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Japanese accent placement on four-mora loanwords

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JAPANESE ACCENT PLACEMENT ON FOUR-MORA LOANWORDS

A Thesis

Presented to

Linguistics and Language Development Department

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

Atsuko Yamura

December 2005

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ABSTRACT

JAPANESE ACCENT PLACEMENT ON FOUR-MORA LOANWORDS

by Atsuko Yamura

Addressing the Japanese accent placement on four-mora loanwords, this thesis evaluates three accent rules in loanwords and includes a corpus analysis of the default accent position for four-mora loanwords as well as the results of an experiment on the accent placement of four-mora loanwords by native speakers of standard Japanese.

Based on the results of both rule evaluation and corpus analysis, the experiment examined the hypothesis that native speakers of standard Japanese should be expected to place the accent on the first mora in four-mora loanwords, especially those with the syllable patterns [L] (light syllable) [L] [L] [L] and [L] [L] [H] (heavy syllable). The results reveal that more native speakers of standard Japanese place the accent on the first mora not only for the four-mora loanwords with the syllable patterns [L] [L] [L] [L] and [L] [L] [H], but also for those with the syllable pattern [L] [H] [L].

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Chapter 1

Introduction and Background

Contemporary Japanese includes large numbers of *gairaigo*, or foreign words, borrowed from other languages, of which the majority is English loanwords. These loanwords are used syntactically in the same way as native Japanese words and their pronunciation is modified so that they resemble native Japanese words. This modification raises certain phonological issues which are the subject of this thesis.

Japanese is a pitch-accent language in which the accented syllable in each word is characterized by a steep drop in pitch. When words from other languages enter the Japanese lexicon, their accent placement is also modified in a way that makes their pronunciation fit the rhythmic pattern of Japanese. Despite the fact that accent placement has been the topic of a number of studies in Japanese phonology, there remains some controversy regarding the accent placement in loanwords.

For native Japanese words, there is no rule-based default accent position. Likewise, the oldest loanwords and most of the recent loanwords do not follow any rules for the default accent position. However, for the vast majority of Japanese loanwords (those which are neither very old nor very new), there seems to be an element of predictability as to where the accent falls.

Several theories have been proposed to predict the accent placement of loanwords. These include proposals by McCawley (1968), Katayama (1998), and Inaba (2005b), in addition to the “traditional” loanword accent rule presented in *The NHK*

Dictionary of Pronunciation and Accents (1998). These different proposals are interesting from the point of view of phonological theory because their explanations rely on three different phonological units: the mora, the syllable, and the foot. In many cases, these accounts make different predictions as to where the pitch accent should be placed on a loanword.

This thesis is an attempt to shed light on the issue of accent placement on Japanese loanwords in the Standard Japanese, as spoken in Tokyo. First, the above-mentioned accounts of accent placement is described and evaluated, noting that they yield different predictions mainly in the case of a certain class of loanword, namely those which are four-mora in length. Next, it is determined whose account of accent placement is most empirically adequate by testing each account's predictions against a pronunciation dictionary. Our results show that the default accent position on four-mora loanwords is on the first mora, consistent with the approach of Inaba (2005b).

Although it is demonstrated that the default accent position on four-mora loanwords is on the first mora, one puzzle remains: why do large numbers of four-mora loanwords in the pronunciation dictionary violate this default pattern? In many cases, the dictionary shows the accent on the second mora, not the first. To answer this question, an experiment to assess how native speakers actually pronounce these loanwords is conducted. Our results show that native speakers indeed prefer the default pattern, placing the accent on the first mora in many cases where the dictionary specifies a different pattern.

Accentuation Patterns of World Languages

Accentuation pattern is language specific, but the world's languages are typically divided into three types with respect to how stress and pitch are applied to words: stress-accent, tone, and pitch-accent languages. Each type is determined by the accentuation element of the language. Japanese is considered a pitch-accent language. Representative languages of the other types are: English, a stress-accent language, and Chinese, a tone language (Tsujimura, 1996).

Pitch Accent Languages and Role of Mora

While specific syllable tones are not predictable in a tone language like Chinese, the pitch or tonal patterns of entire words are predictable in a pitch-accent language like Japanese. In Japanese, the pitch or tonal pattern is predictable according to the location of the accented mora in a word, although there is no rule for predicting the position of an accented mora in any Japanese word.

As opposed to English, which is a “syllable” language, Japanese is classified as a “mora” language. Mora is defined as a unit of duration in Japanese (Bloch, 1950), with each mora taking about the same length of time to articulate. The Japanese mora can be defined as follows (using IPA):

- a. (C)V
- b. the first part of a long consonant [ʔ] (or the first part of a geminate)
- c. syllable final, or ‘moraic’ nasal [N]

In the following table, each mora is indicated with parentheses, and a dot indicates that the accent falls in the immediately preceding mora. So, the mora before the dot is “high” (H) pitch and the mora after the dot is “low” (L) pitch (see Table 1.1).

Table 1.1

Mora Type

Words	Pitch Pattern	Gloss
[(a) • (ki)]	<u>HL</u>	Autumn
[(ja) • (?) (ki) (N)]	<u>HLLL</u>	debt, loan
[(kja) • (?) (ka)]	<u>HLL</u>	Rejection
[(jo) (:) (ka)]	<u>LHH</u>	Digestion

The most common mora type consists of a consonant followed by a vowel such as [ki] in the first example of the table. The first part of a long consonant can be a mora ([?] in [jaʔkiN] in the second example). Although uncommon, a single vowel and a single consonant [N] can also be a mora in Japanese, ([N] in [jaʔkiN]). As long as they take exactly the same length of time to say as a single mora, they can be considered to be one mora. In addition, the long vowel is considered two morae because it takes twice the length of time to say as a single vowel ([:] in [jo:ka] in the fourth example).

Each mora has a high or low pitch and the location of the accent corresponds to the mora before the pitch drop. In the previous table, the mora before the dot has a high pitch and the mora after the dot has a low pitch. The number of capital letters “H” (high

pitch) and “L” (low pitch) corresponds to the number of mora within the word, and the dot should be placed after an “H” immediately followed by an “L.”

Both accented and non-accented words exist in Japanese. Lack of pitch falling, that is, the absence of a “L” pitch immediately after “H,” indicates an unaccented word. In Table 1.1 above, the first, second, and third examples have pitch falling and they are accented words, but the fourth example [(ʃo) (:)(ka)] does not have pitch falling; therefore, it is an unaccented word.

In addition to mora, there are words in which the syllable structure is relevant (Kubozono, 1996). Examples of this are [mikan] orange and [ʃaʔkin] debt, loan. As previously shown, these two words are divided into three morae for orange: [mi] [ka] [ŋ] and four morae for loan: [ʃa] [ʔ] [ki] [ŋ]. However, with the notion of syllable is also taken into account, both words can be divided into two syllables, each indicated by brackets [mi] [ka - ŋ] and [ʃa - ʔ] [ki - ŋ]. Japanese syllable onsets are (C)V in which phonotactic constraints restrict the consonant cluster with [stop, flap, fricative, or placeless nasal] + [glide] and the only coda that can occur is “moraic” nasal.

Japanese Pitch Pattern

The possible space of Japanese pitch patterns (for all words, including loanwords) can be summarized using the following three rules.

1. If the accent is on the first syllable, then the first syllable is high-pitched and the others are low: H-L, H-L-L, etc.
2. If the accent is on the syllable other than the first, then the first syllable is low, the following syllables are high up to and including the accented one, and the rest of the syllables are low: L-H, L-H-L, L-H-H-L, L-H-H, etc.
3. If the word doesn't have an accent, the first syllable is low and everything else is high (and this spreads to grammatical particles, usually unaccented, that may attach at the end of the word). (Wikipedia, 2005)

Chapter 2

Accent on Loanwords

Japanese has adapted many loanwords, but the accent position in loanwords sometimes changes from that of the original word. For example, in Japanese, there is a tendency to accent loanwords. The accent tendencies fall into three basic categories: (1) words adopted long ago, (2) words recently adopted, and (3) words adopted during the middle period (see Figure 2.1).

Figure 2.1

Three Basic Categories of the Accent Tendencies

Regarding words in the first two categories, the accent in words that were adopted long ago is monotonic, while the accent in recently adopted words often occurs in the same location as in the original foreign word. For these two categories, no rules are needed. Examples of these categories are shown in the following table (see Table 2.1).

Table 2.1

Monotonous Accent and Original Accent

Adopted Long Ago → Monotonic		Recently Adopted → Original Accent Position	
ga - ra - su	glass	á - ku - sen - to	a'ccent
ai - ron	iron	gái - dan - su	gu'idance
o - ru - gan	organ	tá: - mi - na - ru	te'rminál
se - men - to	cement	tí - pi - ka - ru	ty'pical

Traditional Accent Rule

Many Japanese accent rules refer to the mora structure of a word to determine the location of the accent by counting the number of morae. For example, this is the loanword accent rule discussed in the *The NHK Dictionary of Pronunciation and Accents* (1998) (abbreviated *NHK* hereafter). The definition of this rule can be translated as follows:

For loanwords consisting of four or more morae: The accent is placed on the antepenultimate mora, or the third mora counted from the end of the word. (Appendix p.10)

Examples which follow this rule are shown in the table below (see Table 2.2).

Note: A mora is indicated by parentheses () and an accent is indicated with an accent

mark ː or Japanese word as in (ス)(カː)(ー)(ト), and ˈ in the International Phonetic

Alphabet as in (su̯)(ká)(ː)(to). In addition, to indicate the devoiced vowel, the

International Phonetic Alphabet symbol ɸ is used under the devoiced vowel as in (su̯ɸ).

Table 2.2

Words that Follow the Traditional Accent Rule

Loanwords with Four or More Mora	Japanese Character	Gloss
(su̯)(ká)(ː)(to)	(ス)(カː)(ー)(ト)	Skirt
(tʃo)(ko)(ré)(ː)(to)	(チ ョ)(コ)(レː)(ー)(ト)	chocolate
(o)(ː)(su̯ɸ)(to)(rá)(ri)(a)	(オ)(ー)(ス)(ト)(ラː)(リ)(ア)	Australia

Although the mora-based antepenultimate rule works well for the words listed in the table, many words consisting of four or more morae do not follow this accent rule.

The following table includes words where this antepenultimate rule does not apply (see Table 2.3).

Table 2.3

Words that Do Not Follow the Traditional Accent Rule

Loanwords with Four or More Mora	Japanese Character	Gloss
(hjuí)(:)(ma)(n)	(ヒ ュ´)(ー)(マ)(ン)	Human
(á)(to)(ra)(su)	(ア´)(ト)(ラ)(ス)	Atlas
(ko)(n)(pjú)(:)(ta)(:)	(コ)(ン)(ピ ュ´)(ー)(タ)(ー)	Computer
(há)(mi)(n)(gu)	(ハ´)(ミ)(ン)(グ)	Humming
(kó)(ro)(?) (ke)	(コ´)(ロ)(ッ)(ケ)	croquet

McCawley's Antepenultimate Rule

McCawley (1968) proposes an antepenultimate rule based on the conception of Tokyo Japanese being a “mora counting, syllable language.” Before evaluating this type of antepenultimate accent rule, the notion of different types of syllables needs to be explained.

Syllables, as applied here, fall into two categories, according to their phonological “weight” and their characteristic phonological behavior: “light” [L] or “heavy” [H] syllable. A light syllable such as a single vowel counts as one phonological unit, whereas long vowels and diphthongs, which are heavy syllables, count as two units. Coda consonants often serve as an independent unit so that closed syllables with a single vowel [CVC] count as being long open syllables with a long vowel or diphthong [CVV]. Onset consonants do not contribute to syllable weight because the presence or absence of an

onset consonant does not change the weight of a particular syllable. The notion of “syllable weight” is closely related to the phonological notion of “mora.” Syllable weight integrates the two notions of “syllable” and “mora.” Light syllables [V or CV] are monomoraic, and heavy syllables [(C)VV] or [(C)VC] are bimoraic.

The definition of McCawley’s rule (McCawley, 1968) is as follows:

For loanwords consisting of four or more morae: the accent is placed on the syllable containing the antepenultimate mora

The examples that conform to this rule are shown in the following table. Note: A mora is indicated by parentheses () and a syllable is indicated by square brackets [] (see Table 2.4).

Table 2.4

Words that Follow McCawley’s Rule

Loanwords with Four or More Mora	Japanese Character	Gloss
[(h)jʷ(:)][(ma)(N)]	[(ヒ ュ´)(ー)][(マ)(ン)]	human
[(o)][(pe)][(ré)(:)][(ta)(:)]	[(オ)][(ペ)][(レ´)(ー)][(タ)(ー)]	operator
[(ko)(N)][(p)jʷ(:)][(ta)(:)]	[(コ)(ン)][(ピ ュ´)(ー)][(タ)(ー)]	computer

The syllable containing the antepenultimate mora has an accent but the antepenultimate mora does not have an accent.

While some of the words that failed the mora-based antepenultimate rule successfully work within this syllable-based antepenultimate rule, there are still some words that contain more than four morae that fail this rule. Words where the syllable-based antepenultimate rule does not work are shown in the next table (see Table 2.5).

Table 2.5

Words that Do Not Follow McCawley's rule

Loanword with Four or More Mora	Japanese Character	Gloss
[(á)][(to)][(ra)][(sw)]	[(ア)][(ト)][(ラ)][(ス)]	atlas
[(í)][(su)][(te)][(mw)]	[(シ)][(ス)][(テ)][(ム)]	system
[(ko)(n)][(dá)][(ku)][(ta)(:)]	[(コ)(ン)][(ダ)][(ク)][(タ)(ー)]	conductor
[(há)][(mi)(n)][(gw)]	[(ハ)][(ミ)(ン)][(グ)]	humming
[(kó)][(ro)(?)][(ke)]	[(コ)][(ロ)(ッ)][(ケ)]	croquet

Inaba's Antepenultimate Accent Rule on Loanwords

Because many loanwords do not follow the first two rules, such as

[(á)][(to)][(ra)][(sw)] atlas, [(í)][(su)][(te)][(mw)] system, [(á)][(ni)][(ma)][(rw)]

animal, and [(ká)][(rw)][(te)][(rw)] kartell (adopted from German), Inaba proposed a

loanword accent rule based on the foot, a unit of metrical phonology, in which a sequence

of two morae is considered to form a larger (or higher) prosodic unit. The accent is on

the non-final rightmost foot. Foot construction in Japanese is bimoraic. Inaba's

conception of foot is Moraic Trochee because the foot consists of two morae, of which

the first is stronger; the left mora receives the accent as in {[(dá)] [(kw)]} and

{ [(ré) (:)]} which are in the following table. The correct accent position can be

determined using this rule for many words where the first two rules do not apply.

Examples are shown in the following table (see Table 2.6).

Note: A mora is indicated by parentheses (), a syllable is indicated by square brackets [], and a foot is indicated by curly brackets { }.

Table 2.6

Words that Follows Inaba's Rule

Loanwords	Japanese Character	Gloss
{{(tʃo)}[(ko)]} {{(ré)(:)} <[(to)]>}	{{(チ ョ)}[(コ)]} {{(レ')(ー)} <[(ト)]>}	chocolate
{{(ko)(N)} {{(pjú)(:)} <[(ta)(:)]>}	{{(コ)(ン)} {{(ピ')(ー)} <[(タ)(ー)]>}	computer
{{(o)}[(pe)]} {{(ré)(:)} <[(ta)(:)]>}	{{(オ)(ペ)} {{(レ')(ー)} <[(タ)(ー)]>}	operator
{{(ko)(N)} {{(dǎ)}[(kú)]} <[(ta)(:)]>}	{{(コ)(ン)} {{(ダ')}[(ク)]} <[(タ)(ー)]>}	conductor
{{(ʃí)}[(sú)]}[(te)] <[(mʷ)]>}	{{(シ')(ス)} {{(テ')}[(ム)]}	system

The main consideration in this rule is how to form the foot. Inaba (2005b)

discusses forming the foot as follows;

For loanwords consisting of five or more morae: form the foot from the end of the word

1. Ignore the last syllable
2. Form a foot with the heavy syllable if any exist. The heavy syllable takes priority when forming
3. Form a foot with two light syllables
4. Place the accent on the non-final rightmost foot (include the ignored syllable which is indicated by <>)

For example, the word “ko N da ku ta :” is accented in this order.

1. ko N da ku <ta :>

<ta :> is the last syllable, so it is ignored.

2. {[ko N]} da ku <ta :>

[ko N] is the heavy syllable, so it takes priority in forming the foot.

3. {[ko ɳ]} {[da kɯ]} <ta :>

[da kɯ] is a foot because it contains two light syllables.

4. {[ko ɳ]} {[da' kɯ]} <ta :>

the accent is on the non-final rightmost foot.

{[da' kɯ]} (in this case, the final is an ignored syllable <ta :>)

Further Consideration When Forming the Foot

After forming the foot with the previous method, it is still necessary to consider the morae that contain devoiced vowels and diphthongs. Whenever a formed foot contains either devoiced vowels or diphthongs in the right syllable, the foot is shifted to the left. Examine the loanword [ko re sɯ te ro: rɯ] using Inaba's foot-forming method.

1. ko re sɯ te ro : <rɯ>

<rɯ> is the last syllable, so it is ignored.

2. ko re sɯ te {[ro :]} <rɯ>

[ro :] is the heavy syllable, so it takes priority in forming the foot.

3. {[ko re]} {[sɯ te]} {[ro :]} <rɯ>

[sɯ te] and [ko re] are formed last because they contain two light syllables.

4. {[ko re]} {[sɯ te]} {[ro' :]} <rɯ>

the accent is on the non-final rightmost foot {[ro' o]}.

Since the foot {[sɯ te]} contains a devoiced vowel in the right syllable, it is necessary to apply one more step to form the foot correctly.

5. [ko][re sɯ][te][ró :]<rw>

the accent is on the non-final rightmost foot.

{[ró :]} (in this case, the final is a syllable <rw>)

6. [ko][re sɯ][te][ró :]<rw>

the accent position remains the same, on the non-final rightmost foot.

Although the sixth step does not change the accent position of “ko re sɯ te ró : rw,”

this further consideration might affect other words introduced later in terms of four-mora loanwords. Diphthongs work similarly.

Unlike words containing five or more morae where the foot is formed from the end, Inaba forms the foot of three-mora words from the beginning of the word. Inaba’s foot forming for three or fewer morae (Inaba, 2005) is as follows:

For loanwords consisting of three or fewer morae: form the foot from the beginning of the word

1. Form a foot with the heavy syllable if any exists. The heavy syllable takes priority when forming
2. Form a foot with two light syllables
3. Place the accent on the non-final rightmost foot (include the ignored syllable)

For example, the word [do ra ma] drama, is accented as follows.

1. do ra ma N/A, no heavy syllable exists.
2. {[do ra]}[ma] [do ra] contains two light syllables and is formed.
3. {[dó] [ra]}[ma] the accent is on the non-final rightmost foot.
 {[dó ra]}

Examining the three-mora word syllable type, Inaba claims that in many cases, a degenerate foot occurs at the beginning of these words. A degenerate foot cannot be formed with a syllable that includes two light syllables or one heavy syllable. For example, the word [mi to ɳ] mitten is accented as followed.

1. mi {[to ɳ]}

[to ɳ] is the heavy syllable so it takes priority in forming the foot.

2. mi {[to ɳ]}

[mi] contains only one light syllable and cannot form a foot.

[mi] is a degenerate foot.

3. (mí){[to ɳ]}

the accent is on the non-final, rightmost foot. In this case, the degenerate foot is accented.

When the degenerate foot occurs at the beginning of the word, Inaba treats it like Van der Hulst's (1984) "top-down construction." Although the accent position is usually decided after constructing the foot, foot construction occurs after the default accent position.

Inaba excludes some words and treats them the same way as three-mora words like [mí to ɳ] (top-down construction). For example [há mi ɳ gu] humming and [kó ro ? ke] croquet are treated as top-down construction (see Table 2.7).

Table 2.7

Words with Four Morae Treated as Top-Down Construction

Four-mora Word	Japanese Character	Gloss
(há)(mi)(N)(gɯ)	(ハ)(ミ)(ン)(グ)	humming
(kó)(ro)(ʔ)(ke)	(コ)(ロ)(ッ)(ケ)	croquet

Let us test all three antepenultimate rules on the word [há mi N gɯ]. The mora-based rule fails because (mi), which is the antepenultimate mora, does not carry the accent, (há)(mi)(N)(gɯ). The syllable-based rule fails because [(mi)], which is the syllable containing the antepenultimate mora, does not carry the accent, (há)[(mi)](N)(gɯ). The foot-based rule also fails because {[mi)][(N)]}, which is the non-final rightmost foot, does not carry the accent, (há){[(mi)][(N)]}<(gɯ)>. Because none of the three rules leads to a correct accent position on this type of four-mora word that contains a [L] [H] [L], Inaba assumes that this type of four-mora word can be treated like a three-mora word used in van der Hulst's "top-down construction." If [há mi N gɯ] is treated as a top-down construction, the accent is on the first mora [ha], and then the foot is formed. The table testing the three antepenultimate rules with different syllable combinations is included in the appendix.

More Analysis of Four-mora Loanwords

Katayama's (1998) treatment of four-mora loanwords under McCawley's rule groups them as long words to be treated the same as words with five or more morae. In contrast, Inaba (2005b) groups four-mora loanwords into the same short-word category as two- or three-mora words. Closely examining four-mora words, Inaba's rule works for the syllable type [L] [L] [H] and [L] [L] [L] [L] with the accent placed on the antepenultimate mora, such as [a sé to ŋ] acetone and [a ré gɯ ro] allegro. The other two rules also apply with these types of words. However, the opposite occurs for the same syllable types with the accent on the first mora. The following table is a partial version extracted from the table in the appendix (see Table 2.8).

