

Paradigm Forces in English Derivational Morphology

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Kim, Jin-hyung. 2001. **Paradigm Forces in English Derivational Morphology.** *Korean Journal of English Language and Linguistics* 1-2, 243-272. This paper focuses on the applicability of paradigm to derivational morphology and the pressure of paradigm enforced on derivational phonology and morphology. Through a close examination of well-attested data, we will demonstrate that apparent surface idiosyncrasies in phonology are the results of paradigm leveling, and that paradigmatic forces of analogy are productively operating in English word formation. On the basis of these observations, it can be argued that the notion of paradigm has at least some justification within derivational morphology as well, even if not to the same extent that it has with inflectional morphology and that the paradigm forces are independently needed in any adequate phonological and morphological theory. This can also be extended to provide evidence against the split morphology hypothesis that inflectional and derivational morphology belong to different grammatical modules.

1. Introduction

Generally speaking the notion of paradigm bears upon sets of related words, where the forces holding among them are paradigmatic in nature. According to Saussure (1959), syntagmatic relationships (*rappports syntagmatiques*) relate to elements in *praesentia*, while paradigmatic relationships (*rappports associatifs*) bear upon elements in *absentia*. Specifically syntagmatic relationships are in force between elements constituting a given linguistic unit. For example, in *driver* the relationship between *drive* and *-er* is syntagmatic. Paradigmatic relationships, on the other hand, are based on the systematic occurrence of similarity.

Examples of paradigmatically related forms are, for example, as follows.

(1) inflectional paradigm

a. walk	b. -ed	c. -s
walk-Ø	laugh-ed	girl-s
walk-s	call-ed	boy-s
walk-ed ₁	walk-ed	toy-s
walk-ed ₂	inform-ed	doll-s
walk-ing	play-ed	cat-s
	invent-ed	cap-s

The words in (1) are said to be paradigmatically related because they share the formal and semantic properties, that is, they share a common element of form, i.e., *walk*, *-ed*, or *-s*, which systematically corresponds to a common element of meaning, i.e., 'walk', 'past tense', or 'plural', respectively. From the above and other par excellence examples, it follows that inflectional paradigms constitute such intimately related sets of forms. However, it is not obvious whether the concept of paradigm is relevant to derivational morphology as well. In this paper on the basis of such data as those in (2), we argue that the notion of paradigm has some justification within derivational morphology, albeit not to the same extent that it has with inflectional morphology.

(2) derivational paradigm

a. nation	b. -er	c. mis-
nation-hood	call-er	mis-kick
nation-al	play-er	mis-judge
nation-al-ize	bak-er	mis-understand
nation-al-ist	driv-er	mis-apply
nation-al-ist-ic	inform-er	mis-educate
nation-al-ity	writ-er	mis-conceive

Although differing in the precise scope and degree of relatedness, (1) and (2) show striking parallelism in the sense that the morphological categories in question share the base or the affix and that they also exhibit semantic similarities. In this respect we oppose the notion of a split morphology that inflectional and derivational morphology belong to different grammatical modules operated by separate principles.

In what follows, it is argued that paradigms should be considered more than mere lists of word forms and rather that paradigms should be assigned an independently motivated status as operating forces on synchronic word formation as well. The remainder of this paper is structured as follows. In section 2, we will examine various examples illustrating paradigm leveling effects and argue that the relative strength of paradigmatic forces is driven by the morphological class size. Section 3 gives the study of the paradigm pressure crucially enforced on word formation, which is exemplified in proportional analogy, back formation and conversion. Section 4 addresses the still unanswered problem of the base identification in morphological paradigms. In the final section, section 5, the main arguments issued in this paper are summarized and some residual questions are raised for future research.

2. Paradigm Leveling in Phonology

2.1. Restructuring of Paradigm

A series of analogical and historical sound changes may involve the morphological reorganization of allomorphy originally motivated by the phonological operation, where morphological constraints govern the alternation patterns in the paradigm in question. Among these morphological or paradigmatic constraints, there is a leveling condition, which yields some predictions about the direction of possible analogical change. According to

Kiparsky (1968:41), it is roughly meant by leveling that existing alternations are either curtailed or eliminated altogether, with the result that allomorphs of some morphemes become more similar to each other or merge completely.

With this in mind, we are ready to examine the restructuring processes of paradigm visible throughout the inflectional system in various languages. An example of such a restructuring process is found in Dutch verb *binden*. The preterite of the Dutch verb *binden* 'to bind' is *bond* (singular), *bond-en* (plural). In the earlier stage, the singular form was *band*. Because there is no general phonological motivation for the change of *a* into *o*, the innovation in the stem vowel can be correctly characterized as the result of morphological pressure of paradigm leveling. In this case a new singular in question was formed on the basis of the plural. Consequently, the paradigm of *binden* no longer exhibits an alternation in the stem vowel: {*band* (sg.), *bond-en* (pl.)} ⇒ {*bond* (sg.), *bond-en* (pl.)}. This innovational analogy is restricted to a specific set of paradigm and is launched by a certain number of individuals before it is accepted for general use.

Another example of leveling is the elimination of *s* in the inflection of certain Latin *s*-stems like *honōs* ~ *honor*.

