This paper seeks to point out the striking similarities which English and (Tokyo) Japanese show concerning the linguistic conditions on the prosodic compound formation process (PCFP). Based on the results of an original study of Japanese compound nouns (cf. Kubozono 1987, 1988, forthcoming), three types of conditions—semantic, branching and rhythmic—are proposed as linguistic factors that commonly constrain the prosodic process in the two languages. This suggests that languages may show a considerable similarity at the abstract level of speech production despite the differences in the phonetic effects of prosodic processes per se. It also suggests that (at least) some conditions on rules and processes are to be defined in the general linguistic theory rather than in the grammar of a specific language.

1. INTRODUCTION

1.1. OVERVIEW. It has been widely known that there are two types of compounds in English, those which are subject to the Compound Stress Rule (CSR) and those which are not. The examples in 1a, for instance, readily undergo the CSR to yield the greatest prominence (main stress) on the initial element, whereas those in 1b fail to undergo the rule to take a main stress on the second element instead (cf. Sweet 1891, Kingdon 1958, Fudge 1984, Ladd 1984). And the recognition of these two types of compounds is known to be essential to the understanding of the phonological structure of 'complex compounds', or compounds consisting of three or more elements (cf. Halle & Keyser 1971). (Capitalized words

* This is a revised version of the paper I read at the Fifth National Conference of the English Linguistic Society of Japan held in November, 1987. It is also a revised version of Kubozono 1988 (Chapter 2) which readers are invited to read for more detailed analyses and exemplification of empirical data of Japanese. The work reported in these papers was partly supported by U.K. Overseas Research Student (ORS) Awards (1985/86) and Nanzan University Research Grant IA (1987). I thank Bob Ladd for his comments and suggestions on their earlier versions. Responsibility of the views expressed in this paper remains mine alone.
bear the main stress):

(1) a. Initially-Stressed Compounds
    BLACKboard, WHITEhouse, GREENhouse

b. Finally-Stressed Compounds
    London ROAD, Christmas PIE, town MEETING

While the existence of the two types of English compounds has been well known and their linguistic differences have been studied in much depth in the literature, very little attention has been paid to the distinction between the two types of compounds in Japanese, which are illustrated in 2 below. Lack of interest in this subject has led to the lack of linguistic analyses of ‘complex compounds’ which apparently show a very complicated accentual behavior. (Japanese accents are marked by an apostrophe (’) throughout this paper.)

(2) a. Compounds which undergo PCFP
    akade’nwa ‘red’ ‘telephone’ = ‘public telephone’
    aozya’sin ‘blue’ ‘picture’ = ‘blueprint’

b. Compounds which fail to undergo PCFP
    zisin soositu ‘self-confidence’ ‘loss’ = ‘noncompos’
    mi’nami haruo ‘Minami Haruo (personal name)’
    seito’kai kaityoo ‘student union’ ‘president’
    = ‘student union president’

1.2. CSR AND CAR. The prosodic compound formation process in English, or the CSR, is a process involving a change in prominence (stress) pattern between the two components. Thus, while phrasal constructions generally take a main stress on the second element by way of the ‘Nuclear Stress Rule (NSR)’, the CSR has an effect of yielding an initially-stressed pattern (cf. Chomsky & Halle 1968, Halle & Keyser 1971):¹

(3) 〈Compounds〉 〈Phrases〉
    Input black board black board
    CSR/NSR BLACK board black BOARD

Output BLACKboard black BOARD

¹ Some phonologists, including Sweet 1891 and Kingdon 1958, analyze phrases (and finally-stressed compounds) as being evenly stressed rather than finally stressed. Under this analysis, the phrasal stress pattern can possibly be seen as a default case, i.e. a case in which the CSR did not simply apply, and the NSR can, therefore, be dispensed with. This line of approach is very interesting but I do not pursue it any further here.
While the PCFP in English is thus a process modifying prominence pattern between the components of compounds, that of Japanese is generally treated as an accent (re)assignment process which can be formulated as the ‘Compound Accent Rule (CAR)’ (cf. Akinaga 1966, McCawley 1968, Martin 1975). This rule involves a change in the accent pattern of component words by way of accenting and deaccenting, and the compound accent pattern that results contrasts with that of phrasal constructions (i.e. phrasal accent pattern) in which the accent patterns of their components remain intact without undergoing such an accentual modification.2

(4) <Compounds> <Phrases>
Input a'ka denwa akai denwa
CAR akade'nwa akai denwa
Output akade'nwa akai denwa
‘public telephone’ ‘red telephone’

In determining the compound accent pattern, the accent pattern and phonological length of the second element play a crucial role while the accentual properties of non-final elements are essentially irrelevant. In principle, the longer the final element is, the more predictable is the accent of the compound of which it forms the final part. The crucial boundary falls between compounds whose final element is three or more morae long3 (henceforce ‘compounds with a long final element’: cf. McCawley 1968) and those whose final element is not more than two morae long (i.e. ‘compounds with a short final element’).

