

Homing in: on arguing for remote representations*

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Eliminate all other factors, and the one which remains must be the truth.

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How often have I said to you that when you have eliminated the impossible, whatever remains, *however improbable*, must be the truth.

– Sherlock Holmes to Watson in *The sign of the four*

FOR ARCHIBALD HILL

Linguistic analysis possesses both an 'arbitrary' and a 'natural' component – on the one hand, methodological principles and various means of organizing and handling data; on the other, empirical studies aimed at exposing linguistic universals through the detailed analysis of specific languages, cross-linguistic comparison, phonetic studies, psycholinguistic experiments, observation of language acquisition, and other sources of pertinent data. In practice, the arbitrary and natural components are intertwined, and each makes use of methods and results from outside linguistics in a narrow sense: the arbitrary component contains many principles and methods which are not peculiar to linguistics at all, but are rather the common property of scientific investigation, while the natural component refers ultimately to aspects of mental and social organization and physical properties of the vocal tract, many of which are independent of specifically linguistic behaviours and abilities.

The arbitrary aspect of linguistic analysis might seem to correspond to what Chomsky in several places calls the 'heuristic procedures' of linguistics, as opposed to the theory of language proper. Chomsky (1962) begins by discussing the child as a learning device, emphasizing the importance of linguistic theory:

To select a recursive, formalized grammar, given fragmentary data, a learning device must obviously contain both heuristic procedures and a specification of

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the form of grammar, as part of its internal structure. But the task remaining to heuristic procedures is obviously lightened as we make the specification of the form of grammars increasingly narrow and restrictive. It seems to me that the relative suddenness, uniformity, and universality of language learning, the bewildering complexity of the resulting skills, and the subtlety and finesse with which they are exercised, all point to the conclusion that a primary and essential factor is the contribution of an organism with highly intricate and specific initial structure. (536)

and then extends this discussion to the linguist, again discounting heuristics:

The linguist tries to discover the grammatical structure of some language, bringing to bear, in this attempt, a selected array of concepts that give an implicit picture of what a natural language, in his view, must be like. He brings to bear, in other words, a more or less detailed general theory of linguistic structure, which must, furthermore, have the features of the language-learning device described above. The linguist will accumulate data as to which phonetically transcribed items are well-formed and which pairs conform (are repetitions); he tries to find the optimal grammar consistent with these data. He thus performs a genuine act of discovery. No doubt something can be said about the heuristic and inductive principles that can be used as an aid to discovery. However, this is, at most, a marginal concern of linguistic theory. What must concern the linguist primarily is the precise specification of (a) the form of grammars . . . , (b) the notion 'structural description', and (c) a way of determining the structural description of an arbitrary sentence, given a grammar. (536)

Undoubtedly, the linguist performs a genuine act of discovery. But there is no reason to suppose that the linguist's methods are very much like the child's – the linguist has more sources of information open to him than the child in one sense, and fewer in another, and the linguist is engaged in constructing linguistic theory at the same time he is analysing a specific language. He may also interest himself in the heuristics used by children, or even (as I have interested myself) in the methods actually used by linguists in analysis and in theory construction. Even if the rôle of heuristics in acquisition is as small as Chomsky suggests, the rôle of heuristics in analysis is considerable, to judge from the practice of generative linguists. Consequently, I find the study of analytic procedures quite rewarding.

My concern here is with an aspect of the arbitrary component, one shared with other enterprises in which methods of problem solving are brought to bear on empirical data. What is characteristic about *HOMING IN* is that facts are viewed as a kind of puzzle, obscuring the real elements and relationships; the function of the analyst is to determine what these remote entities are by eliminating possibilities so as to fix upon, or 'home in on', the right answer. Typically, this process

involves assembling facts in such a way that one can SOLVE FOR the answer. In sciences of quantity, the answer is obtained by using a bag of tricks to set up an equation, which is then solved. In linguistics, the analyst makes a list of conditions, and the answer is taken to be the simplest entity satisfying them.

The method is familiar from contrived logical puzzles of the 'A, B, and C are a bank clerk, tightrope walker, and drug smuggler, though not necessarily respectively' variety, which Wylie (1957: intro.) takes to 'epitomize the entire scientific process' and in which 'the answer is ultimately wrested from the seemingly incoherent information initially provided'.

