

## The Strategy of Generative Phonology\*

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### 1. Introduction.

The purpose of this paper is to examine some principles of argumentation and verification used by generative phonologists, so as to show areas of agreement and to highlight areas of controversy.<sup>1</sup> By 'generative phonology' I refer not necessarily to the analyses in The Sound Pattern of English, but rather to a wider body of practice, of which the Chomsky-Halle approach represents one rather extreme position out of a large class of possible positions.

I begin by attempting to clarify the central notion of methodological principle, which is meant to be opposed to theoretical, or substantive, principle. Briefly, substantive principles are theoretical requirements, methodological principles are theoretical biases.<sup>2</sup> For example, the sequential application of processes within derivations is a theoretical principle of generative phonology; to question this principle is clearly to advocate a new, though related, theory of phonology, in the sense that the two systems allow distinct sorts of phenomena as potential human languages. On the other hand, the greater worth of phonological variants as opposed to distributional restrictions (Principle (E) below) is a principle of good practice. To question this principle is to question its value within a given theoretical structure--but reversing the bias would not create a new theory (since all languages consistent with one theory would be consistent with the other).

I do not wish to give the impression that there is a clear or a priori distinction between the two sorts of principles. Obviously there is not. The same assumption may figure now as a substantive principle, now as a methodological one; consider in this light the assumptions that two segments that distinguish morphemes are underlyingly distinct, *ceteris paribus* (Principle (L) below) and that two segments that never distinguish morphemes are not underlyingly distinct, *ceteris paribus* (Principle (M) below). In some classic treatments of phonemics, these are theoretical principles defining the phoneme, whereas in generative phonology they are background assumptions, utilized when there is no contradictory evidence. That is, a generative phonologist is entitled to say that English t and d are distinct segments because of minimal pairs like tip and dip; in so saying he supplies the tacit assurance that he knows of no reason to suppose that the t in tip versus the d in dip ought to be predicted from considerations he hasn't mentioned.

Similarly, what most generative phonologists would take as methodological issues--the relative unacceptability of special underlying

representations for non-alternating segments, like the ? in button (Principle (T) below) and the relative unacceptability of absolute neutralization (Principle (U) below)--Paul Kiparsky (ms. 1968) has promoted to theoretical issues, by hypothesizing that no languages violate strong forms of Principles (T) and (U).

Methodological principles are cited, or appealed to implicitly, in response to the question 'Why did you choose analysis X instead of analysis Y or Z?' and as guiding procedures in analyzing a language. So, for example, Principles (L) and (M) move the analyst to survey minimal pairs and look for elements in non-contrastive distribution.

Neither the structure of the evidence nor the rationale of on-going analysis is exposed by presentations that lay out the result as a *fait accompli*, an extensive formal description with illustrative examples. Unfortunately, some of the generative phonological literature is of this sort, and some consists of exegeses of Chomsky's theoretical positions, with no regard for evidential or procedural issues. This reluctance on the part of us generative grammarians to take our colleagues into the kitchen has made many of them feel the cooking is done not with ordinary materials and by ordinary utensils but instead with soma and by divine inspiration. Fortunately, the literature now contains the reminiscences of some reputable, if not infallible, chefs. I refer to such works as Kuroda (1967) on Yawelmani, Schane (1968a) on French, Harris (1969) on Spanish, McCawley (1968) on Japanese, parts of Wurzel (1970) on German, and here and there sections of Chomsky and Halle (1968) on English. Especially valuable in this regard are the squabbles over controversial issues in the analysis of specific languages. For instance, there is the many-faceted discussion surrounding the underlying form of the English inflectional endings: Does the underlying shape of the noun plural suffix contain a vowel, or is it simply *z*?<sup>3</sup> The vowel analysis was first defended by Bloomfield (1933:212), who cited 'an exact parallel in English syntax', namely the forms of the verbal auxiliary *is*, as supporting evidence; Nida (1948:sec. 3.03) gives the argument in detail. Hockett (1958:282), on the other hand, argues for a vowelless analysis, on the grounds that *z* is the only plural allomorph whose selection is not automatic. Both positions are represented in the generative literature--the vowel analysis is maintained by Luelsdorff (1969) and Zwicky (1970a:333f.), who give Bloomfield's argument; the association of auxiliary contraction and the noun plural alternation is attacked by Lightner (1970a) in an otherwise inconclusive article; the vowelless solution, assumed without argument in Labov (1969), is defended by Sloat and Hoard (1970), Shibatani (1971), and Delack (1971); more recently, Guile (1972:468) and Miner (1972) have adduced new evidence in favor of the vowel analysis. This sequence of articles is especially interesting, in that not only are new data from English cited in connection with the English inflectional endings, as in Sloat and Hoard, Shibatani, and Miner, but also quite a variety of other lines of argument are offered--theoretical considerations proper, as when Shibatani considers the role of surface phonetic constraints and Miner the effect of eliminating extrinsic ordering statements; cross-linguistic generalizations, as when Guile cites a putative condition on syncope and epenthesis; non-standard dialects, used by Shibatani; and patterns of acquisition, mentioned by Delack.<sup>4</sup>

Some additional insight into the characteristic approaches of generative phonologists can be obtained from restatements, such as the reworking of the Southern Paiute material in Sapir (1946) by Harms (1966), Rogers (1967), Chomsky and Halle (1968:345-9), Nessly (1971), Lightner (1972:340-2) and Cairns (forthcoming); the recasting of Swadesh and Voegelin (1939) by McCawley (1969) and Lightner (1970b); and the discussion of Robins (primarily 1957) on nasalization in Sundanese by Langendoen (1968:100f.), Howard (ms. 1971), and Anderson (1972).

