Categorical and Non-categorical Variation

in English Stress Assignment*

Hideki Zamma

Kobe City University of Foreign Studies

ABSTRACT.　The purpose of this paper is twofold. First, based on a comprehensive investigation utilizing the *SOED*, I will show that some differences in English stress assignment are categorical, while others are non-categorical -- a difference which has not been studied in the literature. I will further argue that Partial Ordering Theory (proposed by Anttila (2002)) can properly accommodate such variation. This analysis predicts another pattern of variation among stress patterns, which is actually observed in English, suggesting appropriateness of the analysis.

Keywords: categoricality, stress patterns, English suffixes, Partial Ordering Theory

1. Introduction

　　As summarized in Zamma (2003, 2005a), English has the following five major stress patterns; extrametrical (where stress falls on the antepenult if the penult is light as in (1a)); non-extrametrical (where stress falls on the light penult as in (1b)); non-retracting (where stress falls on the last syllable as in (2a-d)); strongly-retracting (where stress falls on the antepenult as in (3a)); and weakly-retracting (where stress falls on the penult if it is heavy as in (3b)). Representative suffixes of each pattern are summarized in (4).

(1) a. (nátu)<ral>　　(húmo)<rous>　(dómi)<nant>　(áddi)<tive>

　　 b. alco(hóli)<c>　a(tómi)<c>　　ti(táni)<c>　　　sym(phóni)<c>[1]

(2) a. Jàpanése, Chìnése, Vìetnamése, Pòrtuguése, jòurnalése

　　 b. ènginéer, vòluntéer, pìonéer, mòuntainéer, àuctionéer, pùppetéer

　　 c. àrabésque, Ròmanésque, pìcarésque, pìcturésque, gròtésque

　　 d. nòvelétte, kìtchenétte, màrionétte, màisonétte, cìgarétte

(3) a. désignàte, démonstràte, cónfiscàte; sátisfỳ, récognìze, ánecdòte, ásymptòte

　　 b. ellípsòid, mollúscòid, stalágmìte, gelígnìte, eleméntary, perfúnctory, reféctory[2]

(4) a. extrametrical suffixes:　　-ity, -ion, -(i)an, -al, -ous, -ive, etc.

　　 b. non-extrametrical suffixes: -ic, -id, etc.

　　 c. non-retracting suffixes:　　-ese, -eer, -esque, -ette, etc.

　　 d. strongly retracted suffixes: -ate, -(i)fy, -ize, etc.

　　 e. weakly retracted suffixes:　-oid, -ite, -ary, -ory, etc.

These facts are not new, having been studied by many researchers such as Chomsky and Halle (1968), Liberman and Prince (1977) and Hayes (1980). In the literature, however, it is generally assumed that a suffix categorically shows one of the possible stress patterns.

Liberman and Prince (1977), for example, give an analysis in which *-oid* is assigned a Weak Retraction rule while *-ate* gets a Strong Retraction rule. Words which do not conform to these observations are simply treated as 'exceptions.'

A closer investigation shows that this is not an adequate way of dealing with the stress patterns of suffixes. Surveying a large corpus of the *Shorter Oxford English Dictionary (SOED)*,[3] I found that while some suffixes do show such categorical stress patterns, others do not. In the latter cases, quite a few suffixes show variant stress patterns. We will see this difference in the degree of consistency in the next section.

2. Categorical and Non-categorical Patterns
2.1. Categorical Suffixes

In (5), I counted the frequencies of words in the *SOED* having a particular stress pattern for several suffixes. The suffixes all show more than 90% consistency in their stress patterns. In other words, we can categorically regard *-ity* as extrametrical, *-ic* as non-extrametrical, *-ese/-eer/-esque/-ette* as non-retracting, and *-ane* as weakly-retracting suffixes. 'Optional' is a category for words which show both patterns.