Compounds with a long final element show a high degree of regularity regarding their accentual patterns. The general rule is to remove the accent of the first element if it is accented and retain the accent of the final element as a compound accent. If the final element is either an unaccented word (of which Japanese has many) or a word accented on its final syllable, the compound accent is placed on its first syllable as a default pattern. The examples in 5 illustrate this.

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2 In addition to this accentual difference, compound constructions differ from their phrasal counterparts in often undergoing rendaku, or ‘sequential voicing’ process (Martin 1952: 48) as well as morphological changes whereby their components are nominalized, often accompanied by accentual changes: e.g. akai → a'ka.

3 Both the syllable and the mora are relevant phonological units in Japanese. See Kubozono 1988 and Vance 1987 for the distinction and the roles of these two units.
(5) Compound Nouns With a Long Final Element
a. sya'kai + se'ido → syakaise'ido
   ‘society’ ‘system’ ‘social system’
b. iso'ppu + monoga'tari → isoppumonoga'tari
   ‘Aesop’ ‘story’ = ‘Fables of Aesop’
c. Kyooiku + zyooke'n → kyooikuzyo'oken
   ‘education’ ‘condition’ = ‘educational conditions’
d. a'ka + denwa → akade'nwa
   ‘red’ ‘telephone’ = ‘public telephone’

In contrast to compounds with a long final element, those with a short
element exhibit a somewhat complicated situation. McCawley 1968 di-
vides ‘short’ second elements into three classes depending upon the com-
pound accent pattern they yield: (a) ‘preaccenting’ morphemes (marked
as {+PreAcc} in what follows), which put a compound accent on the last
syllable of the first element; (b) ‘deaccenting’ morphemes ({+DeAcc}),
which yield unaccented compounds; and (c) ‘initial-accenting’ mor-
phemes ({+InAcc}), which take a compound accent on their first
syllable. The examples in 6 illustrate these three types of morphemes
and compounds of which they form the final part:

(6) Compound Nouns With a Short Final Element
a. ka'buto + musi → kabuto'musi
   ‘helmet’ ‘insect’ = ‘beetle’
b. sya'kai + to'o → syakaitoo
   ‘society’ ‘party’ = ‘Socialist Party’
c. pe'rusya + ne'ko → perusyane'ko
   ‘Persia’ ‘cat’ = ‘Persian cat’

While the CSR and the CAR differ in their phonetic effects, it must be
pointed out that the two rules resemble in the phonological effect they
produce. In English, the CSR has an effect of assigning ‘a main stress
near the beginning of the combination, rather as single words have a
tendency to bear penultimate or antepenultimate stress rather than final
stress’ (Fudge 1984: 135). In Japanese, similarly, the CAR is not simply
an accent (re)assignment rule but is a process yielding one unified pho-
nological word, or ‘accentual phrase’ as I call it, which involves at most
one lexical accent just like single words. In fact, the more essential na-
ture of the compounding process in Japanese is not one of accent (re)as-
signment, as might have been assumed, but one of accentual unification
or phrasing whereby a single accent unit (accentual phrase) results out of
two (or more) syntactic words each of which can potentially constitute an
independent accentual phrase.

The fact that prosodic compound rules in English and Japanese show such a similarity should come as no surprise since 'compounding' is, by definition, a process whereby one word is produced out of the string of two (or more) words. In phonological terms, this means that 'compounding' produces one unified phonological word out of the string of two (or more) syntactic words each of which can potentially constitute an independent phonological word.