Table 2.8

Testing Three Antepenultimate Rules with Different Syllable Patterns

Mora	Syllable Pattern	Loanword	Traditional	McCawley	Inaba
4	[L] [L] [H]	(mé)(ro)(di)(:)	×	×	○
4	[L] [L] [H]	(a)(sé)(to)(ŋ)	○	○	×
4	[L] [L] [L] [L]	(ká)(rɯ)(te)(rɯ)	×	×	○
4	[L] [L] [L] [L]	(a)(ré)(gɯ)(ro)	○	○	×

There are five types of four-mora words, including sequences of two heavy syllables [H] [H]; one heavy syllable followed by two light syllables [H] [L] [L]; two light syllables followed by a heavy syllable [L] [L] [H]; four light syllables [L] [L] [L] [L]; and one light syllable followed by a heavy syllable and a light syllable [L] [H] [L].

The following table shows each type of syllable combination within four-mora words (see Table 2.9).

Table 2.9

Four-mora Words with Different Syllable Combinations

Syllable Pattern	Example
[H] [H]	[pí ɲ][po ɲ] [má :][dʒi ɲ]
[H] [L] [L]	[fá ɲ][to][mɯ] [má :][bɯ][rɯ]
[L] [L] [H]	[mé][ro][di :] [a][sé][to ɲ]
[L] [L] [L] [L]	[ká][rɯ][te][rɯ] [a][ré][gɯ][ro]
[L] [H] [L]	[há][mi ɲ][gɯ] [o][ré ɲ][dʒi]

Now, examine different kinds of words containing four morae to see if Inaba's foot forming from the beginning works better than forming the foot from the end.

[H] [H] syllable type

[pí ɲ][po ɲ]

- from the end: {[pí ɲ]}<[po ɲ]> the accent is on the non-final rightmost foot
- from the beginning: {[pí ɲ]}{[po ɲ]} the accent is on the non-final rightmost foot

[H] [L] [L] syllable type

[fá ɲ][to][mɯ]

- from the end: {[fá ɲ]}[to]<[mɯ]> the accent is on the non-final rightmost foot
- from the beginning: {[fá ɲ]}{[to][mɯ]} the accent is on the non-final rightmost foot

[L] [L] [H] syllable type

[mé][ro][di :]

- from the end: {[mé][ro]}<[di :]> the accent is on the non-final rightmost foot
- from the beginning: {[mé][ro]}{[di :]} the accent is on the non-final rightmost foot

[a][sé][to ɲ]

- from the end: {[a][sé]}<[to ɲ]> the rule fails because the foot does not contain a trochaic accent
- from the beginning: {[a][sé]}{[to ɲ]} the rule fails because the foot does not contain a trochaic accent

[L] [L] [L] [L] syllable type

[ká][rɯ][te][rɯ]

- from the end: [ká]{[rɯ][te]}<[rɯ]> the rule fails
- from the beginning: {[ká][rɯ]}{[te][rɯ]} the accent is on the non-final rightmost foot

[a][ré][gɯ][ro]

- from the end: [a]{[ré][gɯ]}<[ro]> the accent is on the non-final rightmost foot
- from the beginning: {[a][ré]}{[gɯ][ro]} the accent is on the non-final rightmost foot

[L] [H] [L] syllable type

[há][mi ɲ][gɯ]

- from the end: [há]{[mi ɲ]}<[gɯ]> the rule fails
- from the beginning: [há]{[mi ɲ]}[gɯ] the rule fails

[o][ré N][dʒi]

- from the end: [o]{[ré N]}<[dʒi]> the accent is on the non-final rightmost foot
- from the beginning: [o]{[ré N]}[dʒi] the accent is on the non-final rightmost foot

Summary

From this evaluation of the three accent rules, Inaba's theory seems to apply best for loanwords of five or more morae, except for those in which the accent is on the light syllable followed by a heavy syllable at the end, for example [aḯ - ʃa - do:]. For four-mora loanwords, a significant improvement was shown with Inaba's rule due to his forming of the foot from the beginning of the word. However, there are contradictory results in four-mora loanwords with the syllable pattern [L] [L] [L] [L] and [L] [L] [H] between Inaba's rule and McCawley's rule. While four-mora loanwords of the syllable type [L] [L] [L] [L] should have the accent on the second mora [L] [L'] [L] [L] under McCawley's rule, Inaba's rule leads to the accent position being on the first mora [L'] [L] [L] [L].

Chapter 3

Default Accent Placement and Corpus Analysis of Four-mora Loanwords

In the previous section, the three accent rules were evaluated. From this evaluation of the three accent rules, a contradictory result came up in four-mora loanwords with the syllable pattern [L] [L] [L] [L]. Inaba's rule (2005b) leads to the accent position being on the first mora [L'] [L] [L] [L], while under McCawley's rule (1968) [L] [L] [L] [L] should have the accent on the second mora [L] [L'] [L] [L]. Due to this contradiction in accent placement between these two rules, in this section, four-mora loanwords with the syllable pattern [L] [L] [L] [L] from the previous studies by Katayama (1998) and Inaba will be reviewed and a corpus analysis performed based on the data in *NHK* (1998).

Default Accent Placement of Four-mora Loanwords

Katayama (1998), applying McCawley's rule, showed the default accent position of four-mora loanwords with [L] [L] [L] [L] as being on the second mora [L] [L'] [L] [L]. Table 3.1 shows the most frequent accent positions for the five different syllable patterns of four-mora loanwords under Katayama's treatment. Table 3.2 shows the same words with the default accent positions that Katayama found according to McCawley's rule.

Table 3.1

Most Frequent Accent Position of Four-mora Loanwords (Katayama, 1998)

Syllable pattern	Example Word in IPA	Example Word in Japanese Character
[H] [H]	[ó: - da:]	オ ¹ ーダー
[H] [L] [L]	[tó: - su - to]	ト ¹ ースト
[L] [H] [L]	[o - re ¹ - n - dʒi]	オレ ¹ ンジ
[L] [L] [H]	[kó - me - di:]	コ ¹ メディー
[L] [L] [L] [L]	[mé - di - ka - rɯ]	メ ¹ ディカル

Table 3.2

Default Accent Position of Four-mora Loanwords (Katayama, 1998)

Syllable pattern	Example Word in IPA	Example Word in Japanese Character
[H] [H]	[ó: - da:]	オ ¹ ーダー
[H] [L] [L]	[tó: - su - to]	ト ¹ ースト
[L] [H] [L]	[o - re ¹ - n - dʒi]	オレ ¹ ンジ
[L] [L] [H]	[kó - me - di:]	コ ¹ メディー
[L] [L] [L] [L]	* [me - dí - ka - rɯ]	メ ¹ ディカル

Although the last type of four-mora loanword [L] [L] [L] [L] has the accent position on the first mora [L¹] [L] [L] [L] such as [mé - di - ka - rɯ], which should be the most frequent type, Katayama decides the default accent position for this syllable pattern as being on the second mora. On the other hand, Inaba's rule for the type [L] [L] [L] [L] has the accent on the first mora, and assumes this as the default accent position for this syllable type.

To solve this ambiguity of whether the default position for the syllable pattern [L] [L] [L] [L] is on the first mora or the second mora, a corpus analysis was performed on all four-mora loanwords with all possible syllable patterns. After finding out the number

of each type existing in the data, further analysis of [L'] [L] [L] [L] and [L] [L'] [L] [L], taking into consideration Japanese phonological characteristics such as devoiced vowels will be performed.

The Data

The data were collected from *NHK* (1998). The data in *NHK* were collected from all of the newscasters of *NHK* and some newscasters of local broadcasting companies in the Tokyo area. The accent position in the words in this dictionary is based on the accent that is currently used in the mass media (*NHK*, 1998).

The Process of Corpus Analysis

The outline of the corpus analysis is as follows. Each step in more detail will be discussed later.

1. Collecting four-mora loanwords from the dictionary
2. Dividing these loanwords into five groups depending on the syllable pattern
3. Examining the loanwords in each syllable pattern depending on the accent position
4. Finding the ratio of each syllable pattern with different accent positions
5. Finding the most frequent accent position of each syllable pattern
6. Comparing the results of [L'] [L] [L] [L] and [L] [L'] [L] [L] with the programming script

7. Assuming the default accent position as the more frequent type between [L'] [L] [L] [L] and [L] [L'] [L] [L] with the programming script

First, all of the loanwords that consist of four-mora from *NHK* were collected. Some of the words in this dictionary have two or three possible accent placements. For this data analysis, the primary accent placement was selected. The next step was dividing these words according to possible syllable patterns. As indicated in the previous section, five possible syllable patterns in four-mora words are found, including [H] [H], which consists of two heavy syllables; [H] [L] [L], which consists of one heavy syllable followed by two light syllables; [L] [H] [L], which consists of a light syllable followed by a heavy syllable and another light syllable; [L] [L] [H], which consists of two light syllables followed by a heavy syllable; and [L] [L] [L] [L], which consists of four light syllables. The following table contains all possible syllable patterns with sample loanwords. Examples of each syllable pattern are repeated in Table 3.3. Some of these sample words are different from Table 3.1.

Table 3.3

Syllable Patterns of Four-mora Loanwords

Syllable pattern	Example Word in IPA	Example Word in Japanese Character
[H] [H]	[ó: - da:]	オーダー
[H] [L] [L]	[tó: - su - to]	トースト
[L] [H] [L]	[dé - ni? - ʃu]	デニッシュ
[L] [L] [H]	[kó - me - di:]	コメディ
[L] [L] [L] [L]	[dé - dʒi - ta - ru]	デジタル

Once the four-mora loanwords were classified, each syllable pattern of four-mora loanwords depending on the accent position was examined. Because the data by the type of syllable was sorted, it is necessary to describe what types of heavy syllable were considered. The following are the heavy syllables that were found in the data:

- A syllable consisting of any sequence of two morae which has the second mora as either [ʔ], [N]
- A syllable consisting of long vowels: [a:] [i:] [u:] [e:] [o:]
- A syllable consisting of diphthongs according to the sonority hierarchy scale
The sonority scale in the Japanese vowel system used in this data sort is the following:
[a - e - o - i - u]

The following are the possible diphthongs in Japanese loanwords. In addition, [ɰi] is included because [i] becomes a glide in [ɰi] and therefore, is considered to be a diphthong. Three possible types, [aɔ], [eɰ], and [oɰ], are not present in the data (see Table 3.4).

Table 3.4

Loanwords with Diphthongs

Diphthong Type	Example Word in IPA	Example Word in Japanese Character
(C) [aɰ]	[a - baɰ - to]	アバウト
(C) [ai]	[su - tai - ru]	スタイル
(C) [aɔ]	N/A	N/A
(C) [ae]	[sa - raε - bo]	サラエボ
(C) [eɰ]	N/A	N/A
(C) [ei]	[bu - ru - nei]	ブルネイ
(C) [eo]	[su - te - reo]	ステレオ

(C) [oɯ]	N/A	N/A
(C) [oɨ]	[sɯ - pɔ - to]	スポイト
(C) [i - ɯ]	N/A	N/A
(C) [ɯi]	[tʃá - pɯ - sɯ́i]	チャップスイ

The following table contains the doubled vowels which are not considered to be diphthongs according to the sonority hierarchy scale (see Table 3.5).

Table 3.5

Loanwords with Doubled Vowels: Not Considered Diphthongs

Diphthong Type	Example Word in IPA	Example Word in Japanese Character
(C) [i - o]	[í - di - o - mɯ]	イディオム
(C) [i - e]	[ká - ri - e - sɯ]	カリエス
(C) [i - a]	[ʃí - ri - a - sɯ]	シリアス
(C) [ɯ - o]	N/A	N/A
(C) [ɯ - e]	[dʒɯ́ - e - ri:]	ジュエリー
(C) [ɯ - a]	[ká - dʒɯ - a - rɯ]	カジュアル
(C) [o - e]	[pó - e - dʒi:]	ポエジー
(C) [o - a]	[ó - a - ʃi - sɯ]	オアシス
(C) [e - a]	[tʃé - a - man]	チェアマン

There are some loanwords with a doubled vowel that might possibly have a diphthong, but the second vowel is followed by a consonant or a long vowel, forming a heavy syllable. For these words, the heavy syllable takes priority. Therefore, although they are diphthongs, they don't form a syllable. The following are examples of these types (see Table 3.6).

Table 3.6

Loanwords with Second Vowel Followed by Heavy Syllable

Doubled Vowel	Example Word in IPA	Example Word in Japanese Character
[a - i:]	[na - í: - bɯ]	ナイーブ
[a - ɯN]	[ba - ɯN - do]	バウンド
[a - ɯN]	[bɯ - ra - ɯN]	ブラウン
[a - ɯN]	[ja - ɯN - de]	ヤウンデ
[a - in]	[ri - fá - in]	リファイン
[o - iʔ]	[ho - íʔ - pɯ]	ホイップ

The Result of the Corpus Analysis

With respect to the syllable pattern constraints, the results of the corpus analysis completed with the programming script appear in Table 3.7, which indicates the number of four-mora loanwords according to each type of syllable. The sample script and its output are attached in the appendix.

Table 3.7

The Number of Four-mora Loanwords According to the Syllable Pattern

Syllable Pattern	Number Found / Total Number of Four-mora Loanwords	Percentage (%)
Total [H] [H]	261	17.71%
Total [H] [L] [L]	235	15.94%
Total [L] [H] [L]	408	27.68%
Total [L] [L] [H]	256	17.37%
Total [L] [L] [L] [L]	314	21.30%
Total	1474	100%

As shown in Table 3.7, the number of four-mora loanwords found in *NHK* totaled 1474. Among the 1474 words, the most frequent syllable pattern found was [L] [H] [L], with 26.68% of the results. The next most frequent type was the syllable pattern [L] [L] [L] [L], with 21.30 %; then [H] [H] with 17.71 %, and [L] [L] [H] with 17.37 %. Finally, the least frequent syllable pattern was [H] [L] [L] with 15.94 %.

Within this syllable pattern, let us examine a number of the variations depending on the accent placement. The following table shows the results of the accent position within the syllable pattern (see Table 3.8).

Table 3.8

The Number of Each Syllable Pattern Depending on its Accent Position

Syllable pattern	Example word	Total Number	Percentage (%)
[H •] [H]	[ó: - da:]	237	90.80%
[H] • [H]	[toí - ki:]	1	0.39%
[H] [H •]	[ko: - hí:]	11	4.25%
Non-accented	[pen - gin]	12	4.62%
Total [H] [H]	_____	261	100%
[H •] [L] [L]	[ǎ? - pɯ - rɯ]	136	57.87%
[H] • [L] [L]	[ɯí - rɯ - sɯ]	3	1.28%
[H] [L] • [L]	[san - hó - se]	6	2.55%
Non-accented	[kon - so - me]	90	38.3%
Total [H] [L] [L]	_____	235	100%
[L] • [H] [L]	[tó - ni? - kɯ]	45	11.03%
[L] [H •] [L]	[a - rí: - na]	299	73.46%
[L] [H] • [L]	N/A	N/A	0 %

Unaccented	[sa - ʊn - do]	64	15.69%
Total [L] [H] [L]	_____	408	100%
[L] • [L] [H]	[ká - rʊ - tʃa:]	153	59.77%
[L] [L] • [H]	[de - zá - in]	48	18.47%
[L] [L] [H •]	[he - a - dǎi]	10	3.95%
Non-accented	[ri - mo - kon]	45	17.58%
Total [L] [L] [H]	_____	256	100%
[L] • [L] [L] [L]	[pá - ra - so - rʊ]	84	26.75%
[L] [L] • [L] [L]	[pʊ - rí - zʊ - mʊ]	40	12.66%
[L] [L] [L] • [L]	[a - pʊ - rí - ke]	2	0.63%
Non-accented	[e - na - me - rʊ]	188	59.68%
Total [L] [L] [L] [L]	_____	314	100%

From the results, the most frequent accent position of each syllable pattern is as follows. The syllable pattern [H] [H] with the accent on the first mora with a ratio of 90.80 %, [H] [L] [L] with the accent on the first mora with 57.87 %, [L] [H] [L] with the accent on the second mora with 73.46 %, [L] [L] [H] on the first mora with 59.77 %, and [L] [L] [L] [L] with no accent with 59.68%. On the other hand, the least frequent accent position of each syllable pattern is as follows. The syllable pattern [H] [H] with the accent on the second mora with a ratio of 0.39%, [H] [L] [L] with the accent on the second mora with 1.28%, [L] [L] [H] with the accent on the third mora with 3.95%, and [L] [L] [L] [L] with the accent on the third mora with 0.63%.

Discussion

From the results of the corpus analysis, there are two questions that are asked:

1) What is the default position of each syllable pattern? and 2) What is the default accent position of the syllable pattern [L] [L] [L] [L] regarding the contradiction in accent placement between Inaba's rule and McCawley's rule?

1) The answer to the first question, what the default position of each syllable pattern is, can be simply assumed from the results to be the most frequent accent position of each syllable pattern. The following table contains the most frequent accent positions that were found in the result (see Table 3.9).

Table 3.9

The Most Frequent Accent Position of Each Syllable Pattern

Syllable pattern	Most Frequent Accent position	Example word	Percentage (%)
[H] [H]	[H'] [H]	[ó: - da:]	90.80%
[H] [L] [L]	[H'] [L] [L]	[á? - pɯ - rɯ]	57.87%
[L] [H] [L]	[L] [H'] [L]	[a - rí: - na]	73.46%
[L] [L] [H]	[L'] [L] [H]	[ká - rɯ - tʃa:]	59.77%
[L] [L] [L] [L]	Non-accented	[e - na - me - rɯ]	59.68%

It seems that the syllable pattern which contains a heavy syllable in the first two syllable positions tends to receive the accent on the heavy syllable.

2) Regarding the contradiction in accent placement between Inaba's rule and McCawley's rule, what is the default accent position of the syllable pattern [L] [L] [L] [L]?

The most frequent accent position of the word with the syllable pattern [L] [L] [L] [L] is no accent. However, as discussed earlier, the goals of this study made it necessary to exclude loanwords with no accent. Let us focus on the result of the loanwords with the syllable pattern [L] [L] [L] [L] which carries an accent. Looking at the results of the syllable pattern [L] [L] [L] [L] with the accent on the first mora, [L'] [L] [L] [L], and on the second mora, [L] [L'] [L] [L], the results show that the first mora received the accent with 26.75%, and the later mora received the accent with 12.66%. This clearly shows that the number of the syllable pattern with the accent on the first mora [L'] [L] [L] [L] is more than twice the number as the syllable pattern with the accent on the second mora [L] [L'] [L] [L]. The results in Table 3.10 have been extracted from Table 3.8.

Table 3.10

Accent Position of Four-mora Words: [L] [L] [L] [L] (Extracted from previous table)

[L'] [L] [L] [L]	[pá - ra - so - ru]	84	26.75%
[L] [L'] [L] [L]	[pu - rí - zu - mu]	40	12.66%
[L] [L] [L'] [L]	[a - pu - rí - ke]	2	0.63%
Unaccented	[e - na - me - ru]	188	59.68%
Total [L] [L] [L] [L]	_____	314	100%

This result is different from the one in Katayama's (1998) data analysis. The following is the result of Katayama's data analysis of four-mora loanwords with the syllable pattern extracted from the [L] [L] [L] [L] (see Table 3.11).

Table 3.11

Katayama's Results Extracted from Katayama (1998)

Syllable pattern	Example word	Number Found / Total Number of Four-mora Loanwords	Percentage (%)
[L'] [L] [L] [L]	[bí - dʒi - ne - sw]	64	31%
[L] [L'] [L] [L]	[té - ki - sw - to]	46	22%
[L] [L] [L'] [L]	[pɯ - ro - pé - ra]	4	2%
Unaccented	[sw - te - re - o]	95	45%
Total [L] [L] [L] [L]	_____	209	100%

First of all, from this data comparison, the total number of words was increased from Katayama's data to the data used for this corpus analysis. Obviously, the unaccented words were greatly increased with a ratio of 45 % to 59.68% although, in this section, these words are excluded. Some of the words take a different accent position. For example, the words with the syllable pattern [L] [L] [L'] [L] [pɯ - ro - pé - ra] in Katayama's data receive the accent on the third mora, yet the same word has no accent in my data.

Secondly, Katayama's analysis shows that [L'] [L] [L] [L] held in 31%, and [L] [L'] [L] [L] occurred in 22%. It shows that the number of the syllable pattern with the accent on the first mora [L'] [L] [L] [L] is more than the number of the syllable pattern with the accent on the second mora [L] [L'] [L] [L], yet the one number is not twice as big as the other. Taking the increased data into account, the evidence demonstrates that the [L'] [L] [L] [L] is likely to be the default accent type.

Further Analysis with A Different Approach to the Syllable Patterns [L] [L] [L] [L] and [L] [L] [H]

The position of voiceless vowels might change the accent position. In Japanese, when the high vowels, such as [i] and [ɯ], occur between two voiceless consonants, these vowels become devoiced.

With this phonological rule, one prediction can be built among the sorted data. Because of the occurrence of the devoiced vowels, the accent position might have shifted to the neighboring position. The words with syllable pattern [L] [L] [L] [L] with a voiceless vowel can therefore have a different accent position from the expected one.

