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ON A CLASS OF SOLUTIONS TO A
PHONOLOGICAL DILEMMA

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Morpholexical alternation in the Welsh definite article

PREAMBLE

Abstract

The question (presumed to be legitimate) is asked: which of the three allomorphs of the Welsh article is 'basic' or 'underlying'? Its surface form may depend left or rightwards on its phonological context, in some cases despite the fact that the form of the context is dependent on the presence of the article. All the logically-possible ways of deriving the surface forms from each candidate underlier are examined* Of those ways which yield descriptively adequate solutions, it is found that each requires general mechanisms and at least one ad hoc stipulation or other theoretically undesirable feature. The issue of what constitutes a 'best' or 'correct' solution is then discussed, and it is argued that no optimal solution is achievable within the framework of classical generative phonology. A face-saver borrowed from autosegmental/3-D phonology is offered. The paper is by now something of a period piece (on the then current background see Coates 1982), but it has been extended to show how the insoluble dilemmas presented in the original can be elegantly sidestepped using more modern phonological techniques.

Acknowledgements

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The first draft was produced at a time when I still wrote things longhand, and I am very grateful to Sheila Lee for her amazing ability to make both head and tail of my handwriting. I am also indebted to Alex Morris and Andy Casson for checking the Welsh data. The responsibility for shortcomings is mine alone.

Richard Coates

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Morpholexical alternation in the Welsh definite article

INTRODUCTION

The definite article in Welsh appears in three regular allomorps $\langle y \text{ yr } r \rangle$, here and below cited for convenience in their orthograph forms* $\langle y \rangle$ represents a mid central vowel (schwa), or a high one in the final syllables of lexical words like $tj^{\wedge} \text{ house}^f$ (degree of frontness differing from dialect to dialect). $\langle r \rangle$ is a usually voiced alveolar trill* (There is a fourth form $\langle yn \rangle$ which is recognizable as a cognate form only by historical analysis; it is not generally felt by Welsh speakers to be an article in expressions like yn awr 'now'* [1]) The purpose of this paper is not to describe the distribution or the phonological environment of the three allomorps - that is a rather essential task - nor even to explain the distribution - which is up to a point also not a difficult job. Instead, I shall be asking how the necessary distributional statements can be integrated into a linguistic description of Welsh, given the state of the art in phonology*

We must start with the description, though, before proceeding to theoretical matters* The allomorphic distribution is a question of external sandhi, a discourse-level rule*

- (1)(i) $\langle y \rangle$ occurs before a noun-form beginning with a consonant, except /h/ and (variably) /j/*

[For brevity: before a consonant*]

/h/ [2] or (variably) /j/ .

[For brevity: before a vowel*]

(iii) <r> occurs instead of either if the preceding word ends in a vowel, (iii) is therefore a systematic exception-case to rules (i) and (ii).

The expression in (1 (i)) noun-form beginning with a consonant requires some comment. As many readers must know, the Celtic languages in general have a system of stem-allomorphy which entails, among other things, that initial consonants in nouns alternate under a variety of grammatical conditions (e.g. gender of the noun) or lexical conditions (e.g. choice of a particular pronoun or possessive adjective to precede the noun) [3L The important consequence of this system for my present purpose is that there are critical cases of stem-alternation involving forms of the same noun beginning with a consonant and with a vowel. Feminine nouns with an initial //g// [4] have alternants with a zero initial, given the appropriate conditions:

(2)	Citation-form	Gloss	Mutated form	Definite form (after pause)
	gwraig	'wife'	wraig	y wraig
	gwlad	'country'	wlad	y wlad
	gwaun	'moor'	waun	y waun
	gwefl	'lip'	wefl	y wefl
	glan	'bank'	Ian	y Ian
	grugiar	'grouse'	rugiar	y rugiar
	gorsaf	'station'	orsaf	yr orsaf
	geneth	'girl'	eneth	yr eneth
	gardd	'garden'	ardd	yr ardd

It can be seen that the choice of the form of the article seems to depend on the phonological shape of the noun in a form indicating definiteness* The specification of the article thus does not respect some canonical or underlying lexical form: and the article does not, in any intelligible sense, cause mutation in the noun, I say this because the article does not vary according to the gender of the noun; therefore there is no alternative to ascribing the mutations in question to the interplay between the noun-phrase feature [+ definite], the form by which the lexical item is accessed, and its grammatical class, which in these cases is the feminine gender, There is, then, nothing about the phonological shape of the article which causes mutation; if there were, mutation would operate independently of gender, which it doesn't,

The form of the article obviously depends on the form of the following noun; let us say briefly that it depends rightwards, However, we have also established that it depends leftwards (see condition (iii) in (1)).

