INFLECTIONAL COMPLEXITY IN RELATION TO PHONOLOGY

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1. The problem of 'abstractness'. In *The Sound Pattern of English* (SPE), Chomsky and Halle (1968) propose an account of English phonology in which many instances of what would traditionally be regarded as morphological alternation are handled phonologically. Indeed, it is precisely in terms of their success in handling 'morphological' alternations that many of Chomsky and Halle's phonological rules are justified. But the cost of this success is that it is sometimes necessary to set up underlying representations which are quite remote from any of the surface alternants derived from them, and the phonological component which relates underlying and surface representations has to be correspondingly powerful. It is not surprising, therefore, that a reaction against the Chomsky-Halle approach set in as soon as SPE was published. Beginning with Kiparsky's 'How abstract is phonology?' (1968), a succession of proposals have been put forward about ways of limiting the power of the phonological component in a generative grammar, and the debate on this issue is unresolved.

One of the central questions in the debate can be posed roughly as follows: when two surface forms ('morphs') are to be related, how do we decide whether to state the relationship in terms of phonological rules, deriving both from a single underlying phonological representation, or to state it morphologically, as involving an alternation between forms which are phonologically distinct? In principle, it looks as if there should be two ways of tackling this question: from the phonological side, by looking for evidence on what should or should not be permissible in phonological rules and representations, and from the morphological side, by investigating how various possible answers to the question interact with what is known independently about how morphology behaves. In practice, however, the question has been tackled almost exclusively from the phonological side. Answers have been

proposed which invoke constraints on both phonological representations and the content and ordering of phonological rules, generally involving some criterion of 'naturalness'; but few, if any, answers have been proposed on the basis of what is possible or impossible in morphology.[1] This imbalance is due, I think, to a widespread pessimism about the feasibility of formulating any worthwhile generalisations of a morphological kind affecting the sort of alternation we are concerned with here. If an alternation is not accountable for phonologically, many linguists would say, then it is suppletive, and suppletion is a matter of language-particular idiosyncrasy; there is therefore no point in looking to morphological theory for any help in resolving the debate on abstractness.

In my view, this degree of pessimism is excessive. I will suggest that there is evidence for a general tendency of a specifically morphological kind which can furnish good grounds in certain types of case for handling alternations morphologically rather than phonologically, quite independently of any arguments from the phonological side of the debate.[2] I will illustrate this tendency first in a set of well-known facts about Maori; I will then justify it by appeal to a wider range of linguistic facts from a variety of languages; and finally I will show that, in connexion with an apparent counterexample in Hungarian, the tendency points towards a correct prediction about the direction of inflexional change.

2. Maori Passives: conjugation or consonant-deletion? Maori verbs (or 'universals', in the terminology of Biggs 1973) have Passive forms which, superficially at least, are derived from the corresponding Actives by a variety of suffixes, as illustrated in (1) (from Hale 1973:414).[3] Superficially, Maori verbs are distributed among a number of 'conjugations' characterised by distinct Passive endings; -tia, -kia, -mia, etc.[4] Hale calls this relatively concrete analysis the 'conjugation solution' for the Maori Passive. But, as he points out, within the framework of generative phonology of the SPE variety, the most natural way of accounting for this range of forms is to set up a single Passive suffix /ia/ (or possibly two, /ia/ and /a/) and to assign the immediately preceding consonant to the underlying phonological representation of the stem:/afit, hopuk, arum/etc. This stem-final consonant can then be got rid of in the Active forms by an exceptionless rule of word-final consonant deletion. The relatively abstract 'phonological solution' to the Maori problem is so apparently obvious, in fact, that if the data had been presented in a phonology test to first-year

linguistics students at MIT around 1969, any student who opted
for the conjugation solution would have been accused of failing
to notice an important generalisation and would have failed the
test. Yet Hale is able to demonstrate that, for a variety of
mainly 'external' reasons involving productivity and nonce-
forms,[5] the phonological solution is wrong and the conjugation
solution is right; consequently, the Active-Passive alter-
nation cannot be used as evidence for the existence of a
synchronic rule of final-consonant deletion.