For example: [ká - sɯ̥ - ta - mɯ̥] has a voiceless vowel in the second mora while the accent position is on the first mora. For this type of word, there is a possibility that the accent was originally placed on the second mora, but the occurrence of devoiced vowels makes the accent position shift to the first mora. This could also happen to the syllable pattern with the accent on the second mora, [sɯ̥ - kuí - ra - mɯ̥]. In this case, due to the occurrence of a devoiced vowel, the first mora cannot receive the accent, which may shift to the second mora. The following is the rewritten result with consideration of devoiced vowels that may cause an accent shift (see Table 3.12). In addition, the same phenomenon possibly occurs in the syllable pattern of [L'] [L] [H] and [L] [L'] [H], so the table also includes these types of loanwords. Removed loanwords with devoiced vowels are listed in the appendix.

Table 3.12

The Ratio Change with Devoiced Vowel

Syllable Pattern	Example Word	Number Found / Total Number of Four-mora Loanwords	Percentage (%)
[L'] [CV̥] [L] [L]	[ká - su̥ - ta - mɯ]	84 → 64	26.75% → 21.77%
[CV̥] [L'] [L] [L]	[su̥ - kuí - ra - mɯ]	40 → 36	12.66% → 11.61%
[L'] [CV̥] [H]	[ká - su̥ - ta:]	153 → 117	59.77% → 53.18%
[L] [CV̥'] [H]	N/A	48 → No change	18.47%

Taking into consideration devoiced vowels, the ratio is still almost twice from one to the other. This result also demonstrates that the [L'] [L] [L] [L] has a high possibility of being the default accent type.

Now, let us consider one more possibility of accent shift due to the occurrence of devoiced vowels. The type which may be concerned is [L] [L'] [L] [L] with the devoiced vowel on the third mora, exemplified by [to - rá - su̥ - to]. The possible accent shift is due to the devoiced vowel making the second and third mora a heavy mora and the accent placement shifting to the second mora (see Table 3.13).

Table 3.13

Results with Devoiced Vowels

Syllable Pattern	Example Word	Number Found / Total Number of Four-mora Loanwords	Percentage (%)
[CV̥] [L'] [L] [L]	[su̥ - kuí - ra - mɯ]	40 → 36	12.66% → 11.61%
[L] [CV̥'] [L] [L]	[to - rá - su̥ - to]	36 → 24	11.61% → 8.05%

This result shows the decrease in the number of occurrence of the syllable pattern [L] [L'] [L] [L]. The preceding table shows the comparison between the ratio of [L'] [L] [L] [L] and [L] [L'] [L] [L] (see Table 3.14).

Table 3.14

The Comparison Between the Ratio of [L'] [L] [L] [L] and [L] [L'] [L] [L]

Syllable Pattern	Example Word	Number Found / Total Number of Four-mora Loanwords	Percentage (%)
[L'] [CV̆] [L] [L]	[ká - sɯ̆ - ta - mɯ̆]	84 → 64	26.75% → 21.77%
[L] [CV̆'] [L] [L]	[to - rá - sɯ̆ - to]	36 → 24	11.61% → 8.05%

This result also demonstrates that the ratio of [L'] [L] [L] [L] was more than twice that of [L] [L'] [L] [L]. The evidence of all of the preceding analysis suggests that [L'] [L] [L] [L] has a high possibility of being the default accent type.

Summary

Due to the contradiction between the rules proposed by Inaba (2005b) and McCawley (1968) regarding the accent placement of four-mora loanwords with the syllable pattern [L] [L] [L] [L], a corpus analysis has been done. Considering the most frequent accent position of each syllable pattern, the default positions were demonstrated to be the first mora in the syllable patterns [H] [H], [H] [L] [L] and [L] [L] [H], the second mora in the syllable patter [L] [H] [L], and no accent in the syllable pattern [L] [L] [L] [L]. Although the syllable pattern [L] [L] [L] [L] has the most frequent accent position as no accent, to solve the ambiguity of the default accent position between [L']

[L] [L] [L] and [L] [L'] [L] [L], an analysis of only accented [L] [L] [L] [L] words was completed. According to the detailed analysis, focusing on the more frequent accent positions of [L'] [L] [L] [L] and [L] [L'] [L] [L], [L'] [L] [L] [L] has a high probability of being the default accent type.

Chapter 4

Experiment

According to the corpus analysis of the default accent placement for four-mora loanwords from the *NHK* analyzed in the previous section, most words received the accent on the first mora. This result supported Inaba's accent rule for all four-mora loanwords except those with the pattern [L] [L] [L] [L], because the most frequent type in this pattern does not have an accent. However, for the purpose of determining the contradictory accent rules for four-mora loanwords with the pattern [L] [L] [L] [L], it was crucial to exclude the unaccented words and find the more frequent accent placement among the remaining four-mora loanwords with the pattern [L] [L] [L] [L] which do take an accent. In this manner, the results support Inaba's rule. The table below shows the result of the corpus analysis only for [L] [L] [L] [L] from the previous section (see Table 4.1).

Table 4.1

[L] [L] [L] [L] Depending on the Accent Position

Syllable Pattern	Example Word	Number Found / Total Number of Four-mora Loanwords	Percentage (%)
[L'] [L] [L] [L]	[pá - ra - so - rɯ]	84	26.75%
[L] [L'] [L] [L]	[pɯ - rí - zu - mɯ]	40	12.66%
[L] [L] [L'] [L]	[a - pɯ - rí - ke]	2	0.63%
Unaccented	[e - na - me - rɯ]	188	59.68%
Total [L] [L] [L] [L]	—————	314	100%

The evidence from the corpus analysis shows that the four-mora loanwords with the pattern [L] [L] [L] [L] receive the accent placement more frequently on the first mora than on the second mora, yet going through the data from the *NHK* as a native speaker of standard Japanese, some interesting observations can be made. Some words which in the *NHK* are shown to have the accent on the second mora seem to me as a native speaker to require an accent on the first mora. For example, the loanword [a - ná - na - su], which is [L] [L] [L] [L] with the accent position on the second mora in the *NHK* (1998) could possibly be accented on the first mora by a native speaker of standard Japanese. Furthermore, some words with two possible accent placements have the second mora as the primary choice, and the first mora as the secondary choice in the *NHK*. For instance, the loanword [sa - fuú - ran] has the accent on the second mora as a primary choice and the accent on the first mora as the secondary choice. However, when pronounced by a native speaker, the accent might be placed on the first mora, which is the secondary choice in the *NHK*.

According to all three rules of accent placement of loanwords, the accent is placed on the first mora in short words, such as those with two or three morae. If four-mora words are also considered short words, it is conceivable that these would also receive the accent on the first mora.

Observations of the accent placement of native speakers of Japanese suggested the possibility of the accent being placed on the first mora in the syllable patterns [L] [L] [L] [L] and [L] [L] [H], which both carry the accent on the second mora in the *NHK*. To test this possibility, an experiment of how native speakers of standard Japanese put the

accent on words with the pattern [L] [L] [L] [L] and [L] [L] [H] loanwords was conducted.

Furthermore, taking a close look at the results concerning evaluation of different syllable patterns with accent on four-mora loanwords, and the data resulting from my corpus analysis of the *NHK*, it was found that some of the words with the syllable pattern [L] [H] [L] which carry the accent on the second mora might possibly be accented on the first mora. For this type of syllable, Inaba has a special treatment that makes his rule valid for this type of four-mora loanword. Inaba's treatment of [L¹] [H] [L] is a top-down construction (van der Hulst, 1984); he states that native speakers of standard Japanese recognize four-mora loanwords as short words just like two-mora and three-mora words, and they immediately put an accent on the first mora.

Using Inaba's treatment of [L¹] [H] [L] loanwords, the [L] [H¹] [L] words which possibly have the accent placed on the first mora by native speakers of standard Japanese were also tested.

Hypothesis

The subjects would be expected to place the accent on the first mora for the four-mora loanwords with the syllable patterns [L] [L] [L] [L] and [L] [L] [H] which had the accent placement on the second mora in the *NHK*. The subjects should also be expected to place the accent on the first mora for the four mora loanwords which in the *NHK*, had the primary accent placement on the second mora and the secondary placement on the first mora. On the other hand, subjects would be expected to place the accent on the first

mora for the four-mora loanwords which in the *NHK* have the primary accent placement on the first mora and the secondary choice is on the second mora. The example loanwords with the accent that are shown in the *NHK* and possible accent shifts are listed in the table below (see Table 4.2).

Table 4.2

Example Loanwords with Possible Accent Shift 1

Syllable Pattern	Primary Choice in <i>NHK</i>	Secondary Choice in <i>NHK</i>	Possible Output
[L] [L] [L] [L]	[a - ná - na - sw]	N/A	[á - na - na - sw]
[L] [L] [H]	[a - sé - ton]	N/A	[á - se - ton]
[L] [H] [L]	[je - rá? - kw]	N/A	[jé - ra? - kw]
[L] [L] [L] [L]	[ki - rí - ba - sw]	[kí - ri - ba - sw]	[ki - rí - ba - sw]
[L] [L] [H]	[sa - fuí - ran]	[sá - fu - ran]	[sá - fu - ran]
[L] [H] [L]	[so - ké? - to]	[só - ke? - to]	[só - ke? - to]

In addition to the loanwords shown in the table above, the loanwords that have the accent on the first mora as a primary choice and on the second mora as a secondary choice were tested for the validity of the primary choice. The following table includes the loanwords of this type (see Table 4.3).

Table 4.3

Example Loanwords with Possible Accent Shift 2

Syllable Pattern	Primary Choice in <i>NHK</i>	Secondary Choice in <i>NHK</i>	Possible Output
[L] [L] [L] [L]	[ó - a - ji - sw]	[o - á - ji - sw]	[ó - a - ji - sw]
[L] [L] [H]	[á - be - njw:]	[a - bé - njw:]	[á - be - njw:]
[L] [H] [L]	[kjuí - ro? - to]	[kju - ró? - to]	[kjuí - ro? - to]

Summarizing the hypothesis, subjects should be able to find the accent position on the first mora for the four-mora loanwords with these three different syllable patterns.

Method

Throughout the experiment, subjects were asked to read the frame with different loanwords which have no marking on the accent position. The observation reveals if the subject put the accent on the first mora or on the second mora of the targeted word. The accent position which is desired is on the first mora of the syllable patterns [L] [L] [L] [L] and [L] [L] [H], which are the target syllable patterns of four-mora loanwords. The experiment was recorded and the pitch measured with a spectrogram to find the accurate accent position of each word.

Speakers

The subjects were nine native speakers of “standard” Japanese. Six females and three males participated in this experiment for no compensation. Two of the subjects had lived in Japan for between 11 and 20 years. Three had lived in Japan for between 21 and

30 years. The rest had lived in Japan for more than 30 years. One of the subjects currently lives in Japan, and the others currently live in the United States, but their native language is Japanese, and all were born and raised in the Tokyo area. Since Tokyo is the capital prefecture in Japan, all of the subjects are considered to be native speakers of what it is called standard Japanese. Because the experiment is based on standard Japanese data from the *NHK*, these subjects should be appropriate for this experiment.

Survey Material

The material used for this survey was a list of frame sentences with different loanwords. The frame sentence was extracted from a short story (see Appendix). There were 191 words in the frame sentences on the list. Each sentence had a loanword with a different number of morae.

Words were included with different numbers of morae, ranging from three to eight. For the target four-mora words, different types of syllables were included. This was designed to prevent subjects from realizing that the target words were the four-mora loanwords with the syllable patterns [L] [L] [L] [L] and [L] [L] [H]. The number of each syllable pattern was as follows: 27 three-mora loanwords, 81 four-mora loanwords, 12 five-mora loanwords, 15 six-mora loanwords, nine seven-mora loanwords. Besides the four-mora loanwords, the words were randomly selected from the *NHK*. There are 59 target four-mora loanwords which were of two types: 20 words with the accent on the second mora as the only choice in the *NHK*, but which seem to require the accent on the first mora (see Table 4.4) and 39 words with two possible accent positions, of which the

second mora is the primary position in the *NHK* (see Table 4.5). In addition, besides the target words, there were 41 words with two possible accent positions with the first mora as the expected primary position, according to the *NHK*. In these tables, the syllable patterns [L] [L] [L] [L] and [L] [L] [H] are written in bold.

Table 4.4

Words with Accent on the Second Mora as the Only Choice

Loanwords in IPA	Japanese Character	Loanwords in IPA	Japanese Character
[dʒa - ká - rɯ - ta]	ジャカ ¹ ルタ	[ʃe - ráʔ- kɯ]	シェラ ¹ ック
[pɯ - rí - ma - sɯ]	プリ ¹ マス	[to - ríʔ- kɯ]	トリ ¹ ック
[ma - ná - gɯ - a]	マナ ¹ グア	[to - ríʔ- pɯ]	トリ ¹ ップ
[a - ná - na - sɯ]	アナ ¹ ナス	[ba - kéʔ- to]	バケ ¹ ット
[te - á - to - rɯ]	テア ¹ トル	[ba - réʔ- kɯ]	バラ ¹ ック
[a - sé - ton]	アセ ¹ トン	[pi - kéʔ- to]	ピケ ¹ ット
[ka - ná - kin]	カナ ¹ キン	[pi - kóʔ- to]	ピコ ¹ ット
[ki - ró - ton]	キロ ¹ トン	[ri - béʔ- to]	リベ ¹ ット
[ʃi - tó - ron]	シト ¹ ロン	[ma - ráʔ- ka]	マラ ¹ ッカ
[to - bí - rin]	トビ ¹ リン		
[ra - nó - rin]	ラノ ¹ リン		

Table 4.5

Words with Two Possible Accent Positions; Second Mora as Priority Choice

Loanwords in IPA	Japanese Character	Loanwords in IPA	Japanese Character
[de - rí - ʃa - sɯ]	デリ ¹ シャス	[to - róʔ- to]	トロ ¹ ット
[to - rí - pɯ - rɯ]	トリ ¹ プル	[do - róʔ- pɯ]	ドロ ¹ ップ
[ʃi - á - to - rɯ]	シア ¹ トル	[ba - kéʔ- to]	バケ ¹ ット

[bw - ruí - nej]	ブルネイ	[pa - ré?- to]	パレット
[kw - ré - son]	クレソン	[ba - ró?- kw]	バロック
[sa - fuí - ran]	サフラン	[bi - jó?- pw]	ビショップ
[kjuw - rá - so:]	キュラソー	[po - ké?- to]	ポケット
[do - rá - ma:]	ドラマー	[re - gá?- ta]	レガッタ
[e - pó?- kw]	エボック	[ro - ké?- to]	ロケット
[ka - já?- kw]	カヤック	[ke - bé?- kw]	ケベック
[ka - rá?- to]	カラット	[mo - ró?- ko]	モロッコ
[kw - rí?- pw]	クリップ	[tja - rén- dʒi]	チャレンジ
[ke - tʃá?- pw]	ケチャップ	[i - mé:- dʒi]	イメージ
[go - jí?- kw]	ゴシック	[ga - ré:- dʒi]	ガレージ
[go - jí?- pw]	ゴシップ	[je - pá:- do]	シェパード
[ko - njá?- kw]	コニャック	[da - mé:- dʒi]	ダメージ
[sw - í?- tʃi]	スイッチ	[ba - rá:- do]	バラード
[sw - rí?- pw]	スリップ	[ba - rá:- do]	パレード
[so - ké?- to]	ソケット	[re - kó:- do]	レコード
[ta - rá?- pw]	タラップ		

In addition, a list of all other loanwords used for this experiment is attached in the appendix.

Experimental Procedure

The subjects were tested individually in several different quiet rooms, and recorded with a digital voice recorder. The materials for this experiment were divided into 18 pages. The first page consisted of a short paragraph story with the frame sentence. The short paragraph story was read in order for the subjects to understand what the frame was about. The second to seventeenth pages consisted of a list of frame sentences with

different loanwords. The last page repeated the sentences from the first page to test for subjects' consistency.

First, the subjects were told that this was an experiment about accent placement and that the whole experiment would be recorded. Then, they read the first page which contained the frame story. Next, the subjects were told that they should read each individual sentence clearly. After making sure they had no questions, the subjects were asked to begin reading the frame sentences.

Results

In Japanese accent placement, where the pitch falls corresponds to the accent position. In this experiment, the accent placement was measured by the pitch (Hz) and then the placement of pitch falling was considered to be the accent position. The following table contains the sample pitch measurement, which was recorded using my own voice speaking one of the target words with the syllable pattern [L] [L] [L] [L], [ananasu]. The left window contains the word with the accent placed on the first mora and the right window contains the word with the accent placed on the second mora (see Figure 4.1).

Figure 4.1

Pitch Difference in the Word [ananasu]

According to the accent position measured, the following table shows the ratio of target word accent placement. The most frequent accent position is shown in bold text, and words with the syllable patterns [L] [L] [L] [L] and [L] [L] [H] are highlighted again in the table below (see Table 4.6).

Table 4.6

Results of Words with the Accent on the Second Mora as the Only Choice

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[dʒa - ká - ru - ta]	ジャカルタ	11%	0%	89%
[pu - rí - ma - su]	プリマス	78%	22%	0%
[ma - ná - gu - a]	マナグア	11%	0%	89%
[a - ná - na - su]	アナナス	78%	22%	0%
[te - á - to - ru]	テアトル	89%	0%	11%
[a - sé - ton]	アセトン	78%	0%	22%

[ka - ná - kin]	カナ ¹ キン	67%	0%	33%
[ki - ró - ton]	キロ ¹ トン	100%	0%	0%
[ji - tó - ron]	シト ¹ ロン	78%	22%	0%
[to - bí - rin]	トビ ¹ リン	89%	0%	11%
[ra - nó - rin]	ラノ ¹ リン	89%	0%	11%
[je - rá?- kw]	シェラ ¹ ック	78%	22%	0%
[to - rí?- kw]	トリ ¹ ック	67%	33%	0%
[to - rí?- pw]	トリ ¹ ップ	44%	56%	0%
[ba - ké?- to]	バケ ¹ ット	56%	33%	11%
[ba - ré?- kw]	バラ ¹ ック	56%	33%	11%
[pi - ké?- to]	ピケ ¹ ット	89%	11%	0%
[pi - kó?- to]	ピコ ¹ ット	78%	22%	0%
[ri - bé?- to]	リベ ¹ ット	33%	56%	11%
[ma - rá?- ka]	マラ ¹ ッカ	78%	22%	0%

The results show that out of 20 words, 16 words were pronounced with the accent on the first mora by a majority subjects (see Table 4.7).

Table 4.7

Results of Words with Two Possible Accent Positions; Second Mora as Primary Choice

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[de - rí - ja - sw]	デリ ¹ シャス	33%	67%	0%
[to - rí - pw - rw]	トリ ¹ プル	56%	22%	22%
[ji - á - to - rw]	シア ¹ トル	100%	0%	0%
[bw - ruí - nej]	ブル ¹ ネイ	22%	11%	67%
[kw - ré - son]	クレ ¹ ソン	89%	0%	11%
[sa - fuí - ran]	サフ ¹ ラン	100%	0%	0%
[kjw - rá - so:]	キュラ ¹ ソー	100%	0%	0%

[do - rá - ma:]	ドラ ¹ マー	33%	22%	45%
[e - pó?- kw]	エポ ¹ ック	67%	33%	0%
[ka - já?- kw]	カヤ ¹ ック	78%	22%	0%
[ka - rá?- to]	カラ ¹ ット	56%	44%	0%
[kw - rí?- pw]	クリ ¹ ップ	33%	67%	0%
[ke - tjá?- pw]	ケチャ ¹ ップ	44%	56%	0%
[go - jí?- kw]	ゴシ ¹ ック	78%	22%	0%
[go - jí?- pw]	ゴシ ¹ ップ	44%	56%	0%
[ko - njá?- kw]	コニヤ ¹ ック	78%	22%	0%
[sw - í?- tji]	スイ ¹ ッチ	67%	33%	0%
[sw - rí?- pw]	スリ ¹ ップ	22%	78%	0%
[so - ké?- to]	ソケ ¹ ット	56%	44%	0%
[ta - rá?- pw]	タラ ¹ ップ	67%	33%	0%
[to - ró?- to]	トロ ¹ ット	44%	56%	0%
[do - ró?- pw]	ドロ ¹ ップ	56%	44%	0%
[ba - ké?- to]	バケ ¹ ット	56%	22%	22%
[pa - ré?- to]	パレ ¹ ット	78%	22%	0%
[ba - ró?- kw]	バロ ¹ ック	67%	33%	0%
[bi - jó?- pw]	ビショ ¹ ップ	67%	33%	0%
[po - ké?- to]	ポケ ¹ ット	22%	78%	0%
[re - gá?- ta]	レガ ¹ ッタ	33%	67%	0%
[ro - ké?- to]	ロケ ¹ ット	22%	78%	0%
[ke - bé?- kw]	ケベ ¹ ック	89%	11%	0%
[mo - ró?- ko]	モロ ¹ ッコ	56%	44%	0%
[tja - rén- dži]	チャレ ¹ ンジ	33%	67%	0%
[i - mé:- dži]	イメ ¹ ージ	33%	67%	0%
[ga - ré:- dži]	ガレ ¹ ージ	22%	78%	0%
[je - pá:- do]	シェパ ¹ ード	56%	44%	0%
[da - mé:- dži]	ダメ ¹ ージ	22%	78%	0%
[ba - rá:- do]	バラ ¹ ード	0%	89%	11%

[ba - rá:- do]	パレード	44%	56%	0%
[re - kó:- do]	レコード	0%	100%	0%

Out of 39 loanwords, 21 words received the accent on the first mora as the most frequent placement, 16 words received the accent on the second mora, and two words did not receive any accent as the most frequent type (see Table 4.8).