2. SEMANTIC CONSTRAINT ON PCFP

2.1. TWO TYPES OF COMPOUNDS. Having understood that the PCFP is essentially a process unifying two potential phonological words into one both in English and Japanese, let us now consider the linguistic structures of the two types of compounds in the two languages. Given the fact that compounds which fail to undergo the PCFP (CSR/CAR) take the same phonological (stress/accidental) pattern as phrasal constructions in the two languages, one may be inclined to think that this apparently exceptional type of compounds should be treated as phrases, not as compounds. This approach may be attractive as these phrase-type compounds behave exactly like phrases in phonological terms. However, it can be refuted for several reasons, the most important being that no clear borderline can be drawn between the compound-type and phrase-type compounds. For example, the expressions in 7 are syntactically indistinguishable from those in 1b but, unlike the latter, they are subject to the CSR. Likewise, the expressions in 8 readily undergo the CAR although they are indistinguishable from those in 2b in syntactic/morphological terms. In addition, Japanese poses a further complicated situation where one and the same expression shows an accentual fluctuation between (i) compound accent pattern and (ii) phrasal accent pattern, as shown in 9 (cf. Kubozono 1987, 1988, forthcoming).

(7) LONDON Street, CHRISTMAS cake, FACULTY meeting

(8) kioku soositu → kiokuso'ositu
‘memory’ ‘loss’ = ‘amnesia’
rona'rudo re'egan → ronarudore'egan ‘Ronald Reagan’
se'iito kaityoo → seitoka'iityoo
‘student’ ‘president’ = ‘student union president’

See Kubozono 1988 for other reasons.
Given the examples as in 7-9, it is clear that there is no syntactic reason for saying that *London ROAD* and *seito’kai kaityoo* are noun phrases whereas *LONDON Street* and *seitoka’ityoo* are compound nouns: If the latter group of words are to be recognized as ‘compound nouns’, the former group should also be treated as such. Thus we have no alternative but to recognize a second type of compounds which fail to undergo the PCFP (CSR or CAR) and whose phonological structure is consequently identical with that of phrases.

2.2. **Semantic Constraint.** Although no clear borderline can be drawn between the two types of compounds in either language, as noted just above, this does not mean that their distinction is entirely arbitrary in linguistic terms. On the contrary, a careful examination of the second type of compounds suggests that the distinction can be linguistically generalized to a considerable extent both in English and Japanese, and moreover, that the two languages show a striking similarity in this respect.

Generally speaking, the two types of compounds can be differentiated essentially on semantic grounds in both languages, and the second type of compounds can be seen as a marked type of compounds, compounds in which the PCFP is blocked because of the marked semantic structure involved, or the ‘semantic constraint’ on the PCFP. In English, for example, the compounding process is generally blocked if compounds represent a proper noun, including those involving a personal name as in 10b. Similarly, the PCFP fails to take place in those compounds of which the first element represents either a time or a place (including an organization, as in 11b). Moreover, compound nouns whose component words constitute a coordinate relation generally fail to undergo the CSR. 10-12 illustrate these three cases (cf. Adams 1973, Fudge 1984, Ladd 1984).

(10) a. London ROAD, Eiffle TOWER, Cambridge UNIVERSITY, Lake HURON, River THAMES, Loch NESS
    b. Professor HIGGINS, President REAGAN
Henry HIGGINS, Ronald REAGAN

(11) a. summer HOLIDAY, morning PAPER, Christmas PIE
city HALL, lawn TENNIS, Channel FERRY

b. department CHAIRMAN, company EXECUTIVE,
team MANAGER, university PROFESSOR

(12) producer-DIRECTOR, king-EMPEROR,
historian-POLITICIAN

There is, as is well known, no single principle which can characterize all these marked semantic structures exhaustively (cf. Fudge 1984, Ladd 1984). Nor is there apparently any precise parallelism in Japanese, in which one can easily find compound nouns which are subject to the CAR although they involve semantic structures comparable to some of the English examples given in 10-12:

(13) a. tookyoo daigaku → tookyooda’igaku
‘Tokyo’ ‘university’ = ‘Tokyo University’

b. natu’ yasumi’ → natuya’sumi
‘summer’ ‘holiday’ = ‘summer holiday’
si’ yakusyo → siya’kusyo
‘city’ ‘hall’ = ‘city hall’

A glance at these examples might give the impression that the content of the semantic constraint varies greatly from language to language. A careful examination of the semantic constraint in the two languages (cf. Kubozono 1987, 1988), however, reveals that most of the semantic structures which reject the application of the CAR in Japanese reject the application of the CSR in English, although not vice versa. To put it another way, most of the semantic structures which form the semantic constraint in Japanese constitute a semantic constraint in English too. For example, among the compound nouns representing a proper name, those representing a personal name are immune from the effect of the PCFP (CAR) in Japanese although those representing a non-personal name readily undergo the process, as shown in 13. Similarly, the Japanese PCFP is generally blocked in compound nouns whose first element represents an organization although it is not blocked if the first element represents an ordinary place. Moreover, the coordinate structure generally blocks the application of the PCFP in Japanese just as it does in English. 14-16 illustrate these three cases:

(14) yu’kawa kyoozyu ‘Professor Yukawa’
re’egan daito’oryoo ‘President Reagan’
mi’nami haruo ‘Minami Haruo (personal name)’
(15) seito’kai kaityoo ‘student union president’
    se’ihu kookan ‘government official’

(16) i’ppu tasai ‘one husband’ ‘many wives’ = ‘polygamy’
    ha’kusyu kassai ‘handclap’ ‘ovation’ = ‘applause’

This line of evidence suggests that the PCFP is blocked by certain types of semantic structures in English and Japanese alike, which, in turn, suggests that the prosodic process may be conditioned by some universal semantic principle to a certain extent. If so, a further cross-linguistic study of this issue may enable us to define the principle that differentiates the marked semantic structures from the unmarked structures.5

2.3. GENERALIZATIONS ON SEMANTIC CONSTRAINT. Having pointed out that similar semantic structures form a semantic constraint in English and Japanese, it may be worth spending a few paragraphs to describe the effect of this constraint in complex compounds. In English, the notion of semantic constraint adequately accounts for the stress pattern of such complex compound nouns as in 17, which attract the main stress on the second element.

(17)

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       S
      /
     /  
   w   s   w
```

parent-TEACHER association

A comparable situation can be found about Japanese too, where one can find many compounds which fail to unify themselves into one accentual phrase. One of the major sources of these multi-phrasal compounds is those which are subject, in some way or other, to the semantic constraint briefly sketched above. In fact, as compounds become longer and involve a more complicated structure, they are more likely to involve two nouns subject to this constraint. 18 illustrates the effect of the

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5 Seen in this light, the semantic account proposed by Suiko 1987 appears rather interesting. His attempt to generalize the English data on the basis of the semantic relationship between the two elements of a compound may provide a principled account of the ‘core’ of the marked semantic structures in English and Japanese.
semantic constraint in three-element compound nouns of which the first two component words involve a coordinate relation, e.g. 18a–18b, or the sequence of an organization plus a position in it, e.g. 18c.\(^6\)\(^7\)

\[(18)\]

a. \[[i'ppu tasai] seido\] → i'ppu tasaise'ido
   'one husband' 'many wives' 'system' = 'polygamy'
b. \[[ma'rukusu re'enin] syu'gi\] → ma'rukusu reeninsyu'gi
   'Marx' 'Lenin' 'principle' = 'Marxism-Leninism'
c. \[[seito'kai kaityoo] se'nkyo\] → seito'kai kaityoose'nkyo
   'student union' 'president' 'election'
   = 'student union president election'

The effect of the semantic constraint can be further found in more complex compound constructions. Uniformly left-branching compound nouns whose initial two members are subject to the semantic constraint, for example, show the accentual pattern as shown in 19, whereby the first element constitutes an accentual unit independently of the rest of the compound.

\[(19)\]

\[[[ma'rukusu re'enin] syu'gi] sisoo\]
→ ma'rukusu reeninsyu'gisoo
   'Marx' 'Lenin' 'principle' 'idea'
   = 'Marxism and Leninism Theory'

\[[[seito'kai kaityoo] se'nkyo] kitei\]
→ seito'kai kaityoose'nkyokitei
   'student union' 'president' 'election' 'rules'
   = 'student union president election regulation'

The semantic constraint can apply more than once within a given compound expression, decomposing it into more than two accentual units. Although instances of this accentual pattern are rare, this is simply because few compound nouns involve the marked semantic structures in question more than once, not because the semantic constraint fails to apply to such compounds. Thus, the tripartite accentual pattern

\(^6\) Many of the compounds of this type can yield a mono-phrasal accentual pattern as a variant pronunciation depending on various pragmatic factors: e.g. 18a ipputa-saise'ido (cf. Kubozono 1988). The existence of such a variant accentual pattern, however, does not constitute any evidence against the notion of semantic constraint I have proposed here, for unmarked left-branching compounds as in 21b never fail to unify themselves into a single accentual unit.

\(^7\) These cases involve a discrepancy between the syntactic (constituent) and phonological structures. See Kubozono 1988, forthcoming for the theoretical implications of this phenomenon.
in 20 results if the first three nouns constitute a coordinate structure.

(20) \[\text{kyooiku ka'gaku bu'nka} \text{ ki'kan}\]
\[\rightarrow \text{kyooiku ka'gaku bunkaki'kan}\]
‘education’ ‘science’ ‘culture’ ‘organization’ = ‘(UN)ESCO’

3. **Branching Constraint on PCFP**

