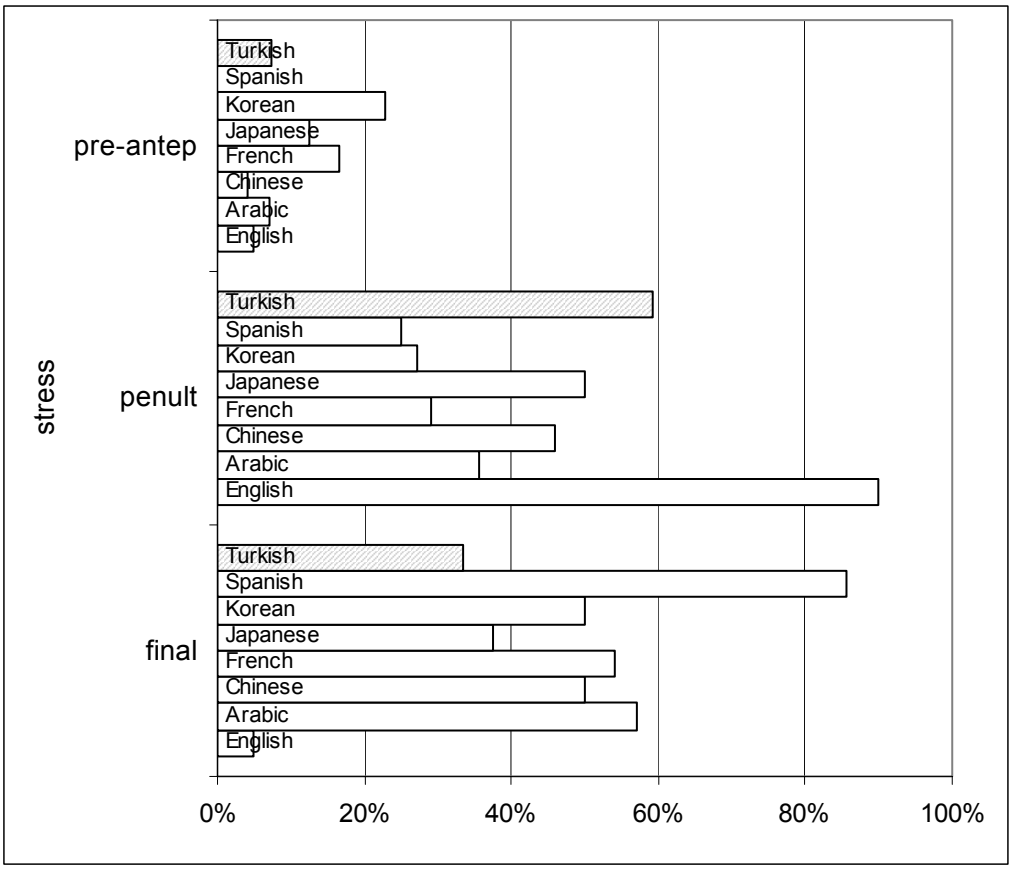

Figure 17: Production CV̲-Cə-CV̲-CV̲

[17] It should be noted that a score of 50 percent indicated a clear preference in this case as opposed to a random choice, since there were three options for stress placement, and 33% would indicate a random choice.

5.5. Discussion

For convenience, the most preferred stress location for each analyzed structure across languages is summarized in Table 9. Entries of multiple locations (e.g., final/penult) indicate less than 15 percent difference between these positions within a given language group. Shaded cells highlight responses in clear agreement with the control group.

Table 12: Most preferred stress location in production by language and structure

	CV̲-CV̲	**CV̲-Cə-CV̲**	**CV̲-CV̲-Cə**	**Cə-CV̲-Cə-CV̲**	**CV̲-Cə-CV̲-Cə**	**CV̲-Cə-Cə-CV̲** [18]	**CV̲-CV̲-Cə-CV̲**	**CV̲-Cə-CV̲-CV̲**
English	penult	antepenult	penult	antepenult	penult	(final)	antepenult	penult
French	penult	antepenult	penult	antepenult/ final	penult	final	antepenult	final
Turkish	penult/ final	antepenult	penult	antepenult	penult	final	antepenult	penult
Arabic	penult/ final	antepenult	penult	antepenult	penult	[19]	antepenult	final
Spanish	penult/ final	final	penult	antepenult/ final	penult	final	final	final
Japanese	final	final	penult	antepenult	penult	final	final	penult/ final
Korean	final	antepenult/ final	penult	antepenult/ final	penult	final	antepenult/ final	final
Chinese	final	final	penult	final	penult	preantepenult	final	penult/ final

[18] This structure is provided here for completeness' sake. Since the control group provided a very low number of items of this type, no analysis of target-like performance was possible.

[19] Productions of this structure were too few in number for the Arabic group by subject as well as by token, thus no analysis was possible for this language group.

5.5.1. Stress Production

There seems to be a clear default pattern that English native speakers show for nonce words, which can be described as stressing the rightmost non-final stressable vowel. In this, the current findings agree with previous studies that investigated the stressing of nonce words by English native speakers (Pater 1997, Archibald 1998). Section 5.5.2 below will provide more discussion of what the emergence of a pattern in a non-predictable language may be due to. Interestingly, none of the L2 language groups had trouble providing an English-like stress pattern for word types with a final schwa syllable. All of the L2 groups patterned with the English speakers for such types (C<u>V</u>-C<u>V</u>-Cə and C<u>V</u>-S-C<u>V</u>-Cə). It seems that the learners were aware of the preference in English to stress penultimate syllables if they are followed by a schwa syllable since there was at least one more potentially stressable position (another tense vowel in this case) in these two word types. For other word types with two or more tense vowels, however, a great variety of options could be detected among languages. That is, the L2 groups either appeared to be undecided and produced different pronunciations within a given group for the same types, or they preferred to stress a position that was not the syllable of choice for English native speakers.

Overall, it turned out that the L2 groups that came closest to English performance across all the different word types were predictable stress languages, while the productions of the various non-stress languages could not be grouped together and speakers of the unpredictable stress language, Spanish, did not pattern with the English group either.

As for predictable stress languages, they showed a high degree of agreement regarding stress placement with the English speakers. The Turkish learners more or less agreed with the baseline group for all word types except for one (CV-CV), where they were undecided. In Turkish, the final syllable in a prosodic word gets stressed (Kabak & Vogel 2001). Since the items in this study did not contain any clitics or potential Turkish suffixes, the Turkish subjects could not have followed any L1 pattern and still have produced English-like stress patterns. Thus, their high degree of agreement with the baseline group was quite remarkable.

The Arabic L2 learners clearly disagreed with the English group for only two structures (CV-CV and CV-Cə-CV-CV); in all other cases, they showed similar preferences to the baseline group. This behavior might nevertheless be due to an L1 effect since the final syllable was never superheavy in this experiment, and following the patterns of Arabic, the rightmost non-final heavy syllable in such cases would receive primary stress. The two types in which they differed from the English group, however, cannot be explained by a potential L1 strategy, since the majority produced final stress for the structure CV-Cə-CV-CV, while they were undecided for CV-CV.

The performance of the French speakers was similar to both the Turkish and the Arabic groups' in as far as they had a relatively high degree of overlap with native speakers' productions. For only one structure, the French speakers clearly preferred final stress (CV-Cə-CV-CV), which may be due to application of their L1 pattern since the final (non-schwa) syllable always receives stress in French. For one other structure (Cə-

CV-Cə-CV), the subjects were undecided between (L1-like) final stress and (English-like) antepenultimate stress. Therefore, while some L1 influence may still be visible, these learners mostly supplied target-like stress placement, just like the other predictable stress languages.

Among the non-stress languages, Chinese appears to be the least native-like in production across word types, almost consistently placing stress where English speakers would not place it, that is, the last stressable vowel, including final syllables. Korean learners also displayed a high rate of disagreement with English production of the nonce words (in line with Guion 2005); however, they were often undecided as a group between different positions for many word types. The Japanese speakers showed a somewhat intermediate position between Chinese and Korean, displaying incorrect final stresses as well as agreement with the control group or being undecided. Based on the performance of the subjects of these three L1s, no uniform grouping could be found for non-stress languages regarding the production of L2 stress.

The Spanish subjects, finally, coming from an L1 with unpredictable stress, were either undecided or tended to stress the final vowel. In this way, their performance was quite unlike the English control group, agreeing with them for only two structures (CV-CV- Cə and CV-Cə-CV-Cə). Responses where stress was placed on the final syllable were very common, which may indicate the use of a simple linear strategy to stress the rightmost syllable, although it was not followed consistently for all types of structures.

What must be noted across L2 groups is that whenever the productions were not target-like, the final syllable was the most common choice for stress. The language

groups that showed a great number of such stress misplacement on the final syllable either seem not to be aware of some restriction that English speakers posed on that position, making it ineligible for stress in the production of nonce words, or they may have simply applied some different kind of stress placement strategy to new L2 words.

5.5.2. Patterns and Strategies

Before looking in more detail at the L2 learners' response patterns and strategies, the English native speakers' pattern must be further investigated. As stated in various places throughout this dissertation, and being a crucial motivating factor underlying the current study, English word stress is not predictable on phonological on phonological grounds alone. The question then arises as why English native speakers do perform consistently as a group when they are asked to place stress on novel words. One possible explanation might be related to the frequency facts of English stress patterns.

5.5.2.1. English native speakers

Murphy and Kandil (2004) examined the database of the Academic Word List (AWL) (Coxhead 2000), compiled through principled corpus analysis from electronic written texts of a total of 3.5 million words, regarding the frequency of stress patterns. This database presents high frequency words and word families from different academic fields. In their investigation of the 2979 polysyllabic (morphologically simple and complex) words taken from the AWL, Murphy and Kandil (2004) found that three-syllable words with penultimate primary stress are by far the most frequent among all

word types and stress locations in the above listing. Penultimate stress was also the most preferred stress location for English native speakers in the present production experiment (where possible). The findings based on the AWL seem to be appropriate for the current experiments since the subjects were all university students who could be expected to have knowledge of the words contained in this list.

Furthermore, Clopper (2002) reports a search of the Hoosier Mental Lexicon (HML) (Luce & Pisoni 1998), which is an online version of the Webster's Pocket Dictionary that includes about 20,000 words and detailed information about them, such as lexical frequency (Kucera & Francis 1967), regarding the frequency of stress patterns for words between two to four syllables in length. Their findings are summarized in Figure 18, where Mean Frequency was calculated as Sum Frequency divided by Word Count and thus takes into consideration both the number of words (as Word Count) with certain stress patterns as well as the frequency of a given stress pattern per million words (as Sum Frequency).

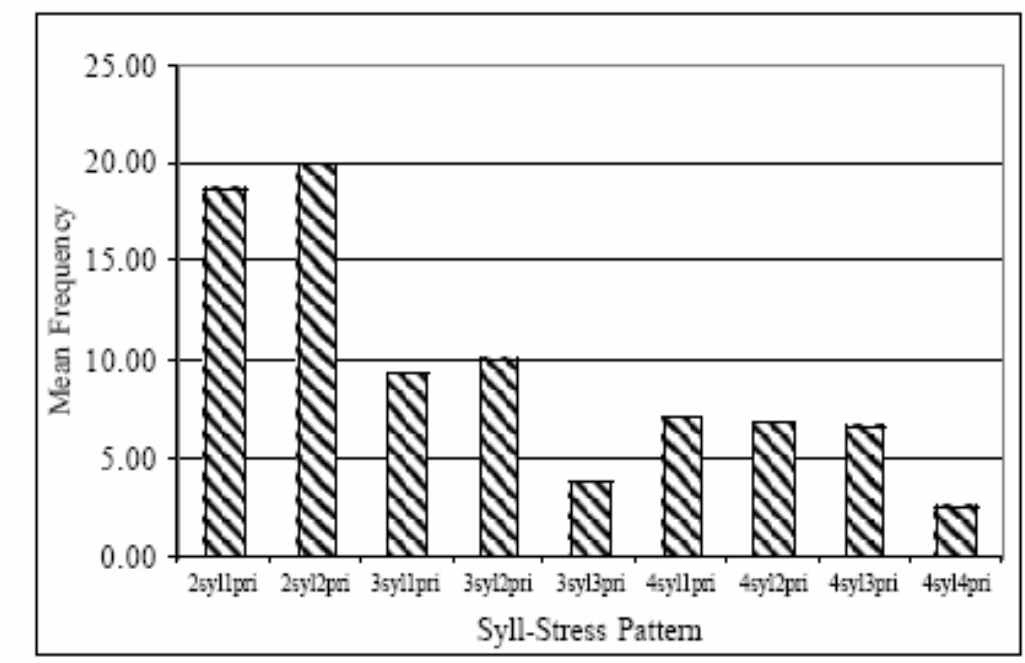

Figure 18: Mean frequency of occurrence for words in nine different syllable-stress patterns. (Clopper 2002:6)

It can be seen that the most common word types are two-syllable words and among them final stress is somewhat more frequent than initial stress. For longer words, however, all positions except the final syllable are likely to carry primary stress. A comparison of frequencies across three- and four-syllable words, however, reveals that three-syllable words with stress on the first (antepenult) or second (penult) syllable are more frequent than the most common stress patterns within four-syllable words.

Based on the results of the corpus studies by Murphy and Kandil (2004) and Clopper (2002), it can be summarized that penultimate stress and antepenultimate stress are the most frequent patterns for three-syllable words in English. Unfortunately, the corpi in these studies included polymorphemic words, so that no conclusion can be drawn

regarding monomophemic words alone. Furthermore, there is no information about word-internal syllable structure. Thus, stressing the penult or antepenult in words longer than one syllable is a generalization that native speakers can deduce from frequency facts within their lexicon that they might consult when they need to place stress on novel words.

Since the potential location has been narrowed down to non-final stress, and taking into consideration syllable weight and computation of stress from the right edge in English (e.g., Halle and Vergnaud 1987, Hayes 1995) in cases where there are regularities, a potential 'default' pattern emerges. Stress is very likely to be on the rightmost non-final syllable, which is exactly the pattern the native speakers showed in the current production experiment. Therefore, the pattern observed in the present experiment may be a reflection of frequency facts such as those presented in the AWL and the HML, but enriched to some extent with considerations of syllable weight, such that stress is found to fall very frequently on the penultimate syllable if this syllable is one that is deemed stressable by its weight properties, otherwise the antepenult.

5.5.2.2. L2 learners

Only for two language groups, a possible non-target-like response pattern became visible in the production findings. Both Chinese and Spanish speakers preferred finally stressed syllables over any other position within the novel words employed in this study. Since these two languages fall into different categories (non-stress versus non-predictable

stress) typologically with differential parameter settings, it is quite interesting that they showed very similar patterns in their responses.

The Chinese L2 speakers displayed an exceptionally clear linear pattern across all the word types. That is, they consistently preferred to stress the last stressable vowel regardless of the length of the word; only for one structure, they were undecided between the penult and the final syllable. It is obvious that this apparent strategy is very different from the control group's, and since Chinese is also a non-stress (tonal) language, L1 transfer cannot be a possible explanation for the learners' mostly incorrect stress placement since there are no parameters set for stress in Chinese.

A similar issue arises for the Spanish speakers, although they come from a stress language, albeit one with unpredictable L1 stress. Their behavior seems to be similar to that of the Chinese subjects', preferring to stress the final syllable wherever possible. Again, this pattern cannot be explained by potential L1 transfer, although Spanish, being a stress language, does involve one positively set parameter. Given that (a) stress in Spanish is not regular, and (b) if there is some kind of default stress in Spanish, it would fall on the penultimate syllable for the nonce words involved in this study, no transfer of L1 settings can be argued for.

5.5.3. Stress Properties

As mentioned in section 5.5.1., learners of L1s with predictable stress placed stress most like the native English speakers in the production of novel words, while speakers of L1s without stress or with non-predicable stress fared much worse. Although

similar patterns could be found in the responses of Spanish and Chinese speakers, which is at first glance surprising, there may nevertheless be something more systematic to the L2 groups' performance than first meets the eye.

Speakers of languages with stress in their L1, on the one hand, do have the concept of word stress as well as ample experience producing it in a way that it is perceived as such by others. This may explain why L2 learners from L1s with predictable stress (i.e., Turkish, French, and Arabic) fared best in the production of English novel words. This, however, cannot explain alone why speakers of Spanish, which is a stress language as well, did not perform as well as the Turkish, French, or Arabic subjects. As stated, stress in Spanish as well as in English is not predictable on purely phonological criteria, meaning that stress placement often involves more information about words such as their syntactic category and morphological structure. Since this was not provided in the current study, and being aware that stress is not predictable in English, similar to their L1, the Spanish subjects may have simply not known what to do with the words, thus resorting to some basic strategy.

On the other hand, speakers of languages without any parameter settings for stress (i.e., non-stress languages), in the current case Chinese, Korean, and Japanese, do not have any experience with the production of phonological word stress in their L1. Thus, it is not surprising that they would resort to some linear strategy, or be quite undecided and disagree often as a group, or display a behavior that is a mixture of these two possibilities. Specific differences in the stress production behavior of these languages would not be expected since they all share the property of 'non-stress' language.

Experience with producing pitch-accent or tone (or the lack of it) in the L1 does not allow for predictions regarding stress, since stress is more than pitch and involves further components. Furthermore, learners from a non-stress L1 may not even feel the need to actively place stress in L2 words according to some strategy or to look for some kind of regularity in the L2 input they have received since they do not have the concept of word stress and its functions in their L1.

It seems like the more parameters are being set for stress in the L1, the more successful (i.e., target-like) L2 stress placement proved to be. Although it might go too far to say that negative settings impede the correct production of L2 stress, it can be stated that the presence of a regular stress assignment pattern in the L1 facilitates correct production in the L2, at least in the case of English as L2. The absence of a regular stress pattern, however, as well as the complete absence of word-level stress in the L1 seems to cause difficulties with the production of target-like stress placement in the L2.

There may also be another consequence of the absence of parameter settings regarding stress, specifically in the cases of the non-stress languages Chinese, Japanese, and Korean. It should be noted that the productions were scored and transcribed by a native speaker and a near-native speaker of English. For speakers of non-stress languages, it might have been difficult to produce the right combination of pitch, intensity, and duration that is being perceived as stress by native speakers of English. Therefore, they may have intended to place stress on a certain syllable but speakers were not successful in combining the correlates appropriately. Speakers of stress languages,

however, may have fared better in this task since they had experience with expressing stress in their L1. This point will be revisited and discussed in more detail in Chapter 6.

5.5.4. Comparison to previous studies

In line with the findings reported in Pater (1997) and Archibald (1998), the English native speakers in the current study followed the strategy of stressing the last possible (heavy) syllable before the final syllable, regardless of word length or the number of stressable vowels in a word, possibly based on frequency facts from their mental lexicon. Since only schwa and tense vowels were considered in the current study, the rightmost non-final non-schwa vowel was consistently stressed across items and the results of previous studies are in agreement with the findings of the current production experiment for the English native speakers' performance.

With regard to French L2 learners of English, however, Pater (1997) found a different strategy. Specifically, he observed a tendency to place stress either on the leftmost or the leftmost heavy syllable, while such a strategy was not confirmed in the present experiment. In the present study, however, French speakers preferred to stress the leftmost possible syllable, for only two structures: C<u>V</u>-C<u>V</u> and C<u>V</u>-Cə-C<u>V</u>. In these cases, they grouped with the English native speakers and against the L1 French pattern. For all other analyzed types, they tended to avoid placing stress on the leftmost syllable, placing it instead on the rightmost non-schwa syllable (except for C<u>V</u>-C<u>V</u>-Cə-C<u>V</u>, where the antepenult was stressed). This pattern, in fact, may be explained by L1 transfer since in French stress always falls on the rightmost (non-schwa) syllable.

Generally speaking, direct transfer of L1 stress placement strategies could not be attested. Furthermore, Pater's (1997) finding that French learners display some parameter 'missetting' (within Dresher & Kaye's (1990) framework) and thus prefer to stress the leftmost (heavy) syllable in English nonce words could not be confirmed. On the contrary, they were among the language groups that exhibited the most target-like patterns in production. The only learners that seemed to have a consistent non-native strategy for stress placement, which might be called parameter 'missetting' comparable to Pater's French speakers, were the Chinese and the Spanish groups. In relation to the STM, however, there are no specific parameters regarding the exact positioning of primary stress within the word or the directionality of stress assignment, so it is unclear what parameter the Chinese speakers (with no stress) or the Spanish speakers (with no predictable stress) could possibly have misset[20].

5.6. Conclusions

English native speakers were found to display a type of default stress pattern for novel words, namely stressing the rightmost non-final stressable vowel, possibly based on frequency facts for longer words in English. An overall error pattern emerged among the L2 speakers, however, such that misplacement of stress most commonly targeted the final syllable, which is precisely the syllable that native English speakers avoided stressing. The errors of L2 learners displayed different patterns for the pronunciation of

[20] Note that non-stress tonal languages like Chinese are not mentioned in the SDM and thus this model does not allow for any predictions regarding this language group.

novel words, ranging from seemingly linear strategies to potential L1 transfer. Some language groups were more English-like in their productions than others, which can be explained as an effect of the differential parameter settings between the languages under investigation.

The results of this production experiment more specifically indicate that speakers of languages with (predictable) stress performed in a more English-like way than L2 learners whose native language had no phonological stress on the word level. In the case of the former, the experience with producing word stress in one's native language may have provided an advantage for L2 target-like pronunciation of nonce words.[21] Speakers who do not have such an advantage, however, may either not be able to provide an acceptable combination of the acoustic correlates of stress to be understood by native speakers of the target (e.g., the Chinese subjects), or they may simply have been too undecided to pattern as a group regarding stress placement (e.g., the Korean subjects).

It must be pointed out again that the scoring was done by (near-) native speakers, which involves the two challenges that L2 learners face in a naturalistic situation as well: (a) The location of L2 word stress must be produced in a way that it is perceived as such by native speakers, and (b) stress must be placed appropriately so that native speakers perceive it where it is supposed to be. These two factors cannot be separated in target-like productions; only if one of them is absent, they become visible.

[21] The issue of how they are able to deduce some default stress pattern in English despite having problems with the perception of stress will be addressed in the next chapter.

Chapter 6

DISCUSSION OF RESULTS

This is the first large scale study that tests L2 stress perception and production on the same subjects and on the same types of items. The results thus enable us for the first time to directly compare the role of L1 stress patterns in both the perception and production of stress in a second language. In addition, the fact that the L1s represent different typological categories provides information regarding which specific stress characteristics or parameters in one's L1 may favor or impede the L2 acquisition of stress.

Two models are evaluated in the discussion of the results of the current L2 stress perception and production experiments. As presented in detail in Chapter 3, both the Stress Deafness Model (SDM) (Peperkamp & Dupoux 2002) and the Stress Typology Model (STM) (Altmann & Vogel 2002) make predictions regarding the success of speakers of typologically different L1s. According to the hierarchy postulated in the SDM, there should be a gradation of rate of difficulty among speakers of languages with predictable L1 stress. Specifically, great difficulty is expected for highly regular L1s with stress on word edges; difficulty should decrease for L1s with less easily recognizable stress regularities. No problems with the perception of stress should arise

for speakers of L1s with non-predictable stress. According to the STM, no problems are expected for speakers of such L1s either. This model does, however, make further predictions regarding the success of L1 groups without stress (e.g., tonal languages), as well as L1s with predictable stress. A number of branching parameters are proposed in this model, where each positively set parameter may impede the perceptibility of L2 stress. Accordingly, speakers of languages without word-level stress should not have problems with the perception of L2 stress. Similarly, L1 groups with non-predictable stress are expected to perform well in perception. Problems, however, should arise for speakers of L1s with predictable stress since these languages involve positive settings for a number of stress parameters. There should be a gradation of the rate of success within these languages, although the predictions differ somewhat from the gradation predicted by the SDM.

In the following, the findings of the two experiments reported in this dissertation are put into perspective in light of the hypotheses presented in section 3.2. Subsequently, the results of both experiments are compared and their implications for L2 stress systems, based on the two models under investigation, are discussed. It will be determined if and how the perception and production of L2 stress can be correlated and if the models can accommodate not only the perception but also the production findings since neither has been previously tested on the production of L2 stress.

6.1. Perception and Production Hypotheses

In Chapter 3, several hypotheses were advanced. According to the null hypothesis, no difference between the different language groups and the English comparison group would be expected for either perception or production. If the null hypothesis was not confirmed, however, it would be necessary to examine the results further to determine which factors may be responsible for the different behaviors of speakers of different languages. In this dissertation, data were collected for both perception and production of stress, and thus the hypotheses can be tested separately for both types of data. First, the perception results are discussed, and then the production results. Table 10 provides an overview of the hypotheses for the perception and the production of L2 stress for convenience.

Table 13: Hypotheses for perception and production experiments

Perception Hypotheses	**Production Hypotheses**
(a) predictable stress L1s have more problems than others (SDM and STM): French, Arabic, Turkish worse than Spanish, Japanese, Chinese, Korean	(a) transfer of L1 stress pattern (Anani 1989, Archibald 1993)
(b) SDM: French more problems than Arabic or Turkish STM: French and Turkish same rate of success, Arabic worse	(b) emergence of non-L1 and non-L2 pattern (a la Pater 1997, Youssef & Mazurkewich 1998)
(c) non-predictable stress L1 (Spanish) no problems (SDM and STM)	(c) English native speakers show common pattern (Archibald 1998, Pater 1997)
(d) non-stress L1s no problems (STM; not mentioned in SDM)	

6.1.1. Perception

The first observation with regard to the perception experiment is that the null hypothesis must be rejected. Not all language groups showed the same success regarding the perception of stress as the English speakers, or each other, for that matter. Instead, as shown above, there was a distinct effect caused by the type of language in the perception results.

In particular, Hypothesis (a) was confirmed. That is, it was observed that speakers of predictable stress L1s had more problems than the other language groups, a finding predicted by both the STM and the SDM. Accordingly, the speakers of languages with predictable stress in their L1 (i.e., Arabic, French, Turkish) performed significantly worse than speakers of languages with non-predictable stress (i.e., Spanish) or no stress (i.e., Japanese, Chinese, Korean).

Looking first at the languages with predictable stress, Hypothesis (b) predicted that French speakers would perform better than Turkish or Arabic speakers. Indeed, it was observed that the French speakers generally achieved the highest correctness scores within the group of predictable stress languages and their performance was significantly better than that of the Arabic speakers. While there was no statistically significant difference between the French, Turkish and Arabic speakers in the present data, future experiments designed precisely to distinguish among different predictable stress systems may yield more substantial differences. In any case, from the present study it is clear that (a) the French speakers did not perform worse than the speakers of the other two languages, and (b) the Arabic speakers never exceeded the correctness score of the

Turkish or French speakers. The latter point may, furthermore, be an indication that the Arabic speakers experienced greater difficulty with the perception of stress than the speakers of the other two languages with predictable stress, and of course, the speakers of the other languages as well.

In light of these results, we do not find support for the claim made by the SDM that French speakers are the most 'stress deaf' subjects. By contrast, the STM precisely predicts a decrease in performance for Arabic speakers compared to French or Turkish speakers. Furthermore, according to the STM, the latter two language groups would be expected to perform similarly. Again, the perception results bear this out, since there was an observable tendency across items for the speakers of French and Turkish to score more similarly to each other than either group scored in relation to the speakers of Arabic. The results of the perception experiment for predictable stress languages thus are in not in accordance with the predictions made by the SDM, while specific features of the STM were either clearly supported or at least supported by a noticeable trend.

Let us now consider Hypotheses (c) and (d), according to which speakers of non-predictable stress or no-stress languages would have no problems regarding the perception of stress. As reported in Chapter 4, the speakers of languages with non-predictable stress and no stress consistently patterned with English native speakers. This indicates that neither of these two language types led to problems perceiving stress. Although the Spanish scores turned out to be lower than the non-stress languages in some cases, no statistical significance was found between the performance of these language groups overall. In this regard, both the SDM and the STM make correct predictions for

Spanish as a language with unpredictable stress. The somewhat lower correctness scores of the Spanish speakers compared to the language groups without stress might be due to the presence of one differential (positive) setting for the parameter 'stress'. Although this parameter does not seem to influence the general ability to perceive the location of stress (as opposed to specific stress parameters for languages with predictable stress), it may still have a slight effect displayed by the better scores for non-stress languages compared to the (unpredictable) stress language Spanish. To further investigate such a potential effect with speakers of more unpredictable stress languages, for example Russian or German, remains a challenge for future research.

In addition, the STM makes the accurate prediction with regard to non-stress languages, while no claim is made about these languages in the SDM. Specifically, the STM predicts that languages that lack a stress system should not experience difficulty in stress perception, as there is nothing in the L1 to interfere with it. In fact, it was found that the speakers of the non-stress languages, Chinese, Japanese and Korean, performed like English native speakers.

It cannot be claimed that the good performance of non-predictable or no-stress languages is due to strong positive L1 influence since these language groups, who performed just like the English target group in perception, do not have specific stress settings that could be transferred. On the other hand, the languages that fared worst in this study did so even for structures where the location of stress would have matched the L1, for example, final stress for French and Turkish or heavy syllable stress for Arabic. If positive L1 transfer occurred, this should have enabled the subjects to respond

correctly to items whose stress location corresponded to where it would appear in their L1. It must be noted, however, that it is not even clear what would actually constitute L1 transfer in the case of predictable stress languages, since these speakers have problems to perceive stress in general, which means not only in the L2 but most likely also in their L1.

By the same token, there was also no apparent negative L1 transfer, which would have yielded a higher number of incorrect responses in a position where stress would be expected to fall in the L1 (e.g., incorrect final stress responses for French or Turkish speakers). In other words, speakers of the three languages with predictable stress had somewhat comparable rates of (relatively poor) performance across all items regardless of their structure and possible similarities to the L1 stress patterns.

6.1.2. Production

As in the perception experiment, the null hypothesis must be rejected for the production experiment. The different language groups did not perform like the English control group, and they furthermore displayed diverging response patterns from each other.

It was stated in Hypothesis (a) that learners may transfer an L1 stress placement strategy onto the L2 task. The current experiment indicated, however, that the speakers of languages that do have stress in their L1 (in this case French, Turkish, Arabic, Spanish,) did not consistently follow an L1 stress strategy in English.

French and Turkish speakers, who generally place stress on the last (non-schwa) syllable in their L1[22], would have been expected to produce final stress for the nonce items in the production experiment if they pronounced them according to their native stress rules. It was found, however, that final stress was only the choice of the clear majority of subjects from one language group, and only for one structure, the French speakers' production of CV-Cə- CV - CV words. Furthermore, the Turkish and French speakers' stress placement frequently overlapped with the English native speakers' productions, meaning that their performance was target-like rather than showing L1 interference regarding stress.

The case of Arabic speakers remains unclear. They stressed the rightmost non-final heavy syllable (i.e., syllable with a tense vowel) in the majority of cases. This would be in accordance with their L1 stress placement pattern, however, it is also in accordance with the English target group's performance. Only one structure elicited a clear preference for non-L1 (but also non-English) final stress (CV-Cə- CV - CV). This alone, however, does not constitute a trend of any sort on which claims in favor of or against an L1 transfer strategy could be based. Since L1 and target stress placement coincide for the items used in this production experiment, specific claims cannot be made regarding the Arabic learners' acquisition of English stress placement. To tease apart the effects of L1 transfer and L2 acquisition of English stress, more specific experiments

[22] No final syllables in the stimulus items coincided with unstressable suffixes in Turkish, therefore, the final syllable would be expected to receive stress if the items were pronounced in accordance with the Turkish stress pattern.

would need to be constructed. For example, it would be important to examine structures with items involving lax vowels (and thus light syllables) in stressable position.

