# 22 Analogical Morphophonology

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It is the forgèd feature finds me; it is the rehearsal
Of own, of abrúpt sélf there so thrusts on, so throngs the ear.
—Hopkins, ''Henry Purcell''

## 22.1 Introduction

Since the neogrammarians first distinguished analogical change in morphological systems from what Osthoff and Brugmann (1878, xiv) called ''mechanical'' sound change, the study of word-based sound patterns has raised significant questions about these two types of change. Are sound changes indeed ''mechanical,'' or, as V. Kiparsky (1963, 7), Kiparsky (1965, 1967a, 1970, 1988a, 1995), and others have suggested, are they constrained by the linguistic systems in which they are embedded? Is diachrony solely responsible for the common similarity of word-based sound patterns and phonetic processes, or do phonetic principles actively constrain the form of words?

A related question is how to define the diachronic relationship between what are sometimes called ''phonological'' (automatic exceptionless) patterns and ''morphophonological'' patterns (which may have morphological or lexical restrictions inter alia). The standard answer to this question is given by Kiparsky (1993a, 309): it is ''a characteristic trajectory of phonological rules'' for them to be ''confined to the lexical phonology'' over time. Dressler (1985, 149) writes in a similar vein that morphophonological processes evolve from phonological ones ''by acquiring morphological and reducing phonological domains,'' and Spencer (1991, 126) adds that they ''reflect a stage in historical development of phonological rules which are becoming morphologized or lexicalized but which still retain a certain degree of generality.'' In short, on this view, morphologically restricted sound patterns reflect formerly exceptionless patterns.[1] Mechanisms of morphophonologization include morphological domain restriction, rule inversion (Vennemann 1972; McCarthy 1991; Blevins 1997), and telescoping (Wang 1968; Bach and Harms 1972; Anderson 1981; Blevins and Garrett 1993).

A typical example is the evolution of the English pattern of /g/ deletion in the adjectives *long* and *strong* (vs. *longer* and *stronger*).[2] This can be analyzed as a process of coda /g/ deletion after /ŋ/ (Borowsky 1986) if the morphology is organized so that resyllabification saves /g/ in some contexts (e.g., comparatives) but not others (e.g., agent nouns like *singer*). Since few forms alternate, the linguistic reality of this case can be challenged, but the point is precisely that the alternation is restricted in scope.

Interestingly, there is evidence that the alternation was once general: coda /g/ was not realized after /ŋ/, but onset /g/ was. In his *Principles of the English Language* (1765), the orthoepist James Elphinston wrote that /g/ is pronounced after /ŋ/ when required "to articulate either a vowel or a liquid; which it does not only if the vowel or liquid follow in the same word, but even, upon solemn occasions, if either feebly commence the word following in immediate connexion and dependance" (Müller 1914, 215–216; cf. Horn 1901; Dobson 1968; Rohlfing 1984). That is, in conservative ("solemn") speech, /g/ was retained after /ŋ/ if followed in the same phrase (or word) by an unstressed ("feeble") syllable beginning with a vowel or liquid; this can be treated as postlexical resyllabification. In colloquial speech styles, presumably, word-final /g/ was always deleted after /ŋ/. Though Elphinston had lost word-internal coda /g/ in cases like *leng**th*** and *king**dom***, he specifically cites all the examples in (1) as retaining their highlighted /g/.

(1) a. an**g**le, an**g**ling; an**g**er, an**g**ry, fin**g**er, hun**g**er, lin**g**er; lon**g**er, youn**g**er
    b. han**g**er, sin**g**er, slin**g**er; han**g**ing, sin**g**ing, prolon**g**ing, brin**g**ing, belon**g**ing, lon**g**ing, sin**g**ing, sprin**g**ing, twan**g**ing; han**g**ed, lon**g**ed
    c. sin**g** aloud, prolon**g** it, stron**g** and mighty, sprin**g** eternal, lon**g** repose, youn**g** Leander

In most modern English dialects, /g/ is still pronounced as in (1a) but not (1b) or (1c).[3] Over the last two centuries Kiparsky's "characteristic trajectory" has been realized. Coda /g/ deletion after /ŋ/ was a postlexical pattern in the conservative speech variety Elphinston described; it is now restricted to the lexical phonology.