(1)   Active   Passive

    awhi   *awhitia*   'to embrace'
    hopu   *hopukia*   'to catch'
    aru   *arumia*   'to follow'
    tohu   *tohungia*   'to point out'
    mau   *mauria*   'to carry'
    wero   *werohia*   'to stab'
    patu   *patua*   'to strike, kill'
    kite   *kitea*   'to see, find'

The question immediately arises: if Hale is correct, is
there any 'internal' evidence -- evidence discernible in the
Maori linguistic system synchronically, without regard to
diachronic tendencies -- which will induce both us as analysts
and Maori infants as native learners to prefer the more
concrete conjugation solution over the more abstract phono-
logical one? A closely related question is: is there any
general linguistic principle which imposes a conjugation
solution for the Maori data? Hale does suggest a principle
of a phonological kind, to the effect that underlying phono-
logical representations ending in consonants would violate the
'surface canonical pattern' of morphemes in Maori.[6] But this
principle is problematic, as Hale admits. If we take it to
mean that underlying representations can never violate any
phonotactic generalisation which applies to the surface
phonetic shapes of morphemes, then it seems too strong; it
would rule out, for example, the possibility of positing
underlying representations ending in voiced obstruents in
German, since syllable-final voiced obstruents never occur
'on the surface'. But, whether or not 'canonical patterns'
are relevant, Hale does not suggest any relevant principle
of a morphological rather than a phonological kind. I would
like to suggest, however, that a relevant morphological
principle does exist, which applies in Maori to the contrast
between verbal and nonverbal Passive forms.

The notion of a nonverbal Passive form may appear strange.

But it is a feature of Maori that any nonverbal element following a Passive verb within the verb phrase must be marked as Passive too (Biggs 1973:115):

(2) a. *I kai-nga ota-tia ngaa kuumara*
     eat-Pass raw-Pass the kumaras
     'The kumaras were eaten raw'

 b. *I patu-a   rawa-tia   te hoariri*
     kill-Pass completely-Pass the enemy
     'The enemy was killed outright'

 c. *I tanu-mia ora-tia   a Te Heuheu*
     bury-Pass   alive-Pass
     'Te Heuheu was buried alive'

Here, the words *ota, rawa,* and *ora* which modify the preceding verbs each carry a Passive ending too. The important point is that the ending is the same for all of them, and indeed for all such postverbal modifiers: *-tia.* Now, the phonological solution would require us to posit, for anything which can function as a postverbal modifier, a *t*-final underlying representation (e.g. /otat, rawat, orat/). But this at once provokes the question of why no such modifier ever has a stem ending in any other consonant -- a remarkable phonotactic restriction. Hale therefore counts this as evidence against the phonological solution. If we adopt the conjugation solution, on the other hand, we need only say that all modifiers are assigned to the *-tia* conjugation (which happens to be the most productive), and we are not required to posit a final /t/ in their underlying representations.

There is, however, a further reason why the facts of (2) count in favour of a conjugation solution. Given the conjugation solution, postverbal modifiers are in an obvious sense less complex inflexionally than verbs are; verbs belong to about fourteen conjugations whereas modifiers belong to only one. In more general terms: the head and the modifier in the verb phrase both realise the property Passive inflexionally, but the modifier does so more simply than the head. This is suggestive. Suppose we find that, in a variety of languages, there are numerous instances where modifiers are inflexionally less complex than heads and few if any instances of the opposite situation. Suppose, too, that in many of these instances there is no possibility of a phonological account of this difference in complexity. How this imbalance between heads and modifiers fits into linguistic theory may not be obvious; nevertheless, it will clearly be a morphological rather than a

phonological phenomenon. Yet a phonological solution for
the Maori Passive will preclude our treating the contrast
between verbs and modifiers in Maori as an instance of the
phenomenon. Therefore a conjugation solution for the Maori
data, which does not preclude such a treatment, is preferable.
We have here, then, a further argument, an 'internal' one of a
purely morphological kind, in favour of a conjugation solution
for the Maori data. At the same time, we have an example of a
type of argument which has been so far absent from the abstract-
ness controversy: an argument on morphological rather than
phonological grounds against an 'abstract' solution for a
certain phonological problem, and consequently against the need
for the synchronic phonological rule (final-consonant-deletion)
that that solution requires.

The argument just presented presupposes, however, that
modifiers are indeed generally less complex inflexionally than
heads. The next section is devoted to justifying this crucial
claim.