By contrast, the Spanish subjects produced final (non-schwa) stress for all word types. The control group of English speakers never favored final stress for any word type in the study, thus this is an indicator that there may have been some non-native (linear) strategy applied by the Spanish subjects. It is not clear, however, what might lead to such a strategy. Although Spanish is typologically classified as having phonologically unpredictable stress, it is still possible that speakers might use some regular pattern in their L1 (and L2) words in the absence of morphological or other non-phonological information. Should such a pattern exist, however, it did not find application in the L2 task at hand. Indeed, since all items were vowel-final and no lexical or morphological specification of stress or other information was provided, the most likely case would be for stress to fall on the penultimate syllable in the subjects' L1. Since all items were vowel-final, they would receive penultimate stress in Spanish according to general pattern that applies in the absence of any other overruling specification. Therefore, stressing the final syllable is a non-native and non-target-like strategy. It might not be surprising to find such a behavior by Spanish speakers, since both the target language as well as the native language have unpredictable stress, thus no generalizations may be expected by the learners that could be applied to the nonce words.

Regarding Hypothesis (b), which involves the application of some common (non-L1) strategy within language groups, the Chinese and Spanish speakers seem to be the most likely candidates.

The Chinese speakers consistently preferred to stress the rightmost non-schwa syllable across the board.. There was only one structure for which they were undecided between the final and penultimate syllable: C<u>V</u>-Cə- C<u>V</u> - C<u>V</u>. Since Mandarin Chinese is classified as a non-stress language, L1 transfer cannot account for this pattern. If any case of L1 transfer were feasible for this language group, it would have to be non-final prominence since Mandarin Chinese does have a number of toneless syllables word-finally. The learners could have tried to avoid stressing the final syllable since this is a position in their L1 where weak syllables occur. Thus stressing the final syllable seems to be another instance of a general non-native but also non-target-like stress placement strategy irrespective of the internal structure of the items.

Overall, stressing the final syllable appeared to be the most frequent non-L1 and non-English strategy. No language group preferred to place stress on a syllable further to the left edge than English speakers did. It was more common to place stress further to the right, namely, on the final syllable.

It must be noted that the participants in this study had no information regarding the syntactic category of the test words. That is, it was open if the items were nouns, verbs, or adjectives. Although it is possible that the speakers who preferred final stress assumed that the items were verbs, for example, and thus applied the most common stress pattern for disyllabic verbs in English, there is no foundation for such a claim. It should

be noted that it is only attested for disyllabic words that verbs tend to have stress on the final syllable and nouns on the initial (Chomsky & Halle 1968, Liberman & Prince 1977) and does not apply for longer words. On the contrary, polysyllabic nouns in English tend to have antepenultimate stress, while polysyllabic verbs are more likely to have penultimate stress (Schane 1979). Since no morphological or other information was provided concerning the type of word the items belong to and the words were presented without any context (e.g., phrasal or sentential), which could create a semantic or rhythmic bias of any kind, a possible bias in favor of (or against) a certain word class or rhythmic structure cannot be verified or falsified in any way.

A future experiment designed specifically to assess such possibilities is required.

6.2. Comparison of the perception and production results

It would have been reasonable to expect subjects who had problems locating stress in unknown words to encounter difficulty in placing stress in new words. That is, if L2 learners are not able to perceive the location of stress when they hear L2 words, it would seem impossible to extract a strategy for applying stress when pronouncing new words in the L2. What was found in the two experiments, however, was quite the opposite: the languages that showed a lower success rate in the perception of stress displayed relatively good performance in the production experiment. Moreover, L2 groups that had the best perception scores overall produced nonce words with the least native-like stress patterns. The common assumption that good perceptual ability is a

prerequisite for success in production (e.g., as indicated in the Speech Learning Model (SLM) (Flege 1987) or the Perceptual Assimilation Model (PAM) (Best 1995) thus seems to be unfounded, at least with regard to stress.

At first glance, it would appear that such a position is also supported in the findings of Archibald (1993), where the L2 speakers had better scores in the perception of stress than in production. The subjects in this study were speakers of Hungarian and Polish, languages with predictable stress, and on the basis of the findings in the present study, we would expect them to perform worse in perception than in production. It should be noted, however, that Archibald employed real words, raising the possibility that they were known (along with their pronunciation including stress) by the subjects.

Given the extent of the present study in terms of languages examined and number of subjects, there is no doubt that at least in certain cases good perception still may yield bad production (regardless of the specific L1). In this regard, the current results fall in line with recent reports in the literature on L2 segmental phonology, where findings are showing more cases in which there is a similar discrepancy between perception and production. In these cases, too, poor perceptual ability does not necessarily yield poor production. For example, Japanese listeners were found to have difficulties hearing the difference between the sounds [l] and [r], however, they were able to produce both of them quite distinctly when pronouncing English words (Goto 1971, Sheldon and Strange 1982).

With regard to stress, a possible explanation for the differences between the perception and production results is that there may be (at least partially) different systems

at work for these two tasks. The predictability of stress one's first language may lead native speakers to lose the ability to consciously locate stress, which would explain the poor performance of French, Turkish, and Arabic subjects in the perception experiment. In production, however, the speakers who have experience with the articulation of stress in their L1 appear able to utter forms in such a way that native speakers can recognize the stressed syllable. That is, they apply an appropriate combination of the components, specifically, duration, pitch, and intensity[23], although certainly the location of stress is not always identical to that of native English speakers. It is possible that, although learners with predictable L1 stress may have lost the conscious ability to locate stress, they still have the concept of word-level stress and, unconsciously process the stress variation in the input that they receive in the L2 to find some level of regularity. Since such learners are used to stress being regular, they may expect to find some kind of regularity in the L2, which they then apply to unfamiliar words in the L2.

By contrast, speakers who do not use word stress in their native language may be perceptually more sensitive to the acoustic properties and the related functional cues of stress in L2 words. In the case of speakers of tonal or pitch accent languages, in the current study Chinese and Japanese, it is possible that their awareness of pitch changes, which is crucial to distinguish meaning on the word-level, in their L1 facilitates recognition of stress since pitch is one of the acoustic components of stress. However, it is also possible that these speakers have learned that there is prosodic marking of contrast

[23] It should be recalled that the production data were scored on the basis of perceptual judgments. Since the precise contributions of duration, pitch, and intensity vary across languages, it would be interesting to determine, in future research, to what extent the acoustic measurements show similarities and differences in relation to the L1.

on the word-level in English, comparable to their L1, however, the L2 contrast is marked using different acoustic components. In this respect, these learners may actually be using a similar strategy as Korean native speakers. Korean speakers do not make use of pitch in their L1 on the word-level at all, and thus may be especially sensitive to any word-level prominence. In fact, according to the SLM (Flege 1987), L2 sounds that are dissimilar to the L1 are generally acquired more easily than similar ones. This postulation for segmental material may hold for suprasegmentals as well, at least in the perception of stressed syllables. If an L1 does not make use of (the combination of) certain acoustic components on the lexical level, this may actually increase learners' sensitivity for the presence of such components and thus facilitate their perception of on that level.

With regard to the production of stress, however, speakers of non-stress languages could be expected to encounter greater difficulty in intentionally articulating the requisite combination of pitch, duration and intensity, since they would not have experience with this in their L1. Furthermore, their native language lacks the concept of word-level stress, therefore this might be a more general problem than simply the appropriate articulation. Without further investigation, however, it is not possible to determine whether the lower scores on the production experiment found among speakers of non-stress languages are due to their failure to acquire the rules or some patterning of stress placement, or their inability to produce syllables with the appropriate acoustic properties such that they are recognized as stress by a native speaker of English.

It should be noted that in their actual speech, L2 speakers are often able to produce real words correctly because they have learned or memorized how to pronounce these words, even if they are not aware of where the word is stressed. Personal anecdotal evidence can be cited with regard to a Turkish L2 speaker of English, a linguist, who could pronounce the word 'garden' perfectly, however, he thought that he was stressing the second syllable. As stated, furthermore, in Peperkamp and Dupoux (2002), "[French] speakers typically do not recall where stress falls in foreign words" (p.17). Without this awareness, however, it should be hard, if not impossible, to extract a generalization regarding the English stress pattern based on known words, especially considering that the stress pattern of these words may be influenced by morphology or other factors. Although it seems possible, as entertained above, that learners on a lower processing level are able to perceive stress and search for some level of regularity in the L2 input, it remains unclear on what specific basis speakers of predictable stress L1s were able to produce stress patterns that are were very similar to the English native speakers' patterns and must be investigated further in future research. Dupoux and Pallier (1997) found significantly lower discrimination performance for stress contrasts than for segmental contrasts for French speakers, however, that merely indicates that stress differences are less salient to them than segmental differences in perception. It does not mean that they are unable to process stress differences. The same can be said about the current study: Speakers of L1s with predictable stress performed significantly worse than others in perception, however, they performed better than chance (hence no 'stress deafness'). The

little information that they are able to extract may be enough for them to be useful for finding stress regularities or frequency facts.

Taking into account the various factors influencing English stress placement, the question remains as to what L2 learners should actually be able to learn regarding the rules or generalizations of English stress assignment. As witnessed in the present production experiment as well as reported by other studies (e.g., Archibald 1998, Pater 1997), the English native speakers showed a high degree of agreement for stress placement for novel words. Thus, there seems to be some kind of default stress pattern in the absence of morphological or other information that native speakers (and potentially L2 learners) are able to extract during the acquisition of English. As discussed earlier, although there is no simple algorithm for placing stress in English in general, the frequency of occurrence of a certain pattern may be very high and thus this pattern may be applied to cases where the lexicon or morphology do not provide any other indications.

More often than not, learners of English as an L2 (or any other language with contrastive stress) are being taught explicitly that it is important to place stress on the right syllable. In this, it may be the case that learners are often drilled to pronounce minimal stress pairs correctly, thus focusing specifically on the production of stress placement in the classroom early on. Also, orthographic (diacritic) marking of the location of stress, as in any good dictionary, helps learners to visualize and thus internalize (get knowledge of) where stress lies in English words. Thus, a comparison to the Japanese [l/r] dichotomy seems valid: The awareness for the existence of a certain

contrast is being raised, to compensate for the fact that the learner cannot easily make this distinction perceptually, and to ultimately enable the learner to be more successful in production than in perception.

6.3. Implications for L2 stress systems

As mentioned above, in recent years, two typological stress models have been developed, the SDM and the STM. The findings from the two experiments conducted in this study allow us to evaluate the claims of these two models.

6.3.1. Stress 'Deafness' Model (SDM)

It should be noted that the SDM was developed only for the perception of stress and thus cannot be considered in relation to the production experiment. As seen in Chapter 3, the SDM predicts not only that speakers of languages with predictable stress will have problems hearing stress, but also that there is a hierarchy of difficulty of stress perception based on certain properties of these languages. The stress deafness hierarchy is presented again in Table 10 for convenience.

Table 10: Hierarchy of 'stress deafness' (adapted from Peperkamp & Dupoux 2002)

Class I (e.g., French, Finnish):	regular stress always at an utterance edge (no phrase-final/initial unstressed function words)
Class II (e.g., Fijian?):	regular stress at an utterance edge based on syllable weight: utterance-final if heavy, otherwise penultimate (no phrase-final unstressed function words)
Class III (e.g., Hungarian):	regular stress at utterance edge, except for unstressed function words
Class IV (e.g., Polish):	regular stress pattern for content words, however, not at utterance edge unless monosyllabic

In the present research, speakers of three predictable stress languages were investigated. French displays the highest level of stress 'deafness' in the SDM hierarchy. In addition, speakers of Turkish and Arabic were investigated, although as mentioned before, it is not completely clear where the latter two languages would fall within the SDM since these two languages are not explicitly considered. It can be speculated according to the criteria, however, that Arabic may be classified as Class II in the hierarchy since stress can be predicted based on syllable weight and it has default stress on a word edge in the absence of heavy syllables. Thus, in order to assign stress in Arabic, only information regarding the weight of syllables is required. Turkish, on the other hand, generally has peripheral stress at the right edge of a prosodic word and may be classified into Class III with Hungarian, which displays a very similar stress pattern albeit at the left edge. Following this line of argumentation, it can be stated that French

speakers should have the most problems with the perception of L2 stress according to the SDM, Turkish speakers the least, and Arabic speakers should fall somewhere in between these two.

As mentioned in section 6.1.1., however, Arabic speakers displayed the lowest correctness scores regarding the perception of stress, followed by the Turkish and French speakers. Although the SDM correctly predicted that these three language groups would have more difficulties perceiving stress than languages with non-predictable stress, the hierarchy within the predictable stress languages regarding the degree of difficulty was not confirmed in the current experiment.

Other than English, the only language examined with non-predictable stress is Spanish. The SDM makes the right prediction in this case. According to Peperkamp and Dupoux, Spanish speakers, as representatives of a language with contrastive (non-predictable) stress, display no stress deafness, a claim that was confirmed in the current study.

It must be noted that the SDM is based on a comparison of the ability to perceive stress contrasts with (segmental) phonemic contrasts, while the perception experiment described here focuses on locating the stressed syllable within a word, not just noticing a contrast. Furthermore, the stimulus items employed in the SDM exclusively involved two-choice tasks, meaning that subjects only needed to choose between two options (i.e., same or different; ABX). Thus, the current task required more active awareness of stress than matching or distinguishing between two words, and, additionally, it required the participants to evaluate words up to four syllables in length. This different nature of the

experiments might explain why the specific hierarchical order could not be replicated in the current study, although the better performance of the French speakers in the current experiment still cannot be explained by any of these factors. It would require experiments designed more specifically to test different types of predictable stress systems in order to determine more conclusively to what extent the hierarchy proposed in the SDM holds for more complicated tasks such as the type used in the present investigation.

In general, however, certain claims made by the SDM have been supported. Specifically, it was seen that (a) speakers of languages with predictable stress do have problems perceiving stress, (b) there may be different levels of difficulty depending on some further properties of these languages, and c) speakers of languages with contrastive stress do not exhibit difficulty perceiving stress.

6.3.2. The Parameters of Stress

The hierarchy of stress parameters posited in the STM is specifically intended to apply to the L2 acquisition of stress rather than its mere perceptibility. Furthermore, a broader range of language types is included in this model. Specifically, in addition to languages with predictable and non-predictable (or contrastive) stress, non-stress languages are also considered. For convenience, Figure 19 repeats the STM, with the inclusion of the languages investigated in the current study listed under their appropriate parameter settings.

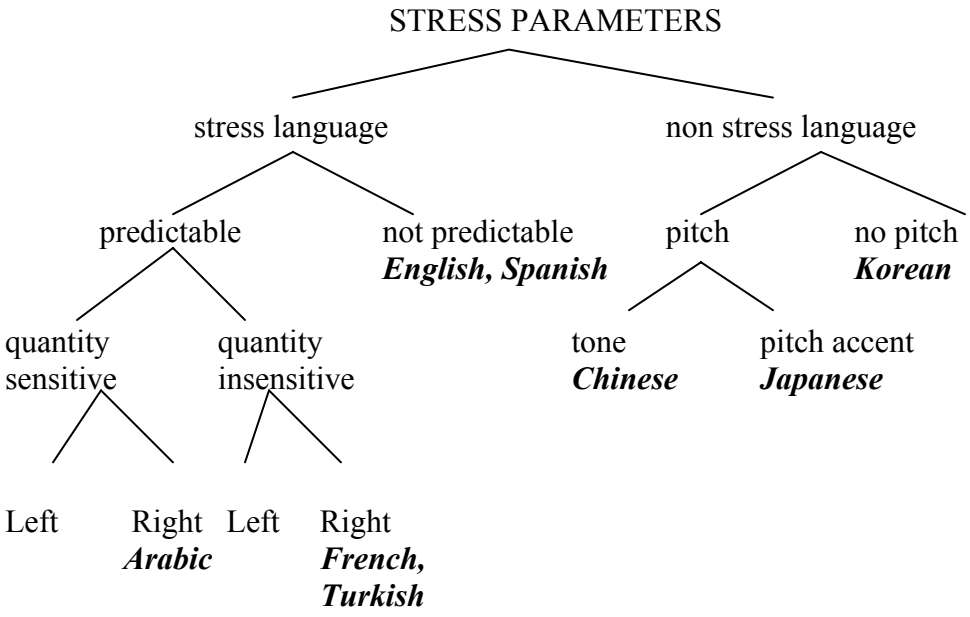

Figure 19: Stress typology model with languages selected for the experiments

In order to be able to determine if and how the STM can account for the perception as well as for the production findings in the current experiments, both sets of results will be discussed separately with respect to the predictions made by the model.

6.3.2.1. Perception

Altmann and Vogel (2002) proposed that only positive parameter settings of an L1 in this typology may impede the perception of L2 stress, while negative settings may not have an effect. That is, in the case of positive settings, something specific is acquired, while in the case of negative settings, nothing specific needs to be acquired. The current perception results confirm this position.

First, languages with phonological word level stress require a positive (YES) setting for the parameter 'stress language', while non-stress languages only involve a negative (NO) setting regarding stress and thus nothing should impede the perceptibility of stress. In fact, the non-stress languages in this study uniformly did not display any problems with the perception of stress and showed a target-like performance, with close to ceiling results, across all types of items. Stress languages, on the other hand, showed differential behavior, which would be expected if some further parameters are at play.

Second, it should be noted that among the languages with a positive setting for 'stress', the English control group performed close to ceiling, as expected, since the experiment involved an L1 task rather than an L2 task for these speakers. The Spanish group, sharing the exact same settings in the STM as English, specifically, YES for the parameter 'stress languages', but NO for the parameter 'predictable', performed comparably to the English group, albeit with somewhat lower scores than the English speakers, and also the speakers of non-stress languages in some cases. Although it is only a slight difference, this might indicate the differential contributions of the first stress setting between YES (for Spanish) and NO (for the non-stress languages). In order to investigate whether comparable results as for the Spanish speakers in this study can be found, more languages with non-predictable stress need to be included in future experiments.

Furthermore, the poorer performance of languages with a positive setting for the parameter 'stress language' and a further positive setting for the parameter 'predictable' appear to reflect the effect of this additional positively set parameter. Specifically,

French, Turkish, and Arabic are all languages with predictable stress and the speakers of these languages displayed much lower correctness scores than the language groups with negative settings for either the parameter 'stress language' or 'predictable (stress)'. This leads to the conclusion that the additional positive setting for 'predictable' required in French, Turkish, and Arabic, compared to the non-predictable or non-stress languages, is responsible for the significantly lower success rate of the speakers of these three languages with regard to the perception of stress.

Finally, there is an apparent gradation among the languages with predictable stress. Arabic involves yet another positive parameter setting for 'quantity sensitive'. French and Turkish are not quantity sensitive and thus only have a negative setting for this parameter. Indeed, Arabic speakers had lower scores than the speakers of the other two languages in this predictable stress group, which supports the proposal that only additional positive parameter settings have a detrimental effect on the ability to locate L2 stress.

6.3.2.2. Production

The typological divider 'stress language', at the top level of the hierarchy between stress and non-stress languages determines the ability to produce L2 stress. While, for perception, a two-way distinction between predictable and non-predictable stress languages could be found, where one positive setting seemed to be responsible for differential ability to locate stress, in production, in fact, a positive setting for 'stress language' is responsible for differential success with the production of L2 word stress.

Such a setting indicates that speakers have experience in producing phonological word stress in their native language, either predictable or unpredictable, and this appears to offer an advantage over the absence of any word-level stress. That is, speakers of non-stress languages, since they do not have experience producing phonological stress, seem to be at a disadvantage with regard to producing stress in the L2, even if they can perceive it quite accurately.

As the results show, the speakers of the three non-stress languages in this study displayed mostly non-target-like behavior. There was a strong general tendency in all three languages to produce final stress and, in Korean in particular, evidence also of a high degree of variability. For these languages, L1 interference regarding stress placement is not possible since their L1s have a negative parameter setting for 'stress language'. Thus, it seems possible that the speakers were using some general (linear) strategy or simply could not decide on a particular strategy for all words due to the lack of experience with stress in their native language.

While Spanish has the same parameter settings as English, it should be noted that the Spanish speakers did not perform as well as the target group of English speakers. Instead, it appears that they may have used a combination of target-like stress placement and the application of a linear strategy (stress on the final syllable). Since these speakers are accustomed to stress placement being somewhat unpredictable, they tended either to treat it this way in English as well, or to adopt a simple linear strategy of placing stress on the final syllable. Since the other language with unpredictable stress in this study performed an L1 task, it is difficult to say if the negative setting for the parameter

'predictable' causes the somewhat poorer performance of the Spanish speakers in production. It seems obvious, however, that speakers who have to deal with unpredictable stress in their L1 may recognize this feature in the L2 as well and thus try to come up with some strategy to handle unknown L2 words.

It is somewhat unexpected that the language groups with more positive parameter settings in the STM, namely the predictable stress languages, performed the most target-like regarding the production of L2 stress, given the perception results. The French and Turkish speakers appeared to be using an English-like strategy since they tended to correctly place L2 stress on the rightmost non-final stressable syllable in the vast majority of nonce words; following their L2 patterns would have led, instead, to stressing the final syllable in the word, unless, in the French case, this syllable contained a schwa vowel. For the Arabic group, it is not quite clear if they correctly applied target-like stress placement or if they followed an L1 strategy, since both approaches would have yielded the same results in the cases investigated here. In line with the other predictable stress languages, however, who applied a target-like strategy and patterned with the native speakers just like the Arabic subjects, it may be speculated that they actually have applied English stress placement rather than Arabic stress placement as well since they showed the same pattern. The additional positive setting of 'quantity sensitivity' may not have had any effect here since there were no final super-heavy syllables in the study that may have enabled us to decide between the two strategies in the case of the Arabic speakers. This speculation, however, cannot be evaluated by the results in this study since they are ambiguous for this language group due to the overlap of L1 and L2 stress for the

production items tested here. Future studies should be able to clarify if all the predicable stress languages are able to correctly apply L2 English stress patterns to unknown words and thus all language groups that do have stress but where stress does not carry information on the word level are successful in acquiring L2 English stress placement strategies.

6.3.2.3. Comparison

Based on the findings from the current study on the perception and production of L2 stress, it can be concluded that the STM yields accurate predictions for both tasks. The parameters proposed in this model can account in a principled way for the differential performance observed by speakers of typologically different languages.

On the one hand, for the perception of stress, what seem to be most crucial are positive parameter settings. Positive settings impede the ability to identify the location of word stress. The more positive settings a language exhibits, the more difficulty speakers of that language have with the perception of L2 stress. Negative parameter settings do not have any effect on the perceptibility of stress.

On the other hand, for the production of word stress, what seems to be crucial is the setting for the uppermost parameter, "stress language", as opposed to the actual number of positive or negative settings for individual additional parameters. The speakers of languages with a negative setting for the parameter 'stress' were the ones who displayed the greatest difficulty with the application of target-like stress placement,

while the speakers of languages with a number of additional positive settings showed the most target-like behavior.

Thus, the value of setting for the topmost parameter, namely 'stress language', in the STM is the most important factor in determining the successful placement of L2 stress in production. If this parameter is set positively, as in the case of stress languages, there appear to be no (major) problems with the correct pronunciation of L2 words with regard to stress placement. Further experiments may, however, permit a closer examination of the possibility of L1 transfer with such languages. In any case, when the first parameter is set negatively, as in the case of non-stress languages, there are major problems with correct placement of L2 stress, leading to different and inadequate strategies for stress production.

This has crucial relevance for the success of L2 acquisition. If learners are able to perceive the location of stress, they still need to be able to produce it according to what native speakers of the L2 perceive as stress. Therefore, only a combination of both skills allows for effective communication in the L2. Therefore, one two-way distinction for perception due to the differential setting for the stress property 'predictable' versus others, and another two-way distinction due to the differential setting of the property 'stress language' requires that successful L2 learners need to have a combination of both settings available.

6.3.3. Summary

The results of the experiments on the perception and the production of stress support the main claim of the SDM and the specific parameters established in the STM. The SDM could be confirmed for the perception of L2 stress in that (i) speakers of languages with predictable stress performed significantly worse than other speakers, (ii) speakers of languages with contrastive stress performed in a target-like way, and (iii) there were differential rates of success within the group of languages with predictable stress. What could not be confirmed, however, was that the most regular languages in this group have the highest degree of difficulty. On the contrary, the speakers of the most regular language according to the SDM, French, had the best perception results among the predictable stress languages in the current experiment.

The parameter settings proposed in the STM were found to have clear manifestations in both the perception and production of L2 stress. Since the parameters in this model have binary settings (negative and positive), only positive settings seem to impede the ability to correctly locate stressed syllables, while negative settings do not seem to influence the performance. For the production of L2 stress, on the contrary, only the topmost parameter appears to be crucial, and in this case the positive setting provides an advantage for speakers. That is, only the speakers with a positive setting for 'stress language' were able to produce L2 stress in a target-like manner, while speakers of languages without stress displayed non-target-like stress placement patters.

6.4. Conclusions

In a comparison of the two experiments, it was found that good perception of L2 stress does not necessarily lead to good production of L2 stress. Furthermore, bad perception does not entail bad production. On the contrary, speakers of languages that performed poorly in the perception task were still able to display fairly target-like production, while speakers of languages that performed target-like in perception displayed poor production of English nonce words regarding stress placement. Hearing stress and articulating stress are independent from each other.

We can conclude that stress characteristics of the native language do have an impact on L2 performance regarding stress in both perception and production. Predictable L1 stress leads to a loss of conscious awareness for the location of stress, however, speakers may nevertheless have a (possibly unconscious) ability to extract and apply some kind of default L2 stress pattern essentially similar to that of native speakers, at least for the types of words investigated in the current study.

It should be remembered that frequency facts regarding stress placement indicate the existence of one very common pattern in English, which was adhered to in production by native speakers as well as the L2 learners in question.

At the same time, however, experience with the production of word stress in the L1 seems to be an advantage for producing stress correctly in a second language. For learners from an L1 with non-predictable stress, this very property may prevent them from trying to find predictability in the L2 and thus cause them to miss a frequency-based regularity. Speakers of languages without stress may not have been able to produce the

appropriate combination of the acoustic correlates of stress in the correct position within a word to be perceived as such by native speakers of the L2.

Therefore, on the one hand, for the perception of word stress, the crucial property undermining the ability to locate L2 stress is having predictable word stress in the L1. On the other hand, for the production of word stress, the crucial property undermining the application of an L2-like pattern is having experience with the production of word stress in the L1. Only a combination of good perceptibility and the ability to produce L2 stress patterns yield successful communication in the L2, which is the ultimate goal of L2 acquisition.

The STM can accommodate the results of the perception as well as in the production experiments, with different parameter settings having different effects in the two tasks. The SDM, however, could only be confirmed for features that are also present in the STM, while the specific claims regarding a hierarchy of stress deafness were not supported by the present experiments.

Chapter 7

SUMMARY AND CONCLUSIONS

This investigation into the L2 acquisition of English stress was conducted to provide more insight into the problems that learners from typologically different native languages encounter. Since the assignment of primary word level stress in English cannot be predicted on the basis of phonological properties of the word alone, this language provided a good test case. This study involved two experiments concerning the perception and production of stress using novel words. Thus, it was the first study of this kind that avoided potential interference of known lexical information or morphological structure, which might have skewed the results of earlier attempts to investigate this issue. Furthermore, a large number of words of varied internal structure was employed in order to yield a substantial number of data points for analysis. Finally, the language groups that participated in the experiments all involved differential parameter settings for word stress according to two typological stress models, namely the Stress Deafness Model (SDM) (Peperkamp and Dupoux 2002), where applicable, and the Stress Typology Model (STM) (Altmann and Vogel 2002).

The results of the study indicate that perception and production of L2 stress underlie different restrictions. Good perceptibility of the location of stress does not imply

good production of stress, and bad perception does not imply bad production. While positive parameter settings in the STM seem to come at a cost for the rate of success in locating the stressed syllable in an unknown L2 word, negative parameter settings do not affect perception. For production, however, it is the mere experience with word level stress, that is, a setting of 'stress language' at the topmost layer in the branching typological hierarchy, that leads to more native-like L2 stress placement, with disadvantages for speakers of non-stress languages.

The current study was not intended to resolve all mysteries surrounding the L2 acquisition of stress, which would have been too great a feat. On the contrary, it aimed at shedding more light on the typological differences of the perception as well as the production side of the L2 acquisition of stress in order to stimulate further systematic research in this area. A number of puzzles remain to be unsolved and thus, the current experiments should provide the motivation and a starting point for future, more detailed studies on L2 stress.

First, the results need to be replicated for a different L2 with unpredictable stress (e.g., Spanish, Russian). This would allow to us look for parallels to the findings reported in this dissertation and providing further support for the claims made here.

Second, the issue of a potential effect of parameter settings beyond 'predictable' versus 'unpredictable' needs to be investigated in more detail. That is, the possible cost of another positive setting, the one for quantity sensitivity, should be clarified. To be more precise, the Arabic speakers' lower performance in perception than the other two predictable stress languages requires further attention. For the same language group,

different production items are necessary (e.g., closed syllables including superheavy final ones) in order to tease apart the overlap of L1 and L2 stress assignment patterns in the current study.

Third, it might be possible that predictable stress languages with less fine-grained stress structures (e.g., French) might show different results for L2s with more detailed stress patterns (e.g., Turkish with its unstressed clitics). Along the same line, more than one language group needs to be evaluated for each branch in the typology, that is, it would be desirable to examine two or three languages sharing the same parameter. Studies exploring these points further will lead to more information regarding the internal organization of certain branches in the typology.

Fourth, it would be desirable to include speakers of languages with stress and tone, for example, Thai speakers. Although there is no provision in the STM for such a language type yet, it should pattern with the predictable stress languages (as reported for perception in Altmann and Vogel 2002) since it does incur positive settings for 'stress' and 'predictable' in the typology.

Fifth, one major question that had to remain unanswered in this study concerns the ability to produce target-like stress patterns despite poor perceptibility. How are learners able to extract stress patterns in the L2 and apply them to novel words if they are not too successful locating the stressed syllable in the input they hear?

Sixth, would the results for production or perception of English stress change if any (morphological or syntactic) information about the type of test words were provided (e.g., using only nouns or words with different kinds of suffixes)? The problem with such an

inquiry, however, is that it is difficult to evaluate what kind of language instruction learners have received and how explicit certain stress rules have been made in the course of learning English.

Finally, a testing design needs to be developed that allows for statistical analysis of production results. This may not only involve using a larger number of items for each structure to be tested (to receive a sizable number of productions for a given structure), but also determining a means of triggering unambiguous (segmental) pronunciations, in order to have comparable data points for each language group.

In sum, the present research has contributed a unified account for the L2 perception and production of stress within one theory-independent typological model. At the same time, however, it also opens a Pandora's Box, leading the way towards further research on related issues.

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APPENDIX A:

Exhaustive List of Types and Items Used in Perception Task

C = consonant

V = tense vowel

V = lax vowel

G = glide

Bold print indicates syllables carrying primary word stress.