Also valuable are sequences of argument on theoretical points illustrated by language-particular data, for instance on the representation of vowel length (Kenstowicz 1970; Pyle 1970; Fidelholtz 1971), on binary features for vowel heights (Kiparsky 1968:sec. 5; Wang 1968; Contreras 1969; Harris 1970b; Naro 1971), on the assignment of phonological features to word boundaries (Zwicky 1965; Lass 1971; Halle 1971; Lightner 1972:331-5), and on rule insertion (King ms. 1970; Watkins 1970; Dressler 1971).<sup>5</sup>

In the sections of the paper that follow, I try to bring out many of the methodological principles that figure in these and similar works.

## 2. Data.

The first principles I mention are of a rather special sort; they declare what are acceptable sources of data.

- (A) The data to be comprehended by a phonological analysis consists of
- (1) variant shapes of morphemes and
  - (2) distributional restrictions on phonological elements.

This, the orthodox list, contains the data treated by structuralist morphophonemics and phonemics taken together, and no more. However, numerous other means have been suggested for the validation of feature systems, phonological representations, and phonological processes. These are listed in (B) together with a few works in which they are cited.

- (B) Additional data can be obtained by considering
- (1) speech errors (Fromkin 1971),
  - (2) misperceptions (Bond 1971:ch. 3),
  - (3) language replacement (Dressler 1972b),
  - (4) aphasia (references in Whitaker 1971:208-14),
  - (5) borrowing (Hyman 1970a, b; Ohso 1972),
  - (6) cross-linguistic surveys of inventories (Miller 1972),
  - (7) cross-linguistic surveys of processes (Foley ms. 1970; Lightner 1970c; Schourup 1972; Stampe 1972b; and many articles in Working Papers in Linguistic Universals, Stanford University),
  - (8) linguistic games (Sherzer 1970),
  - (9) productivity of processes (Esieh 1970; discussion in Dingwall 1971a; Skousen 1972),
  - (10) poetic requirements (Kiparsky 1968b, 1971a),

- (11) historical change (Kiparsky 1968a, 1971b; and the phonological papers in Stockwell and Macaulay 1972),
- (12) acquisition (Edwards 1970; many articles in Papers and Reports on Child Language Development, Stanford Univ.; Drachman 1971 and elsewhere),
- (13) stylistic variation (Zwicky 1972a, b; Dressler 1972a),
- (14) patterns of dialect and idiolect variation, and
- (15) statistics of variation (both treated in many studies by Labov and his students and by Bailey, e.g. Labov 1971 and Bailey to appear),
- (16) orthography (Chomsky and Halle 1968:49; Aronson 1969),
- (17) articulatory phonetics, and
- (18) acoustic phonetics (each separately or both together cited to support feature systems and formulations of processes in numerous works),
- (19) patterns of exceptions (Zwicky 1970c),
- (20) informant judgments on novel forms, and
- (21) psycholinguistic investigations of other types (for example Read 1971 and Gudschinsky, Popovich, and Popovich 1970: 86f.--two relatively unusual examples from a considerable body of material, much of it not explicitly generative),
- (22) distorted speech (Kazazis 1968, 1969).

Attitudes towards the types of data in (B) differ widely, from those who appear to believe that the types of evidence in (B) can never be used alone to justify an analysis, to those who hold that the two groups are of equal value, or even that some types of data in (B) are weightier than those in (A). Reliance on (A) alone, combined with a relatively 'abstract' stand on the nature of underlying representations and no special emphasis on regular or productive variants, or on variants as opposed to distributional restrictions, characterizes the Sound Pattern approach, whereas the phonological theory of Stampe (1972a) insists upon the psychological reality expressed by the considerations in (B).

For an illustration of the differences that can arise, consider how to analyze a language that appears to have the rule

$$s \rightarrow r / \underline{V} \_ V$$

The most direct approach, and the one most in accord with (A), is to say that the rule shifts s to r. A less obvious approach would claim that two rules applying in sequence give the effect of s → r: roughly,

$$\begin{array}{l} s \rightarrow z / \underline{V} \_ V \\ z \rightarrow r / \underline{V} \_ V \end{array}$$

The phonologist alive to the sorts of data in (B) would consider, for example, the occurrence of rhotacism rules across languages. One reasonable hypothesis (though data are hard to come by) is that if a language has intervocalic s and z in underlying representations, and shifts s to r in this position, then it shifts z to r in this position also. Accordingly, the direct shift of s to r is not a possible

natural rule; the shift must proceed through an intermediate stage, even if that stage is not evidenced by synchronic alternations, or else the shift must be a morphologized remnant of several distinct phonological changes.