Table 4.8

Results of Words with Two Possible Accent Positions; First Mora as Primary Choice

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[ó - a - ʃi - sw]	オアシス	100%	0%	
[kó - ko - na - tsu]	コナツ	89%	11%	
[té - ki - sw - to]	テキスト	100%	0%	
[kí - ri - ba - sw]	キリバス	78%	0%	22%
[só - bi - e - to]	ソビエト	56%	33%	11%
[tjá - pu - swi]	チャプスイ	56%	33%	11%
[fi - ri - pin]	フィリピン	100%	0%	
[ré - ba - non]	レバノン	100%	0%	
[ó - re - gon]	オレゴン	100%	0%	
[dó - ra - gon]	ドラゴン	100%	0%	
[tó - ru - en]	トルエン	67%	33%	
[mé - ga - ton]	メガトン	100%	0%	
[mé - ga - hon]	メガホン	100%	0%	
[tjé - a - man]	チェアマン	78%	22%	
[á - be - njw:]	アベニュー	100%	0%	
[má - tjí - ne:]	マチネー	33%	44%	23%
[swí - ma:]	スイマー	89%	11%	

[é - pi? - kw]	エ ¹ ピック	89%	11%	
[ká - po? - kw]	カ ¹ ポック	67%	33%	
[kjú - ro? - to]	キュ ¹ ロット	89%	11%	
[kó - ro? - ke]	コ ¹ ロッケ	100%	0%	
[dzá - ke? - to]	ジャ ¹ ケット	56%	0%	44%
[jí - ro? - pw]	シ ¹ ロップ	100%	0%	
[swí - ri? - pa]	ス ¹ リップ	56%	44%	
[dé - ni? - jw]	デ ¹ ニッシュ	89%	11%	
[tó - pi? - kw]	ト ¹ ピック	100%	0%	
[tó - ro? - ko]	ト ¹ ロッコ	56%	44%	
[pá - do? - kw]	パ ¹ ドック	89%	11%	
[pá - ni? - kw]	パ ¹ ニック	100%	0%	
[bwí - ti? - kw]	ブ ¹ ティック	100%	0%	
[pó - tje? - to]	ポ ¹ シェット	89%	11%	
[má - dži? - kw]	マ ¹ ジック	56%	44%	
[jú - ni? - to]	ユ ¹ ニット	78%	0%	22%
[ró - dži? - kw]	ロ ¹ ジック	89%	11%	
[ró - bo? - to]	ロ ¹ ボット	11%	89%	
[bá - kan - sw]	バ ¹ カンス	100%	0%	
[bwí - ran - ko]	ブ ¹ ランコ	78%	22%	
[ró - man - sw]	ロ ¹ マンス	100%	0%	
[é - t[ɰ: - do]	エ ¹ チュード	78%	22%	
[jí - ri: - zw]	シ ¹ リーズ	0%	100%	
[tó - pa: - zw]	ト ¹ パーズ	78%	22%	

Out of 41 words, the majority received the accent on the first mora as the most frequent placement, except for the loanwords [má - tji - ne:], [ró - bo? - to]. In addition, the pitch measurement of all of the target words is attached in the appendix.

Discussion

Four questions need to be considered: 1) For the words with the patterns [L] [L] [L] [L] and [L] [L] [H], did the subjects place the accent on the first mora for the four-mora loanwords that have only one possible accent position, which in the *NHK* is on the second mora? 2) For the words with the syllable patterns [L] [L] [L] [L] and [L] [L] [H], did the subjects place the accent on the first mora for the four-mora loanwords that have two possible choices of accent position (the primary choice of accent on the second mora and the secondary choice on the first mora) in the *NHK*? 3) What was the accent placement of the words with the syllable pattern [L] [H] [L]? 4) Did the subjects place the accent on the first mora for the four-mora loanwords that have two possible choices of accent position (the primary choice of accent on the first mora and the secondary choice on the second mora) in the *NHK*?

First, for the words with the patterns [L] [L] [L] [L] and [L] [L] [H], did the subjects place the accent on the first mora for the four-mora loanwords that have only one possible accent position, which is on the second mora, in the *NHK*?

There are five words with the pattern [L] [L] [L] [L] for this section. First of all, it is obvious that none of the words received the accent placement on the second mora, although the accent on the second mora is the placement given in the *NHK*. Out of five words, three including [pu - rí - ma - su], [a - ná - na - su] and [te - á - to - ru] received the accent on the first mora from more than 70 percent of the subjects, and this is what was expected based on the hypothesis. For two other words, [dʒa - ká - ru - ta] and [ma - ná - gu - a], most subjects did not place the accent on the first mora, yet none

of the subjects placed the accent on the second mora. According to the discussion about the default accent placement on four-mora loanwords, the most frequent accent placement on the words with the syllable type [L] [L] [L] [L] was no accent. This might explain the reason why subjects did not place an accent on these words (see Table 4.9).

Table 4.9

Accent on the Second Mora as the Only Choice for [L] [L] [L] [L]

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[dʒa - ká - rɯ - ta]	ジャカルタ	11%	0%	89%
[pɯ - rí - ma - sɯ]	プリマス	78%	22%	0%
[ma - ná - gɯ - a]	マナグア	11%	0%	89%
[a - ná - na - sɯ]	アナナス	78%	22%	0%
[te - á - to - rɯ]	テアトル	89%	0%	11%

There are six words with the pattern [L] [L] [H] for this section. The result was that the most frequent accent position was on the first mora. The rest of the accent placement choices were no accent, except for one word [ʃi - tó - rɔŋ], yet only 22 % put the accent on the second mora, which is the placement in the dictionary (see Table 4.10).

Table 4.10

Accent on the Second Mora as the Only Choice for [L] [L] [H]

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[a - sé - tɒn]	アセ ¹ トン	78%	0%	22%
[ka - ná - kɪn]	カナ ¹ キン	67%	0%	33%
[ki - ró - tɒn]	キロ ¹ トン	100%	0%	0%
[ʃi - tó - rɒn]	シト ¹ ロン	78%	22%	0%
[to - bí - rɪn]	トビ ¹ リン	89%	0%	11%
[ra - nó - rɪn]	ラノ ¹ リン	89%	0%	11%

Secondly, for the words with the patterns [L] [L] [L] [L] and [L] [L] [H], did the subjects place the accent on the first mora for the four-mora loanwords that have two possible choices of accent position (the first choice of accent on the second mora and the secondary choice on the first mora) in the *NHK*.

There are three words with the pattern [L] [L] [L] [L] in this part. The most frequent accent placement was on the first mora for [to - rí - pɯ - rɯ] and [ʃi - á - to - rɯ]. For one word, [de - rí - ʃa - sɯ], most subjects placed the accent on the second mora, which is the accent placement in the *NHK*, but a third of them placed the accent on the first mora (see Table 4.11).

Table 4.11

Possible Accent Position; Second Mora as the Primary Choice for [L] [L] [L] [L]

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[de - rí - ʃa - sɯ]	デリ ¹ シャス	33%	67%	0%
[to - rí - pɯ - rɯ]	トリ ¹ プル	56%	22%	22%
[ʃi - á - to - rɯ]	シア ¹ トル	100%	0%	0%

There are five words with the pattern [L] [L] [H] in this part. Like the results for the same syllable pattern in the previous section, the accent placement on the second mora was not the most frequent accent placement for any word. Three words received the most frequent accent placement on the first mora. The other two had no accent as the most frequent accent type. Again, the default accent placement on four-mora loanwords should explain this phenomenon that the most frequent accent placement on the words with the syllable type [L] [L] [L] [L] was no accent (see Table 4.12).

Table 4.12

Possible Accent Position; Second Mora as the Primary Choice for [L] [L] [H]

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[bɯ - rú - neɪ]	ブル ¹ ネイ	22%	11%	67%
[kɯ - ré - son]	クレ ¹ ソン	89%	0%	11%
[sa - fuí - ran]	サフ ¹ ラン	100%	0%	0%
[kɟɯ - rá - so:]	キュラ ¹ ソー	100%	0%	0%
[do - rá - ma:]	ドラ ¹ マー	33%	22%	45%

Thirdly, what was the accent placement of the words with the syllable pattern [L] [H] [L] [H]?

For the words with the accent on the second mora as the only placement in the *NHK*, the most frequent accent placement was on the first mora, except for two words [to - rí?- pɯ] and [ri - bé?- to]. For these words, the most frequent accent placement was on the second mora, but only by slightly more than half of the subjects (see Table 4.13).

Table 4.13

Accent on the Second Mora as the Only Choice [L] [H] [L]

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[je - rá?- kɯ]	シェラ ¹ ック	78%	22%	0%
[to - rí?- kɯ]	トリ ¹ ック	67%	33%	0%
[to - rí?- pɯ]	トリ ¹ ップ	44%	56%	0%
[ba - ké?- to]	バケ ¹ ット	56%	33%	11%
[ba - ré?- kɯ]	バラ ¹ ック	56%	33%	11%
[pi - ké?- to]	ピケ ¹ ット	89%	11%	0%
[pi - kó?- to]	ピコ ¹ ット	78%	22%	0%
[ri - bé?- to]	リベ ¹ ット	33%	56%	11%
[ma - rá?- ka]	マラ ¹ ッカ	78%	22%	0%

For the words with the syllable pattern [L] [H] [L] with the accent on the second mora as the first choice and on the first mora as the secondary choice in the *NHK*, 16 words out of 31 received the most frequent accent placement on the first mora. The other

15 words received the most frequent accent placement on the second mora (see Table 4.14).

Table 4.14

Two Possible Accent Position; Second Mora as the Primary Choice [L] [H] [L]

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[e - p ^ó ?- kw]	エボ ¹ ック	67%	33%	0%
[ka - j ^á ?- kw]	カヤ ¹ ック	78%	22%	0%
[ka - r ^á ?- to]	カラ ¹ ット	56%	44%	0%
[kw - r ^í ?- pw]	クリ ¹ ップ	33%	67%	0%
[ke - t ^á ?- pw]	ケチャ ¹ ップ	44%	56%	0%
[go - j ^í ?- kw]	ゴシ ¹ ック	78%	22%	0%
[go - j ^í ?- pw]	ゴシ ¹ ップ	44%	56%	0%
[ko - nj ^á ?- kw]	コニヤ ¹ ック	78%	22%	0%
[sw - í?- tji]	スイ ¹ ッチ	67%	33%	0%
[sw - r ^í ?- pw]	スリ ¹ ップ	22%	78%	0%
[so - k ^é ?- to]	ソケ ¹ ット	56%	44%	0%
[ta - r ^á ?- pw]	タラ ¹ ップ	67%	33%	0%
[to - r ^ó ?- to]	トロ ¹ ット	44%	56%	0%
[do - r ^ó ?- pw]	ドロ ¹ ップ	56%	44%	0%
[ba - k ^é ?- to]	バケ ¹ ット	56%	22%	22%
[pa - r ^é ?- to]	パレ ¹ ット	78%	22%	0%
[ba - r ^ó ?- kw]	バロ ¹ ック	67%	33%	0%
[bi - j ^ó ?- pw]	ビショ ¹ ップ	67%	33%	0%
[po - k ^é ?- to]	ポケ ¹ ット	22%	78%	0%
[re - g ^á ?- ta]	レガ ¹ ッタ	33%	67%	0%
[ro - k ^é ?- to]	ロケ ¹ ット	22%	78%	0%
[ke - b ^é ?- kw]	ケベ ¹ ック	89%	11%	0%

[mo - ró?- ko]	モロ ¹ ッコ	56%	44%	0%
[tʃa - rén- dʒi]	チャレ ¹ ンジ	33%	67%	0%
[i - mé:- dʒi]	イメ ¹ ージ	33%	67%	0%
[ga - ré:- dʒi]	ガレ ¹ ージ	22%	78%	0%
[ʃe - pá:- do]	シェパ ¹ ード	56%	44%	0%
[da - mé:- dʒi]	ダメ ¹ ージ	22%	78%	0%
[ba - rá:- do]	バラ ¹ ード	0%	89%	11%
[ba - rá:- do]	パレ ¹ ード	44%	56%	0%
[re - kó:- do]	レコ ¹ ード	0%	100%	0%

Although the ratio between the accent placement on the first mora and on the second mora was almost even, an interesting phenomenon was found through the results of the words with the heavy syllable with the long vowel. In the table above, the words with this type are highlighted. Interestingly, most of these, except for one word [ʃe - pá:- do], had the most frequent accent placement on the second mora.

Fourth and finally, did the subjects place the accent on the first mora for the four-mora loanwords that have two possible choices of accent position (the first choice of accent on the first mora and the secondary choice on the second mora) in the *NHK*?

Because the accent placements shown in the dictionary are the accent placements that were hypothesized, the accent should be placed on the first mora. However, there are some words that have the most frequent placement on the second mora. Among these words for the two words with the syllable pattern [L] [H] [L], [ró - bo? - to] and [ʃí - ri: - zu], most subjects placed the accent on the second mora (see Table 4.16).

Table 4.16

Result of Words with Two Possible Accent Positions; First Mora as the Primary Choice

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[má - tʃi - ne:]	マ ¹ チネー	33%	44%	23%
[ró - boʔ - to]	ロ ¹ ボット	11%	89%	0%
[ʃí - ri - zu]	シ ¹ リーズ	0%	100%	0%

Furthermore, for some words, most subjects pronounced the word with the accent on the first mora although some subjects pronounced the word with no accent (see Table 4.17). Again, that the most frequent accent placement on the words with the syllable type [L] [L] [L] [L] in the corpus analysis was no accent reveals the lack of accent on the words [kí - ri - ba - su] and [só - bi - e - to].

Table 4.17

Result of Words with Two Possible Accent Positions; First Mora as the Primary Choice

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[kí - ri - ba - su]	キ ¹ リバス	78%	0%	22%
[só - bi - e - to]	ソ ¹ ビエト	56%	33%	11%
[tʃá - pu - su]	チャ ¹ プスイ	56%	33%	11%
[dʒá - keʔ - to]	ジャ ¹ ケット	56%	0%	44%
[juí - niʔ - to]	ユ ¹ ニット	78%	0%	22%

Additional Analysis

One interesting phenomenon that emerged from the experimental data was the tendency for subjects to place the accent on the second mora for words with the syllable pattern [L] [H] [L]. The three types of heavy syllables were the following:

- A syllable consisting of any sequence of two morea which has the second mora as either [ʔ], [N]
- A syllable consisting of a long vowel V[:]
- A syllable consisting of diphthongs according to the sonority hierarchy scale.

The subjects had a tendency of having the accent on the second mora for the heavy syllable of the second type, those with long vowels. Let us look at the words with [L] [H] [L] with the heavy syllable consisting of a long vowel (see Table 4.18).

Table 4.18

Result of Word with Syllable Pattern [L] [H] [L] with Long Vowels

Loanwords in IPA	Japanese Character	Subject Placed Accent on the First Mora	Subject Placed Accent on the Second Mora	No Accent
[i - mé:- dʒi]	イメージ	33%	67%	0%
[ga - ré:- dʒi]	ガレッジ	22%	78%	0%
[je - pá:- do]	シェパード	56%	44%	0%
[da - mé:- dʒi]	ダメージ	22%	78%	0%
[ba - rá:- do]	バラード	0%	89%	11%
[pa - ré:- do]	パレード	44%	56%	0%
[re - kó:- do]	レコード	0%	100%	0%
[ʃí - ri: - zu]	シリーズ	0%	100%	0%

Javkin (1977) examined the perceptual basis of vowel duration differences associated with the voiced/voiceless distinction. Comparing the longer duration of vowels before voiced consonants with their duration before voiceless consonant in English, Javkin (1977, p.65) conducted an experiment, with the following hypothesis: “the fact that one of the characteristics of the vowel, voicing, continues into the consonant, might make the vowel appear to be longer than if voicing abruptly ended.” Javkin showed that even vowels of the same duration are perceived as longer if followed by a voiced consonant. Javkin hypothesized that this phenomenon led listeners to learn to produce vowels with longer duration if they are followed by voiced consonants than if they are followed by voiceless consonants.

A similar phenomenon might occur with vowels followed by glottal stop (Lehiste, 1970). Taking into consideration the vowel duration as the result of receiving the accent on the heavy mora of the word with the syllable pattern [L] [H] [L], the vowel length of [H] with a long vowel should have a longer duration than [H] with a glottal stop. This reveals that the four-mora loanwords with the syllable pattern [L] [H] [L] in which the heavy syllable has a long vowel perceived to be longer than the [L] [H] [L] in which the heavy syllable has a glottal stop. Therefore, it is essential that words with the syllable pattern [L] [H] [L] with the heavy syllable as a long vowel [ʃi - ri - zu] receive the accent on the heavy syllable, while words with this syllable pattern with the heavy syllable as a glottal stop [go - ʃiʔ - ku] tend to have the accent on the first mora. Another way of describing this phonological perception is that the antepenultimate accent

rule applies to long loanwords and the accent placement on the first mora applies to short loanwords.

With this consideration, let us measure the duration of the word

[ʃi - ri: - zʷ] with its long vowel and [go - ʃiʔ - kʷ] with its glottal stop. The example images were taken from one of the subjects (see Figure 4.2).

Figure 4.2

Duration of [i:] in [ʃi - ri: - zʷ] and [ʔ] in [go - ʃiʔ - kʷ]

The duration of the word [ʃi - ri: - zʷ] is about 0.7 seconds, and the duration of the word [go - ʃiʔ - kʷ] is about 0.6 seconds. This illustrates that the duration of [ʃi - ri: - zʷ] is longer than that of [go - ʃiʔ - kʷ].

Summary

According to the corpus analysis, the more frequent accent placement of four-mora loanwords with the syllable pattern [L] [L] [L] [L] was on the first mora. This supported Inaba's accent rule of loanwords. However, the data from the corpus analysis shows that some of the four-mora loanwords which have the accent on the second mora might be accented on the first mora by native speakers of standard Japanese. The experiment was conducted to test whether native speakers of standard Japanese place the accent on the first mora of the target words. The result reveals that more subjects placed the accent on the first mora of most of the target words. Subjects also placed the accent on the first mora for the loanwords with the syllable pattern [L] [H] [H]. Furthermore, the words with the syllable pattern [L] [H] [L] with the heavy syllable as a long vowel frequently received the accent on the heavy mora which is the second mora.

Chapter 5

Conclusion

In the previous four sections, Japanese accent placement has been discussed from different perspectives. In the first section, the pitch pattern of native Japanese words was described using the notions of “mora” and “syllable.” Japanese is a pitch accent language where the position of pitch falling, corresponds to the accent position, yet no accent rules for Native Japanese or Sino Japanese are found, while the pitch pattern can be predicted after knowing the accent position.

In the second section, the three rules of accent placement for loanwords: Traditional Accent Rule (1998), McCawley's Accent Rule (1968) and Inaba's Accent Rule (2005b), were introduced and each was evaluated. Each rule determines the accent rule based on different units: “mora,” “syllable,” and “foot.” From these evaluations of the three accent rules, Inaba's theory seems to apply best for loanwords of five or more moras, yet a contradictory result appeared in the accent placement of four-mora loanwords with the syllable pattern [L] [L] [L] [L] between these, McCawley's Accent Rule and Inaba's Accent Rule.

To investigate the contradiction between the results from McCawley's Accent Rule and Inaba's Accent Rule, a corpus analysis of *NHK* (1998) for all loanwords which consist of four-mora was performed. A corpus analysis showed the default accent position, in other words the most frequent accent placement in each syllable pattern. The default positions were considered for the syllable pattern [H] [H], [H] [L] [L] and [L] [L]

[H] to be on the first mora, for [L] [H] [L] on the second mora, and for [L] [L] [L] [L], no accent. Regarding the most frequent accent position for the pattern [L] [L] [L] [L] being no accent, the more frequent accent position between words with the accent on the first mora and on the second mora was examined. The result showed that for the pattern [L] [L] [L] [L] the accent on the first mora is the default accent type.

Finally, an experiment was conducted with native speakers of standard Japanese to see their accent placement on some loanwords which diverged from *NHK* (1998). Under the hypothesis, subjects should be able to find the accent position on the first mora for the four-mora loanwords in the given test words. The result reveals that more subjects placed the accent on the first mora of the words not only with the syllable pattern [L] [L] [L] [L] and [L] [L] [H], but also with the pattern [L] [H] [L].

In conclusion, the default accent positions which are the most and more frequent accent positions showed that Inaba's rule best leads to these positions among the three principles. Furthermore, the experiment demonstrated the tendency for the native standard Japanese speakers to place the accent on the first mora for four-mora loanwords. Therefore, it might be the case that native speakers of standard Japanese place the accent on the first mora for unknown words which have the syllable type [L] [L] [L] [L] due to the possibility of four-mora loanwords being considered short words. Furthermore, my conclusion regarding the accent placement of four-mora loanwords is that a native speaker might recognize a four-mora with [L] [H] [L], for example the word [goʃiʔkw], as a short word and place the accent on the first mora, in spite of the second mora being the default accent position for the pattern [L] [H] [L].

