The Syllable is Not a Universal Prosodic Unit
— a case of Japanese

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1. Introduction

Since Nespor and Vogel (1986) persuasively argued for the need to recognize the units of prosodic hierarchy in phonology, many phonologists (e.g., Kenstowicsz 1994, Spencer 1996) have discussed the hierarchy of a language or languages in one way or another, assuming that every language is characterized by the universal prosodic hierarchy shown below:

(1)　mora < syllable < foot < phonological word
　　　(where the mark (<) indicates the domains from a hierarchy, with each domain being included in the next domain higher up)

Put differently, although Nespor and Vogel did not present the mora as a proper prosodic domain, many phonologists afterwards have begun to extend the hierarchy down one level to include it, claiming that the mora is a universal prosodic unit immediately dominated by the next higher unit in phonology, as shown in (1). Levels beyond the phonological word to the utterance are ignored in this paper.

Kenstowicsz (1994: 293), for example, states that "the mora is not a species of sound but rather an elementary prosodic unit that, like the syllable, organizes the phonemes in a particular way." However, although some phonologists used a hierarchical type of syllable structure in discussing world languages, some others opted for a flat type, creating a situation that most phonologists have been using one or the other in their arguments about the hierarchy. Nevertheless, it is generally understood today that while a long vowel consists of two morae, a short vowel one mora. When it comes to Japanese, it is taken for granted today that Japanese has five long/short vowel pairs. In fact, a long vowel like [aa] in *obaasan* 'grandmother' in Japanese is approximately twice as long as a short one of [a] in *obasan* 'aunt' (Otaka 2009).

Although Japanese can be considered a mora(-timed) language, some linguists like McCawley (1968) state, before the appearance of moraic phonology in the late 1980's, that it is a 'mora-counting syllable' language. Shibatani (1990: 159) goes on to say that "both moras and syllables play an important role in the Japanese accentual system," claiming a distinction between the prosodic units, syllable and mora. Kubozono (1993, 2002) is another forceful advocate of the notion syllable in Japanese, even if his experiments (1995) confirm that the mora, rather

than the phoneme or syllable, serves as a perceptual unit of Japanese. Thus the data used in his arguments would be reanalyzed in the framework argued for in this paper. (The data he used from a 'secret' language spoken in Japan are dubious.) Otaka (2009), after examining various arguments concerning the mora, falls back on a "mainstream" treatment of Japanese phonology.

On the other hand, until quite recently many Japanese linguists in this country held the position that Japanese 'morae' were, in fact, *onsetsu* (normally translated as 'syllable') of this language (Okumura 1988). Their 'traditional' view would be couched in the following hierarchy:

（2） mora < foot < phonological word

In this paper, after carefully examining Japanese (i.e. Tokyo Japanese), I will support their view in （2）, and argue that the syllable is not a universal prosodic unit, contrary to a "mainstream" treatment of Japanese phonology. The claim developed here also reinforces the view that Japanese differs significantly from Italian in phonology. Thus, this paper consists of the following sections. Section 1 reviews the definitions of 'syllable' and 'mora'. Section 2 phonologically examines the two languages, Japanese and Italian, occasionally quoting examples from English by way of comparison. Section 3 states my conclusion.

2. Definitions of syllable and mora

It is said that native speakers of English usually agree on the number of syllables a given word in their language has. For example, it may be comparatively easy for them to decide on how many syllables are present in the word *Christmas*. In this case, 'two' will be the correct, expected answer. On the other hand, it may not be so easy to define the term, construct syllabification rules, or determine syllable boundaries. For most speakers of Tokyo Japanese, the same word would consist of 5 morae: that is, /ku-ri-su-ma-su/ as a loanword. This raises a question as to how we should define the prosodic units, syllable and mora.

2.1 Defining the syllable

In Chomsky and Halle (1968: 5), "a phonetic representation has the form of a two dimensional matrix in which the rows stand for particular phonetic features; the columns stand for the consecutive segments of the utterance generated; and the entries in the matrix determine the status for each segment with respect to the features." In other words, their representations entirely consist of strings of distinctive feature matrices, which define segments or boundaries, the latter derived from the (morpho) syntax. Therefore, no phonological structure, such as the syllable or the higher prosodic units shown in the Introduction, was examined in their work.