This diachronic scenario is common, but we will argue here that there is another, previously undescribed historical source of morphophonological patterns. The pathway we identify differs significantly from morphological domain restriction, telescoping, and rule inversion. These processes yield patterns whose substance actually reflects one or more earlier sound changes (telescoped, inverted, or restricted in domain). They may result in phonetically unmotivated patterns, but phonetically based sound changes underlie them. The examples we will discuss show a different diachronic profile. In these cases, phonetically unnatural patterns arise not through a series of ordinary sound changes but by analogy, that is, morphological or paradigmatic generalization. Analogical extension of phonetically unnatural patterns is

interesting because it shows that such patterns can be as productive and morphologically salient as any sound patterns in language. Extensions of this type, which has some points of contact with "phonological analogy" (Kiparsky 1982a, 58), result in what we will call "analogical morphophonology."

In sections 22.2–4 we discuss three cases, in ancient Greek, East Cushitic, and South Central Dravidian, from different language families. The relevant historical developments are partly documented in the first case but must be reconstructed in the second and third cases. In each case we identify the crucial pattern and explain why we consider it unnatural, and we then analyze its evolution.[4]

## 22.2 Greek

Nasal-induced coronal spirantization corresponds to no observed sound change and has no articulatory or perceptual basis as far as we know.[5] Nevertheless, in ancient Greek, a process by which coronal stops (/t/, /t$^h$/, /d/) surface as *s* before /m/ is regular and thoroughly embedded in the verbal morphology.[6] This is shown in (2) with two /m/-initial perfect middle verbal suffixes, 1SG. /-mai/ and masculine nominative singular participle /-menos/.

(2)

| | *Root* | | *Perfect middle 1SG.* | *Participle* |
|---|---|---|---|---|
| a. | poie- | 'make' | pe-poíe:-**m**ai | pe-poie:-**m**énos |
| | stel- | 'send' | é-stal-**m**ai | e-stal-**m**énos |
| | der- | 'flay' | dé-dar-**m**ai | de-dar-**m**énos |
| b. | grap$^h$- | 'write' | gé-gra**m**-**m**ai | ge-gra**m**-**m**énos |
| | plek- | 'weave' | pé-ple**ŋ**-**m**ai | pe-ple**ŋ**-**m**énos |
| c. | peit$^h$- | 'persuade' | pé-pei**s**-**m**ai | pe-pei**s**-**m**énos |
| | pseud- | 'deceive' | é-pseu**s**-**m**ai | e-pseu**s**-**m**énos |

Before /m/, vowels and sonorant consonants surface intact as in (2a), noncoronal stops assimilate in nasality as in (2b), and coronal stops surface as *s* as in (2c). As shown in (3), the same pattern is found in nouns derived from verbal roots.

(3)

| | *Root* | | *Derived noun* | |
|---|---|---|---|---|
| a. | peit$^h$- | 'persuade' | peî**s**-**m**a | 'persuasion' |
| | pre:t$^h$- | 'swell" | prê:**s**-**m**a | 'swelling' |
| | pseud- | 'deceive' | pseû**s**-**m**a | 'untruth' |
| b. | dat- | 'divide' | da**s**-**m**ós | 'division of spoil' |
| | hed- | 'sit' | he**s**-**m**ós | '(a) swarm (of bees)' |
| | kne:t$^h$- | 'scratch' | kne:**s**-**m**ós | 'itching' |
| c. | o:t$^h$- | 'thrust' | o:**s**-**m**é: | '(a) thrust' |
| | od- | 'smell' | o**s**-**m**é: | '(a) smell' |

The change in (2c) does not occur morpheme internally, as shown by words like *a:**tm**ós* 'steam' and *sta**t**$^{h}$**m**ós* 'doorpost'.[7]

The origin of this pattern has long been known (Brugmann 1878, 81 note 1; Schmidt 1885). Its starting point was the finite paradigm of the perfect middle. The perfect as a whole is one of three basic aspectual types in the language (the others are the present and aorist); its regular formation is shown in (4) for the verb /stel-/ 'send', whose perfect stems are active /e-stal-k-/ and middle /e-stal-/.

(4) a. *Perfect active*

| | *SING.* | *DUAL* | *PLUR.* |
|---|---|---|---|
| 1. | é-stal-k-a | —— | e-stál-k-amen |
| 2. | é-stal-k-as | e-stál-k-aton | e-stál-k-ate |
| 3. | é-stal-k-e | e-stál-k-aton | e-stál-k-a:si |

b. *Perfect middle*

| | *SING.* | *DUAL* | *PLUR.* |
|---|---|---|---|
| 1. | é-stal-mai | —— | e-stál-met$^{h}$a |
| 2. | é-stal-sai | é-stal-t$^{h}$on | é-stal-t$^{h}$e |
| 3. | é-stal-tai | é-stal-t$^{h}$on | —— |

Note that the perfect active endings are vowel initial while the perfect middle endings are consonant initial. (A periphrasis replaces the third person plural form.)