Beyond (A) and (B), other principles assign relative weights to different sorts of evidence: First, the disputed principle

(C) Data from (A) has greater value than data from (B).

then the widely accepted principles

(D) A variant has greater value according as it is

(1) more regular, and

(2) more productive.

(E) Evidence from variants has greater value than evidence from distributional restrictions (cf. Vennemann 1970).

Finally, the principle of 'independent evidence':

(F) Insofar as possible, the choice of a particular remote representation should be motivated by several independent lines of evidence.

Thus, Kiparsky (1971b:585), responding to Kisseberth (1969), admits that one might have to 'assume that wholly abstract segments are to be allowed when more than one rule refers to them crucially', despite the strictures of Kiparsky (ms. 1968).

### 3. Realism and Working Back.

I turn now to methodological principles proper, beginning with two related injunctions that distinguish generative phonology from earlier morphophonemics; these are aspects of Postal's (1968:ch. 4) Naturalness Condition:

(G) Insofar as possible, the content of segments in remote representations is phonological rather than abstract.

Thus, morphophonemes are not distinguished by diacritics but by appropriate phonetically-based distinctive features, wherever possible.

(H) Insofar as possible, phonological rules are conditioned phonologically rather than arbitrarily.

That is, phonetically-based features are preferred to lexical markings.

Next, three principles bearing directly on the choice of remote representations, beginning with a third aspect of the Naturalness Condition:

(I) Whenever possible, a remote representation for an occurrence of a surface segment is chosen from its set of variants.

That is, the analyst normally assumes that the underlying representation of a morpheme is one of its 'forms'.<sup>6</sup>

- (J) Otherwise, the content of segments in remote representations is assembled piece by piece, using information from variants and distributional restrictions ('homing in', as in Zwicky ms. 1972).

For example, we find the Sound Pattern (191f.) analysis of [ɔj] as underlying  $\bar{\alpha}$  defended by a series of steps in which it is argued that on the basis of English rules previously motivated, a remote representation for [ɔj] must be first a tense vowel, which next must be nonback, then also low and round.

- (K) As far as possible, each set of surface variants has a single corresponding underlying representation.

Thus, insofar as possible (excluding, e.g., suppletion), each morpheme has a unique underlying form; the listing of alternants is to be minimized.

Principles (G), (I) and (K), taken together, require the analyst to assume that phonological representation is identical to phonetic representation, unless he has evidence to the contrary. Consequently, analysis proceeds by 'working back from the surface'. At each stage it is argued that some representations are underlain by different representations (for which I have been using Postal's felicitous term 'remote representations', so as to make no claims about when the most remote, or underlying, representations are reached). The make-up of remote representations is guided by two further rules of thumb,

- (L) *Ceteris paribus*, two segments that distinguish morphemes are underlyingly distinct.
- (M) *Ceteris paribus*, two segments that never distinguish morphemes are not underlyingly distinct.

At each stage in the process of working, or arguing, back from the surface, rules are formulated as notations of the processes relating more remote representations to less remote ones. These rules and remote representations themselves are subject to various conditions that have been proposed in the literature, among them:

- (N) Of the available alternatives, choose the remote representation with the most complex or least determined context, so as to obtain the simplest rules deriving the surface form.
- (O) Choose a representation from which the surface forms can be derived by rules that are natural, in the sense that they recur in many languages and have a phonetic basis.
- (P) Choose the least marked representation available (Schane 1968b, opposed by Malone 1970 and Vennemann ms. 1971a).

- (Q) Choose the representation that results in the longest derivations (take a 'free ride', in the sense of Zwicky 1970b).
- (R) Choose representations and rules so as to minimize extrinsic ordering statements (Anderson 1969; Kisseberth ms. 1972; Norman 1972).
- (S) Choose underlying systems that are unmarked, in the sense that they recur in many languages and are symmetrical (Chomsky and Halle 1968:ch. 9).

Of these principles, only (N) is regularly used without comment. Principle (O) is widely applied, but presents difficulties when the most natural analysis (in the sense of this principle) is not the simplest one, or when facts make the most natural analysis unlikely (Davison 1971). The remaining principles are all controversial. Probably, none of them is a good guide to analytic or verificatory practice. Certainly they are contradictory as a set and contradictory to other principles,<sup>7</sup> so that at the very least different principles must be assigned different weights; some must undoubtedly be discarded.

Further constraints on the choice of remote representations have been advocated by Kiparsky (ms. 1968; 1971b). Expressed in terms of methodological principles, Kiparsky's constraint on abstract analyses splits into two conditions, the first a special case of (I):

- (T) Other things being equal, an occurrence of a segment not involved in alternations should be represented underlyingly in its surface form.
- (U) Wherever possible, avoid rules that neutralize completely some underlying distinction.

