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WILLIAM J. FRAWLEY

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participle of *wash* changes from *washen* to *washed*.”) This style is also not unknown for semantic changes (“The meaning ‘say’ used to be expressed by *cweðan*, and is now expressed by *say*”). However, the second style is more usual here (“*Cweðan* became obsolete, and *say* shifted its meaning”); and it is dominant when the replacement is imported (“Italian *zio* ‘uncle’ is a loanword from Greek”).

The replacement pattern best describes the systemic impact of a morphemic process. It is independent, however, of how the replacing morphs happen to originate—for example, of whether they are indigenous (“semantic change”) or foreign (“borrowings”). Replacements of all kinds may be one-to-one and unconditional:

- (1) Old English *cweðan* → Eng. *say*.  
Eng. *eme* ‘uncle’ → *uncle* (< French *oncle*).

Or they may be many-to-one and unconditional:

- (2) Latin *avunculus* ‘maternal uncle’ > French *oncle* ‘uncle’;  
La. *patruus* ‘paternal uncle’ → Fr. *oncle* (‘*Avunculus*  
has widened its meaning.’).

These examples, to be sure, ignore the specific environments that are appropriate to the narrower meaning (e.g. ‘my *avunculus* and other maternal relatives’); thus they disappear with the widening, and emerge with the narrowing, of referential meaning.

- (3) La. *avunculus* → Italian *zio* (a borrowing); *patruus* →  
It. *zio* (a borrowing).

Or they may be one-to-many and conditioned:

- (4) La. *homo* (*hominem*) → Fr. *homme* ‘man’ in some  
discourses, → *un homme* ‘a man’ in others, → *l’homme*  
‘the man’ in still others.  
Eng. *staff/stave-s* → *staff/staff-s* in some discourses, →  
*stave/stave-s* in others (‘differentiation of allomorphs’).

[See also Analogy; Borrowing; Language Change; and Obsolescent Languages.]

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HENRY M. HOENIGSWALD

#### Relative Chronology

Linguistic change occurs in time, and events of change are dated in specific periods of time. If two changes A and B occur in language L, and we say that the first happened in century Y and the second in century Z, we are making a statement about the absolute chronology of these changes. We may simply say, however, that A occurred before B. If so, we are making a statement about the relative chronology of A and B, but not about their absolute chronology. Obviously, a complete account of the absolute chronology of two or more changes also fully defines their relative chronology. (For general reference, see Bremer 1894, Hoenigswald 1960, and Bynon 1977.)

Although our knowledge of absolute chronology mostly depends on the availability of suitable documentary evidence, relative chronology can sometimes be established through structural considerations. Thus, in the early history of Latin, we identify two changes:

- (1)  $s > r / V \text{ \_\_\_\_ } V$  (Intervocalic [s] was replaced by [r].)  
(2)  $ss > s / \bar{V} \text{ \_\_\_\_ } V$  (Prevocalic [ss] was replaced by [s] after a long vowel or diphthong.)

The presence in classical Latin of forms like *honōris* < \**honōses* ‘of the honor’ and *causa* < *caussa* ‘cause’ makes it likely that change (1) occurred before change (2). If [ss] > [s] had occurred before [s] > [r], we would have had forms like \**caura*, which are not attested.

A third Latin change,

- (3)  $dt > ss / V \text{ \_\_\_\_ } V$

led to the replacement of intervocalic [dt] by [ss], as in *fossus* < \**fod-tos* ‘dug’. Forms like *clausus* ‘closed’ <

\**klaud-tos* (which can be reconstructed with confidence, cf. *claud-ō* 'I close') suggest that (3) operated before (2). If (3) had operated after (2), classical Latin would have *claussus*—which is in fact attested, but only as a sporadic archaism. Thus both (1) and (3) must be ordered before (2). Did (3) precede or follow (1)? Evidence comes from data which substantiate an absolute chronology: our earliest Latin texts have instances of intervocalic [s] which will be later changed into [r], but no memory is preserved of forms like \**klaudtos*. Thus [dt] > [ss] at a prehistoric stage, while [s] > [r] in the historic period. In other words, (3) precedes (1), and we can adopt a chronological ordering (3) → (1) → (2) (provided, of course, that we operate in terms of the notation and rules adopted).

