

## ANOTHER MOUTHFUL OF DIVINITY FUDGE\*

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That rules (or processes) are linearly ordered<sup>1</sup> has been a traditional assumption of transformational phonological analysis. The fact that no adequate conceptual backing has ever been provided for this assumption, however, makes it an attractive target for theorists. Recently, Stampe (1972) has advanced the view that phonological processes do not apply in a linear order, but rather whenever the configurations that they would eliminate arise. To support this view he presents evidence from the casual speech pronunciations of the phrase divinity fudge which he feels 'leaves absolutely no doubt' (p.54) that processes are nonlinear.

Despite this strong claim, we find his argument unconvincing. It seems quite possible to provide an alternative analysis of divinity fudge which is both plausible and consistent with linear ordering. Stampe's argument hinges upon the acceptance of various assumptions, some explicit and some implicit, which are themselves open to question.

Section 1 of this paper is a brief recapitulation of Stampe's analysis and an attempt to provide a plausible reanalysis which is consistent with linear ordering. In section 2 we will explore a possible general principle of ordering which may be implicitly assumed by Stampe and which we feel deserves some attention.

1. Shortening the 'divinity' derivations. The principal processes upon which Stampe's analysis is based are Syllabication, Flapping, and Flap-Deletion. The process of Syllabication 'attaches a nonsyllabic to the syllable to the right; but if that syllable is unstressed (or, optionally, less stressed), the nonsyllabic is attached to the syllable to the left' (p.54). Syllabication also applies optionally to unstressed syllabics, desyllabifying them and attaching them to an adjacent syllable. The Syllabication process is subject to constraints on boundaries and on permissible syllables.

Flapping changes released apical stops [t, d, n] to their corresponding flaps [ɾ, ɽ, ɳ] after vowels and certain other segments in syllable-final position: [bæɾ.ɪŋ] batting, [sæɾ.əst] saddest, [θɪɾ.ɪŋ] thinner. It also applies optionally in syllable-initial position in certain contexts: [ðə.ɾækt.ɪ] the doctor. Flap-Deletion optionally elides flaps in syllable-final position, as in [bæ.ɪŋ] batting, [sæ.əst] saddest, [θɪ.ɪŋ] thinner. It does not apply in syllable-initial position.

The derivation of the casual speech forms of divinity fudge proposed by Stampe is given in (1) below. Asterisks indicate forms which are unpronounceable because other obligatory processes have not applied. Alongside Stampe's derivation we give another shorter one (2), which we will discuss in a moment.

(1) dəvɪnəti (fɪ)

1. \*də.vɪn.ə.ti
2. \*də.vɪɾ.ə.ti
3. də.vɪɾ.ə.ti
4. də.vɪ.ə.ti
5. \*də.vɪɾ.ti
6. də.vɪɾ.ti
7. də.vɪ.ɪ.ti
8. də.vɪ.ti
9. \*də.vɪ.ti
10. də.vɪ.ɪ.ti
11. də.vɪɾ.ti
12. də.vɪ.ti
13. \*də.vɪ.ɪ
14. də.vɪ.ɪ

On the basis of and Flap-Deletion (as points in the derivat occur in a linear ord

There are severa According to Stampe's we would expect the [ɪ] since the following s) would allow the deriva fewer reoccurrences of fudge and his definiti

A significant fac gradual contraction of take place solely with [ɪ], for example, come operated to bring it 1 We gather from Stampe' cation does not correc insists that [ɪ] is sy upon that assumption.