3.1. **Syntactic Asymmetry.** Up to this point, we have considered only those compounds which involve the left-branching structure. However, both English and Japanese permit compounds involving the right-branching structure and, for that matter, compounds uniformly organized by this branching structure (i.e. uniformly right-branching compounds) as well. Although the number of these compound constructions is relatively small, a detailed analysis of this marked type of compound structure and its characteristic phonological behavior reveals several interesting similarities between English and Japanese compounds. One such similarity which has been revealed by the present analysis is that English and Japanese show an interesting common tendency with respect to their syntactic (constituent) structure. That is, both in English and Japanese, compounds with a left-branching structure like those in 21 outnumber those with a right-branching structure as in 22 (cf. Chomsky & Halle 1968: 92, Kubozono 1988). This tendency shows up more distinctly in more complex compound constructions: the uniformly left-branching structure, as given in 23, accounts for a majority of four-element compounds, followed by constructions involving the combination of the two types of structures, 24–26, while the uniformly right-branching structure as given in 27 accounts for the least part.

(21) a. [[community center] building]
[[computer class] instructor]

b. [[sy’a’kai syu’gil] ko’kka]
‘society’ ‘principle’ ‘nation’ = ‘socialist state’

(22) a. [evening [computer class]], [kitchen [towel rack]]

b. [ze’nkoku [yo’ron tyo’osa]]
‘whole land’ ‘public opinion’ ‘survey’
\[= \text{‘nation-wide opinion poll’}\]

[ta’nki [ka’igai ryuugaku]]
‘short period’ ‘foreign land’ ‘study abroad’
\[= \text{‘short-time study abroad’}\]

(23) a. [[[law degree] requirement] changes]
[[[labor union] president] election]
While it seems clear that complex compounds in English and Japanese show such a common syntactic asymmetry (i.e., an asymmetry in the sense that the left-branching structure is much preferred to the right-branching counterpart), the reason for this asymmetry is not clear. One plausible account will be to link it to the unmarked word order, that is, to the fact that both English and Japanese favor the word order [modifier + head] rather than [head + modifier]. This account may be supported by Ladd’s (personal communication) observation that the right-branching structure appears to be preferred in French, a typical [head + modifier] language. According to Ladd, right-branching compounds as the following can be found in French, in which compounds of more than two members are relatively rare in general: [voiture [nouvelle model]] ‘car’ ‘new’ ‘style’ = ‘a new-style car’; [version [canape [two places]]] or [[version canape][two places]] ‘version’ ‘settee’ ‘two’ ‘seats’ = ‘two-seat settee version’.
relationship between word formation and sentence structure, although I do not propose to explore it any further here.

3.2. BRANCHING CONSTRAINT. A second and more interesting similarity between English and Japanese concerning right-branching compound constructions is that the PCFPs in the two languages are equally subject to a constraint, which I term 'branching constraint', which can be generalized on the basis of the syntactic (branching) structure of compounds. Thus, while the PCFP is in no way blocked in left-branching compounds as shown in 28 (unless, of course, it is subject to the semantic constraint outlined above), it is generally blocked where a right-branching structure is involved. To be more specific, right-branching three-element compounds generally yield a phrasal stress/accent pattern between the first element and the rest, as shown in 29, thereby producing the main stress on the second element in English (cf. Halle & Keyser 1971) and introducing an accent phrase boundary between the first element and the rest in Japanese (cf. Kubozono 1985) respectively.9,10

(28) (= 21)
    a. [[COMMUNITY center] building]
       [[COMPUTER class] instructor]
    b. [[syā’kai syū’gi] ko’kka] → syakaisyugiko’kka

(29) (= 22)
    a. [evening [COMPUTER class]], [kitchen [TOWEL rack]]
    b. [ze’nkoku [yo’ron tyo’osa]]
       → ze’nkoku yorontyo’osa
       [ta’inki [ka’igai ryuugaku]]
       → ta’nki kaigairyu’ugaku

The validity of the branching constraint thus sketched is further substantiated by the fact that it is also capable of accounting for the phonological patterns of more complex compound constructions. Thus, English compounds consisting of four elements generally take the main

9 In Japanese, this type of syntax-related prosodic asymmetry is found with some other prosodic processes too (cf. Kubozono 1988).