Questions of relative chronology arise whenever the history of a language provides evidence for two or more stages, and we want to reconstruct the intermediate stages. Obviously, these questions concern all levels of analysis: phonology, morphology, syntax, and semantics. However if we rely on evidence internal to the language, the most fruitful and discussed area is that of phonology and morphophonemics. Some further examples may illustrate both achievements and problems.

In Attic Greek we identify the following changes:

- (4)  $\bar{a} > [e:]$  in most environments ([nɪ:kɑ:] > [nɪ:ke:] 'victory').  
 (5)  $ae > a$ : ([ni:káete] > [ni:ká:te] 'you win').  
 (6)  $Vns > V:n / (C) \text{ — } V$  (\**ékrinse* > [ékri:ne] 'he judged', \**ámunsai* > [á:mu:nai] 'to protect').

We must now account for forms like [éphe:na] < \**éphansa* 'he showed', instead of the expected \*[épha:na] predicted by (6). It would be possible to redefine 6 and to set up an additional rule:

- (7)  $ans > [e:n] / (C) \text{ — } V$

But a simpler solution is available. Rule (5) must be later than (4); otherwise, we would have had a change [ni:káete] > [ni:ká:te] > \*\*[ni:kê:te]. If (6) is earlier than (4), we can reconstruct a development \**éphansa* > [épha:na] > [éphe:na]. This account commends itself because of its elegance and simplicity. It also allows us to set up for Attic the same number of rules as we do for other dialects (but see below).

It follows from what has been said that the techniques used to establish the relative chronology of our rules are closely connected with those which we employ to identify

the rules themselves (Hoenigswald 1973:6–7). This is a more important point than is normally supposed. In discussing the Latin examples mentioned above, we could have set up two different rules, such as these:

- (3)  $dt > ss / V \text{ — } V$   
 (3'')  $dt > s / \bar{V} \text{ — } V$  (\**klaud-tos* > [klausus]).

Yet, given the independent evidence for rule (2), it seemed simpler to adopt the solution proposed. Our decision is historically correct, because *claussus* exists. In other instances, there is a conflict between simplicity and historical accuracy. The two examples that follow, from Germanic and from Greek, show at different levels of complexity that the "simplest" and intuitively most obvious account of both changes and chronology need not always be correct. Before we consider them, however, it is important to stress that our diachronic rules should not be confused with the synchronic rules established for generative phonology, though sometimes they appear to overlap with them. In our rules, the assumption is that all forms were actually pronounced at some time—that is, they are forms of the surface structure. The symbol ">" indicates replacement in time, and the forms to the right of it are chronologically later than those to the left. Any ordering we suggest for these rules is established on different principles from those used for the ordering of synchronic rules.

In the development from O[ld] H[igh] G[erman] to Modern German, we encounter two changes: the devoicing of final stops, and the loss of final vowels (Hock 1986:242 ff.). OHG nom.sg. [tag] 'day' and dat.sg. [tage] are replaced by modern nom.sg. [ta:k] and dat.sg. [ta:k]. The obvious account is that first, final vowels were lost (hence dat.sg. [tage] > [tag]); and second, final stops were devoiced (hence nom.sg. and dat.sg. [tag] > [ta:k]). Yet there is enough intermediate evidence to show that the devoicing of final stops came first, and only afterward did [tage] > [tagə] > [tag]. If so, the dat.sg. [ta:k] must result from later leveling. The historical ordering differs from that which we were tempted to reconstruct.

Again, we posit two changes for prehistoric or early Greek:

- (8)  $s > \emptyset / V \text{ — } V$  (\**génesos* > [géneos] 'of the family').  
 (9)  $Vnty > V:s / (C) \text{ — } V$  (\**mónt-ya* > [mô:sa] 'Muse').