(1) <u>dəvɪnəti</u> (fʌdʒ)		(2)
1. *də.vɪn.ə.ti	Syllabication	1. *də.vɪn.ət.i
2. *də.vɪf.ə.ti	Flapping	2. *də.vɪf.əf.i
3. də.vɪf.ə.ti	Vowel-Nasalization	3. də.vɪf.əf.i
4. də.vɪ.ə.ti	Flap-Deletion	4. ?də.vɪ.ə.i
5. *də.vɪɹ.ti	Syllabication	5. *də.vɪɹ.i
6. də.vɪɹ.ti	Vowel-Nasalization	6. *də.vɪɹ.i
7. də.vɪɹ.ti	ə-Harmony	7. də.vɪɹ.i
8. də.vɪ.ti	Shortening	8. *də.vɪɹ.i
9. *də.vɪt.i	Syllabication	
10. də.vɪf.i	Flapping	
11. də.vɪɹ.i	Flap-Nasalization	
12. də.vɪ.i	Flap-Deletion	
13. *də.vɪɹ	Syllabication	
14. də.vɪɹ	Vowel-Nasalization	9. də.vɪɹ

On the basis of the reoccurrence of Syllabication, Flapping, and Flap-Deletion (as well as Vowel-Nasalization) at several points in the derivation, Stampe concludes that processes do not occur in a linear order.

There are several reasons for questioning this treatment. According to Stampe's own description of the Syllabication process, we would expect the [t] to be attached to the preceding syllable, since the following syllable is unstressed. Such a syllabication would allow the derivation (2) above, in which there are several fewer reoccurrences of processes. Stampe's derivation of divinity fudge and his definition of Syllabication are thus in conflict.

A significant fact about Stampe's derivation (1) is that the gradual contraction of the form is the result of deletions which take place solely within the stressed syllable. The deletion of [t], for example, comes about only after other processes have operated to bring it into final position in the stressed syllable. We gather from Stampe's discussion that his statement of Syllabication does not correctly capture his intent, inasmuch as he insists that [t] is syllable-initial and his argument rests heavily upon that assumption.

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lation of Stampe's analysis which is will explore a be implicitly attention.

The principal are Syllabication, abication 'attaches of that syllable is nonsyllabic is llabication also labifying them and abication process rmissible syllables. l, n] to their cor- n other segments [k.əst] saddest, syllable-initial ator. Flap-Deletion n, as in [bæ.tŋ] es not apply in

divinity fudge sks indicate forms y processes have ve another t.

The reason for this conclusion that [t] is syllable-initial appears to be that syllable-final flaps can be optionally deleted but 'pronunciations like [də.vɪ̃.ə.i] ... do not occur' (p.57). However, we find such forms to be acceptable with progressive nasalization: [dəvɪ̃fəi] divinity, [kʰɛ̃fɛi] Kennedy. We do not intend to play the game 'My Dialect', although it seems likely to us that a correct explanation will show a systematic relationship between the two dialects in question.

Aside from the confusion in Stampe's discussion, and aside from the question of whether [də.vɪ̃.ə.i] is acceptable, there are at least two other problems with Stampe's analysis. First, pronunciations like [dəvɪ̃fəi] are acceptable, even though a full vowel separates the [t] from the stressed syllable. Stampe acknowledges the existence of such pronunciations, saying that the '[t] could have flapped optionally at any time, but it does not delete until it becomes syllable-initial at 9' (p.57). This clearly means that the flapping is not due to the obligatory syllable-final flapping process, but rather to the optional syllable-initial process which he mentions only parenthetically: '(There are also optional syllable-initial applications before syllabics, e.g. [ðə.fákt.ɾ] the doctor, which need not detain us here.)' (p.55).

Certainly the crucial role of the syllable-structure assumption that is being made merits a clearer statement of this process than we are given. It is difficult to see the justification for syllable-initial flapping here, since the environment in the doctor (before a stressed vowel) is quite dissimilar to the one that is relevant in divinity. It also appears to be the case that t does not flap in the prestress context referred to: compare the doctor, the doorknob, both of which have optional flaps, with the topless waitress, the tangerine, which do not. Or at least if [t] does flap it must remain voiceless [t̥]. One way to prevent [f] from becoming voiced before a stressed vowel in examples like the preceding would be to extrinsically order aspiration before flap-voicing. Another would be to prevent syllable-initial flaps from becoming voiced, but of course this would lead back to the conclusion that the [t] of divinity or the flap which results from it is after all syllable-final.