10 Like many of the compound nouns as in 18 (cf. note 6 above), many of the compounds of the type in 29b admit, under certain circumstances, of a variant pronunciation whose accentual (and intonational) patterns are indistinguishable from those of unmarked left-branching compounds as in 28b: e.g. 29b zenkokuyorontyo’osa (cf. Kubozono 1988).
stress on the left-most element dominated by the (inner-most) right-branching node, as illustrated in 30 (cf. Liberman & Prince 1979: 258-9). The same principle adequately accounts for the accentual phrasing patterns of Japanese counterparts, as given in 31, in which the CAR is blocked wherever a right-branching structure is involved.

(30)  
a. (= 24a) [[law degree] [LANGUAGE requirement]]  
b. (= 25a) [[evening [COMPUTER class]] instructor]  
c. (= 26a) [Labor [[HOME affairs] spokesman]]  
d. (= 27a) [world [amateur [BASEBALL championship]]]

(31)  
a. (= 24b) [[ke'izai taisaku] [kakuryoo ka'igil]]  
   → keizaitaisaku kakuryooka'igi  
b. (= 25b) [[ze'nkoku [yo'ron tyo'osa]] kekka]  
   → ze'nkoku yorontyoosake'kka  
c. (= 26b) [ni'tibei [[lanzen hosyoo] zyooyaku]]  
   → ni'tibei anzenhosyoozyo'yaku  
d. (= 27b) [ni'kkan [te'iki [kakuryoo ka'igil]]]  
   → ni'kkan te'iki kakuryooka'igi

Against this syntax-based generalization, it might be hypothesized that the phonological pattern characteristic of the right-branching compound structure is due to the semantic constraint outlined in section 2 above. A glance at the examples given in 29-31 may suggest that this speculation is true as many of the right-branching compounds in English and Japanese alike take, in relevant positions, a noun denoting a 'place' or 'time' (e.g. kitchen, evening, ze'nkoku, ta'nki), the types of nouns which often block the PCFP in the two languages: cf. 11 and 15. While it is interesting to note that English and Japanese show an identical tendency in this respect, it must be emphasized that it does not invalidate the notion of 'branching constraint' or the generalization on syntax. That the stress patterns in 29a and 30 and the accentual splits in 29b and 31 are essentially attributable to the structural configuration of compounds, and not to any semantic factors, is clearly shown by the fact that the PCFP readily takes place if the right-branching structure is 'resolved' (cf. Chomsky & Halle 1968, Kubozono 1988):

(32)  
a. [EVENING class], [KITCHEN rack]  
b. [ze'nkoku tyo'osa] → zenkokutyo'osa  
   'national-wide survey'  
   [ta'nki ryuugaku] → tankiryu'ugaku  
   'short-time study'
3.3. EXCEPTIONS TO BRANCHING CONSTRAINT. Having seen that English and Japanese compounds are equally subject to what can be defined as 'branching constraint' and that the only major difference between the two languages in this regard is, in fact, one of realization, it may be desirable to point out that the two languages show a further similarity as to the exceptions to this constraint. Some typical examples are given in 33 and 34 below.

(33) [math [hand book]] → MATH handbook, *math HANDbook
[steel [ware house]] → STEEL warehouse, *steel WAREhouse

(34) a. [iso’ppu [mono’ katari]] → isoppumonoga’tari
    *iso’ppu monoga’tari
    ‘Aesop’ ‘thing’ ‘narration’ = ‘Fables of Aesop’
[ki’nu [ori’ mono’]] → kinuori’mono
    *ki’nu ori’mono
    ‘silk’ ‘weave’ ‘thing’ = ‘silk fabrics’
b. [si’ritu [yoo’ti e’n]] → sirituyooti’en
    {+PreAcc} *si’ritu yooti’en
    ‘private’ ‘infancy’ ‘garden’ = ‘private kindergarten’
[si’nri [ge’ngo ga’ku]] → sinrigengo’gaku
    {+PreAcc} *si’nri gengo’gaku
    ‘psychology’ ‘language’ ‘-ology’ = ‘psycholinguistics’

These compound nouns involve a right-branching structure just as those in 22 above, but, unlike the latter, undergo the PCFP without being subject to the branching constraint. What is interesting about these instances is that their right-hand component forms a virtually ‘lexicalized’ or ‘etymological’ compound in the sense that the compoundedness of the two elements is hardly recognized by native speakers. In English, the last two elements of this type of compounds are so deeply fused as to be spelled as a single word. Essentially the same account holds true of the Japanese compound nouns, which involve a bound (or ‘nearly-bound’) form as one of its members: e.g. a deverbal noun like katari and ori in 34a, or a bound Sino-Japanese morpheme like e’n and ga’ku in 34b. Seen in this light, it can be argued that the right-hand component of the compounds in 33 and 34 are so tightly bound that their internal branching structure is somehow masked in the lexicon of the speakers.

4. RHYTHMIC CONSTRAINT ON PCFP

4.1. FACTS. In the foregoing discussion, I outlined two types of constraints which commonly condition the PCFP in English and Japanese.