Rule (9) must be later than (8), because otherwise we would have \*[mô:a]. Most forms with intervocalic [s] in

classical Attic result from the output of (9) (hence [mô:sa]), or from analogical restoration as in [ni:ké:sa:s] 'having won' (instead of the expected [ni:ké:a:s]), which is rebuilt on the model of e.g. [gráp-sa:s] 'having written'. However, in late Laconian, a Greek dialect, we find aorist participles of the type [ni:ká:a:s] and forms like [mô:a] 'muse'. The obvious suggestion is that, in Laconian, (9) occurred before (8), leading to [mô:a], while the expected [ni:ká:a:s] was preserved. However, evidence from early Laconian (where forms with intervocalic [s] are attested) proves conclusively that, in Laconian too, (8) and (9) operated in this order, and that Laconian too had a remodeled [ni:ká:sa:s]. For Laconian we establish a later rule (10); in absolute chronology, this was probably several centuries later than (8), which deleted intervocalic [s] of inherited origin. The historical sequence was as follows:

- (8)  $s > \emptyset / V \text{ \_\_\_\_ } V$   
 (9)  $Vnty > [V:s] / (C) \text{ \_\_\_\_ } V$   
 (10)  $s > \emptyset / V \text{ \_\_\_\_ } V$

Note that (9) is now in a *feeding* relationship with 10; that is, it provides input for it (Kiparsky 1982:37 ff.). Note also that if we were setting up synchronic rules instead of describing historical events, then the grammar of late Laconian would probably require only (9) and (10) in this order.

We have seen that, when absolute chronology does not provide a check, it is sometimes possible to give more than one account of the rules of change and their ordering. A choice is then made on a variety of grounds, such as appeal to structural plausibility or teleological explanations. Apropos of the Latin example above, it could be argued that rule (2),  $ss > s / \bar{V} \text{ \_\_\_\_ } V$ , had to occur after rule 1,  $s > r / V \text{ \_\_\_\_ } V$ ; the change was prompted by the need to fill the empty slot left by  $s > r / V \text{ \_\_\_\_ } V$ . Moreover, only this ordering could prevent the merger of [ss] and [s], and allow forms like La. *quaerō* < [kwaiso:] 'I look for' vs. *quaesō* < [kwaisso:] 'I ask you, please' to be kept apart. These points should be noticed, but it is doubtful that they can provide conclusive evidence (Lass 1980); if taken to their extreme conclusion, such arguments would exclude the possibility of merger. Furthermore, one would hesitate to decide chronological issues on the basis of any general theory about the preferred order of synchronic rules and its putative connection with a diachronic ordering.

Implicitly or explicitly, we often depend on premises based on phonological "naturalness," or on typological

validity; but these require a fuller statement than they are normally given. With regard to rules (1–2), what we know for certain (if we disregard the data bearing on absolute chronology) is simply that the relevant consonantal stretches in the Latin words for 'of the honor' and for 'cause' remained distinct. The ordering (1) → (2) (*\*honōses* > *honōris* before *caussa* > *causa*) posits a transitory stage at which no intervocalic [s] existed (except perhaps in loanwords which may not have been fully integrated). We implicitly reject the alternative possibility that *caussa* > *caus<sub>2</sub>a*, when *\*honōs<sub>1</sub>es* had not yet changed into *honōris*; i.e., we avoid postulating a stage at which there were two contrasting sibilants. We may ask whether we are entitled to take this decision on general grounds, or whether we need more specific evidence. (See Lass 1997:241–246.)