After their monumental work, however, many phonologists (e.g., Kahn 1976) have become uneasy about a phonological rule of the format given below:

（3） A → B / _____ {C, #}

(where C stands for a consonant, and # for a word boundary)

According to the rule format, in British English the postvocalic liquid, /r/, is correctly deleted in that context, as in *port* and *car* (resulting in the longer duration of the preceding vowels). And ever since 1968, it has been quite frequently observed that this phonological environment appears in many languages of the world. Clearly, the reoccurrence of this rule context cannot be simply due to chance. Further, as they do not make up a 'natural' class, no convincing arguments in support of distinctive features shared by a consonant and a word boundary have been presented, leading eventually to the proposal of the prosodic unit, the syllable, as a desired answer to this question.

Before we define the term, it may be necessary to distinguish a phonetic syllable from a phonological one. Lass (1984: 250), for example, makes the following statement: "The phonetic syllable is a 'performance' unit, whose entire reality is phonetic; the phonological syllable is a structural (if phonetically based) unit, perhaps with non-phonetic properties as well." In this paper we are interested in the phonological syllable rather than the phonetic one, as this is a phonological study of the units of the prosodic hierarchy of Tokyo Japanese.

According to one dominant phonological approach (*A Dictionary of Phonetics and Phonology* 1996), "the syllable is a purely phonological unit consisting of a single peak of intrinsic sonority, though with qualifications for cases like English *spit,* which has two peaks." Despite this language-particular phenomenon (Lass 1984), it is clear that the nucleus of a syllable is the most sonorous part of the structure, being usually associated with a vowel or diphthong. It is possibly (i.e. optionally) preceded and/or followed by one or more consonants that are less sonorous than the nucleus, the only universal syllable type being CV (where V stands for a vowel). Thus, one characteristic of syllables is that they are related to sonority.

Secondly, there are certain phonological phenomena typically observed in a domain of the prosodic hierarchy, i.e. the 'syllable.' Thus, for example, Hayes (2009) seems to uphold that some phonological generalizations are better stated if we use that prosodic unit. He states that "many rules that epenthesize vowels can be analyzed in terms of the syllable structure of the language they occur in. (p. 263)" Kenstowicsz (1994), for example, cites one interesting example from English. According to him, the string [ðm] is not a possible coda (i.e. a sequence of consonants immediately following a vowel in a syllable), but in pronouncing the word *rhythm* the underlying cluster ends up sounding very much like the disyllabic word *atom,* through epenthesis of a schwa. He further notes that the schwa must be inserted rather than underlying, given the contrast between trisyllabic *atom-ic* and disyllabic *rhythm-ic.*

Thirdly, all English speakers know that /t/ is aspirated when it occurs word-initially, in such words as *take* and *tree,* but after /s/ it cannot aspirate, as in *stake* and *stray.* How, then, do the same speakers pronounce the word-internal /t/ sound in the word *mistake* without aspiration? In order to answer the question, it may be necessary to divide it into the two-syllable word (i.e. in slow speech), *mi-stake.* Obviously, it is the syllabification that is responsible for the differences in pronunciation of the /t/ sound. As for aspiration in English, there is an important finding

reported by Kahn (1976: 74). He states that /p, t, k/ are aspirated if and only if they are both syllable-initial and non-syllable-final. It is clear that the words, *take* and *tree,* begin with /t/.

Finally, I will discuss the relationship between stress and syllable structure. Hayes (2009: 271) states: "stress is generally taken to involve the force or intensity with which a syllable is uttered." To understand this point, it may be necessary to compare the pronunciations of the following English words:

（4） a. *bandana*　　 b. *banana*
　　　/bændǽnə/　　/bənǽnə/

(4a) would be syllabified (in slow speech) as *ban-da-na*, and (4b) as *ba-na-na*. (The mark (-) here indicates syllable boundaries.) The differences between them would be clear in the degree of stress and pronunciation of the first syllables when they are uttered. In the case of (4a), the first syllable receives some degree of stress and the vowel is pronounced with [æ], while in (4b), the first syllable is unstressed and the vowel is pronounced with a schwa. Clearly, the first syllable of (4a) is closed (i.e. CVC) and heavy, the entire word constituting two feet, whereas the first syllable of (4b) is open (i.e. CV) and light, i.e. a degenerate foot, making up only one foot for the whole word. (A foot is here roughly defined in English as a prosodic unit containing at least one stressed syllable.) This observation is generally correct, because in many stress languages like English and Italian, stress is sensitive to syllable weight distinction.