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Appendix A

Testing Three Antepenultimate Rules with Different Syllable Patterns

Mora#	Syllable Pattern	word	Japanese	Traditional	McCawley	Inaba
3	[L] [L] [L]	[dórama]	ド [↑] ラマ	○	○	○
3	[H] [L]	[sóngu]	ソ [↑] ング	○	○	○
3	[L] [H]	[mítón]	ミ [↑] トン	○	○	T.D.
4	[H] [H]	[hjuí:man]	ヒュ [↑] ーマン	×	○	○
4	[H] [L] [L]	[fántomw]	ファ [↑] ントム	×	○	○
4	[L] [L] [H]	[mérodi:]	メ [↑] ロディー	×	×	○
4	[L] [L] [H]	[aséton]	アセ [↑] トン	○	○	×
4	[L] [L] [L] [L]	[kárwuterw]	カ [↑] ルテル	×	×	○
4	[L] [L] [L] [L]	[aréguwo]	アレ [↑] グロ	○	○	×
4	[L] [H] [L]	[oréndzi]	オレ [↑] ンジ	○	○	○
4	[L] [H] [L]	[hámingw]]	ハ [↑] ミング	×	×	T.D.
5	[L] [L] [H] [L]	[tjokoré:to]	チョコレ [↑] ート	○	○	○
5	[H] [L] [H]	[ajfádo:]	アイシャ [↑] ドー	○	○	×
6	[H] [H] [H]	[konpjú:ta:]	コンピュ [↑] ーター	×	○	○
6	[L] [L] [H] [H]	[operé:ta:]	オペレ [↑] ーター	×	○	○
6	[H] [L] [L] [H]	[konpánion]	コンパ [↑] ニオン	×	×	○
7	[H] [L] [L] [L] [L] [L]	[o:swutorária]	オーストラ [↑] リア	○	○	○

Traditional: Traditional Accent Rule
 McCawley: McCawley's Accent Rule
 Inaba: Inaba's Accent Rule
 T.D.: Top-down

Appendix B

Script for Corpus Analysis

```
#!/perl

$total = 0;
$succeeded = 0;
$noAccent = 0;
$failed = 0;

# load the matchWords from file
open(fileIN,"matchWords1.txt") or die("Cannot open matchWords.txt: $!");
@matchWords1 = <fileIN>;
close(fileIN);
foreach $line (@matchWords1) {
    chomp($line);
    # total number of words evaluated
    $total++;
    print "$total: $line\n";
}

# load the matchWords from file
open(fileIN,"matchWords_yayuyo1.txt") or die("Cannot open matchWords.txt: $!");
@matchWords2 = <fileIN>;
close(fileIN);
$total = 0;
foreach $line (@matchWords2) {
    chomp($line);
    # total number of words evaluated
    $total++;
    print "$total: $line\n";
}

#read the data file
use encoding "euc-jp";
open(fileIN,"4mora_loanword_Edot.txt") or die("Cannot open data.txt: $!");
@logData = <fileIN>;
close(fileIN);
$total = 0;
$excluded = 0;
$qualifiednodot = 0;
$position1 = 0;
$position2 = 0;
```

```

$position3 = 0;

foreach $line (@logData) {
    chomp($line);
    #remove hidden tab char
    $line =~ s/\t//g;
    # total number of words evaluated
    $total++;
    print "$total: $line ";

    if ($line =~ $matchWords1[0]) {
        print "contains $matchWords1[0], excluded.";
        $excluded++;
    } elsif ($line =~ $matchWords1[1]) {
        print "contains $matchWords1[1], excluded.";
        $excluded++;
    } elsif ($line =~ $matchWords1[2]) {
        print "contains $matchWords1[2], excluded.";
        $excluded++;
    } else {
        #create a temp string without the small char
        $temp = $line;
        $temp =~ s/$matchWords2[0]//g;
        $temp =~ s/$matchWords2[1]//g;
        $temp =~ s/$matchWords2[2]//g;
        $temp =~ s/$matchWords2[3]//g;
        $temp =~ s/$matchWords2[4]//g;
        $temp =~ s/$matchWords2[5]//g;
        $temp =~ s/$matchWords2[6]//g;

        print " [$temp] ";

        $position = index($temp, '.');

        if ($position == -1) {
            print " no '.' found.";
            $qualifiednodot++;
        } elsif ($position == 1) {
            print " position: $position";
            push(@position1, $line);
            $position1++;
        } elsif ($position == 2) {
            print " position: $position";
            push(@position2, $line);
        }
    }
}

```

```

        $position2++;
    }elseif ($position == 3) {
        print " position: $position";
        push(@position3, $line);
        $position3++;
    } else {
        print " position: " . $position;
    }
}
print "\n";
}

print "\n";
print "Total in the file=$total\n";
print "\n";

print "SUMMARY\n";
print "Excluded=$excluded\n";
print "Qualified word, but no dot=$qualifiednodot\n";
print "One=$position1\n";
print "Two=$position2\n";
print "Three=$position3\n";
print "Total=" . ($excluded+$qualifiednodot+$position1+$position2+$position3) . "\n";

print "=====\n";
print "ONE- $position1\n";
foreach $element(@position1)
{
    print "$element\n";
}
print "=====\n";
print "TWO- $position2\n";
foreach $element(@position2)
{
    print "$element\n";
}
print "=====\n";
print "THREE- $position3\n";
foreach $element(@position3)
{
    print "$element\n";
}

```

Output

Total in the file=1474

SUMMARY

Excluded=1077

Qualified word, but no dot=222

One=100

Two=69

Three=6

Total=1474

ONE- 100

ア.いディア

ア.いテム

ア.いドル

ア.いリス

ア.くセス

ア.くセル

ア.くティブ

ア.トラス

ア.ドレス

ア.ニマル

ア.パレル

イ.ディオム

オ.アレス

オ.ふいシャル

カ.くテル

カ.ジュアル

カ.すタム

カ.ふセル

カ.ラフル

カ.リエス

カ.ルテル

キャ.ピタル

コ.コナツ

コ.スモス

コ.ミカル

サ.いクル

サ.くセス

シ.グナル
シ.システム
シ.ニカル
シ.ノニム
シ.ラブ
シ.リアス
タ.イトル
タ.フネス
ダ.ブルス
チャ.プスイ
ティ.ピカル
テ.キサス
テ.キスト
デ.ジタル
デ.シベル
ド.クトル
ナ.チュラル
ネ.イティブ
ネ.ガティブ
ネ.クタ
バ.イブル
パ.ステル
バ.チルス
パ.ピルス
パ.ラソル
び.クルス
ビ.ジネス
ビ.ジュアル
ピ.リオド
ブ.ギウギ
ペ.ガサス
ベ.クトル
ヘ.ルペス
ヘ.ルメス
ポ.ジティブ
ホ.ステス
ホ.ステル
ホ.スピス
ホ.チキス

マ.イルド
ミ.ディアム
ミ.ニマム
ミ.ネラル
ミ.ラクル
ム.ニエル
メ.ディカル
モ.ノラル
ラ.いバル
ラ.いフル
ラ.クロス
ラ.ジカル
リ.ベラル
リ.リカル
ロ.ジカル
ロ.すトル
ア.ルザス
ア.ルプス
カ.いバル
カ.フカス
キ.プロス
キ.リバス
ザ.グレブ
ス.リナム
セ.ネガル
セ.レベス
ソ.ビエト
チ.グリス
テ.キサス
バ.いカル
ビ.リニユス
ポ.ツダム
ホ.ルムズ
マ.ラウイ

=====

TWO- 69

アシ.すト
アダ.ルト
アナ.ナス

アバ.ウト
ウイ.ルス
クラ.ふト
クレ.バス
ゲバ.ルト
コミュ.ニケ
サディ.ズム
サファ.イア
すカ.ウト
すク.イズ
すク.ラム
すケ.ルツォ
すタ.イル
すタ.ウト
すト.レス
すパ.イク
すパ.イス
すペ.シャル
すポ.イル
スマ.イル
スラ.イス
セレ.クト
ソリ.すト
タバ.すコ
チェリ.すト
チェレ.すタ
テア.トル
デフオ.ルメ
デリ.シャス
トナ.カイ
ドラ.いブ
トラ.すト
ドラ.ふト
トラ.ブル
トリ.プル
トロ.いか
トロ.いデ
ナチ.ズム
パエ.リエ

パパ.いア
パプ.リカ
ハレ.ルヤ
ピロ.しキ
フィヨ.ルド
プラ.イス
ブラ.ウス
プリ.ズム
ブレ.すト
プロ.セス
マズ.ルカ
ミサ.イル
メサ.いア
モザ.イク
リタ.いア
リラ.イト
レプ.リカ
ロベ.リア
ウイ.グル
オハ.イオ
クラ.クフ
シア.トル
ジャカ.ルタ
プリ.マス
ブル.ネイ
マナ.グア
ラバ.ウル

THREE- 6
アプリ.ケ
デいケ.ア
ピザパ.い
へアダ.い
れいオ.フ
デラウエ.ア

Appendix C

A Story That Frame Sentence was Extracted From

「日本語で____と発音される言葉はどういう意味ですか。」

“In Japanese, what is the meaning of the word pronounced as _____?”

日本では多くの外来語が使われている。

“The Japanese language adopted many loanwords from various countries.”

しかし、それらの外来語が使われた場合、日本語の音声学上の特徴を含んで発音されることが往々にしてある。

“However, the pronunciation that Japanese people use often differs from the pronunciation in the original language because of Japanese phonological characteristics.”

それ故、発音の違いから、外国人が自国の言葉を知らない言葉と思い、日本人に

「日本語で____と発音される言葉はどういう意味ですか。」

と聞き、「それは日本語ではなくもともとはあなたの国の言葉ですよ。」と言われ、意味を理解した際、苦笑してしまうことも少なくない。

“For that reason, foreigners often do not recognize the loanwords used in Japanese and ask Japanese speakers, ‘In Japanese, what is the meaning of the word pronounced as _____?’ After finding out that it was actually a word from their country, they often laugh in response.”

たとえば、「マクドナルド」は日本語の発音では、[makudonarudo]と発音されるが、これをアメリカ人が聞くと、理解できないことがよくある。これは日本語の音声学の特徴で子音の後に母音を置くことから、本来の[mæk dɑːnɑld]と違って聞こえるためである。

“For example, Mc Donald’s (pronounced as [mæk dɑːnɑld] in English) is one of the most famous fast food restaurants in Japan, yet the pronunciation of the name in Japanese would be [makudonarudo] because the most common Japanese syllable type is

Consonant followed by a Vowel . When the English speaker listens to this word, they barely understand what that means.”

Appendix D

Experimental Test Words

Table D.1

Three-mora Loanwords for the Experiment

Loanwords in IPA	Japanese Character	Loanwords in IPA	Japanese Character
[í - ɔn]	イ ¹ オン	[fó:- mɯ]	フォ ¹ ーム
[ó - zɔn]	オ ¹ ゾン	[pó - e - mɯ]	ポ ¹ エム
[gáí - do]	ガ ¹ イド	[má - sɯ - to]	マ ¹ スト
[ké - to - rɯ]	ケ ¹ トル	[mí- ton]	ミ ¹ トン
[sá - rɔn]	サ ¹ ロン	[mé - in]	メ ¹ イン
[táí - kw]	タ ¹ ック	[mó:- do]	モ ¹ ード
[tjá - pe - rɯ]	チャ ¹ ペル	[juí? - ka]	ユ ¹ ッカ
[dó: - mɯ]	ド ¹ ーム	[rí - sɯ - kw]	リ ¹ スク
[ná - ɸɯ - sa]	ナ ¹ フサ	[rɯ' - a:]	ル ¹ アー
[ní: - zɯ]	ニ ¹ ーズ	[ré - dʒa:]	レ ¹ ジャー
[nuí- ga:]	ヌ ¹ ガー	[gá: - na]	ガ ¹ ーナ
[nó - zɯ - rɯ]	ノ ¹ ズル	[háí - tʃi]	ハ ¹ イチ
[pá - rɯ - sɯ]	パ ¹ ルス	[bé - nin]	ベ ¹ ニン
[pí: - sɯ]	ピ ¹ ース		

Table D.2

Four-mora Loanwords for the Experiment

Loanwords in IPA	Japanese Character	Loanwords in IPA	Japanese Character
[aí - kon]	アイコン	[ní - ke- rɯ]	ニッケル
[ran - tan]	ランタ ¹ ン	[rín - ne - rɯ]	リンネル
[to: - kí:]	トー ¹ キー	[san - da - rɯ]	サンダル
[é: - te - rɯ]	エーテル	[ka: - so - rɯ]	カーソル
[tʃen - ba - ro]	チェンバロ	[de - ra - wé - a]	デラウエ ¹ ア

Table D.3

Five-mora Loanwords for the Experiment

Loanwords in IPA	Japanese Character	Loanwords in IPA	Japanese Character
[aŋ - tí: - kɯ]	アンティーク	[ma - dʒo - ri - ti:]	マジョリティー
[ɯ - éi - ta:]	ウエイター	[jo: - gw - ru - to]	ヨーグルト
[o - ku - tá: - bu]	オクターブ	[ri - a - ri - zu - mu]	リアリズム
[sa - mo - wá: - ru]	サモワール	[rei - áu - to]	レイアウト
[bi - bu - rá - to]	ビブラート	[san - má - ri - no]	サンマリノ
[hoi? - su - ru]	ホイッスル	[ba: - ré: - n]	バーレーン

Table D.4

Six-mora Loanwords for the Experiment

Loanwords in IPA	Japanese Character	Loanwords in IPA	Japanese Character
[a - ni - mé: - {oŋ}]	アニメーション	[noŋ - fi - ku - {oŋ}]	ノンフィクション
[o - pe - ré: - ta:]	オペレーター	[bi - n - ná: - ru]	ビエンナール
[ku - ri - é - tá:]	クリエーター	[me - ta - se - koi - ja]	メタセコイヤ
[sa: - fu - bó: - do]	サーフボード	[mo - no - ku - ró: - mu]	モノクローム
[dʒe - ne - ré: - {oŋ}]	ジェネレーション	[ju: - ti - ri - ti:]	ユーティリティー
[su - ta: - dá - su - to]	スターダスト	[ai - su - rán - do]	アイスランド
[seŋ - sé: - {oŋ}]	センセーション	[ka - za - fu - su - tan]	カザフスタン
[na - bi - gé: - ta:]	ナビゲーター		

Table D.5

Seven-mora Loanwords for the Experiment

Loanwords in IPA	Japanese Character	Loanwords in IPA	Japanese Character
[i - ma - dʒi - ne: - ʃon]	イマジネーション	[nuí - be - ru - bá: - gw]	ヌーベルバーグ
[wi: - ku - éɳ - do]	ウィークエンド	[pa: - so - ná - ri - ti:]	パーソナリティ
[o: - ba: - ó: - ru]	オーバーオール	[a - ze - ru - bá: - dʒan]	アゼルバイジャン
[ko: - di - né: - ta:]	コーディネーター	[nu: - dʒi: - rán - do]	ニュージーランド
[de - so - mi - né: - ʃon]	デソミネーション		

Table D.6

Eight-mora Loanwords for the Experiment

Loanwords in IPA	Japanese Character	Loanwords in IPA	Japanese Character
[i - ra - su - to - ré: - ta:]	イラストレーター	[wan - da: - fó: - ge - ru]	ワンダーフォーゲル
[faj - ba: - su - kó - pu]	ファイバースコップ	[to - ri - ni - da: - do - to - ba - go]	トリニダードトバゴ
[maj - ku - ro - wé: - bu]	マイクロウェーブ	[to - ru - ku - me - ní - su - tan]	トルクメニスタン

Appendix E

Experimental Result with Pitch Measurement (Hz)

Table E.1

Subject 1: Accent on the Second Mora as an Only Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[a - ná - na - sw̥]	アナ ¹ ナス	232.48	2340.6	
[dʒa - ka - rw̥ - ta]	ジャカ ¹ ルタ	---	---	---
[te - á - to - rw̥]	テア ¹ トル	274.24	243.15	
[pw̥ - rí - ma - sw̥]	プリ ¹ マス	254.64	241.83	
[ma - ná - gw̥ - a]	マナ ¹ グア	---	---	---
[a - sé - ton]	アセ ¹ トン	247.24	243.15	
[ka - ná - kin]	カナ ¹ キン	---	---	---
[ki - ró - ton]	キロ ¹ トン	289.82	263.36	
[ʃi - tó - ron]	シト ¹ ロン	330	307.3	
[to - bí - rin]	トビ ¹ リン	254.69	236.74	
[ra - nó - rin]	ラノ ¹ リン	262.25	260.3	
[ʃe - ráʔ - kw̥]	シェラ ¹ ック	258.44	250.14	
[to - ríʔ - kw̥]	トリ ¹ ック	255.6	242.73	
[to - ríʔ - pw̥]	トリ ¹ ップ	258.44	250.14	
[ba - kéʔ - to]	バケ ¹ ット	186.22	242.54	200.64
[ba - ráʔ - kw̥]	バラ ¹ ック	237.23	223.1	
[p̥j - kéʔ - to]	ピケ ¹ ット	280	252.13	
[p̥j - kóʔ - to]	ピコ ¹ ット	280	258.4	
[ri - béʔ - to]	リベ ¹ ット	198.57	229.1	160.72
[ma - ráʔ - ka]	マラ ¹ ッカ	261.57	240.67	

Table E.2

Subject 1: Accent on the Second Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[de - rí - ʃa - sw]	デリ ¹ シャス	196.53	248.42	217.71
[to - rí - pw - rw]	トリ ¹ ブル	262.96	245.38	
[ʃi - á - to - rw]	シア ¹ トル	270.53	247.12	
[bw - rwí - neɪ]	ブル ¹ ネイ	242.94	223.17	
[kw - ré - son]	クレ ¹ ソン	275.49	245.91	
[sa - φuí - ran]	サフ ¹ ラン	248.73	205.65	
[kjuw - rá - so:]	キュラ ¹ ソー	275.67	242.64	
[do - rá - ma:]	ドラ ¹ マー	245.84	224.78	
[e - póʔ - kuɸ]	エポ ¹ ック	270.37	247.99	
[ka - jáʔ - kw]	カヤ ¹ ック	267.05	202.54	
[ka - ráʔ - to]	カラ ¹ ット	186.63	238	165.21
[kw - ríʔ - puɸ]	クリ ¹ ップ	200.73	261.62	200.77
[ke - tʃáʔ - puɸ]	ケチャ ¹ ップ	185.26	241.91	198.84
[go - ʃíʔ - kuɸ]	ゴシ ¹ ック	249.42	218.7	
[go - ʃíʔ - puɸ]	ゴシ ¹ ップ	175.39	246.08	205.58
[ko - njáʔ - kuɸ]	コニヤ ¹ ック	279.03	188.3	
[sw - íʔ - tʃi]	スイ ¹ ッチ	207.56	245.22	208.87
[sw - ríʔ - pw]	スリ ¹ ップ	210.04	253.78	207
[so - kéʔ - to]	ソケ ¹ ット	181.19	243.31	187.28
[ta - ráʔ - pw]	タラ ¹ ップ	263.51	236.36	
[to - róʔ - to]	トロ ¹ ット	207.77	253.68	185.5
[do - róʔ - pw]	ドロ ¹ ップ	251.97	241.84	
[ba - géʔ - to]	バゲ ¹ ット	179.33	210.5	181.87
[pa - réʔ - to]	パレ ¹ ット	275.84	247.94	
[ba - róʔ - kw]	バロ ¹ ック	236.8	218.23	
[bi - ʃóʔ - pw]	ビショ ¹ ップ	243.21	222.59	
[po - kéʔ - to]	ポケ ¹ ット	180.36	237.26	159.45
[re - gáʔ - ta]	レガ ¹ ッタ	188.65	222.28	150.21
[ro - kéʔ - to]	ロケ ¹ ット	203.38	274.38	203.38
[ke - béʔ - kw]	ケベ ¹ ック	261.24	222.13	
[mo - róʔ - ko]	モロ ¹ ッコ	259.63	249.44	

[tʃa - rén - dʒi]	チャレンジ	200.04	244.9	147.5
[i - mé: - dʒi]	イメージ	187.92	261.49	171.83
[ga - ré: - dʒi]	ガレッジ	182.22	236.39	153.77
[ʃe - pá: - do]	シェパード	262.84	233.28	
[da - mé: - dʒi]	ダメージ	187.16	242.48	170.49
[ba - rá: - do]	バラード	188.61	232.14	181.08
[pa - ré: - do]	パレード	192.51	241.92	168.15
[re - kó: - do]	レコード	206.02	280.62	198.62

Table E.3

Subject 1: Accent on the First Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[ó - a - ʃi - sw]	オアシス	262.46	232.73	
[kí - ri - ba - sw]	キリバス	269.21	251.63	
[té - ki - sw - to]	テキスト	257.52	227.44	
[só - bi - e - to]	ソビエト	196.19	230.17	243.38
[tʃa - pɯ - suʃi]	チャプスイ	210.77	241.13	220.95
[tʃé - a - man]	チェアマン	258.15	208.38	
[dó - ra - gon]	ドラゴン	253.53	220.55	
[tó - ru - en]	トルエン	210.29	245.69	196.14
[mé - ga - ton]	メガトン	244.43	214.5	
[mé - ga - hon]	メガホン	250.28	244.18	
[fi - ri - pin]	フィリピン	268.99	247.52	
[ré - ba - non]	レバノン	253.74	240.04	
[ó - re - gon]	オレゴン	259.8	244.85	
[á - be - njw:]	アベニュー	209	195.59	
[suʃi - ma:]	スイマー	269.87	237.59	
[má - tʃi - ne:]	マチネー	183.22	226.9	228.33
[bá - kan - sw]	バカンス	280.62	245.8	
[buʃ - ran - ko]	ブランコ	246.28	230.44	
[ró - man - sw]	ロマンス	261.74	230.36	
[é - piʔ - kw]	エピック	241.67	215.7	
[ká - poʔ - kw]	カボック	244.72	217.11	