(3) rhotacism rule in Latin *s*-stems (Kiparsky 1982:99)

	Old Paradigm	⇒	New Paradigm
Nom.	honōs		honor
Gen.	honōris		honōris
Acc.	honōrem		honōrem
	⋮		⋮

As can be seen above, the *s/r* alternation due to the rhotacism rule ($s \rightarrow r / V_V$) was eliminated by generalizing *r* in the nominative of new paradigm. To account for this, some ad hoc measures must be taken: Either the underlying form is indeed

restructured with /r/, or there is a special additional condition on the $s \rightarrow r$ rule which states that the rule must be also applied in the nominative even though no vowel follows the s . Either way complicates the grammar. What makes this a good thing to happen in spite of the formal complexity is the principle of paradigm leveling. This principle is implemented at the cost of complicating the system of rules. In the older system of Latin s -stems, the base form is /honōs/ and the r is derived by the rhotacism rule ($s \rightarrow r / V_V$). The nominative form *honor* in the new paradigm, albeit being opaque with respect to the distribution of r and s , involves optimizing the grammar by generalizing the r -form in the declension. We can say that the rhotacism rule has been overridden by the substantive principle of leveling,¹⁾ with leveling in favor of the predominant allomorph with r occurring in the most forms in the paradigm.

Let us now turn to the German example where vowel quantity distinctions are merged and leveled, as we see in (4).

(4) vowel lengthening in modern German

{Lob, Lob-es} [lop], [lo:bəs] ⇒ [lo:p], [lo:bəs] 'praise'
 {Weg, Weg-e} [vek], [ve:gə] ⇒ [ve:k], [ve:gə] 'path'
 {Rad, Rad-es} [rat], [ra:dəs] ⇒ [ra:t], [ra:dəs] 'wheel'

Here forms having resisted the regular phonetic change (e.g., vowel lengthening before voiced obstruents) do undergo the process of vowel lengthening due to analogical pressure. That is, the analogical pressure of quantity leveling serves as a constraint on the regular phonology, and thus stem vowels are analogically lengthened at the cost of phonological transparency, enforcing uniform length within paradigms. This is another example to

¹⁾The relative force of this substantive principle of leveling and the formal principle of simplicity is to be delimited in some way. Where there is conflict between them, we are not close to being able to predict which one will win out. This waits for future research.

show that morphological and paradigmatic transparency overrides the phonological transparency, obscuring the original phonological situation. Language learners despair of a phonological rule, and opt instead to choose a consistent vowel quantity on the word-by-word basis. With regard to the trigger for the restructuring in modern German, the inflected plural forms prevail over the singular ones.²⁾

Within the framework of Optimality Theory (Prince & Smolensky 1993, and much subsequent OT literature), paradigm leveling effects have been modeled by constraints that require output forms to resemble each other. The constraints are variously termed: output-to-output correspondence (McCarthy & Prince 1995), base-identity (Kenstowicz 1995), uniform exponence (Kenstowicz 1996), and paradigm uniformity (Steriade 1996) to name a few. A more substantive perspective on analogical change, however, reveals that the relevant data are in general better described in terms of paradigm leveling than in terms of output-based accounts. The fact that the leveling principle can be implemented at the level of underlying stem as in Latin (Kiparsky 2000) challenges OT which defines optimality only on output representations. In addition, we will be faced with difficulties within the OT model when covering cases where the leveling goes in favor of the predominant allomorph or inflected forms rather than the uninflected base form (Dresher 2000). Any other purely output-based account than paradigm approach sheds no light on the fact that we can understand through paradigm leveling that the morphology can be drastically simplified.

2.2. Leveling Effects in English Derivational Phonology

²As to the questions about the bases of the restructuring, there might be some variations cross-linguistically. There have been several attempts to characterize which forms tend to serve as bases, on which we will consider in section 4.

In this section, we will show that the effect of paradigm leveling in inflectional system is also prominent in derivation. Consider the following English data.

(5) Trisyllabic Shortening

heed: {heed, heedlessness, heedlessly, heedfulness, ...}
 labor: {labor, laborless, laborer, Laborism, laboring, ...}
 -ly: {peacefully, faithfully, faithlessly, wearily, mightily, ...}
 -ness: {peacefulness, faithfulness, weariness, mightiness, ...}
 -ism: {legalism, vocalism, finalism, localism, tutorism, ...}

(6) Nasal Assimilation

unbalanced (*u[m]balanced), unmanly (*u[m]manly)
 unlawful (*u[l]lawful), unlucky (*u[l]lucky)
 unreal (*u[r]real), unreliable (*u[r]reliable)

(7) Flapping:

[tə]	[rə]
military ~ militaristic	capital ~ capitalistic
voluntary ~ voluntaristic	rotary ~ rotaristic
positive ~ positivistic	fatal ~ fatalistic
relative ~ relativistic	totem ~ totemistic

The words with class 2 affixes³ such as (5) are not affected by Trisyllabic Shortening, even though they meet its structural description: stressed vowel is shortened if followed by two syllables, the first of which is unstressed (e.g., *divinity*, *serenity*, *profundity* et al.). Another type of misapplication can be seen in Nasal Assimilation occurring between the prefix and the stem. In the examples of (6), parallel uniform exponence of negative

³Here and in other cases, class 2 affixation witnesses much more phonological invariance than class 1 affixation. This is because there is a gradient difference in paradigm leveling strength, which will be dealt in the next section.