2.2　Defining the mora

The term is defined as "a phonological unit larger than a single segment but typically smaller than a syllable (*A Dictionary of Phonetics and Phonology*, 1996)." According to the same dictionary, a light syllable consists of a single mora while a heavy syllable consists of two. Shibatani (1990: 158) writes: "a mora in Japanese is a unit that can be represented by one letter of *kana* and functions as a rhythmic unit in the composition of Japanese poem, e.g. *waka* and *haiku.*" Thus, in Japanese the mora appears to be an important rhythmic element, although its phonetic aspects have been under discussion by many linguists (e.g., Otaka 2009).

Although we are not interested in the rigid isochrony of Japanese morae, it is worthwhile to describe the term in more detail. Most linguists agree today that it consists of the following elements:

（5） a.　(C) V: namely, a vowel preceded optionally by a consonant,
　　　 b.　the first half of a geminate consonant,
　　　 c.　a mora nasal ([N]), and
　　　 d.　the second half of a long vowel or a diphthongal vowel sequence.

(5b), (5c), and (5d) are the three kinds of elements often called 'mora phonemes'. (5b) is symbolized by a small *kana*, and referred to by the Japanese word *sokuon*, as in the word, *ippo* 'one

step', which consists of three morae. (5c), also called *hatsuon* in Japanese, is used to represent, for example, the nasal of *hon* 'book', which makes up a two-mora word. The second half of a long vowel is called *hikion* (sometimes shown by the mark (-) in Japanese), and shows, for example, the second high front vowel of, *ojiisan* 'grandfather', which constitutes five morae.

All the above elements of the mora will be further illustrated below:

（6） a.　*te* 'hand'（1）　　　　　　　*atama* 'head'（3）

　　 b.　*kitto* 'surely'（3）　　　　　　*motto* 'more'（3）

　　 c.　*Nippon* 'Japan'（4）　　　　　 *ten* 'point or dot'（2）

　　 d.　*neisan* 'elder sister'（4）　　*kaasan* 'mother'（4）

　　 (where each numeral shows the number of morae)

Usually, the honorific prefix, *o-*, is attached to each of (6d) examples. What is to be noted here is the fact that *o-neesan* instead of the more formal *o-neisan* would be heard in an everyday conversation. In each example in （6）, one mora corresponds to one letter of *kana* (i.e. *katakana* or *hiragana* syllabary) in Japanese orthography (though a small *kana* is used in some words as in *kitto* /kitto/: that is, a consonant immediately followed by another identical consonant).

3.　Comparing Japanese and Italian

In this section, the phonological systems of Japanese and Italian will be compared, with particular attention to their syllables and/or morae. One chief reason to investigate the two languages is because they are said to have some linguistic characteristics in common, such as the five-vowel system (disregarding the effects of stress in Italian), and a syntactic Pro-drop sentence property. There are, however, many more significant dissimilarities rather than similarities between the two, with respect to their phonological systems.

3.1　Japanese Phonology

3.1.1　*Haiku* and mora

Haiku occupies a unique position in world literature, not only in its brevity to express a particular aspect of nature, but also in its pertinent use of *kigo* ('season word'), which gives us a feeling of a season of the year. Unfortunately, however, this shortest form of poetry in the world has been misleadingly referred to as "the 17-syllable haiku" (Blyth 1982). *Haiku* actually consists of 17 morae: the first line consisting of 5 morae, the second line 7 morae, and the third line 5 morae. Observe the following famous examples:

（7） a.　*Furu-ike-ya*　　　*kawazu-tobikomu*　　*mizu-no-oto.*　　 (from Matsuo Basho)

　　　　(The old pond　a frog jumps in　　the sound of water)

　　 b.　*Yase-gaeru*　　*makeruna-Issa*　　*koko-ni-ari.*　　 (from Kobayashi Issa)

　　　　(Thin frog　　don't give up　　Issa is here with you)

The mark (-) here roughly indicates word boundaries. Matsuo Basho (1644–1695) was normally considered the originator of *haiku*. He strictly observed the rhythm created by the 17-mora poetry, as in (7a). Kobayashi Issa (1763–1827), another *haiku* poet, is said to have created a unique style through his short poems.