We must now try to proceed to a unified statement about the relations among its allomorphs, and I will assume for the time being that an appropriate strategy is to do this by selecting a unique underlier, as is the common practice in generative phonology (Lass 1984: 63, chapter 9)* Since two of the allomorphs consist of proper substrings of the third, I can find no reason for selecting one whose segments are abstract, nor one which is 'form-abstract' in the sense defined by Coates (1987), i.e; containing segment sequences not represented in any allomorph* Let us therefore examine one by one the consequences of assuming, with practitioners of Natural Generative Phonology like Vennemann (1973), that one of the allomorphs must be phonologically

alternative underliers: //yr//, //y//, //r//.

(i) //yr// AS UNDERLIER

If //yr// is phonologically basic, we are required to postulate the existence of two morphophonemic rules to bully it into the actually attested alternate surface forms. These are, in their maximally simple form:

(3) Rule A: /r/-deletion if the segment beginning the following
noun is a consonant

Rule B: /y/-deletion if the segment ending the previous
word is a vowel [5]

If we assume sequential rule-application then, with such a pair of rules, either order would result in a null form of the article in the expression //i yr ty// 'to the house':

(4)	//i yr ty//	//i yr ty//
Rule A:	y	Rule B: r
Rule B:		Rule A:
	*[i ty]	*[i ty]

We can rescue the right-hand solution more easily by constraining Rule A not to apply if Rule B has applied; at least the application of Rule B leaves us with the ultimately appropriate segment [r], unlike the applicational order A > B. This is what Morris Jones did in his classic statement (1912: 192). But what principle would we be entitled to invoke to block the application of Rule A in such an instance? There are two possibilities the merits of which I want to examine.

Rule B saying that it should not apply if the result of its application would be the eventual null exponency of the category Article of which the segment /y/ is a part. Functionally, this obviously makes a great deal of sense; it would preserve the distinction [+/- definite] as a surface distinction, for indefiniteness has no overt expression in Welsh. Structurally and theoretically, it would be hair-raising. It would require a morphophonemic rule to scrutinize its own output before applying, i.e. be globally sensitive (in the terminology of Lakoff 1972). If readers are old enough to remember the polemic of the early 1970's, they may recall that Lakoff, in a footnote (1972: 83, note 4), alleges that such a strategy is equivalent to, but less arbitrary than, allowing extrinsic ordering of phonological rules. However, neither of the logically possible extrinsic (stipulated) orderings of these rules as they stand permits the correct derivation. In fact, the only structural way of blocking the application of Rule A is as follows:

(5 (b)) We could amend the structural description of Rule A so that it operates only after a word-boundary followed by a vowel:

Rule A': /r/ ==> Ø / V__ %] % C
Art

The facts of Welsh mean that the rule's operation is lexically restricted to the definite article, because, of the words that satisfy this structural description, only the article is subject to the rule (and not /ar/ 'on', /er/ 'since', /oir/ 'cold', /aur/ 'hour' etc.). This would make Rule A' an arbitrary lexical property of the article, which would appear to be the obvious solution. However, inspection of the data

embodying it still has to be constrained to apply after Rule B (as in the first solution (5 (a)) above), because its non-application is conditional upon the deletion of /y/. Another way of expressing this is to require Rules B and A' to be disjunctively ordered* But since the two rules have only zero (or indeed nothing) in common they cannot revealingly be collapsed by brace notation* Hence the stipulation of disjunctive application would be ad hoc and contrary to the usual expectation about the application of rules uncollapsed by brace notation, which is that it is conjunctive (Chomsky and Halle 1968: 61-4). Oddly enough, the ordering B > A' with or without additional stipulations violates Linell's renewed case for the application of morpholexical rules before phonological rules proper, for Rule B, despite the undiscussed conditions mentioned in footnote [5], appears to be a better candidate to be a phonological rule than Rule A', which is undoubtedly lexically specific. Extrinsic A' > B order would also require phonologically unnatural sensitivity in Rule A¹ to stop /r/ deleting just in case the preceding /y/ followed a vowel:

(6) Rule A": /r/ ==> Sf / X V ___ K] K C
 Art

Condition: X does not contain a vowel

It is possible to express this state of affairs as a structural rule as in (6), but the motivation for such a phonologically unnatural rule would have to be functional rather than structural, i»e» it would have to stop its own application if it knew that the article would otherwise turn out to be null»