prefix *un-* occurs at the expense of general well-formedness constraint. This is a strong supporting evidence for the fact that derivational paradigms can be organized around affixes as well as stem forms. As a further evidence for the leveling effects within derivational paradigm, we can cite the contrast of aspiration and flapping as shown in (7). The contrast in *militaristic* and *capitalistic* is particularly instructive. These two words have a very similar superficial structure, and, in particular, the *ts* in both words appear in the same environment of stressless syllable onset. Yet the *ts* have sharply differing realizations, one being aspirated in *militaristic* and the other flapped in *capitalistic*. The very explanation lies in the paradigmatic pressure. The foot structure of the base word remains unchanged throughout the paradigm: [F mili][F tary] ~ [F mili][F taristic], [F capital] ~ [F capita][F listic]. This is another case where the base form has a snowball effect which adds the structural pressure to subsequent derivation for innovations.

Here we can see that, just as we have seen in inflectional paradigms, paradigmatic forces are operating in derivational paradigms and that the correct phonological forms are predicted on the basis of other parallel forms in a given paradigm. In lexical phonology & morphology, the correct output is obtained by a series of rule applications, while there lacks any answer to the question of conspiracy in paradigm forces or leveling directionality.

Within Optimality & Correspondence Theory, the fact that these show a paradigmatically simplified consistent pattern is captured by correspondence relations between morphologically related forms. Yet this approach is not without problems. In reality, there is a large body of evidence demonstrating the insufficiency of purely output-based accounts of leveling. The well-attested cases where forms are predicted on the basis of other parallel forms in the same paradigm rather than from the

ostensible base and those where leveling is implemented at the level of underlying representation⁴) challenge theories which try to explain leveling only on base-oriented and output-based representations.

In sum, segmental phonology in English derivation, such as trisyllabic shortening, nasal assimilation, and flapping, characteristically witnesses the leveling effects on the basis of other parallel forms in the same paradigm.

Turning to the prosodic phonology, we can see the similar effects as in segmental phonology. The examples in (8) illustrate the paradigmatic forces exerted on the stress placement in derivational paradigm.

(8) secondary stress placement in English

- a. winnepesáukee, lòlapalóza, àbracadábra, Tàtamagóuchi
- b. {original, orìginálicity (*òriginálicity), orìginally}
 {theátrical, theàtricálicity (*thèatricálicity), theátricalize}
 {imáagine, imàginátion (*imaginátion), imáiginable}

In long monomorphemic English words, we usually find secondary stress on the first syllable of the word (5a). Yet derived words of the same length often seem to deviate from this canonical stress pattern, as can be seen in (5b). In the generative framework since SPE, this has been argued to be the result of cyclic rule application. In the serial operational approach, albeit its descriptive adequacy, surface forms are nothing more than the epiphenomenal result of rule cyclicity and thus similarity effects between a derivative and its base cannot be captured directly.

Within Correspondence Theory, on the other hand, the

⁴Kiparsky (2000) examines the analogical changes at the level of lexical underlying representation in Gothic declension and conjugation and argues the inadequacy of output-based accounts. For details, I refer the reader to Kiparsky's (2000) article.

cyclicity effect is captured in a more direct way, namely by output-to-output correspondence relation on feet. In the examples of (8), derived forms preserve the stress feet of the base forms as much as possible. The primary stress feet of the simple forms survive as primary or secondary stress feet in the complex forms, with the least violation of ranked constraints.

A more substantive account for the opacity in derived environments is to assume a paradigm-based approach to cyclicity effects: there is a leveling principle requiring morphologically and paradigmatically related forms to be phonologically as similar as possible. We argue that the leveling principle is the very basis of the native speaker's linguistic ability. That is, language learners wish to find a single lexical representation for lexical stems, so they abandon the alternation and assign words a single underlying representation.

By promoting the morphological leveling condition over the phonological condition, the otherwise well-behaved stress assignment processes are disrupted by the demands of the leveling principle within the relevant paradigm. In effect, the parallel uniform stress pattern emerges via local analogy and thus the simplicity and system-conformity of grammar increase as a result. If we only assume that it is appropriate to extend the notion of paradigm to the cases of derivation as well, then phonological misapplication can be best and directly explained. This demonstrates the empirical and theoretical superiority of paradigm approach to analogy over rule-based and constraint-based ones, in that it provides a priori substantial reason for the leveling effects in the phonological behavior.

2.3. Strength Scales in Paradigm Forces

In the foregoing section, we have shown that paradigmatic leveling has a role to play in the segmental and prosodic phonology in English derivation, which witnesses the

applicability of paradigm in derivation as well as in inflection. In this section we will consider whether there exists any scalar difference in paradigm leveling strength with respect to the derivation type, and, if so, what picture it does present. Let us take the stress preservation in derived words as an example.