While these two constraints account for almost all instances of phrasal stress/accent pattern shown by compounds in the two languages, there are yet a handful of instances which remain unaccounted for. In English, for instance, uniformly left-branching four-element compounds like those in 23a often permit two stress patterns, as given in 35, one in which the main stress is placed on their initial element, the other in which the third element is as prominent as the initial one (cf. Selkirk 1984: 248–9).

\[(35) \quad (= 23a)\]

\[\begin{array}{ll}
   & a. \quad (i) \quad [[[LABOR union] president] election] \\
   & \quad \quad \quad (ii) \quad [[[LABOR union] PRESIDENT] election] \\
   & b. \quad (i) \quad [[[LAW degree] requirement] changes] \\
   & \quad \quad \quad (ii) \quad [[[LAW degree] REQUIREMENT] changes]
   \end{array}\]

Of these two stress patterns, 35i represents the basic pattern predicted by the CSR, as shown by the metrical representation in 36. By contrast, 35ii represents a variant stress pattern which involves additional prominence on the third element, and is hence very similar, if not identical, to the bipartite foot structure shown by the symmetrically-branching compound constructions in 30a (cf. 37).

\[(36) \quad (37)\]

Comparable compound constructions in Japanese, e.g. 23b, also generally permit two accentual patterns as shown in 38: (i) a monophrasal pattern whereby whole compound expressions are fused into one accentual phrase, and (ii) the same bipartite pattern as shown by the symmetrically branching compounds in 31a, whereby the whole expressions are phrased into two accentual units with the PCFP blocked between the second and third elements.\(^{11}\) The first three component words of these compounds invariably yield one accentual phrase when they stand by themselves, as

\(^{11}\) The split of the sort in 38ii—and the resultant phonological neutralization with the symmetrically-branching structure in 31a—is also found in other phonological processes in Japanese like the intonational phrasing process and downstep (cf. Kubozono 1988).
shown in 39, suggesting that the addition of a fourth element triggers the optional split in uniformly left-branching compounds.

(38) (= 23b)

[[[toonan a'zia] syo'koku] rengoo]
→ (i) toonanaziasyokokure'ngoo
   (ii) toonana'zia syokokure'ngoo
[[[sa'n kootai] ki'nmu] se'ido]
→ (i) sankootaikinmuse'ido
   (ii) sanko'otai kinmuse'ido

(39) [[toonan a'zia] syo'koku] toonanaziasyo'koku
     *toonana'zia syo'koku

'Southeast Asian nations'
[[sa'n kootai] ki'nmu] sankootaiki'nmu
     *sanko'otai ki'nmu

'three-shift work'

A comparison of the metrical variation in 35 and the accentual variation in 38 reveals three points of interest in which English and Japanese are similar. First, the compounds in question all involve a uniformly left-branching structure, an 'unmarked' structure which is free from the branching constraint outlined in section 3. Second, they consist of four (or possibly more) elements. And third, the PCFP is optionally blocked in such a way that the resultant pattern becomes a phonologically symmetrical, well-balanced one rather than a 'monotonous' metrical/accentual structure made up of four elements. The last point can be seen clearly from the fact that no additional prominence is generally allowed to be put on either the second or fourth element in English compounds, as shown in 40a, and that no optional accentual split is observed at other logically possible places in Japanese compounds, as shown in 40b.

(40) a. *[[[LABOR UNION] president] election]
   *[[[LABOR union] president] ELECTION]

b. [[[toonan a'zia] syo'koku] rengoo]
   → *toonan aziasyokokure'ngoo
      *toonanaziasyo'koku rengoo

In view of this, it will be more than natural to assume that the variation in stress pattern in 35 and the accentual variation in 38 are governed by a certain common principle. In both of these two cases, the sequence of four elements are regrouped into two subgroups of two, or to be more specific, monotonous sequences of four elements are reorganized into a well-balanced structure. In the PCFP in Japanese, this reorganization
results in the splitting of one long phrase into two, phonologically neu-
tralizing the uniformly branching structure and the symmetrically-
branching structure. In the case of English, the same principle yields an
additional boost in stress prominence on the third element of the uni-
formly left-branching strings. Seen in this light, it can be said that the
prominence boost in English compounds and the accentual split in
Japanese compounds are not isolated idiosyncratic phenomena but
represent some abstract, (quasi-)universal principle which has the effect
of converting otherwise monotonous patterns into alternating and, in