A second problem is that other casual speech processes seem to argue for syllabification of nonsyllabics between unstressed vowels or diphthongs with the preceding syllable. Consider, for example, the lenition of [k] to [x]. [k] can be lenited when the first preceding syllabic is stressed and the first following syllabic is unstressed, e.g. [bɛ̃yɫɾ] baker, [máxɾi] mockery. But [k] cannot be lenited when the first following syllabic (in the same word) is stressed, e.g. \*[ɾáxvɪn] raccoon, \*[ɾəxɔl] recall. This restriction on [k]-lenition might be expressed by reference to syllable boundary, i.e., syllable-initial [k] cannot be lenited, although it could also be expressed as a condition having to do with stress. The behavior of [k] around word-boundary supports the syllable boundary version, since [k] followed by word-boundary may lenite regardless of whether the following syllabic is stressed, e.g.

[mɛ̃yɫəmɛ̃nz] make amen  
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(see, for example, Ho  
lenition with referen  
a disjunctive environ

Having determined  
syllable boundary wit  
really interested in .  
we can now use the bel  
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[ə.máɾɛxə] should be ac  
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each processes seem to een unstressed vowels nsider, for example, d when the first ollowing syllabic is y. But [k] cannot in the same word) is call. This restric- erence to syllable lenited, although it to do with stress. rts the syllable oundary may lenite s stressed, e.g.

[méyxaménz] make amends, [t<sup>h</sup>éyxóvvɛ] take over. Since on other grounds we expect syllable boundary to correspond to word-boundary (see, for example, Hooper 1972), stating the restriction on [k]-lenition with reference to syllable boundary avoids having to give a disjunctive environment for this process.<sup>2</sup>

Having determined how [k]-lenition depends on the location of syllable boundary without reference to the environment we are really interested in -- between unstressed vowels or diphthongs -- we can now use the behavior of [k] in this environment as a test for what syllabification is proper. If the only correct syllabification of, for example, America is [ə.mɛr.ə.kə], [k] should not lenite; but if [ə.mɛr.ək.ə] is also possible, the pronunciation [ə.mɛrəkə] should be acceptable. In fact, we find this latter pronunciation acceptable and take this as demonstrating that [k], and by extension nonsyllabics generally, may go in the<sub>3</sub> syllable to the left when the following syllable is unstressed.

On the basis of the arguments presented above, let us examine some of the consequences of assuming that [t] is optionally attached to the preceding syllable. One such consequence is that syllable-final flapping and application of the optional Flap-Deletion process will yield the forms which Stampe finds unacceptable. It will thus be necessary to find some alternative means for blocking these forms in his dialect.

Having insufficient access to the facts of his dialect, we can only speculate as to how this problem might be handled. If Flapping and Flap-Deletion apply, it is possible to characterize the output as unacceptable because some other obligatory process has failed to apply. A likely candidate for this is a Syncope process, since the string will at this point have a sequence of unstressed vowels, the first of which is schwa. Vowel Syncope is in any event necessary to derive such forms as [adɪ] oddity and [ɔfsɪ] officer.

If we adopt a Syncope process deleting a schwa before a vowel, together with the revised assumption about syllabification, the derivation of each pronunciation of divinity will be considerably shortened. Two such derivations are given in (3) below. The numbers in brackets following each acceptable form correspond to the steps in Stampe's derivation (1) which yield these forms. As can be seen, seven of the nine acceptable forms in (1) can be derived by means of these two derivations. The remaining two may also be accounted for by the same ordering of processes.

Although this reanalysis eliminates a number of the reoccurrences of the same processes in the ordering, both Syllabication and Nasalization are still found twice. However, there is reason to doubt whether this is sufficient proof of a violation of linear ordering.