(5) a.

	extrametrical	non-extrametrical	optional	total
-ity	613 (100%)	0 (0%)	0 (0%)	613 (100%)
-ic	19 (1.3%)[4]	1399 (98.1%)	8 (0.6%)	1425 (100%)

b.

	retracting	non-retracting	optional	total
-ese	2 (2.1%)[5]	92 (97.9%)	0 (0%)	94 (100%)
-eer	0 (0%)	32 (100%)	0 (0%)	32 (100%)
-esque	0 (0%)	73 (100%)	0 (0%)	73 (100%)
-ette	5 (3.9%)[5]	120 (93.8%)	3 (2.3%)[5]	128 (100%)

c.

	Weak Retraction	Strong Retraction	optional	total
-ane	12 (100%)	0 (0%)	0 (0%)	12 (100%)

As for (5c), the table does not mean that only 12 words with the suffix *-ane* are found: I actually found 55 words in the *SOED* with this suffix. Rather, it means that 12 words were found with a heavy syllable in the penultimate position.[6] Note that the difference between Strong Retraction and Weak Retraction is whether the penultimate heavy syllable is assigned primary stress or not. If the stress is assigned to that syllable, Weak Retraction applies to the word; if it is not, Strong Retraction applies.

Although there are no Strong Retraction suffixes in (5), possible candidates for that pattern are the so-called compound-forming elements (cf. Fudge (1984)), such as *-lite, -phile, -phone, -sphere* and *-type*. These Greek morphemes show a categorical Strong Retraction pattern, but it is not clear if these should be treated in exactly the same way as suffixes. I

merely point out here the facts concerning the categorical Strong Retraction pattern, and leave the issue of its status open.

2.2. Non-categorical Suffixes

In the *SOED*, some suffixes show both Strong and Weak Retraction patterns. As shown in (6), *-ary, -ate, -ize* and *-ite* show both patterns, although they are only treated as Strong Retraction (*-ate* and *-ize*) or Weak Retraction (*-ary* and *-ite*) suffixes in the literature (see (4)). The number of words which belong to the other pattern is too large to simply regard them as 'exceptions'.

(6)

	Weak Retraction	Strong Retraction	optional	others	total
-ary	43 (36.1%)	30 (25.2%)	3 (2.5%)	43 (36.1%)	119 (100%)
-ate	35 (18.6%)	114 (60.6%)	14 (7.4%)	25 (13.3%)	188 (100%)
-ize	6 (24.0%)	12 (48.0%)	2 (8.0%)	5 (20.0%)	25 (100%)[7]
-ite	40 (45.5%)	26 (29.5%)	9 (10.2%)	13 (14.8%)	88 (100%)

In (7)-(10), I give examples of words with a root base (a- and b-examples) and those in which the stress of the base word is shifted (c- and d-examples). In both cases, the Strong Retraction (a- and c-examples) and the Weak Retraction patterns (b- and d-examples) are found. Underlined vowels indicate that they are long.

(7)   a.   cólumbary, óctonary, sédentary, vóluntary
       b.   abecédary, anivérsary, conséctary, duodénary, quatérnary, septuagénary
       c.   ántiquary (< antíque), plebíscitary (< plébiscite), resíduary (< résidue)
       d.   compleméntary, documéntary, eleméntary, evangelístary, reféndary

(8)   a.   áltercate, áuscultate, bífurcate, cómpensate, cónfiscate, cóntemplate, íllustrate
       b.   adnúmbrate, averrúncate, detúrpate, discúlpate, elíxate, expíscate, obúmbate
       c.   ácerbate, ádvocate, ántiquate, áspirate, cónservate, férmentate, íncurvate
       d.   (unattested)

(9)   a.   árchaize, éxorcize, fráternize, Hebraize, Júdaize, quáternize
       b.   amórtize, anthropomórphize, eléctrize, gigántize, Hibérnize, metamórphize
       c.   (unattested)
       d.   apóstatize (< ápostate), dívinize (< divíne), ímmunize (< immúne), infántilize (< ínfantile), ridículize (< rídicule), volátilize (< vólatile)

(10) a.   árgentite, bélemnite, gélignite, lánarkite, Mórasthite, spáragmite
       b.   acánthite, calavérite, colúmbite, maghémite, molýbdite, smarágdite
       c.   árenite (< aréna), ímpedite (< impéde), stálagmite (< stalágma)
       d.   cylíndrite (< cýlinder), impáctite (< ímpact), philippínite (< Phílippine)

Since these words do not preserve the stress of the base, we can conclude that either stress pattern can be assigned to them.