In what follows I examine some argumentation using homing in from *The sound pattern of English*¹ (section 1), which I take to be impeccable in structure, even though it results in an indefensible analysis. This I contrast with a structurally similar case from Sanskrit (section 2), in which the method of homing in is supported at each stage by empirical evidence. I close with some discussion of homing in in syntax (section 3) and a brief assessment of the value of the method (section 4).

I. THE SPE TREATMENT OF [ɔj]

SPE treats many CHOICE PROBLEMS, in which the analysis selects as underlying a segment that is actually in alternation; a typical case is the argument that /k/ underlies the alternation [k] in *electric* ~ [s] in *electricity* ~ [ʃ] in *electrician* (*SPE*: 168, 219, 224–237). More complex are alternations for which it is argued that the underlying representation is distinct from all of its surface realizations, as when Chomsky and Halle claim that the second vowel in *divine* and *divinity* is underlyingly neither /aj/ nor /I/, but rather /ī/ (*SPE*: 178–186) and that the second consonant in *right* and *righteous* is underlyingly neither simple /t/ nor the affricate /č/, but rather the cluster /xt/ (*SPE*: 223–224). These are all homing in arguments.

Consider now the surface diphthong [ɔj]. The *SPE* discussion (191–192) of this phonological element proceeds through nine steps:

(a) It is observed that one consequence of the analyses up to this point in *SPE* is that VG sequences have been eliminated from the lexicon (in favour of tense vowels affected by Diphthongization and Vowel Shift).

(b) We then see if we can remove this exception by taking it to be some underlying X which is converted to the surface diphthong [ɔj]; if possible, this conversion should be effected by independently motivated rules, so as not to add rules for this special case.

(c) Note that the existing Diphthongization rule inserts a glide after a tense vowel; j is inserted after a nonback vowel. To take advantage of this rule, we assume that X is a tense nonback vowel.

[1] Chomsky & Halle (1968). Hereafter *SPE*.

(d) [ɔj] is low and round. Apparently, if X were nonlow or nonround, we would need special rules to generate the right features. Consequently, take X to be low and round.

(e) Putting these observations together, we see that X has been specified for all the relevant features: it is a tense, nonback, low, round vowel – that is, $\bar{\alpha}$.

(f) As a result, we need a $\bar{\alpha} \rightarrow \bar{\alpha} / -j$ rule. But there is already a Backness Adjustment taking $\bar{\alpha} \rightarrow \bar{\alpha} / -j$. This rule can now be made more general.

(g) Consider next the effect of adding / $\bar{\alpha}$ / to the inventory of underlying segments. *SPE* claims that it fills a ‘gap’ in the set of tense low vowels, which otherwise are / $\bar{\alpha}$ $\bar{\alpha}$ $\bar{\alpha}$ /.

(h) Next we must see how the new segment would be treated by existing rules. First, there is the Vowel Shift, which affects tense vowels. However, to prevent $\bar{\alpha}$ from being shifted, *SPE* restricts the rule to $\left[\begin{array}{c} \alpha \text{back} \\ \alpha \text{round} \end{array} \right]$ vowels; consequently $\bar{\alpha}$ is conveniently exempted as well.

(i) Nevertheless, $\bar{\alpha}$ must be marked as an exception to at least one rule, laxing before two following syllables, because surface [ɔj] occurs in words like *exploitative*. This is the price we must pay for the analysis.

It is striking how little empirical input this argument has. Its original motivation is to simplify underlying morpheme structure (and even this step depends upon how well supported other arguments eliminating underlying diphthongs are); we determine the identity of X by considering how to use existing rules to the fullest and how to avoid positing new rules; a new rule that is required is justified on the ground that it is a generalization of an existing rule; the new segment is justified on the ground that it fills a distributional gap; its failure to undergo Vowel Shift is said to follow from its being a member of a natural class with $\bar{\alpha}$; its failure to lax is, reluctantly, admitted to be exceptional (though presumably outweighed by all the other considerations). There are no morpho-phonemic alternations to be explained here, no facultative variation, no universal constraints on systems, not even slips of the tongue or stages in acquisition. The entire argument is formal.