(9) stress preservation in derived words

	class 1 affixation	class 2 affixation
{original,	orìgináality ⁵ }	orìginally}
{theátrical,	theàtricáality	theátricalize}
{imáagine,	imàgináation	imáaginable}
{hómicide	hòmícídál}	
{élement	èleméntary}	
{párent		párenthòod}
{Américan		Américanìsm}

As can be seen in (9), there are different phonological effects observable in class 1 and class 2 affixation in terms of English stress pattern, that is, class 2 affixation witnesses much more phonological invariance than class 1 affixation. On the basis of these different identity patterns, we can argue that there is a scalar strength difference in leveling pressure between class 1 and class 2 affixed words within the derivational paradigm, with stronger leveling effects in class 2 affixed words than in class 1 affixed ones.⁶ Only by bringing the paradigm leveling

⁵Apparent counterexamples where the primary stress of the base is never carried over on the derived word with incurring the violation of paradigm leveling (e.g., *óorigin* ~ *orìginal*, *expéct* ~ *èxpectáation*, *specífic* ~ *spècíficity*, *grámmar* ~ *grammáarian*, etc.) can be adequately explained from No-Clash perspective. No-Clash, which comes from another functional principle of eurhythmicity, bans a too-near adjacency of prominences. For example, the form of *óorigin*, where main and paradigm-oriented stresses do show clash, is remedied into *orìginal* in order to satisfy No-Clash.

⁶Under the correspondence theory framework, Benua (1997), Burzio

principle into the foreground, the gradient leveling effect can be captured, which is impossible within the framework of categorial rule-based or parameter-based theories.

The case study by Boersma & Hayes (2001) of the acceptability judgements on light and dark /l/ in English casts some positive light on our argument for the gradient strength difference in leveling pressure between class 1 and class 2 affixed words. In various American English dialects, /l/ is obligatorily light in initial (*light, loop*) and pretonic position (*allow, allege*), and obligatorily dark in final and preconsonantal position (*bell, help*). In medial, pre-atomic position, free variation occurs: forms like *Greeley* can have light or dark /l/. Here in medial position are the effects of morphology stepping in, that is, a gradient effect of paradigm strength occurs. From the comparison of acceptability judgements on monomorphemes (*Greeley*), affixed forms (*mail-er, free-ly*), and syntactically derived forms (*mail it*), it emerges that the well-formedness judgement differences originate from the relative morphological hierarchy.

(10) acceptability judgement scales on light and dark /l/

light /l/ harmony:

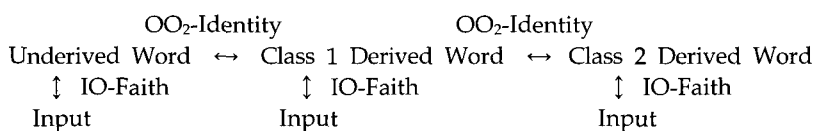
light > *Louanne* > *free-ly* > *Greeley* > *mail-er* > *mail it* > *bell*

dark /l/ harmony:

light < *Louanne* < *free-ly* < *Greeley* < *mail-er* < *mail it* < *bell*

(1998), and Alderete (1999) proposed a multiple correspondence model that class 1 affixes subcategorize for an OO₁-correspondence relation governed by OO₁-identity constraint, while class 2 affixes for a distinct OO₂-correspondence relation. Their model is schematically shown below.

<Multiple Correspondence Model>



On the basis of the above observations, we can draw a tentative conclusion: in monomorphemic forms, syllable well-formedness constraints derive the basic patterns of obligatory and optional [l] or [ɫ]: in affixed forms, there is a paradigmatic effect that /l/ allophones are respectively inherited from their source forms in the same paradigm, that is, *mail-er* strongly prefers the dark [ɫ] inherited from *mail*, while *free-ly* rather strongly prefers light [l] for the matchup with *-ly*.⁷⁾ and finally in syntactically derived forms with a word break, stronger paradigm effects occur, thus the form *mail it* favoring dark [ɫ] even more strongly than *mail-er*. In sum, paradigm coherence is stronger at higher levels of phonological and morphological hierarchy, which is predicted to be the norm cross-linguistically.

3. Paradigm Pressure on Morphology

3.1. Two Dimensions of Word Formation

There are two different dimensions in word-formation, syntagmatic and paradigmatic. When working on the syntagmatic basis, the affix interacts with the form it attaches to in a predictable manner conforming to the lexical conceptual structure or the subcategorizational framework. The other processes are paradigmatic in the sense that they crucially involve elements in absentia, that is, they must presuppose the prior existence of a complex model form in the relevant paradigm. Consequently, the semantic and phonological properties of the derivatives of these processes do not depend on the properties of the concatenated elements, i.e., bases and affixes, but on their relationship with other parallel pair forms and non-present

⁷⁾Within the derived words, the productivity of derivational processes may play a role in determining the relative strength of paradigm leveling. We suspect that the instances where paradigm leveling pressure can be seen to have most force are those where a morphological process approaches full productivity with a certain base type.

elements in the same paradigm.

By contrast, the selection of affixes may sometimes depend on the paradigm, that is, morphemes belonging to different paradigms take different affixes. This is very often the case in the inflectional morphology. In French, for example, the regular verbs belong to one of three morphological classes: *-er* verbs, *-ir* verbs and *-re* verbs. Depending on which paradigm a verb belongs to, it co-occurs with different allomorphs of inflectional suffix morphemes.

One similar case, albeit not to the same extent, can be found in English derivation, where certain forms may be blocked by rival morphological processes. The rival suffixes involved in this connection are *-ity* and *-ness* in English.