[kjuí - ro? - to]	キュ ¹ ロット	271.98	228.02	
[kó - ko - na - tsu]	コ ¹ コナツ	271.59	242.89	
[kó - ro? - ke]	コ ¹ ロッケ	265.88	247.32	
[dʒá - ke? - to]	ジャ ¹ ケット	---	---	---
[jí - ro? - pu]	シ ¹ ロップ	265.56	233.29	
[su - rí? - pa]	ス ¹ リップ	257.74	215.38	
[dé - ni? - ju]	デ ¹ ニッシュ	263.68	242.24	
[to - pí? - kw]	ト ¹ ピック	263.04	245.7	
[tó - ro? - ko]	ト ¹ ロッコ	262.91	229.31	
[pá - do? - kw]	パ ¹ ドック	262.22	222.19	
[pá - ni? - kw]	パ ¹ ニック	261.79	222.13	
[buí - ti? - kw]	ブ ¹ ティック	261.03	244.05	
[pó - je? - to]	ポ ¹ シェット	256.87	229.92	
[má - dʒi? - kw]	マ ¹ ジック	182.85	228.82	172.33
[juí - mi? - to]	ユ ¹ ニット	241.56	218.03	
[ró - dʒi? - kw]	ロ ¹ ジック	252.74	244.49	
[ró - bo? - to]	ロ ¹ ボット	195.33	244.39	162.04
[é - tju: - do]	エ ¹ チュード	247.26	226.25	
[jí - ri: - zu]	シ ¹ リーズ	185.64	246.4	152.64
[tó - pa: - zu]	ト ¹ パーズ	267.74	218.06	

Table E.4

Subject 2: Accent on the Second Mora as an Only Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[a - ná - na - su]	アナ ¹ ナス	259.31	312.77	243.59
[dʒa - ka - ru - ta]	ジャカ ¹ ルタ	---	---	---
[te - á - to - ru]	テア ¹ トル	345.53	323.81	
[pu - rí - ma - su]	プリ ¹ マス	364.16	312.8	
[ma - ná - gu - a]	マナ ¹ グア	0	0	
[a - sé - ton]	アセ ¹ トン	339.03	175.4	
[ka - ná - kin]	カナ ¹ キン	---	---	---
[ki - ró - ton]	キロ ¹ トン	392.59	341.74	
[ji - tó - ron]	シト ¹ ロン	384.99	345.92	

[to - bí - rin]	トビ ¹ リン	322.89	296.33	
[ra - nó - rin]	ラノ ¹ リン	349.5	312.54	
[ʃe - ráʔ - kw]	シェラ ¹ ック	317.1	296.07	
[to - ríʔ - kw]	トリ ¹ ック	336.38	332.33	
[to - ríʔ - pw]	トリ ¹ ップ	326.28	171.65	
[ba - kéʔ - to]	バケ ¹ ット	302.24	145.79	
[ba - ráʔ - kw]	バラ ¹ ック	281.97	281.31	
[pɪ - kéʔ - to]	ピケ ¹ ット	376.87	284.8	
[pɪ - kóʔ - to]	ピコ ¹ ット	254.94	347.72	224.18
[ri - béʔ - to]	リベ ¹ ット	243.54	314.03	264.69
[ma - ráʔ - ka]	マラ ¹ ッカ	220.82	267.31	247.16

Table E.5

Subject 2: Accent on the Second Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[de - rí - ʃa - sw]	デリ ¹ シャス	245.55	294.57	291.9
[to - rí - pw - rw]	トリ ¹ プル	336.47	262.93	
[ʃi - á - to - rw]	シア ¹ トル	342.3	260.48	
[bw - ruí - neɪ]	ブル ¹ ネイ	376.06	324.11	
[kw - ré - son]	クレ ¹ ソン	329.74	323.23	
[sa - φuí - ran]	サフ ¹ ラン	341.39	325.53	
[kjw - rá - so:]	キュラ ¹ ソー	375.29	340.48	
[do - rá - ma:]	ドラ ¹ マー	322.57	251.16	
[e - póʔ - kw]	エポ ¹ ック	330.72	306.7	
[ka - jáʔ - kw]	カヤ ¹ ック	336.32	324.66	
[ka - ráʔ - to]	カラ ¹ ット	301.5	284.94	
[kw - ríʔ - pw]	クリ ¹ ップ	282.81	333.27	289.81
[ke - tʃáʔ - pw]	ケチャ ¹ ップ	361.73	327.27	
[go - ʃíʔ - kw]	ゴシ ¹ ック	335.66	299.66	
[go - ʃíʔ - pw]	ゴシ ¹ ップ	321.61	298.03	
[ko - njáʔ - kw]	コニヤ ¹ ック	339.39	298.93	
[sw - íʔ - tʃi]	スイ ¹ ッチ	364.51	355.53	
[sw - ríʔ - pw]	スリ ¹ ップ	325.76	317.66	

[so - ké? - to]	ソケット	347.32	316.24	
[ta - rá? - pw]	タラップ	311.37	285.73	
[to - ró? - to]	トロット	335.75	312.85	
[do - ró? - pw]	ドロップ	294.25	346.81	223.44
[ba - gé? - to]	バゲット	300.73	275.23	
[pa - ré? - to]	パレット	333.45	315.09	
[ba - ró? - kw]	バロック	290.33	276.21	
[bi - jó? - pw]	ビショップ	238.71	319.79	202.57
[po - ké? - to]	ポケット	317.33	286.48	
[re - gá? - ta]	レガッタ	235.25	300.38	246.75
[ro - ké? - to]	ロケット	286.49	270.43	
[ke - bé? - kw]	ケベック	372.72	329.43	
[mo - ró? - ko]	モロッコ	279.61	223.31	
[tʃa - rén - dʒi]	チャレンジ	341.58	318.18	
[i - mé: - dʒi]	イメージ	237.4	333.43	251.65
[ga - ré: - dʒi]	ガレージ	324.62	291.46	
[ʃe - pá: - do]	シェパード	363.05	311.28	
[da - mé: - dʒi]	ダメージ	221.62	303.63	267.82
[ba - rá: - do]	バラード	244.12	326.51	273.73
[pa - ré: - do]	パレード	272.51	350.55	267.9
[re - kó: - do]	レコード	251.47	314.88	251.36

Table E.6

Subject 2: Accent on the First Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[ó - a - ʃi - sw]	オアシス	328.35	313.51	
[kí - ri - ba - sw]	キリバス	309.2	294.09	
[té - ki - sw - to]	テキスト	343.76	161.2	
[só - bi - e - to]	ソビエト	366.13	327.57	
[tʃa - pw - swí]	チャプスイ	326.55	162.96	
[tʃé - a - man]	チェアマン	335.81	316.33	
[dó - ra - gon]	ドラゴン	314.99	262.33	
[tó - rw - en]	トルエン	---	---	---

[mé - ga - ton]	メ ^ㇿ ガトン	259.44	233.57	
[mé - ga - hon]	メ ^ㇿ ガホン	313.92	284.69	
[fi - ri - pin]	フィ ^ㇿ リピン	366.47	330.79	
[ré - ba - non]	レ ^ㇿ バノン	340.25	323.33	
[ó - re - gon]	オ ^ㇿ レゴン	312.05	274.61	
[á - be - njw:]	ア ^ㇿ ベニュー	341.57	307.09	
[suí - ma:]	ス ^ㇿ イマー	341.26	313.69	
[má - tji - ne:]	マ ^ㇿ チネー	228.51	315.52	263.09
[bá - kan - sw]	バ ^ㇿ カンス	346.5	307.88	
[buí - ran - ko]	ブ ^ㇿ ランコ	277.88	321.42	239.01
[ró - man - sw]	ロ ^ㇿ マンズ	296.73	285.5	
[é - pi? - kw]	エ ^ㇿ ピック	341.59	297.95	
[ká - po? - kw]	カ ^ㇿ ポック	322.13	283.47	
[kjuí - ro? - to]	キュ ^ㇿ ロット	336.83	318.3	
[kó - ko - na - tsu]	コ ^ㇿ コナツ	300.51	269.23	
[kó - ro? - ke]	コ ^ㇿ ロッケ	369.72	353.32	
[dzá - ke? - to]	ジャ ^ㇿ ケット	321.9	291.5	
[ji - ro? - pw]	シ ^ㇿ ロップ	359.01	333.67	
[sw - ri? - pa]	ス ^ㇿ リップ	258.39	287.87	213.12
[dé - ni? - jw]	デ ^ㇿ ニッシュ	315.2	279.1	
[to - pí? - kw]	ト ^ㇿ ピック	364.09	396.75	
[tó - ro? - ko]	ト ^ㇿ ロッコ	338.86	327.95	
[pá - do? - kw]	パ ^ㇿ ドック	312.47	154.82	
[pá - ni? - kw]	パ ^ㇿ ニック	364.72	331.1	
[buí - ti? - kw]	ブ ^ㇿ ティック	329.58	310.79	
[pó - je? - to]	ポ ^ㇿ シェット	314.01	277.3	
[má - dzi? - kw]	マ ^ㇿ ジック	330.77	314.99	
[juí - mi? - to]	ユ ^ㇿ ニット	347.03	313.72	
[ró - dzi? - kw]	ロ ^ㇿ ジック	336.75	264.51	
[ró - bo? - to]	ロ ^ㇿ ボット	341.02	298.21	
[é - tju: - do]	エ ^ㇿ チュード	225.44	337.57	253.07
[ji - ri: - zw]	シ ^ㇿ リーズ	274.72	346.17	305.43
[tó - pa: - zw]	ト ^ㇿ パーズ	342.14	205.29	

Table E.7

Subject 3: Accent on the Second Mora as an Only Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[a - ná - na - sw̥]	アナ ¹ ナス	235.05	227.01	
[dʒa - ka - rw̥ - ta]	ジャカ ¹ ルタ	---	---	---
[te - á - to - rw̥]	テア ¹ トル	251.45	249.96	
[pw̥ - rí - ma - sw̥]	プリ ¹ マス	292.8	239.94	
[ma - ná - gw̥ - a]	マナ ¹ グア	202.18	225.74	214.36
[a - sé - ton]	アセ ¹ トン	300.62	270.69	
[ka - ná - kin]	カナ ¹ キン	244.29	231.1	
[ki - ró - ton]	キロ ¹ トン	306.43	250.55	
[ʃi - tó - ron]	シト ¹ ロン	270.03	252.12	
[to - bí - rin]	トビ ¹ リン	268.26	217.45	
[ra - nó - rin]	ラノ ¹ リン	204	198.72	
[ʃe - ráʔ - kw̥]	シェラ ¹ ック	245.31	225.09	
[to - ríʔ - kw̥]	トリ ¹ ック	218.26	246.48	148.72
[to - ríʔ - pw̥]	トリ ¹ ップ	284.61	229.09	
[ba - kéʔ - to]	バケ ¹ ット	245.62	240.06	
[ba - ráʔ - kw̥]	バラ ¹ ック	197.07	234.34	213.04
[p̥i - kéʔ - to]	ピケ ¹ ット	237.27	217.82	
[p̥i - kóʔ - to]	ピコ ¹ ット	196.5	250.15	185.04
[ri - béʔ - to]	リベ ¹ ット	256.91	248.06	
[ma - ráʔ - ka]	マラ ¹ ッカ	200.06	234.79	75.39

Table E.8

Subject 3: Accent on the Second Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[de - rí - ʃa - sw̥]	デリ ¹ シャス	202.04	242.32	210.95
[to - rí - pw̥ - rw̥]	トリ ¹ プル	251.92	234.38	
[ʃi - á - to - rw̥]	シア ¹ トル	241.35	233.82	
[bw̥ - ruí - neɪ]	ブル ¹ ネイ	207.33	226.29	180.43
[kw̥ - ré - son]	クレ ¹ ソン	265.55	232.04	

[sa - φύ - ran]	サフ ¹ ラン	261.81	224.8	
[kjuw - rá - so:]	キュラ ¹ ソー	271.29	259.73	
[do - rá - ma:]	ドラ ¹ マー	---	---	---
[e - pó? - ku]	エポ ¹ ック	154.59	245.46	168.66
[ka - já? - ku]	カヤ ¹ ック	261.36	229.84	
[ka - rá? - to]	カラ ¹ ット	221.92	254.06	202.87
[kw - rí? - pu]	クリ ¹ ップ	233.67	272.71	180.3
[ke - tjá? - pu]	ケチャ ¹ ップ	277.41	235.23	
[go - jí? - ku]	ゴシ ¹ ック	251.1	145.69	
[go - jí? - pu]	ゴシ ¹ ップ	204.59	262.8	214.7
[ko - njá? - ku]	コニヤ ¹ ック	272.42	235.86	
[sw - í? - ti]	スイ ¹ ッチ	267.98	238.75	
[sw - rí? - pu]	スリ ¹ ップ	221.89	250.03	219.41
[so - ké? - to]	ソケ ¹ ット	230.49	254.92	221.49
[ta - rá? - pu]	タラ ¹ ップ	275.13	252.44	
[to - ró? - to]	トロ ¹ ット	216.03	260.55	141.11
[do - ró? - pu]	ドロ ¹ ップ	208.01	241.13	146.63
[ba - gé? - to]	バゲ ¹ ット	240.79	229.99	
[pa - ré? - to]	パレ ¹ ット	269.52	240.91	
[ba - ró? - ku]	バロ ¹ ック	201.75	251.49	204.62
[bi - jó? - pu]	ビショ ¹ ップ	243.68	205.82	
[po - ké? - to]	ポケ ¹ ット	153.2	251.59	150.63
[re - gá? - ta]	レガ ¹ ッタ	255.04	218.42	
[ro - ké? - to]	ロケ ¹ ット	201.52	276.59	200.19
[ke - bé? - ku]	ケベ ¹ ック	259.59	234.45	
[mo - ró? - ko]	モロ ¹ ッコ	284.74	247.8	
[tja - rén - dzi]	チャレ ¹ ンジ	209.78	244.24	223.8
[i - mé: - dzi]	イメ ¹ ージ	241.69	217.19	
[ga - ré: - dzi]	ガレ ¹ ージ	247.49	220.69	
[je - pá: - do]	シェパ ¹ ード	209.82	253.24	184.24
[da - mé: - dzi]	ダメ ¹ ージ	193.05	246.12	200.49
[ba - rá: - do]	バラ ¹ ード	190.05	246.34	182.79
[pa - ré: - do]	パレ ¹ ード	265.16	235.36	
[re - kó: - do]	レコ ¹ ード	194.12	266.58	185.27

Table E.9

Subject 3: Accent on the First Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[ó - a - ʃi - sw]	オ ¹ アシス	238.89	232.35	
[kí - ri - ba - sw]	キ ¹ リバス	304.09	243.53	
[té - ki - sw - to]	テ ¹ キスト	277.48	245.82	
[só - bi - e - to]	ソ ¹ ビエト	260.48	217.74	
[tʃa - pw - suʃi]	チャ ¹ プスイ	222.89	185.85	
[tʃé - a - man]	チェ ¹ アマン	236.19	249.6	186.92
[dó - ra - gon]	ド ¹ ラゴン	223.59	197.65	
[tó - rw - en]	ト ¹ ルエン	216.13	268.24	221.58
[mé - ga - ton]	メ ¹ ガトン	242.48	231.99	
[mé - ga - hon]	メ ¹ ガホン	278.88	256.77	
[fí - ri - pin]	フィ ¹ リピン	270.04	238.67	
[ré - ba - non]	レ ¹ バノン	234.76	218.06	
[ó - re - gon]	オ ¹ レゴン	257.89	237.57	
[á - be - njw:]	ア ¹ ベニュー	231.49	207.84	
[suʃi - ma:]	ス ¹ イマー	248.77	210.95	
[má - tʃi - ne:]	マ ¹ チネー	205.92	181.44	
[bá - kan - sw]	バ ¹ カンス	245.58	229.71	
[bwí - ran - ko]	ブ ¹ ランコ	269.99	247.98	
[ró - man - sw]	ロ ¹ マンズ	247.47	209.74	
[é - pi? - kw]	エ ¹ ピック	228.69	160.27	
[ká - po? - kw]	カ ¹ ポック	251.63	228.43	
[kjuí - ro? - to]	キュ ¹ ロット	266.31	221.06	
[kó - ko - na - tsu]	コ ¹ コナツ	285.73	217.68	
[kó - ro? - ke]	コ ¹ ロッケ	274.51	236.1	
[dʒá - ke? - to]	ジャ ¹ ケット	---	---	---
[ʃí - ro? - pw]	シ ¹ ロップ	292.5	257.03	
[sw - rí? - pa]	ス ¹ リップ	292.91	250	
[dé - ni? - ʃw]	デ ¹ ニッシュ	237.73	211.44	
[to - pí? - kw]	ト ¹ ピック	260.56	241.9	
[tó - ro? - ko]	ト ¹ ロッコ	237.37	258.47	194.73
[pá - do? - kw]	パ ¹ ドック	256.99	224.82	

[pá - ni? - kw]	パ ¹ ニック	267.26	247.33	
[buí - ti? - kw]	ブ ¹ ティック	217.12	137.83	
[pó - [e? - to]	ポ ¹ シエット	280.28	226.95	
[má - dʒi? - kw]	マ ¹ ジック	241.42	219.26	
[juí - mi? - to]	ユ ¹ ニット	254.32	215.91	
[ró - dʒi? - kw]	ロ ¹ ジック	244.15	211.09	
[ró - bo? - to]	ロ ¹ ボット	214.46	278.14	205
[é - tʃw: - do]	エ ¹ チュード	304.26	228.72	
[ʃi - ri: - zw]	シ ¹ リーズ	234.73	223.93	
[tó - pa: - zw]	ト ¹ パーズ	276.98	258.04	

Table E.10

Subject 4: Accent on the Second Mora as an Only Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[a - ná - na - sw]	アナ ¹ ナス	230.65	216.49	
[dʒa - ka - rw - ta]	ジャカ ¹ ルタ	196.58	237.86	211.01
[te - á - to - rw]	テア ¹ トル	276.66	262.33	
[pw - rí - ma - sw]	プリ ¹ マス	244.18	218.96	
[ma - ná - gw - a]	マナ ¹ グア	---	---	---
[a - sé - ton]	アセ ¹ トン	254.73	229.48	
[ka - ná - kin]	カナ ¹ キン	---	---	---
[ki - ró - ton]	キロ ¹ トン	252.68	227.41	
[ʃi - tó - ron]	シト ¹ ロン	254.29	224.06	
[to - bí - rin]	トビ ¹ リン	237.81	225.72	
[ra - nó - rin]	ラノ ¹ リン	---	---	---
[e - rá? - kw]	シェラ ¹ ック	251.36	210.88	
[to - rí? - kw]	トリ ¹ ック	242.01	220.66	
[to - rí? - pw]	トリ ¹ ップ	231.15	253.93	217.22
[ba - ké? - to]	バケ ¹ ット	---	---	---
[ba - rá? - kw]	バラ ¹ ック	---	---	---
[pɿ - ké? - to]	ピケ ¹ ット	243.56	213.34	
[pɿ - kó? - to]	ピコ ¹ ット	267.78	202.56	

[ri - bé? - to]	リベ ¹ ット	---	---	---
[ma - rá? - ka]	マラ ¹ ッカ	217.54	228.63	205.13

Table E.11

Subject 4: Accent on the Second Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[de - rí - {a - sw}]	デリ ¹ シャス	206.24	234.74	204.23
[to - rí - pw - rw]	トリ ¹ プル	---	---	---
[ji - á - to - rw]	シア ¹ トル	255.41	232.97	
[bw - ruí - nei]	ブル ¹ ネイ	---	---	---
[kw - ré - son]	クレ ¹ ソン	264.87	228.16	
[sa - φuí - ran]	サフ ¹ ラン	256.8	237.97	
[kjuw - rá - so:]	キュラ ¹ ソー	262.73	241.61	
[do - rá - ma:]	ドラ ¹ マー	---	---	---
[e - pó? - ku]	エポ ¹ ック	108.77	228.22	204.34
[ka - já? - kw]	カヤ ¹ ック	213.01	229.14	192.87
[ka - rá? - to]	カラ ¹ ット	209.28	223.11	197.06
[kw - rí? - pu]	クリ ¹ ップ	243.75	235.93	
[ke - t{á? - pu]	ケチャ ¹ ップ	212.93	242.83	204.75
[go - jí? - ku]	ゴシ ¹ ック	214.45	230.74	201.88
[go - jí? - pu]	ゴシ ¹ ップ	200.33	234.68	191
[ko - njá? - ku]	コニヤ ¹ ック	216.04	237.93	214.99
[sw - í? - tji]	スイ ¹ ッチ	251.05	215.49	
[sw - rí? - pw]	スリ ¹ ップ	233.65	250.42	243.56
[so - ké? - to]	ソケ ¹ ット	248.82	227.55	
[ta - rá? - pw]	タラ ¹ ップ	---	---	---
[to - ró? - to]	トロ ¹ ット	212.44	242.05	198.91
[do - ró? - pw]	ドロ ¹ ップ	213.35	231.32	203.28
[ba - gé? - to]	バゲ ¹ ット	---	---	---
[pa - ré? - to]	パレ ¹ ット	262.78	246.52	
[ba - ró? - kw]	バロ ¹ ック	233.79	213.21	
[bi - {ó? - pw]	ビショ ¹ ップ	211.66	249.39	209.69
[po - ké? - to]	ポケ ¹ ット	212.04	246.2	201.97

[re - gá? - ta]	レガ ¹ ッタ	202.17	219.67	198.51
[ro - ké? - to]	ロケ ¹ ット	219.71	283.78	209.17
[ke - bé? - kw]	ケベ ¹ ック	264.57	222.65	
[mo - ró? - ko]	モロ ¹ ッコ	218.94	246.24	207.33
[tʃa - rén - dʒi]	チャレ ¹ ンジ	236.14	218.36	
[i - mé: - dʒi]	イメ ¹ ージ	246.39	222.01	
[ga - ré: - dʒi]	ガレ ¹ ージ	207.58	234.69	199.01
[ʃe - pá: - do]	シェパ ¹ ード	211.19	237.46	206.44
[da - mé: - dʒi]	ダメ ¹ ージ	216.1	207.77	
[ba - rá: - do]	バラ ¹ ード	---	---	---
[pa - ré: - do]	パレ ¹ ード	244.68	221.78	
[re - kó: - do]	レコ ¹ ード	214.27	243.78	199.01