Even as they stand, the steps of the argument are subject to criticism. Step (a) depends upon previous arguments against underlying diphthongs; these in turn have been widely attacked. Against step (b), we could claim (with Postal, 1968) that underlying form is identical to surface form, unless there are cogent reasons for saying otherwise; a somewhat unusual underlying sequence would scarcely count, since there must be borrowings, exceptions, and the like anyway. Steps (c) through (e) home in on X, using existing rules and features; but there is no inherent advantage in taking a free ride (Zwicky, 1970) on existing rules. The generalization in step (f) may be spurious. The gap in step (g) certainly is, since the occurrence of a low front rounded vowel in a language seems to depend not

at all on what other low vowels occur, but rather on what other front rounded vowels occur (briefly, to have a low front unrounded vowel a language must have mid or high front unrounded vowels); the system *SPE* argues for is quite unnatural. Step (h) treats \bar{a} and $\bar{\alpha}$ as a natural class, an unlikely claim, it seems to me; certainly I know of no parallels. Even step (i) creates some difficulties, because although [ɔj] does not undergo Trisyllabic Laxing, there are examples in which it appears to have been affected by the other laxing environment in English, before two consonants: *destruction*, *puncture*, *junction*, and *unction* (presumably related to *destroy*, *point*, *join*, and *ointment*, respectively). Here a remote representation \bar{u} is suggested by the alternation with [ʌ] (compare *profound/profundity* for which *SPE* has \bar{u}). Other possibilities are simply /ɔj/, using (as in Vennemann, ms. 1971) the principle that underlying forms should not differ from surface forms without reason; / \bar{y} /, if we try to apply the same arguments as *SPE* but attend to the generalization that a language has nonhigh front rounded vowels only if it has high front rounded vowels; / $\bar{\wedge}$ /, suggested by the few actual alternations and by general constraints on phonological systems (Hoard, 1972); or even a front rounded vowel that is both low and high, as postulated by Krohn (1972).

In any event, each stage of the *SPE* analysis rests entirely upon considerations of systematic simplicity. At the same time it illustrates quite nicely a style of argument in which we are to assume that there is some unknown X and that the features of X can be determined, step by step, from the conditions it must satisfy.

2. SANSKRIT ROOTS IN *kṣ*

I now take up the case of the internal sandhi of Classical Sanskrit roots ending in *kṣ*.² As in the previous section, I will present arguments that the underlying representation is distinct from any of its surface realizations and will home in on this underlying form. In contrast to the example from *SPE*, the Sanskrit argument depends upon empirical input at several points. In fact, the argument begins with morphophonemic alternations to be explained, rather than the asymmetrical underlying system that motivated the *SPE* analysis.

2.1. Roots in *ṣ* and *ṣ̄*

To show this, I must first present important background facts about Sanskrit morphophonemics, in particular the internal sandhi of root-final *ṣ* and *ṣ̄*, as summarized in Table 1.³

[2] This section is a much revised and expanded treatment of section 4.1 of Zwicky (1965).

The transliterations of Sanskrit forms are essentially standard, but do not show the effects of some late sandhi rules (in particular those affecting final *s*).

[3] A few roots in *ṣ̄* (*diṣ̄*— 'point', *dr̥ṣ̄*— 'see', *spr̥ṣ̄*— 'touch', and sometimes *naṣ̄*— 'attain') show *k* throughout. See Whitney (1889: 74).

Table 1 Internal sandhi of *ṣ* and *ṣ̣*

	<i>dviṣ</i> – ‘hate’	<i>dāṣ</i> – ‘make offering’	Ending
<i>Present indicative</i>			
(a) 1 sg. act.	<i>dvéṣmi</i>	<i>dāṣmi</i>	+ <i>mi</i>
1 du. act.	<i>dviṣvas</i>	<i>dāṣvas</i>	+ <i>vas</i>
1 sg. midd.	<i>dviṣé</i>	<i>dāṣé</i>	+ <i>e</i>
(b) 3 sg. act.	<i>dvéṣti</i>	<i>dāṣti</i>	+ <i>ti</i>
2 du. act.	<i>dviṣṡ^has</i>	<i>dāṣṡ^has</i>	+ <i>t^has</i>
(c) 2 pl. midd.	<i>dviḍḍ^hvé</i>	<i>dāḍḍ^hvé</i>	+ <i>d^hve</i>
(d) 2 sg. act.	<i>dvéḱṣi</i>	<i>dāḱṣi</i>	+ <i>si</i>
<i>Root noun</i>			
(e) nom. sg.	<i>dvitṡ</i>	<i>dāt</i>	(+ <i>s</i>)
loc. pl.	<i>dviṡsú</i>	<i>dāṡsú</i>	## <i>su</i>
inst. pl.	<i>dviḍb^his</i>	<i>dāḍb^his</i>	## <i>b^his</i>

In the (a) forms in the table – that is, before endings beginning with sonorants⁴ – we see *ṣ* and *ṣ̣*, which I take to be the underlying segments (because position before sonorants is the position where there are the most contrasts, and because there are no obvious explanations for the segments that appear there, so that there is no reason to suppose that the underlying segments are not the same as the surface ones).