Verbs ending in vowels and liquids undergo no relevant changes in the perfect middle. As seen for /grap$^{h}$-/ 'write' (perfect stem /gé-grap$^{h}$-/) in (2b) and (5), verbs in noncoronal stops do undergo assimilatory processes in the perfect middle.

(5) a. *Perfect active*

| | *SING.* | *DUAL* | *PLUR.* |
|---|---|---|---|
| 1. | gé-gra**p$^{h}$**-a | —— | ge-grá**p$^{h}$**-amen |
| 2. | gé-gra**p$^{h}$**-as | ge-grá**p$^{h}$**-aton | ge-grá**p$^{h}$**-ate |
| 3. | ge-gra**p$^{h}$**-e | ge-grá**p$^{h}$**-aton | ge-grá**p$^{h}$**-a:si |

b. *Perfect middle*

| | *SING.* | *DUAL* | *PLUR.* |
|---|---|---|---|
| 1. | gé-gra**m-m**ai | —— | ge-grá**m-m**et$^{h}$a |
| 2. | gé-gra**p-s**ai | gé-gra**p$^{h}$-t$^{h}$**on | gé-gra**p$^{h}$-t$^{h}$**e |
| 3. | gé-gra**p-t**ai | gé-gra**p$^{h}$-t$^{h}$**on | —— |

In the perfect middle paradigm of verbs in noncoronal stops, the surface nasality and laryngeal features of the stem-final consonant are always predictable from the following consonant. In the first person singular and plural, the final stop assimilates in nasality to *m*; it is realized as *p* before /s/ or /t/, and as *p$^{h}$* before the aspirate /t$^{h}$/. These assimilations are fully regular in Greek.

Another regular sound pattern is a spirantization process by which /t/ → *s* before a coronal obstruent, as in /**íd-**te/ → *íste* 'you (PL.) know' and /anu**t-t**ó-s/ → *anu**st**ós*

'practicable'. Showing this pattern in (6) are the reconstructed perfect middle forms of two verbs ending in coronal stops, /pseud-/ 'deceive' (perfect stem /e-pseud-/) and /peit$^{h}$-/ 'persuade' (/pe-peít$^{h}$-/).[8]

(6) a. *Perfect middle: /pseud-/ 'deceive'*

| | *SING.* | *DUAL* | *PLUR.* |
|---|---|---|---|
| 1. | *é-pseu**d-m**ai | —— | *e-pseú**d-m**et$^{h}$a |
| 2. | *é-pseu**s-s**ai | *é-pseu**s-t$^{h}$**on | *é-pseu**s-t$^{h}$**e |
| 3. | *é-pseu**s-t**ai | *é-pseu**s-t$^{h}$**on | —— |

b. *Perfect middle: /peit$^{h}$-/ 'persuade'*

| | *SING.* | *DUAL* | *PLUR.* |
|---|---|---|---|
| 1. | *pé-pei**t$^{h}$-m**ai | —— | *pe-peí**t$^{h}$-m**et$^{h}$a |
| 2. | *pé-pei**s-s**ai | *pé-pei**s-t$^{h}$**on | *pé-pei**s-t$^{h}$**e |
| 3. | *pé-pei**s-t**ai | *pé-pei**s-t$^{h}$**on | —— |

Note that the linguistic stage in (6) is reconstructed. Because the second and third person endings of the perfect middle all begin with coronal obstruents, spirantization alters an underlying stem-final coronal stop everywhere except in the first person singular and plural forms.

Based on paradigms like those in (6), a simple analogical change occurred. The stem-final /s/ that appeared throughout the perfect middle of verbs in coronal stops was extended to the first person forms. This was an instance of paradigm leveling similar to many well-known changes, and its result was the new pattern in (7).

(7) a. *Perfect middle: /pseud-/ 'deceive'*

| | *SING.* | *DUAL* | *PLUR.* |
|---|---|---|---|
| 1. | é-pseu**s-m**ai | —— | e-pseú**s-m**et$^{h}$a |
| 2. | é-pseu**s-s**ai | é-pseu**s-t$^{h}$**on | é-pseu**s-t$^{h}$**e |
| 3. | é-pseu**s-t**ai | é-pseu**s-t$^{h}$**on | —— |

b. *Perfect middle: /peit$^{h}$-/ 'persuade'*

| | *SING.* | *DUAL* | *PLUR.* |
|---|---|---|---|
| 1. | pé-pei**s-m**ai | —— | pe-peí**s-m**et$^{h}$a |
| 2. | pé-pei**s-s**ai | pé-pei**s-t$^{h}$**on | pé-pei**s-t$^{h}$**e |
| 3. | pé-pei**s-t**ai | pé-pei**s-t$^{h}$**on | —— |

Note that this is the actually attested paradigm in which—due to an analogical extension from the second and third person forms—an underlying coronal stop now surfaces as *s* before *m*.