3. Head-modifier contrasts in inflexional complexity. I
present below at (3)-(17) what may at first seem a rather
haphazard set of facts about inflexional morphology in a variety
of languages:

(3) There are several Russian noun declensions, but only
one adjective declension (or two, depending on how
one regards the contrast between 'hard' and 'soft'
stems).

(4) The Genitive Plural of Russian adjectives always ends
in -ix, but Masculine second declension nouns display
a phonologically conditioned alternation in the
Genitive Plural: -ej if the stem ends in a palatalised
or palatoalveolar consonant, otherwise -ov.

(5) There are several German noun ceclensions, but only
one adjective declension; thus, Masculine nouns belong
to at least five types (Tag, Pl. Tage 'day'; Gast,
Pl. Gäste 'guest'; Mann, Pl. Männer 'man'; Streik, Pl.
Streiks 'strike'; Ochse, Pl. Ochsen 'ox') but
adjectives qualifying Masculine nouns belong to only
one (rot, Pl. strong rote, weak roten 'red').

(6) There is phonologically conditioned allomorphy in the
realisation of Plural in German nouns but not in
adjectives. Thus, Leiter, Pl. Leiter 'leader' can

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be regarded as belonging to the same type as *Tag*, and
Apfel, Pl. *Äpfel* can be regarded as belonging to the
same type as *Gast*, subject to the provision that there
is no overt suffix in the Plural when the stem ends in
an unstressed syllable and a sonorant; but no such
provision applies to adjectives, so that *heiter*
'cheerful' and *dunkel* 'dark' both have strong Plurals
heitere and *dunkele*, with final *-e*, just like *rote*.

(7)   In Zulu adjectives, some nominal Class distinctions
      are neutralised, or syncretised (Doke 1973:101;
      Class labels as in Rycroft & Ngcobo 1979:75):

	Noun	Adjective
Class 1	*umu-ntu* 'person'	} *om-khulu* 'big'
1a	*u-thisha* 'teacher'	}
8	*izi-gqoko* 'hat'	} *ezin-kulu* 'big'
10	*izin-cwadi* 'books'	}

(8)   German adjectival 'weak' (i.e. post-determiner)
      declension syncretises Genitive-Dative Singular
      and all Plural Cases; most noun declensions do not.

(9)   Russian adjectival declension syncretises Genitive,
      Dative, Instrumental and Locative Cases in the
      Feminine Singular; no noun declension does this.

(10) Latin third-declension adjectives mostly have (or
      acquire, by the 1st century AD) a syncretised
      Dative-Ablative Singular ending -ī; third-declension
      non-Neuter nouns nearly all have (or acquire) a
      contrast between Dative -ī and Ablative -e (Ernout
      1953:52-53,58).

(11) Many Russian nouns have alternating stress, but no
      adjectives do (in the attributive declension).

(12) Many German Masculine nouns and some neuters have
      umlaut as a Plural marker, but no adjectives do.

(13) Some Hungarian nouns have a long stem vowel in the
      Nominative Singular and most other Singular Cases but
      a short one in the Accusative Singular and throughout
      the Plural (e.g. *kéz* 'hand', Superessive Singular

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kézen versus Acc. Sg. *kezet*, Nom. Pl. *kezek*);
no adjectives have this alternation.

(14) Most modern Greek Masculine nouns in *-os* with ante-
penultimate stress in the Nominative Singular have
penultimate stress in the Genitive Singular,
Accusative Plural and Genitive Plural; but adjectives
do not show this alternation (e.g. Nominative
o tétartos ánөropos 'the fourth man', Genitive
tu tétartu anөrópu 'of the fourth man'; contrast
Ancient (Attic) Greek *tũ: tetártu: anthró:pu*ı)
(Householder, Koutsoudas & Kazazis 1964:54-6).

(15) Most Latin 2nd-declension nouns in *-us* are Masculine,
but a few are Feminine (e.g. *bonus servus* 'good
servant' versus *bona pinus* 'good pine tree'), and
conversely most 1st-declension nouns are Feminine
but a few are Masculine (e.g. *bona mensa* 'good table'
versus *bonus nauta* 'good sailor); but no adjectives
follow this minority pattern of having *-a* in the
Masculine or *-us* in the Feminine.

(16) Latin has adjectives which 'go like' the nominal
first, second and third declensions, but none which
'goes like' the fourth or fifth declension.