The (b) and (c) forms show a retroflex consonant before endings beginning with a stop; this consonant is a spirant before a voiceless ending, a stop before a voiced ending. These examples also illustrate the operation of two general rules of Sanskrit, a (word-internal) Progressive Retroflexion Assimilation in (b) and a Regressive Voicing Assimilation (applicable in both internal and external sandhi) in (c). In (d), before *s*, both spirants appear as *ḱ*, and a general rule of *s*-Retroflexion applies to the initial *s* of the ending. Finally, the forms of the root noun in (e) show that in word-final position both spirants are realized as retroflex stops; the nominative singular ending *s* is deleted by an early (independently motivated) rule of Cluster Simplification, and the two other endings behave in general as if they occurred with a boundary stronger than + (note, for example, the failure of Progressive Retroflexion Assimilation in the locative plural). I therefore assume that the relevant context for (e) is: before the boundary ##.

The analysis exposed thus far is outlined in Table 2. Cluster Simplification, in (a), applies before the Spirant Shifts, in (b). For the moment, I have not formulated the Spirant Shifts as rules; instead, I give the outputs and their

[4] The segment customarily transliterated as *v*, whatever its phonetics, functions as a semivowel throughout Sanskrit phonology. See Whitney (1889: 20).

environments. List (c) contains other rules that apply in the derivation of the forms in Table 1; all of these are independently motivated.

Table 2 Rules exemplified in Table 1

(a) Cluster Simplification

(b) Spirant Shifts

$$\begin{aligned} \text{ʃ} / - & \begin{bmatrix} + \text{obst} \\ - \text{cont} \\ - \text{vcd} \end{bmatrix} \\ \text{t} / - & \left\{ \begin{bmatrix} + \text{obst} \\ - \text{cont} \\ + \text{vcd} \\ \# \end{bmatrix} \right\} \\ \text{k} / - & \begin{bmatrix} + \text{obst} \\ + \text{cont} \end{bmatrix} \end{aligned}$$

(c) Progressive Retroflexion Assimilation

Regressive Voicing Assimilation

s-Retroflexion

The problem of formulating the Spirant Shifts does not affect the subsequent discussion in any significant way. For definiteness, we may consider the process as involving three rules: rule (A) shifts *ʃ* to *ʃ̣* before continuants, and *ʃ̣* to *ʃ* before stops and *#*; rule (B) then takes *ʃ̣* to *k* before continuants; and (C) takes *ʃ* to *t* before voiced stops and *#*.⁵ The feature composition of these rules is not relevant here.

2.2. Roots in *kʃ*

Table 3 gives forms for the root *caʃ*— ‘see’ corresponding to the forms in Table 1. The (a) cases again show the root-final element unchanged, and the remaining cases show exactly the same alternants as the roots in *ʃ* and *ʃ̣*. We now seek an explanation of why the cluster *kʃ* should behave in just the same way as the simple spirants.⁶

One possible account would be to say that there is a *k*-Dropping rule, roughly of the form

$$k \rightarrow \emptyset / - \begin{bmatrix} + \text{obst} \\ + \text{cont} \end{bmatrix} \left\{ \begin{bmatrix} + \text{obst} \\ \# \end{bmatrix} \right\}$$

[5] (C) might be more general, since there are also cases of *s*→*t*. Moreover, it might be possible to combine (B) and (C) into a single despirantization rule.

[6] The argumentation concerns root-final *ʃ* only. It might be possible to support a non-obvious source for the fairly common root-INITIAL cluster *kʃ*, but the material in this paper does not bear on the question.

Table 3 Internal sandhi of *kṣ*

	<i>cakṣ</i> — 'see'	Ending
<i>Present indicative</i>		
(a) 1 sg. act.	<i>cakṣmi</i>	+ <i>mi</i>
1 du. act.	<i>cakṣvās</i>	+ <i>vas</i>
1 sg. midd.	<i>cakṣé</i>	+ <i>e</i>
(b) 3 sg. act.	<i>caṣṭi</i>	+ <i>ti</i>
2 du. act.	<i>caṣṭ^hás</i>	+ <i>t^has</i>
(c) 2 pl. midd.	<i>caḍḍ^hvé</i>	+ <i>d^hve</i>
(d) 2 sg. act.	<i>cákṣi</i>	+ <i>si</i>
<i>Root noun</i>		
(e) nom. sg.	<i>cát</i>	(+ <i>s</i>)
loc. pl.	<i>caṭsu</i>	## <i>su</i>
inst. pl.	<i>caḍb^his</i>	## <i>b^his</i>