Table E.12

Subject 4: Accent on the First Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[ó - a - ʃi - sw]	オ ¹ アシス	243.77	230.53	
[kí - ri - ba - sw]	キ ¹ リバス	270.9	239.57	
[té - ki - sw - to]	テ ¹ キスト	269.38	243.85	
[só - bi - e - to]	ソ ¹ ビエト	250.22	237.95	
[tʃa - pɯ - suʃi]	チャ ¹ プスイ	243.75	211.67	
[tʃé - a - man]	チェ ¹ アマン	270.14	225.38	
[dó - ra - gon]	ド ¹ ラゴン	229.08	210.29	
[tó - ru - en]	ト ¹ ルエン	254.55	218.92	
[mé - ga - ton]	メ ¹ ガトン	228.86	217.2	
[mé - ga - hon]	メ ¹ ガホン	256.51	220.28	
[fi - ri - pin]	フィ ¹ リピン	260.39	235.43	
[ré - ba - non]	レ ¹ バノン	247.52	219.17	
[ó - re - gon]	オ ¹ レゴン	240.32	219.6	
[á - be - njɯ:]	ア ¹ ベニユー	236.19	220.64	
[suʃi - ma:]	ス ¹ イマー	247.01	215.67	
[má - tʃi - ne:]	マ ¹ チネー	209.01	230.91	201.12
[bá - kan - sw]	バ ¹ カンス	231.99	213.86	

[buí - ran - ko]	ブ ¹ ランコ	243.62	228.95	
[ró - man - sw]	ロ ¹ マンス	238.21	224.21	
[é - pi? - ku]	エ ¹ ピック	212.12	256.85	196.03
[ká - po? - ku]	カ ¹ ポック	204.46	242.43	208.57
[kjuí - ro? - to]	キュ ¹ ロット	231.26	238.99	191.57
[kó - ko - na - tsu]	コ ¹ コナツ	255.79	231.15	
[kó - ro? - ke]	コ ¹ ロッケ	243.5	230.91	
[dʒá - ke? - to]	ジャ ¹ ケット	220.81	210.34	
[ʃí - ro? - pu]	シ ¹ ロップ	260.91	233.99	
[sw - rí? - pa]	ス ¹ リップ	249.62	236.19	
[dé - ni? - ʃu]	デ ¹ ニッシュ	214.85	234.6	196.12
[to - pí? - ku]	ト ¹ ピック	301.26	245.92	
[tó - ro? - ko]	ト ¹ ロッコ	219.4	231.91	207.65
[pá - do? - ku]	パ ¹ ドック	---	---	---
[pá - ni? - ku]	パ ¹ ニック	267	235.81	
[buí - ti? - ku]	ブ ¹ ティック	241.78	230.09	
[pó - ʃe? - to]	ポ ¹ シェット	228.9	255.68	209.04
[má - dʒi? - ku]	マ ¹ ジック	206.42	244.57	183
[juí - mi? - to]	ユ ¹ ニット	235.15	231.92	
[ró - dʒi? - ku]	ロ ¹ ジック	242.48	219.77	
[ró - bo? - to]	ロ ¹ ボット	205.89	242.19	205.29
[é - tʃu: - do]	エ ¹ チュード	244.98	223.05	
[ʃí - ri: - zu]	シ ¹ リーズ	220.16	246.91	95.64
[tó - pa: - zu]	ト ¹ パーズ	246.7	230.06	

Table E.13

Subject 5: Accent on the Second Mora as an Only Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[a - ná - na - su]	アナ ¹ ナス	300.19	243.43	
[dʒa - ka - ru - ta]	ジャカ ¹ ルタ	---	---	---
[te - á - to - ru]	テア ¹ トル	306.95	266.64	
[pu - rí - ma - su]	ブリ ¹ マス	336.35	322.41	
[ma - ná - gu - a]	マナ ¹ グア	---	---	---

[a - sé - ton]	アセ ¹ トン	314.9	286.59	
[ka - ná - kin]	カナ ¹ キン	324.81	297.46	
[ki - ró - ton]	キロ ¹ トン	332.77	290.8	
[ʃi - tó - ron]	シト ¹ ロン	255.23	322.03	227.11
[to - bí - rin]	トビ ¹ リン	339.66	244.36	
[ra - nó - rin]	ラノ ¹ リン	311.62	249.55	
[ʃe - ráʔ - ku]	シェラ ¹ ック	300.76	246.26	
[to - ríʔ - ku]	トリ ¹ ック	319.22	250.81	
[to - ríʔ - pu]	トリ ¹ ップ	329.97	285.56	
[ba - kéʔ - to]	バケ ¹ ット	276.67	247.29	
[ba - ráʔ - ku]	バラ ¹ ック	288.55	260.82	
[pi - kéʔ - to]	ピケ ¹ ット	295.05	249.45	
[pi - kóʔ - to]	ピコ ¹ ット	218.06	303.35	200.89
[ri - béʔ - to]	リベ ¹ ット	309.66	291.91	
[ma - ráʔ - ka]	マラ ¹ ッカ	318.13	266.14	

Table E.14

Subject 5: Accent on the Second Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[de - rí - ʃa - sw]	デリ ¹ シャス	202.57	286.56	203.3
[to - rí - pu - ru]	トリ ¹ プル	348.71	331.15	
[ʃi - á - to - ru]	シア ¹ トル	318.22	273.8	
[bu - ruí - ne]	ブル ¹ ネイ	211.61	265.25	168.34
[ku - ré - son]	クレ ¹ ソン	305.71	269.73	
[sa - ɸuí - ran]	サフ ¹ ラン	307.19	246.24	
[kju - rá - so:]	キュラ ¹ ソー	311.16	278.62	
[do - rá - ma:]	ドラ ¹ マー	294.38	265.85	
[e - póʔ - ku]	エポ ¹ ック	202.63	246.95	173.05
[ka - ʃáʔ - ku]	カヤ ¹ ック	316.86	268.11	
[ka - ráʔ - to]	カラ ¹ ット	313.75	264.49	
[ku - ríʔ - pu]	クリ ¹ ップ	321.02	275.42	
[ke - tʃáʔ - pu]	ケチャ ¹ ップ	216.4	291.16	227.25
[go - ʃíʔ - ku]	ゴシ ¹ ック	294.58	264.27	

[go - ʃí? - pɯ]	ゴシッ プ	225.37	311.66	221.21
[ko - nǵá? - kɯ]	コニャッ ク	323.76	275.54	
[su - í? - tʃi]	スイッ チ	325.31	270.73	
[su - rí? - pɯ]	スリッ プ	218.53	302.06	182
[so - ké? - to]	ソケッ ト	294.44	243.75	
[ta - rá? - pɯ]	タラッ プ	300.99	250.71	
[to - ró? - to]	トロッ ト	298.35	277.14	
[do - ró? - pɯ]	ドロッ プ	342.01	281.48	
[ba - gé? - to]	バゲッ ト	314.15	290.36	
[pa - ré? - to]	パレッ ト	307.65	261.87	
[ba - ró? - kɯ]	バロッ ク	304.19	268.31	
[bi - ʃó? - pɯ]	ビショッ プ	297.33	228.56	
[po - ké? - to]	ポケッ ト	236.43	286.67	
[re - gá? - ta]	レガッ タ	288.88	263.8	
[ro - ké? - to]	ロケッ ト	294.54	270.33	
[ke - bé? - kɯ]	ケベッ ク	305.79	296.83	
[mo - ró? - ko]	モロッ コ	322.24	269.96	
[tʃa - rén - dʒi]	チャレ ンジ	276.58	254.17	
[i - mé: - dʒi]	イメ ージ	201.72	285.79	178.31
[ga - ré: - dʒi]	ガレ ージ	228.15	292.38	163.86
[ʃe - pá: - do]	シェパ ード	283.66	238.48	
[da - mé: - dʒi]	ダメ ージ	196.36	300.64	202.53
[ba - rá: - do]	バラ ード	192.47	310.42	194.36
[pa - ré: - do]	パレ ード	194.69	298.93	164.56
[re - kó: - do]	レコ ード	199.04	318.35	244.81

Table E.15

Subject 5: Accent on the First Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[ó - a - ʃi - su]	オ ア シ ス	327.64	252.69	
[kí - ri - ba - su]	キ リ バ ス	327.14	282.3	
[té - ki - su - to]	テ キ ス ト	269.46	249.69	
[só - bi - e - to]	ソ ビ エ ト	296.96	271.91	

[tʃa - pɯ - suʃi]	チャップスイ	203.7	302.38	223.79
[tʃé - a - man]	チェアマン	207.62	282.6	165.54
[dó - ra - gon]	ドラゴン	297.59	255.18	
[tó - ru - en]	トルエン	313.83	250.89	
[mé - ga - ton]	メガトン	340.74	285.56	
[mé - ga - hon]	メガホン	361.06	225.69	
[fi - ri - pin]	フィリピン	339.74	247.01	
[ré - ba - non]	レバノン	321.34	303.61	
[ó - re - gon]	オレゴン	314.92	263.1	
[á - be - njw:]	アベニュー	259.71	228.07	
[suʃi - ma:]	スイマー	278.58	258.46	
[má - tʃi - ne:]	マチネー	208.01	296.8	228.26
[bá - kan - sw]	バカンス	262.56	237.19	
[buí - ran - ko]	ブランコ	311.42	297.46	
[ró - man - sw]	ロマンス	284.2	216.87	
[é - pi? - kw]	エピック	324.67	296.16	
[ká - po? - kw]	カポック	185.93	271.63	171.08
[kjuí - ro? - to]	キューロット	370.3	285.24	
[kó - ko - na - tsu]	ココナツ	308.03	280.01	
[kó - ro? - ke]	コロッケ	300.89	243.69	
[dʒá - ke? - to]	ジャケット	307.65	257.06	
[ʃi - ro? - pu]	シロップ	331.49	313.43	
[sw - rí? - pa]	スリッパ	331.89	266.65	
[dé - ni? - ʃu]	デニッシュ	310.7	258.42	
[to - pí? - kw]	トピック	306.05	265.76	
[tó - ro? - ko]	トロッコ	321.42	279.39	
[pá - do? - kw]	パドック	345.29	312.78	
[pá - ni? - kw]	パニック	284.54	232.37	
[buí - ti? - kw]	ブティック	278.34	230.96	
[pó - ʃe? - to]	ボッシュェット	305.48	246.06	
[má - dʒi? - kw]	マジック	288.87	255.25	
[juí - mi? - to]	ユニット	312.13	244.82	
[ró - dʒi? - kw]	ロジック	204.43	309.13	198
[ró - bo? - to]	ロボット	195.37	271.73	147.02

[é - tʃw: - do]	エ ¹ チュード	279.47	222.6	
[ʃí - ri: - zw]	シ ¹ リーズ	222.56	306.36	179.13
[tó - pa: - zw]	ト ¹ パーズ	355.27	261.4	

Table E.16

Subject 6: Accent on the Second Mora as an Only Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[a - ná - na - sw]	アナ ¹ ナス	157	146.21	
[dʒa - ka - rw - ta]	ジャカ ¹ ルタ	---	---	---
[te - á - to - rw]	テア ¹ トル	147.43	135.63	
[pw - rí - ma - sw]	プリ ¹ マス	163.39	153.29	
[ma - ná - gw - a]	マナ ¹ グア	---	---	---
[a - sé - ton]	アセ ¹ トン	152.91	137.53	
[ka - ná - kin]	カナ ¹ キン	160.14	137.17	
[ki - ró - ton]	キロ ¹ トン	172.14	149.21	
[ʃi - tó - ron]	シト ¹ ロン	159.77	145.89	
[to - bí - rin]	トビ ¹ リン	161.83	147.12	
[ra - nó - rin]	ラノ ¹ リン	153.76	138.78	
[ʃe - ráʔ - kw]	シェラ ¹ ック	159.04	146.96	
[to - ríʔ - kw]	トリ ¹ ック	160.7	154.01	
[to - ríʔ - pw]	トリ ¹ ップ	127.53	159.46	126.87
[ba - kéʔ - to]	バケ ¹ ット	147.2	130.45	
[ba - ráʔ - kw]	バラ ¹ ック	148.87	139.1	
[pɿ - kéʔ - to]	ピケ ¹ ット	161.55	147.4	
[pɿ - kóʔ - to]	ピコ ¹ ット	172.34	154.25	
[ri - béʔ - to]	リベ ¹ ット	167.11	152.17	
[ma - ráʔ - ka]	マラ ¹ ッカ	104.34	155.08	114.78

Table E.17

Subject 6: Accent on the Second Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[de - rí - ʃa - sw]	デリ ¹ シャス	112.26	143.23	140.21
[to - rí - pw - rw]	トリ ¹ ブル	137.67	153.09	132.01
[ʃi - á - to - rw]	シア ¹ トル	160.56	147.9	
[bw - rwí - nei]	ブル ¹ ネイ	---	---	---
[kw - ré - son]	クレ ¹ ソン	183.07	165.77	
[sa - ɸwí - ran]	サフ ¹ ラン	154.63	125.6	
[kju - rá - so:]	キュラ ¹ ソー	167.7	152.47	
[do - rá - ma:]	ドラ ¹ マー	116.84	138.87	111.97
[e - pó? - ku]	エボ ¹ ック	167.36	155.84	
[ka - já? - kw]	カヤ ¹ ック	168.17	147.12	
[ka - rá? - to]	カラ ¹ ット	165.65	151.29	
[kw - rí? - pu]	クリ ¹ ップ	132.1	154.1	125.87
[ke - tʃá? - pu]	ケチャ ¹ ップ	171.49	158.22	
[go - ʃí? - ku]	ゴシ ¹ ック	149.02	134.38	
[go - ʃí? - pu]	ゴシ ¹ ップ	153.53	143.36	
[ko - njá? - ku]	コニヤ ¹ ック	160.27	141.88	
[sw - í? - tʃi]	スイ ¹ ッチ	160.9	148.09	
[sw - rí? - pw]	スリ ¹ ップ	165.76	151.48	
[so - ké? - to]	ソケ ¹ ット	172.77	156.45	
[ta - rá? - pw]	タラ ¹ ップ	152.42	142.64	
[to - ró? - to]	トロ ¹ ット	154.45	134.15	
[do - ró? - pw]	ドロ ¹ ップ	115.1	137.98	107.35
[ba - gé? - to]	バゲ ¹ ット	140.26	123.02	
[pa - ré? - to]	パレ ¹ ット	164.9	157.05	
[ba - ró? - kw]	バロ ¹ ック	153.86	142.31	
[bi - ʃó? - pw]	ビショ ¹ ップ	171.54	152.9	
[po - ké? - to]	ポケ ¹ ット	127.18	150.05	132.12
[re - gá? - ta]	レガ ¹ ッタ	153.83	135.4	
[ro - ké? - to]	ロケ ¹ ット	126.23	160.98	135.43
[ke - bé? - kw]	ケベ ¹ ック	165.01	150.75	
[mo - ró? - ko]	モロ ¹ ッコ	151.34	136.44	

[tʃa - rén - dʒi]	チャレ ^ン ジ	122.81	149.86	104.68
[i - mé: - dʒi]	イメ ^ー ジ	161.65	143.83	
[ga - ré: - dʒi]	ガレ ^ー ジ	113.67	144.86	117.59
[ʃe - pá: - do]	シェパ ^ー ード	161.96	143.29	
[da - mé: - dʒi]	ダメ ^ー ジ	144.9	132.94	
[ba - rá: - do]	バラ ^ー ード	117.8	142.93	113.18
[pa - ré: - do]	パレ ^ー ード	166.25	151.92	
[re - kó: - do]	レコ ^ー ード	117.44	162.78	104.78

Table E.18

Subject 6: Accent on the First Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[ó - a - ʃi - sw]	オ ^ー アシス	157.38	137.53	
[ki - ri - ba - sw]	キ ^ー リバス	---	---	---
[té - ki - sw - to]	テ ^ー キスト	---	---	---
[só - bi - e - to]	ソ ^ー ビエト	158.6	138.16	
[tʃa - pu - suʃi]	チャ ^ー プスイ	129.28	101.25	138.31
[tʃé - a - man]	チェ ^ー アマン	158.05	132.31	
[dó - ra - gon]	ド ^ー ラゴン	145.89	121.44	
[tó - ru - en]	ト ^ー ルエン	160.07	122.02	
[mé - ga - ton]	メ ^ー ガトン	145.12	138.56	
[mé - ga - hon]	メ ^ー ガホン	162.08	145.08	
[fi - ri - pin]	フィ ^ー リピン	169.64	161.02	
[ré - ba - non]	レ ^ー バノン	161.99	140.48	
[ó - re - gon]	オ ^ー レゴン	156.58	123.83	
[á - be - njw:]	ア ^ー ベニュー	141.09	121.26	
[suʃi - ma:]	ス ^ー イマー	165.2	149.06	
[má - tʃi - ne:]	マ ^ー チネー	138.06	122.5	
[bá - kan - sw]	バ ^ー カンス	147.07	137.18	
[buí - ran - ko]	ブ ^ー ランコ	168.14	141.28	
[ró - man - sw]	ロ ^ー マンズ	149.2	137.26	
[é - pi? - ku]	エ ^ー ピック	147.89	139.41	
[ká - po? - ku]	カ ^ー ポック	160.26	144.9	

[kjuú - ro? - to]	キューロット	181.3	163.04	
[kó - ko - na - tsu]	コナツ	154.71	146.58	
[kó - ro? - ke]	コロッケ	165.68	150.63	
[dʒá - ke? - to]	ジャケット	---	---	---
[ʃí - ro? - pu]	シロップ	166.29	147.43	
[su - rí? - pa]	スリッパ	175.65	170.9	
[dé - ni? - ʃu]	デニッシュ	147.71	138.09	
[to - pí? - ku]	トピック	168.78	149.62	
[tó - ro? - ko]	トロッコ	162.99	153.19	
[pá - do? - ku]	パドック	157.01	138.4	
[pá - ni? - ku]	パニック	164.72	147.58	
[buí - ti? - ku]	ブティック	170.77	151.52	
[pó - ʃe? - to]	ポシェット	179.15	145.61	
[má - dʒi? - ku]	マジック	121.62	141.62	113.67
[juú - mi? - to]	ユニット	---	---	---
[ró - dʒi? - ku]	ロジック	144.33	135.2	
[ró - bo? - to]	ロボット	123.99	149.04	110.42
[é - tʃu: - do]	エチュード	157.57	131.39	
[ʃí - ri: - zu]	シリーズ	125.65	158	133
[tó - pa: - zu]	トパーズ	154.43	125.89	

Table E.19

Subject 7: Accent on the Second Mora as an Only Position

Four-mora Loanword	Japanese	First mora	Second mora	Third mora
[a - ná - na - su]	アナナス	142.71	210.85	192.4
[dʒa - ka - ru - ta]	ジャカルタ	---	---	---
[te - á - to - ru]	テアトル	---	---	---
[pu - rí - ma - su]	ブリマス	209.28	173.87	
[ma - ná - gu - a]	マナグア	---	---	---
[a - sé - ton]	アセトン	---	---	---
[ka - ná - kin]	カナキン	210.23	171.4	
[ki - ró - ton]	キロトン	233.89	182.03	
[ʃi - to - ron]	シトロン	177.65	202.83	171.94

[to - bí - rin]	トビ ¹ リン	225.99	173.5	
[ra - nó - rin]	ラノ ¹ リン	212.81	176.3	
[ʃe - ráʔ - kw]	シェラ ¹ ック	141.46	180.99	113.25
[to - ríʔ - kw]	トリ ¹ ック	137.57	208.39	124.08
[to - ríʔ - pw]	トリ ¹ ップ	153.09	208.58	109.91
[ba - kéʔ - to]	バケ ¹ ット	159.74	192.85	141.25
[ba - ráʔ - kw]	バラ ¹ ック	120.23	168.95	154.92
[pɿ - kéʔ - to]	ピケ ¹ ット	245.23	197.79	
[pɿ - kóʔ - to]	ピコ ¹ ット	229	144.35	
[ri - béʔ - to]	リベ ¹ ット	120.13	184	149.02
[ma - ráʔ - ka]	マラ ¹ ッカ	120.73	169.41	138.04

Table E.20

Subject 7: Accent on the Second Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[de - rí - ʃa - sw]	デリ ¹ シャス	136.51	223.44	203.2
[to - rí - pw - rw]	トリ ¹ プル	154.96	229.54	173.06
[ʃi - á - to - rw]	シア ¹ トル	205.51	190.38	
[bw - ruí - neɪ]	ブル ¹ ネイ	---	---	---
[kw - ré - son]	クレ ¹ ソン	265.57	203.88	
[sa - φuí - ran]	サフ ¹ ラン	214.45	203.47	
[kɰw - rá - so:]	キュラ ¹ ソー	266.85	234.5	
[do - rá - ma:]	ドラ ¹ マー	123.76	193.65	158.13
[e - póʔ - kw]	エポ ¹ ック	171.44	208.01	143.78
[ka - jáʔ - kw]	カヤ ¹ ック	154.44	195.75	160.37
[ka - ráʔ - to]	カラ ¹ ット	176.36	202.59	177.46
[kw - ríʔ - pw]	クリ ¹ ップ	195.19	234.25	214.2
[ke - tʃáʔ - pw]	ケチャ ¹ ップ	197.99	392.05	253.35
[go - ʃíʔ - kw]	ゴシ ¹ ック	201.76	197.35	
[go - ʃíʔ - pw]	ゴシ ¹ ップ	191.27	158.82	
[ko - njáʔ - kw]	コニヤ ¹ ック	223.7	187.53	
[sw - íʔ - tʃi]	スイ ¹ ッチ	137.88	205.8	149.59
[sw - ríʔ - pw]	スリ ¹ ップ	147.39	201.28	145.35