(17) Some Maori verbs have a reduplicated stem in the
Active but a nonreduplicated stem in the Passive
(e.g. *tatari* 'wait', Pass. *taaria; pupuhi* 'blow',
Pass. *puuhia*); no postverbal modifiers have this
alternation.

Despite the haphazard appearance of (3)-(17), certain ten-
dencies emerge from them, alongside (1), which can be summarised
as follows:

(18) Where both heads (e.g. nouns) and modifiers (e.g.
adjectives) realise the same morphosyntactic pro-
perties inflexionally, the heads tend to have:

(a) more paradigms (declensions or conjugations):
cf. (1, 3, 5, 16);

(b) less syncretism: cf. (7, 8, 9, 10);

(c) more stem allomorphy: cf. (11, 12, 13, 14, 17);

(d) more phonologically conditioned allomorphy

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within the paradigm: cf. (4, 6);

    (e)   more idiosyncrasy in the marking of lexically
          determined or concordial properties such as
          Gender: cf. (15).

Furthermore, it seems reasonable to regard each of the character-
istics (18a-e) as a measure of relative inflexional complexity
in the sense that, with respect to each of these characteristics,
the inflexional behaviour of the class of words which function
as heads imposes a greater learning and memory burden than that
of the class of words which function as modifiers. So we can
distil from (18) the following more general tendency, at least
provisionally:

    (19)   Tendency for Differential Complexity in Inflexion
          (TDCI): Where both heads and modifiers regularly
          realise the same morphosyntactic properties inflex-
          ionally, and where there is a difference in inflex-
          ional complexity between the classes of words which
          fulfil each function, the head class will be inflex-
          ionally more complex than the modifier class.

     At first sight, it is easy to find counterexamples to
the TDCI, since there are instances where morphosyntactic
properties relevant to the noun phrase are realised inflexion-
ally in the head noun either not at all or only marginally,
their regular realisation being in some other element. Examples
of this can be found in Maori and spoken French, where Number
is regularly realised in the determiner (or 'definitive':
Biggs 1973:48) but not in the noun; nouns such as Maori *tamaiti*
'child' and French *oeil* 'eye, with phonetically distinct plural
forms *tamariki* and *yeux* respectively, are in a small minority.
But these are not counterexamples to the TDCI as formulated at
(19), because the TDCI relates only to situations where heads
and non-heads *regularly* realise the same morphosyntactic
properties, and does not rule out the possibility that the task
of realising some property may always or nearly always fall to
some element within the phrase other than the head. This
qualification is relevant also to the somewhat more complex
situation in modern written German, which appears to conflict
with (18 c) in that there is more syncretism in the Case-
Number inflexion of the noun than in that of the determiner or
in the so-called 'strong' adjective declension. The amount of
syncretism in German nouns is so great, however, that is
extremely rare to find noun phrases containing inflected non-
head elements in which the inflexion of the head noun contrib-
utes crucially to identifying what Case-Number combination is

being realised;[7] and one can plausibly argue that in modern German, just as in French and Maori, the realisation of Case-Number within the noun phrase is regularly taken care of not by the noun but by the determiner -- or by an adjective in its 'strong' form, just when no overtly inflected determiner is present (cf. Durrell 1979).

The genuineness of the TDCI is supported by the fact that in several instances historical change has reinforced it, even without any obvious independent phonological or other motivation. Examples are at (6), (10), (12) and (14). As is well known, the German vowel assimilation process known as umlaut (mentioned in (12)) was originally phonologically conditioned in Old High German, but subsequently became morphologised. What is important for present purposes is that it was morphologised differently in noun and adjective inflexion: in nouns it became a common mark of Plural, whereas in adjectives it survived only marginally as a mark of Comparative and Superlative.[8] A similar divergence affected apocope (the loss of unstressed final vowels) in German, as (6) shows. In the SPE framework of generative phonology, it is feasible to describe the latter in phonological terms, as Wurzel does (1970:172ff.); but such a description, without recourse to the TDCI, cannot account for the fact that it is adjectives rather than nouns that resist apocope. Moreover, no purely phonological description (much less explanation) is feasible for (12) or for the Latin divergence at (10).