ordered before the spirant shifts. Such an analysis would cover the facts, but at the cost of an additional rule, one without independent motivation. Moreover, *k*-Dropping would have to precede Cluster Simplification, since otherwise the nominative singular of *cakṣ*— would come out *cak* instead of the correct *cát*. This is a somewhat peculiar consequence of the analysis, because Cluster Simplification otherwise appears to apply before all other phonological rules in Sanskrit. In fact, the *k*-Dropping solution leads to an ordering paradox, if *s*-Retroflexion is to be used to explain the fact that there are no Sanskrit roots ending in *ks*, only in *kṣ*. That is, if the final *ṣ* in *cakṣ*— and similar roots is derived from *s* by the *s*-Retroflexion rule, then *s*-Retroflexion must both precede *k*-Dropping (so that underlying *caks* will yield *cakṣ* and then *caṣ*, rather than the incorrect *cas*) and follow it (*k*-Dropping precedes the Spirant Shifts, and these must precede *s*-Retroflexion because they create some occurrences of *k* that trigger retroflexion, as in 2 sg. act. *cákṣi*).

The ordering paradox might be eliminable by reference to general principles of rule application: *s*-Retroflexion applies before *k*-Dropping so that both rules will have the opportunity to apply, and then *s*-Retroflexion applies again when new occurrences of *k* are created. Perhaps such principles could be appealed to for an explanation of why *k*-Dropping precedes Cluster Simplification; although the two rules bleed each other and both yield opaque outputs, *k*-Dropping leads to forms (e.g. *caṣ*) to which other rules are applicable, whereas Cluster Simplification does not feed other rules. However, it is by no means clear that general principles can be found that will eliminate the need for reference to extrinsic order in linguistic descriptions (see King, ms. 1973).

In any event, the *k*-Dropping solution is not without problems of its own, aside from involving a new rule.

Now, just as *SPE* attempted to find an underlying representation for [ɔj] so as to avoid VG sequences in the lexicon, we attempt to find an underlying representation for *kṣ* so as to avoid adding a special rule. First, this X must reduce to *t* before *ʃ*. There are only four segments – *ṣ*, *ṣ̣*, *t*, and *ḍ* – that yield *t* in this position by existing rules of Sanskrit, so that one of these four must be an intermediate stage between underlying X and surface *t*.

Next, X must become *kṣ* before sonorants. Again, given the rules presented so far, there are only four possible sources of *kṣ* in this position: *ṣṣ*, *ṣs*, *ṣṣ̣*, and *ṣṣ*. Before *ʃ* any one of these would give *ṣ* or *ṣ* as an intermediate stage leading to *t*.

Of the four clusters, the first three contain *ṣ* in a position where retroflexion is not in general predictable. Consequently, if we try to minimize features in the lexicon, the cluster *ṣṣ* is the best candidate for X. Underlying *caṣṣ+mi* would give *cakṣ+mi* by the Spirant Shifts and *cakṣ̣+mi* by *s*-Retroflexion; underlying *caṣṣ#su* would give *caṣ̣#su* by Cluster Simplification and then *caṣ̣#su* by the Spirant Shifts.

Thus far, we have homed in on the underlying cluster *ṣṣ*. But just as Chomsky and Halle had apparently to add a $\bar{\alpha}\bar{\epsilon}\rightarrow\bar{\alpha}$ rule, given their solution for X, so we appear to have to add a rule, given our solution for X. The problem arises in the remaining environments for the *kṣ* roots, namely before obstruents. Here we have medial clusters like *ṣṣ+t*, *ṣṣ+d*, and *ṣṣ+s*, which would yield *kṣ+t*, *kṣ+d*, and *kṣ+s* with our present rules. Since the correct results are the same as those deriving from the medial clusters *ṣ+t*, *ṣ+d*, and *ṣ+s*, it seems that we need a special rule deleting *s* between *ṣ* and an obstruent. *SPE* argued that the special Backness Adjustment rule was in fact merely a generalization of an existing rule for $\bar{\alpha}$. Similarly (but with greater justification) I claim that *s*-Deletion is not new or special at all: it is a well-known rule of Sanskrit, a general deletion of *s* between two obstruents, illustrated in Table 4 by the active voice forms of the *s*-aorist. The entire conjugation of *nī-*, and the 1 dual and plural forms for *c^hid-* and *tap-*, have the structure