(11) rival morphological processes: *-ity* and *-ness*

Xive	Xile	Xiveness	Xility
perceptive		perceptiveness	?perceptivity
secretive		secretiveness	
talkative		talkativeness	
	docile		docility
	agile	?agileness	agility
	servile	?servileness	servility

Considering the behavior of the suffixes *-ity* and *-ness* in English, we can see that the form *Xiveness* is more productive than the form *Xivity*, that is, the former type-blocks the latter. However, this is not carried over to the *Xile* bases. The number of words of the form *Xility* overwhelmingly exceeds that of the form *Xileness* also by type-blocking. This witnesses the general tendency that the domain of a certain morphological process is curtailed by the domain of its rival process.⁸⁾

⁸⁾The direction of blocking generally assumed is the curtailing of the domain of a general case by the domain of a rival systematic special

Another case of paradigm-based rival morphological processes is shown in the deverbal nominal suffix *-ation/-ication/-ion*. Verbs which end in *-ize* will automatically take *-ation*; verbs that end in *-ify* will automatically take *-ication*; verbs that end in *-ate* will automatically take *-ion*, as shown in (12).

(12) rival affixes in English: *-ation*, *-ication*, and *-ion*

<i>-ize-ation</i>	<i>-ify-ication</i>	<i>-ate-ion</i>
organize/organization	justify/justification	create/creation
moralize/moralization	purify/purification	moderate/moderation
colonize/colonization	certify/certification	translate/translation
civilize/civilization	modify/modification	accumulate/accumulation
legalize/legalization	identify/identification	alternate/alternation

Just as each verb has a present tense form, a past tense form, a present participle form, and a past participle form, it also has a nominalization form. That is, nominalization is one of the slots in the paradigm for a verb. What is suggested here is that there are slots or constellations of positions in paradigm matrices which can play a considerable role in word-formation. Here in examples (12), suffixes *-ation*, *-ication*, and *-ion* are allomorphs of one morpheme, and their distribution is regulated by which paradigm the corresponding suffix belongs to. From the following section on, we are going to consider the various slot-filling mechanisms of paradigm-oriented word formation.

3.2. Paradigm Forces in English Derivational Morphology

3.2.1. Paradigm Structure

Most English derivatives are syntagmatically made up of a

case. However, Rainer (1988) claims that this is not always the case by demonstrating that the domain of special cases may also be affected by type-blocking on the basis of an analysis of German and Italian quality nouns. For a detailed discussion, see van Marle (1985, 1986) and Rainer (1988).

base lexeme and an affix, just like *driver* (*drive-er*). However, there is some evidence that this is not the only way to generate words. In a number of cases, new word forms are derived on the basis of the other related parallel forms, rather than from their immediate constituents. Booij (1996) presents a case from Dutch where the need for paradigmatic information is paramount.

(13) toponymic adjectives in Dutch (Booij 1996:45)

<i>toponym</i>	<i>inhabitant</i>	<i>toponymic adjective</i>
Amerika	Amerikaan	Amerikaan-s
Guatemala	Guatemalteek	Guatemalteek-s
Finland	Fin	Fin-s
Hongarije	Hongaar	Hongaar-s
Rome	Romein	Romein-s

Booij argues, on the basis of these data, that the toponymic adjective is formally derived from the name of the inhabitant of the place, not from the semantically related toponym itself. This is a case of paradigmatically oriented derivation, which violates semantic compositionality. The importance here is that we have instances where a particular form can be derived only from another form in the same paradigm, even though it is not semantically consonant with its formal base. We can also find its parallel pattern in English derivation. Consider the systematic gaps in the case of derivatives in *-istic*.

(14) adjectives of the form *Xistic* in English (Aronoff 1976:138)

archaeologist	*archaeologism	*archaeologic
alchemist	*alchemism	*alchemistic
botanist	*dentism	*dentistic
economist	*economism	*economistic
cellist	*cellism	*cellistic

On the basis of the distributional test on *Xist*, *Xism*, and *Xistic*, Aronoff draws a distributional generalization that there cannot exist a corresponding word *X_iistic* unless there also exists a corresponding word *X_iism*. From this, we can infer that the *-istic* is substituted into already existing words with *-ism* rather than being added to a root such as *botan-* or to a base *botanist-*.⁹⁾ This general pattern shows that some word forms can be predicted from other forms in a paradigm at the cost of phonological transparency.¹⁰⁾ In conclusion, here in this case cross-referencing within the paradigm is the only way to generate the appropriate forms, and in this respect the derivational paradigm must be operating at the heart of a generative grammar.

3.2.2. Analogy

Another area that shows the possible relevance of paradigmatic relation is that of analogy. Although the notion of analogy has been around for several centuries, different disciplines and different schools of thought have assigned disparate interpretations to the term. The traditional way of representing an analogical regularity is in the form of a proportion.

(15) analogical proportion in inflection

English verbs: hope : hoped : : help : x, x = helped
 German nouns: Tag : Tage : : Arm : x, x = Arme

⁹⁾Aronoff, on the other hand, attempts to give a rule-based syntagmatic account in the form of the suffixation of *-ic* to *Xism* and the subsequent rule of $m \rightarrow t / s_ + ic$. Although his analysis derives the forms correctly, it is problematic in that there is no independent motivation involved in the rule at all.

¹⁰⁾A similar case is also found in compounding, where some compounds are newly coined by creative reanalysis of other complex words in the same paradigm.