(3)				
Syllabication	*də.vín.ət.i		*də.vín.ət.i	
Flapping	*də.víɸ.ət.i		*də.víɸ.ət.i	
Vowel-Nasalization	də.víɸ̃.ət.i	[3]	də.víɸ̃.ət.i	[3]
Flap-Deletion	*də.ví.ət.i		də.ví.ət.i	[4]
Syncope	də.ví.i	[12]	-----	
Syllabication	*də.ví̩		*də.ví̩	
Vowel-Nasalization	də.ví̩̃	[14]	də.ví̩̃	[6]
Schwa-Harmony	-----		də.ví̩̃	[7]
Shortening	-----		də.ví̩̃	[10]

Consider the two occurrences of Syllabication. The second of these is a complex change, gliding a vowel and attaching it to the preceding syllable. Stampe emphasized that desyllabication and attachment must be a single change, since otherwise there would be a (universally) unpronounceable stage in the derivation containing either a syllable with no syllabic segment or a syllable with two syllabic segments. It seems to us that this instance of Syllabication may be more appropriately conceived of as a process of Gliding, creating an ill-formed structure with a syllable containing no syllabic segment, followed by obligatory resyllabification. The Gliding process would be a specific fact about English, but the mechanism which brings about resyllabification would be a universal constraint on derivations. Like 'pruning' in syntax, this resyllabification principle would apply whenever its structural description is met in any derivation in any language, without exception.

In contrast with Syllabication of the type just discussed, the first occurrence of Syllabication clearly involves language-specific constraints and 'applies' obligatorily, we would suppose. Actually, applying Syllabication here is more like a linguist's decision to use syllable boundaries in his theory than it is like a real process. Real processes change pronunciation, but we doubt that the mere presence or location of syllable boundaries reflect actual differences in pronunciation, though there may be consequent phonetic changes. In any case, because of the special nature of Syllabication, an argument against linear ordering based upon repetitions of Syllabication would be extremely weak.

Although Vowel-Nasalization also applies twice in (3), the first application is regressive and the second progressive. For these to constitute a valid argument against linear ordering, we would have to claim that these form a single unitary generalization. While it could be argued that we are offering no evidence against

such an assumption, a mirror-image environment. Aside from Lightner's convention predicts 1 evidence may be given acquisition to show t quite different prope and regressive Vowel-would be inappropriate falsified by divinity

## 2. Lengthening

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Adopting misasterism w unstarred and hence ac history of a form. Th ly be derived with one is correct in saying th needn't be, the form w Another immediate conse level' of careful pron in the derivations of misasterism is worth co is that his divinity de Another is that misaste difficulty. Stampe obs

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 ə.v(ɪf.ət).i  
 ə.v(ɪf.ət).i [6]  
 ə.v(ɪf.ət).i [7]  
 ə.v(ɪf.ət).i [10]

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such an assumption, there is good reason to be suspicious of mirror-image environments constituting unitary generalizations. Aside from Lightner's admonition (1971:234) that the mirror-image convention predicts linguistic changes of unattested types, evidence may be given from both synchronic grammars and children's acquisition to show that such cases often (if not always) have quite different properties. If we can assume that progressive and regressive Vowel-Nasalization are distinct processes, it would be inappropriate to conclude that linear ordering is falsified by divinity fudge.

## 2. Lengthening the 'divinity' derivations -- Misasterism.

In the previous section, we showed that one could avoid all, or nearly all, process reoccurrences in the divinity derivations and that it is not after all obvious that linear ordering cannot be maintained for the phonology of English casual speech. The device used was to consider separately the derivation of each acceptable pronunciation and to shorten each as much as possible. We thus viewed the single derivation Stampe gives us as no more than an abbreviation for a set of nine derivations, and we believe that taking such a view is sanctioned by current phonological theory. Nevertheless, in comparing Stampe's derivation with our set of derivations, occasionally the feeling comes on us that his is somehow nicer. We suspect that the source of this feeling has to do with the fact that Stampe's derivation is a bit like a pseudo-history of the reduced form [də.vɪ.ɪ], in which many of the antecedents are 'attested' acceptable pronunciations. Vague as this notion is, in this section we intend to explore a formal assumption which may help to capture it and may in turn allow a more convincing argument to be made against the principle of linear ordering.