1. Two-syllable structures:

Primary stress on 1st syllable (9 types):

CV-Cə	**CV**-Cə	**CVG**-Cə
mel-la[24]	dea-ma	ny-da
vip-pa	soo-ra	loy-fa
CV-CV	**CV**-CV	**CVG**-CV
fis-soe	koo-ree	moy-roo
dal-ley	nee-soo	fauw-tay
CV-CVG	**CV**-CVG	**CVG**-CVG
fen-nye	chee-noy	loi-gauw
pum-moy	zoa-gye	py-doy

[24] Phonologically, CV syllables with lax vowels are open, however, in surface phonetics they may attract the following syllable onset and thus contain an ambisyllabic segment. This is different from open schwa syllables. In spelling, I am using double consonants to express this distinction here: double consonants for full lax vowels, and single consonants for others (including schwa).

Primary stress on 2nd syllable (8 types):

Cə-**CV** ra-dey ba-noo	Cə-**CVG** pa-roy fa-sye
CV-**CV** jav-vay lin-noa	CV-**CVG** buf-foy pez-zye
CV-**CV** nay-lee dee-soo	CV- **CVG** yoo-zye vee-rauw
CVG-**CV** fye-roo doy-vee	CVG-**CVG** lauw-sai vye-loy

2. Three-syllable structures:[25]

Primary stress on 1st syllable (13 types):

CV-Cə-Cə lis-se-da	**CV**-Cə-Cə roo-de-la	**CVG**-Cə-Cə soi-be-na
CV-CV-Cə naf-fee-pa	**CV**-CV-Cə kee-day-sa	**CVG**-CV-Cə foy-roa-ba
CV-CVG-Cə del-loy-ma	**CV**-CVG-Cə lay-tou-sa	
CV-Cə-CV pag-ge-noo	**CV**-Cə-CV bey-ne-dee	**CVG**-Cə-CV koy-va-lee
CV-Cə-CVG sim-me-lauw	**CV**-Cə-CVG dea-ve-nye	

[25] Empty cells are due to the exclusion of structures with two or more diphthongs in 3- and 4-syllable words.

Primary stress on 2nd syllable (13 types):

Cə-**CV**-Cə ta-rem-ma	Cə-**CV**-Cə ze-doo-la	Cə-**CVG**-Cə me-noy-sa
Cə-**CV**-CV ve-ril-lay	Cə-**CV**-CV da-fea-noo	Cə-**CVG**-CV pe-coi-tay
Cə-**CV**-CVG ca-vos-sauw	Cə-**CV**-CVG ba-foo-roy	
CV-**CV**-Cə shoo-bel-la	CV-**CV**-Cə hoa-fay-la	CV-**CVG**-Cə ley-tauw-ma
CVG-**CV**-Cə soi-det-ta	CVG-**CV**-Cə moy-roa-na	

Primary stress on 3rd syllable (5 types):

(no more than one unstressed syllable allowed word-initially):

CV-Cə-**CV** fel-la-zee sav-va-ney lin-ne-soo	CV-Cə-**CVG** dim-me-foy saf-fe-gye ves-se-tauw
CV-Cə-**CV** joa-ma-ray fay-sa-boo voo-la-fea	CV-Cə-**CVG** roo-la-doy boe-da-zye kea-va-loy
CVG-Cə-**CV** pow-na-soe coy-da-lee fye-ca-nye	

3. Four-syllable structures:

Primary stress on 1st syllable: (7 types)

CV-CV-Cə-CV fin-nay-ba-soo kat-tee-ne-moe	**CV**-CV-Cə-CV lee-roo-ne-mey roo-nee-be-rey	**CVG**-CV-Cə-CV gow-roo-za-tay foi-nee-le-ro
CV-CV-Cə-CVG bal-lee-de-mye nid-doo-va-loy	**CV**-CV-Cə-CVG chee-lay-ne-zow tay-loe-de-noy	
CV-CVG-Cə-CV seg-gow-ne-rey sim-maw-le-roo	**CV**-CVG-Cə-CV voo-dauw-se-mee hoa-gow-ve-zay	

Primary stress on 2nd syllable (12 types):

Cə-**CV**-Cə-CV za-fer-ra-doo	Cə-**CV**-Cə-CV da-rey-sa-mee	Cə-**CVG**-Cə-CV fa-bou-se-dee
Cə-**CV**-Cə-CVG wa-tep-pe-loy	Cə-**CV**-Cə-CVG na-tee-fe-zow	
CV-**CV**-Cə-CV bea-del-la-zay	CV-**CV**-Cə-CV mea-soo-fa-nee	CV-**CVG**-Cə-CV yee-loi-ne-boo
CV-**CV**-Cə-CVG roo-nef-fa-mye	CV-**CV**-Cə-CVG boo-rey-ga-vow	
CVG-**CV**-Cə-CV fy-rem-ma-tee	CVG-**CV**-Cə-CV mye-zea-ca-boo	

Primary stress on 3rd syllable (12 types):

CV-Cə-**CV**-Cə fay-se-rik-ka	CV-Cə-**CV**-Cə vea-da-soo-la	CV-Cə-**CVG**-Cə poo-de-nauw-za
CV-Cə-**CV**-CV mea-da-rem-mye	CV-Cə-**CV**-CV soo-la-bey-dee	CV-Cə-**CVG**-CV roa-ma-sye-poe
CV-Cə-**CV**-CVG loa-ca-din-noy	CV-Cə-**CV**-CVG zea-da-rai-nye	
CVG-Cə-**CV**-Cə bou-se-del-la	CVG-Cə-**CV**-Cə dow-se-koo-ma	
CVG-Cə-**CV**-CV dy-ne-ves-soe	CVG-Cə-**CV**-CV ty-se-doo-vay	

Primary stress on 4th syllable (6 types):

Cə-CV-Cə-**CV** sa-jow-me-doo be-lee-ga-zay	Cə-CV-Cə-**CVG** ka-roo-de-mauw ne-tee-fe-sye
Cə-CVG-Cə-**CV** cha-moy-na-vea sha-ly-de-ree	
CV-Cə-Cə-**CV** poa-ne-la-zay doo-ve-na-lee	CV-Cə-Cə-**CVG** ree-ze-la-nye zay-fa-ra-loy

CVG-Cə- Cə-**C<u>V</u>** dy-me-la-ree poi-la-sa-doo	

APPENDIX B:

Transcript of Instructions for Practice in Perception Experiment

As you may know, the placement of stress in an English word may change its meaning. For example, the word "permit" has two different pronunciations: (1) If stress is on the first syllable (PERmit), it is a noun, as in the example "You need a PERmit if you want to park your car on campus." (2) If stress is on the second syllable (perMIT), it is a verb, as in the example "The police does not perMIT people to drive when they are drunk." I will play to you the two different pronunciations of 'permit' in comparison with each other. Please listen carefully to see if you can hear the difference. Click in the "yes" box now if you are ready to continue.

PER mit

per MIT

SUS pect

sus PECT

ARE YOU READY FOR SOME ACTION? You will hear a few words. Every word is spoken twice so that you can listen more closely. After hearing a word twice, please use your mouse and click on the syllable that you think has the most stress or sounds the most prominent in this word. After your response, you will see which response would have been correct. The same word will then be presented again, in order for you to have a chance to revise your answer. You'll need to select the syllable with most stress again, no matter if you got it right the first time or not. OK? Let's practice! Click in the "YES" box to start.

A me ri ca
Ca na da
mel le ree
ca ra tis sey
fay na

Now, we'll continue practicing without feedback! What you will see now is exactly the way the actual experiment will work. The procedure is the same as before: You will hear each word twice and then you respond by clicking on the syllable that you think has most stress in the word. Remember that you can't respond before you hear the second presentation of each word. Don't try to recognize these words -- I am sure you have never seen or heard them before. Ready? Then click on "YES", and the practice session will start.

Practice Items for Perception Experiment (bold indicates primary stress):

*da-pe-**ven**-na, koa-la-**vee**, **pif**-fa-tel-la, re-**tu**-me-ree, ta-**kee***

APPENDIX C:

Statistical Analyses

1. One-way ANOVA for overall performance

- Summary of Fit:

Rsquare	0,732557
Adj Rsquare	0,706556
Root Mean Square Error	0,563117
Mean of Response	2,174
Observations (or Sum Wgts)	80

- Analysis of Variance:

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
language	7	62,537640	8,93395	28,1738	<.0001
Error	72	22,831280	0,31710		
C. Total	79	85,368920			

- Means for Oneway Anova:

Level	Number	Mean	Std Error	Lower 99%	Upper 99%
Arabic	10	0,59800	0,17807	0,1268	1,0692
Chinese	10	2,76300	0,17807	2,2918	3,2342
English	10	2,86700	0,17807	2,3958	3,3382
French	10	1,50400	0,17807	1,0328	1,9752
Japanese	10	2,96200	0,17807	2,4908	3,4332
Korean	10	2,89200	0,17807	2,4208	3,3632
Spanish	10	2,68100	0,17807	2,2098	3,1522
Turkish	10	1,12500	0,17807	0,6538	1,5962

Std Error uses a pooled estimate of error variance

- Means Comparisons:

Dif=Mean[i]-Mean[j]	Japanese	Korean	English	Chinese	Spanish	French	Turkish	Arabic
Japanese	0,0000	0,0700	0,0950	0,1990	0,2810	1,4580	1,8370	2,3640
Korean	-0,0700	0,0000	0,0250	0,1290	0,2110	1,3880	1,7670	2,2940
English	-0,0950	-0,0250	0,0000	0,1040	0,1860	1,3630	1,7420	2,2690
Chinese	-0,1990	-0,1290	-0,1040	0,0000	0,0820	1,2590	1,6380	2,1650
Spanish	-0,2810	-0,2110	-0,1860	-0,0820	0,0000	1,1770	1,5560	2,0830
French	-1,4580	-1,3880	-1,3630	-1,2590	-1,1770	0,0000	0,3790	0,9060
Turkish	-1,8370	-1,7670	-1,7420	-1,6380	-1,5560	-0,3790	0,0000	0,5270
Arabic	-2,3640	-2,2940	-2,2690	-2,1650	-2,0830	-0,9060	-0,5270	0,0000

Alpha= 0,01

1.1 Comparisons for all pairs using Tukey-Kramer HSD

q*	Alpha
3,68195	0,01

Abs(Dif)-LSD	Japanese	Korean	English	Chinese	Spanish	French	Turkish	Arabic
Japanese	-0,9272	-0,8572	-0,8322	-0,7282	-0,6462	0,5308	0,9098	1,4368
Korean	-0,8572	-0,9272	-0,9022	-0,7982	-0,7162	0,4608	0,8398	1,3668
English	-0,8322	-0,9022	-0,9272	-0,8232	-0,7412	0,4358	0,8148	1,3418
Chinese	-0,7282	-0,7982	-0,8232	-0,9272	-0,8452	0,3318	0,7108	1,2378
Spanish	-0,6462	-0,7162	-0,7412	-0,8452	-0,9272	0,2498	0,6288	1,1558
French	0,5308	0,4608	0,4358	0,3318	0,2498	-0,9272	-0,5482	-0,0212
Turkish	0,9098	0,8398	0,8148	0,7108	0,6288	-0,5482	-0,9272	-0,4002
Arabic	1,4368	1,3668	1,3418	1,2378	1,1558	-0,0212	-0,4002	-0,9272

Positive values show pairs of means that are significantly different.

1.2 Cluster Analysis

Level			Mean
Japanese	A		2,9620000
Korean	A		2,8920000
English	A		2,8670000
Chinese	A		2,7630000
Spanish	A		2,6810000
French		B	1,5040000
Turkish		B	1,1250000
Arabic		B	0,5980000

Levels not connected by same letter are significantly different

2. Analysis of language and word length

2.1. Manova across languages and word lengths

Sphericity Test:

Mauchly Criterion	0.9269981
ChiSquare	5.3820645
DF	2
Prob >Chisq	0.0678109

2.2. Mixed Effects Model Analysis of Repeated Measures across languages and word lengths

- Summary of Fit

RSquare	0.913696
RSquare Adj	0.904506
Root Mean Square Error	0.331447
Mean of Response	2.174167
Observations (or Sum Wgts)	240

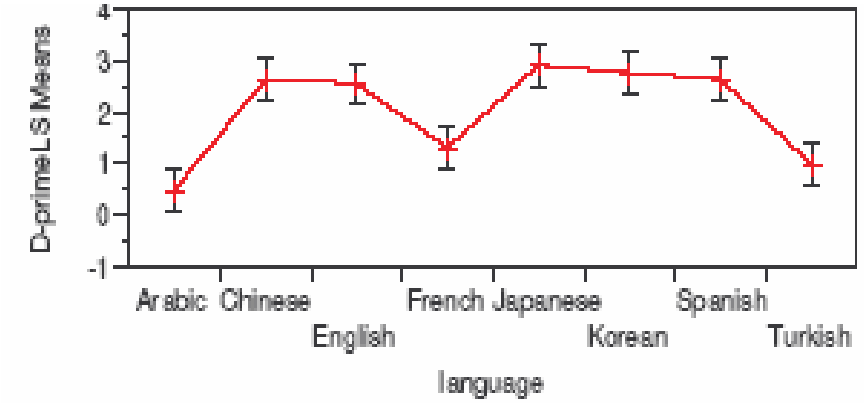
- Effect Test

Source	Nparm	DF	DFDen	Sum of Squares	F Ratio	Prob > F
Language	7	7	144	17.709084	23.0288	<.0001
Length	2	2	144	1.951936	8.8840	0.0002
Language*length	14	14	144	1.290071	0.8388	0.6262
Subject&Random	80	72	144	60.668150	.	.

SS for Tests on Random effects refer to shrunken predictors rather than traditional estimates.

2.2.1 Language

- LS Means Plot



- LSMeans Differences Tukey HSD

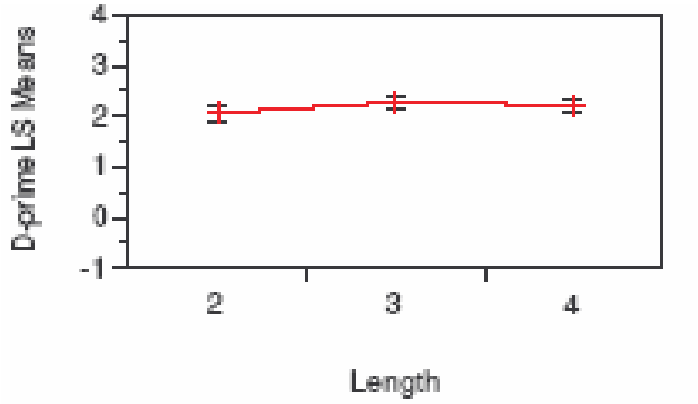
Alpha=0.050 Q=3.07601

Level			Least Sq Mean
Japanese	A		2.9170000
Korean	A		2.7790000
Chinese	A		2.6540000
Spanish	A		2.6520000
English	A		2.5690000
French		B	1.3230000
Turkish		B	1.0070000
Arabic		B	0.5000000

Levels not connected by same letter are significantly different

2.2.2 Word Length

- LS Means Plot



- LSMeans Differences Tukey HSD

Alpha= 0.050 Q=2.36823

Level		Least Sq Mean
3	A	2.2618750
4	A	2.2105000
2	B	2.0501250

Levels not connected by same letter are significantly different

3. Analysis by language and stressed position

3.1 Two-Syllable Words

3.1.1 Summary of Fit

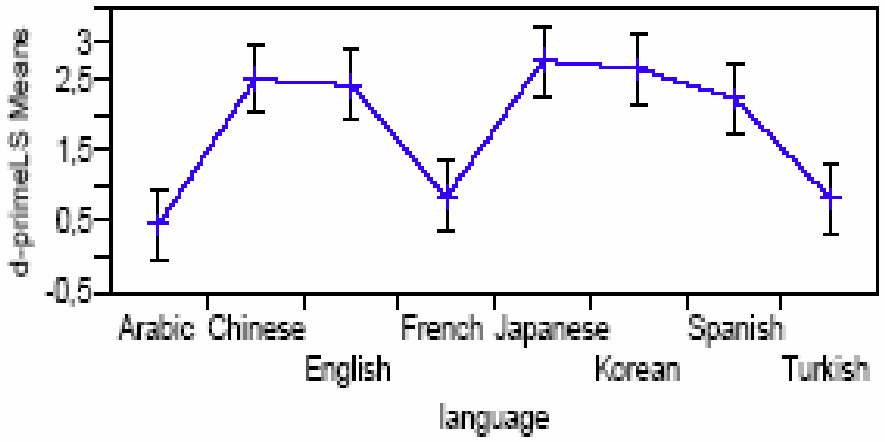
RSquare	0,606086
RSquare Adj	0,565053
Root Mean Square Error	0,784838
Mean of Response	2,048438
Observations (or SumWgts)	160

3.1.2 Effect Test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
language	7	7	63,698689	14,7731	<.0001
position (R edge) 2	1	1	7,280356	11,8193	0,0008
language*position (R edge) 2	7	7	3,161929	0,7333	0,6440

3.1.2.1 Language

3.1.2.1.1 LS Means Plot



3.1.2.1.2 LS Means Differences Tukey HSD

p= .050 Q=3.0760

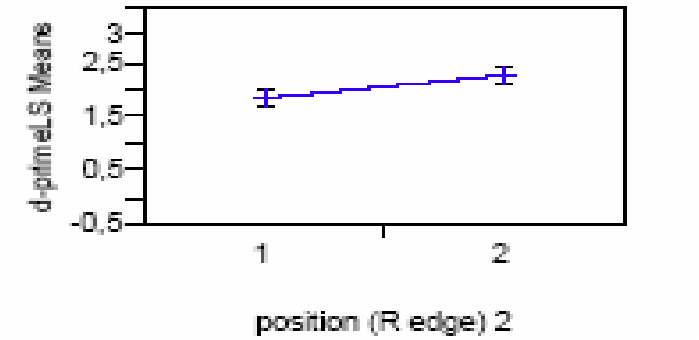
Level		Least Sq Mean
Japanese	A	2,7600000
Korean	A	2,6460000
Chinese	A	2,5050000
English	A	2,4200000
Spanish	A	2,2280000
French	B	0,8500000
Turkish	B	0,8170000
Arabic	B	0,4550000

Levels not connected by the same letter are significantly different.

3.1.2.2 Position

[Analysis from right edge, thus 1=final, 2=penult]

3.1.2.2.1 LS Means Plot



3.1.2.2.2 LS Means Differences Tukey HSD

Alpha= .050 Q= 1.9766

Level		Least Sq Mean
2	A	2,2617500
1	B	1,8351250

Levels not connected by the same letter are significantly different.

3.2 Three-Syllable Words

3.2.1 Summary of Fit

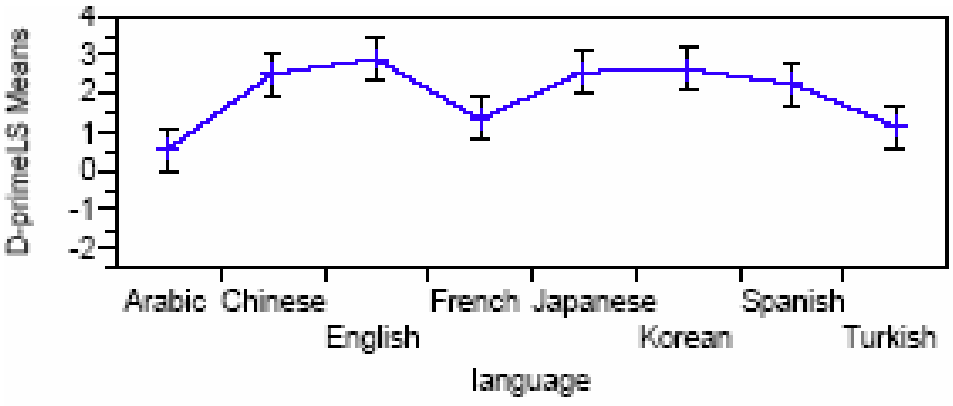
RSquare	0,560025
RSquare Adj	0,513176
Root Mean Square Error	0,884297
Mean of Response	2,262792
Observations (or Sum Wgts)	240

3.2.2 Effect Test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
language	7	7	50,130909	9,1582	<.0001
Position (R edge)	2	2	9,759103	6,2400	0,0023
language*Position (R edge)	14	14	8,501990	0,7766	0,6939

3.2.2.1 Language

3.2.2.1.1 LS Means Plot



3.2.2.1.2 LS Means Differences Tukey HSD

Alpha= .050 Q= 3.0601

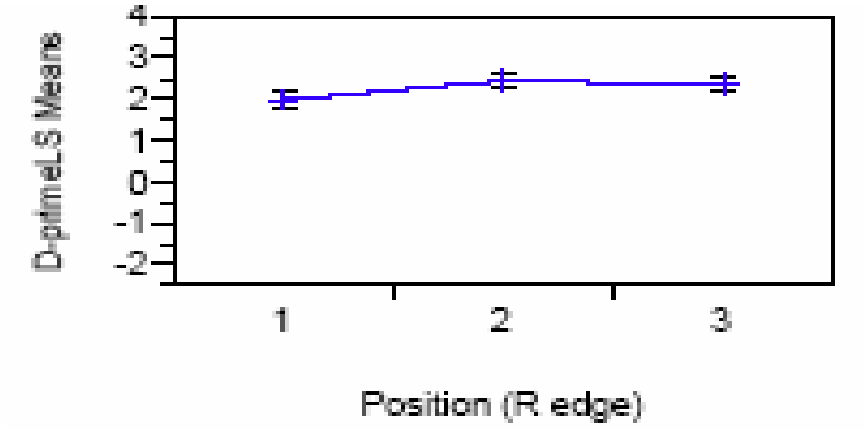
Level					Least Sq Mean
English	A				2,8950000
Korean	A				2,6140000
Japanese	A				2,5470000
Chinese	A	B			2,4980000
Spanish	A	B	C		2,2530000
French		B	C	D	1,3320000
Turkish			C	D	1,1560000
Arabic				D	0,5620000

Levels not connected by the same letter are significantly different.

3.2.2.2 Position

[Analysis from right edge, thus 1=final, 2=penult, 3=antepenult]

3.2.2.2.1 LS Means Plot



3.2.2.2.2. LS Means Differences Tukey HSD

Alpha= .050 Q= 2.3600

Level		Least Sq Mean
2	A	2,4468750
3	A	2,3593750
1	B	1,9821250

Levels not connected by the same letter are significantly different.

3.3 Four-Syllable Words

3.3.1 Summary of Fit

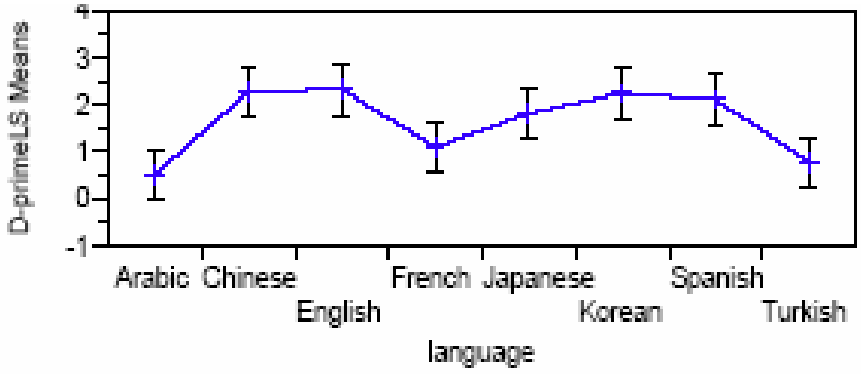
RSquare	0,590454
RSquare Adj	0,546371
Root Mean Square Error	0,871637
Mean of Response	2,209812
Observations (or Sum Wgts)	320

3.3.2 Effect Test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
language	7	7	37,902339	7,1268	<.0001
Position (R edge)	3	3	60,642381	26,6063	<.0001
	21	21	14,579044	0,9138	0,5734

3.3.2.1 Language

3.3.2.1.1 LS Means Plot



3.3.2.1.2 LS Means Differences Tukey HSD

Alpha= .050 Q= 3.0534

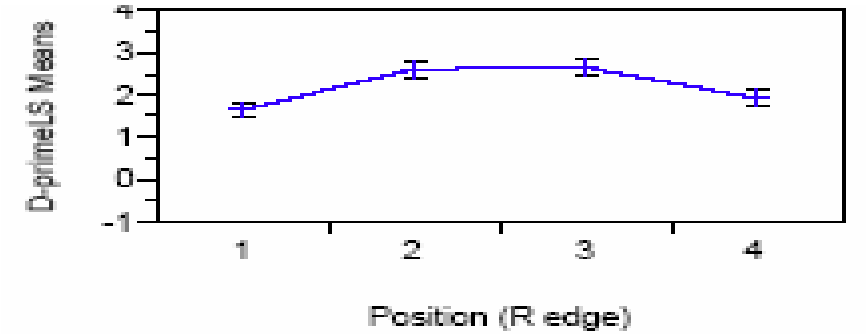
Level					Least Sq Mean
English	A				2,3280000
Chinese	A	B			2,2810000
Korean	A	B			2,2460000
Spanish	A	B			2,1150000
Japanese	A	B	C		1,8150000
French		B	C	D	1,1060000
Turkish			C	D	0,7790000
Arabic				D	0,5190000

Levels not connected by the same letter are significantly different.

3.3.2.2 Position

[Analysis from right edge, thus 1=final, 2=penult, 3=antepenult, 4=preantepenult]

3.3.2.2.1 LS Means Plot



3.3.2.2.2 LS Means Differences Tukey HSD

Alpha= .050 Q= 2.5841

Level		Least Sq Mean
3	A	2,6510000
2	A	2,6171250
4	B	1,9225000
1	B	1,6486250

Levels not connected by the same letter are significantly different.

APPENDIX D:

Exhaustive List of Structures and Items Used in Production Task

C = consonant

V = tense vowel

2-syllable words	3-syllable words	4-syllable words
Cə-CV le·soo za•fey fa•roe na•zee de•rey	Cə-CV-Cə da·boo·va la•vee•ga na•zey•da sa•foa•na	Cə-CV-Cə-CV ma·ley·da·zee da•noo•va•sey sa•roa•la•noo
CV-Cə chee·la noo•va toa•fa dey•sa roa•na	CV-Cə-CV mee·ga·noo nay•sa•mee hoa•la•dee soo•da•rey	CV-Cə-CV-Cə pey·sa·doa·ba roa•fa•zee•la soo•ba•ney•da
CV-CV noo·dee zay•voo joa•tay vay•mee dee•nay	CV-CV-Cə toa·nee·ma jee•doo•va ley•soa•da voo•zay•la	CV-Cə-CV-CV vee•na•doo•rey roo•la•doa•ney mey•da•ree•voo
	CV-Cə-Cə fay·se·na coa•ne•va zee•me•la soo•be•ra	CV-Cə-Cə-CV mey•ze•la•noe zea•re•ma•voo goo•ve•ra•dee

		C<u>V</u>-C<u>V</u>-Cə-C<u>V</u> soa•loo•da•mee pey•nee•za•roo noo•zay•fa•loe

APPENDIX E:

Subject Responses (Perception Experiment)

Subjects' responses are coded by the syllable they clicked on, counted from the right edge of the word (i.e., 1 = final, 2= penultimate, etc.).

The percentages provide the correctness score for each subject across all items, and blank cells indicate no response for this item.