that sense, more rhythmic ones at an abstract level of phonology.

4.2. Principle of Rhythmic Alternation. Given the facts and a
preliminary generalization concerning the seemingly similar stress/
accent variation in English and Japanese, it is important to refer here to a
well-known fact from non-linguistic research. It is often assumed in
various areas related to human psychology that the human mind tends to
seek in every kind of motor action a rhythmic pattern, or a pattern charac-
terized by ‘an ordered alternation of contrasting elements’ (Crossley-
Holland 1978: 744) (cf. Woodrow 1951, Fraisse 1963). This tendency is
evident with the perception side of human performance as well as the
production side. In discussing the nature of human perception in
general, for instance, Allen (1975: 76) states as follows:

With regular sequences of stimuli, such as a sequence of nearly
identically spaced nearly identical clicks, the structures usually
perceived are simple groupings of two to six successive stimuli per
group. Each group has one of its pulses perceptually stronger,
usually the first or the last, but in groupings by fours a secondary
weak beat is often perceived on the pulses next but one to the
‘strong’ pulses, giving a fully alternating rhythm.

Given the principle of the subjective grouping and rhythmic organiza-
tion in perception, it will not be so unrealistic to suppose that the human
mind seeks to apply the same rhythmic principle in the production of
speech. That is, that sequences of four elements are regrouped into two
plus two in order to create rhythmic sequences out of otherwise monoton-
onous patterns. If this is the case, the stress/accentual variations in
English and Japanese compounds can now be characterized as manifesta-
tions of a general, abstract principle which, following Selkirk 1984, I call
the ‘Principle of Rhythmic Alternation (PRA)’.12

5. CONCLUSION. In the foregoing discussion, I proposed three types of conditions which commonly constrain the PCFP in English and Japanese, claiming that the compounding processes in the two languages exhibit some strikingly similar patterns at the abstract level in spite of the considerable differences in phonetic realization. We have seen, first of all, that the two languages show a considerable similarity as to the content of the Semantic Constraint: compound nouns of certain semantic structures tend to constitute a constraint on the PCFP in both languages. Second, the prosodic process is blocked in both languages if the right-hand element of a (part of) compound itself branches (Branching Constraint). In other words, both of the two languages phonologically mark the right-branching structure as opposed to other branching structures, showing the markedness by blocking the PCFP. Where the process fails to take place, the phrasal pattern is automatically assigned as a default pattern in either language, giving the marked compound structure the same prosodic pattern as a comparable phrasal construction. The fact that the right-branching structure exhibits a marked phonological behavior appears more interesting when considered in conjunction with the fact that compounds involving the left-branching structure outnumber those involving the right-branching counterpart both in English and Japanese. These two facts combined suggest that syntactically marked structures may be treated as marked structures in prosodic terms too. A more extensive inquiry into this issue may provide an interesting insight into the abstract relationship between syntax and phonology. And last, English and Japanese show a similar variation in uniformly left-branching compounds, which I claim should be attributed to a common rhythmic principle, or PRA.

Several questions remain to be answered, as pointed out in passing. However, the fact remains that two linguistically independent languages

12 Given the popularly accepted view that Japanese is a typical ‘syllable-timed’ language, this implies that the PRA (or ‘rhythm of alternation’ to use Allen’s 1975 terminology) exists in the phonological system of the language alongside the principle of rhythmic succession (PRS or ‘rhythm of succession’). This consequence has a far-reaching implication for the rhythmic structure of Japanese, and for the general phonological theory of speech rhythm in general (cf. Kubozono 1988, forthcoming). See Kubozono (in preparation) in which I will discuss, with more evidence for the PRA in Japanese phonology, how the two rhythmic principles interact therein.
involve essentially identical conditions on a phonological process, which suggests that these conditions can possibly be defined as universal constraints on the PCFP. A detailed cross-linguistic analysis is expected to confirm this speculation.

REFERENCES