The principle we suggest, which we will call 'misasterism' (hatred of stars), is as follows: In the course of a derivation, starred forms must be eliminated as quickly as possible. A formal assumption which more or less<sup>4</sup> captures this is:

Optional<sup>5</sup> processes or subprocesses do not apply to starred<sup>6</sup> forms.

Adopting misasterism will obviously tend to increase the number of unstarred and hence acceptable pronunciations in the derivational history of a form. The form [də.vɪf.ət.i], for example, could ordinarily be derived with one application of Flapping; however, if Stampe is correct in saying that the [n] must be flapped but the [t] needn't be, the form with two flaps must be derived from [də.vɪf.ət.i]. Another immediate consequence is that there will be a 'derivational level' of careful pronunciation, inasmuch as careful pronunciations (to which only obligatory processes have applied) will always appear in the derivations of casual pronunciations. One reason we think misasterism is worth considering in relation to Stampe's analysis is that his divinity derivation is consistent with this principle. Another is that misasterism appears to handle the following difficulty. Stampe observes, in the first two sentences following

his derivation of divinity fudge, that:

'This is not the ultimate reduction of the phrase, but it should suffice to illustrate the fact that processes do not occur in a linear order. Rather they seem to apply whenever the configurations they would eliminate arise.' (pp.56-57)

However, when we examine the derivation itself it can be seen that the structural description of Flap-Deletion is met at stage 3, before Vowel-Nasalization applies, and yet the ordering here is crucial. That is, pronunciations of divinity in which the stressed vowel is nonnasal are all unacceptable.

On a later page, Stampe delineates the nature of possible constraints on ordering:

'A derivation terminates only when all applicable processes have applied. If order is imposed, it is of the form: B may not apply after A, i.e. to A's output.' (p.60)

This principle is inadequate to account for the ordering of Vowel-Nasalization and Flap-Deletion, however, since the statement that Vowel-Nasalization cannot apply after Flap-Deletion does not prevent Flap-Deletion from applying first. Moreover, Vowel-Nasalization must also follow Flap-Deletion in Stampe's derivation.

Although extrinsic ordering constraints of the type specified by Stampe are ineffective here, the fact that vowels are obligatorily nasalized before a nasal in the same syllable, while Flap-Deletion is optional, prevents the derivation of the unacceptable pronunciations in a theory incorporating the principle of misasterism.

What relation, then, does misasterism have to linear ordering? First, it should be clear that misasterism is logically necessary neither in a theory with linear ordering nor in a theory without linear ordering; nor, for that matter, is misasterism logically incompatible with linear ordering. In fact, a theory assuming both linear ordering and misasterism would be rather attractive, we think. Consider, for example, the relation between the obligatory process of aspiration in English and the optional process of stop-devoicing in some dialects. Both processes apply in the derivation of [t̚ɛyt̚ánt] for detente. Misasterism requires that aspiration should apply first, thus ruling out the derivation \*[d̚ɛyt̚ánt] → (stop-devoicing) \*[t̚ɛyt̚ánt] → (aspiration) \*[t̚h̚ɛyt̚ánt], and thus we can prevent the pronunciation of detente with two [t̚h̚]'s from being derived in any way. Moreover, since processes must apply in the same order in all derivations, we can also exclude the pronunciation \*[p̚h̚áy] for by.