1. Arabic

Item	Stressed syllable (from right edge)	Arab 1 (52.0 %)	Arab 2 (48.8 %)	Arab 3 (32.8 %)	Arab 4 (72 %)	Arab 5 (49.6 %)	Arab 6 (68.8 %)	Arab 7 (64.8 %)	Arab 8 (60.8 %)	Arab 9 (34.4 %)	Arab 10 (46.4 %)
"mel-la"	**2**	1	1	1	1	1	2	2	2	1	1
"vip-pa"	**2**	1	1	2	2	1	2	1	1	2	1
"dea-ma"	**2**	1	1	1	2	2	2	1	2	2	2
"soo-ra"	**2**	1	1	2	2	2	2	1	2	1	2
"ny-da"	**2**	2	2	2	2	1	2	2	2	2	2
"loy-fa"	**2**	2	1	1	2	2	1	2	1	1	2
"fis-soe"	**2**	2	2	2	1	2	1	1	2	1	2
"dal-ley"	**2**	2	2	1	2	2	2	2	2	1	2
"koo-ree"	**2**	2	2	1	2	2	2	2	2	1	2
"nee-soo"	**2**	2	2	2	2	2	1	2	2	2	1
"moy-roo"	**2**	2	1	1	2	1	1	2	2	2	2
"fauw-tay"	**2**	2	2	1	2	2	2	2	2	1	2
"fen-nye"	**2**	1	2	2	2	1	2	2	1	1	1
"pum-moy"	**2**	2	2	2	2	2	1	2	2	1	2
"chee-noy"	**2**	2	1	1	2	2	2	2	2	1	2
"zoa-gye"	**2**	1	1	1	2	1	2	2	2	2	2
"loi-gauw"	**2**	2	1	1	2	1	1	2	2	1	2
"py-doy"	**2**	1	1	1	2	2	2	2	2	2	2
"ra-dey"	**1**	1	1	1	1	1	1	1	2	1	2
"ba-noo"	**1**	1	1	1	1	2	1	1	2	2	2

cont'd

Item	Stressed syllable (from right edge)	Arab 1 (52.0 %)	Arab 2 (48.8 %)	Arab 3 (32.8 %)	Arab 4 (72 %)	Arab 5 (49.6 %)	Arab 6 (68.8 %)	Arab 7 (64.8 %)	Arab 8 (60.8 %)	Arab 9 (34.4 %)	Arab 10 (46.4 %)
"pa-roy"	**1**	2	2	1	1	1	1	1	2	1	1
"fa-sye"	**1**	1	1	2	2	2	1	1	2	2	2
"jav-vay"	**1**	2	1	1	1	2	1	1	1	1	2
"lin-noa"	**1**	1	2	2	1	2	1	1	2	1	1
"buf-foy"	**1**	2	1	2	1	2	2	1	1	1	2
"pez-zye"	**1**	2	2	2	1	2	2	1	2	2	1
"nay-lee"	**1**	1	2	1	1	1	1	1	2	1	1
"dee-soo"	**1**	2	2	2	1	2	1	1	2	2	2
"yoo-zye"	**1**	2	1	2	1	1	1	1	1	1	1
"vee-rauw"	**1**	1	2	1	1	2	1	1	1	2	1
"fye-roo"	**1**	1	1	1	2	2	1	1	2	2	2
"doy-vee"	**1**	1	1	1	1	1	2	1	1	1	1
"lauw-sai"	**1**	1	1	1	1	1	1	2	1	2	2
"vye-loy"	**1**	1	2	2	1	1	1	2	2	2	1
"lis-se-da"	**3**	2	3	3	1	2	3	2	3	2	3
"roo-de-la"	**3**	1	3	2	3	2	2	2	2	1	3
"soi-be-na"	**3**	3	1	2	3	2	2	3	3	2	3
"naf-fea-pa"	**3**	2	3	1	2	3	3	2	3	1	3
"kee-dey-sa"	**3**	3	1	3	3	3	3	3	2	2	3
"foy-roa-ba"	**3**	3	3	1	3	3	3	3	3	2	2
"del-loy-ma"	**3**	2	3	2	2	2	3	1	2	2	2
"ley-tou-sa"	**3**	3	3	2	2	2	2	3	3	2	2
"pag-ge-noo"	**3**	1	1	2	3	2	3	2	3	1	3
"bey-ne-dee"	**3**	1	1	2	3	1	3	1	3	1	1
"koy-va-lee"	**3**	3	1	1	3	3	3	3	3	1	3
"sim-me-lauw"	**3**	3	3	2	1	2	3	3	1		3
"dea-ve-nye"	**3**	3	3	1	3	1	1	3	2	2	2
"ta-rem-ma"	**2**	2	2	1	3	2	2	2	2	2	3
"ze-doo-la"	**2**	2	2	3	3	2	2	2	2	3	3
"me-noy-sa"	**2**	3	1	1	3	2	2	2	1	2	2
"ve-ril-ley"	**2**	1	2	3	2	1	2	1	2	1	2
"da-fea-noo"	**2**	3	1	3	2	2	2	2	3	1	2
"pe-coi-tay"	**2**	2	1	1	3	2	2	2	2	1	2
"ca-vos-sauw"	**2**	2	1	2	2	2	1	1	3	2	1
"ba-foo-roy"	**2**	1	1	2	2	2	2	2	2	3	2
"shoo-bel-la"	**2**	2	2	2	2	2	2	2	2	1	2
"hoa-fay-la"	**2**	2	1	1	2	2	3	3	2	1	3
"ley-tauw-ma"	**2**	2	2	2	2	2	2	1	1	2	2
"soi-det-ta"	**2**	1	1	2	2	1	2	2	2	2	2
"moy-roa-na"	**2**	3	3	1	2	2	3	3	3	1	2
"fel-la-zee"	**1**	1	1	1	1	2	1	1	1	2	2
"sav-va-ney"	**1**	3	3	2	3	3	1	1	2	1	1
"lin-ne-soo"	**1**	1	3	2	1	1	3	2	1		3
"dim-me-foy"	**1**	1	1	2	1	2	3	1	2	3	3

cont'd

Item	Stressed syllable (from right edge)	Arab 1	Arab 2	Arab 3	Arab 4	Arab 5	Arab 6	Arab 7	Arab 8	Arab 9	Arab 10
"saf-fe-gye"	**1**	1	1	2	1	2	1	1	1	1	3
"ves-se-tauw"	**1**	2	1	2	1	1	1	1	1	1	1
"joa-ma-rey"	**1**	2	2	3	1	3	1	1	1	1	2
"fay-sa-boo"	**1**	1	2	2	1	1	1	1	3	3	1
"voo-la-fea"	**1**	2	1	2	1	1	3	2	1	1	2
"roo-la-doy"	**1**	1	1	1	1	1	1	1	1	1	2
"kea-va-loy"	**1**	3	1	2	3	3	3	1	1	1	3
"boe-da-zye"	**1**	1	2	2	1	2	1	2	1	2	2
"pow-na-soe"	**1**	1	1	2	3	1	3	1	2	1	3
"coy-da-lee"	**1**	3	1	2	3	1	3	1	3	2	2
"fye-ca-nye"	**1**	1	1	2	2	2	3	3	2	2	2
"fin-nay-ba-soo"	**4**	3	4	2	3	3	4	1	4	4	2
"kat-tee-ne-moe"	**4**	3	3	2	3	3	4	3	4	2	3
"lee-roo-ne-mey"	**4**	5	4	2	4	2	4	3	4	1	1
"roo-nee-be-rey"	**4**	4	2	3	4	3	3	3	4	1	3
"gow-roo-za-tay"	**4**	1	4	2	4	1	1	3	4	1	2
"foi-nee-le-ro"	**4**	3	3	2	4	3	4	4	3	3	3
"bal-lee-de-mye"	**4**	2	2	3	1	2	2	3	4	2	3
"nid-doo-va-loy"	**4**	4	3	2	3	3	4	1	4	4	2
"chee-ley-ne-zow"	**4**	4	4	2	4	4	4	3	4	3	4
"tay-loe-de-noy"	**4**	3	4	5	4	1	4	1	4	3	4
"seg-gow-ne-rey"	**4**	3	3	2	1	2	4	3	4	3	4
"sim-mauw-le-roo"	**4**	3	1	4	4	3	4	3	3	4	3
"voo-dauw-se-mee"	**4**	2	4	2	4	4	3	1	3	4	3
"hoa-gow-ve-zay"	**4**	3	3	2	3	3	3	3	1	2	3
"za-fer-ra-doo"	**3**	4	4	3	4	2	3	4	3	1	2
"da-rey-sa-mee"	**3**	2	3	1	3	3	3	2	3	1	3
"fa-bou-se-dee"	**3**	3	1	2	3	1	1	3	3	2	3
"wa-tep-pe-loy"	**3**	2	3	3	3	3	3	3	3	1	3
"na-tee-ve-zow"	**3**	2	3	2	3	3	3	3	4	2	3
"bea-del-la-zay"	**3**	3	3	2	3	3	3	2	3	2	3
"mea-soo-fa-nee"	**3**	2	1	2	3	3	3	3	3	2	1
"yee-loi-ne-boo"	**3**	3	4	2	4	2	3	2	3	3	3
"roo-nef-fa-mye"	**3**	3	1	3	3	3	4	3	4	3	2
"boo-ray-va-gow"	**3**	3	2	2	4	3	3	3	3	3	1
"fy-rem-ma-tee"	**3**	1	1	1	3	2	2	1	2	1	1
"mye-zea-ca-boo"	**3**	2	2	2	3	2	2	3	2	4	2
"fay-se-rik-ka"	**2**	2	2	2	2	2	2	2	1	3	4
"vea-da-soo-la"	**2**	3	2	2	3	3	2	2	2	4	3
"poo-de-nauw-za"	**2**	2	2	2	2	2	2	2	2	2	3
"mea-da-rem-mye"	**2**	2	3	2	3	2	2	1	3	3	2
"soo-la-bey-dee"	**2**	2	1	2	1	2	2	1	2	2	1
"roa-ma-sye-poe"	**2**	1	1	2	2	3	2	3	2	2	2

cont'd

Item	Stressed syllable (from right edge)	Arab 1	Arab 2	Arab 3	Arab 4	Arab 5	Arab 6	Arab 7	Arab 8	Arab 9	Arab 10
"loa-ca-din-noy"	**2**	2	2	2	2	2	2	2	2	2	4
"zea-da-rai-nye"	**2**	2	3	2	1	3	1	2	2	2	1
"bou-se-del-la"	**2**	2	1	3	2	2	2	2	2	3	3
"dow-se-koo-ma"	**2**	2	1	2	2	2	4	2	1	4	2
"dy-ne-ves-soe"	**2**	2	4	2	2	2	2	2	3	2	4
"ty-se-doo-vay"	**2**	1	2	2	2	2	2	2	2	3	4
"sa-jow-me-doo"	**1**	3	1	3	1	1	1	3	3	1	1
"be-lee-ga-zay"	**1**	3	1	2	1	1	1	1	3	2	4
"ka-roo-de-mauw"	**1**	1	4	2	3	3	1	1	4	2	3
"ne-tee-fe-sye"	**1**	3	3	2	1	3	3	1	4	2	1
"cha-moy-na-vea"	**1**	4	1	1	4	4	4	1	4	2	4
"sha-ly-de-ree"	**1**	4	2	2	1	3	1	1	3	2	1
"poa-ne-la-zay"	**1**	4	1	3	4	4	1	1	1	1	2
"doo-ve-na-lee"	**1**	1	4	2	4	1	4	3	3	3	1
"ree-ze-la-nye"	**1**	3	2	2	1	4	3	1	1	4	3
"zay-fa-ra-loy"	**1**	1	4	3	1	3	1	1	4	4	3
"dy-me-la-ree"	**1**	2	1	2	1	1	1	1	1	2	2
"poi-la-sa-doo"	**1**	1	1	2	1	2	2	1	1	4	2

2. Chinese

Item	Stressed syllable (from right edge)	Chin 1 (87.9 %)	Chin 2 (99.2 %)	Chin 3 (83.2 %)	Chin 4 (86.4 %)	Chin 5 (97.6 %)	Chin 6 (96.8 %)	Chin 7 (96.0 %)	Chin 8 (87.2 %)	Chin 9 (96.8 %)	Chin 10 (95.2 %)
“mel-la”	**2**	2	2	2	2	2	2	2	2	2	2
“vip-pa”	**2**	1	2	2	2	2	2	2	1	2	2
“dea-ma”	**2**	2	2	2	2	2	2	2	2	2	2
“soo-ra”	**2**	2	2	2	2	2	2	2	2	2	2
“ny-da”	**2**	2	2	2	2	2	2	2	2	2	2
“loy-fa”	**2**	2	2	2	2	2	2	2	2	2	2
“fis-soe”	**2**	2	2	2	2	2	2	2	2	2	2
“dal-ley”	**2**	2	2	2	2	2	2	2	2	2	2
“koo-ree”	**2**	2	2	2	2	2	2	2	2	2	2
“nee-soo”	**2**	2	2	2	2	2	2	2	2	2	2
“moy-roo”	**2**	2	2	2	2	2	2	2	2	2	2
“fauw-tay”	**2**	2	2	2	2	2	2	2	2	2	2
“fen-nye”	**2**	2	2	1	1	2	2	2	2	2	2
“pum-moy”	**2**	2	2	2	1	2	2	2	2	2	2
“chee-noy”	**2**	2	2	2	2	2	2	2	2	2	2
“zoa-gye”	**2**	2	2	2	2	2	2	2	2	2	2
“loi-gauw”	**2**	2	2	2	2	2	2	2	2	2	2
“py-doy”	**2**	2	2	2	2	2	2	2	2	2	2
“ra-dey”	**1**	1	1	1	1	1	1	1	1	1	1
“ba-noo”	**1**	1	1	1	1	1	1	1	1	1	1
“pa-roy”	**1**	1	1	1	1	1	1	1	1	1	1
“fa-sye”	**1**	1	1	1	1	1	1	1	1	1	1
“jav-vay”	**1**	1	1	1	1	1	1	1	1	1	1
“lin-noa”	**1**	1	1	1	1	1	1	1	1	1	2
“buf-foy”	**1**	1	1	1	1	1	1	1	1	1	1
“pez-zye”	**1**	1	1	1	1	1	1	1	1	1	1
“nay-lee”	**1**	1	1	1	2	1	1	1	2	1	1
“dee-soo”	**1**	1	1	2	1	1	1	1	1	1	1
“yoo-zye”	**1**	1	1	1	1	1	1	1	1	1	1
“vee-rauw”	**1**	1	1	1	1	1	1	1	1	1	2
“fye-roo”	**1**	2	1	1	1	1	1	1	2	1	1
“doy-vee”	**1**	1	1	1	1	1	1	1	1	1	1
“lauw-sai”	**1**	1	1	2	1	1	1	1	1	1	1
“vye-loy”	**1**	1	1	2	1	1	1	1	1	1	1
“lis-se-da”	**3**	3	3	3	3	3	3	3	3	3	3
“roo-de-la”	**3**	3	3	3	3	3	3	3	3	3	3
“soi-be-na”	**3**	3	3	1	3	3	3	3	3	3	3
“naf-fea-pa”	**3**	3	3	1	3	3	3	3	3	3	3
“kee-dey-sa”	**3**	3	3	3	3	3	3	3	3	3	3
“foy-roa-ba”	**3**	3	3	2	3	3	3	3	3	3	3
“del-loy-ma”	**3**	3	3	1	2	3	3	3	3	3	3
“ley-tou-sa”	**3**	3	3	3	3	3	3	3	3	3	3

cont'd

Item	Stressed syllable (from right edge)	Chin 1	Chin 2	Chin 3	Chin 4	Chin 5	Chin 6	Chin 7	Chin 8	Chin 9	Chin 10
"pag-ge-noo"	**3**	3	3	3	1	3	3	3	3	3	3
"bey-ne-dee"	**3**	3	3	1	3	3	3	3	3	3	3
"koy-va-lee"	**3**	3	3	3	1	3	3	3	3	3	3
"sim-me-lauw"	**3**	1	3	1	3	3	3	3	3	3	3
"dea-ve-nye"	**3**	1	3	3	3	3	3	3	3	3	3
"ta-rem-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"ze-doo-la"	**2**	2	2	2	2	2	2	2	2	2	2
"me-noy-sa"	**2**	2	2	2	2	2	2	2	2	2	2
"ve-ril-ley"	**2**	1	2	2	2	2	2	2	1	2	2
"da-fea-noo"	**2**	2	2	2	2	2	2	2	2	2	2
"pe-coi-tay"	**2**	1	2	2	2	2	2	2	2	2	2
"ca-vos-sauw"	**2**	2	2	2	2	2	2	2	2	2	2
"ba-foo-roy"	**2**	1	2	2	2	2	2	2	2	2	2
"shoo-bel-la"	**2**	2	2	3	2	2	2	2	2	2	2
"hoa-fay-la"	**2**	2	2	2	2	2	2	2	2	2	2
"ley-tauw-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"soi-det-ta"	**2**	2	2	2	2	2	2	2	2	2	2
"moy-roa-na"	**2**	3	2	2	2	2	1	2	2	2	2
"fel-la-zee"	**1**	1	1	1	1	1	1	1	1	1	1
"sav-va-ney"	**1**	1	1	1	1	1	1	1	2	3	1
"lin-ne-soo"	**1**	1	1	1	1	1	1	1	3	1	1
"dim-me-foy"	**1**	1	1	1	3	1	1	1	2	1	1
"saf-fe-gye"	**1**	1	1	1	1	1	1	1	1	1	1
"ves-se-tauw"	**1**	1	1	1	1	1	1	1	1	1	1
"joa-ma-rey"	**1**	1	1	1	1	1	1	1	1	1	1
"fay-sa-boo"	**1**	3	1	1	1	1	1	1	1	1	1
"voo-la-fea"	**1**	1	1	1	1	1	1	1	1	1	1
"roo-la-doy"	**1**	1	1	1	1	1	1	1	1	1	3
"kea-va-loy"	**1**	1	1	1	1	1	1	3	3	3	3
"boe-da-zye"	**1**	1	1	1	1	3	1	1	1	1	1
"pow-na-soe"	**1**	1	1	1	1	1	1	1	1	1	1
"coy-da-lee"	**1**	1	1	1	1	1	1	1	1	1	1
"fye-ca-nye"	**1**	1	1	3	1	1	1	1	1	1	1
"fin-nay-ba-soo"	**4**	4	4	3	3	4	4	3	4	4	4
"kat-tee-ne-moe"	**4**	4	4	1	4	4	4	4	4	4	4
"lee-roo-ne-mey"	**4**	4	4	4	1	4	4	4	4	4	4
"roo-nee-be-rey"	**4**	4	4	4	4	4	4	4	4	4	4
"gow-roo-za-tay"	**4**	2	4	4	1	4	4	4	4	4	4
"foi-nee-le-ro"	**4**	3	4	3	3	4	4	4	4	4	4
"bal-lee-de-mye"	**4**	4	4	4	2	4	4	4	4	4	4
"nid-doo-va-loy"	**4**	4	4	4	4	4	4	4	4	4	4
"chee-ley-ne-zow"	**4**	4	4	4	4	4	4	4	4	4	4
"tay-loe-de-noy"	**4**	4	4	4	4	4	4	4	4	4	3
"seg-gow-ne-rey"	**4**	4	4	4	3	4	4	4	4	4	4

cont'd

Item	Stressed syllable (from right edge)	Chin 1	Chin 2	Chin 3	Chin 4	Chin 5	Chin 6	Chin 7	Chin 8	Chin 9	Chin 10
"sim-mauw-le-roo"	**4**	3	4	4	4	4	4	4	4	4	4
"voo-dauw-se-mee"	**4**	4	4	4	3	4	4	4	4	3	4
"hoa-gow-ve-zay"	**4**	3	4	3	4	4	4	4	4	4	4
"za-fer-ra-doo"	**3**	3	3	3	3	3	3	3	3	3	3
"da-rey-sa-mee"	**3**	3	3	3	3	3	3	3	3	3	3
"fa-bou-se-dee"	**3**	3	3	3	3	3	3	3	3	3	3
"wa-tep-pe-loy"	**3**	3	3	3	3	3	3	3	4	3	3
"na-tee-ve-zow"	**3**	3	3	3	3	3	3	3	3	3	3
"bea-del-la-zay"	**3**	3	3	3	3	3	3	3	3	3	3
"mea-soo-fa-nee"	**3**	3	3	3	2	3	3	3	3	3	3
"yee-loi-ne-boo"	**3**	3	3	3	3	3	3	3	3	3	3
"roo-nef-fa-mye"	**3**	3	3	3	3	3	3	3	3	3	3
"boo-ray-va-gow"	**3**	3	3	3	3	3	3	3	3	3	3
"fy-rem-ma-tee"	**3**	3	3	3	3	3	3	3	3	3	3
"mye-zea-ca-boo"	**3**	3	3	1	3	3	3	3	3	3	3
"fay-se-rik-ka"	**2**	5	2	2	2	2	2	2	4	2	2
"vea-da-soo-la"	**2**	2	2	2	2	2	2	2	2	2	2
"poo-de-nauw-za"	**2**	2	2	2	2	2	4	2	2	2	2
"mea-da-rem-mye"	**2**	2	1	2	1	2	2	2	4	2	2
"soo-la-bey-dee"	**2**	2	2	2	2	2	2	2	2	2	2
"roa-ma-sye-poe"	**2**	2	2	4	2	2	4	2	2	2	2
"loa-ca-din-noy"	**2**	2	2	2	2	2	2	2	2	2	2
"zea-da-rai-nye"	**2**	2	2	2	2	2	2	2	2	2	2
"bou-se-del-la"	**2**	2	2	4	2	2	2	2	2	2	2
"dow-se-koo-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"dy-ne-ves-soe"	**2**	2	2	2	2	2	2	2	2	2	2
"ty-se-doo-vay"	**2**	2	2	2	2	2	2	2	2	2	2
"sa-jow-me-doo"	**1**	1	1	1	1	1	1	1	2	1	1
"be-lee-ga-zay"	**1**	1	1	1	1	1	1	1	2	1	1
"ka-roo-de-mauw"	**1**	1	1	1	1	1	1	3	3	1	1
"ne-tee-fe-sye"	**1**	1	1	1	1	1	3	1	3	1	1
"cha-moy-na-vea"	**1**	1	1	1	1	1	1	1	1	1	1
"sha-ly-de-ree"	**1**	1	1	1	2	1	1	1	1	3	1
"poa-ne-la-zay"	**1**	1	1	1	1	1	1	4	1	1	1
"doo-ve-na-lee"	**1**	1	1	4	1	1	1	1	1	1	1
"ree-ze-la-nye"	**1**	1	1	4	1	1	1	1	1	1	1
"zay-fa-ra-loy"	**1**	2	1	1	1	4	1	4	4	1	1
"dy-me-la-ree"	**1**	1	1	1	1	1	1	1	1	1	1
"poi-la-sa-doo"	**1**	2	1	1	1		1	1	1	1	2

3. English

Item	Stressed syllable (from right edge)	Eng 1 (97.6 %)	Eng 2 (83.2 %)	Eng 3 (93.6 %)	Eng 4 (97.6 %)	Eng 5 (96.0 %)	Eng 6 (97.6 %)	Eng 7 (88.0 %)	Eng 8 (96.0 %)	Eng 9 (88.0 %)	Eng 10 (99.7 %)
“mel-la”	**2**	2	2	2	2	2	2	2	2	2	2
“vip-pa”	**2**	2	1	2	2	2	2	2	2	2	2
“dea-ma”	**2**	2	2	2	2	2	2	2	2	2	2
“soo-ra”	**2**	2	2	2	2	2	2	2	2	2	2
“ny-da”	**2**	2	2	2	2	2	2	2	2	2	2
“loy-fa”	**2**	2	2	2	2	2	2	2	2	2	2
“fis-soe”	**2**	2	1	2	2	2	2	2	2	2	2
“dal-ley”	**2**	2	2	2	2	2	2	2	2	2	2
“koo-ree”	**2**	2	2	2	2	2	1	2	2	1	2
“nee-soo”	**2**	2	2	2	2	2	1	2	2	2	2
“moy-roo”	**2**	2	2	2	2	2	2	2	2	2	2
“fauw-tay”	**2**	2	2	2	2	2	2	2	2	2	2
“fen-nye”	**2**	2	2	2	2	2	1	1	2	2	2
“pum-moy”	**2**	2	2	2	2	2	2	2	2	2	2
“chee-noy”	**2**	2	2	2	2	2	2	2	2	2	2
“zoa-gye”	**2**	2	2	2	2	2	2	2	2	2	2
“loi-gauw”	**2**	2	2	2	2	2	2	2	2	2	2
“py-doy”	**2**	2	2	2	2	2	2	2	2	2	2
“ra-dey”	**1**	1	1	1	1	1	1	1	1	1	1
“ba-noo”	**1**	1	1	1	1	2	1	1	1	1	1
“pa-roy”	**1**	1	1	1	1	1	1	1	1	1	1
“fa-sye”	**1**	1	1	1	1	1	1	1	1	1	1
“jav-vay”	**1**	1	1	1	1	1	1	2	1	1	1
“lin-noa”	**1**	1	2	1	1	1	1	1	1	1	1
“buf-foy”	**1**	1	1	1	1	1	1	1	1	1	1
“pez-zye”	**1**	1	1	1	1	1	1	1	1	2	1
“nay-lee”	**1**	1	1	1	1	1	1	1	1	1	1
“dee-soo”	**1**	1	1	1	1	1	1	1	2	2	1
“yoo-zye”	**1**	1	1	1	1	1	1	1	1	1	1
“vee-rauw”	**1**	1	1	1	1	1	1	1	1	1	1
“fye-roo”	**1**	1	1	1	1	1	1	2	1	1	1
“doy-vee”	**1**	1	1	2	1	1	1	1	2	1	1
“lauw-sai”	**1**	1	1	1	1	1	1	1	1	1	1
“vye-loy”	**1**	1	1	1	1	1	1	1	1	1	1
“lis-se-da”	**3**	3	3	3	3	3	3	1	3	3	3
“roo-de-la”	**3**	3	3	3	3	3	3	3	3	3	3
“soi-be-na”	**3**	3	3	3	3	3	3	3	3	3	3
“naf-fea-pa”	**3**	3	3	3	3	3	3	3	3	3	3
“kee-dey-sa”	**3**	3	3	3	3	3	3	3	3	3	3
“foy-roa-ba”	**3**	3	3	3	3	3	3	3	3	3	3
“del-loy-ma”	**3**	3	3	3	3	3	3	3	3	3	3
“ley-tou-sa”	**3**	3	3	2	3	3	3	3	3	3	3

cont'd

Item	Stressed syllable (from right edge)	Eng 1	Eng 2	Eng 3	Eng 4	Eng 5	Eng 6	Eng 7	Eng 8	Eng 9	Eng 10
"pag-ge-noo"	**3**	3	3	3	3	3	3	3	3	3	3
"bey-ne-dee"	**3**	3	3	3	3	3	3	3	3	3	3
"koy-va-lee"	**3**	3	3	3	3	3	3	3	3	3	3
"sim-me-lauw"	**3**	3	3	1	3	3	3	3	3	3	3
"dea-ve-nye"	**3**	3	1	3	3	3	3	3	3	3	3
"ta-rem-ma"	**2**	2	2	3	2	2	2	2	2	2	2
"ze-doo-la"	**2**	2	2	2	2	2	2	2	2	2	2
"me-noy-sa"	**2**	2	2	2	2	2	2	2	2	2	2
"ve-ril-ley"	**2**	2	2	2	2	2	2	2	2	2	2
"da-fea-noo"	**2**	2	3	2	2	2	2	2	2	2	2
"pe-coi-tay"	**2**	2	2	2	2	2	2	2	2	2	2
"ca-vos-sauw"	**2**	2	2	2	2	2	2	2	2	2	2
"ba-foo-roy"	**2**	2	2	2	2	2	2	2	2	2	2
"shoo-bel-la"	**2**	2	2	2	2	2	2	2	2	2	2
"hoa-fay-la"	**2**	2	2	2	2	2	2	2	2	2	2
"ley-tauw-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"soi-det-ta"	**2**	2	2	2	2	2	2	2	2	2	2
"moy-roa-na"	**2**	2	2	2	2	2	2	3	2	2	2
"fel-la-zee"	**1**	1	3	1	1	1	1	1	1	1	1
"sav-va-ney"	**1**	1	1	1	1	1	1	1	1	1	1
"lin-ne-soo"	**1**	1	1	1	1	1	1	1	1	1	1
"dim-me-foy"	**1**	1	3	1	1	1	1	1	1	1	1
"saf-fe-gye"	**1**	1	1	1	1	1	1	1	2	1	1
"ves-se-tauw"	**1**	1	1	1	1	1	1	1	1	1	1
"joa-ma-rey"	**1**	1	1	1	1	1	1	1	1	1	1
"fay-sa-boo"	**1**	1	1	1	1	1	1	1	1	1	1
"voo-la-fea"	**1**	1	2	1	3	1	1	1	1	3	1
"roo-la-doy"	**1**	1	2	1	1	1	1	1	1	1	1
"kea-va-loy"	**1**	1	2	1	1	1	1	1	1	1	1
"boe-da-zye"	**1**	1	1	1	1	1	1	1	1	1	1
"pow-na-soe"	**1**	1	3	1	1	1	1	3	1	1	1
"coy-da-lee"	**1**	1	1	1	1	1	1	1	1	1	1
"fye-ca-nye"	**1**	1	1	1	1	1	1	1	1	1	1
"fin-nay-ba-soo"	**4**	3	3	3	4	3	4	4	4	4	4
"kat-tee-ne-moe"	**4**	4	4	4	4	4	4	3	4	4	4
"lee-roo-ne-mey"	**4**	4	4	4	4	4	4	4	4	4	4
"roo-nee-be-rey"	**4**	4	4	4	4	4	4	4	4	4	4
"gow-roo-za-tay"	**4**	4	4	3	4	4	4	4	4	4	4
"foi-nee-le-ro"	**4**	4	4	4	4	4	4	3	4	4	4
"bal-lee-de-mye"	**4**	4	4	4	4	4	4	4	4	4	4
"nid-doo-va-loy"	**4**	4	4	4	4	4	4	4	4	4	4
"chee-ley-ne-zow"	**4**	4	4	4	4	4	4	4	4	4	4
"tay-loe-de-noy"	**4**	4	4	3	4	4	4	4	4	4	4
"seg-gow-ne-rey"	**4**	4	4	4	4	4	4	4	4	4	4

cont'd

Item	Stressed

Item	syllable (from right edge)	Eng 1	Eng 2	Eng 3	Eng 4	Eng 5	Eng 6	Eng 7	Eng 8	Eng 9	Eng 10
“sim-mauw-le-roo”	**4**	3	4	4	4	4	4	3	4	4	4
“voo-dauw-se-mee”	**4**	4	4	4	3	3	4	3	4	4	3
“hoa-gow-ve-zay”	**4**	4	3	4	4	3	4	4	4	4	4
“za-fer-ra-doo”	**3**	3	3	3	3	3	3	4	3	3	3
“da-rey-sa-mee”	**3**	3	3	3	3	3	3	3	3	3	3
“fa-bou-se-dee”	**3**	3	3	3	3	3	3	3	3	3	3
“wa-tep-pe-loy”	**3**	3	4	3	3	3	3	3	3	3	3
“na-tee-ve-zow”	**3**	3	3	3	3	3	3	3	3	3	3
“bea-del-la-zay”	**3**	3	3	3	3	3	3	3	3	4	3
“mea-soo-fa-nee”	**3**	3	3	3	3	3	3	3	3	3	3
“yee-loi-ne-boo”	**3**	3	3	3	3	3	3	3	3	3	3
“roo-nef-fa-mye”	**3**	3	3	3	3	3	3	3	3	3	3
“boo-ray-va-gow”	**3**	3	3	3	3	3	3	3	3	3	3
“fy-rem-ma-tee”	**3**	3	3	3	3	3	3	3	3	3	3
“mye-zea-ca-boo”	**3**	3	3	3	3	3	3	3	3	3	3
“fay-se-rik-ka”	**2**	2	3	2	2	2	2	2	2	2	2
“vea-da-soo-la”	**2**	2	2	2	2	2	2	2	2	2	2
“poo-de-nauw-za”	**2**	2	2	2	2	2	2	2	2	2	2
“mea-da-rem-mye”	**2**	2	2	2	2	2	2	2	2	2	2
“soo-la-bey-dee”	**2**	2	2	2	2	2	2	2	2	2	2
“roa-ma-sye-poe”	**2**	2	2	2	2	2	2	2	2	4	2
“loa-ca-din-noy”	**2**	2	1	2	2	2	2	2	2	2	2
“zea-da-rai-nye”	**2**	2	2	2	2	2	2	2	2	2	2
“bou-se-del-la”	**2**	2	4	2	2	2	2	2	2	2	2
“dow-se-koo-ma”	**2**	2	2	2	2	2	2	2	2	2	2
“dy-ne-ves-soe”	**2**	2	2	2	2	2	2	2	2	2	2
“ty-se-doo-vay”	**2**	2	4	2	2	2	2	2	1	2	2
“sa-jow-me-doo”	**1**	1	3	1	1	1	1	3	1	3	1
“be-lee-ga-zay”	**1**	1	1	1	1	1	1	1	1	1	1
“ka-roo-de-mauw”	**1**	1	1	1	1	1	1	1	1	3	1
“ne-tee-fe-sye”	**1**	1	1	1	1	1	1	1	1	3	1
“cha-moy-na-vea”	**1**	1	4	1	1	1	1	3	1	1	1
“sha-ly-de-ree”	**1**	1	1	1	1	1	1	1	3	3	1
“poa-ne-la-zay”	**1**	1	1	1	1	1	1	1	1	4	1
“doo-ve-na-lee”	**1**	1	1	1	1	1	1	1	1	1	1
“ree-ze-la-nye”	**1**	1	1	1	1	1	1	1	1	4	1
“zay-fa-ra-loy”	**1**	4	2	4	3	1	1	1	1	4	1
“dy-me-la-ree”	**1**	1	1	1	1	1	1	4	1	4	1
“poi-la-sa-doo”	**1**	1	1	1	1	2	1	4	1	4	1