A condition that is similar in spirit to (T), but logically independent of it, is one that McCawley (1967a:79; 1967b:107) observes in the descriptions of William Dwight Whitney and Edward Sapir:

- (V) Every underlying segment should also occur as a surface segment.

Generative descriptions do not hold to this principle absolutely, but analysts customarily feel obliged to defend violations of Principle (V), and (T) as well.

Even in analyses in which the underlying segments constitute a subset of the surface segments, there is considerable room for non-patent steps. For example, underlying forms can be chosen by a sort of 'musical chairs' principle, so that surface x realizes underlying y; surface y realizes underlying z, and surface z realizes underlying x; the result violates Principle (T) and requires special justification. The Sound Pattern treatment of English vowels is very close to this paradigm. Also, intermediate steps in derivations may introduce elements that do not occur on the surface, even when the underlying inventory is impeccable; these 'false steps' (Zwicky 1972c) are constraints by a generalization of Principle (V):

(W) Every segment in a derivation should occur as a surface segment.

Again, deviations from Principle (W) are reasonably common; they do need defense, however.

If principles (T) and (U) are promoted to theoretical principles prohibiting special underlying forms for non-alternating forms and prohibiting rules of absolute neutralization, then this position in combination with a strong form of principle (I) yields a particularly 'realistic' or 'non-abstract' view of underlying representations, one not held by anyone, to my knowledge. This extreme position would be opposed to a highly 'formalistic' or 'abstract' approach, which would seek the simplest lexicon and system of rules consistent with the data to be explained, regardless of other considerations. An extreme version of the formalistic position is again one not actually advocated by anyone, although as Vennemann (ms. 1971b) points out, there is a noticeable tendency in the literature towards a 'once a systematic phoneme, always a systematic phoneme' principle:

(X) If some occurrences of a segment x are derived from a remote representation distinct from x, then all occurrences should be derived from remote representations distinct from it.

That is, the existence of one or more sources for x allows us to eliminate it entirely from the underlying inventory. This principle is applied several times in Sound Pattern, as when the existence of a Vowel Shift rule deriving aj from i permits even non-alternating occurrences of aj, as in light, to be so derived. This principle has not been defended, except insofar as it promotes simple underlying systems, and it contradicts reasonably well-established principles like (I), hence it cannot be considered established.

#### 4. Simplicity and Significant Generalizations.

I provide here no discussion of formal simplicity and the evaluation metric, because I believe that these considerations have played virtually no role (beyond that in Principle (N)) in what generative phonologists have done in arriving at and arguing for particular analyses. Consequently, although I find Botha's recent (1971) book on methodology in generative phonology stimulating at many points, I have not built on it in this paper, because its almost exclusive concern with the evaluation metric removes it from the domain of the working phonologist.

Simplicity in its informal sense is, of course, appealed to often in the generative literature, by implicit use of principles like

(Y) Write as few rules as possible.

and in the explicit attempts to capture (in Chomsky and Halle's phrasing) 'significant linguistic generalizations', an undertaking governed by the maxim

(Z) Whenever possible, apparently disparate facts which belong together should be described by identical means.



Here we have passed well beyond methodological assumptions peculiar to linguistics, into attitudes towards scientific inquiry in general. Principle (Z), which is appropriately the last of the set, amounts to an injunction to search out the hidden unities of nature.

##### 5. Concluding Remarks.

Methodological principles are established by success; they are valuable insofar as they lead us to choose those accounts of phonological phenomena we have independent reason to suppose are (relatively) correct. As a result, if there is a poverty of sustaining evidence for us to refer to, there is a high degree of indeterminacy in our descriptions. This indeterminacy--the existence of alternative descriptions all of which are possible theoretically--has manifested itself so often that there has been a continuing effort to go beyond linguistic facts in the narrowest sense (those in (A) above) and to pursue other evidence (the lines of inquiry in (B), for instance). Consequently, the central methodological issues depend for their solution upon a decision as to the sorts of data germane to phonological analysis.

The title of this paper echoes 'The Strategy of Phonemics', an article of Morris Halle's setting out some of the methodological principles of phonemics at a time when he was wrestling with the foundations of the theory. I have tried to do something similar for generative phonology at a time when most of its practitioners<sup>8</sup> are sceptical of some of the fundamental tenets of that theory. I close with an apposite quotation from Halle's earlier work (1954:199): 'To us the major criterion for the applicability of a certain category to linguistic description is whether or not this category yields simple statements not only on the particular level for which it was introduced, but on all levels which are pertinent to descriptions of a language. It must always satisfy a multiplicity of criteria'.

##### Footnotes

\*This version of the paper was prepared after the Phonologie-Tagung and shows my responses to some of the suggestions made to me at the conference. In particular, I have included a fair amount of bibliography. The references cited are by no means exhaustive, however, and exhibit my personal biases. In some cases I cite an item to illustrate a point even if I disagree with the approach or find the argumentation faulty; this paper is intended to be primarily descriptive rather than prescriptive.