In the earliest documented stages of Greek, only the analogical extension in (7) had taken place; the change of coronal stops to *s* before *m* in verbs (and forms derived from verbs) had not yet become general. Early sources instead show stop-*m* clusters, as in the archaic perfect middle participles in (8).

| | | |
|---|---|---|
| (8) a. | ke-koru**t$^{h}$-m**énos | 'armed' (frequent in Homer) |
| | /korut$^{h}$-/ | 'arm, equip' |
| b. | ke-ka**d-m**éna | 'surpassed' (Pindar, *Olympian* 1.27) |
| | /kad-/ | 'surpass' |
| c. | (pro-)pe-p$^{h}$ra**d-m**éna | 'told (beforehand)' (Hesiod, *Works & Days* 655) |
| | /p$^{h}$rad-/ | 'show' |
| d. | pe-puká**d-m**enon | 'covered' (Sappho 166) |
| | /pukad-/ | 'cover' |

Only in the classical (postarchaic) period did the pattern in (2c), with surface *sm*, become regular in the language. No doubt the extension was favored by the paradigmatic connection between (first person and participial) forms of the perfect middle; extension to /m/-initial suffixes generally will then have followed the extension to participial forms. In any case, the point is that a case of ordinary paradigm leveling led to a fortuitous pattern that, though phonetically unmotivated, was nonetheless generalized to become quite regular. Analogy has created a phonetically unnatural morphophonological process.[9]

## 22.3 East Cushitic

We have argued elsewhere that metathesis (linear order inversion) of nasals and oral stops is unnatural phonetically; a survey of proposed cases shows that it is undocumented as a sound change in the languages of the world.[10] This is because metathesis arises when a segment is perceived as being in a position other than its historical one. Such misperceptions are often faciliated by the temporally extended cues of segments like rhotics and pharyngeals. Yet in stop-nasal clusters, since nasality cannot leak across an adjacent oral stop without rendering it nasal, a TN cluster cannot be perceived as NT (nor can NT > TN).

Synchronically productive nasal-obstruent metatheses are nevertheless documented in several East Cushitic languages. According to Bender (1976b, 3), the Cushitic branch of Afroasiatic contains four subbranches: North Cushitic (the Beja language), Central Cushitic (Agaw), South Cushitic, and East Cushitic. East Cushitic itself contains the three branches and various languages shown in (9), following Heine (1978) and Hayward (1984, 9). Nasal-obstruent metathesis alternations have been identified in the seven languages highlighted in boldface in (9): four Highland languages and three Lowland languages.[11]

(9) *East Cushitic*
Highland East Cushitic: Burji, **Darasa, Hadiyya, Kambata, Sidamo**
Werizoid (Black 1976)
Lowland East Cushitic

**Qafar**, Saho
Konso, **Oromo**
Omo-Tana (a.k.a. Macro-Somali)
  Proto-Baz
  Western Omo-Tana: Arbore, Dasenech, Elmolo
  Northern Omo-Tana: **Bayso**
  Eastern Omo-Tana: Boni, Rendille, Somali

Here it is impossible to present a full treatment of the evolution of each set of alternations. Instead, we will describe one system (that of Bayso) and propose a diachronic account of its origin. We will then sketch our reasons for believing that our account will also be applicable in the other East Cushitic cases.

The Bayso language has been described by Hayward (1978), and some aspects of its history have been explored by Heine (1978); its consonant inventory is shown in (10).

(10)

| | | | | |
|---|---|---|---|---|
| pˀ | t, tˀ | c (= [tʃ]), cˀ | k, kˀ | ʔ |
| b | d | j (= [dʒ]) | g | |
| f | s, sˀ (= [tsˀ]), z | š (= [ʃ]) | | |
| m, mˀ | n, nˀ, l, lˀ, r, rˀ | y, yˀ | w, wˀ | h |

The relevant alternations arise only in the verbal morphology, where personal endings begin with vowels, /t/, or /n/. This is shown in (11) for a representative verb ending in a labial.