With regard to stress preservation of the base word (a typical Class 2 behavior -- cf.

Siegel (1974)), *-ize* and *-ite* are often treated as Class 2 suffixes for having that property. As discussed from time to time, however (cf. Szpyra (1989)), these suffixes also attach to a root base, which is a typical Class 1 behavior. These 'Class 3' suffixes (having both properties) are treated together with Class 1 suffixes here, since root-base words should be assigned stress of their own anyway (cf. Zamma (2005b)).

The 'others' column for *-ary* and *-ate* may also have something to do with stress preservation. Although the stress preserving effects of these suffixes are not as robust as *-ize* or *-ite* as shown in (11),[8] some words do show such an effect, having stress on the third syllable before the suffix (i.e., so-called Long Retraction (cf. Liberman and Prince (1977))): 42 words (out of 43 'others') with *-ary* and 18 words (out of 25 'others') with *-ate* show such a pattern.[9]

(11)

	preserving	non-preserving	optional	total
-ary	158 (71.5%)	60 (27.1%)	3 (1.4%)	221 (100%)
-ate	207 (67.0%)	93 (30.1%)	9 (2.9%)	309 (100%)
-ize	530 (95.3%)	22 (4.0%)	4 (0.7%)	556 (100%)
-ite	406 (86.2%)	51 (10.8%)[10]	14 (3.0%)	471 (100%)

In the comparison of tables (5) and (6), it is clear that suffixes can have both categorical and non-categorical patterns. Moreover, when non-categorical, the degree of variation is different among the suffixes, as shown in (6).

What is more problematic is that the same stress pattern can be both categorical and non-categorical. At a first glance, it seems from (6) that the distinction of Weak versus Strong Retraction is always non-categorical. As shown in (5c), however, *-ane* shows a categorical Weak Retraction pattern.

3. An Analysis within Partial Ordering Theory

Now that it is clear that some cases of variation are categorical while others are not, we may consider how these facts can be theoretically accounted for. As it happens, Partial Ordering Theory (cf. Anttila (2002), Anttila and Cho (1998), etc.) offers an elegant way of dealing with these facts.