4. French

Item	Stressed syllable (from right edge)	Fren 1 (68.8 %)	Fren 2 (47.2 %)	Fren 3 (74.4 %)	Fren 4 (80.8 %)	Fren 5 (82.4 %)	Fren 6 (84.8 %)	Fren 7 (77.6 %)	Fren 8 (71.2 %)	Fren 9 (75.2 %)	Fren 10 (56.0 %)
“mel-la”	**2**	2	2	2	2	1	2	2	2	2	1
“vip-pa”	**2**	2	2	2	1	1		1	2	2	2
“dea-ma”	**2**	2	2	2	2	2	2	2	2	2	2
“soo-ra”	**2**	2	2	2	2	2	2	2	2	2	2
“ny-da”	**2**	1	1	2	2	2	2	2	2	2	1
“loy-fa”	**2**	2	2	2	1	2	2	2	2	2	2
“fis-soe”	**2**	2	1	2	2	2	2	2	2	2	2
“dal-ley”	**2**	2	1	2	2	2	2	2	2	2	2
“koo-ree”	**2**	2	2	2	2	2	2	2	2	2	2
“nee-soo”	**2**	2	2	2	2	2	1	2	2	2	2
“moy-roo”	**2**	1		2	1	2	2	2	2	2	2
“fauw-tay”	**2**	2	1	2	2	1	2	2	2	2	2
“fen-nye”	**2**	2	2	2	1	1	2	2	2	1	2
“pum-moy”	**2**	2	2	2	2	2	2	2	2	2	2
“chee-noy”	**2**	2	1	2	2	2	2	2	2	2	2
“zoa-gye”	**2**	2	2	2	2	1	2	2	2	2	2
“loi-gauw”	**2**	2	1	2	2	2	2	2	2	2	1
“py-doy”	**2**	2	2	2	2	2	2	2	2	2	2
“ra-dey”	**1**	1	1	1	1	1	1	1	1	1	1
“ba-noo”	**1**	1	2	1	1	2	1	1	2	1	2
“pa-roy”	**1**	1	1	1	1	1	1	1	2	2	1
“fa-sye”	**1**	1	2	1	1	1	1	1	2	1	1
“jav-vay”	**1**	2	1	1	1	1	1	1	2	2	1
“lin-noa”	**1**	1	2	2	2	1	1	1	1	1	2
“buf-foy”	**1**	1	2	1	1	1	1	1	2	1	2
“pez-zye”	**1**	1	2	1	1	1	1	1	1	2	2
“nay-lee”	**1**	1	2	1	1	2	1	2	1	1	2
“dee-soo”	**1**	1	1	1	1	1	1	2	2	2	1
“yoo-zye”	**1**	2	2	1	1	1	1	1	1	1	1
“vee-rauw”	**1**	2	1	1	1	1	1	1	1	1	1
“fye-roo”	**1**	2	2	2	1	2	1	2	1	2	2
“doy-vee”	**1**	2	1	2	1	1	1	1	1	1	1
“lauw-sai”	**1**	1	2	1	1	1	1	1	1	2	2
“vye-loy”	**1**	2	2	1	1	1	2	1	1	2	2
“lis-se-da”	**3**	3	2	3	3	3		3	3	3	2
“roo-de-la”	**3**	3	3	3	3	3	3	3	3	3	2
“soi-be-na”	**3**	3	2	3	3	3	3	3	3	3	3
“naf-fea-pa”	**3**	3	2	3	3	3	3	3	3	3	3
“kee-dey-sa”	**3**	3	2	3	3	3	2	3	3	3	3
“foy-roa-ba”	**3**	3	3	3	3	3	3	3	3	3	3
“del-loy-ma”	**3**	3	2	3	2	3	3	3	2	3	2
“ley-tou-sa”	**3**	2	2	3	3	3	3	3	3	3	3

cont'd

Item	Stressed syllable (from right edge)	Fren 1	Fren 2	Fren 3	Fren 4	Fren 5	Fren 6	Fren 7	Fren 8	Fren 9	Fren 10
"pag-ge-noo"	**3**	2	3	3	3	3	3	3	3	3	3
"bey-ne-dee"	**3**	3	3	3	3	3	1	3	3	3	3
"koy-va-lee"	**3**	3	2	3	3	3	3	3	3	3	3
"sim-me-lauw"	**3**	3	3	3	3	1	1	1	3	3	3
"dea-ve-nye"	**3**	3	2	3	3	3	3	3	3	3	3
"ta-rem-ma"	**2**	2	3	2	3	2	2	2	3	2	1
"ze-doo-la"	**2**	2	2	2	2	2	2	2	3	2	3
"me-noy-sa"	**2**	2	2	2	2	2	2	2	2	2	3
"ve-ril-ley"	**2**	1	3	2	1	2	2	2	2	1	3
"da-fea-noo"	**2**	2	3	2	2	2	2	3	2	3	3
"pe-coi-tay"	**2**	2	3	2	2	1	2	2	2	2	2
"ca-vos-sauw"	**2**	3	1	2	1	2	2	2	2	3	2
"ba-foo-roy"	**2**	2	2	3	2	2	2	2	2	2	3
"shoo-bel-la"	**2**	2	2	3	2	2	2	2	3	2	2
"hoa-fay-la"	**2**	3	2	2	1	2	2	2	2	2	2
"ley-tauw-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"soi-det-ta"	**2**	3	2	2	2	2	2	2	2	2	2
"moy-roa-na"	**2**	2	2	2	1	2	2	2	2	3	3
"fel-la-zee"	**1**	1		2	1	1	1	1	3	3	2
"sav-va-ney"	**1**	1	1	3	1	1	1	3	3	1	1
"lin-ne-soo"	**1**	1	1	1	1	1	1	1	3	1	2
"dim-me-foy"	**1**	1	1	2	1	3	1	3	3	1	3
"saf-fe-gye"	**1**	3	3	1	1	1	1	1	1	1	1
"ves-se-tauw"	**1**	1	2	1	1	1	1	1	3	1	1
"joa-ma-rey"	**1**	1	2	1	1	1	1	1	1	1	1
"fay-sa-boo"	**1**	1	1	1	1	1	1	1	1	3	2
"voo-la-fea"	**1**	1	2	2	1	1	1	1	3	3	3
"roo-la-doy"	**1**	1	2	3	1	1	1	1	1	1	1
"kea-va-loy"	**1**	3	1	3	1	1	1	3	3	1	2
"boe-da-zye"	**1**	3	2	2	1	1	1	3	3	1	3
"pow-na-soe"	**1**	1	3	3	1	1	1	3	1	3	3
"coy-da-lee"	**1**	1	1	1	1	1	1	1	1	3	2
"fye-ca-nye"	**1**	1	2	3	1	2	1	3	3	2	2
"fin-nay-ba-soo"	**4**	3	3	3	3	4	3	3	4	3	4
"kat-tee-ne-moe"	**4**	3	3	4	4	4	4	4	4	4	3
"lee-roo-ne-mey"	**4**	4	3	4	1	1	4	4	4	4	4
"roo-nee-be-rey"	**4**	4	3	4	1	3	4	3	4	4	3
"gow-roo-za-tay"	**4**	4	4	4	4	4	4	4	4	4	4
"foi-nee-le-ro"	**4**	3	3	3	3	4	4	4	4	4	3
"bal-lee-de-mye"	**4**	4	4	4	4	4	4	4	4	4	4
"nid-doo-va-loy"	**4**	3	3	3	1	3	4	3	3	4	4
"chee-ley-ne-zow"	**4**	4	3	4	3	4	4	4	4	4	4
"tay-loe-de-noy"	**4**	3		4	3	4	3	4	4	4	4
"seg-gow-ne-rey"	**4**	3	3	3	3	4	3	3	4	3	3

cont'd

Item	Stressed syllable (from right edge)	Fren 1	Fren 2	Fren 3	Fren 4	Fren 5	Fren 6	Fren 7	Fren 8	Fren 9	Fren 10
"sim-mauw-le-roo"	**4**	3	3	4	4	4	3	4	4	3	4
"voo-dauw-se-mee"	**4**	3	3	3	3	3	3	3	4	3	3
"hoa-gow-ve-zay"	**4**	4	3	4	4	4	3	4	4	4	4
"za-fer-ra-doo"	**3**	1	3	3	4	3	3	3	3	3	3
"da-rey-sa-mee"	**3**	3	2	3	3	3	3	3	3	3	3
"fa-bou-se-dee"	**3**	3	3	4	3	3	3	3	3	3	3
"wa-tep-pe-loy"	**3**	1	3	3	3	3	3	3	3	3	3
"na-tee-ve-zow"	**3**	3	3	3	3	3	3	3	3	3	3
"bea-del-la-zay"	**3**	4		4	3	3	3	3	3	3	4
"mea-soo-fa-nee"	**3**	3	3	3	2	3	3	3	3	3	3
"yee-loi-ne-boo"	**3**	3	4	3	3	3	3	3	3	3	1
"roo-nef-fa-mye"	**3**	3	3	3	3	3	3	3	3	3	3
"boo-ray-va-gow"	**3**	4	4	3	1	3	3	3	3	3	2
"fy-rem-ma-tee"	**3**	3	1	4	3	4	2	3	3	3	4
"mye-zea-ca-boo"	**3**	3	2	3	1	3	4	4	2	4	4
"fay-se-rik-ka"	**2**	4	2	4	2	2	3	1	2	2	3
"vea-da-soo-la"	**2**	2	2	4	2	2	2	4	2	2	3
"poo-de-nauw-za"	**2**	2	2	4	2	2	2	2	2	2	3
"mea-da-rem-mye"	**2**	1	3	2	2	3	2	2		2	3
"soo-la-bey-dee"	**2**	2	2	2	2	2	2	2	4	2	2
"roa-ma-sye-poe"	**2**	4	2	2	2	2	2	2	2	2	2
"loa-ca-din-noy"	**2**	2	2	2	2	2	2	2	4	2	2
"zea-da-rai-nye"	**2**	2	2	2	2	2	2	2	4	2	2
"bou-se-del-la"	**2**	2	2	2	2	2	2	4	4	4	2
"dow-se-koo-ma"	**2**	2	2	4	2	2	2	2	4	2	4
"dy-ne-ves-soe"	**2**	4	2	2	2	2	2	4	3	4	4
"ty-se-doo-vay"	**2**	2	2	2	2	2	2	2	2	2	2
"sa-jow-me-doo"	**1**	1	1	1	1	1	3	3	1	2	3
"be-lee-ga-zay"	**1**	1	1	2	1	1	1	1	3	1	1
"ka-roo-de-mauw"	**1**	1	2	1	1	1	1	1	3	2	1
"ne-tee-fe-sye"	**1**	1	1	1	1	1	1	1	3	1	1
"cha-moy-na-vea"	**1**	3	3	3	1	3	1	1	4	1	4
"sha-ly-de-ree"	**1**	2	3	3	1	1	1	1	1	1	4
"poa-ne-la-zay"	**1**	1	1	4	1	1	1	4	4	1	1
"doo-ve-na-lee"	**1**	4	3	1	1	3	1	1	4	4	2
"ree-ze-la-nye"	**1**	1	2	1	1	1	1	4	4	1	2
"zay-fa-ra-loy"	**1**	4	3	2	1	4		4	4	4	4
"dy-me-la-ree"	**1**	3	3	4	1	1	1	4	1	4	4
"poi-la-sa-doo"	**1**	3	3	1	1	4	2	4	1	4	2

5. Japanese

Item	Stressed syllable (from right edge)	Jap1 (98.4 %)	Jap2 (95.2 %)	Jap3 (96.0 %)	Jap4 (90.4 %)	Jap5 (85.6 %)	Jap6 (90.4 %)	Jap7 (95.2 %)	Jap8 (97.6 %)	Jap9 (92.8 %)	Jap 10 (97.6 %)
“mel-la”	**2**	2	2	2	2	2	2	2	2	2	2
“vip-pa”	**2**	2	2	2	2	2	2	2	2	2	2
“dea-ma”	**2**	2	2	2	2	2	2	2	2	2	2
“soo-ra”	**2**	2	2	2	2	2	2	2	2	2	2
“ny-da”	**2**	2	2	2	2	2	2	2	2	2	2
“loy-fa”	**2**	2	2	2	2	1	2	2	2	2	2
“fis-soe”	**2**	2	2	2	2	2	2	2	2	2	2
“dal-ley”	**2**	2	2	2	2	2	2	2	2	2	2
“koo-ree”	**2**	2	2	2	2	2	2	2	2	2	2
“nee-soo”	**2**	2	2	2	2	2	2	2	2	2	2
“moy-roo”	**2**	2	2	2	2	2	2	2	2	2	2
“fauw-tay”	**2**	2	2	2	2	2	2	2	2	2	2
“fen-nye”	**2**	2	2	2	1	2	2	2	2	2	2
“pum-moy”	**2**	2	2	2	2	2	2	2	2	2	2
“chee-noy”	**2**	2	2	2	2	2	2	2	2	2	2
“zoa-gye”	**2**	2	2	2	2	2	2	2	2	2	2
“loi-gauw”	**2**	2	2	2	2	2	2	2	2	2	2
“py-doy”	**2**	2	2	2	2	2	2	2	2	2	2
“ra-dey”	**1**	1	1	1	1	1	1	1	1	1	1
“ba-noo”	**1**	1	1	1	1	2	1	1	1	1	1
“pa-roy”	**1**	1	1	1	1	1	1	1	1	1	1
“fa-sye”	**1**	1	1	1	1	1	1	1	1	1	1
“jav-vay”	**1**	1	1	1	1	1	1	1	1	1	1
“lin-noa”	**1**	1	1	1	1	1	1	1	1	1	1
“buf-foy”	**1**	1	1	1	1	1	2	1	1	1	1
“pez-zye”	**1**	1	1	1	1	1	1	1	1	1	1
“nay-lee”	**1**	1	1	1	1	2	1	1	1	1	1
“dee-soo”	**1**	1	1	1	1	2	2	1	1	1	1
“yoo-zye”	**1**	1	1	1	1	1	1	1	1	1	1
“vee-rauw”	**1**	1	1	1	1	1	1	1	1	1	1
“fye-roo”	**1**	1	1	1	2	1	1	1	1	1	1
“doy-vee”	**1**	1	1	1	1	1	2	1	1	1	1
“lauw-sai”	**1**	1	1	1	1	1	1	1	1	1	1
“vye-loy”	**1**	1	1	1	1	1	1	1	1	1	1
“lis-se-da”	**3**	3	3	3	3	3	3	3	3	3	3
“roo-de-la”	**3**	3	3	3	3	3	3	3	3	3	3
“soi-be-na”	**3**	3	3	3	3	3	3	3	3	3	3
“naf-fea-pa”	**3**	3	3	3	3	3	3	3	3	3	3
“kee-dey-sa”	**3**	3	3	3	3	3	3	3	3	3	3
“foy-roa-ba”	**3**	3	3	3	2	3	3	3	3	3	3
“del-loy-ma”	**3**	3	3	3	3	2	3	3	3	3	3
“ley-tou-sa”	**3**	3	3	3	3	3	3	3	3	3	3

cont'd

Item	Stressed syllable (from right edge)	Jap1	Jap2	Jap3	Jap4	Jap5	Jap6	Jap7	Jap8	Jap9	Jap 10
"pag-ge-noo"	**3**	3	3	3	3	3	3	3	3	3	3
"bey-ne-dee"	**3**	3	3	3	3	3	3	3	3	3	3
"koy-va-lee"	**3**	3	3	3	3	3	3	3	3	3	3
"sim-me-lauw"	**3**	3	3	3	1	3	3	3	3	3	3
"dea-ve-nye"	**3**	3	3	3	3	3	3	3	3	3	3
"ta-rem-ma"	**2**	2	2	2	2	3	2	2	2	2	2
"ze-doo-la"	**2**	2	2	2	2	2	2	2	2	2	2
"me-noy-sa"	**2**	2	2	2	2	2	2	2	2	2	2
"ve-ril-ley"	**2**	2	2	2	1	2	2	2	2	2	2
"da-fea-noo"	**2**	2	2	2	2	2	2	2	2	2	2
"pe-coi-tay"	**2**	2	2	2	2	1	3	2	2	2	2
"ca-vos-sauw"	**2**	2	2	2	2	2	2	2	2	2	2
"ba-foo-roy"	**2**	2	2	2	2	2	2	2	2	2	2
"shoo-bel-la"	**2**	2	2	2	2	2	2	2	2	2	2
"hoa-fay-la"	**2**	2	2	2	2	2	2	2	2	2	2
"ley-tauw-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"soi-det-ta"	**2**	2	2	2	2	2	2	2	2	2	2
"moy-roa-na"	**2**	2	2	2	2	2	2	2	2	2	2
"fel-la-zee"	**1**	1	1	1	1	1	3	1	1	1	1
"sav-va-ney"	**1**	1	1	1	1	3	1	1	1	1	1
"lin-ne-soo"	**1**	1	1	1	1	1	1	1	1	1	1
"dim-me-foy"	**1**	1	1	1	1	1	1	1	1	1	1
"saf-fe-gye"	**1**	1	1	1	1	1	1	1	1	1	1
"ves-se-tauw"	**1**	1	1	1	1	1	1	1	1	1	1
"joa-ma-rey"	**1**	1	1	1	1	1	1	1	1	3	1
"fay-sa-boo"	**1**	1	3	1	1	1	1	1	1	1	1
"voo-la-fea"	**1**	1	1	1	1	1	1	1	1	3	1
"roo-la-doy"	**1**	1	1	1	1	1	1	1	1	1	1
"kea-va-loy"	**1**	3	3	1	1	1	3	1	1	1	1
"boe-da-zye"	**1**	1	1	1	1	1	3	1	1	1	1
"pow-na-soe"	**1**	1	1	3	1	1	1	1	1	3	1
"coy-da-lee"	**1**	1	1	1	3	1	1	1	1	1	1
"fye-ca-nye"	**1**	1	3	1	1	1	3	1	1	1	1
"fin-nay-ba-soo"	**4**	3	4	4	4	4	4	3	4	4	4
"kat-tee-ne-moe"	**4**	4	4	4	4	4	4	4	4	4	4
"lee-roo-ne-mey"	**4**	4	4	4	4	4	4	4	4	4	4
"roo-nee-be-rey"	**4**	4	4	4	4	4	4	4	4	4	4
"gow-roo-za-tay"	**4**	4	4	4	4	4	4	4	4	4	4
"foi-nee-le-ro"	**4**	4	4	4		4	4	4	4	4	4
"bal-lee-de-mye"	**4**	4	4	4	3	4	4	4	4	4	4
"nid-doo-va-loy"	**4**	4	4	4	1	3	4	4	1	4	4
"chee-ley-ne-zow"	**4**	4	4	4	4	4	4	4	4	4	4
"tay-loe-de-noy"	**4**	4	4	4	4	4	4	4	4	4	4
"seg-gow-ne-rey"	**4**	4	4	4	3	4	4	3	4	4	4

cont'd

Item	Stressed syllable (from right edge)	Jap1	Jap2	Jap3	Jap4	Jap5	Jap6	Jap7	Jap8	Jap9	Jap 10
"sim-mauw-le-roo"	**4**	4	4	4	4	4	4	4	4	4	4
"voo-dauw-se-mee"	**4**	4	3	4	4	4	4	4	4	4	4
"hoa-gow-ve-zay"	**4**	4	4	4	4	3	4	4	4	4	4
"za-fer-ra-doo"	**3**	3	3	3	3	3	3	3	3	3	3
"da-rey-sa-mee"	**3**	3	3	3	3	3	3	3	3	3	3
"fa-bou-se-dee"	**3**	3	3	3	3	3	3	3	3	3	3
"wa-tep-pe-loy"	**3**	3	3	3	3	3	3	3	3	3	3
"na-tee-ve-zow"	**3**	3	3	3	3	3	3	3	3	3	3
"bea-del-la-zay"	**3**	3	3	3	3	3	3	3	3	3	3
"mea-soo-fa-nee"	**3**	3	3	3	3	3	3	3	3	3	3
"yee-loi-ne-boo"	**3**	3	3	3	3	3	3	3	3	3	3
"roo-nef-fa-mye"	**3**	3	3	3	3	3	3	3	3	3	3
"boo-ray-va-gow"	**3**	3	3	3	3	3	3	3	3	3	3
"fy-rem-ma-tee"	**3**	3	3	3	3	3	3	3	3	3	3
"mye-zea-ca-boo"	**3**	3	3	3	3	4	3	3	3	3	3
"fay-se-rik-ka"	**2**	2	2	2	2	2	2	2	2	2	2
"vea-da-soo-la"	**2**	2	2	2	2	2	2	2	2	2	2
"poo-de-nauw-za"	**2**	2	2	2	2	2	2	2	2	2	2
"mea-da-rem-mye"	**2**	2	2	2	1	3	2	2	2	2	2
"soo-la-bey-dee"	**2**	2	2	2	2	2	2	2	2	2	2
"roa-ma-sye-poe"	**2**	2	2	4	2	2	2	2	2	2	2
"loa-ca-din-noy"	**2**	2	2	2	2	2	2	2	2	2	2
"zea-da-rai-nye"	**2**	2	2	2	2	2	2	2	2	2	2
"bou-se-del-la"	**2**	2	2	2	2	2	2	2	2	2	2
"dow-se-koo-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"dy-ne-ves-soe"	**2**	2	2	2	2	2	2	2	2	2	2
"ty-se-doo-vay"	**2**	2	2	2	2	2	2	2	2	2	2
"sa-jow-me-doo"	**1**	1	1	1	1	1	3	1	1	1	1
"be-lee-ga-zay"	**1**	1	1	1	3	1	1	3	1	3	1
"ka-roo-de-mauw"	**1**	1	1	1	1	1	1	1	3	1	1
"ne-tee-fe-sye"	**1**	1	1	1	1	3	3	3	3	3	1
"cha-moy-na-vea"	**1**	1	1	1	1	1	1	3	1	1	1
"sha-ly-de-ree"	**1**	1	1	1	1	1	1	1	1	1	1
"poa-ne-la-zay"	**1**	1	1	1	1	4	1	1	1	2	4
"doo-ve-na-lee"	**1**	1	4	4	1	4	4	1	1	4	1
"ree-ze-la-nye"	**1**	1	1	4	1	1	1	1	1	4	1
"zay-fa-ra-loy"	**1**	1	1	4	1	3	1	4	1	4	4
"dy-me-la-ree"	**1**	1	1	1	1	4	4	1	1	1	1
"poi-la-sa-doo"	**1**	1	4	1	1	4	1	1	1	1	4

6. Korean

Item	Stressed syllable (from right edge)	Kor1 (97.6 %)	Kor2 (80.0 %)	Kor3 (96.8 %)	Kor4 (94.4 %)	Kor5 (99.7 %)	Kor6 (100 %)	Kor7 (96.0 %)	Kor8 (96.0 %)	Kor9 (73.6 %)	Kor 10 (96.0 %)
“mel-la”	**2**	2	2	2	2	2	2	2	2	2	2
“vip-pa”	**2**	2	2	2	2	2	2	2	2	2	2
“dea-ma”	**2**	2	2	2	2	2	2	2	2	2	2
“soo-ra”	**2**	2	2	2	2	2	2	2	2	2	2
“ny-da”	**2**	2	2	2	2	2	2	2	2	2	2
“loy-fa”	**2**	2	2	2	2	2	2	2	2	2	2
“fis-soe”	**2**	2	2	2	2	2	2	2	2	2	2
“dal-ley”	**2**	2	2	2	2	2	2	2	2	2	2
“koo-ree”	**2**	2	2	2	2	2	2	2	2	2	2
“nee-soo”	**2**	2	2	2	2	2	2	2	2	2	2
“moy-roo”	**2**	2	2	2	2	2	2	2	2	1	2
“fauw-tay”	**2**	2	2	2	2	2	2	2	2	2	2
“fen-nye”	**2**	2	2	2	2	2	2	2	2	1	2
“pum-moy”	**2**	2	2	2	2	2	2	2	2	2	2
“chee-noy”	**2**	2	2	1	2	2	2	2	2	2	2
“zoa-gye”	**2**	2	1	2	2	2	2	2	2	2	2
“loi-gauw”	**2**	2	2	2	2	2	2	2	2	2	2
“py-doy”	**2**	2	2	2	2	2	2	2	2	2	2
“ra-dey”	**1**	1	1	1	1	1	1	1	1	1	1
“ba-noo”	**1**	1	1	1	1	1	1	1	1	1	1
“pa-roy”	**1**	1	1	1	1	1	1	2	1	1	1
“fa-sye”	**1**	1	2	1	1	1	1	1	1	1	1
“jav-vay”	**1**	1	2	1	1	1	1	1	1	1	1
“lin-noa”	**1**	1	1	1	1	1	1	1	1	1	2
“buf-foy”	**1**	1	1	1	1	1	1	2	1	1	1
“pez-zye”	**1**	1	2	1	1	1	1	1	1	2	1
“nay-lee”	**1**	1	1	1	1	1	1	1	1	1	1
“dee-soo”	**1**	1	1	1	1	1	1	1	1	1	1
“yoo-zye”	**1**	1	1	1	1	1	1	1	1	1	1
“vee-rauw”	**1**	1	1	1	1	1	1	1	1	1	1
“fye-roo”	**1**	1	1	1	1	1	1	1	1	1	1
“doy-vee”	**1**	1	2	1	1	1	1	1	1	1	1
“lauw-sai”	**1**	1	1	1	1	1	1	1	1	1	1
“vye-loy”	**1**	1	1	1	1	1	1	1	1	1	1
“lis-se-da”	**3**	3	3	3	3	3	3	3	3	3	3
“roo-de-la”	**3**	3	2	3	3	3	3	3	3	3	3
“soi-be-na”	**3**	3	3	3	3	3	3	3	3	3	3
“naf-fea-pa”	**3**	3	3	3	3	3	3	3	3	2	3
“kee-dey-sa”	**3**	3	2	3	3	3	3	3	3	3	3
“foy-roa-ba”	**3**	3	3	3	3	3	3	3	3	3	3
“del-loy-ma”	**3**	3	3	3	3	3	3	3	3	1	3
“ley-tou-sa”	**3**	3	3	3	3	3	3	3	3	2	3

cont'd

Item	Stressed syllable (from right edge)	Kor1	Kor2	Kor3	Kor4	Kor5	Kor6	Kor7	Kor8	Kor9	Kor 10
"pag-ge-noo"	**3**	3	3	3	3	3	3	3	3	3	3
"bey-ne-dee"	**3**	3	3	3	3	3	3	3	3	3	3
"koy-va-lee"	**3**	3	3	3	3	3	3	3	3	3	3
"sim-me-lauw"	**3**	3	3	3	3	3	3	3	3		3
"dea-ve-nye"	**3**	3	3	3	3	3	3	3	3	3	3
"ta-rem-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"ze-doo-la"	**2**	2	2	2	2	2	2	2	2	2	2
"me-noy-sa"	**2**	3	2	2	2	2	2	2	2	2	2
"ve-ril-ley"	**2**	2	2	2	2	2	2	2	2	1	2
"da-fea-noo"	**2**	2	2	2	2	2	2	2	2	2	2
"pe-coi-tay"	**2**	2	3	2	2	2	2	2	2	2	2
"ca-vos-sauw"	**2**	2	3	1	2	2	2	2	2	1	2
"ba-foo-roy"	**2**	2	2	2	2	2	2	2	2	2	2
"shoo-bel-la"	**2**	2	2	2	2	2	2	2	2	2	2
"hoa-fay-la"	**2**	2	2	2	2	2	2	2	2	2	2
"ley-tauw-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"soi-det-ta"	**2**	2	3	2	2	2	2	2	2	2	2
"moy-roa-na"	**2**	2	3	2	2	2	2	2	2	2	2
"fel-la-zee"	**1**	1	3	1	1	1	1	1	1	1	1
"sav-va-ney"	**1**	1	1	1	1	1	1	1	1	1	1
"lin-ne-soo"	**1**	1	1	1	1	1	1	1	1	1	1
"dim-me-foy"	**1**	1	1	1	3	1	1	1	1	1	1
"saf-fe-gye"	**1**	1	1	1	1	1	1	1	1	1	1
"ves-se-tauw"	**1**	1	1	1	1	1	1	1	1	1	1
"joa-ma-rey"	**1**	1	1	1	1	1	1	1	1	1	1
"fay-sa-boo"	**1**	1	1	1	1	1	1	1	1	2	1
"voo-la-fea"	**1**	1	1	1	1	1	1	1	1	3	1
"roo-la-doy"	**1**	1	2	1	1	1	1	1	1	1	1
"kea-va-loy"	**1**	1	1	1	1	1	1	1	1	1	1
"boe-da-zye"	**1**	1	1	3	3	1	1	1	1	3	1
"pow-na-soe"	**1**	1	3	1	1	1	1	1	3	3	1
"coy-da-lee"	**1**	1	1	1	1	1	1	1	1	2	1
"fye-ca-nye"	**1**	1	1	1		1	1	1	1	3	3
"fin-nay-ba-soo"	**4**	4	1	4	3	4	4	3	4	3	4
"kat-tee-ne-moe"	**4**	4	4	4	4	4	4	4	4	3	4
"lee-roo-ne-mey"	**4**	4	4	4	4	4	4	4	4	4	4
"roo-nee-be-rey"	**4**	4	4	4	4	4	4	4	4	4	4
"gow-roo-za-tay"	**4**	4	4	1	4	4	4	4	4	4	4
"foi-nee-le-ro"	**4**	4	4	4	4	4	4	4	4	4	4
"bal-lee-de-mye"	**4**	4	4	4	4	4	4	4	4	4	4
"nid-doo-va-loy"	**4**	4	4	4	4	4	4	4	4	4	4
"chee-ley-ne-zow"	**4**	4	4	4	4	4	4	4	4	4	4
"tay-loe-de-noy"	**4**	4	4	4	4	4	4	4	4	4	4
"seg-gow-ne-rey"	**4**	4	3	4	4	4	4	4	4	4	4

cont'd

Stressed

Item	syllable (from right edge)	Kor1	Kor2	Kor3	Kor4	Kor5	Kor6	Kor7	Kor8	Kor9	Kor 10
“sim-mauw-le-roo”	**4**	4	3	4	3	4	4	4	4	5	4
“voo-dauw-se-mee”	**4**	4	4	4	3	4	4	4	4	4	4
“hoa-gow-ve-zay”	**4**	4	3	4	4	4	4	4	4	3	4
“za-fer-ra-doo”	**3**	3	3	3	3	3	3	3	3	3	3
“da-rey-sa-mee”	**3**	3	2	3	3	3	3	3	3	3	3
“fa-bou-se-dee”	**3**	3	3	3	3	3	3	3	3	3	3
“wa-tep-pe-loy”	**3**	3	3	3	3	3	3	3	3	3	3
“na-tee-ve-zow”	**3**	3	3	3	3	3	3	3	3	3	3
“bea-del-la-zay”	**3**	3	3	3	3	3	3	3	3	2	3
“mea-soo-fa-nee”	**3**	3	2	3	3	3	3	3	3	3	3
“yee-loi-ne-boo”	**3**	3	3	3	3	3	3	3	3	3	3
“roo-nef-fa-mye”	**3**	3	3	3	3	3	3	2	3	2	3
“boo-ray-va-gow”	**3**	3	4	3	3	3	3	3	3	3	3
“fy-rem-ma-tee”	**3**	3	3	3	3	3	3	3	3	3	3
“mye-zea-ca-boo”	**3**	3	3	3	3	3	3	3	3	4	3
“fay-se-rik-ka”	**2**	2	2	2	2	2	2	2	2	2	2
“vea-da-soo-la”	**2**	2	2	2	2	2	2	2	2	2	2
“poo-de-nauw-za”	**2**	2	2	2	2	2	2	2	2	2	2
“mea-da-rem-mye”	**2**	2	2	2	2	2	2	2	2	1	2
“soo-la-bey-dee”	**2**	2	2	2	2	2	2	2	2	2	2
“roa-ma-sye-poe”	**2**	4	2	2	2	2	2	2	2	2	2
“loa-ca-din-noy”	**2**	2	2	2	2	2	2	2	2	2	2
“zea-da-rai-nye”	**2**	2	2	2	2	2	2	2	2	1	2
“bou-se-del-la”	**2**	2	2	2	2	2	2	2	2	2	2
“dow-se-koo-ma”	**2**	2	2	2	2	2	2	2	2	2	2
“dy-ne-ves-soe”	**2**	2	2	2	2	2	2	2	2	2	2
“ty-se-doo-vay”	**2**	2	2	2	2	2	2	2	2	2	2
“sa-jow-me-doo”	**1**	1	1	1	1	1	1	1	3	3	1
“be-lee-ga-zay”	**1**	1	1	1	1	1	1	1	1	2	1
“ka-roo-de-mauw”	**1**	1	1	1	1	1	1	1	1	1	1
“ne-tee-fe-sye”	**1**	1	1	1	1	1	1	1	1	3	1
“cha-moy-na-vea”	**1**	1	2	1	1	1	1	1	1	3	1
“sha-ly-de-ree”	**1**	1	1	1	1	1	1	1	1	3	1
“poa-ne-la-zay”	**1**	1	1	1	1	1	1	1	2	2	1
“doo-ve-na-lee”	**1**	4	1	1	1	1	1	1	4	1	1
“ree-ze-la-nye”	**1**	1	1	1	1	1	1	1	1	4	1
“zay-fa-ra-loy”	**1**	1	2	1	1	1	1	1	4	1	4
“dy-me-la-ree”	**1**	1	4	1	4	1	1	1	1	4	1
“poi-la-sa-doo”	**1**	1	2	1	1	4	1	2	1	3	2