1. My aim here is similar to that of Trubetzkoy's rules (1935), Bloch's postulates (1948), and the structuralist manuals of Pike (1947) and Nida (1949).

2. See the discussion in Zwicky (1971a). A wider discussion would include also those substantive and methodological principles that are embodied in experimental methods and design.

3. For the purposes of this discussion, the additional possibilities *s* and vowel plus *s* are excluded (though this exclusion

must be defended, as in Lightner 1970a), as is the possibility that different inflectional endings are to be analyzed in different ways (a solution advocated by Sloat and Hoard 1970). Also I take no stand on which lax vowel would occur in the suffix; there are at least four alternatives--i, e, ɛ, and ə--that are not obviously wrong.

4. Other *casus belli* include umlaut in German (Zwicky 1967; Bach and King 1970; Vennemann 1968; Wurzel 1970:Teil 2), word stress in English (Chomsky and Halle 1968:ch. 3; Ross ms. 1969; Lee 1969; Langendoen 1969; Sloat and Hoard 1972), sentence stress in English (Chomsky and Halle 1968:sec. 2.1; Bresnan 1971; Lakoff 1972; Berman and Szamosi 1972; Bresnan 1972; Bolinger 1972), Spanish plural formation (Foley 1967; Saltarelli 1970; Harris 1970a), metathesis in Greenlandic (Pyle 1970; Underhill 1971; Sadock 1972), vowel harmony in Nez Perce (Aoki 1966; Chomsky and Halle 1968:377f.; Jacobsen 1968; Kiparsky ms. 1968; Rigsby and Silverstein 1969; Zwicky 1971b), stem vowels in Finnish nouns (Harms 1964:ch. 1; McCawley 1963; Austerlitz 1967; Anttila 1967:569f.), and Grassmann's and Bartholomae's Laws in Sanskrit (Zwicky 1965:ch. 5; Kiparsky 1965; Anderson 1970; Butler ms. 1972). Indeed, it can be fairly said that each language that has received more than cursory study from generative phonologists has its own puzzle areas--nasalization in French, retroflexion of s in Sanskrit, palatalization in Russian, vowel harmony in Turkish, the glottal fricative in Welsh, the coronal consonants in Japanese, the vowel shift in English, to add a few examples to those given already. In many cases, generativists' interest in these puzzles continues earlier structuralist discussion, of course.

5. A full list of such topics would include at least: the alpha notation, the predictability of ordering relationships, cyclical application of rules, phonological conspiracies and targets, the representation of complex segments (e.g. affricates and diphthongs), strata of the vocabulary, variable rules, phonemic representation, rule repetition, syntactic constraints on phonological rules, and phonological constraints on syntactic rules.

6. A strong, or substantive, form of this principle, requiring the underlying representation to be one of its forms, is attributed by McCawley (1967a:80) to William Dwight Whitney. As is well known, structuralist phonologists expressed doubts about 'fictitious' base forms; but the need for some cases of such representations is a commonplace of generative phonology.

7. The opposition of Sound Pattern naturalness, expressed by (S), and Postalian naturalness, expressed by earlier principles, is remarked upon in Zwicky (1971b).

8. See, for example, the discussion in Lightner (1971).

## Bibliography

- Anderson, Stephen. 1969. West Scandinavian vowel systems and the ordering of phonological rules. Ph.D. dissertation, M.I.T.
- \_\_\_\_\_. 1970. On Grassmann's Law in Sanskrit. *Linguistic Inquiry* 1.387-96.
- \_\_\_\_\_. 1972. On nasalization in Sundanese. *Linguistic Inquiry* 3.253-68.
- Anttila, Raimo. 1967. Review of Harms, Finnish structural sketch. *Language* 43.2.566-73.
- Aoki, Haruo. 1966. Nez Perce vowel harmony and Proto-Sahaptian vowels. *Language* 42.4.759-67.
- Aronson, Ruth. 1969. The predictability of vowel patterns in the Hebrew verb. *Glossa* 3.127-45.
- Austerlitz, Robert. 1967. The distributional identification of Finnish morphophonemes. *Language* 43.1.20-33.
- Bach, Emmon and Robert T. Harms, eds. 1968. *Universals in linguistic theory*. New York: Holt, Rinehart and Winston.
- \_\_\_\_\_, and Robert D. King. 1970. Umlaut in Modern German. *Glossa* 4.3-21.
- Bailey, Charles-James. To appear. The patterning of language variation. *Varieties of present day American English*, ed. by R. W. Bailey and J. L. Robinson.
- Berman, Arlene and Michael Szamosi. 1972. Observations on sentential stress. *Language* 48.304-25.
- Bloch, Bernard. 1948. A set of postulates for phonemic analysis. *Language* 24.3-46.
- Bloomfield, Leonard. 1933. *Language*. Chicago: Holt.
- Bolinger, Dwight. 1972. Accent is predictable (if you're a mind-reader). *Language* 48.633-44.
- Bond, Zinny S. 1971. Units in speech perception. Ph.D. dissertation, O.S.U. Published in *Working Papers in Linguistics* 9.viii-112.
- Botha, Rudolf. 1971. Methodological aspects of transformational generative phonology. The Hague: Mouton.
- Bresnan, Joan. 1971. Sentence stress and syntactic transformations. *Language* 47.257-81.
- \_\_\_\_\_. 1972. Stress and syntax; a reply. *Language* 48.326-42.
- Butler, Jonathan. ms. 1972. A murmured proposal regarding Grassmann's Law.
- Cairns, Charles. Forthcoming. Universal rules and vocalic devoicing in Southern Paiute.
- Chomsky, Noam, and Morris Halle. 1968. *The sound pattern of English*. New York: Harper & Row.
- CLS x = Papers from the xth regional meeting, Chicago Linguistic Society.
- Contreras, Heles. 1969. Simplicity, descriptive adequacy, and binary features. *Language* 45.1-8.
- Davison, Alice. 1971. A problem concerning the relative naturalness of phonological rules and phonological representation. *CLS* 7.332-9.
- Delack, John B. 1971. English morphology and linguistic universals. *Glossa* 5.202-21.
- Dingwall, William O. 1971a. Linguistics as psychology: a definition and some initial tasks. *Dingwall* 1971b:758-802.
- \_\_\_\_\_. 1971b. A survey of linguistic science. Linguistics Program, University of Maryland.