It appears, then, that neither extrinsic-ordering solution involving the underlier //yr/7 will pass muster within generative phonological theory, firstly because the inquest on global rules and

(largely, I suspect, because the abstract-underlier corpse disappeared halfway through); and secondly because solutions involving the application of general processes before ad hoc ones have generally not

found favour. In passing, note that invoking the Unordered Rule Hypothesis, which permits the simultaneous application of Rules A' and B, simply doesn't work, because the article turns out to be phonologically null in critical cases of the type i^f. Jt^f (//i yr ty//)> Simultaneous ordering of Rules A^{ft} and B produces the correct output at the cost of a complication in Rule A^{ff} which amounts to building in a specification of the conditions under which Rule B applies and making them into a condition under which Rule A^f itself does not apply. With //yr// as underlier, therefore, I submit that no straightforward phonological statement about the allomorphy of the Welsh definite article is possible.

(ii) //y// AS UNDERLIER

If //y// is phonologically basic, the simplest 'rules' which would generate the various allomorphs are:

(7) Rule C: /y/-deletion, which we met as Rule B above

Rule D: /reinsertion, a lexically specific rule:

$$X \text{ r} \Rightarrow /r/ \left\{ \begin{array}{l} \text{ (} _ \ll] \ll V \\ \text{ Art} \\ \text{ I } V^* [f c X _ \ll] \ll C \text{ [6]} \\ \text{ Art} \end{array} \right\}$$

Condition: X is null.

the prior application of C in the second subcase, where the effect of is encoded in the structural description. Phonological theory would also have to allow 'momentary' phonological nullity of a category whose labelled brackets would still be available for another rule (D) to be sensitive to (see (8)). (If one were to allow certain features of autosegmental or CV/3-D phonology (Goldsmith 1979, Clements and Keyser 1983), this could be tantamount to allowing CV places in structure to remain unassociated with phonetic material during parts of a derivation. For more on this idea see below.)

(8) //i y ty//
 Rule C: i ty
 Rule D: i r ty
 [i r ty]

The extrinsic order Rule D > C produces the correct results (see (10)), but this is, of course, at the cost of the stipulation of the extrinsic order itself, and at the cost of stipulating that the second subcase of (D) contain a vowel, i.e. actually y since the rule is lexically specific anyway:

(9) Rule D': $\emptyset \Rightarrow /r/ / \left\{ \begin{array}{l} V \text{ __ } \%] \% V \\ \text{Art} \\ V \% [\% /y/ \text{ __ } \%] \% C \\ \text{Art} \end{array} \right\}$

(10) //i y ty//
 Rule D': i yr ty
 Rule C: i r ty
 [i r ty]

However, this formal dressing-up is actually tantamount to saying in the

formalism is diacritically equivalent to requiring the global sensitivity of Rule D' to the following Rule C's structural description. At least, though, this order has the merit of allowing a lexically specific 'process' to apply before a more general phonological process.

Unordered rules, allowing the simultaneous application of Rules C and D', works; but, as in the case of extrinsic ordering of the same rules, D' must be formulated in such a way as to encode in itself the environment in which deletion of y occurs according to Rule C. Rule D' can only apply if Rule C is implicated. Moreover, of course, we would have simultaneity of a phonological rule proper (C) and a morpholexical one (D'), which few except those holding positions compatible with classical generative phonology would countenance.

(iii) //r// AS UNDERLIER

If //r// is phonologically basic, the 'rules' required are:

(11) Rule E: /r/-deletion as already met as Rule A

Rule F: /y/-insertion if the left element is a consonant

or in absolute initial position

$$\emptyset \Rightarrow /y/ / \left\{ \begin{array}{c} C \\ \% \end{array} \right\} \% [\% \text{ Art } _ /r/$$

In the critical cases where both rules need to apply, viz. //(yn) r ty// '(in) the house' ==> [(yn) y ty], the extrinsic order Rule E > Rule F is impossible as the conditions for F to apply would never arise. Removal