$$((a + \text{MODIFIED ROOT} + s) + \text{ENDING})$$

but the remaining six examples have no *s*. The roots that lack the *s* are just those that end in obstruents, and then only when they precede endings like *-tam*, *-tām*, and *-ta*, which begin with an obstruent; these forms are boxed in Table 4. Since Sanskrit already needs *s*-Deletion, it is no surprise that medial clusters of *ṣṣ* plus an obstruent are treated the same way as *ṣ* plus an obstruent. It is just what we should expect.

This completes the arguments for *ṣṣ* as a remote representation for root-final *kṣ*. The observed alternations have been explained without any additional rule apparatus. At this point in their treatment of [ɔj] Chomsky and Halle consider whether the underlying system they have argued for is plausible or not; they claim – quite incorrectly, I think – that the addition of $\bar{\alpha}$ to the vowel inventory

of English is plausible. Consider now the corresponding problem in the Sanskrit analysis: I have maintained that there are roots ending in the cluster *śs*. On general grounds, this is an unusual, highly marked cluster (just as *æ* is an unusual,

Table 4 Active *s*-aorist forms

	<i>nī</i> — 'lead'	<i>chid</i> — 'cut off'	<i>tap</i> — 'heat'	Ending
(a) 1 du.	<i>anāⁱśva</i>	<i>acc^hāⁱtsva</i>	<i>atāpsva</i>	— <i>va</i>
1 pl.	<i>anāⁱśma</i>	<i>acc^hāⁱtsma</i>	<i>atāpsma</i>	— <i>ma</i>
(b) 2 du.	<i>anāⁱśtam</i>	<i>acc^hāⁱttam</i>	<i>atāptam</i>	— <i>tam</i>
3 du.	<i>anāⁱśtām</i>	<i>acc^hāⁱttām</i>	<i>atāptām</i>	— <i>tām</i>
2 pl.	<i>anāⁱśta</i>	<i>acc^hāⁱtta</i>	<i>atāpta</i>	— <i>ea</i>

highly marked vowel). And *śs* is peculiar in Sanskrit (just as *æ* is peculiar in English, which lacks other front rounded vowels); there are no other clusters of unlike spirants within Sanskrit morphemes. Unless we can in some way explain away the oddness of morpheme-final *śs*, we shall have saved a rule only at the cost of lexical complexity, and our analysis will be no better than *SPE*'s.

The cluster *śs* would be unsurprising across morpheme boundaries. Could the final *s* be a separate formative? As it turns out, there are lexical doublets indicating just this analysis. These are *b^hā*— and *b^hās*—, both 'shine'; *śru*— and *śruś*—, both 'hear'; and *hā*— 'leave, go forth' as well as *hās*— 'go'. The case is clinched by a precious quartet of forms in which an alternation between *ś* and *kṣ* corresponds to the absence or presence of final *s* in the other examples: *aś*— with *akṣ*—, and *naś*— with *nakṣ*—, all meaning 'attain'. That is, there is at least one alternating form to support the treatment of surface *kṣ* as underlying /*ś*+*s*/.⁷

There has even been some attempt made to characterize the meaning of the morpheme —*s*, which survives in Classical Sanskrit only in a handful of frozen forms. Gonda has examined the connection, made in many standard sources on Vedic, between *b^hūś*— 'adorn, embellish' and *b^hū*— 'be, become, thrive'. From a careful survey of the textual evidence he concludes that 'in the main, the meaning of *bhūśati* is: "to make a person or a thing prosper, to add strength to . . ., to favour, etc."' (Gonda, 1959: 87), especially by means of adornments or ceremonies with magic value.⁸ He maintains (90) that the *s* had causative meaning

[7] A few roots in *kṣ* require a different treatment. Thus, *jakṣ*— 'eat' is probably to be analyzed as *jag^hs*, ultimately as /*ja*+*g^has*/, a reduplicated form of *g^has*— 'eat'; this treatment is supported by the participle *jag^ha*, instead of the expected *jaśta* or *jakṣita*. Two other roots, *mṛkṣ*— 'stroke' and *b^haks*— 'eat, partake of', have associated forms that suggest underlying /*j*+*s*/— respectively, *mṛj*— 'wipe' and *b^haj*— 'divide, share'. However, there is no evidence from alterations in inflection, because all the attested forms of *mṛkṣ*— and *b^haks*— have a sonorant following the *kṣ*.