Nevertheless, some examples suggest that adopting misasterism might force one to give up linear ordering. We have already mentioned one such case above, where Flapping would have to apply twice

in the derivation [n] must be flapped, dubious, we feel, matter depends on count as a spell of acclimate. This not mean that [k̚] with glottal stricture to the preceding this particular an glottalization an [æk̚lamɛyt] or [æk̚] with linear order talization of [k̚] before obligatory optional process, \*[æk̚lamɛyt]. To alternate descript voicing are both

Although Stampe on divinity fudge elsewhere. If Flap-Deletion precedes the hitting becomes [k̚] second vowel is optional, misasterism Vowel-Nasalization presents a difficulty of misasterism. argument than divinity proof on one who a difference between zation.

There is a need for a more forth and careful subject to some degree of nasalization on the part that in [s̚tɪŋ] sit regressive Vowel-Nasalization is a different, misasterism Flap-Deletion.

There are some examples of misasterism and so we will consider the optional precedence and Stampe's distinction

Ringen has precedence over optional

in the derivation of [davi<sup>h</sup>ʔæfi] since, according to Stampe, the [n] must be flapped but the [t] needn't be. But it is a little dubious, we feel, that Flapping is ever obligatory; perhaps the matter depends on how careful a pronunciation must be in order to count as a spelling pronunciation. Consider instead pronunciations of acclimate. The [k] here may be glottalized [k̚], by which we do not mean that [k̚] is ejective, but rather that it is articulated with glottal stricture. The [l] may be voiceless by assimilation to the preceding [k], provided that [k] is not glottalized. For this particular word, we find that exactly one of the two processes glottalization and progressive devoicing must apply, since we have [æk̚ləməyt] or [æk̚ləməyt], but not \*[æk̚ləməyt] or \*[æk̚ləməyt]. With linear ordering we can describe the situation by making glottalization of [k] optional in this environment and ordering it before obligatory progressive devoicing, but this requires that an optional process, glottalization, apply to the unacceptable form \*[æk̚ləməyt]. To maintain misasterism we are thus forced to an alternate description in which glottalization and progressive devoicing are both obligatory, but may apply in either order.<sup>7</sup>

Although Stampe based his argument against linear ordering on divinity fudge, he provides one, more solid, piece of evidence elsewhere. If Flap-Deletion applies before a nasal segment, the vowel preceding the deleted flap will be nasalized. Thus, [hɪɫɪŋ] hitting becomes [hɪɫɪŋ] when Flap-Deletion applies. Since the second vowel is obligatorily nasalized, but Flap-Deletion is optional, misasterism would require two applications of (regressive) Vowel-Nasalization in the derivation of [hɪɫɪŋ]. But this case presents a difficulty for the linear ordering principles regardless of misasterism. In fact, it seems like a much more convincing argument than divinity fudge and would seem to put the burden of proof on one who advocates linear ordering to show a significant difference between the two applications of regressive Vowel-Nasalization.

There is a need for more cases of this sort to be brought forth and carefully scrutinized. Even the one discussed above is subject to some doubt, since it seems to us that the degree of nasalization on the first vowel in [sɪɫɪŋ] sinning is greater than that in [sɪɫɪŋ] sitting. If this is true, it may mean that the regressive Vowel-Nasalization process that follows Flap-Deletion is a different, more secondary, process than the one which precedes Flap-Deletion.

There are some interesting conceptual relationships between misasterism and some other ideas in phonology. By way of conclusion, we will consider three of these: Ringen's principle of obligatory/optional precedence, Kiparsky's notions of transparency and opacity, and Stampe's distinction between rule and process.

Ringen has proposed that obligatory transformations take precedence over optional ones:

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[dɛy<sup>h</sup>tɪnt] → (stop-  
[dɛt<sup>h</sup>tɪnt], and thus we  
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ould have to apply twice

'If a representation meets the structural description of both an obligatory and an optional rule, the obligatory rule must apply to that representation.' (1972, 1973)

Ringgen's idea is that this principle is simply a consequence of the notion 'obligatory' in a theory with sequential application of transformations but without ordering constraints. It is, indeed, a logical consequence, provided we accept her definition of 'obligatory', but she defines it in such a way that no derivational stage may meet the structural description of a transformation yet fail to undergo it. As she points out (1972:270 fn.12), this has the strange consequence that no derivational stage could ever meet the structural description of two obligatory transformations.