[so - ké? - to]	ソケット	14.42	209.71	96.75
[ta - rá? - pw]	タラップ	147.6	179.29	101.94
[to - ró? - to]	トロット	160.95	207.69	170.66
[do - ró? - pw]	ドロップ	133.74	185.86	169.29
[ba - gé? - to]	バゲット	137.93	217.3	146.45
[pa - ré? - to]	パレット	151.97	223.29	173.68
[ba - ró? - kw]	バロック	124.47	189.57	139.53
[bi - jó? - pw]	ビショップ	222.17	184.82	
[po - ké? - to]	ポケット	156.76	207.31	134.53
[re - gá? - ta]	レガッタ	134.08	189.63	174.64
[ro - ké? - to]	ロケット	134.29	200.91	154.21
[ke - bé? - kw]	ケベック	136.32	196.99	144.23
[mo - ró? - ko]	モロッコ	116.34	199.95	120.36
[tja - rén - dʒi]	チャレンジ	128.02	184.63	111.7
[i - mé: - dʒi]	イメージ	135.09	220.46	123.04
[ga - ré: - dʒi]	ガレージ	108.01	227.26	139.48
[je - pá: - do]	シェパード	157.88	201.22	93.39
[da - mé: - dʒi]	ダメージ	93.08	190.71	140.59
[ba - rá: - do]	バラード	155.75	210.7	138.77
[pa - ré: - do]	パレード	152.58	198.47	131.57
[re - kó: - do]	レコード	131.37	225.06	128.66

Table E.21

Subject 7: Accent on the First Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[ó - a - [i - sw]	オアシス	211.75	205.56	
[kí - ri - ba - sw]	キリバス	---	---	---
[té - ki - sw - to]	テキスト	291.6	228.87	
[só - bi - e - to]	ソビエト	124.41	207.56	141.68
[tja - pw - suí]	チャプスイ	---	---	---
[tjé - a - man]	チェアマン	238.88	187.45	
[dó - ra - gon]	ドラゴン	208.33	182.36	
[tó - rw - en]	トルエン	160.36	202.61	154.47

[mé - ga - ton]	メ ^ㇿ ガトン	208.39	164.15	
[mé - ga - hon]	メ ^ㇿ ガホン	200.17	176.42	
[fi - ri - pin]	フィ ^ㇿ リピン	228.96	188.17	
[ré - ba - non]	レ ^ㇿ バノン	194.59	160.63	
[ó - re - gon]	オ ^ㇿ レゴン	195.09	162.83	
[á - be - njw:]	ア ^ㇿ ベニュー	188.13	160.33	
[suǵi - ma:]	ス ^ㇿ イマー	143.81	221.51	120.1
[má - tji - ne:]	マ ^ㇿ チネー	128.62	217.93	134.99
[bá - kan - sw]	バ ^ㇿ カンス	193.04	169.46	
[buí - ran - ko]	ブ ^ㇿ ランコ	213.29	187.33	
[ró - man - sw]	ロ ^ㇿ マンス	190.69	145.8	
[é - pi? - kw]	エ ^ㇿ ピック	186.04	129.11	
[ká - po? - kw]	カ ^ㇿ ポック	140.66	217.03	121.95
[kjuí - ro? - to]	キュ ^ㇿ ロット	242.53	189.21	
[kó - ko - na - tsu]	コ ^ㇿ コナツ	249.83	188.3	
[kó - ro? - ke]	コ ^ㇿ ロッケ	242.24	195.58	
[dzá - ke? - to]	ジャ ^ㇿ ケット	---	---	---
[ji - ro? - pw]	シ ^ㇿ ロップ	387.81	238.93	
[sw - ri? - pa]	ス ^ㇿ リップ	152.33	221.89	137.46
[dé - ni? - jw]	デ ^ㇿ ニッシュ	209.02	177.22	
[to - pi? - kw]	ト ^ㇿ ピック	228.55	161.06	
[tó - ro? - ko]	ト ^ㇿ ロッコ	164.26	208.16	184.79
[pá - do? - kw]	パ ^ㇿ ドック	142.09	192.97	137.24
[pá - ni? - kw]	パ ^ㇿ ニック	202.68	168.79	
[buí - ti? - kw]	ブ ^ㇿ ティック	126.36	198.42	96.37
[pó - je? - to]	ポ ^ㇿ シエット	220.67	123.13	
[má - dzi? - kw]	マ ^ㇿ ジック	126.32	206.94	142.24
[juí - mi? - to]	ユ ^ㇿ ニット	211.67	179.83	
[ró - dzi? - kw]	ロ ^ㇿ ジック	192.76	140.54	
[ró - bo? - to]	ロ ^ㇿ ボット	109.28	157.43	126.24
[é - tsw: - do]	エ ^ㇿ チュード	201.07	207.73	127.11
[ji - ri: - zw]	シ ^ㇿ リーズ	150.92	231.81	136.38
[tó - pa: - zw]	ト ^ㇿ パーズ	111.95	164.85	101.35

Table E.22

Subject 8: Accent on the Second Mora as an Only Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[a - ná - na - su]	アナ ¹ ナス	113.67	137.62	96.75
[dʒa - ka - ru - ta]	ジャカ ¹ ルタ	---	---	---
[te - á - to - ru]	テア ¹ トル	139.35	130.11	
[pu - rí - ma - su]	プリ ¹ マス	129.44	152.85	131.08
[ma - ná - gu - a]	マナ ¹ グア	---	---	---
[a - sé - ton]	アセ ¹ トン	---	---	---
[ka - ná - kin]	カナ ¹ キン	157.68	144.53	
[ki - ró - ton]	キロ ¹ トン	165.91	136.41	
[ji - tó - ron]	シト ¹ ロン	187.67	154.96	
[to - bí - rin]	トビ ¹ リン	---	---	---
[ra - nó - rin]	ラノ ¹ リン	145.12	114.48	
[je - rá? - ku]	シェラ ¹ ック	150.38	129.77	
[to - rí? - ku]	トリ ¹ ック	116.05	164.68	155.13
[to - rí? - pu]	トリ ¹ ップ	121.21	143.65	136.93
[ba - ké? - to]	バケ ¹ ット	96.11	136.26	90.88
[ba - rá? - ku]	バラ ¹ ック	140.02	153.44	136.43
[pi - ké? - to]	ピケ ¹ ット	168.65	114.68	
[pi - kó? - to]	ピコ ¹ ット	163.4	79.87	
[ri - bé? - to]	リベ ¹ ット	103.05	132.91	84.78
[ma - rá? - ka]	マラ ¹ ッカ	104.75	153.88	86.31

Table E.23

Subject 8: Accent on the Second Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[de - rí - [a - su]	デリ ¹ シャス	103.62	141.42	120.34
[to - rí - pu - ru]	トリ ¹ プル	---	---	---
[ji - á - to - ru]	シア ¹ トル	153.9	134.93	
[bu - ruí - nei]	ブル ¹ ネイ	---	---	---
[ku - ré - son]	クレ ¹ ソン	---	---	---

[sa - φwí - ran]	サブ ¹ ラン	160.24	137.82	
[kjuw - rá - so:]	キュラ ¹ ソー	156.33	140.25	
[do - rá - ma:]	ドラ ¹ マー	---	---	---
[e - pó? - kw]	エポ ¹ ック	151.26	129.94	
[ka - já? - kw]	カヤ ¹ ック	150.27	139.19	
[ka - rá? - to]	カラ ¹ ット	153.31	136.96	
[kw - rí? - pw]	クリ ¹ ップ	119.42	139.47	106.54
[ke - tʃá? - pw]	ケチャ ¹ ップ	111.26	145.62	103.1
[go - íí? - kw]	ゴシ ¹ ック	95.24	149.49	86.09
[go - íí? - pw]	ゴシ ¹ ップ	104.73	151.99	92.77
[ko - njá? - kw]	コニヤ ¹ ック	113.42	132.48	86
[sw - í? - tʃi]	スイ ¹ ッチ	123.1	149.35	114.76
[sw - rí? - pw]	スリ ¹ ップ	124.03	152.61	101.97
[so - ké? - to]	ソケ ¹ ット	120.77	152.03	91.93
[ta - rá? - pw]	タラ ¹ ップ	112.62	143.46	83.55
[to - ró? - to]	トロ ¹ ット	123.52	151.43	83.46
[do - ró? - pw]	ドロ ¹ ップ	95.7	150.25	88.92
[ba - gé? - to]	バゲ ¹ ット	133.16	116.5	
[pa - ré? - to]	パレ ¹ ット	126.63	165.3	97.9
[ba - ró? - kw]	バロ ¹ ック	98.04	130.97	103.6
[bi - jó? - pw]	ビショ ¹ ップ	149.53	133.1	
[po - ké? - to]	ポケ ¹ ット	126.65	157.74	93.61
[re - gá? - ta]	レガ ¹ ッタ	93.19	126.53	81.66
[ro - ké? - to]	ロケ ¹ ット	95.93	147.05	88.8
[ke - bé? - kw]	ケベ ¹ ック	167.2	140.5	
[mo - ró? - ko]	モロ ¹ ッコ	95.21	143.88	88.78
[tʃa - rén - dʒi]	チャレ ¹ ンジ	110.79	140.27	85
[i - mé: - dʒi]	イメ ¹ ージ	91.57	136.68	114.72
[ga - ré: - dʒi]	ガレ ¹ ージ	98.6	137.48	85.34
[je - pá: - do]	シェパ ¹ ード	165.6	129.24	
[da - mé: - dʒi]	ダメ ¹ ージ	99.52	130.52	87.47
[ba - rá: - do]	バラ ¹ ード	102	158.17	82.22
[pa - ré: - do]	パレ ¹ ード	115.66	161.11	121.92
[re - kó: - do]	レコ ¹ ード	99.38	154.85	84.51

Table E.24

Subject 8: Accent on the First Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[ó - a - [j] - su]	オ ¹ アシス	155.71	139.21	
[kí - ri - ba - sw]	キ ¹ リバス	138.43	124.33	
[té - ki - sw - to]	テ ¹ キスト	156.55	140.98	
[só - bi - e - to]	ソ ¹ ビエト	106.17	145.61	115.68
[tʃa - pu - suj]	チャ ¹ プスイ	154.8	94.97	
[tʃé - a - man]	チェ ¹ アマン	119.59	139.57	88.24
[dó - ra - gon]	ド ¹ ラゴン	154.51	140.82	
[tó - ru - en]	ト ¹ ルエン	150.77	135.36	
[mé - ga - ton]	メ ¹ ガトン	155.96	134.04	
[mé - ga - hon]	メ ¹ ガホン	142.4	130.99	
[fi - ri - pin]	フィ ¹ リピン	146.73	133.03	
[ré - ba - non]	レ ¹ バノン	156.93	139.41	
[ó - re - gon]	オ ¹ レゴン	147.13	142.22	
[á - be - njw:]	ア ¹ ベニュー	155.54	132.16	
[suji - ma:]	ス ¹ イマー	152.88	132.52	
[má - tji - ne:]	マ ¹ チネー	125.23	105.19	
[bá - kan - sw]	バ ¹ カンス	160.82	124.81	
[buí - ran - ko]	ブ ¹ ランコ	100.27	142.54	81.01
[ró - man - sw]	ロ ¹ マンス	161.68	139.14	
[é - pi? - kw]	エ ¹ ピック	420.63	142.78	
[ká - po? - kw]	カ ¹ ポック	168.36	136.24	
[kjuí - ro? - to]	キュ ¹ ロット	182.35	155.79	
[kó - ko - na - tsu]	コ ¹ コナツ	159.81	128.96	
[kó - ro? - ke]	コ ¹ ロッケ	162.87	150.71	
[dʒá - ke? - to]	ジャ ¹ ケット	146.63	130.98	
[ji - ro? - pu]	シ ¹ ロップ	153.52	135.25	
[sw - ri? - pa]	ス ¹ リップ	120.29	161.04	86.05
[dé - ni? - ju]	デ ¹ ニッシュ	139.58	113.87	
[to - pi? - kw]	ト ¹ ピック	167.57	131.05	
[tó - ro? - ko]	ト ¹ ロッコ	124.26	157.8	91.21
[pá - do? - kw]	パ ¹ ドック	171.98	143.67	

[pá - ni? - kw]	パ ¹ ニック	159.4	139.2	
[buí - ti? - kw]	ブ ¹ ティック	159.45	131.82	
[pó - [e? - to]	ポ ¹ シエット	155.98	134.69	
[má - dʒi? - kw]	マ ¹ ジック	156.66	134.07	
[juí - mi? - to]	ユ ¹ ニット	---	---	---
[ró - dʒi? - kw]	ロ ¹ ジック	154.77	130.81	
[ró - bo? - to]	ロ ¹ ボット	101.39	143.15	89.79
[é - tʃw: - do]	エ ¹ チュード	131.32	107.06	
[ʃí - ri: - zw]	シ ¹ リーズ	120.82	154.49	86.24
[tó - pa: - zw]	ト ¹ パーズ	164.6	136.18	

Table E.25

Subject 9: Accent on the Second Mora as an Only Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[a - ná - na - sw]	アナ ¹ ナス	278.81	202.88	
[dʒa - ka - rw - ta]	ジャカ ¹ ルタ	---	---	---
[te - á - to - rw]	テア ¹ トル	298.02	213.89	
[pw - rí - ma - sw]	プリ ¹ マス	224.71	330.72	202.08
[ma - ná - gw - a]	マナ ¹ グア	---	---	---
[a - sé - ton]	アセ ¹ トン	301.41	238.68	
[ka - ná - kin]	カナ ¹ キン	316.71	238.06	
[ki - ró - ton]	キロ ¹ トン	334.02	252.05	
[ʃi - tó - ron]	シト ¹ ロン	312.14	245.79	
[to - bí - rin]	トビ ¹ リン	301.41	221.87	
[ra - nó - rin]	ラノ ¹ リン	263.87	195.3	
[ʃe - rá? - kw]	シェラ ¹ ック	303.1	249.62	
[to - rí? - kw]	トリ ¹ ック	282.66	212.03	
[to - rí? - pw]	トリ ¹ ップ	204.09	273.76	180.57
[ba - ké? - to]	バケ ¹ ット	263.61	181.98	
[ba - rá? - kw]	バラ ¹ ック	243.1	219.35	
[pɔ̣ - ké? - to]	ピケ ¹ ット	331.49	230.29	
[pɔ̣ - kó? - to]	ピコ ¹ ット	281.24	210.2	

[ri - bé? - to]	リベ ¹ ット	194.01	360.34	208.6
[ma - rá? - ka]	マラ ¹ ッカ	169.1	220.51	165.84

Table E.26

Subject 9: Accent on the Second Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[de - rí - ja - sw]	デリ ¹ シャス	204.39	276.58	233.39
[to - rí - pw - rw]	トリ ¹ プル	286.06	219.26	
[ji - á - to - rw]	シア ¹ トル	267.32	220.04	
[bw - rwí - nej]	ブル ¹ ネイ	---	---	---
[kw - ré - son]	クレ ¹ ソン	363.08	259	
[sa - φuí - ran]	サフ ¹ ラン	284.25	234.96	
[kju - rá - so:]	キュラ ¹ ソー	300	194.26	
[do - rá - ma:]	ドラ ¹ マー	---	---	---
[e - pó? - ku]	エポ ¹ ック	291.05	197.92	
[ka - já? - kw]	カヤ ¹ ック	285.85	213.52	
[ka - rá? - to]	カラ ¹ ット	278.15	195.67	
[kw - rí? - pu]	クリ ¹ ップ	242.45	269.57	167.82
[ke - tjá? - pu]	ケチャ ¹ ップ	207.53	257.25	189.71
[go - jí? - ku]	ゴシ ¹ ック	257.1	176	
[go - jí? - pu]	ゴシ ¹ ップ	265.46	127.19	
[ko - njá? - ku]	コニヤ ¹ ック	284.16	231.42	
[sw - í? - tji]	スイ ¹ ッチ	294.46	242.99	
[sw - rí? - pw]	スリ ¹ ップ	298.2	246.08	
[so - ké? - to]	ソケ ¹ ット	288.25	203.75	
[ta - rá? - pw]	タラ ¹ ップ	293.1	226.34	
[to - ró? - to]	トロ ¹ ット	295.63	206.74	
[do - ró? - pw]	ドロ ¹ ップ	257.01	186.86	
[ba - gé? - to]	バゲ ¹ ット	243.39	195.56	
[pa - ré? - to]	パレ ¹ ット	260.56	192.01	
[ba - ró? - kw]	バロ ¹ ック	170.06	216.2	162.19
[bi - jó? - pw]	ビショ ¹ ップ	180.08	251.96	174.78
[po - ké? - to]	ポケ ¹ ット	322.16	238.17	

[re - gáʔ - ta]	レガʔッタ	176.44	238.23	222.48
[ro - kéʔ - to]	ロケʔット	177.39	244.15	133
[ke - béʔ - kw]	ケベʔック	287.62	203.23	
[mo - róʔ - ko]	モロʔッコ	---	---	---
[tʃa - rén - dʒi]	チャレʔンジ	186.82	270.14	158.84
[i - mé: - dʒi]	イメʔージ	192.51	308.8	150.31
[ga - ré: - dʒi]	ガレʔージ	181.51	259.21	212.62
[ʃe - pá: - do]	シェパʔード	188.36	272.51	151.94
[da - mé: - dʒi]	ダメʔージ	185.68	257.79	152.64
[ba - rá: - do]	バラʔード	178.55	240.64	157.14
[pa - ré: - do]	パレʔード	192.17	239.67	149.16
[re - kó: - do]	レコʔード	174.77	260.99	155.03

Table E.27

Subject 9: Accent on the First Mora as a Primary Position

Four-mora Loanword	Japanese	First mora	Seond mora	Third mora
[ó - a - ʃi - sw]	オʔアシス	269.63	216.72	
[kí - ri - ba - sw]	キʔリバス	369.21	255.52	
[té - ki - sw - to]	テʔキスト	305.85	222.98	
[só - bi - e - to]	ソʔビエト	182.16	260.01	155.52
[tʃa - pu - suʃi]	チャʔプスイ	341.34	298.9	
[tʃé - a - man]	チェʔアマン	346.48	279.03	
[dó - ra - gon]	ドʔラゴン	301.28	214.72	
[tó - rw - en]	トʔルエン	302.84	200.15	
[mé - ga - ton]	メʔガトン	273.68	206.9	
[mé - ga - hon]	メʔガホン	255.21	192.92	
[fi - ri - pin]	フィʔリピン	293.15	237.67	
[ré - ba - non]	レʔバノン	257.89	210.46	
[ó - re - gon]	オʔレゴン	263.98	214.59	
[á - be - njw:]	アʔベニユー	282.2	216.47	
[suʃi - ma:]	スʔイマー	284.46	203.51	
[má - tʃi - ne:]	マʔチネー	188.36	239.62	248.57
[bá - kan - sw]	バʔカンス	271.54	206.28	

[búí - ran - ko]	ブ ¹ ランコ	191.67	239.33	173.78
[ró - man - sw]	ロ ¹ マンス	279.66	188.87	
[é - pi? - kw]	エ ¹ ピック	283.48	184.88	
[ká - po? - kw]	カ ¹ ポック	279.67	210.76	
[kjúí - ro? - to]	キュ ¹ ロット	289.54	220	
[kó - ko - na - tsu]	コ ¹ コナツ	216.03	274.16	157.34
[kó - ro? - ke]	コ ¹ ロッケ	301.98	215.81	
[dzá - ke? - to]	ジャ ¹ ケット	285.02	188.82	
[jí - ro? - pw]	シ ¹ ロップ	295.62	218.71	
[sw - rí? - pa]	ス ¹ リップ	201.84	276.04	191.16
[dé - ni? - jw]	デ ¹ ニッシュ	282.09	219.18	
[to - pí? - kw]	ト ¹ ピック	306.22	213.28	
[tó - ro? - ko]	ト ¹ ロッコ	329.07	247.93	
[pá - do? - kw]	パ ¹ ドック	288.22	196.17	
[pá - ni? - kw]	パ ¹ ニック	282.44	222.27	
[búí - ti? - kw]	ブ ¹ ティック	301.6	204.41	
[pó - je? - to]	ポ ¹ シェット	291.63	213.13	
[má - dzi? - kw]	マ ¹ ジック	260.25	175.16	
[júí - mi? - to]	ユ ¹ ニット	282.93	208.5	
[ró - dzi? - kw]	ロ ¹ ジック	254.14	204.3	
[ró - bo? - to]	ロ ¹ ボット	184.81	249.36	136.73
[é - tju: - do]	エ ¹ チュード	283.75	200.35	
[jí - ri: - zw]	シ ¹ リーズ	174.51	259.61	145.11
[tó - pa: - zw]	ト ¹ パーズ	212.75	272.72	148.8

Figure E.1

Subject 1: Pitch Draw

Figure E.2

Subject 2: Pitch Draw

Figure E.3

Subject 3: Pitch Draw

Figure E.4

Subject 4: Pitch Draw

Figure E.5

Subject 5: Pitch Draw

Figure E.6

Subject 6: Pitch Draw

Figure E.7

Subject 7: Pitch Draw

Figure E.8

Subject 8: Pitch Draw

Figure E.9

Subject 9: Pitch Draw