[8] I am indebted to Calvert Watkins for calling this article to my attention.

and cites *b^his*— ‘frighten, terrify’ alongside of *b^hi*— ‘fear’ as well as possible etymologies for *diviṣ*— ‘hate’ and *ukṣ*— ‘(be)sprinkle’ treating them as originally morphologically complex.

2.3. *The German velar nasal*

In the previous section I argued that Sanskrit root-final *kṣ* (alternating with *ṣ*, *t*, *ḍ*, and *k*) should be underlying */ṣ+s/*, and I claimed that the process of homing in on this remote representation is supported at each step in a way in which the otherwise quite parallel *SPE* analysis of [ɔj] as */ǣ/* is not. The generative phonological literature is full of arguments that home in, but not many of these are laid out in as much detail as the example from *SPE*, or the one I have supplied as a contrast to it. One excellent illustration of the process is the analysis of the German velar nasal by Vennemann (1970), who summarizes his arguments as follows:

In §8 we . . . found that because of a phonological rule, [ŋ] must be phonologically bisegmental. In §9-11 the conclusion was forced upon us by phonological and morphological evidence that the first of these two segments is a nasal, the second an obstruent. In §12 we were informed by a phonological rule that furthermore . . . the obstruent must be voiced. The nasal assimilation condition . . . tells us that this voiced obstruent must be velar. The only phonological voiced velar obstruent of German is */g/*. . . . The conclusion is inevitable that [ŋ] (where it is not flanked by a phonetic velar consonant) derives synchronically from */Ng/*. (77-78)

3. HOMING IN IN SYNTAX

The phonological examples of homing in involve appeals to simplicity (not necessarily, or even usually, in the technical sense). There would be nothing to discuss if we did not have to worry about keeping down the number of rules, about the wisdom of positing new underlying elements or combinations of them, and the like. In this respect, linguistic homing in is like curve fitting, the choice of continuous curves to fit finite collections of data: there are certain facts to be accounted for, and there are ways of judging some putative solutions as better or simpler than others (in the case of curve fitting, goodness of fit and simplicity of the function graphed by the curve).

In the Sanskrit example I made use of an implicit appeal to explanation as well, when I pointed out that it is no accident that *kṣ* behaves just like *ṣ* and *ṣ* before obstruents – that given the alternants before sonorants and in final position and given the fact that Sanskrit has an *s*-Deletion rule, *kṣ* SHOULD have the same reflexes in the remaining environments as the simple spirants have there. My analysis, the argument goes, EXPLAINS the convergence of forms.

Syntactic applications of homing in tend to emphasize the appeals to sim-

licity and explanation more than the process of constructing a remote representation bit by bit. The following subsections summarize two fairly transparent instances of homing in from the recent syntactic literature.

3.1. *Ross' analysis of declaratives*

Ross (1970) claims that every declarative sentence has a remote structure in which the content of the surface sentence is dominated by a higher structure with the salient characteristics of the explicitly performative clause:

(1) I declare to you that . . .

These salient characteristics are at least (a) a first person singular subject, (b) a verb of verbal communication, (c) a second person indirect object, and (d) a direct object with the content of the surface sentence. Ross argues for each of these points individually – proposing to show, for example, that peculiar properties of first person singulars in main declarative sentences reflect peculiar properties of certain embedded noun phrases, namely those dominated by verbs of verbal communication with subjects coreferential to the embedded noun phrases. Thus, the restriction of the reflexive in (2) to the first person singular – compare (3) – reflects a restriction of the embedded reflexive in (4) to pronouns coreferential with the subject of the higher verb; compare (5):

- (2) This is a story about myself.
- (3) *This is a story about himself/themselves.
- (4) He said it was a story about himself.
- (5) *He said it was a story about yourself/themselves.

The factual details of Ross's arguments have been much disputed. For my purposes here, I need only point out that his arguments are arranged to home in on a structure like that of (1), and that they can be seen as making an appeal to explanation and to at least two sorts of judgments of simplicity.

The appeal to explanation comes in the attempt to provide a uniform account for two sets of otherwise disparate data, the peculiar properties of first person singulars in main declarative clauses of embedded clauses. The argument runs: it is no accident that there is a parallelism between these sets of properties, for there is a single principle encompassing them both, and for an adequate account of these phenomena the parallelism must be made manifest.