The Greek example at (14) is especially interesting from the historical point of view. In most Ancient Greek dialects, those word-forms with 'recessive' accent would be accented on the penultimate or the antepenultimate syllable according to whether the vowel of the final syllable was short or long; for this class of forms, therefore, the place of the accent was determined phonologically. When the distinction between long and short vowels was lost, however, two options presented themselves: either the place of the accent could be maintained at the cost of losing phonological predictability, or phonological predictability could be maintained (on the basis that all final-syllable vowels were now short) at the cost of moving the accent on all 'recessive' word-forms to the ante-penultimate syllable. What happened was that most recessive nouns chose the first option, while all recessive adjectives chose the second, so that a completely new divergence in accentual behaviour between nouns and adjectives was created; we even find doublets such as the noun *Tetárti* 'Wednesday', retaining the old penultimate stress, in contrast with the adjective *tétarti* (Fem. Sg. Nom.) 'fourth' displaying a

leftward shift.

At the end of section 2, I suggested that, if modifiers tended generally to be less complex inflexionally than heads, this would constitute an 'internal' ground for choosing the conjugation solution for Maori Passives. The facts presented in (3)-(17) seem to constitute quite solid prima facie evidence for the existence of such a tendency, on the lines of the statement of the TDCI given at (19). I turn now to an apparent counterexample to the TDCI.

4. A Hungarian problem.[9] Consider the data in (20), from a relatively conservative variety of standard Hungarian, involving Plurals of nouns and adjectives exhibiting back-vowel harmony and with stems ending in vowels (based on Sauvageot 1951:89 and Bánhidi, Jókaj, & Szabó 1965).

(20)   Noun Plurals   Adjective Plurals

   Stem-final vowel:

   high: háború-k 'wars'[10]   szomorú-ak 'sad'

              kocsi-k 'cars'   londoni-ak 'of London'

   non-high: író-k 'writers'   kívalo-k 'excellent'

In these data we observe two at least superficially distinct Plural suffixes: -k and -ak. What is interesting for present purposes is their distribution, which seems to run counter to our earlier generalisation (18d): in the noun column we find only the one alternant -k, while in the adjective column we find both alternants -k and -ak, so that the adjective inflexion is more complex than the nominal.[11]

Assuming still that the TDCI is broadly correct, there are two possible ways of reconciling these Hungarian facts with it. The first is to say that the -k/-ak alternation in the adjective column of (20) is superficial, and to account for it phonologically in such a way that there are no more alternants for Plural in adjectives than in nouns. The second is to say that the alternation is morphological, and to predict that the infringement of the TDCI will be remedied by some morphological innovation. We will explore the phonological approach first.

Can we posit a single underlying phonological represent-

ation for the adjectival Plural endings? A plausible contender
is /ak/, yielding underlying representations /szomorú-ak/,
/londoni-ak/ and /kiváló-ak/; the last of these is then converted
to [kiválók] by a phonological process of vowel-deletion.
Further evidence for vowel-deletion as a synchronic process in
Hungarian seems to emerge when we compare the vowel-final stems
in (20) with consonant-final ones. Back-vowel nouns and
adjectives with stems ending in consonants take as their Plural
ending either -ok or -ak. Of these, -ok is primarily a
nominal ending and -ak is primarily an adjectival one. There
are a few common adjectives which take -ok (e.g. nagy 'big',
gazdag 'rich'), but most take -ak, which seems to be productive.
By contrast, while many nouns take -ak, most nouns take -ok,
including loanwords such as sport, autóbusz, aspiráns, 'graduate
student', kongresszus. There are moreover noun-adjective
doublets distinguished by their Plural endings, e.g. havas
(adjective) 'snowy', Pl. havasak versus havas (noun) 'permanent-
ly snow-covered mountain', Pl. havasok; and (with the corres-
ponding front-vowel-harmonic suffixes) ismerős (adjective)
'known', Plural ismerősek versus ismerős (noun) 'acquaintance',
Pl. ismerősök (Sauvageot 1951:52). The only nouns which end
in simple -k in the Plural are ones with stems ending in
vowels, like those in the left-hand column in (20). It
therefore seems plausible to posit for these nouns underlying
representations such as /háború-ok/, /kocsi-ok/, /író-ok/, and
to derive their surface forms by appeal to the same vowel-
deletion process that we have invoked for kiváló-k.