7. Spanish

Item	Stressed syllable (from right edge)	Span 1 (92.8 %)	Span 2 (83.2 %)	Span 3 (89.6 %)	Span 4 (72.8 %)	Span 5 (83.2 %)	Span 6 (90.4 %)	Span 7 (99.2 %)	Span 8 (96.8 %)	Span 9 (97.6 %)	Span 10 (92.8 %)
“mel-la”	**2**	2	2	2	2	2	2	2	2	2	2
“vip-pa”	**2**	2	2	2	2	2	2	2	2	2	2
“dea-ma”	**2**	2	2	2	2	2	2	2	2	2	2
“soo-ra”	**2**	2	2	2	2	2	2	2	2	2	2
“ny-da”	**2**	2	2	2	2	2	2	2	2	2	2
“loy-fa”	**2**	2	2	2	2	2	2	2	2	2	2
“fis-soe”	**2**	2	2	2	2	2	2	2	2	2	2
“dal-ley”	**2**	2	2	2	2	2	2	2	2	2	2
“koo-ree”	**2**	2	2	2	2	2	2	2	2	2	2
“nee-soo”	**2**	2	2	2	2	2	2	2	2	2	2
“moy-roo”	**2**	2	2	2	2	2	2	2	2	2	2
“fauw-tay”	**2**	2	2	2	2	2	2	2	2	2	2
“fen-nye”	**2**	2	2	2	2	2	2	2	2	2	1
“pum-moy”	**2**	2	2	2	2	2	2	2	2	2	2
“chee-noy”	**2**	2	2	2	2	2	2	2	2	2	2
“zoa-gye”	**2**	2	2	2	2	2	1	2	2	2	2
“loi-gauw”	**2**	2	2	2	2	2	2	2	2	2	2
“py-doy”	**2**	2	2	2	2	2	2	2	2	2	2
“ra-dey”	**1**	1	1	1	1	1	1	1	1	1	1
“ba-noo”	**1**	1	1	1	1	1	1	1	1	1	1
“pa-roy”	**1**	1	2	1	1	1	1	2	1	1	1
“fa-sye”	**1**	1	1	1	1	1	1	1	1	1	1
“jav-vay”	**1**	1	1	1	1	2	1	1	1	1	1
“lin-noa”	**1**	1	1	1	2	1	1	1	1	1	1
“buf-foy”	**1**	1	2	1	1	1	1	1	1	1	1
“pez-zye”	**1**	1	1	1	2	1	1	1	1	2	1
“nay-lee”	**1**	1	1	1	1	1	1	1	1	1	1
“dee-soo”	**1**	1	1	1	2	1	1	1	1	1	1
“yoo-zye”	**1**	1	1	1	1	1	1	1	1	1	1
“vee-rauw”	**1**	1	2	1	1	1	1	1	1	1	1
“fye-roo”	**1**	1	1	1	2	2	1	1	1	1	1
“doy-vee”	**1**	1	1	1	1	1	1	1	1	1	1
“lauw-sai”	**1**	2	1	1	2	1	1	1	1	1	1
“vye-loy”	**1**	1		1	1	2	1	1	1	1	1
“lis-se-da”	**3**	3	3	3	3	3	3	3	3	3	3
“roo-de-la”	**3**	3	3	3	3	3	3	3	3	3	3
“soi-be-na”	**3**	3	3	3	3	3	3	3	3	3	3
“naf-fea-pa”	**3**	3	3	3	3	3	3	3	3	3	3
“kee-dey-sa”	**3**	3	3	3	3	3	3	3	3	3	3
“foy-roa-ba”	**3**	3	3	3	3	3	3	3	3	3	3
“del-loy-ma”	**3**	2	2	3	2	2	3	3	3	3	3
“ley-tou-sa”	**3**	3	3	3	2	3	3	3	3	3	3

cont'd

Item	Stressed syllable (from right edge)	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6	Span 7	Span 8	Span 9	Span 10
"pag-ge-noo"	**3**	3	3	3	3	3	1	3	3	3	3
"bey-ne-dee"	**3**	3	3	3	3	3	3	3	3	3	3
"koy-va-lee"	**3**	3	3	3	3	3	3	3	3	3	3
"sim-me-lauw"	**3**	1	3	3	3	3	3	3	3	3	3
"dea-ve-nye"	**3**	3	3	3	3	1	3	3	3	3	3
"ta-rem-ma"	**2**	2	2	2	3	2	2	2	2	2	2
"ze-doo-la"	**2**	2	2	2	2	2	2	2	2	2	2
"me-noy-sa"	**2**	2	2	2	2	2	2	2	2	2	2
"ve-ril-ley"	**2**	2	3	2	2	2	2	2	2	2	2
"da-fea-noo"	**2**	2	2	2	2	2	2	2	2	2	2
"pe-coi-tay"	**2**	2	2	2	2	1	2	2	2	2	2
"ca-vos-sauw"	**2**	2	2	2	2	2	2	2	2	2	2
"ba-foo-roy"	**2**	2	2	2	2	2	2	2	2	2	2
"shoo-bel-la"	**2**	2	2	2	3	2	2	2	2	2	2
"hoa-fay-la"	**2**	2	2	2	2	2	2	2	2	2	2
"ley-tauw-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"soi-det-ta"	**2**	2	2	2	2	2	2	2	2	2	2
"moy-roa-na"	**2**	2	2	2	2	3	2	2	2	2	2
"fel-la-zee"	**1**	1	3	1	1	1	1	1	1	1	1
"sav-va-ney"	**1**	1	1	1	1	1	3	1	1	1	1
"lin-ne-soo"	**1**	1	1	1	1	1	1	1	1	1	1
"dim-me-foy"	**1**	1	1	1	2	1	1	1	1	1	1
"saf-fe-gye"	**1**	1	1	1	2	1	1	1	1	1	1
"ves-se-tauw"	**1**	1	1	1	1	1	1	1	1	1	1
"joa-ma-rey"	**1**	1	3	1	2	1	1	1	1	1	1
"fay-sa-boo"	**1**	1	3	1	1	3	1	1	1	1	1
"voo-la-fea"	**1**	1	1	2	2	1	1	1	1	1	1
"roo-la-doy"	**1**	1	1	1	2	1	1	1	1	1	1
"kea-va-loy"	**1**	3	3	3	2	1	1	1	2	1	1
"boe-da-zye"	**1**	1	3	1	2	1	1	1	1	1	1
"pow-na-soe"	**1**	1	3		1	1	1	1	1	1	1
"coy-da-lee"	**1**	1	1		2	1	1	1	1	1	1
"fye-ca-nye"	**1**	1	2	1	2	3	1	1	1	1	1
"fin-nay-ba-soo"	**4**	4	3	4	3	3	3	4	4	4	3
"kat-tee-ne-moe"	**4**	4	4	4	4	4	4	4	4	4	4
"lee-roo-ne-mey"	**4**	4	4	4	4	4	1	4	4	4	4
"roo-nee-be-rey"	**4**		4		4	4	4	4	4	4	3
"gow-roo-za-tay"	**4**	1	4	4	2	1	1	4	4	4	4
"foi-nee-le-ro"	**4**	4	4	4	4	3	4	4	4	4	4
"bal-lee-de-mye"	**4**	4	4	4	4	4	1	4	4	4	4
"nid-doo-va-loy"	**4**	4	4	4	3	4	4	4	4	4	4
"chee-ley-ne-zow"	**4**	4	4	4	4	4	4	4	3	4	4
"tay-loe-de-noy"	**4**	4	4	4	4	4	4	4	4	4	4
"seg-gow-ne-rey"	**4**	4	4	4	4	4	3	4	3	4	3

cont'd

Item	Stressed syllable (from right edge)	Span 1	Span 2	Span 3	Span 4	Span 5	Span 6	Span 7	Span 8	Span 9	Span 10
"sim-mauw-le-roo"	**4**	4	3	3	4	4	3	4	4	4	3
"voo-dauw-se-mee"	**4**	3	3	4	3	3	3	4	3	4	4
"hoa-gow-ve-zay"	**4**	4	4	4	4	3	3	4	4	4	4
"za-fer-ra-doo"	**3**	3	3	3	3	3	3	3	3	3	3
"da-rey-sa-mee"	**3**	3	3	3	3	3	3	3	3	3	3
"fa-bou-se-dee"	**3**	3	3	3	3	3	3	3	3	3	3
"wa-tep-pe-loy"	**3**	3	3	3	3	3	3	3	3	3	3
"na-tee-ve-zow"	**3**	3	3	3	3	3	3	3	3	3	3
"bea-del-la-zay"	**3**	3	3	3	3	3	3	3	3	3	3
"mea-soo-fa-nee"	**3**	3	3	3	3	3	1	3	3	3	3
"yee-loi-ne-boo"	**3**	3	3	3	3	3	3	3	3	3	3
"roo-nef-fa-mye"	**3**	3	3	3	3	3	3	3	3	3	3
"boo-ray-va-gow"	**3**	3	3	3	3	2	3	3	3	3	3
"fy-rem-ma-tee"	**3**	3	3	3	2	3	3	3	3	3	3
"mye-zea-ca-boo"	**3**	3	3	3	3	4	3	3	3	3	3
"fay-se-rik-ka"	**2**	2	2	4	4	4	2	2	2	2	2
"vea-da-soo-la"	**2**	2	2	2	2	2	2	2	2	2	2
"poo-de-nauw-za"	**2**	2	2	2	2	2	2	2	2	2	2
"mea-da-rem-mye"	**2**	2	1	2	2	2	2	2	2	2	2
"soo-la-bey-dee"	**2**	2	2	2	2	2	2	2	2	2	2
"roa-ma-sye-poe"	**2**	2	2	2	2	2	2	2	2	2	2
"loa-ca-din-noy"	**2**	2	2	2	2	2	2	2	2	2	2
"zea-da-rai-nye"	**2**	2	2	2	3	2	2	2	2	2	2
"bou-se-del-la"	**2**	2	2	2	2	2	2	2	2	2	2
"dow-se-koo-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"dy-ne-ves-soe"	**2**	4	2	2	2	2	2	2	2	2	2
"ty-se-doo-vay"	**2**	2	2	2	3	2	2	2	2	2	2
"sa-jow-me-doo"	**1**	1	1	1	2	1	1	1	1	1	1
"be-lee-ga-zay"	**1**	1	1	1	3	1	1	1	1	1	1
"ka-roo-de-mauw"	**1**	1	3	3	2	1	1	1	1	3	1
"ne-tee-fe-sye"	**1**	1	3	3	1	1	1	1	1	3	3
"cha-moy-na-vea"	**1**	1	3	1	3	2	1	1	1	1	1
"sha-ly-de-ree"	**1**	1	1	1	1	1	1	1	1	1	1
"poa-ne-la-zay"	**1**	1	1	4	1	1	1	1	1	1	1
"doo-ve-na-lee"	**1**	1	1	4	1	1	1	1	1	1	1
"ree-ze-la-nye"	**1**	1	1	1	2	3	1	1	1	1	4
"zay-fa-ra-loy"	**1**	3	4	4	4	2	1	1	1	1	4
"dy-me-la-ree"	**1**	1	1	1	2	4	1	1	1	1	1
"poi-la-sa-doo"	**1**	1	1	4	4	1	1	1	1	1	2

8. Turkish

Item	Stressed syllable (from right edge)	Turk 1 (78.4 %)	Turk 2 (69.6 %)	Turk 3 (62.4 %)	Turk 4 (68.8 %)	Turk 5 (56.8 %)	Turk 6 (68.0 %)	Turk 7 (68.8 %)	Turk 8 (51.2 %)	Turk 9 (88.8 %)	Turk 10 (44.8 %)
“mel-la”	**2**	2	2	2	1	1	2	2	2	2	2
“vip-pa”	**2**	2	2	2	1	1	2	2	1	2	1
“dea-ma”	**2**	1	2	2	2	1	2	1	1	2	2
“soo-ra”	**2**	2	1	2	2	2	2	2	2	2	1
“ny-da”	**2**	2	2	2	2	2	2	2	2	2	2
“loy-fa”	**2**	2	1	2	2	1	2	2	2	2	1
“fis-soe”	**2**	2	1	2	1	2	2	2	2	2	1
“dal-ley”	**2**	2	1	2	2	1	2	2	1	2	2
“koo-ree”	**2**	2	2	2	2	2	2	2	1	2	2
“nee-soo”	**2**	2	2	2	2	1		2	2	2	1
“moy-roo”	**2**	2	2	2	2	2	1	2	1	2	1
“fauw-tay”	**2**	1	2	2	2	2	2	2	2	2	2
“fen-nye”	**2**	1	2	2	2	2	2	1	2	2	1
“pum-moy”	**2**	2	2	2	2	2	2	1	2	2	2
“chee-noy”	**2**	2	2	2	2	2	2	2	2	2	2
“zoa-gye”	**2**	1	2	2	2	2	2	2	2	2	1
“loi-gauw”	**2**	1	1	2	2	1	2	2	2	1	1
“py-doy”	**2**	1	2	2	2	2	1	2	1	2	2
“ra-dey”	**1**	1	1	1	1	1	1	2	1	1	1
“ba-noo”	**1**	1	2	1	2	2	2	1	1	1	2
“pa-roy”	**1**	1	1	1	1	1	2	1	1	1	1
“fa-sye”	**1**	1	1	1	1	1	1	1	1	1	1
“jav-vay”	**1**	1	1	2	2	1	1	2	2	1	2
“lin-noa”	**1**	1	1	1	2	1	1	1	1	2	1
“buf-foy”	**1**	1	1	1	2	1	1	1	1	1	1
“pez-zye”	**1**	2	1	1	1	1	1	1	1	1	1
“nay-lee”	**1**	1	2	1	2	1	2	1	2	1	1
“dee-soo”	**1**	1	2	2	2	2	2		2	1	2
“yoo-zye”	**1**	1	1	1	1	1	1	1	2	1	1
“vee-rauw”	**1**	1	1	1	1	1	1	1	1	1	1
“fye-roo”	**1**	1	2	1	1	2	2	1	2	2	2
“doy-vee”	**1**	2	2	2	2	1	2	2	1	1	1
“lauw-sai”	**1**	1	1	2	1	1	1	1	1	1	2
“vye-loy”	**1**	1	2	2	2	1	1	1	1	1	1
“lis-se-da”	**3**	3	1	2	1	2	3	3	1	3	1
“roo-de-la”	**3**	2	3	3	3	2	2	3	3	3	2
“soi-be-na”	**3**	3	3	3	3	3	2	3	1	1	3
“naf-fea-pa”	**3**	3	3	2	3	3	3	3	3	3	3
“kee-dey-sa”	**3**	3	3	3	3	3	3	3	3	3	2
“foy-roa-ba”	**3**	3	3	3	3	1	3	3	2	3	2
“del-loy-ma”	**3**	3	3	3	3	1	3	2	2	2	1
“ley-tou-sa”	**3**	3	2	3	3	1	2	3	3	3	2

cont'd

Item	Stressed syllable (from right edge)	Turk 1	Turk 2	Turk 3	Turk 4	Turk 5	Turk 6	Turk 7	Turk 8	Turk 9	Turk 10
"pag-ge-noo"	**3**	3	3	3	3	1	3	1	1	3	2
"bey-ne-dee"	**3**	2	3	3	3	1	3	3	1	3	1
"koy-va-lee"	**3**	3	3	1	3	1	2	3	3	3	2
"sim-me-lauw"	**3**	3	3	3	1	1	2	1	1	1	1
"dea-ve-nye"	**3**	3		1	2	3	3	2	3	3	3
"ta-rem-ma"	**2**	2	2	3	2	2	2	2	2	2	3
"ze-doo-la"	**2**	2	2	1	2	1	2	1	2	2	2
"me-noy-sa"	**2**	2	2	2	2	2	2	2		2	2
"ve-ril-ley"	**2**	1	3	3	3	1	1	2	2	2	2
"da-fea-noo"	**2**	2	2	3	2	2	2	2	3	2	3
"pe-coi-tay"	**2**	2	3	2	2	2	1	2	2	1	2
"ca-vos-sauw"	**2**	2	1	2	2	2	2	3	3	1	2
"ba-foo-roy"	**2**	2	3	2	3	2	2	2	2	2	2
"shoo-bel-la"	**2**	2		2	2	2	2	2	2	2	2
"hoa-fay-la"	**2**	2	2	2	1	2	2	1	3	2	2
"ley-tauw-ma"	**2**	2	2	2	2	2	2	2	2	2	2
"soi-det-ta"	**2**	2	3	2	2	1	2	2	2	2	2
"moy-roa-na"	**2**	2	2	2	2	2	2	2	3	2	2
"fel-la-zee"	**1**	1	1	2	1	1	2	1	1	1	1
"sav-va-ney"	**1**	1	1	3	1	1	2	1	3	1	2
"lin-ne-soo"	**1**	1	3	1	1	1	1	1	1	1	1
"dim-me-foy"	**1**	1	1	2	1	2	1	1	2	1	2
"saf-fe-gye"	**1**	1	1	1	1	1	1	3	1	1	1
"ves-se-tauw"	**1**	1	1	2	1	2	1	1	1	1	1
"joa-ma-rey"	**1**	1	1	2	1	2	2	1	1	1	1
"fay-sa-boo"	**1**	1	1	2	2	1	2	1	1	1	2
"voo-la-fea"	**1**	1	1	2	1	1	3	3	1	1	2
"roo-la-doy"	**1**	1	1	1	1	1	1	1	1	1	1
"kea-va-loy"	**1**	1	2	1	3	1	1	2	3	1	2
"boe-da-zye"	**1**	1	1	3	1	2	2	3	3	1	2
"pow-na-soe"	**1**	3	1	2	3	1	2	3	1	1	2
"coy-da-lee"	**1**	3	1	1	3	1	2	3	1	1	3
"fye-ca-nye"	**1**	1	1	2	1	2	2	1	1	2	2
"fin-nay-ba-soo"	**4**	3	3	3	3	3	4	4	2	4	3
"kat-tee-ne-moe"	**4**	4	4	4	4	3	4	3	3	4	3
"lee-roo-ne-mey"	**4**	1	1	4	4	2	4	4	4	4	4
"roo-nee-be-rey"	**4**	4	4	4	4	4	1	4	3	4	2
"gow-roo-za-tay"	**4**	4	4	4	4	4	4	4	3	4	3
"foi-nee-le-ro"	**4**	4	1	3	3	3	4	4	1	4	3
"bal-lee-de-mye"	**4**	4	4	4	4	4	4	4	3	4	2
"nid-doo-va-loy"	**4**	4	1	3	4	4	4	1	4	4	3
"chee-ley-ne-zow"	**4**	4	4	4	4	1	4	4	4	4	4
"tay-loe-de-noy"	**4**	1	4	4	4	2	4	2	3	4	2
"seg-gow-ne-rey"	**4**	3	3	2	4	3	3	3	3	3	3

cont'd

Item	Stressed syllable (from right edge)	Turk 1	Turk 2	Turk 3	Turk 4	Turk 5	Turk 6	Turk 7	Turk 8	Turk 9	Turk 10
"sim-mauw-le-roo"	**4**	4	4	4	4	3	3	4	3	4	3
"voo-dauw-se-mee"	**4**	4	3	3	4	3	3	3	3	3	3
"hoa-gow-ve-zay"	**4**	3	3	4	4	3	4	4	2	4	1
"za-fer-ra-doo"	**3**	3	3	3	4	3	3	4	3	3	4
"da-rey-sa-mee"	**3**	3	3	3	3	3	3	3	3	3	3
"fa-bou-se-dee"	**3**	3	3	3	3	1	3	3	3	3	1
"wa-tep-pe-loy"	**3**	3	3	3	4	2	3	1	4	3	3
"na-tee-ve-zow"	**3**	3	3	3	3	3	2	3	1	1	3
"bea-del-la-zay"	**3**	3	3	3	3	3	3	3	4	3	3
"mea-soo-fa-nee"	**3**	3	2	4	4	3	3	1	4	3	3
"yee-loi-ne-boo"	**3**	4	3	3	4	4	3	3	4	3	3
"roo-nef-fa-mye"	**3**	3	3	4	3	2	2	3	1	3	2
"boo-ray-va-gow"	**3**	3	3	3	3	1	3	1	1	3	3
"fy-rem-ma-tee"	**3**	4	3	4	3	1	4	4	1	3	3
"mye-zea-ca-boo"	**3**	3	2	3	3	3	2	3	3	4	2
"fay-se-rik-ka"	**2**	2	2	4	1	1	4	2	2	2	2
"vea-da-soo-la"	**2**	4	2	2	1	2	4	2	4	2	3
"poo-de-nauw-za"	**2**	2	2	3	2	2	2	2	3	2	3
"mea-da-rem-mye"	**2**	2	3	4	2	3	2	2	4	2	2
"soo-la-bey-dee"	**2**	2	2	3	3	2	2	4	4	2	3
"roa-ma-sye-poe"	**2**	5	2	2	4	1	2	2	1	2	2
"loa-ca-din-noy"	**2**	2	4	2	2	3	2	2	2	2	3
"zea-da-rai-nye"	**2**	3	2	2	4	2	2	2	4	2	2
"bou-se-del-la"	**2**	2	2	2	4	2	2	2	2	2	3
"dow-se-koo-ma"	**2**	2	2	1	2	3	2	4	2	2	1
"dy-ne-ves-soe"	**2**	2	2	2	4	1	2	2	4	2	4
"ty-se-doo-vay"	**2**	2	2	2	2	2	2	2	2	2	3
"sa-jow-me-doo"	**1**	1	4	3	4	3	3	1	3	1	3
"be-lee-ga-zay"	**1**	1	1	3	1	1	2	4	1	1	2
"ka-roo-de-mauw"	**1**	3	1	3	2	1	1	1	1	1	4
"ne-tee-fe-sye"	**1**	1	1	3	3	1	1	1	2	1	1
"cha-moy-na-vea"	**1**	3	3	2	1	3	1	3	4	1	3
"sha-ly-de-ree"	**1**	1	3	3	1	3	1	3	1	1	1
"poa-ne-la-zay"	**1**	1	1	4	1	3	4	1	4	1	4
"doo-ve-na-lee"	**1**	2	1	2	3	1	4	3	3	2	2
"ree-ze-la-nye"	**1**	1	1	3	1	1	1	1	4	1	4
"zay-fa-ra-loy"	**1**	1	1	4	1	1	1	4	3	1	4
"dy-me-la-ree"	**1**	4	4	2	1	1	1	4	3	1	3
"poi-la-sa-doo"	**1**	1	4	1	4	2	4	4	1	1	4

APPENDIX F:

Subject Productions (Production Experiment)

Letters in boldface under 'Pronunciation' (=Pronun) indicate the vowel (syllable) carrying primary stress.

S = schwa (Cə)

T = tense vowel (CV

L = lax vowel (CL)

D = diphthong (CVG)

1. Arabic

Item	Arab-1	Arab-2	Arab-3	Arab-4	Arab-5
lesoo	T-**T**	**T**-T	**L**-T	L-**T**	**T**-T
zafey	S-**T**	**L**-T	**L**-T	L-**T**	**L**-T
faroe	S-**T**	L-**T**	**L**-T	S-**T**	**L**-D
nazee	S-**T**	L-**T**	L-**T**	L-**T**	**L**-T
derey	S-**T**	**L**-T	**T**-T	**T**-T	**L**-T
cheela	**T**-S	**T**-L	**T**-S	**T**-S	**T**-S
noova	T-**L**	T-**L**	**T**-S	**T**-S	**T**-S
toafa	T-**L**	T-L	T-**L**	**T**-S	**T**-S
deysa	**T**-S	**T**-L	**T**-L	**T**-S	**T**-S
roana	**T**-S	**T**-L	**T**-S	**T**-S	**T**-S
noodee	**T**-T	T-**T**	**T**-T	**T**-T	**T**-T
zayvoo	T-**T**	T-**T**	T-**T**	**T**-T	**T**-T
joatay	T-**T**	T-**T**	T-**T**	**T**-T	**T**-T
vaymee	**T**-T	T-**T**	T-**T**	**D**-T	**T**-T
deenay	T-**T**	T-**T**	**T**-T	**T**-T	**T**-T
daboova	S-**T**-S	L-**T**-L	L-**T**-S	**L**-T-L	S-**T**-S
laveega	S-**T**-S	L-**T**-L	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	L-T-L	S-**T**-S	**S**-T-S	S-**T**-S
safoana	S-**T**-S	L-**T**-L	S-**T**-S	**L**-T-L	S-**T**-S
meeganoo	**T**-S-T	T-L-**T**	T-L-**T**	T-L-T	**T**-S-T
naysamee	T-S-T	T-L-**T**	T-L-**T**	**T**-S-T	T-**L**-T
hoaladee	**T**-S-T	T-L-**T**	T-**L**-T	**T**-S-T	T-**L**-T
soodarey	**T**-S-T	T-L-**T**	T-**L**-T	**T**-S-T	**T**-S-T
toaneema	**T**-T-S	T-T-**L**	T-**T**-S	**T**-T-S	T-**T**-S
jeedoova	T-T-**L**	T-T-**L**	T-**T**-S	**T**-T-S	T-**T**-S
leysoada	T-**T**-S	**T**-T-L	T-**T**-S	T-**T**-S	T-**T**-S
voozayla	**T**-T-S	T-T-**L**	T-T-**L**	T-**T**-S	T-**D**-L
faysena	T-T-**L**	T-**T**-L	T-**T**-L	**T**-S-S	T-**L**-S
coaneva	T-**T**-S	T-**T**-L	T-**L**-S	**T**-L-L	**T**-S-S
zeemela	T-**T**-L	T-**T**-L	**T**-L-S	**T**-L-L	T-**T**-L
soobera	**T**-L-L	T-T-**L**	T-**T**-L	**T**-L-L	T-**L**-L
maleydazee	S-T-S-**T**	L-T-L-**T**	L-T-**L**-T	T-**T**-L-T	S-**T**-S-T
danoovasey	S-**T**-S-T	L-T-L-**T**	L-T-**L**-T	S-**T**-S-T	S-**T**-S-T
saroalanoo	S-T-S-**T**	L-T-L-T	S-T-**L**-T	S-**T**-S-T	S-**T**-S-T
peysadoaba	T-L-T-**L**	T-L-**T**-L	T-S-**T**-S	T-S-**T**-S	T-**L**-T-L
roafazeela	T-S-**T**-S	T-L-**T**-L	T-L-**T**-L	T-**L**-T-L	T-S-**T**-S
soobaneyda	**T**-S-T-L	T-L-**T**-L	T-S-**T**-S	T-S-**T**-S	T-**L**-T-L
rooladoaney	T-S-T-**T**	T-L-**T**-T	T-S-T-**T**	T-**L**-T-T	T-**L**-T-T
meydareevoo	T-**L**-T-T	T-L-T-**T**	T-S-**T**-T	T-S-**T**-T	T-**L**-T-T
veenadoorey	**T**-S-T-T	T-L-T-**T**	T-L-**T**-T	T-**L**-T-T	T-**L**-T-T
zearemavoo	T-**T**-L-T	T-T-L-**T**	T-T-**L**-T	T-L-**L**-T	T-**L**-L-T
meyzelanoe	T-T-L-**T**	T-**T**-L-T	T-T-**L**-T	T-L-**L**-T	T-**L**-L-T
gooveradee	T-T-L-T	T-T-L-**T**	T-T-**L**-T	T-**L**-L-T	T-S-**L**-T
soaloodamee	T-**T**-S-T	T-T-L-**T**	T-T-**L**-T	T-**L**-L-T	T-**T**-S-T
peyneezaroo	T-T-S-**T**	T-T-L-**T**	T-T-**L**-T	T-**T**-L-T	T-**T**-S-T
noozayfaloe	T-**T**-S-T	T-T-L-**T**	T-T-**L**-T	T-**T**-S-T	T-**T**-S-T

Cont'd					
Item	**Arab-6**	**Arab-7**	**Arab-8**	**Arab-9**	**Arab-10**
lesoo	T-**T**	S-**T**	**T**-T	L-**T**	**T**-T
zafey	**L**-T	L-**T**	S-**D**	**S**-T	S-**T**
faroe	S-**T**	S-**T**	S-**T**	S-**D**	**L**-T
nazee	L-**T**	L-**T**	S-**T**	S-**T**	**L**-T
derey	S-**T**	T-**T**	S-**T**	L-**T**	S-**T**
cheela	**T**-S	T-**L**	**T**-L	**T**-S	**T**-S
noova	**T**-S	T-**L**	**T**-S	**T**-S	**T**-S
toafa	**T**-S	T-**L**	T-**L**-L	**T**-S	**T**-S
deysa	**T**-S	D-**L**	T-**L**	**T**-S	**T**-S
roana	**T**-S	T-**L**	**T**-S	**T**-S	**T**-S
noodee	**T**-T	T-**T**	**T**-T	**T**	**T**-T
zayvoo	**D**-T	T-**T**	T-**T**	**T**-T	T-**T**
joatay	**T**-D	T-**D**	**D**-T	T-**T**	T-**T**
vaymee	T-**T**	T-**T**	**T**-T	D-**T**	T-**T**
deenay	**T**-T	T-**T**	T-**D**	L-**D**	T-**T**
daboova	S-**T**-S	L-T-**L**	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-S	L-T-**L**	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	L-T-**L**	S-**D**-T	S-**T**-S	S-**T**-S
safoana	**L**-T-S	L-T-**L**	S-**D**-S	S-**T**-S	**L**-T-L
meeganoo	**T**-S-T	T-S-**T**	T-S-**T**	T-**L**-T	T-**L**-T
naysamee	**T**-S-T	T-S-**T**	T-**L**-T	T-S-**T**	T-S-**T**
hoaladee	**T**-S-T	T-S-**T**	**D**-S-T	T-S-**T**	**T**-S-T
soodarey	**T**-S-T	T-S-**T**	**T**-S-T	T-**L**-T	T-S-**T**
toaneema	T-**T**-S	T-T-**L**	D-**T**-S	T-**T**-S	T-**T**-S
jeedoova	**T**-T-S	T-L-**T**	**T**-T-S	T-**T**-S	**T**-T-S
leysoada	T-**T**-S	**T**-T-S	T-**T**-S	T-**T**-S	T-**T**-S
voozayla	T-**D**-S	T-T-**L**	T-**T**-S	T-**T**-S	T-**T**-S
faysena	**D**-S-S	T-T-**L**	**T**-S-S	**T**-S-S	**D**-T-L
coaneva	**T**-L-S	T-T-**L**	**T**-L-S	L-**T**-L	T-**L**-S
zeemela	**T**-L-S	**L**-T-L	S-**T**-S	T-**L**-L	T-**L**-S
soobera	**T**-S-S	**T**-T-L	**T**-L-S	T-**L**-L	T-**L**-S
maleydazee	S-**T**-S-T	**T**-T-L-T	S-T-S-**T**	D-L-**L**-T	S-**T**-S-T
danoovasey	S-**T**-S-T	L-T-L-**T**	S-**T**-S-T	S-T-S-**T**	S-T-**L**-T
saroalanoo	S-T-S-**T**	S-T-S-**T**	S-T-S-**T**	L-T-**L**-L	S-**T**-S-T
peysadoaba	T-**L**-T-S	T-S-**T**-S	T-S-**D**-S	T-S-**L**-S	T-S-**T**-S
roafazeela	T-S-**T**-S	T-L-T-**L**	T-S-**T**-S	T-S-**T**-S	T-**L**-T-S
soobaneyda	T-S-**T**-S	T-L-T-**L**	T-S-S-**D**	T-S-**T**-S	T-**L**-T-S
rooladoaney	T-**L**-T-T	T-L-T-**D**	T-S-T-**T**	T-S-**L**-T	T-**L**-T-T
meydareevoo	T-S-**T**-T	T-S-T-**T**	T-S-T-**T**	T-S-T-**T**	T-**L**-T-T
veenadoorey	T-S-**T**-T	T-S-T-**T**	T-S-T-**T**	T-S-**T**-T	T-**L**-T-T
zearemavoo	S-T-S-**T**	T-L-L-**T**	L-**T**-S-T	T-**L**-S-T	T-S-**L**-T
meyzelanoe	T-**T**-L-T	T-S-S-**T**	T-T-S-**D**	T-S-S-**T**	T-**L**-S-T
gooveradee	T-**L**-S-T	T-L-L-**T**	T-T-S-**T**	T-L-**L**-T	T-**L**-S-T
soaloodamee	T-**T**-S-T	T-T-S-**T**	T-T-S-**T**	T-T-S-**T**	T-**T**-S-T
peyneezaroo	T-**T**-S-T	**T**-T-S-T	T-T-S-**T**	T-T-**L**-T	T-**T**-S-T
noozayfaloe	T-**T**-S-T	T-T-S-**T**	T-D-S-**D**	T-T-**L**-D	T-T-S-**T**