We prefer a slightly different definition of 'obligatory' (see footnote 5), one that does not have such consequences. If we modify Ringgen's principle to allow for the possibility that several obligatory transformations might be applicable to a form and to also allow for the presence of ordering constraints, it might read:

If a representation meets the structural description of several obligatory transformations and several optional ones, none of which are prevented from applying by some extrinsic ordering constraint, then one of the obligatory transformations must apply to the representation.

In this modified form, Ringgen's principle is equivalent to misasterism. To see this, consider the set of well-formed derivations and let P be an arbitrary stage of one of these derivations to which a transformation T applies. P is either starred or unstarred. If P is unstarred, there can be no applicable obligatory transformations and so neither misasterism nor Ringgen's principle is relevant. But if P is starred, T must be obligatory. Assuming misasterism, this is immediate. It also follows from Ringgen's principle provided we can establish independently of her principle that there is at least one obligatory transformation which is applicable to P.

Consider a well-formed derivation in which an optional transformation S applies to P. By the meaning of 'optional', there is another well-formed derivation in which S does not apply to P. Since P is starred and so cannot be the final stage of any well-formed derivation, we can continue in this fashion, finding new well-formed derivations by eliminating optional transformations which can apply to P until we come to a well-formed derivation in which an obligatory transformation applies to P. Since there must be such a well-formed derivation, there is at least one obligatory transformation which is applicable to P.

Misasterism has the consequence that all maximally transparent processes are obligatory. By misasterism, an optional process applies only to acceptable forms; it follows that for every optional process, there is an acceptable surface form to which it is appli-

cable. This means the process is applicable obligatory. Since a dicted is 'transparent' are obligatory, or, e

Finally, if Stan as opposed to process stated: all optional ceptable (and unstar somewhat, if the 'ear rules and are all un

\* The authors wish of a seminar on Natu have contributed to to David Stampe for read this paper before responsible for its

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- (P) For any two there is a which A applies
- (1) There is no before its
- (2) If A applies no derivat - (BPA), an
- (3) For any two in which b other; i.e
- (4) If there a B applies A applies transitive

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cable. This means that if there is no surface form to which the process is applicable, the process is not optional -- i.e., it is obligatory. Since a process which is not superficially contradicted is 'transparent' (Kiparsky 1971), transparent processes are obligatory, or, equivalently, optional processes are opaque.

Finally, if Stampe is correct in proposing that all rules, as opposed to processes, are obligatory, then misasterism can be stated: all optional phonological transformations apply to acceptable (and unstarred) pronunciations. Turning things around somewhat, if the 'early stages' of derivations are related by rules and are all unacceptable, then rules must be obligatory.

#### FOOTNOTES

\* The authors wish to express their appreciation to the members of a seminar on Natural Phonology at the University of Hawaii, who have contributed to this work in many ways. We are also indebted to David Stampe for his stimulation and insight, though he has not read this paper before publication and can in no way be held responsible for its contents.

1. A linear ordering is induced in the set of rules and processes by a precedence relation P defined as in (P), provided that (1), (2), (3) and (4) hold:

- (P) For any two rules/processes A and B, APB if and only if there is a derivation in which A and B both apply and in which A applies before B.
- (1) There is no derivation in which a rule or process applies before itself; i.e. -(APA), and P is irreflexive.
- (2) If A applies before B in some derivation, then there is no derivation in which B applies before A; i.e. APB → -(BPA), and P is asymmetric.
- (3) For any two rules or processes, one can find a derivation in which both apply and in which one applies before the other; i.e. APB or BPA, and P is connected.
- (4) If there are derivations in which A applies before B and B applies before C, then there is a derivation in which A applies before C; i.e. APB and BPC → APC, and P is transitive.