- (i) beefburger, eggburger (\Leftarrow ham-burger)
 moonscape, skyscape, seascape, townscape (\Leftarrow land-scape)

Analogy is not just a notion relevant to diachronic change but is present synchronically all the time. Words related phonologically, morphologically or semantically fall into associated groups in the speaker's mind. In the process of mastering their language, speakers do learn a number of connected examples associated into groups, not every single form in a declension or conjugation group. Thus given the proportion $Tag : Tage = Arm : x$, x is given a value and a new form is created, viz. *Arme*. Here in this view words are created as free forms each individually *Arm* and *Arme*, rather than by a set of word formation rules combining morphemes $\{Arm\}$ and $\{e\}$.

Although generative grammarians under the rigid formalism have rejected analogical proportions as being too unconstrained and having no generality of rules, analogy still plays a crucial role as a creative mechanism especially in the morphology. In what follows, we will list and investigate major cases of paradigmatically motivated processes of derivational morphology: local analogy, back formation, and conversion.

The most common case is perhaps local proportional analogy, where word formations operate locally in a non-arbitrary manner on the basis of a well-defined set of already existing complex words. Examples of analogical innovation as a creative mechanism can be well-witnessed in words with bracketing paradoxes.

(16) proportional analogy in bracketing paradoxes

grammatical : ungrammatical : :	grammaticality : x,	
		x = ungrammaticality
happy : unhappy : :	happier : x,	x = unhappier
electric : hydroelectric : :	electricity : x,	x = hydroelectricity
true : untrue : :	truth : x,	x = untruth
bury : rebury : :	burial : x,	x = reburial

Examples of this sort pose grave problems for any kind of

level ordered approach because of their paradoxes. For example, *ungrammaticality* is paradoxical within the syntagmatic viewpoint of level ordered morphology, because the subcategorizational restrictions on the affixes *un-* and *-ity* demand a bracketing [[[un][grammatical]]ity] while the level ordering principles demand a bracketing [un[[grammatical]ity]]. This eventually compels us to opt for the paradigmatic word formation. Given that three closely related expressions are already present in the equation as in (16), we can fill the empty slot (*absentia*) and complete the picture by a process of proportional analogy. What is important here is that the process is defined in terms of a network of relationships based on the associations.¹¹⁾

Another process of analogy is back formation. Whether a form is back-formed or not, albeit sometimes controversial, depends primarily on the dates of the earliest attestations. Consider the classic examples of back formation.

(17) back formation (data from the *OED*)

- a. peddle (1532) < peddler (1377)
- burgle (1872) < burglar (1582)
- edit (1791) < editor (1712)
- sculpt (1864) < sculptor (1634)
- scavenge (1644) < scavenger (1503)
- air-condition (1937) < air-conditioner (1909)
- typewrite (1887) < typewriter (1868)

¹¹We can observe the parallel analogical word formation also in compounding.

- (i) proportional analogy in compound
- grammar : transformational grammar : : grammarian : x,
 x = transformational grammarian
- flute : baroque flute : : flautist : x,
 x = baroque flautist
- practice : general practice : : practitioner : x,
 x = general practitioner

- b. televise (1927) < television (1904)
 orientate (1849) < orientation (1839)
 seduct (1526) < seduction (1490)
- c. writer : write : : peddler : x, x = peddle
 revision : revise : : television : x, x = televise

This presupposes the particular paradigm within which an agentive word ending *-er* and deverbal nominal ending *-ion* must already exist in the speaker's mental lexicon. Here the words *writer* and *peddler* constitute the same paradigm in terms of the affix *-er*, and then proportional pressure of filling the empty slot in paradigm begins to operate in order to reach the stable optimum state of paradigm, causing the verb *peddle* to arise via analogy. In sum, back formation as a productive morphological process can be readily interpreted in terms of paradigmatic relations in the sense that it crucially involves elements in absentia. Consequently, the semantic and phonological properties of the back-formed words also depend on their relationships with other elements in the relevant paradigm.

We close our survey of analogy with listing some cases of conversion. Conversion can also be captured neatly by a process of analogy without assuming zero affixation or morphological conversion solution.

(18) conversion

- a. a look < to look to bridge < a bridge
 a walk < to walk to grandstand < a grandstand
 a cut < to cut to process < a process
 a ride < to ride to date < a date
- b. look (v.) : look (n.) : : ride (v.) : x, x = ride (n.)

In this section we have demonstrated that paradigm forces of analogy play an essential role in English derivational

morphology. We are thoroughly convinced that analogical innovation as a creative mechanism in language opens up a new perspective on the puzzling problems such as phonological opacities, rival processes, and bracketing paradoxes.

The words with the suffix *-ate* attract our attention in that the neologisms featuring *-ate* are extremely diverse in terms of their derivations. The productive suffix *-ate* has a syntagmatic lexical conceptual structure (LCS) of its own, but there are also numerous *-ate* derivatives that do not conform to the LCS for *-ate*. As we will see, most of these are based on local analogies with other already existing complex words, which presents another supporting evidence that analogy has some status as a synchronic morphological process as well.

A full-fledged analysis of *-ate* verbs is beyond the scope of the present study, and here we are going to limit our discussion to the non-affixational paradigmatic operations leading to *-ate* verbs.