2. Chinese

Item	Chin-1	Chin-2	Chin-3	Chin-4	Chin-5
lesoo	T-**T**	S-**T**	S-**T**	**L**-T	S-**T**
zafey	S-**T**	S-**T**	**L**-T	**L**-T	S-**T**
faroe	S-**T**	S-**T**	**L**-T	**L**-T	**L**-T
nazee	S-**T**	S-**T**	S-**T**	S-**T**	S-**T**
derey	T-**T**	S-**T**	S-**T**	**L**-T	L-**T**
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
deysa	**T**-S	**T**-S	S-**L**	**T**-S	L-**T**
roana	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noodee	T-**T**	T-**T**	**T**-T	T-**T**	T-**T**
zayvoo	T-**T**	T-**T**	**T**-T	**T**-T	**T**-T
joatay	T-**T**	T-**T**	**T**-T	**T**-T	**T**-T
vaymee	T-**T**	**T**-T	T-**T**	**T**-T	T-**T**
deenay	T-**T**	T-**T**	T-**T**	T-**T**	T-**T**
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	**L**-T-S	**L**-T-S	S-**T**-S	**L**-T-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
safoana	S-**D**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
meeganoo	T-**L**-T	T-S-T	T-S-**T**	T-S-**T**	T-S-**T**
naysamee	T-S-**T**	T-S-**T**	**T**-S-T	T-**L**-T	**T**-S-T
hoaladee	T-S-**T**	T-S-**T**	**T**-S-T	T-**L**-T	**T**-S-T
soodarey	T-S-**T**	T-S-**T**	**T**-S-T	**T**-S-T	**T**-S-T
toaneema	**T**-S-L	T-**T**-S	T-**T**-S	T-**T**-S	**T**-T-S
jeedoova	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S	**T**-T-S
leysoada	T-**D**-S	**T**-T-S	T-**T**-S	T-**T**-S	T-**T**-S
voozayla	T-**T**-S	**T**-T-S	T-**T**-S	T-**T**-S	T-**T**-S
faysena	T-**T**-S	**T**-S-S	T-**L**-S	T-**L**-S	**T**-S-S
coaneva	**T**-S-S	**T**-S-S	T-**T**-S	T-**L**-S	**T**-S-S
zeemela	S-**L**-S	**T**-S-S	S-**T**-S	T-**L**-S	**T**-S-S
soobera	**T**-S-S	**T**-S-S	**T**-S-T	T-**L**-S	**T**-S-S
maleydazee	S-T-S-**T**	S-T-S-**T**	L-S-**L**-T	S-T-**L**-T	L-T-S-**T**
danoovasey	S-T-S-**T**	S-**T**-S-T	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T
saroalanoo	S-**T**-S-T	S-**T**-S-T	S-T-**L**-T	S-T-S-**T**	**L**-T-S-T
peysadoaba	D-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
roafazeela	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
soobaneyda	T-**L**-T-S	T-S-**T**-S	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S
rooladoaney	T-**L**-D-T	T-S-T-**T**	T-S-**T**-S	T-S-**T**-T	T-S-T-**T**
meydareevoo	T-S-T-**T**	**T**-S-T-T	T-S-**T**-S	T-S-**T**-T	T-S-T-**T**
veenadoorey	T-S-**T**-T	T-S-**T**-T	T-S-**T**-S	T-S-T-**T**	T-S-T-**T**
zearemavoo	T-S-S-**T**	**T**-S-S-T	T-S-**L**-T	T-S-**L**-T	T-S-S-**T**
meyzelanoe	T-**L**-S-T	**T**-S-S-T	T-S-**L**-T	T-S-S-**T**	T-S-S-**T**
gooveradee	T-S-S-**T**	T-S-S-**T**	T-S-**L**-T	T-S-**L**-T	T-S-S-**T**
soaloodamee	T-**T**-S-T	T-T-S-**T**	T-S-**L**-T	T-**T**-S-T	T-T-S-**T**
peyneezaroo	T-T-S-**T**	T-T-S-**T**	T-T-**L**-T	T-T-S-**T**	T-T-S-**T**
noozayfaloe	T-**T**-S-T	**T**-T-S-T	T-T-**L**-T	T-T-S-**T**	T-T-S-**T**

Cont'd					
Item	**Chin-6**	**Chin-7**	**Chin-8**	**Chin-9**	**Chin-10**
lesoo	S-**T**	S-**T**	**L**-T	S-**T**	**L**-T
zafey	S-**T**	S-**T**	**L**-T	S-**T**	**T**-T
faroe	S-**T**	S-**D**	L-**T**	S-**T**	**L**-T
nazee	S-**T**	S-**T**	**L**-T	S-**T**	**L**-T
derey	S-**T**	S-**T**	T-**T**	**L**-T	T-**T**
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	**T**-S	T-**L**	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-S	T-**L**
deysa	**T**-S	**T**-S	**T**-S	**T**-S	T-**L**
roana	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noodee	T-**T**	T-**T**	**T**-T	**T**-T	T-**T**
zayvoo	T-**T**	**T**-T	**T**-T	T-**T**	T-**T**
joatay	T-**T**	T-**T**	**T**-T	T-**T**	**T**-L
vaymee	T-**T**	D-**T**	T-**T**	T-**T**	T-T
deenay	T-**T**	**T**-D	T-**T**	T-**T**	T-**T**
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-T-**L**
laveega	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	**T**-S-S	S-**T**-S	S-**T**-S
safoana	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	**S**-T-S
meeganoo	T-S-**T**	T-S-**T**	T-**L**-T	T-**L**-T	T-S-**T**
naysamee	T-S-**T**	T-S-**T**	T-**L**-T	T-**L**-T	T-S-**T**
hoaladee	T-S-**T**	T-S-**T**	**T**-S-T	T-S-**T**	T-S-**T**
soodarey	T-S-**T**	T-S-**T**	**T**-S-T	T-S-**T**	T-S-**T**
toaneema	T-**T**-S	T-**T**-S	**T**-T-S	T-**T**-S	T-**T**-S
jeedoova	T-**T**-S	T-**T**-S	**T**-T-S	T-**T**-S	T-**T**-S
leysoada	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S
voozayla	T-**T**-S	T-**T**-S	T-**T**-S	D-**T**-S	T-**T**-S
faysena	T-**T**-S	S-**T**-S	T-**T**-T	S-**T**-S	**T**-S-S
coaneva	T-**L**-S	T-**L**-S	T-**L**-S	T-**L**-S	T-**L**-S
zeemela	**T**-S-S	T-**L**-S	T-**L**-S	T-**T**-S	T-**L**-S
soobera	**T**-T-S	T-**L**-S	**T**-S-S	T-**T**-S	T-**L**-S
maleydazee	S-T-S-**T**	S-T-S-**T**	S-T-**L**-T	S-**T**-S-T	**L**-T-S-T
danoovasey	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T	S-T-S-**T**	S-T-S-**T**
saroalanoo	S-T-S-**T**	S-T-S-**T**	S-T-**L**-T	S-T-**L**-T	S-T-S-**T**
peysadoaba	T-S-**T**-S	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S	**L**-T-L-S
roafazeela	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-T-**L**
soobaneyda	T-S-**T**-S	T-S-**T**-S	T-**L**-S	T-S-**T**-S	T-S-**T**-S
rooladoaney	T-S-T-**T**	T-S-T-**T**	T-**L**-S-T	T-S-**T**-T	T-S-**T**-T
meydareevoo	T-S-**T**-T	T-L-T-**T**	T-**L**-T-T	S-S-**T**-T	T-S-T-**T**
veenadoorey	T-S-T-**T**	T-S-T-**T**	T-**L**-T-T	T-S-T-**T**	T-S-**T**-T
zearemavoo	T-S-S-**T**	T-S-S-**T**	T-**L**-S-S	**L**-S-S-T	T-T-S-**T**
meyzelanoe	T-S-S-**D**	S-L-S-**D**	T-S-**L**-T	T-S-**L**-T	L-S-**T**-L
gooveradee	T-S-S-**T**	T-S-S-**T**	T-**L**-S-T	T-T-**L**-T	T-S-S-**T**
soaloodamee	T-T-S-**T**	T-T-S-**T**	T-**T**-S-T	S-T-S-**T**	T-T-S-**T**
peyneezaroo	T-T-S-**T**	S-T-S-**T**	T-T-**L**-T	T-T-S-**T**	T-T-S-**T**
noozayfaloe	T-T-S-**D**	T-**T**-S-D	T-**L**-T-T	T-T-S-**T**	**T**-T-S-T

3. English

Item	Eng-1	Eng-2	Eng-3	Eng-4	Eng-5
lesoo	**T**-T	T-**T**	S-**T**	**T**-T	S-**T**
zafey	**L**-T	S-**T**	**L**-T	S-**T**	S-**T**
faroe	**L**-T	S-**T**	**L**-T	S-**T**	S-**T**
nazee	**L**-T	S-**T**	S-**T**	S-**T**	S-**T**
derey	**L**-T	L-**T**	S-**T**	S-**T**	T-**T**
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	T-**L**	**T**-S	**T**-S	**T**-S
toafa	T-**L**	T-**L**	**T**-S	**T**-S	T-**T**
deysa	**T**-S	T-**L**	**T**-S	**T**-S	**T**-S
roana	**T**-S	T-**L**	**T**-S	**T**-S	**T**-S
noodee	**T**-T	T-**T**	**T**-T	T-**T**	T-**T**
zayvoo	T-**T**	T-**T**	**T**-T	**T**-T	T-**T**
joatay	D-**T**	T-**T**	**T**-T	**T**-T	**T**-T
vaymee	**T**-T	L-**T**	**T**-T	**T**-T	T-**T**
deenay	**T**-T	**T**-T	**T**-T	**T**-T	**T**-T
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	**L**-T-S	S-**T**-S	S-**T**-S	S-**T**-S
safoana	S-**T**-S	L-T-**L**	S-**T**-S	S-**T**-S	S-**T**-S
meeganoo	T-**L**-T	**T**-S-T	T-S-**T**	**T**-S-T	T-S-**T**
naysamee	T-**L**-T	T-**L**-L	**T**-S-T	**T**-S-T	T-S-**T**
hoaladee	T-**L**-T	T-**L**-T	**T**-S-T	**T**-S-T	**T**-S-T
soodarey	**T**-S-T	T-S-**T**	**T**-S-T	**T**-S-T	**T**-S-T
toaneema	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S
jeedoova	T-**T**-S	T-**T**-S	**T**-T-S	T-**T**-S	T-**T**-S
leysoada	T-**D**-S	T-**T**-S	**T**-T-S	T-**T**-S	T-**T**-S
voozayla	T-**T**-S	T-**T**-S	**T**-T-S	T-**T**-S	T-**T**-S
faysena	**T**-S-S	T-**L**-L	**T**-L-S	**T**-S-S	**T**-T-S
coaneva	T-**L**-S	T-L-**L**	**T**-S-S	T-S-**L**	T-**T**-S
zeemela	T-**L**-S	L-**L**-S	T-**L**-S	S-**T**-S	**T**-L-S
soobera	T-**L**-S	T-**T**-S	T-**L**-S	**T**-S-S	T-**T**-S
maleydazee	S-**T**-S-T	T-**T**-L-L	S-T-S-**T**	S-**T**-S-T	S-**T**-S-T
danoovasey	S-T-**L**-T	S-T-S-**T**	S-T-S-**T**	S-**T**-S-T	S-T-**L**-T
saroalanoo	S-**D**-L-T	S-**T**-S-T	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T
peysadoaba	T-S-**D**-S	T-L-T-**L**	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
roafazeela	T-S-**T**-S	T-**L**-T-S	T-**L**-T-S	T-S-**T**-S	T-S-**T**-S
soobaneyda	T-**L**-T-S	T-**L**-T-S	T-S-**T**-S	T-S-**T**-S	T-T-**T**-S
rooladoaney	T-**L**-T-T	T-**L**-T-L	**T**-S-T-T	T-S-**T**-T	T-S-**T**-T
meydareevoo	T-**L**-T-T	T-**L**-T-T	T-**L**-T-T	T-S-**T**-T	T-**L**-T-T
veenadoorey	T-S-**T**-T	T-S-T-**T**	T-S-**T**-T	T-S-**T**-T	T-S-**T**-T
zearemavoo	T-S-**L**-T	T-T-S-**T**	T-S-S-**T**	T-T-S-**T**	T-**T**-S-T
meyzelanoe	T-S-**L**-T	T-**L**-L-T	T-S-S-**T**	T-S-S-**T**	T-**T**-S-T
gooveradee	T-**L**-S-T	T-**L**-S-T	T-**L**-S-T	T-S-**L**-T	T-**L**-S-T
soaloodamee	D-**T**-L-T	T-**T**-S-L	T-**T**-S-T	T-**T**-S-T	T-T-**L**-T
peyneezaroo	T-T-**L**-T	T-**T**-T-T	**T**-T-S-T	T-T-S-**T**	T-**T**-S-T
noozayfaloe	T-T-S-**T**	T-**T**-S-T	T-**T**-S-T	T-T-S-**T**	T-**T**-S-T

Cont'd					
Item	**Eng-6**	**Eng-7**	**Eng-8**	**Eng-9**	**Eng-10**
lesoo	S-**T**	S-**T**	S-**T**	S-**T**	S-**T**
zafey	**L**-T	**L**-T	S-**T**	**L**-T	S-**T**
faroe	**L**-T	**L**-T	S-**T**	S-**T**	S-**T**
nazee	S-**T**	**T**-T	**L**-T	**L**-T	S-**T**
derey	S-**T**	**T**-T	S-**T**	S-**T**	S-**T**
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	T-**L**	**T**-S	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
deysa	**T**-S	**T**-S	T-**L**	**T**-S	**T**-S
roana	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noodee	**T**-T	**T**-T	**T**-T	**T**-T	**T**-T
zayvoo	**T**-T	**T**-T	T-**T**	**T**-T	**T**-T
joatay	T-**T**	**T**-T	T-**T**	**T**-T	**T**-T
vaymee	T-**T**	**T**-T	**T**-T	T-**T**	**T**-T
deenay	**T**-T	**T**-L	T-**T**	**T**-T	S-**T**
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	L-T-**L**	S-**T**-S	S-**T**-S
safoana	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
meeganoo	T-**L**-T	T-**L**-T	**T**-S-T	**T**-S-T	**T**-S-T
naysamee	T-**L**-T	**T**-S-T	**T**-S-T	**T**-S-T	**T**-S-T
hoaladee	**T**-S-T	**T**-S-T	**T**-S-T	**T**-S-T	**T**-S-T
soodarey	T-**T**-T	**T**-S-T	**T**-S-T	**T**-S-T	**T**-S-T
toaneema	T-**T**-S	T-**T**-S	**T**-T-S	**T**-T-S	T-**T**-S
jeedoova	T-**T**-S	T-**T**-S	**T**-T-S	T-**T**-S	**T**-T-S
leysoada	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S
voozayla	T-**T**-S	T-**T**-S	**T**-T-S	T-**T**-S	T-**T**-S
faysena	**T**-S-S	T-**T**-S	**T**-S-S	**T**-S-S	**T**-S-S
coaneva	**T**-S-S	T-**T**-S	**T**-S-S	**T**-S-S	**T**-S-S
zeemela	**T**-S-S	T-**T**-S	**T**-S-S	**T**-S-S	**T**-S-S
soobera	T-**L**-S	T-**L**-S	**T**-S-S	T-**T**-S	**T**-S-S
maleydazee	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T
danoovasey	L-T-**T**-T	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T
saroalanoo	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T
peysadoaba	T-S-**T**-S	T-S-**T**-S	S-**T**-L-L	T-S-**T**-S	T-S-**T**-S
roafazeela	T-S-**T**-S	T-**L**-T-S	T-**L**-T-S	T-S-**T**-S	T-S-**T**-S
soobaneyda	T-S-**T**-S	T-**L**-T-S	T-**L**-T-L	T-S-**T**-S	T-S-**T**-S
rooladoaney	T-S-**T**-S	T-S-**T**-T	T-**L**-T-T	T-S-**T**-T	T-S-**T**-T
meydareevoo	T-S-**T**-T	T-S-**T**-T	T-**L**-T-T	T-S-**T**-T	T-S-**T**-T
veenadoorey	T-S-**T**-T	T-**L**-T-T	T-**L**-T-T	T-**L**-T-T	T-S-**T**-T
zearemavoo	T-S-**L**-T	T-**T**-S-T	S-**T**-S-T	T-S-S-**T**	T-S-S-**T**
meyzelanoe	T-S-**T**-T	T-**T**-S-T	L-**T**-S-T	T-S-S-**T**	T-**L**-S-T
gooveradee	T-**L**-S-T	T-**L**-S-T	T-**T**-S-T	T-S-**L**-T	T-**L**-S-T
soaloodamee	T-**T**-S-T	T-**T**-S-T	T-**T**-S-T	T-T-**L**-T	T-**T**-S-T
peyneezaroo	T-**T**-S-T	T-**T**-S-T	T-**T**-S-T	T-**T**-S-T	T-**T**-S-T
noozayfaloe	T-T-**L**-T	T-**T**-S-T	T-**T**-S-T	T-**T**-S-T	T-**T**-S-T

4. French

Item	Fren-1	Fren-2	Fren-3	Fren-4	Fren-5
lesoo	S-**T**	S-**T**	S-**T**	L-**T**	**L**-T
zafey	**T**-T	S-**T**	**L**-T	**L**-T	**L**-T
faroe	**T**-T	S-**T**	**L**-T	**T**-T	S-**T**
nazee	**T**-T	S-**T**	L-**T**	S-**T**	**S**-T
derey	**T**-L	T-**T**	S-**T**	T-**T**	S-**T**
cheela	**T**-S	T-**L**	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T-L**	**T**-S	**T**-S	**T**-S
toafa	**T**-S	**T-L**	**T**-S	**T**-S	**T**-S
deysa	**T**-L	T-**T**	**T**-S	**T**-S	**T**-S
roana	**T**-S	T-**L**	**T**-S	**T**-S	**T**-S
noodee	**T**-T	T-**T**	T-**T**	T-**T**	**T**-T
zayvoo	**T**-T	T-**T**	**T**-T	**T**-T	**T**-T
joatay	T-**T**	T-**T**	**T**-T	T-**D**	T-**T**
vaymee	**T**-L	T-**T**	**T**-T	L-**T**	T-**T**
deenay	**T**-T	T-**T**	T-**T**	T-**T**	**T**-T
daboova	S-**T**-S	S-T-**L**	S-**T**-S	S-**T**-L	S-**T**-S
laveega	S-**T**-S	S-T-**L**	S-**T**-S	L-T-**L**	S-**T**-S
nazeyda	S-**T**-S	S-T-**L**	S-**T**-S	**D**-S-S	S-**T**-S
safoana	S-**T**-S	S-T-**L**	**L**-T-S	**L**-L-S	S-**T**-S
meeganoo	**T**-S-T	T-S-**T**	T-**L**-T	**T**-S-T	T-**L**-T
naysamee	**T**-S-T	T-S-**T**	T-S-**T**	**T**-S-T	**T**-S-T
hoaladee	T-**T**-T	T-S-**T**	**T**-S-T	T-S-**T**	T-S-**T**
soodarey	T-**T**-T	T-S-**T**	T-S-**T**	**T**-S-T	T-**L**-T
toaneema	T-**T**-S	T-T-**L**	T-**T**-S	T-**T**-S	T-**T**-S
jeedoova	T-**T**-S	T-T-**L**	T-**T**-S	T-T-**L**	T-**T**-S
leysoada	T-**T**-S	**T**-T-S	T-**T**-S	**T**-T-S	T-**T**-S
voozayla	T-**T**-S	T-T-**L**	T-**T**-S	T-T-**L**	T-**T**-S
faysena	**T**-S-S	T-S-**L**	T-**L**-S	L-**T**-S	**T**-S-S
coaneva	**T**-T-S	T-S-**L**	T-**L**-S	T-**T**-L	T-**L**-S
zeemela	T-**T**-S	T-L-**L**	**T**-S-S	T-**T**-S	**T**-S-S
soobera	T-**T**-S	T-T-**L**	T-**L**-S	T-**T**-S	T-**L**-L
maleydazee	L-**T**-S-T	S-T-S-**T**	S-T-**L**-T	S-T-S-**T**	S-T-S-**T**
danoovasey	S-**T**-S-T	S-T-S-**T**	S-T-S-**T**	S-T-S-**T**	S-T-S-**T**
saroalanoo	S-**T**-S-T	S-T-S-**T**	S-T-S-**T**	S-T-S-**T**	S-T-S-**T**
peysadoaba	T-**T**-T-S	T-S-T-**L**	T-S-**T**-S	T-S-T-**L**	**T-S-T-S**
roafazeela	T-**T**-T-S	T-S-T-**L**	T-S-**T**-S	T-S-T-**L**	**T-S-T-S**
soobaneyda	T-**T**-T-S	**T**-S-T-S	T-S-**T**-S	T-S-**T**-S	**T-S-T-S**
rooladoaney	T-**T**-T-T	T-S-T-**T**	T-S-T-**T**	T-S-T-**T**	T-S-**T**-T
meydareevoo	T-**T**-T-T	T-S-T-**T**	T-S-**T**-T	T-S-T-**T**	T-S-T-**T**
veenadoorey	T-**T**-T-T	T-S-T-**T**	T-S-T-**T**	T-S-T-**T**	T-S-**T**-T
zearemavoo	T-**L**-S-T	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**
meyzelanoe	T-**T**-S-T	T-S-S-**T**	T-S-S-**T**	**T**-S-S-T	T-S-S-**T**
gooveradee	T-T-**T**-T	T-S-S-**T**	T-L-S-**T**	T-S-S-**T**	T-S-**L**-T
soaloodamee	T-**T**-S-T	T-T-S-**T**	T-**T**-S-T	T-**T**-S-T	T-T-S-**T**
peyneezaroo	T-**T**-S-T	T-T-S-**T**	T-T-**L**-T	T-T-S-**T**	T-T-**L**-T
noozayfaloe	T-**T**-T-T	T-T-S-**T**	T-T-S-**T**	T-S-L-**T**	T-T-**L**-T

Cont'd					
Item	**Fren-6**	**Fren-7**	**Fren-8**	**Fren-9**	**Fren-10**
lesoo	**T**-T	**T**-T	S-**T**	**T**-T	**L**-T
zafey	S-**T**	S-**T**	S-**T**	S-**T**	**L**-T
faroe	S-**T**	**L**-T	S-**T**	**L**-T	**L**-T
nazee	**S**-T	S-**T**	S-**T**	**T**-T	**L**-T
derey	**L**-T	**T**-T	S-**T**	**T**-T	**L**-T
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-T	**T**-S
deysa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
roana	**T**-S	**T**-S	**T**-S	**T**-T	**T**-S
noodee	**T**-T	**T**-T	**T**-T	**T**-T	**T**-T
zayvoo	T-**T**	T-**T**	**T**-T	**T**-T	**T**-T
joatay	**T**-T	T-**T**	**T**-T	**T**-T	**L**-T
vaymee	T-**T**	**T**-T	**T**-T	**T**-T	**T**-T
deenay	**T**-T	**T**-T	**T**-T	**T**-T	**T**-T
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	S-**T**-S	**L**-S-S	S-**T**-S
safoana	S-**T**-S	**L**-T-S	S-**T**-S	S-**T**-S	S-**T**-S
meeganoo	**T**-S-T	**T**-S-T	**T**-S-T	**T**-S-T	T-**L**-T
naysamee	T-S-**T**	**T**-S-T	**T**-S-T	T-**T**-T	T-**L**-T
hoaladee	**T**-S-T	**T**-S-T	**T**-S-T	T-**L**-T	T-**L**-T
soodarey	**T**-S-T	**T**-S-T	**T**-S-T	**T**-S-T	T-S-**T**
toaneema	T-**T**-S	**T**-T-S	T-T-**L**	D-T-S	T-T-S
jeedoova	**T**-T-S	**T**-T-S	**T**-T-S	T-**T**-S	T-**T**-S
leysoada	**T**-T-S	**T**-T-S	**T**-T-S	T-**T**-S	T-**T**-S
voozayla	**T**-T-S	**T**-T-S	**T**-S-T	**T**-T-S	T-**T**-S
faysena	T-**T**-S	**T**-S-S	T-**T**-S	T-**T**-S	T-**L**-S
coaneva	**T**-S-S	T-**T**-S	**T**-S-T	**T**-S-S	T-**L**-S
zeemela	**T**-S-S	**T**-T-S	**T**-S-S	**T**-S-S	T-**L**-S
soobera	**T**-S-S	**T**-S-S	**T**-S-S	**T**-S-S	T-**T**-S
maleydazee	D-T-S-**T**	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-T-**L**-T
danoovasey	**L**-T-S-T	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-T-**L**-T
saroalanoo	S-T-S-**T**	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T	S-**T**-S-T
peysadoaba	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S
roafazeela	T-**L**-T-S	T-S-**T**-S	T-S-T-**L**	T-**L**-T-S	T-S-**T**-S
soobaneyda	**T**-S-T-S	T-**L**-T-S	**T**-S-T-S	T-S-**T**-S	T-**L**-T-S
rooladoaney	T-S-T-**T**	T-S-T-**T**	T-S-T-**T**	T-**L**-S-D	T-S-**T**-T
meydareevoo	**T**-S-T-T	**T**-S-T-T	T-S-T-**T**	T-**T**-T-T	T-S-**T**-T
veenadoorey	**T**-S-T-T	T-**L**-T-T	**T**-S-T-T	T-S-**T**-T	T-S-**T**-T
zearemavoo	T-S-S-**T**	T-**L**-S-T	T-S-S-**T**	T-**T**-S-T	T-S-**L**-T
meyzelanoe	T-S-S-**T**	T-**T**-S-T	T-S-S-**T**	T-**L**-S-T	T-S-S-**D**
gooveradee	**T**-S-S-T	T-**T**-S-T	**T**-S-S-T	T-**L**-S-T	T-S-**L**-T
soaloodamee	T-T-S-**T**	**T**-T-S-T	T-**T**-S-T	T-**T**-S-T	T-T-**L**-T
peyneezaroo	T-**T**-S-T	T-**T**-S-T	**T**-T-S-T	T-**T**-S-T	T-T-**L**-T
noozayfaloe	**T**-T-S-T	T-**T**-S-T	**T**-T-S-D	T-**T**-S-T	T-S-**T**-D

5. Japanese

Item	Jap-1	Jap-2	Jap-3	Jap-4	Jap-5
lesoo	S-**T**	**L**-T	L-**T**	**L**-L	T-**T**
zafey	S-**T**	S-**T**	**L**-T	**T**-T	S-**T**
faroe	S-**T**	S-**T**	**L**-T	S-**D**	**L**-T
nazee	S-**T**	S-**T**	S-**T**	S-T	S-**T**
derey	T-**T**	T-**T**	T-**T**	S-**T**	T-**T**
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
deysa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
roana	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noodee	T-**T**	T-**T**	T-**T**	**T**-T	T-**T**
zayvoo	**T**-T	D-**T**	**T**-T	D-**T**	T-**T**
joatay	T-**T**	L-**T**	**T**-T	**L**-D	T-**T**
vaymee	T-**T**	D-**T**	D-**T**	**D**-T	D-**T**
deenay	T-**T**	T-**T**	T-**T**	T-**T**	T-**T**
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
safoana	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	**L**-T-S
meeganoo	**T**-S-T	T-S-**T**	T-S-**T**	T-S-**T**	T-S-**T**
naysamee	T-S-**T**	T-S-**T**	T-S-**T**	T-S-**T**	D-S-**T**
hoaladee	**T**-S-T	T-S-**T**	T-S-**T**	T-S-**T**	T-S-**T**
soodarey	T-S-**T**	T-S-**T**	T-S-**T**	T-S-**T**	T-S-**T**
toaneema	T-**T**-S	T-**T**-S	T-T-**L**	T-**T**-S	T-**T**-S
jeedoova	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S
leysoada	T-**T**-S	T-**T**-S	**T**-T-S	T-**D**-S	T-**T**-S
voozayla	T-**T**-S	T-**T**-S	T-T-**L**	T-**T**-S	T-**T**-S
faysena	T-**L**-S	**T**-S-S	T-**L**-S	T-**L**-S	T-**T**-S
coaneva	T-**L**-S	T-**T**-S	T-**L**-S	D-**L**-S	T-**L**-S
zeemela	T-**L**-S	T-**L**-S	T-**T**-S	**T**-S-S	**T**-S-S
soobera	T-**L**-S	T-**L**-S	T-**T**-S	**T**-S-S	T-**T**-S
maleydazee	S-**T**-S-T	S-**T**-S-T	S-T-S-**T**	L-D-S-**T**	S-T-S-**T**
danoovasey	S-**T**-S-T	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T	S-**T**-S-T
saroalanoo	S-**T**-S-T	S-T-S-**T**	S-T-S-**T**	L-T-S-**T**	S-T-S-**T**
peysadoaba	T-S-**T**-S	T-S-**T**-S	T-L-T-**L**	T-S-**T**-S	T-S-**T**-S
roafazeela	T-S-**T**-S	T-S-**T**-S	T-S-T-**L**	T-S-**T**-S	T-**L**-T-S
soobaneyda	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
rooladoaney	T-S-**T**-T	T-S-**T**-T	T-S-S-**T**	T-S-**D**-T	T-**L**-T-T
meydareevoo	T-S-**T**-T	T-S-**T**-T	T-S-**T**-T	T-L-**T**-T	T-S-T-**T**
veenadoorey	T-S-T-**T**	T-S-T-**T**	T-L-T-**T**	T-S-T-**T**	T-S-T-**T**
zearemavoo	T-**L**-S-T	T-S-S-**T**	L-L-S-**T**	T-S-S-**T**	T-T-S-**T**
meyzelanoe	T-**L**-S-T	T-T-S-**T**	T-S-S-**T**	T-T-S-**T**	T-S-**L**-T
gooveradee	T-**L**-S-T	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**	T-L-S-**T**
soaloodamee	T-T-S-**T**	T-**T**-S-T	T-T-S-**T**	L-L-S-**T**	T-T-S-**T**
peyneezaroo	T-**T**-S-T	T-T-S-**T**	T-T-S-**T**	T-T-S-**T**	T-T-S-**T**
noozayfaloe	T-**T**-S-T	T-**D**-S-T	T-T-S-**T**	T-D-S-**T**	T-**T**-S-T

Cont'd					
Item	**Jap-6**	**Jap-7**	**Jap-8**	**Jap-9**	**Jap-10**
lesoo	S-**T**	S-**T**	T-**T**	**T**-T	S-**T**
zafey	**L**-T	**L**-T	S-**T**	S-**T**	S-**T**
faroe	**L**-D	S-**T**	T-**T**	S-**T**	**T**-T
nazee	S-**T**	**L**-T	**T**-T	T-**T**	**T**-T
derey	**T**-T	T-**T**	S-**T**	S-**T**	S-**T**
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
deysa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
roana	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noodee	**T**-T	T-**T**	**T**-T	T-**T**	**T**-T
zayvoo	**T**-T	T-**T**	T-**T**	**T**-T	**T**-T
joatay	**T**-T	T-**T**	**T**-T	**T**-T	T-**T**
vaymee	T-**T**	**T**-T	T-**T**	**T**-T	T-**T**
deenay	**T**-T	**T**-T	T-**T**	**T**-D	**T**-T
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-T-**L**	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
safoana	**L**-L-S	S-**T**-S	S-**T**-S	**T**-T-S	S-**T**-S
meeganoo	T-S-**T**	T-S-**T**	T-S-**T**	**T**-S-T	**T**-S-T
naysamee	T-S-**T**	T-S-**T**	T-S-**T**	**T**-S-T	T-S-**T**
hoaladee	T-S-**T**	T-S-**T**	T-S-**T**	**T**-S-T	**T**-S-T
soodarey	T-S-**T**	T-S-**T**	T-S-**T**	**T**-S-T	T-S-T
toaneema	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S
jeedoova	T-**T**-S	T-**T**-S	S-**T**-S	T-**T**-S	T-**T**-S
leysoada	T-T-S	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S
voozayla	**T**-T-S	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S
faysena	**T**-S-S	**T**-S-S	**T**-S-S	**T**-S-S	**T**-S-S
coaneva	**L**-T-S	T-**L**-S	T-**T**-S	T-**T**-S	T-S-S
zeemela	**T**-S-S	T-**L**-S	L-**T**-S	T-**T**-S	T-**L**-S
soobera	**T**-S-S	T-**L**-S	T-**L**-S	**T**-S-S	T-**T**-S
maleydazee	T-T-S-**T**	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T
danoovasey	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T
saroalanoo	S-T-S-**T**	S-T-S-**T**	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T
peysadoaba	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-T-**T**-S	T-S-**T**-S
roafazeela	**T**-S-T-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
soobaneyda	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
rooladoaney	**T**-S-T-T	T-S-**T**-T	T-**L**-T-T	T-S-**T**-T	T-S-**T**-T
meydareevoo	T-S-T-**T**	T-S-**T**-T	T-S-T-**T**	T-S-**T**-T	T-S-T-**T**
veenadoorey	T-S-**T**-T	**T**-S-T-T	T-S-T-**T**	T-S-**T**-T	**T**-S-T-T
zearemavoo	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**	T-**L**-S-T	T-S-S-**T**
meyzelanoe	T-T-S-**D**	**T**-S-L-T	T-**T**-S-T	**T**-T-S-T	T-S-S-**T**
gooveradee	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**	T-**L**-S-T	T-S-S-**T**
soaloodamee	D-S-S-**T**	T-T-S-**T**	T-**T**-S-T	T-**T**-S-T	T-**T**-S-T
peyneezaroo	**T**-T-S-T	T-T-S-**T**	T-**T**-S-T	T-T-S-**T**	T-**T**-S-T
noozayfaloe	T-T-S-**T**	T-**T**-S-T	T-**T**-S-T	T-**T**-S-D	T-T-S-**T**

6. Korean

Empty cells for Kor-1 are due to technical problems during the recording of this subject.