- Drachman, Gaberell. 1971. Some strategies in the acquisition of phonology. Paper presented to the Urbana Conference on Phonology.
- Dressler, Wolfgang. 1971. An alleged case of nonchronological rule insertion: flörälis. *Linguistic Inquiry* 2.597-9.
- \_\_\_\_\_. 1972a. Allegroregeln rechtfertigen Lentoregeln: Sekundäre Phoneme des Bretonischen. *Innsbrucker Beiträge zur Sprachwissenschaft*.
- \_\_\_\_\_. 1972b. On the phonology of language death. *CLS* 8.448-57.
- Edwards, Mary Louise. 1970. The acquisition of liquids. M.A. thesis, O.S.U. To appear in *Working Papers in Linguistics*.
- Fidelholtz, James L. 1971. On the indeterminacy of the representation of vowel length. *Papers in Linguistics* 4.577-94.
- Foley, James. 1967. Spanish plural formation. *Language* 43.486-93.
- \_\_\_\_\_. ms. 1970. Systematic morphophonology.
- Fromkin, Victoria A. 1971. The non-anomalous nature of anomalous utterances. *Language* 47.27-52.
- Gudschinsky, Sarah C., Harold and Frances Popovich. 1970. Native reaction and phonetic similarity in Maxakalí phonology. *Language* 46.77-88.
- Guile, Timothy. 1972. A generalization about epenthesis and syncope. *CLS* 8.463-9.
- Halle, Morris. 1954. The strategy of phonemics. *Word* 10.197-209.
- \_\_\_\_\_. 1971. Word boundaries as environments in rules. *Linguistic Inquiry* 2.540f.
- Harms, Robert T. 1964. Finnish structural sketch. Indiana Univ. and Mouton, Bloomington and The Hague.
- \_\_\_\_\_. 1966. Stress, voice and length in Southern Paiute. *IJAL* 32.3.288-35.
- Harris, James W. 1969. Spanish phonology. Cambridge, Mass.: M.I.T. Press.
- \_\_\_\_\_. 1970a. A note on Spanish plural formation. *Language* 46.4.928-30.
- \_\_\_\_\_. 1970b. Sequences of vowels in Spanish. *Linguistic Inquiry* 1.1.129-34.
- Howard, Irwin. ms. 1971. On some problems of formalization in generative phonology.
- Hsieh, Hsin-I. 1970. The psychological reality of tone sandhi in Taiwanese. *CLS* 6.489-503.
- Hyman, Larry M. 1970a. How concrete is phonology? *Language* 46.58-76.
- \_\_\_\_\_. 1970b. The role of borrowing in the justification of phonological grammars. *Studies in African linguistics* 1.1-48.
- Jacobsen, William H. 1968. On the prehistory of Nez Perce vowel harmony. *Language* 44.4.819-29.
- Kazazis, Kostas. 1968. Sunday Greek. *CLS* 4.130-140.
- \_\_\_\_\_. 1969. Distorted Modern Greek phonology for foreigners. *Glossa* 3.198-209.
- Kenstowicz, Michael J. 1970. On the notation of vowel length in Lithuanian. *Papers in Linguistics* 3.1.73-114.
- King, Robert D. ms. 1970. Can rules be added in the middle of grammar?
- Kiparsky, Paul. 1965. Phonological change. Ph.D. dissertation, M.I.T.