In (7b), his personal name, Issa, is used in the *haiku,* and it consists of 3 morae. Clearly this trimoraic personal name contributes to the rhythm of the poem, supporting our claim that *sokuon* counts as one mora. Thus, this literary genre seems to account for the moraic rhythm of Japanese.

3.1.2 *Shiritori*

In Japanese, there is a language game called *shiritori* (i.e. a word chain game), which is familiar to most children. According to the rules of the game, a player wins the game when his/her opponent utters a word that ends with a mora nasal (i.e. [N]), because no word in Japanese begins with it. Also, it is usually the case that a player wins the game if his/her opponent cannot come up with a proper word within a certain period of time agreed upon by the players before the game starts, or if his/her opponent uses the same word twice in one game. Now, loot at the following example of this game:

（8） /go.bo.o/ 'burdock root' → /o.ri.ga.mi/ 'paper folding' → /mi.ka.N/ 'mandarin orange'
　　　 (end of the game)
　　　 (where the dot indicates mora boundaries here)

Obviously, the first word /go.bo.o/ ('burdock root') ends with a long vowel /oo/. but the second word /o.ri.ga.mi/ ('paper folding') begins with the last mora of the previous word /o/ instead of the final syllable /boo/. Further, as can be seen above, a player loses the game if he/she uses a word that ends with [N]. Clearly, the mora constitutes a phonological representation in this game.

3.1.3 Accent Assignment

The pitch-accent (or tonal) patterns of Japanese have been studied by many phonologists in the past. Among them, Haraguchi (1977) was the first to present a comprehensive, generative account of the tonal system of Japanese. Later, Kubozono (1993) published a book on the same topic, which was basically a rewrite of his doctoral dissertation submitted to (the) University of Edinburgh in 1987. All the data used in their arguments, however, need to be reanalyzed in the framework presented in Sato (2010), which discusses two types of tonal feet in Japanese.

Tokyo Japanese, for example, consists of both accented and unaccented words underlyingly. Let us first consider the following unaccented words:

（9） *Unaccented words*
　　 a. *ha-ga* LH　　　　　　　'leaf'

b.	*hasi* LH	*hasi-ga* LHH	'edge'
c.	*tonari* LHH	*tonari-ga* LHHH	'neighborhood'
d.	*niwatori* LHHH	*niwatori-ga* LHHHH	'chicken'

（where *-ga* is the （toneless） subject marker）

The examples above indicate that the iambic tonal foot (i.e. LH) is associated with the left edge of the accent domain, spreading the H tone rightwards. Since the H tone spreads, and thus it is active, the L tone is considered to be a default tone assigned at the end of accentual derivation in this dialect. Now compare this pattern with the pattern of accented words below:

(10) *Accented words*

a.	*'ha-ga* HL		'tooth'
b.	*'hasi* HL	*'hasi-ga* HLL	'chopstick'
c.	*'kinoko* HLL	*'kinoko-ga* HLLL	'mushroom'
d.	*koto'ba* LHH	*koto'ba-ga* LHHL	'word'

The underlyingly accented mora in each of the above examples is indicated by the mark (') placed before it, and an underlyingly unaccented mora like *-ga* is given a default L tone at the end of the accent derivation. From the examples in (10), we can conclude that the initial, accented mora of *'kinoko*, for example, is associated with the underlying HL, and thus, in the lexical component the first mora will be linked with H and the second with L, and at the end of accentual derivation, the final mora will be linked with a default L tone. This will produce the correct result, HLL for *'kinoko*. On the other hand, the accent pattern of *koto'ba* shows that, in addition to the underlying HL, the iambic tonal foot is associated with the left edge of the word (as in (9)), and in this case, the L tone of the underlying HL becomes deleted since this dialect does not permit a contour tone. Therefore, it is clear that the mora controls the rhythmic structure of Tokyo Japanese.

The antepenultimate accent assignment rule commonly observed in proper nouns (e.g., *Sakura* HLL, a person's name vs. *sakura* LHH 'cherry tree') will be discussed later.