Other approaches exploit, from a genealogical or typological point of view, the evidence of other dialects or cognate languages. Genealogical arguments are used for both absolute and relative dating. It is often assumed that we must distinguish a Common Greek period from the period which saw a division of Greek into dialects. Pandialectal changes are treated as early, and dialect-specific changes as late—with the result, e.g., that rule (9) above, which is common to all Greek dialects, is deemed to be much earlier than rule (6), which is not (*\*ékrinse* > Attic [éPkri:ne], but Aeolic [ékrinne]). However, it would be possible to restate (6) as (6a–c), in which (6a) at least could be early:

- (6a)  $Vns > [Vnh] / (C) \text{ \_\_\_\_ } V$  (Pan-Greek)  
 (6b)  $Vnh > [V:n]$  (Attic)  
 (6c)  $Vnh > [Vnm]$  (Aeolic)

Furthermore, the example of rule (8), which is matched in Laconian by an "identical" but much later rule (10), may warn us of possible pitfalls in the interpretation of our evidence. The warning is strengthened by the presence of descriptively identical but demonstrably independent changes in closely related languages or dialects. Similar objections can also be raised against the suggestion that, if we have clear evidence for a certain chronology in dialect A, it is likely that events occurred in the same order in dialect B. Nor do we need to assume that one rule of change in dialect A must be matched by a single rule in dialect B. As we have seen above, the form of quasi-typological support produced by cognate languages or dialects is pleasing; yet it should not count as proof. A further difficulty arises. In the previous discussion we have ignored all sociolinguistic stratification; yet

changes may happen at different times in different strata and the final development may be due not to a linear development in a homogeneous dialect but to a more complicated process of diffusion from one stratum to the other (see Lazzeroni 1986, Gusmani 1992).

To summarize: most studies of relative chronology have concentrated on establishing rules of change (often on the basis of morphophonemic data), and on ordering them in time. If an absolute chronology, however partial, is available, this provides a countercheck for both methods and results. However, there is no such thing as an error-proof algorithm to establish relative chronology. In a historical discipline, this is neither surprising nor disappointing.

[See also Comparative Method; Generative Phonology; Language Change; Phonological Derivations; and Reconstruction.]

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ANNA MORPURGO DAVIES

### Typology and Universals

A universal is a linguistic feature, usually phonological or grammatical, hypothesized as being shared by

all human languages; typology is the study of classifications of languages made on the basis of types of structural features, rather than on the basis of genetic affiliation. In linguistics as in other fields, the study of typology and universals is crucially important for its bearing on the nature of mind and the “psychic unity” of mankind.

**1. Importance for historical linguistics.** Since all elementary linguistic concepts are in a sense projections of universals, linguists have always invoked universals, implicitly or explicitly, to justify reconstructions. Phonetics, for example, has claimed to be a universal science transcending the speech act or even the language being described; consequently, all reconstruction rests on assumptions about “possible” and “impossible” speech sounds. Moreover, it has been customary to appeal to processes observed in various languages in order to justify their use in a postulated reconstruction. This is so especially where a proposed etymology assumes a radical change in meaning; here precedent, albeit in a completely different language, has always been allowed as evidence.

Without detracting in any way from the importance of a long and unbroken tradition of work in language universals and what would now be called typology, in both Europe and the United States, most linguists would probably agree that the modern upsurge of interest in these fields received an irreversible impetus from the achievements of Joseph Greenberg in the 1960s—which not only showed the existence of substantive universals but, perhaps even more importantly, focused attention on the study of universals and typology as a distinct project, as opposed to an accidental byproduct of other kinds of research. Especially significant was Greenberg’s idea of an *implicational universal*: a feature whose presence, while not absolutely universal, could be universally predicted *if* some other feature was co-present (cf. Greenberg 1966b, Greenberg et al. 1966).

Greenberg’s work had almost immediate repercussions in the field of comparative reconstruction. Clearly, reconstructed proto-languages had to conform to the constraints suggested by language universals. More interestingly, perhaps, the implicational universals suggested a new tool for reconstruction. To see why this is so, let us consider a universal of the kind: “If a language has feature B, it will also always have feature A.” If the usual methods—the comparative method and internal reconstruction—lead to the reconstruction of feature B for a proto-language, then feature A may now be projected as well; and the languages being compared should be re-