Simultaneous application now yields correct results, as does the Proper Inclusion Precedence principle (cf. for instance Koutsoudas, Sanders and Noll 1974). This supposedly universal constraint on rule-application dictates the order Rule F > Rule E', because the structural description of F is properly included in that of E': /r/ is included in the class of consonants. Nonetheless, there is a possible problem. Within the present analysis, involving //r// as an underlying form, plus the simultaneous or PIP-related Rules E' and F, we have a further difficulty. If F is a rule, then presumably it accounts not only for the allomorphy of the article but also of the forms of the several lexemes /yn/ ~ /n/. But it may be unreasonable to derive the vowelised forms by epenthesis, since it could be argued that morphophonemic /y/-deletion is a general phonological process of Welsh and can be seen in numerous other contexts after a vowel (e.g. colloquially Rhisiart ydy 'n enw i 'my name is Richard'; and cf. the loss of central vowels in expressions (given in their orthographic forms) like o'u < *o eu 'from their ...'), and more generally still in words like yma > 'ma, yna > 'na 'here, there'. It is impossible to envisage deriving all the /y/-forms by epenthesis because of the existence of ma 'place, field', na 'no, nor, not', which never show epenthesis, even though one might make a case for yn, yr to be //n//, //r//.

We have seen so far that every solution involving both insertion and/or deletion of /y/ and /r/ founders on some descriptive or theoretical sandbank. One final attempt can be made to rescue the 'surface allomorph as underlier' position, namely by directly transforming //y// ==> [r] or vice versa* But the critical factor here is the relation of both these allomorphs to the third one, /yr/. The 'direct transformation' must either partly undo the effects of a previous rule { //yr// ==> Cr] or f y j } or be undone in its turn by a succeeding one { //r// or //y// ==> [yr] }. A solution involving such a manoeuvre must bear a close resemblance to one invoking the Duke of York gambit whose status, roughly following and caricaturing Pullum (1976), would be that it is tolerated if it leads to sensible analyses. Since we appear to need /y/-deletion as a morphophonemic rule of Welsh, we can at least envisage a sequence //yr// ==> /r/ ==> [y]. But //yr// ==> /r/ will only take place where the preceding word ends in a vowel, using any (re)formulation of our Rule B, and consequently an underlying //yn yr ty// can yield surface [yn y ty] using a rule converting /r/ ==> [y] only if an ad hoc and completely unmotivated rule for getting rid of the initial /y/ is also formulated* We must conclude that this is not a sensible analysis using anyone's judgment of values - especially Ockham's, for we have three rules instead of two, and one only exists to provide ammunition in defence of a particular choice of underlying form, namely //yr//»

All the possible analyses have an interesting blend of properties, divided between those which are agreed to be good in the sense of being general falsifiable ones, and those which one can easily find linguists prepared to label undesirable. Table (14) sums up the arguments.

presented here, which are a very large subset of those admissible under the assumptions of various schools of generative phonology, excluding only those involving abstract segments and non-occurring segment strings, and those involving rules having diametrically opposite effects like deletion/insertion of identical segments in identical environments* When we scan the morphological alternations, there simply seems to be no call for abstract solutions* The problem is about surface presence or absence of identifiable segments. The solutions presented appear to pull in different directions and to be favoured selectively by different principles* For instance, the //r// underlier could be preferred by proponents of PIP as a principle determining the order of rule application, at the cost of making /y/-insertion a lexically specific rule, unlike its inverse, /y/-deletion, which is a fully-fledged phonological rule* The //y// underlier could be preferred by supporters of extrinsic ordering, specifically in relation to the order Rule D^f > Rule C, who also support the separation of the levels of morphology and phonology* The //yr// underlier should not find favour except among those prepared to support a theory permitting the disjunctive application of unbraced rules, The clear conclusion is that there is no obvious optimal solution within classical generative phonology*

Let us return to the considerations raised in the opening part of this paper* We saw there that the choice of the form of the article was dependent partly on the already-grammaticalized form of the head noun in a noun phrase and partly on the phonology of the preceding context. If we formulate the Welsh speaker's task in terms of decision procedures, then there must be a 'level' of partially phonologized specification of the type (using the noun gorsaf 'station'¹ and the preposition !_ 'to'):

(15) // i t% Art %& orsav //

to the station*» The choice of the form /orsav/ (orthographic orsaf) is dependent on the existence of the Article preceding it (not on its phonological form), but the precise form of the Article is partly dependent on the fact that /orsav/ begins with a vowel, which will require it to end in [r]. The morphophonemic rule of initial consonant mutation must therefore have operated by the time the ultimate pronunciation of the Article is chosen; in effect the latter requires a second delve into the lexicon* (For this two-stage approach see Awbery 1975, and compare McBrearty 1987 on similar phenomena in Irish.) The maximal generalisations about the distributional properties of Art are the following exceptionlessly true ones:

- (16) (i) it begins with [y] if a consonant precedes or it is
in absolute initial position
- (ii) it ends with [r] if a vowel follows or precedes it
or both

We may formulate corresponding realization rules:

- (17) (i) Art --> [y] / " $\left. \begin{array}{l} C \\ \dots \\ \% \end{array} \right\} \text{ --}$
- (ii) Art ~> [r] / V

Their environments are disjoint, so we will allow these purely morpholexical realization rules to operate simultaneously and use a lexically specific linearization convention using constructs of the CV-tier in an autosegmental approach: namely //VC//» [8]

We predict, correctly, the following incidence of forms:

18)

%% Art %% orsaf	'station'	yr	orsaf
i %% Art %% orsaf		i	'r orsaf
yn %% Art %% orsaf		yn	yr orsaf
%% Art %% t ^h y	'house'	y	t ^h y
i %% Art %% t ^h y		i	'r t ^h y
yn %% Art %% t ^h y		yn	y t ^h y
%% Art %% ysbyty	'hospital'	yr	ysbyty
i %% Art %% ysbyty		i	'r ysbyty
yn %% Art %% ysbyty		yn	yr ysbyty

descriptively equivalently, but without special linearization rules, we could have a solution involving two realization sub-rules ordered by PIP and a two-way disjunction, which, with the exception of the lack of a unique phonologically-specified underlier, would be articulable within pre-autosegmental generative theory.

19)

$$\text{Art} \rightarrow \left\{ \begin{array}{l} [\text{yr}] / \text{C} _ _ \text{V} \\ [\text{y}] / \text{C} _ _ \\ [\text{r}] / \text{V} _ _ \end{array} \right\}$$

The first two sub-rules are ordered by PIP (the environment C__V is properly included within C__) and the second pair constitute a disjunction. It is clear, though, that the cost of this process is the obscuration of the generalization that the presence of [r] is dependent on the adjacency of a vowel either to the left or to the right.

If we wished to preserve /y/-deletion as a stylistic or as a morphophonemic rule to handle facts mentioned elsewhere in this paper, we would, under this present proposal, need to claim that the variable appearance of [y] in the definite article is a phenomenon different from its variable appearance in e.g. yma, yn etc. The autosegmental-type

allow us to claim that both phenomena were phonological: the variation in the definite article being 'in order to' maintain canonical syllable structure and that in yma, yn etc. being due to avoidance of hiatus. The non-autosegmental solution (19) has the disadvantage of offering, in its simplest expression, no motivation for the allomorphy of the definite article.

TYPOGRAPHICAL CONVENTIONS

-->	realization arrow ('is realized as')
==>	transformation arrow ('is changed into')
//XXX//	morphophonemic or underlying representation
/XXX/	phonemic or any intermediate representation
[XXX]	surface representation (actual pronunciation)
%	morpheme boundary
%%	word boundary (labelled bracket between if required)
%%%	utterance boundary

Other symbols and formats as is conventional in generative phonology.

- 1] Vendryes (1927) denied this relation, but I accept it, following Lewis and Pedersen (1961: §361, note 1). The common Celtic etymon is the stem *sind-, a demonstrative (cf. Thomson 1984: 246).
- 2] A fact not always pointed out explicitly in Welsh primers, e.g. Rhys Jones (1977).
- 3] No detail of these conditions is provided here. They may be found in any Welsh primer, e.g. Rhys Jones (1977), Williams (1980), any outline grammar for general linguists, e.g. Awbery (1984: 259-61), or certain specialist articles, e.g. Albrow (1966), Awbery (1975), Ellis (1965), Hamp (1951), Thomas (1984). There is also a specialist monograph on the mutations by Morgan (1952).
- 4] The conventional assumption is made that the unmutated form of nouns is the underlier, and this form is enclosed in //morphophonemic double slashes// (see *Typographical Conventions*, p. 17). Intriguingly, proper names like Gwen, Gwladys are not affected by initial mutation.
- 5] There are restrictions on the effect of this rule having to do with how structurally intimate the connection between the previous word and the definite article is, but these will be ignored here. It is assumed that Rule B operates only within certain phrasal categories like prepositional phrases.
- 6] Inserting a free variable in initial position in the article is in fact idle: it would always have a null value if Rule C applied first.

[7] This would be a constraint on derivations for which there is some independent evidence: the deletion of the segmental content of fy /vy/ 'my' leaves nasal mutation of the initial consonant of the following noun.

[8] With rather greater subtlety, we could derive this convention from the predominance of the syllable pattern CV. The Article has the form VC if and only if it is preceded by a consonant and followed by a vowel, with the result that the incidence of the pattern CV.CV..... is maximized, in this instance as C %% V.C %% V.

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