3.1.4 Bimoraic foot

The notion foot is, at present, well established in Japanese phonology. It was Poser (1984) who first proposed the notion, providing a large number of evidence to support the existence of a foot consisting of two morae in Japanese. Since then, the term 'foot' has been employed to refer to the bimoraic prosodic unit in Japanese as shown in (2). Poser examined many foot-based phenomena in Japanese, particularly the various processes of word-formation with a suffix of affection (i.e. *-chan* or *-san*) attached to the end of one's name like the following:

(11) a. hypocoristic name formation,

  b. kinship name formation,

c. *geisha*/bargirl client name formation, and

d. rustic girl's name formation.

For example, according to (11a), if we attach the hypocoristic suffix, *-chan* (/tjan/), to the end of a girl's first name, *Tomoko* (/tomoko/), we will get /tomo-tjan/. Apparently, /tomo/ derives from the first two morae of /tomoko/, and that unit is called a 'bimoraic foot.'

This bimoraic foot template can also be used, as Poser suggested, in shortening an English complex noun such as the ones given below:

(12) a. *professional wrestling* < *purofesionaru resuringu* < /puro-resu/

b. *remote control* < *rimooto kontorooru* < /rimo-koN/

c. *air-conditioner* < *eaa kondesionaa* < /ea-koN/

d. *word processor* < *waado purosessaa* < /waa-puro/

The resulting Japanese expressions on the right edge all explain that each newly created word begins with a string of bimoraic foot cut off from the corresponding initial noun in length. This word formation process is not something new in Japanese. A word like *tookyoo daigaku* ('The University of Tokyo') is usually shortened to /too-dai/, and its shortened form is usually used in newspapers or in our daily conversations. Thus, Poser claimed that bimoraic units were found everywhere as favored patterns in Japanese, implying the existence of bimoraic feet. His claim may be understood to mean that in Japanese a foot immediately dominates morae.

3.1.5 Loanword phonology

It is believed that the Japanese lexicon is made up of native (i.e. *Yamato*), Sino-Japanese, mimetic, and foreign strata. Of the four strata the pitch-accent (or tonal) patterns of foreign vocabulary (i.e. loanwords) that came into Japanese largely from English in recent years present some intriguing problems. In fact, Katayama (1998) says that "loanword phonology presents an interesting area of research because such studies often reveal sound patterns not readily observable in the native vocabulary of Japanese." However, her analysis as well as Kubozono's (2002) concerning the majority of loanwords from English proves to be incorrect. See Sato (2003) for further discussion on this point.

First, some loanwords vacillate between two accent patterns: one pattern is often termed new and the other old, as in *metaru* ('metal') (new LHH vs. old HLL). The old pattern accords with the antepenultimate accent assignment rule in Japanese. Next, some recent borrowings exhibit a tendency toward 'deaccenting' just as the examples shown in (9); that is, they tend to appear unaccented in the lexical component. For example, the first mora of *doramu* ('drum') is L, but from the second mora to the last the H tone spreads (i.e. LHH). Finally, a large percentage of loanwords are actually accented on the mora (corresponding to the syllable in English) that was stressed in the host language. Further, if the first mora of a loanword becomes accented as in /tábuu/ ('taboo'), it is most probably the result of the 'antepenultimate accent assignment rule'

in Japanese as briefly noted above. However, this accent assignment rule is different from the hidden mechanism in loanword phonology, because if the first mora is accented as in /sámarii/ ('summary'), the accent placement is caused by copying English stress: that accented mora corresponds to the stressed vowel in the original English word.

Kubozono was very concerned about, for example, the accent pattern of /wasíNtoN/ (*'Washington'*), and in order to solve such a problem he resorted to the notion syllable structure in Japanese, while maintaining the antepenultimate accent assignment rule, because he did not consent to the hidden mechanism of copying English stress. But two objections can be made about his solution. One objection is that the accent assignment rule cannot assign accent to a mora nasal (i.e. [N]) or the initial part of a geminate in Japanese, so that the preceding mora (i.e. /si/ in this case) is accented. Another objection is that, in English too, nasals sometimes behave strangely, as if they are inactive, in terms of stress assignment, as in *Washington, messenger*, and *passenger,* because the penultimate syllable of each of them is not stressed, even if it is heavy, against the normal stress rule of English (e.g., *ho'rizon*). Therefore, such exceptional examples do not pose a serious challenge to the moraic rhythm of Japanese.