In this theory, it is assumed that the 'core' of the grammar of a language is only partially determined. The remaining undetermined parts are thus fixed differently depending on the subgroup of the language, such as parts of speech, word classes, inflectional forms, etc. In other words, suffixes can have different constraint rankings with respect to each other, in terms of Optimality Theory.
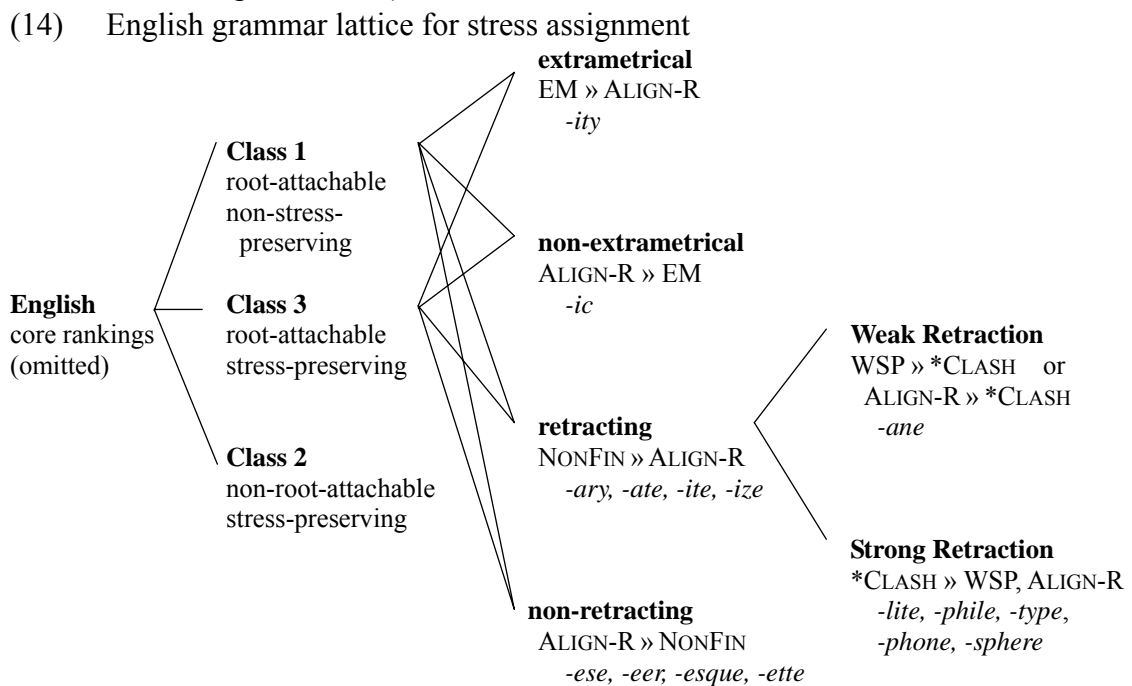
First of all, the five constraints in (12) are necessary to account for English stress assignment in general, and the five stress patterns can be identified by the characteristic rankings among them in (13) (cf. Zamma (2005a)).

(12) a. ALIGN-R: Primary stress should be right-aligned.

b. EXTRAMETRICALITY (EM):   The final syllable is extrametrical.[11]

c. NONFINALITY (NONFIN): Primary stress does not fall on the final syllable.

d. *CLASH: Stresses should not be on adjacent syllables.

e. WEIGHT-TO-STRESS PRINCIPLE (WSP):   A heavy syllable should be stressed.

(13) a. extrametrical: EM » ALIGN-R

b. non-extrametrical: ALIGN-R » EM

c. non-retracting: ALIGN-R » NONFINALITY

d. Strong Retraction: NONFINALITY » ALIGN-R   PLUS
     *CLASH » WSP, ALIGN-R

e. Weak Retraction: NONFINALITY » ALIGN-R   PLUS
     either WSP » *CLASH or ALIGN-R » *CLASH

As argued in Zamma (2005a), none of the constraint interactions other than the ones in (13) produces any phonological alternation. In other words, only the rankings in (13) are responsible for producing the differences among the five stress patterns. Note in (13d) and (13e) that the ranking in the first line only makes the word undergo retraction, and that the one in the second line specifies its type.

Each suffix is assumed to be assigned one of the constraint rankings in (13). The five stress patterns of Class 1/3 suffixes can then be represented in the 'grammar lattice' in (14) (with core fixed rankings ommitted).

(14)   English grammar lattice for stress assignment

extrametrical
EM » ALIGN-R
-ity

Class 1
root-attachable
non-stress-
  preserving

non-extrametrical
ALIGN-R » EM
-ic

English
core rankings
(omitted)

Class 3
root-attachable
stress-preserving

Weak Retraction
WSP » *CLASH   or
ALIGN-R » *CLASH
  -ane

retracting
NONFIN » ALIGN-R
  -ary, -ate, -ite, -ize

Class 2
non-root-attachable
stress-preserving

Strong Retraction
*CLASH » WSP, ALIGN-R
  -lite, -phile, -type,
  -phone, -sphere

non-retracting
ALIGN-R » NONFIN
  -ese, -eer, -esque, -ette

In this lattice, some suffixes are analyzed as fully determined for a stress pattern (hence a pattern is categorical), while others are only partially determined (thus a non-categorical pattern). For example, the suffixes *-ary, -ate,* and *-ite* are only specified with the retracting ranking (i.e. NONFIN » ALIGN-R) -- i.e., with the retraction type undetermined -- whereas *-ane* is fully specified with the ranking for the retraction type (as Weak Retraction, i.e. WSP » *CLASH or ALIGN-R » *CLASH). In this way, Partial Ordering Theory gives us an elegant way

of analyzing the differences between categorical/non-categorical stress behavior.