- Kiparsky, Paul. 1968a. Linguistic universals and linguistic change. *Bach and Harms* 1968:170-202.
- \_\_\_\_\_. 1968b. Metrics and morphophonemics in the Kalevala. *Studies presented to Professor Roman Jakobson by his students*, ed. by Charles Gribble, Slavica, Cambridge, Mass. 137-48.
- \_\_\_\_\_. ms. 1968. How abstract is phonology?
- \_\_\_\_\_. 1971a. 'Elsewhere' in phonology. Paper presented to Dec. LSA meeting, St. Louis, Missouri.
- \_\_\_\_\_. 1971b. Historical linguistics. *Dingwall* 1971b:576-642.
- Kisseberth, Charles W. 1969. On the abstractness of phonology: the evidence from Yawelmani. *Papers in Linguistics* 1.2.248-82.
- \_\_\_\_\_. ms. 1972. Is rule ordering necessary in phonology? To appear in *Papers in linguistics in honor of Henry and Renée Kahane*, Univ. of Illinois Press.
- Kuroda, Sige-Yuki. 1967. *Yawelmani phonology*. Cambridge, Mass.: M.I.T. Press.
- Labov, William. 1969. Contraction, deletion, and inherent variability of the English copula. *Language* 45.4.715-62.
- \_\_\_\_\_. 1971. Methodology. *Dingwall* 1971b:412-91.
- Lakoff, George. 1972. The global nature of the nuclear stress rule. *Language* 48.285-303.
- Langendoen, D. Terence. 1968. *The London school of linguistics*. Cambridge, Mass.: M.I.T. Press.
- \_\_\_\_\_. 1969. Some problems in the description of English accentuation. *O.S.U. Working Papers in Linguistics* 3.122-42.
- Lass, Roger. 1971. Boundaries as obstruents: Old English voicing assimilation and universal strength hierarchies. *Journal of Linguistics* 7.1.15-30.
- Lee, Gregory. 1969. English word-stress. *CLS* 5.389-405.
- Lightner, Theodore M. 1970a. On regular inflectional endings in English. *Papers in Linguistics* 3.3.503-19.
- \_\_\_\_\_. 1970b. On Swadesh and Voegelin's 'A problem in phonological alternations'. *Papers in Linguistics* 3.2.201-20.
- \_\_\_\_\_. 1970c. Why and how does vowel nasalization take place? *Papers in Linguistics* 2.2.179-226.
- \_\_\_\_\_. 1971. Generative phonology. *Dingwall* 1971b:498-564.
- \_\_\_\_\_. 1972. Problems in the theory of phonology. Volume 1: *Russian phonology and Turkish phonology*. Edmonton and Champaign: Linguistic Research.
- Luelsdorff, Philip. 1969. On the phonology of English inflection. *Glossa* 3.1.39-48.
- Malone, Joseph L. 1970. In defense of non-uniqueness of phonological representations. *Language* 46.328-35.
- McCawley, James D. 1963. Finnish noun morphology. *Quarterly Progress Report*, M.I.T. Research Laboratory of Electronics, 68.180-6.
- \_\_\_\_\_. 1968. *The phonological component of a grammar of Japanese*. The Hague: Mouton.
- \_\_\_\_\_. 1967a. The phonological theory behind Whitney's Sanskrit Grammar. *Languages and Areas: Studies presented to George Y. Bobrinskoy*. Division of Humanities: University of Chicago, 77-85.
- \_\_\_\_\_. 1967b. Sapir's phonologic representation. *IJAL* 33.106-11.
- \_\_\_\_\_. 1969. Length and voicing in Tübatulabal. *CLS* 5.407-15.