3.2 Italian Phonology

3.2.1 The five vowel system

Before we discuss the vowel system of Italian, a brief mention must be made about its consonant system. Although similar to the consonant system of Japanese in its sound inventory when compared with that of English, it is more varied, causing some difficulties for Japanese students to acquire the sounds. Particularly, the presence of two types of liquids, /r/ and /l/, in Italian, as in English, is a challenging problem for most of them, since there is no such contrast in Japanese. The only type of liquid we phonologically need to acknowledge in Japanese is a voiced alveolar tap, /r/, although its pronunciation might slightly vary from person to person (Vance 1987).

Another pronunciation problem for most speakers of Japanese, and of English as well, is that although some words are spelled with a word-initial *h* (/akka/) such as *ho* ('I have'), *hai* ('you have'), and *ha* ('s/he has'), the letter is never pronounced in Italian. Thus, *Hanako Hashimoto* (i.e. a female name in Japanese) will in Italian be pronounced /anako asimoto/, a sequence of which sounds funny to most Japanese.

When it comes to the vowels in Italian, the story is different. It has long been considered by most linguists that Italian has a seven-vowel system: three front vowels and four back vowels (e.g., Dardano and Trifone 2010, Perini 2009). This is understandable because in stressed syllables the mid vowels distinguish between tense and lax, or mid-closed and mid-open, respectively. However, this tense/lax distinction among them is neutralized in unstressed syllables (Kramer 2009). Further, the distinction is now attributed to a distinctive feature on tongue root position (i.e. [ATR]). Thus, phonologically we need only to assume the five-vowel system.

Further, both Italian and English have one important phonological characteristic in common; the front vowels are all unrounded, and other than the low vowel (and the English inverted v), the back vowels are all rounded. In comparison with these, the back vowels in Japanese are

different in that in pronouncing the high back vowel, /u/, the lips are not rounded, while in pronouncing the mid back vowel, /o/, the lips are weakly rounded (Vance 2008). Thus, lip rounding (or [labial]) is not a distinctive feature used in classifying the vowels in Japanese.

3.2.2 Stress and syllable structure

Both Italian and English are stress languages, while Japanese is a pitch-accent (or tone) language. Many linguists claim that one distinctive phonological characteristic of stress is that it is normally culminative (see, for example, Hayes 1995). In other words, each phonological word has a single strongest syllable bearing the main stress in a stress language. This seems to hold true for the two languages. For example, observe the following Italian words, in which the main stress is indicated by the mark (') placed immediately before a stressed syllable:

(13) a. *'sempre* "always"   *'mano* "hand"   *'casa* "house"
      b. *profes'sore* "professor"   *occasi'one* "occasion"
      c. *'ordine* "order"   *ami'cizia* "friendship"

The examples in (13a) show that bisyllabic words usually receive stress on their first syllable. On the other hand, the examples in (13b) indicate that stress goes to a heavy syllable (i.e. a syllable with a long vowel in the examples). The two examples in (13c) display that by the common stress assignment rule of Italian, each word bears its main stress on the antepenultimate syllable (i.e. regardless of its syllable weight) when the second one is light.

English seems to lack one of the rules that we have just seen in (13), because it has no words of a long vowel (in its phonological system) like the stressed *professore* /professo:re/. Except for this language-particular rule, it resembles Italian in terms of stress. For example, according to the antepenultimate stress rule of English, we have such words as *'camera, 'consonant,* and *'prominent* (i.e. the word-final rime being extrametrical). And if the penultimate syllable of a word is heavy, stress normally goes to that heavy syllable, as in *ar'oma.* This fact with regard to syllable weight does not count in Japanese, and thus Italian differs from Japanese in this significant respect.

As it was pointed out above, stress in Italian is sensitive to syllable weight, like in English. Let us now compare the following pair of words:

(14) a. *capello* 'hair'   b. *cappello* 'cap'
          /kapéllo/   /kappéllo/

In both examples, each penultimate syllable (i.e. /pel/) is stressed because it is heavy. In other words, if the penultimate syllable of a word is heavy (i.e. CVV or CVC), it gets stressed. What is important here is the fact that the former (i.e. *capello*) is made up of one foot (i.e. the first syllable being a degenerate foot), whereas the latter (i.e. *cappello*) two feet, supporting the notion of syllable weight.