The first simplicity judgment refers to the fact that the structure in (1) – or, at the very least, each of its component parts – is independently required in any description of English syntax. The second appeals to the claim that something very much like (1) is independently required as an account of the semantics of declarative sentences. That is, the Ross analysis does not require the postulation of new sorts of structures. The cost of the Ross analysis, on the other hand,

comes in the transformational processes that must be assumed to relate (1) to simple declarative sentences.

3.2. Geis's analysis of conditionals

Another paradigm example of syntactic homing in can be found in Geis's (1973) treatment of *unless* and *only if*. Geis argues that the remote structure of *unless* is essentially that of *in any event other than that* and that *only if* is similarly related to *in no event other than that*. As part of this demonstration he shows that both types of subordinate clauses⁹ have properties like those of clauses headed by *event*, *case*, *occasion*, and the like. He gives evidence as well that *unless* and *only if* have properties in common with exclusive constructions, for example those following *other than*, *different from*, and *except*. In addition, he argues that clauses headed by *unless* behave syntactically like clauses dominated by universal quantifiers (like *any*), while clauses headed by *only if* behave syntactically like clauses dominated by negatives.

Again, there is an appeal to explanation – it is no accident that certain constructions share properties with *event*-clauses, with exclusive constructions, with universal quantifiers, and with negatives. Again also, systematic simplicity can be invoked – the sorts of structures postulated for *unless* and *only if* are independently required in an adequate English syntax, or at least their components are, and moreover, something on the order of these structures is needed for an adequate account of the semantics of conditionals.

The central part of Geis's exposition uses the separate instances of shared properties to construct piecemeal a remote representation for the subordinating conjunctions *unless* and *only if*. Thereby he homes in on representations like *in any event other than that* and *in no event other than that*. Ross uses the same strategy to compose higher sentential structures like *I declare to you that*. These two articles illustrate nicely the two main lines of inquiry in 'abstract syntax', additional higher sentential structure (Ross on declaratives) and decomposition of surface lexical units (Geis on conditionals).

3.3. Choice problems

In the Geis and Ross examples the representations built up in the process of homing in are substantially similar to rather superficial representations for other constructions. Sometimes this relationship between two classes of representations presents itself as a problem of choice: here are two (or more) types of constructions which are related to each other (they are near or full paraphrases of each other, and perhaps also they are in complementary distribution or serve as stylistic variants); is there a structural relationship between the constructions, and if so,

[9] Also those introduced by *if*, which is presumably something on the order of *in the event that*.

which is more basic, or are both derived from a structure strikingly different from any of the surface realizations?

Quite a few syntactic problems have been treated in the literature as matters of choice – consider the many discussions on the relationship of passive and active sentences in English and other languages and on the underlying structure of sentences with ‘psych’ verbs, as in:

- (6) I am surprised that Marcus admires Publius.
- (7) It surprises me that Marcus admires Publius.
- (8) It is surprising to me that Marcus admires Publius.
- (9) Marcus surprises me {by admiring Publius
in that he admires Publius}.
- (10) I am surprised because Marcus admires Publius.
- (11) That Marcus admires Publius causes me to be surprised.

Now it is far from clear that this is the proper way to treat these topics. But even in cases where the simple choice approach has been followed, the analysis proceeds very much as in those of 3.1 and 3.2: it is argued that one of the constructions has a remote structure essentially identical to the surface structure of the other.

More and more, it seems that we need remote representations which incorporate features of each of the surface representations but which are distinct from all of them; or that we need distinct but partially similar representations for the various surface forms. The latter tack is taken, for instance, in recent discussions of the passive by Hasegawa (1968) and Lakoff (1971), who claim that the remote structures associated with active and passive sentences have much in common with each other but are not identical. Such arguments are immensely more complicated than straightforward homing in and therefore lie beyond the scope of this paper.

4. ON THE METHOD

I hope to have demonstrated in the previous sections that homing in is a valid argument form in both phonology and syntax; but that the correctness of the analysis in a particular case depends upon the extent and value of the data, just as the truth of the conclusion of a syllogism depends on the truth of its premises as well as on the validity of the form. The utility of homing in will also be limited by theoretical considerations; an analyst committed to concrete solutions will reject the method at the point at which it would lead to analyses unacceptable to him. Moreover, as I indicated in discussing the syntactic examples, homing in will be used in combination with other styles and types of argument. What we aim at is, in the words of Francis Bacon, ‘a true and awful marriage between the empirical and the rational faculty’.

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