For (1) to hold we must consider cases where an articulation 'eats its way' through a form (cf. Howard 1972) to result from a single application of a rule or process, rather than from iterated application. (3) would not necessarily hold for the derivations of single morphemes or single words, but is plausible for the derivations of longer expressions.

2. One would expect that [k] preceded by word boundary should not lenite; this is not so clear -- Hai Karate ?[háyxəráfi].
3. Other lenitions work the same way, so far as we know. For instance, rounded nonsyllabic [ɹ] is not lenited to unrounded [r] when it is syllable-initial -- cf. marry [mɛr.i], more oats [mór.ówts] vs. marauder [mərə́ɹ]. But [r] may be unrounded between unstressed vowels or diphthongs: camera [kʰəm.ər.ə], conjec-



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variety of ways, allowing, for instance, a few of the T<sub>i</sub> to be equal, or allowing contiguous T<sub>i</sub> to be equal so that transformations can apply to their own outputs. Note, however, that even in a theory without any ordering constraints at all, to characterize a transformation as obligatory is not to require that the transformation apply in all derivations in which its structural description is met at some point (contra Ringen 1972). In case an obligatory transformation is bled by some previously applying transformation, a derivation in which the obligatory transformation could have applied but did not may be well-formed.

6. A starred form is not necessarily unacceptable, although all unstarred forms are acceptable. We understand the star to mean 'unacceptable in a given reading'; hence, although \*[dæviri] is an unacceptable pronunciation of divinity, it is an acceptable pronunciation of DeVitty. The underlying form of pie, \*[pay], is starred, although for us [pay] is an acceptable pronunciation of by. We are grateful to Frederick Jackson for calling this problem in the definition of 'acceptable form' to our attention.

We can apply stars appropriately to intermediate stages of a derivation as follows. Suppose that we apply stars to all stages of well-formed derivations but the last. If the first k stages of a well-formed derivation A constitute a well-formed derivation B, then the result of removing the star from the kth stage of A is an abbreviation for the two derivations A and B. The set of fully abbreviated derivations have stars in the right places.

Since it is not possible for an optional process to apply to a starred form, misasterism allows one to characterize processes as optional or obligatory solely on the basis of whether they apply to starred forms. Putting matters another way, an optional process R is one that satisfies the following transderivational constraint: whenever R applies in a well-formed derivation to a representation P, the truncated derivation formed by deleting the forms following P is also well-formed.

7. In addition, glottalization must be prevented from applying before a voiceless continuant. This restriction is necessary in any case, since although we have accident pronounced [æksərɪnt] or [æʔksərɪnt], we do not have \*[æksərɪnt]. Similar examples have been raised by Malone -- see also Ringen (1973) -- and by Geoffrey Nathan (personal communication).

## REFERENCES

- Hoard, J.E. 1971. Aspiration, tenseness, and syllabication in English. *Lg.* 47:133-140.
- Hooper, J. 1972. The syllable in phonological theory. *Lg.* 48: 525-540.
- Howard, I. 1972. A directional theory of rule application in phonology. U. Hawaii Working Papers in Linguistics, Vol. 4, No. 7.
- Kiparsky, P. 1971. Historical linguistics. In W.O. Dingwall (ed.) *A survey of linguistic science*. Linguistics Program, U. Maryland, pp. 576-649.

- Lightner, T. 1971. On Swadesh and Voegelin's 'A problem in phonological alternation'. IJAL 37:227-237.
- Malone, J. 1973. A case of optional-obligatory rule ordering. FL.
- Ringen, C. 1972. On arguments for rule ordering. FL 8:266-273.
- Ringen, C. 1973. Obligatory/optional precedence. (ms.)
- Stampe, D. 1972. A dissertation on natural phonology. Unpublished Ph.D. dissertation, U. Chicago.

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