Before attempting to formulate this process as a phono-
logical rule, I shall turn to consider the morphological
approach to the -k/-ak alternation, for reasons which will
become clear shortly. As I said earlier, this approach
commits us to predicting some morphological change in order
to remedy the breach of the TDCI that the data in (20)
demonstrate. This may seem a rash prediction. In fact, there
is only one morphological innovation which will both remove
the offence to the TDCI and at the same time comply with the
subsidiary tendency, observed in German, Latin and Greek, to
create or enhance inflexional divergence between nouns and
adjectives: this is the extension of the -ak ending to
adjectives whose stems end in non-high as well as high vowels,
so as to yield kiváló-ak to replace kiváló-k. But, according
to Sauvageot, this is precisely what happens. The table
corresponding to (20) in the innovating dialect is given in
(21).

The diachronic facts therefore fit the morphological
approach very neatly. We must now compare how well they fit

the phonological approach.

(21)   Noun Plurals   Adjective Plurals

Stem-final vowel:

high: *háború-k*   *szomorú-ak*

                 kocsi-k   *londoni-ak*

non-high: *író-k*   *kiváló-ak*

The vowel-deletion analysis of the *-k/-ak* alternation
yields no such precise prediction about morphological change,
partly because there is no obviously 'correct' way of stating
it as a phonological rule and hence no obvious source from
which to derive expectations about possible phonological
changes involving rule simplification or generalisation, for
example.[12] If we assume underlying Plural endings /ok/ for
nouns and /ak/ for adjectives, the data of (20) require a
rule or rules which will, in the Plural ending, (a) delete the
low vowel /a/ after non-high vowels and (b) delete the mid
vowel /o/ after any vowel. These two effects can be achieved
by separate rules as follows:

(22)   a. $\overset{V}{[+ \text{low}]} \rightarrow \emptyset \ / \ \overset{V}{[- \text{high}]} + \underline{\quad} k\#]$

        b. $\overset{V}{[- \text{low}]} \rightarrow \emptyset \ / \ V + \underline{\quad} k\#]$

But there is no convenient way of collapsing these simply by
means of SPE-style angle brackets or Greek-letter variables.
The best we can achieve is something on the following lines,
incorporating an explicit condition:

(23) $\overset{V}{[\alpha \text{ low}]} \rightarrow \emptyset \ / \ \overset{V}{[\beta \text{ high}]} + \underline{\quad} k\#]$

        Condition: If $\alpha = +$, then $\beta = -$.

An equivalent way of stating the condition is: if $\beta = +$, then
$\alpha = -$. This in turn suggests a second 'expanded' version,
equivalent in effect to both (22) and (23):

(24)   a. $\overset{V}{[- \text{low}]} \rightarrow \emptyset \ / \ \overset{V}{[+ \text{high}]} + \underline{\quad} k\#]$

        b. $V \longrightarrow \emptyset \ / \ \overset{V}{[- \text{high}]} + \underline{\quad} k\#]$

What does all this lead us to expect in the way of phonological

innovation? The first point to note is that, unlike the TDCI-linked morphological account, the phonological account does not require the prediction of any change at all. But certain phonologically-motivated changes do seem at least plausible. These include:

(i) the simplification of version (22) by the elimination of the more complex rule (a), so that only non-low vowels will be deleted and *kiváló-k* will be replaced by *kiváló-ak*.

(ii) the simplification of version (24) by the elimination of the more complex rule (a), so that no vowels will be deleted after high vowels any longer and *háború-k, kocsi-k* will be replaced by '*háború-ok*', '*kocsi-ok*';

(iii) the wholesale simplification of version (23) by the removal of the condition, so that vowel-deletion will occur after any vowel and *szomorú-ak, londoni-ak* will be replaced by '*szomorú-k*', '*londoni-k*'.

Now, one of these plausible changes, namely, (i) does reflect what actually took place, as illustrated in (21). There certainly exists, therefore, a relatively abstract SPE-style phonological account of the état de langue in (20) which is compatible with what followed. But what is important is that the phonological account does not predict precisely which innovation will occur in the way that the morphological account does. So the morphological account emerges as superior, at least on the basis of the evidence considered here; the fact that it requires us to regard the data at (20) as an infringement of the TDCI turns out to be a positive feature of it, after all.

There are no doubt other ways in which one could try to account phonologically for the *-k/-ak/-ok* alternations (or some of them); for example, one could build into the formulation of one's rules some reference to word-classes in order to capture the fact that vowel-deletion is more general in nouns than in adjectives. But it is not necessary to explore such further possibilities here, because we have already established the significant conclusion: a phonological account is compatible with a variety of inflexional innovations (including maintenance of the status quo), whereas our morphological account is compatible with only one, namely the right one.