(19) heterogeneity of *-ate* verbs

- a. LCS of *-ate* verbs: [[NP_i NP_{Theme}]_{Base} -ate]_v (Plag 1999:205)
 { NP_i NP_{Theme} , NP_{Theme} NP_i }
 CAUSE([_{Thing}]_i, [GO([_{Thing/Property}]_{Base}; [TO([_{Thing}]_{Theme})])])
 alluviate, mercurate, metalate, gelate, methanate, phosphatate
- b. back-formation from *-ation*
 escalate < escalator, escalation
 formate < formation
 perseverate < perseveration
- c. local analogy :
 active : activate : : inactive : x, x = inactivate
 active : activate : : radioactive : x, x = radioactivate
 regular : regulate : : stereoregular : x, x = stereoregulate
- d. conversion: citrate, hydroborate, phosphate, xanthate
- e. clipped form: patriate < repatriate

As seen in (19a), *-ate* is productively suffixed to bases that denote chemical substances, whose derivatives express an ornative and resultative meaning. But the majority of *-ate* forms are not derived through the suffixation of *-ate* but through other morphological processes, namely back formation, local analogy, conversion, clipping, etc. Back formation of *escalate* from *escalator* (19b) can be generated by the deletion of suffix *-or* by analogy with other instances where both the suffixed and non-suffixed forms are independent words. The other non-affixational derivatives are also coined in analogy to other parallel forms, and they are paradigmatic in the sense that they crucially involve elements in absentia. Consequently, the semantic and phonological properties of *-ate* verbs do not so much depend on the properties of the concatenated elements (elements in praesentia), i.e., bases and suffixes, as on the relationship with other non-present elements (elements in absentia). This shows that paradigm pressure continues to be synchronically enforced to produce new words, and thus must be included in any synchronic grammar.

Finishing this section, we may speculate over the reason why so many diverse innovative *-ate* formations are created. One possible answer is that it is the diversity and frequency of already existing *-ate* forms that prompts the proliferation of the newcomers. In comparison to the other verbal affixes, *-ate* tends to occur in a comparatively high number of tokens and types. This state of affairs makes it hard for the speaker to discern a unique productive pattern, so there exist too many different possible analogical strategies around, which still needs to be explored in the future research.

4. The Identification of Bases

In the foregoing sections, we have clearly shown that the

notion of paradigm has some justification within derivational phonology and morphology and that the paradigmatic forces of analogy are independently needed to account for the various apparent idiosyncracies in derivational word formation. Based on these observations, it can be concluded that any competence theory of word formation must certainly include some account of paradigmatic aspects of word formations.

We now turn to the issue of concerns about which forms tend to serve as bases in proportional analogy cross-linguistically. Analogy is not random and analogical change is constrained in some principled way. As to the bases of analogical proportions, it can be assumed that certain members of morphological paradigms are more basic than others and that they have the predictive power of various forms within the paradigm. This means that bases of paradigm may act as pivots in determining the possible directionality of proportions.

One possible answer is that isolation forms or independently occurring forms can be bases and determine phonological properties of other forms, which was originally proposed by Kenstowicz (1996) using Base-Identity under the correspondence theory. Vowel alternations in American English spoken in the Philadelphia-New York region offer an evidence for the isolation form as a pivot for paradigm levelling. These dialects have [æ] in open syllables, and its tense allophone [E] in closed syllables, for example *pass* [pEs], but *passive* [pæ.sɪv]. Note that æ-tensing does overapply in Class 2 affixed forms.

(20) æ-tensing: overapplication in class 2 affixed forms

pass	[pEs]
passer	[pE.sɪ], *[pæ.sɪ]
passing	[pE.sɪŋ], *[pæ.sɪŋ]
passable	[pE.sə.bəl], *[pæ.sə.bəl]
passed	[pEst]

Here in the above paradigm, isolation form *pass* is assumed to have the privileged status of base, determining phonological properties of other forms even though they fail to meet the context of tensing. The key difference between *passive* [pæ.sɪv] and *passing* [pɛ.sɪŋ] in the same phonological environment is that only the latter has the isolation form as its base, which in turn functions as the pivot for paradigm leveling.

Another more interesting example which shows that only the free-standing lexical item can act as the base of the morphological paradigm is found in the younger generations of Seoul Korean. In the morphology of Korean, noun stems can be isolated, while verb stems must always undergo some inflection and so it is impossible to cite the verb stem in isolation. This very difference explains the puzzling asymmetries between noun and verb phonology with respect to the cluster simplification.

(21) asymmetry between noun and verb phonology

noun	verb
/talk/ 'chicken'	/palk/ 'be bright'
[ta<l>k] isolation form	___ no isolation form
tak-l nominative	palk-ass-ta, *pak-ass-ta past tense
tak-uy genitive	palk-umyen, *pak-umyen 'bright-if'
tak-ul accusative	palk-uni, *pak-uni interrogative
tak-kwa 'chicken and ...'	pak-ko 'bright and ...'

Upon comparing noun with verb paradigm, it will be clear that cluster simplification is generalized in nouns to apply before vowel-initial inflections, but never generalized in verbs. The assumed reason is that analogical change of cluster simplification extends to the rest of the paradigm only when there exists independently occurring word as in nouns. Here once again, we witness the privileged status of isolation form in remodeling the paradigm and predicting the direction of subsequent paradigmatic leveling.

Another possible factor to govern the direction of analogical change is the notion of markedness. In many previous researches, markedness has played a significant role in explaining the analogical change. Consider the vowel leveling phenomena in modern German (4) again, which are repeated below.