3.2.3 Loanword phonology

Let us now turn to the syllabication problem of loanwords in Italian. In the recent past, many English words came into Italian, and as a result, they are currently used as loanwords. One interesting fact related to such loanwords is that although the words in the native lexicon of Italian do not basically end in a consonant, no such loanword restriction seems to exist. Look at the following loans from English:

(15) *jet* "jet"   *fax* "fax"   *web* "web"
      film "film"   *jogging* "jogging"   *internet* "Internet"

The examples in (15) end in a consonant or a sequence of consonants, indicating that the once active 'vowel epenthesis strategy' is no longer operative in current Italian.

Whatever reason there may be, however, the fact remains that such recent loanwords ending in a consonant or consonants differ from the same ones in Japanese. As mentioned earlier, a great number of English words came into Japanese in recent times, but no loanword can end in a consonant other than a mora nasal or a consonant cluster in our language. For example, the first English word in (15) remains the same (i.e. monosyllabic) in Italian, whereas it becomes a trimoraic word, *jetto* (pronounced /dʒetto/), in Japanese. It may be true that long ago the rule of vowel epenthesis worked in Italian, because historically it once had a strategy of inserting a mid front vowel when adopting a foreign word ending in a consonant (Kramer 2009). We are not sure, at this juncture, whether Japanese will follow the path of Italian concerning its loanword phonology, but it seems crystal clear that Japanese and Italian are at present different in this area.

3.2.4 Word-internal gemination

Word-internal gemination is another area of study, where we can find some similarities between Japanese and Italian. In Japanese word-internal consonantal gemination occurs frequently, as in *Nippon* ('Japan') and *kitto* ('surely'). A similar phenomenon is observed in Italian. However, as it was stated in Sato (2010), although this type of gemination often occurs in Japanese, [h] and [p] are currently in complementary distribution, belonging to the phoneme /h/, in the native and the Sino-Japanese strata of Japanese vocabulary. Thus these two sounds do not constitute a minimal pair contrast in these two strata. On the other hand, a geminated 'p' (i.e. -*pp*-) contrasts with a single sound in Italian as we have examined in (14), which never happens in Japanese. The same contrast would sometimes be heard in Italian, for example, between *pappa* ('baby food') and *papa* ('pope').

Word-internal consonant clusters are quite limited in Japanese, while the restrictions on such clusters in Italian are more relaxed. In Japanese, for example, only the following type of consonant clusters are allowed:

(16) a. *Kyoto* "Kyoto"   *ryoori* "cooking"

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   b. *suNpyou* " a brief comment"   *hoNryou* "a special character"
       ippyou "a vote"   *kokkyoo* "borders of a country"

These examples show that in Japanese it is possible to have a mora-initial consonant immediately followed by a glide, /j/, as in (16a), and that the types of consonant clusters, word-internally, can be limited to (16b): a mora nasal immediately preceding a consonant (in the Sino-Japanese stratum alone), and an occurrence of identical consonants (in the native and the Sino-Japanese strata). In Italian, word-medial consonant clusters are more varied and numerous in kind. Spencer (1996) says: "a great many constraints in a given language will tend to apply at the level of syllable structure." His statement may be true of some stress languages like Italian and English, but may not be true of tone languages like Japanese, a language which has the mora as the smallest prosodic unit immediately dominated by the foot.

4. Conclusion

   I have thus far argued that although, at first glance, Japanese and Italian look similar in phonology, they are, in fact, very much different from each other with respect to their fundamental phonological systems. Phonologically, Italian is much closer to English than to Japanese in many respects. For example, both Italian and English are stress languages, which could be analyzed by using the identical prosodic hierarchy given in (1). On the other hand, Japanese as a mora(-timed) language may be analyzed by the prosodic hierarchy shown in (2). Therefore, the syllable is not employed as a proper prosodic unit in describing the Japanese phonology.

   I have also shown that as far as our language is concerned, the data provided by many linguists in the past could be reanalyzed within the framework argued for in this paper. Although this paper departs widely from a "mainstream" treatment of Japanese phonology, I strongly advocate the prosodic hierarchy presented in (2), which would no doubt cast more light in accounting for the phonology of the language.

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