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5. Conclusion. Hale saw clearly the theoretical problem posed by the Maori Passive: how should linguistic theory reflect the fact that the phonological solution is wrong and the morphological solution, involving a less abstract phonological analysis of Maori verb stems, is right? Hale's answer involved a phonological concept of 'surface canonical pattern'. My answer, by contrast, looks outside phonology to a general inflexional principle provisionally formulated at (19) as the Tendency for Differential Complexity in Inflexion. In general terms, what I am suggesting is that when a morphological alternation reflects the TDCI, it is a mistake to describe it in purely phonological terms; so, if a relatively abstract underlying phonological representation is posited solely on the basis of such alternation, it is not well motivated.

Clearly the TDCI is far from providing a criterion to resolve *all* uncertainties about abstractness in phonology. What is important, however, is that if the TDCI is valid, we have established the principle that morphological theory as well as phonological theory has something to say about the description of morphological alternations. It seems reasonable to expect that, as interest in morphological theory increases, phonologically relevant by-products will become more numerous.

NOTES

[1] For suggestions about constraining phonology, see for example Stampe (1973), Koutsoudas, Sanders & Noll (1974), Hooper (1976), and Linell (1979); apologists for 'abstract' phonology of more or less the SPE variety include Gussmann (1980), Dresher (1981), and Anderson (1981). Hudson (1975; 1980) argues for a morphological (in fact, suppletive) treatment of all or nearly all 'surface' alternations, but his reasons too are phonological rather than morphological; although his position leads him to make morphological predictions (for example, about the productivity of alternations of various kinds), these predictions are not clearly borne out by the evidence and so count against his position rather than for it. The upsurge of American interest in derivational morphology since Aronoff (1976) has yielded no spin-off for the abstractness debate, unfortunately; recent European work (cf. Dressler 1977; Mayerthaler 1981; Wurzel forthcoming) looks more promising from this point of view.

[2]At least one other general constraint on morphological behaviour, namely 'paradigm economy' (Carstairs 1983; forthcoming), has fairly direct implications for the abstractness debate, I believe; but discussion of this here would take us too far afield.

[3]Since Hale's discussion, these Maori data have become a routine textbook example, appearing in Hyman 1975, Hooper 1976, Sommerstein 1977, and Kenstowicz & Kisseberth 1979.

[4]Hohepa (1967) puts forward what is essentially a conjugation solution.

[5]The terms 'external' and 'internal' are used here in the sense of Kenstowicz & Kisseberth 1977.

[6]Hale's use of the term 'canonical pattern' here is reminiscent of the term 'canonical form' introduced into morphological discussion many years earlier by Hockett (1947).

[7]This situation can arise with determiner-less noun phrases such as *guten Wein* (Acc. Sg.) 'good wine', *guten Weins* (Gen. Sg.) 'of good wine', and *guten Weinen* (Dat. Pl.) 'to good wines'. But one of the Cases involved (the Genitive) is obsolete in most forms of spoken German.

[8]There are some nouns and adjectives in which an umlauted stem alternant became generalised throughout the paradigm, e.g. *Käse* 'cheese', *schön* 'beautiful'. But these words are irrelevant to the question of the morphological use to which umlaut was put in those words in which umlaut was not generalised.

[9]I am grateful to Ross Clark for comments on an earlier version of this section. Mistakes which remain are my responsibility, however.

[10]The forms are in normal Hungarian orthography, with acute accent indicating vowel length.

[11]One can interpret (18d) in such a way that (20) is not a prima facie counterexample to it at all, in as much as adjectives with an overt Plural suffix never occur attributively (i.e. as modifiers of nominal heads) but only predicatively (i.e. as heads within their own adjective phrases). If so, the problem vanishes. But it is more interesting to

treat the problem as genuine, at least for the time being, and explore its implications.

[12]The natural place to look for an actual SPE-style attempt to handle the *-k/-ak* alternation whether by deletion or epenthesis, is Vago (1980); but Vago seems strangely to neglect postvocalic suffixal alternations in favour of postconsonantal ones.

REFERENCES

Anderson, Stephen R. 1981. 'Why phonology isn't "natural"', *Linguistic Inquiry*, 12:493-539.