4. A Predicted Pattern from Partial Ordering Theory

In the previous section, it was proposed that the degree of specification of constraint ranking can be different among suffixes. This raises the following question: Are there suffixes which are specified only minimally, that is, just as Class 1/3? As discussed in Zamma (2005a), the stress pattern of a suffix is partially predictable from the rhyme structure of the suffix. When it constitutes a heavy suffix, for example, the stress pattern will be either non-retracting, Strong Retraction, or Weak Retraction. Are there then suffixes which show variation among these three stress patterns?

In fact, one possible candidate was found for such a suffix in the *SOED*: *-oir(e)*. Its classhood is actually not clear, as only two among 46 words have a word base, and neither shows a stress-preserving effect. The observed stress patterns are as follows:

(15)

non-retracting	16 (34.8%)
retracting (SR/WR)	22 (47.8%)
optional	1 (2.2%)
unknown	1 (2.2%)
monosyllabic	6 (13.0%)
total	46 (100%)

Examples of non-retracting words are given below in (16). 'Monosyllabic' words with this suffix inevitably show the non-retracting pattern, because the only vowel which can be stressed is that of the suffix; consequently, they are not considered here any further here. The retraction pattern is not obvious, because only four words with penultimate heavy syllable are found, all of which are given in (17):

(16) armoíre, devoír, drageoír, escritoíre, grimoíre, pochoír, remontoír, scrutoíre

(17) a. Weak Retraction: aspérsoir, Diréctoire
       b. Strong Retraction: répertoire, réservoir

This indeterminacy does not actually matter, as it is clear in (15) that this suffix is not even specified as to whether it undergoes retraction or not. In other words, this suffix is only determined as attaching to base roots (i.e. as Class 1 or 3), and thus all three patterns are possible for words with this suffix. The existence of a suffix of this kind strongly suggests the appropriateness of the proposed analysis.

5. Summary and Remaining Issues

Based on a comprehensive investigation utilizing the *SOED*, I have shown that some differences in English stress assignment are categorical, while others are non-categorical. Subsequently I argued that Partial Ordering Theory can properly accommodate such variation. Variance among suffixes arises because some suffixes (such as *-ane*) are assigned with more

specific rankings, whereas others (such as *-ary, -ate,* and *-ite*) are assigned with less specific ones. Furthermore, I also pointed out that this theory predicts a suffix whose stress type is undetermined, and that such a suffix is actually observed.

Several questions to this analysis arises, however, such as the following:

▪ We have observed only a dozen of suffixes. What about others?

▪ Are the Greek morphemes really suffixes?

▪ Are there suffixes which can be both extrametrical/non-extrametrical?

▪ Where does the dividing line lie between categorical and non-categorical variation?

These questions obviously need to be addressed in future research. However, we can at least conclude from the data in this paper that Partial Ordering Theory is suitable for dealing with this kind of variation in a language.

****

Notes

[1] The final consonant nonetheless undergoes so-called extrasyllabicity (cf. Hayes (1980)).

[2] The final *y* in *-ory* and *-ary* is considered a glide (cf. Chomsky and Halle (1968), Liberman and Prince (1977)).

[3] The reason why the *SOED* was chosen is that it contains a considerable amount of words, with less obsolete ones than the *OED*. Moreover, it contains morphological information for each lexical entry, so that words with a particular suffix can be easily searched.