- Miller, Patricia Donegan. 1972. Some context-free processes affecting vowels. M.A. thesis, O.S.U. In Working Papers in Linguistics 11.136-66.
- Miner, Kenneth. 1972. English inflectional endings and unordered rules. Paper presented to the LSA July Meeting, Chapel Hill, N.C.
- Naro, Anthony. 1971. Resolution of vocalic hiatus in Portuguese: diachronic evidence for binary features. Language 47.2.381-93.
- Nessly, Larry. 1971. Simplicity and explanatory adequacy in Southern Paiute. Paper presented to the LSA Dec. Meeting, St. Louis, Missouri.
- Nida, Eugene A. 1948. The identification of morphemes. Language 24. 414-41.
- \_\_\_\_\_. 1949. Morphology: the descriptive analysis of words. Ann Arbor: University of Michigan Press, 2nd ed.
- Norman, Linda. 1972. The insufficiency of local ordering. CLS 8. 490-503.
- Ohso, Mieko. 1971. A phonological study of some English loan words in Japanese. M.A. thesis, O.S.U.
- Pike, Kenneth. 1947. Phonemics: a technique for reducing language to writing. Ann Arbor: University of Michigan Press.
- Postal, Paul M. 1968. Aspects of phonological theory. New York: Harper & Row.
- Pyle, Charles. 1970. West Greenlandic Eskimo and the representation of vowel length. Papers in Linguistics 3.1.115-46.
- Read, Charles. 1971. Pre-school children's knowledge of English phonology. Harvard Educational Review 41.1-34.
- Rigsby, Bruce and Michael Silverstein. 1969. Nez Perce vowels and Proto-Sahaptian vowel harmony. Language 45.1.45-59.
- Robins, R. H. 1957. Vowel nasality in Sundanese: a phonological and grammatical study. Studies in Linguistic Analysis. Basil Blackwell, Oxford.
- Rogers, Jean H. 1967. Some implications of two solutions to a phonological problem. IJAL 33.3.198-205.
- Ross, J. R. ms. 1969. A reanalysis of English word stress.
- Sadock, Jerrold M. 1972. In defense of metathesis in Greenlandic. Papers in Linguistics 5.1-9.
- Saltarelli, Mario. 1970. Spanish plural formation: apocope or epenthesis? Language 46.1.89-96.
- Sapir, Edward. 1946. The psychological reality of phonemes. Selected writings of Edward Sapir, ed. David Mandelbaum. Berkeley: Univ. of California Press. 46-60.
- Schane, Sanford. 1968a. French phonology and morphology. Cambridge, Mass.: M.I.T. Press.
- \_\_\_\_\_. 1968b. On the non-uniqueness of phonological representations. Language 44.4.709-16.
- Schourup, Lawrence. 1972. A cross-language study of vowel nasalization. M.A. thesis, O.S.U. To appear in Working Papers in Linguistics.
- Sherzer, Joel. 1970. Talking backwards in Cuna: the sociological reality of phonological descriptions. Southwestern Journal of Anthropology 26.343-53.
- Shibatani, Masayoshi. 1971. The phonological representations of English inflectional endings. Paper presented to the LSA December Meeting, St. Louis, Missouri.

- Skousen, Royal. 1972. On capturing regularities. CLS 8.567-77.
- Sloat, Clarence and James E. Hoard. 1971. The inflectional morphology of English. *Glossa* 5.47-56.
- \_\_\_\_\_, \_\_\_\_\_. 1972. English stress. Paper presented to the LSA July Meeting, Chapel Hill, N.C.
- Stampe, David L. 1972a. Dissertation on natural phonology. Ph.D. dissertation. University of Chicago.
- \_\_\_\_\_. 1972b. On the natural history of diphthongs. CLS 8.578-90.
- Stockwell, Robert P. and Ronald K. S. Macaulay. 1972. *Linguistic change and generative theory*. Bloomington: Indiana University Press.
- Swadesh, Morris and Charles F. Voegelin. 1939. A problem in phonological alternation. *Language* 15.1-10.
- Trubetzkoy, Nikolai Sergeevic. 1935. *Anleitung zu phonologischen Beschreibungen*. Brno.
- Underhill, Robert. 1971. Metathesis vs. gemination in Greenlandic. *Papers in Linguistics* 4.299-311.
- Vennemann, Theo. 1968. German phonology. Ph.D. dissertation. UCLA.
- \_\_\_\_\_. 1970. The German velar nasal: a case for abstract phonology. *Phonetica* 22.65-81.
- \_\_\_\_\_. 1971a. Phonological uniqueness in natural generative grammar.
- \_\_\_\_\_. ms. 1971b. Vowel alternations in English, German, and Gothic: remarks on realism in phonology.
- Whitaker, Harry A. 1971. *Neurolinguistics*. Dingwall 1971b:136-251.
- Wurzel, Wolfgang Ullrich. 1970. *Studien zur deutschen Lautstruktur*. *Studia Grammatica* 8. Akademie-Verlag, Berlin.
- Wang, William S-Y. 1968. Vowel features, paired variables, and the English vowel shift. *Language* 44.4.695-708.
- Watkins, Calvert. 1970. A case of non-chronological rule insertion. *Linguistic Inquiry* 1.525-7.
- Zwicky, Arnold M. 1967. Umlaut and noun plurals in German. *Studia Grammatica* 6.35-45.
- \_\_\_\_\_. 1970a. Auxiliary reduction in English. *Linguistic Inquiry* 1.3.323-36.
- \_\_\_\_\_. 1970a. The free-ride principle and two rules of complete assimilation in English. CLS 6.579-88.
- \_\_\_\_\_. 1970c. Greek-letter variables and the Sanskrit ruki class. *Linguistic Inquiry* 1.4.549-55.
- \_\_\_\_\_. 1971a. Linguistics as chemistry: the substance theory of semantic primes. *OSU Working Papers in Linguistics* 8.111-35.
- \_\_\_\_\_. 1971b. More on Nez Perce: on alternative analyses. *IJAL* 37.2.122-6.
- \_\_\_\_\_. 1972a. Note on a phonological hierarchy in English. Stockwell and Macaulay 1972: 275-301.
- \_\_\_\_\_. 1972b. On casual speech. CLS 8.607-15.
- \_\_\_\_\_. 1972c. Taking a false step. Paper presented to the July LSA meeting, Chapel Hill, N.C.
- \_\_\_\_\_. ms. 1972. Homing in.