(22) vowel lengthening in modern German

{Lob, Lob-es} [lop], [lo:bəs] ⇒ [lo:p], [lo:bəs] 'praise'

{Weg, Weg-e} [vek], [ve:gə] ⇒ [ve:k], [ve:gə] 'path'

{Rad, Rad-es} [rat], [ra:dəs] ⇒ [ra:t], [ra:dəs] 'wheel'

Here the analogical pressure of quantity leveling serves as a constraint on the regular phonology, and thus vowels in uninflected forms are analogically lengthened at the cost of phonological transparency, enforcing uniform length within paradigms. With regard to the trigger for the restructuring in modern German, the inflected plural forms prevail over the singular ones, that is, unsuffixed forms are being remodeled on suffixed forms. We claim that this is because there is a hierarchy of preferred forms, and that the phonology of the system constrains possible and impossible analogies. In general, morphologically or phonologically derived forms are considered to be more unmarked in comparison with underived ones under the effects of non-derived environments blocking (NDEB) and the emergence of the unmarked (TETU).

In addition to the markedness of individual word forms, the markedness of functional principles such as maximal utilization of rules, bleeding/feeding ordering, and opacity/transparency of rules is known to govern the direction of analogical change, which was first proposed by Kiparsky (1965). Analogy in this context is not just surface analogy but aims at grammar simplification and optimization constrained by the phonological

system.

A third constraint on the possible directionality of analogical change can be that more numerous forms, or high frequency words play a crucial role in unleashing analogy: namely that the more numerous represented forms tend to pressure the others to change. Furthermore, frequency of occurrence is also a relevant factor in determining whether or not a given form will be subject to analogical change. The higher the frequency, the higher the blocking force. For example, high frequency words like *men*, *feet*, *drank*, and *brought* are resisting regularization (**mans*, **foots*, **drinked*, **bringed*), which is based on the assumption that mental economy demands that frequently occurring forms be short for memory without any overt affix.

As a final possibility, it may be that the problem of base identification is more fruitfully approached as an acquisition problem, rather than as a typological problem, as suggested in Albright (2001). He proposes that base identification is part of a strategy employed by language learners to develop a system that will allow them to project inflected forms that they have not encountered before. Under a computationally-implemented model of paradigm acquisition, he shows how the model correctly selects the typologically marked form as the base.

Among these four alternatives considered, no single one does work in all cases, or exactly predicts what will happen afterwards by projecting the remaining forms. Instead we can only say that the identification of bases allows some flexibility. Actual selection of bases may involve the interplay of other factors than those just mentioned, which waits for further study.

5. Conclusions and Remaining Questions

In this paper, we have attempted to seek plausible answers to the questions of what really happened, how it happened, why

it happened, and what will happen in the English derivational paradigm system. Through a close examination of well-attested examples, we have demonstrated that there are general paradigmatic forces operating in English derivational processes as well as syntagmatic selectional restrictions.

By showing that apparent surface idiosyncrasies in derivational phonology are, in reality, conspiring for the simplicity and system conformity of grammar via leveling, we have presented another supporting evidence that paradigmatic force of leveling is at the very heart of English derivational phonology as well. As a morphological evidence for derivational paradigm, we have demonstrated that the majority of morphological processes is based on local analogies with other already existing complex words, and that any competence theory of word formation must certainly include some account of analogical formations. Based on these, it is argued that the value of the derivational paradigm in phonology and morphology is independently and appropriately motivated in any adequate linguistic theory. Seen in this light, this paper offers another independent evidence against the split morphology.

In spite of the argument for the appropriateness of the notion of derivational paradigm, however, it is clear that derivational paradigms are not prototypical paradigms, in that a derivational paradigm allows a lesser degree of prediction than an inflectional one does. There is a cline observed both in the degrees of paradigm coherence and applicability between typical cases of derivation and inflection, and in the scales of paradigm strength as we move from one class affixation to another.¹²⁾

¹²⁾A derivational paradigm does not have the exactly same degree of predictability and applicability as an inflectional one. For example, any English verb can be put in the 3rd person singular present indicative, while not all the transitive verbs have the agentive nouns. There are unexplainable gaps: consider *express* which does not have a corresponding word **expresser*. Also there exists some gradient distinction

We close this paper with a question of why paradigm leveling does occur. The answer to this question must ultimately be grounded on functional motivation in the broader sense of language behavior. Functional principles controlling language behavior can be divided into the speaker-oriented principle of the minimization of articulatory effort, the listener-oriented principle of the maximization of perceptual contrast and the learner-oriented principle of the minimization of paradigmatic allomorphy. These natural drives cannot be optimized simultaneously, that is, it is impossible for one certain linguistic form to meet all the three requirements. Therefore these principles are inherently conflicting.

Here we have shown cases where the conflict tends to be resolved in favor of the learner-oriented principle of the minimization of paradigmatic allomorphy, resulting in leveling effects. But this is clearly not always the case. More extensive investigation of what determines the trade-off relation among the conflicting principles is not at present ready, but this task is necessarily required if the principle of paradigmatic forces is to yield any predictions about the directionality of possible paradigm leveling.

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in the degree of productivity within the derivational paradigm itself. For example, *-ness* can practically occur with any English adjective, whereas *-th* only attaches to a limited number of bases.

Many thanks to an anonymous reviewer for bringing this to my attention.

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접수일자: 2001. 5. 10.

게재결정: 2001. 5. 31.