Aronoff, Mark. 1976. *Word formation in generative grammar*. Cambridge, MA: MIT Press.

Bánhidi, Z., Z. Jókaj, and D. Szabó. 1965. *Learn Hungarian*. 4th ed. Budapest: Tankönyvkiadó.

Biggs, Bruce. 1973. *Let's learn Maori*. 2nd ed. Wellington: Reed.

Carstairs, Andrew. 1983. 'Paradigm economy', *Journal of Linguistics*, 19:115-128.

----------------- Forthcoming (1984). 'Paradigm economy in the Latin third declension', *Transactions of the Philological Society*.

Chomsky, Noam and Morris Halle. 1968. *The sound pattern of English*. New York: Harper & Row.

Doke, C.M. 1973. *Textbook of Zulu grammar*. 6th ed. Cape Town: Longman.

Dresher, Bezalel Elan. 1981. 'Abstractness and explanation in phonology'. *Explanation in linguistics*, edited by Norbert Hornstein and David Lightfoot, 76-115. London: Longman.

Dressler, Wolfgang U. 1977. *Grundfragen der Morphonologie*. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

Durrell, Martin. 1979. 'Some problems in the morphology of the German noun phrase', *Transactions of the Philological Society*, 66-89.

Ernout, A. 1953. *Morphologie historique du latin*. 3rd ed. Paris: Klincksieck.

Gussmann, Edmund. 1980. *Studies in abstract phonology*. Cambridge, MA: MIT Press.

Hale, Kenneth. 1973. 'Deep-surface canonical disparities in relation to analysis and change: an Australian example'. *Current trends in linguistics*, vol. 11, ed. by Thomas

Sebeok, 401-458. The Hague: Mouton.

Hockett, Charles F. 1947. 'Problems of morphemic analysis', *Language*, 23:321-343. Reprinted in Joos 1966.

Hohepa, Patrick W. 1967. *A profile generative grammar of Maori*. (Supplement to *International Journal of American Linguistics* vol. 33, no. 2). Bloomington: Indiana University Press.

Hooper, Joan B. 1976. *An introduction to natural generative phonology*. New York: Academic Press.

Householder, Fred W., Kostas Kazazis, and Andreas Koutsoudas. 1964. *Reference grammar of literary dhimotiki*. Bloomington: Indiana University Press.

Hudson, Grover. 1975. *Suppletion in the representation of alternations*. PhD thesis, UCLA. Ann Arbor: University Microfilms.

------------- 1980. 'Automatic alternations in non-transformational phonology', *Language*, 56: 94-125.

Hyman, Larry M. 1975. *Phonology: theory and analysis*. New York: Holt Rinehart.

Joos, Martin, ed. 1966. *Readings in linguistics 1*. Chicago: University of Chicago Press.

Kenstowicz, Michael and Charles Kisseberth. 1977. *Topics in phonological theory*. New York: Academic Press.

------------- 1979. *Generative phonology: description and theory*. New York: Academic Press.

Kiparsky, Paul. 1968. 'How abstract is phonology?' Bloomington: Indiana University Linguistics Club. Reprinted in Kiparsky 1982:119-163.

------------- 1982. *Explanation in phonology*. Dordrecht: Foris.

Koutsoudas, Andreas, Gerald Sanders, and Craig Noll. 1984. 'On the application of phonological rules', *Language*, 50:1-28.

Linell, Per. 1979. *Psychological reality in phonology*. Cambridge: CUP.

Mayerthaler, Willi. 1981. *Morphologische Natürlichkeit*. Wiesbaden: Athenaion.

Rycroft, D.K. and A.B. Ngcobo. 1979. *Say it in Zulu*. London: School of Oriental and African Studies.

Sauvageot, Aurélien. 1951. *Esquisse de la langue hongroise*. Paris: Klincksiek.

Sommerstein, Alan H. 1977. *Modern phonology*. London: Edward Arnold.

Stampe, David. 1973. *A dissertation on natural phonology*. PhD thesis, University of Chicago.

Vago, Robert M. 1980. *The sound pattern of Hungarian*. Washington, DC: Georgetown University Press.

Wurzel, Wolfgang Ullrich. 1970. *Studien zur deutschen*

Lautstruktur. Berlin: Akademie-Verlag.
——————— Forthcoming. *Flexionsmorphologie und Natürlichkeit*. Berlin: Akademie-Verlag.