[4] The examples suggest that stress preservation may have influenced several words, although *-ic* does not usually show that effect (as in *atómic* (< *átom*)): *Árabic* (< *Árab*), *cadáveric* (< *cadáver*), *Dáedalic* (< *dáedal*), *étheric* (< *éther*), *ímagic* (< *ímage*), *mótivic* (< *mótive*), *Mozárabic* (< *Mozárab*), *rhétoric* (< *rhétor*), *Sódomic* (< *Sódom*); *idólatric* (< *idóltary*), *théoric* (< *théory*). There are also examples with root bases, however: *déuteric, íchthyic, níccolic, pólitic, síalic, túrmeric*.

[5] Exceptions to non-retracting patterns with *-ese* (ia) and *-ette* (ib, ic) are:

    (i) a. Camáldolese, Váudese

         b. bánerette, Rúfflette, sávonette, Sténorette, vóilette

         c. córselette/corselétte, épaulette/epaulétte, sátinette/satinétte

[6] Below are exhaustive examples with heavy penult: *adamántane, antemúndane, dodecahédrane, elástane, enflúrane, hentriacóntane, heptacósane, silóxane, tramóntane, transrhénane, ultramóntane, ultramúndane*

[7] There are only 25 relevant words; that is, words with more than three syllables whose penultimate is heavy. This may have something to do with the fact that *-ize* puts a strong restriction on a base word with final stress (cf. Raffelsiefen (1999)).

[8] The percentage of preserving words seems rather high (i.e. 71.5% and 67.0%), but this is because it contains words which happened to have the stress on the same syllable as the base word as a result of stress assignment.

[9] In many cases, words in this category have a base with *-ion*: I found 39 such words out of 42 Long Retraction words for *-ary*, and 8 such words out of 18 LR words for *-ate*.

[10] Among the 51 'non-preserving' words, 21 have a base from foreign languages. There is also one such word in 'optional'.

[11] A constraint like this is necessary in addition to NONFINALITY to guarantee the distinction between extrametrical and retracting suffixes (cf. Zamma (2005a)).

References

Anttila, Arto (2002) "Morphologically Conditioned Phonological Alternations," *Natural Language and Linguistic Theory* 20, 1-42.

Anttila, Arto and Young-mee Yu Cho (1998) "Variation and Change in Optimality Theory," *Lingua* 104, 31-56.

Chomsky, Noam and Morris Halle (1968) *Sound Pattern of English*. New York: Harper & Row.

Fudge, Erik (1984) *English Word-Stress*. London: George Allen & Unwin.

Hayes, Bruce (1980) *A Metrical Theory of Stress Rules*. Doctoral dissertation, MIT.

Liberman, Mark and Alan Prince (1977) "On Stress and Linguistic Rhythm," *Linguistic Inquiry* 8, 249-336.

Raffelsiefen, Renate (1996) "Gaps in Word Formation," *Interfaces in Phonology*, ed. by U. Kleinhenz, 194-209. Berlin: Academie Verlag.

Shorter Oxford English Dictionary on CD-ROM version 2. (2002) Oxford: Oxford University Press.

Siegel, Dorothy (1974) *Topics in English Phonology*. Doctoral dissertation, MIT.

Szpyra, Joranta (1989) *The Phonology-Morphology Interface: Cycles, Levels and Words*. London: Routledge.

Zamma, Hideki (2003) "Suffixes and Stress/Accent Assignment in English and Japanese: a Survey," *A New Century of Phonology and Phonological Theory*, ed. by T. Honma et al., 456-469. Tokyo: Kaitakusha.

Zamma, Hideki (2005a) *Predicting Varieties: Partial Orderings in English Stress Assignment*. ms., Kobe City University of Foreign Studies and University College London. [available at Rutgers Optimality Archive: ROA-712]

Zamma, Hideki (2005b) *Four Classes in English Lexicon: a Solution to an Old Problem and a New Prediction by Partial Ordering Theory*. Paper read at 13th Manchester Phonology Meeting, 26 May 2005.