Item	Kor-1	Kor-2	Kor-3	Kor-4	Kor-5
lesoo		S-**T**	S-**T**	S-**T**	S-**T**
zafey	S-**T**	S-**T**	S-**T**	S-**T**	S-**T**
faroe	**L**-T	S-**T**	**L**-T	S-**T**	S-**T**
nazee	S-**T**	S-**T**	S-**T**	**L**-T	S-**T**
derey	L-**T**	S-**T**	S-**T**	T-**T**	L-**T**
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
deysa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
roana	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noodee	T-**T**	T-**T**	**T**-T	T-**T**	T-**T**
zayvoo		**T**-T	**T**-T	**T**-T	T-**T**
joatay		T-**T**	**T**-T	**T**-T	T-**T**
vaymee		T-**T**	T-**T**	**T**-T	T-**T**
deenay	T-**T**	T-**T**	T-**T**	**T**-T	T-**T**
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-S	S-T-L	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
safoana	S-**T**-S	S-T-**S**	**L**-S-S	S-**T**-S	S-**T**-S
meeganoo	**T**-S-T	T-S-**T**	**T**-S-T	T-**L**-T	**T**-S-T
naysamee	T-S-**T**	**T**-S-T	T-S-**T**	T-S-**T**	T-S-**T**
hoaladee	T-S-**T**	T-**L**-T	**T**-S-T	T-**L**-T	T-S-**T**
soodarey		T-S-**T**	T-S-**T**	**T**-S-T	**T**-S-T
toaneema	T-**T**-S	T-T-**L**	**T**-T-S	T-**T**-S	T-**T**-S
jeedoova		T-T-**L**	T-**T**-S	T-**T**-S	T-**T**-S
leysoada		**T**-T-S	T-**T**-S	T-**T**-S	T-**T**-S
voozayla	T-**T**-S	T-T-**L**	**T**-T-S	T-**T**-S	**T**-T-S
faysena		**T**-S-S	**T**-S-S	**T**-S-S	**T**-S-S
coaneva		**T**-S-S	**T**-S-S	T-**L**-S	**T**-L-S
zeemela	**T**-S-S	T-S-**L**	**T**-S-S	T-**L**-S	**T**-S-S
soobera	T-**T**-S	T-S-**L**	**T**-S-S	T-**L**-S	**T**-S-S
maleydazee	S-T-S-**T**	S-**T**-S-T	S-**T**-S-T	S-T-**L**-T	S-T-S-**T**
danoovasey	S-T-**L**-T	**T**-S-S-T	S-**T**-S-T	S-T-**L**-T	S-**T**-S-T
saroalanoo	S-T-S-**T**	S-T-S-**T**	S-T-S-**T**	S-T-**L**-T	S-T-S-**T**
peysadoaba	T-S-**T**-S	T-S-T-**L**	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
roafazeela	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S
soobaneyda		T-S-T-**L**	T-S-**T**-S	T-S-**T**-S	T-**L**-T-S
rooladoaney		T-S-T-**T**	**T**-S-T-T	T-S-T-**T**	T-S-**T**-T
meydareevoo		T-S-T-**T**	T-S-**T**-T	**T**-S-T-T	T-S-**T**-T
veenadoorey	T-S-T-**T**	T-S-T-**T**	T-S-**T**-T	T-S-T-**T**	T-S-**T**-T

Cont'd					
Item	**Kor-1**	**Kor-2**	**Kor-3**	**Kor-4**	**Kor-5**
zearemavoo	T-S-S-**T**	T-S-S-**T**	**T**-S-S-T	T-**L**-S-T	T-S-S-**T**
meyzelanoe	T-S-S-**T**	T-S-S-**T**	**T**-S-S-T	**T**-S-S-T	**T**-S-S-T
gooveradee	T-L-S-**T**	T-S-**L**-T	T-**L**-S-T	T-S-S-**T**	T-S-S-**T**
soaloodamee		T-T-S-**T**	T-**T**-S-T	T-T-S-**T**	T-**T**-S-T
peyneezaroo		T-T-S-**T**	T-**T**-S-T	**T**-T-S-T	T-T-S-**T**
noozayfaloe	T-**T**-S-T	T-**T**-S-T	T-**T**-S-D	T-**T**-S-T	T-T-S-**T**

Item	**Kor-6**	**Kor-7**	**Kor-8**	**Kor-9**	**Kor-10**
lesoo	S-**T**	S-**T**	**T**-T	**L**-T	L-**T**
zafey	S-**T**	S-**T**	S-**T**	S-**T**	S-**T**
faroe	**L**-D	**L**-D	**L**-T	L-**T**	**L**-T
nazee	S-**T**	S-**T**	S-**T**	S-**T**	S-**T**
derey	S-**T**	**T**-T	T-**T**	T-**T**	L-**T**
cheela	T-**L**	**T**-S	**T**-S	**T**-S	**L**-S
noova	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
toafa	T-L	**T**-S	**T**-S	**T**-S	**T**-S
deysa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
roana	T-**L**	**T**-S	**T**-S	**T**-S	**T**-S
noodee	T-**T**	**T**-T	T-**T**	T-**T**	T-**T**
zayvoo	T-**T**	**T**-T	T-**T**	T-**T**	T-**T**
joatay	T-**T**	**T**-T	**T**-T	T-**T**	T-**T**
vaymee	T-**T**	**T**-T	**T**-T	**T**-T	T-**T**
deenay	T-**T**	**T**-T	T-**T**	T-**D**	T-**D**
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	S-**T**-S	S-T-**L**	S-**T**-S
safoana	**L**-T-L	S-**T**-S	**L**-T-S	S-**T**-S	**L**-T-S
meeganoo	T-S-**T**	**T**-S-T	T-**L**-T	**T**-S-T	**T**-S-T
naysamee	**T**-S-T	T-S-**T**	T-**L**-T	D-S-**T**	D-**L**-T
hoaladee	**T**-S-T	T-S-**T**	**T**-S-T	**T**-S-T	T-**L**-T
soodarey	T-S-**T**	T-S-**T**	T-**L**-T	**T**-S-T	**T**-S-T
toaneema	**T**-T-S	T-T-**L**	T-**T**-S	T-**T**-S	**T**-T-S
jeedoova	T-T-**L**	T-**T**-S	T-**T**-S	**T**-T-S	T-**T**-S
leysoada	**T**-T-S	T-**T**-S	**T**-T-S	**T**-T-S	T-**T**-S
voozayla	T-**T**-S	**T**-T-S	T-**T**-S	T-**D**-S	T-**T**-S
faysena	**T**-S-S	T-**T**-S	**T**-S-S	**D**-S-T	T-**T**-S
coaneva	**T**-S-S	T-**T**-S	**T**-S-S	S-**T**-S	T-**T**-S
zeemela	**T**-S-S	T-**T**-S	T-**L**-S	**T**-S-S	T-**L**-S
soobera	**T**-S-S	T-**L**-S	T-**L**-S	T-**L**-S	**T**-S-S
maleydazee	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T
danoovasey	S-**T**-S-T	S-T-S-**T**	S-**T**-T-T	S-T-S-**T**	S-T-S-**T**

Cont'd					
Item	**Kor-6**	**Kor-7**	**Kor-8**	**Kor-9**	**Kor-10**
saroalanoo	**L**-T-S-T	S-T-S-**T**	S-**T**-S-T	S-T-S-**T**	S-**T**-S-T
peysadoaba	T-S-**T**-S	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S	**T**-S-T-S
roafazeela	T-**L**-T-S	T-S-T-**L**	T-**L**-T-S	T-S-**T**-S	T-S-**T**-S
soobaneyda	**T**-S-T-S	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S	T-S-**T**-S
rooladoaney	T-S-T-**T**	T-S-T-**T**	T-**T**-T-T	**T**-S-T-T	T-**L**-T-T
meydareevoo	T-S-T-**T**	**T**-S-T-T	T-**L**-T-T	T-S-**T**-T	T-**L**-T-T
veenadoorey	**T**-S-T-T	T-S-T-**T**	T-**L**-T-T	T-S-T-**T**	T-**L**-T-T
zearemavoo	T-S-S-**T**	T-S-**L**-T	T-S-S-**T**	T-S-**L**-T	T-**L**-S-T
meyzelanoe	T-S-S-**T**	T-L-**L**-T	T-**L**-S-T	T-**L**-S-T	T-**L**-S-T
gooveradee	T-S-S-**T**	T-S-S-**T**	T-**L**-S-T	**T**-S-S-T	**T**-S-S-T
soaloodamee	T-T-S-**T**	T-T-S-**T**	T-**T**-S-T	**T**-T-S-T	T-**T**-S-T
peyneezaroo	T-T-S-**T**	T-T-S-**T**	T-**T**-S-T	**T**-T-S-T	T-T-S-**T**
noozayfaloe	**T**-T-S-T	T-T-S-**T**	T-**T**-S-T	T-T-S-**T**	T-T-**L**-T

7. Spanish

Item	Span-1	Span-2	Span-3	Span-4	Span-5
lesoo	T-**T**	T-**T**	S-**T**	T-**T**	T-**T**
zafey	**L**-T	**L**-T	**L**-T	**L**-T	S-**T**
faroe	S-**T**	**L**-T	**L**-T	S-**T**	S-**T**
nazee	S-T	T-**T**	S-**T**	S-**T**	S-**T**
derey	L-**T**	**T**-T	**T**-T	S-**T**	S-**T**
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	**T**-S	T-**L**	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-S	T-**L**
deysa	**T**-S	**T**-T	**T**-S	**T**-S	**T**-S
roana	**T**-S	**T**-S	**T**-S	**T**-S	T-**L**
noodee	**T**-T	**T**-T	T-**T**	T-**T**	T-**T**
zayvoo	**T**-T	**T**-T	T-**T**	T-**T**	**T**-T
joatay	T-**T**	**T**-D	**T**-T	T-**T**	D-**T**
vaymee	**T**-T	**D**-T	**T**-T	**T**-T	D-**T**
deenay	T-**T**	**L**-T	**T**-T	T-**D**	T-**D**
daboova	S-**T**-S	**L**-T-S	S-**T**-S	S-T-**L**	S-T-**L**
laveega	S-**T**-S	**T**-T-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	**L**-T-T	S-**T**-S	S-**T**-S	D-S-**L**	S-**T**-S
safoana	S-**T**-S	**L**-T-T	S-**T**-S	S-T-**L**	S-T-**L**
meeganoo	T-S-**T**	**T**-S-T	**T**-S-T	**T**-S-T	T-S-**T**
naysamee	**T**-S-T	T-**T**-T	T-S-**T**	T-S-**T**	D-S-**T**
hoaladee	T-S-**T**	**T**-S-T	T-**L**-T	T-S-**T**	T-S-**T**
soodarey	T-S-**T**	**T**-S-T	T-**L**-T	**T**-S-T	T-S-**T**
toaneema	T-T-S	**T**-T-S	T-**T**-S	**T**-T-S	T-T-**L**
jeedoova	T-**T**-S	**T**-T-S	T-**T**-S	T-T-**L**	T-T-**L**
leysoada	T-**T**-S	**T**-T-S	T-**T**-S	T-T-**L**	T-T-**L**
voozayla	T-**T**-S	**T**-S-S	T-**T**-S	T-S-**L**	T-T-**L**
faysena	T-**T**-S	**T**-T-S	T-**T**-S	**T**-S-S	D-T-**L**
coaneva	T-**T**-S	**T**-S-S	T-**T**-S	T-S-**L**	T-T-**L**
zeemela	T-**L**-S	**L**-L-S	T-**L**-S	T-T-**L**	T-T-**L**
soobera	T-**L**-S	**T**-S-S	T-**T**-S	T-S-**L**	T-S-**L**
maleydazee	T-T-S-**T**	S-T-S-**T**	L-T-S-**T**	S-T-S-T	S-**T**-S-T
danoovasey	S-T-S-**T**	S-**T**-S-T	S-T-S-**T**	S-T-S-**T**	S-**T**-S-T
saroalanoo	S-T-S-**T**	S-T-S-**T**	S-T-S-**T**	S-T-S-**T**	S-T-S-**T**
peysadoaba	T-S-**T**-S	**T**-S-T-S	T-S-**T**-S	T-S-T-**L**	T-S-T-**L**
roafazeela	T-S-**T**-S	**T**-S-L-S	T-S-**T**-S	T-S-T-**L**	T-S-T-**L**
soobaneyda	T-S-T-**L**	T-**D**-T-S	T-S-**T**-S	**T**-S-T-S	T-S-**T**-S
rooladoaney	T-S-T-**T**	T-D-**T**-T	T-S-T-**T**	T-S-T-**T**	T-S-T-**T**
meydareevoo	T-S-**T**-T	T-S-T-**T**	T-S-T-**T**	T-S-T-**T**	T-S-T-**T**
veenadoorey	T-S-T-**T**	T-S-T-**T**	T-S-T-**T**	T-S-T-**T**	T-**L**-T-T
zearemavoo	T-T-S-**T**	L-**T**-S-T	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**
meyzelanoe	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**
gooveradee	T-L-S-T	T-**L**-S-T	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**
soaloodamee	T-T-S-**T**	T-T-D-**T**	T-T-S-**T**	**T**-T-S-T	T-T-S-**T**
peyneezaroo	T-T-**L**-T	T-**T**-S-T	T-**T**-S-T	**T**-T-S-T	T-T-S-**T**
noozayfaloe	T-T-S-**T**	T-**T**-S-T	T-T-S-**T**	T-D-S-**T**	T-T-S-**T**

Cont'd					
Item	**Span-6**	**Span-7**	**Span-8**	**Span-9**	**Span-10**
lesoo	T-**T**	T-**T**	**T**-T	S-**T**	**T**-T
zafey	S-**T**	S-**T**	S-**T**	S-**T**	**L**-T
faroe	**T**-T	**L**-T	S-**T**	**L**-T	S-**T**
nazee	S-**T**	**L**-T	S-**T**	**L**-T	S-**T**
derey	T-**T**	**T**-T	S-**T**	L-**T**	S-**T**
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
deysa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
roana	**T**-S	**T**-S	**T**-S	T-**L**	**T**-S
noodee	T-**T**	T-**T**	**T**-T	**T**-T	**T**-T
zayvoo	T-**T**	D-**T**	D-**T**	T-**T**	D-**T**
joatay	**T**-T	T-**T**	**T**-D	**T**-T	**T**-T
vaymee	T-**T**	D-**T**	D-**T**	T-**T**	D-**T**
deenay	**T**-T	T-**T**	T-**D**	T-**T**	**T**-T
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-T	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	D-**T**-S	S-**T**-S	S-**T**-S
safoana	D-**T**-S	**L**-T-S	S-**T**-S	S-**T**-S	**L**-T-S
meeganoo	**T**-S-T	T-S-**T**	**T**-S-T	T-S-**T**	T-S-**T**
naysamee	T-S-**T**	D-S-**T**	D-**L**-T	T-S-**T**	T-**L**-T
hoaladee	**T**-S-T	T-S-**T**	T-S-**T**	T-S-**T**	**T**-S-T
soodarey	**T**-S-T	**T**-S-T	T-S-**T**	T-S-**T**	**T**-S-T
toaneema	T-**T**-S	T-**T**-S	T-**T**-S	**T**-T-S	T-**T**-S
jeedoova	**T**-T-S	T-**T**-S	**T**-T-D	**T**-T-S	**T**-T-S
leysoada	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S
voozayla	T-**T**-S	T-**D**-S	T-**D**-S	T-**T**-S	T-**T**-S
faysena	T-**T**-S	D-**L**-S	T-**T**-S	**T**-S-S	**D**-T-S
coaneva	**T**-S-S	T-**L**-S	T-**T**-S	T-**L**-S	**T**-S-S
zeemela	**T**-T-S	**T**-S-S	**T**-S-S	T-**L**-S	**T**-S-S
soobera	**T**-S-S	T-**T**-S	T-**T**-S	T-**T**-S	T-T-**L**
maleydazee	S-T-S-**T**	S-T-S-**T**	D-T-S-**T**	S-**T**-S-T	S-T-S-**T**
danoovasey	S-T-S-**T**	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T
saroalanoo	S-T-S-**T**	S-T-**L**-T	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T
peysadoaba	T-S-**T**-S	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S	T-S-**T**-S
roafazeela	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
soobaneyda	T-T-**T**-S	T-S-**T**-S	T-S-**T**-S	T-**L**-T-S	T-S-**T**-S
rooladoaney	T-S-T-**T**	T-S-S-**T**	T-S-T-**T**	T-S-**T**-T	T-S-T-**T**
meydareevoo	T-S-T-**T**	T-S-T-**T**	T-**L**-T-T	T-S-**T**-T	T-S-T-**T**
veenadoorey	T-T-T-**T**	T-S-**T**-T	T-**L**-T-T	T-S-**T**-T	T-S-**T**-T
zearemavoo	T-S-S-**T**	T-S-S-**T**	T-**T**-S-T	T-**L**-S-T	T-S-S-**T**
meyzelanoe	T-T-S-**T**	T-S-**L**-T	T-**L**-S-T	T-**L**-S-T	**T**-S-S-T
gooveradee	T-S-S-**T**	T-L-S-**T**	T-**L**-S-T	T-S-S-**T**	T-S-**L**-T
soaloodamee	T-T-S-**T**	T-**T**-S-T	S-**T**-S-T	T-**T**-S-T	T-T-S-**T**
peyneezaroo	T-T-S-**T**	T-T-S-**T**	T-**T**-S-T	T-**T**-S-T	T-T-S-**T**
noozayfaloe	T-T-S-**T**	T-D-S-**T**	T-D-S-**T**	T-**T**-S-T	T-D-**L**-T

8. Turkish

Item	Turk-1	Turk-2	Turk-3	Turk-4	Turk-5
lesoo	S-**T**	S-**T**	S-**T**	S-**T**	**T**-T
zafey	S-**T**	S-**T**	S-**T**	S-**T**	**L**-T
faroe	S-**T**	S-**T**	S-**T**	S-**T**	**L**-T
nazee	S-**T**	**L**-T	S-**T**	S-**T**	**L**-T
derey	S-**T**	S-**T**	S-**T**	S-**T**	T-T
cheela	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noova	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
toafa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
deysa	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
roana	**T**-S	**T**-S	**T**-S	**T**-S	**T**-S
noodee	**T**-T	T-**T**	**T**-T	T-**T**	**T**-T
zayvoo	**T**-T	**T**-T	D-**T**	**T**-T	**T**-T
joatay	**T**-T	**T**-T	T-**T**	**T**-T	**T**-T
vaymee	**T**-T	**T**-T	**D**-T	**D**-T	**D**-T
deenay	**T**-T	T-**T**	**T**-T	T-**T**	**T**-T
daboova	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
laveega	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	S-T-**L**	S-**T**-S	S-**T**-S
safoana	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
meeganoo	**T**-S-T	T-**L**-T	T-**L**-T	T-S-**T**	T-**L**-T
naysamee	**T**-S-T	**T**-S-T	D-S-**T**	**T**-S-T	D-**L**-T
hoaladee	**T**-S-T	T-S-**T**	T-S-**T**	**T**-S-T	T-**L**-T
soodarey	**T**-S-T	T-S-**T**	**T**-S-T	T-S-**T**	**T**-S-T
toaneema	**T**-T-S	T-**T**-S	T-**T**-S	T-**T**-S	T-**T**-S
jeedoova	**T**-T-S	T-T-**L**	**T**-T-S	T-**T**-S	**T**-T-S
leysoada	**T**-T-S	**T**-T-S	S-**T**-S	T-**T**-S	**T**-T-S
voozayla	**T**-T-S	T-**T**-S	S-**T**-S	T-**T**-S	T-**T**-S
faysena	D-**T**-S	T-**T**-S	**D**-S-S	**T**-S-S	D-**T**-S
coaneva	**T**-S-S	**T**-S-S	**T**-S-S	**T**-S-S	**T**-S-S
zeemela	T-**T**-S	T-T-L	T-**T**-S	**T**-S-S	T-**T**-S
soobera	T-**L**-S	**T**-S-S	**T**-S-S	T-**T**-S	T-**T**-S
maleydazee	S-**T**-S-T	S-T-**L**-T	S-T-S-**T**	S-**T**-S-T	S-T-**L**-T
danoovasey	S-**T**-S-T	S-T-S-**T**	S-T-**L**-T	S-**T**-S-T	S-T-**L**-T
saroalanoo	S-**T**-S-T	S-T-**L**-T	S-T-S-**T**	S-**T**-S-T	S-T-**L**-T
peysadoaba	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
roafazeela	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S	T-S-**T**-S
soobaneyda	T-S-**T**-S	T-S-**T**-S	T-S-**D**-S	T-S-**T**-S	T-S-**T**-S
rooladoaney	T-S-T-**T**	T-S-**T**-T	T-S-T-**T**	T-S-**T**-T	T-S-**T**-T
meydareevoo	T-S-T-**T**	T-**L**-T-T	T-S-**T**-T	T-S-**T**-T	T-S-**T**-T
veenadoorey	**T**-S-T-T	T-S-**T**-T	T-S-T-T	T-S-**T**-T	T-S-T-**T**
zearemavoo	T-**L**-S-T	T-S-**L**-T	T-S-S-**T**	**T**-S-S-T	T-S-**L**-T
meyzelanoe	T-**L**-S-T	T-S-**L**-T	T-S-S-**T**	T-**T**-S-T	T-S-**L**-T
gooveradee	T-**L**-T	T-S-**L**-T	T-S-S-**T**	T-**T**-S-T	T-S-**L**-T
soaloodamee	T-**T**-S-T	T-T-**T**-T	T-T-S-**T**	**T**-L-S-T	T-T-**L**-T
peyneezaroo	T-**T**-S-T	T-**T**-S-T	T-T-S-**T**	T-**T**-S-T	T-T-**L**-T
noozayfaloe	T-**T**-S-T	T-T-**L**-T	T-T-S-**T**	T-**T**-S-T	T-T-**L**-T

Cont'd					
Item	**Turk-6**	**Turk-7**	**Turk-8**	**Turk-9**	**Turk-10**
lesoo	S-**T**	S-**T**	S-**T**	S-**T**	**T**-T
zafey	S-**T**	S-**T**	S-**T**	S-**T**	**L**-T
faroe	**L**-T	S-**T**	S-**T**	T-**T**	**L**-T
nazee	S-**T**	S-**T**	S-**T**	S-**T**	**L**-T
derey	S-**T**	S-**T**	S-**T**	S-**T**	S-**T**
cheela	**T**-S	**T**-S	T-**T**	**T**-S	**T**-S
noova	**T**-S	**T**-S	T-**L**	T-**T**	**T**-S
toafa	**T**-S	**T**-S	T-**L**	**T**-S	**T**-S
deysa	**T**-S	**T**-S	T-**L**	T-**L**	**T**-S
roana	**T**-S	**T**-S	T-**L**	T-**L**	**T**-S
noodee	T-**T**	T-**T**	T-**T**	**T**-T	**T**-T
zayvoo	T-**T**	T-**T**	T-**T**	T-**T**	**T**-T
joatay	**T**-T	**T**-T	T-**T**	T-**T**	**T**-T
vaymee	T-**T**	**T**-T	T-**T**	T-**T**	**T**-T
deenay	**T**-T	T-**T**	T-**T**	T-**T**	T-**T**
daboova	S-**T**-S	S-**T**-S	L-T-**L**	S-**T**-S	S-**T**-S
laveega	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S	S-**T**-S
nazeyda	S-**T**-S	S-**T**-S	S-T-**L**	S-**T**-S	S-**T**-S
safoana	S-**T**-S	S-**T**-S	S-**T**-S	T-**T**-S	**L**-T-T
meeganoo	**T**-S-T	T-S-**T**	T-S-**T**	T-**L**-T	T-**L**-T
naysamee	**T**-S-T	T-S-**T**	T-S-**T**	T-**T**-T	**T**-S-T
hoaladee	**T**-S-T	T-**L**-T	T-S-**T**	**T**-S-T	**T**-S-T
soodarey	**T**-S-T	**T**-S-T	T-S-**T**	**T**-S-T	**T**-S-T
toaneema	T-**T**-S	**T**-T-S	T-**T**-S	T-**T**-S	**T**-T-S
jeedoova	T-**T**-S	T-**T**-S	T-T-**L**	T-**T**-S	**T**-T-S
leysoada	T-**T**-S	**T**-T-S	**T**-T-S	T-**T**-S	T-**T**-S
voozayla	T-**T**-S	T-**T**-S	T-T-**T**	T-**T**-S	**T**-T-S
faysena	T-**L**-S	**T**-S-S	D-**T**-S	T-**L**-S	**T**-S-S
coaneva	**T**-S-S	**T**-S-S	T-S-**L**	T-**T**-S	**T**-S-S
zeemela	**T**-S-S	T-**T**-S	T-S-**L**	**T**-S-S	**T**-L-S
soobera	**T**-S-S	**T**-S-S	T-S-**L**	T-**T**-S	**T**-S-S
maleydazee	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-T-S-**T**	S-T-**L**-T
danoovasey	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	T-T-S-**T**	S-T-**L**-T
saroalanoo	S-**T**-S-T	S-**T**-S-T	S-**T**-S-T	S-T-S-**T**	S-T-**L**-T
peysadoaba	T-S-**T**-S	T-S-**T**-S	T-**L**-T-S	T-S-T-**L**	T-S-**T**-S
roafazeela	T-S-**T**-S	T-S-**T**-S	T-**L**-T-S	T-S-T-**T**	T-S-**T**-S
soobaneyda	T-S-**T**-S	**T**-S-T-S	T-L-T-**L**	T-T-**T**-S	T-S-**T**-S
rooladoaney	T-S-**T**-T	T-**L**-T-T	**T**-S-T-T	T-S-T-**T**	T-S-**T**-T
meydareevoo	T-S-**T**-T	T-S-**T**-T	T-S-T-**T**	T-S-T-**T**	T-S-**T**-T
veenadoorey	T-S-**T**-T	T-**L**-T-T	T-S-**T**-T	L-T-**T**-T	T-S-**T**-T
zearemavoo	T-**T**-S-T	T-**L**-S-T	T-**L**-T	T-S-S-**T**	T-T-**L**-T
meyzelanoe	T-**L**-S-T	T-**L**-S-T	T-S-S-**T**	T-S-S-**T**	T-S-S-**T**
gooveradee	T-**L**-S-T	**T**-S-S-T	T-**L**-S-T	T-S-S-**T**	T-S-**L**-T
soaloodamee	T-**T**-S-T	T-**T**-S-T	T-**T**-S-T	T-S-S-**T**	T-T-**L**-T
peyneezaroo	T-**T**-S-T	T-**T**-S-T	T-**T**-S-T	T-T-S-**T**	T-T-**L**-T
noozayfaloe	T-**T**-S-T	**T**-T-S-T	T-**T**-S-T	T-T-S-**T**	T-T-**L**-T