(11) *Bayso simple perfect: /dub-/ 'bake'*

| | | | |
|---|---|---|---|
| 1SG. | /dub-**e**/ → dub**e** | 1PL. | /dub-**n**e/ → dub**n**e |
| 2SG. | /dub-**t**e/ → dub**t**e | 2PL. | /dub-**t**en/ → dub**t**en |
| 3SG.F. | /dub-**t**e/ → dub**t**e | 3PL. | /dub-**e**n/ → dub**e**n |
| 3SG.M. | /dub-**e**/ → dub**e** | | |

Labial roots like /dub-/ exhibit no relevant alternations with /n/-initial and /t/-initial suffixes, but such alternations do occur with coronal roots. These alternations are of several types. First, whenever a /t/-initial ending is added to a root in /š/, the two segments surface as *c* ([tʃ]). This "coalescence" is a sibilant metathesis (Blevins and Garrett 2004): /št/ → [tʃ]. With roots ending in other coronal obstruents, the result is total progressive assimilation. These alternations are illustrated in (12) for several roots in coronal obstruents; the endings cited are the masculine and feminine third person singular endings /-e/ and /-te/.

(12)

| | *Simple perfect 3SG.M.* | *Simple perfect 3SG.F.* | |
|---|---|---|---|
| a. | /oš-e/ → oše | /o**š**-**t**e/ → o**c**e (= [o**tʃ**e]) | 'dig' |
| b. | /doot-e/ → doote | /doo**t**-**t**e/ → doo**tt**e | 'want' |
| | /šigid-e/ → šigide | /šigi**d**-**t**e/ → šigi**dd**e | 'anoint' |

| | | |
|---|---|---|
| /wutʔ-e/ → wutʔe | /wut**ʔ**-**t**e/ → wut**ʔ**t**ʔ**e | ‘sow’ |
| /foocʔ-e/ → foocʔe | /foo**cʔ**-**t**e/ → foo**cʔcʔ**e | ‘chew’ |
| /ajees-e/ → ajeese | /ajee**s**-**t**e/ → ajee**ss**e | ‘speak’ |

As shown in (13), roots of the same type exhibit obstruent-nasal metathesis when followed by /n/-initial endings. This metathesis is regular for underlying sequences of coronal obstruents plus /n/. It is this synchronic metathesis alternation that is the object of our analysis here.

(13)

| *Simple perfect 3SG.M.* | *Simple perfect 1PL.* | |
|---|---|---|
| /doot-e/ → doote | /doot-**n**e/ → doo**n**te | ‘want’ |
| /wod-e/ → wode | /wod-**n**e/ → wo**n**de | ‘drive’ |
| /wutʔ-e/ → wutʔe | /wutʔ-**n**e/ → wu**n**tʔe | ‘sow’ |
| /foocʔ-e/ → foocʔe | /foocʔ-**n**e/ → foo**n**cʔe | ‘chew’ |
| /oš-e/ → oše | /o**š**-**n**e/ → o**nc**e | ‘dig’ |
| /gilis-e/ → gilise | /gilis-**n**e/ → gili**n**se | ‘swim’ |
| /kees-e/ → keese | /kees-**n**e/ → kee**n**se | ‘raise’ |

The assimilatory pattern in (12), with underlying sequences of coronal obstruent (other than /š/) plus /t/, is progressive: /t/ regularly assimilates to the obstruent preceding it. A different pattern of assimilation is found in two other contexts in Bayso. The first context arises when any of the three consonant-final ‘‘auxiliary’’ suffixes /-gir-/, /-ar-/, /-r-/ is followed by a consonant-initial verb ending. The result in such cases is an underlying /rt/ or /rn/ cluster. However, unlike /rt/ and /rn/ clusters in /r/-final verbs, which ordinarily surface without change (Hayward 1978, 554, note 25), these /rt/ and /rn/ clusters in ‘‘auxiliary’’ contexts surface with total regressive assimilation. For instance, the imperfect past is formed using the auxiliary /-ar-/, and representative forms are cited in (14).

(14) *Bayso imperfect past: /dub-/ ‘bake’*

| | | |
|---|---|---|
| 1PL. | /dub-in-a**r**-**n**e/ → dubina**nn**e | |
| 2PL. | /dub-in-a**r**-**t**en/ → dubina**tt**en | |
| 3PL. | /dub-in-a**r**-en/ → dubina**r**en | |

The second context where verbal endings trigger regressive assimilation is in the formation of ‘‘extended-stem verbs with a radical extension in **-at**, **-sat**, **-aat**, or **-oot**’’ (Hayward 1978, 558). The final /t/ of these extensions regularly assimilates to a following verbal ending in /n/, as illustrated in (15).

(15) *Bayso simple perfect: /kor-at-/ ‘climb’*

| | | |
|---|---|---|
| 1PL. | /kor-a**t**-**n**e/ → kora**nn**é | |
| 2PL. | /kor-a**t**-**t**en/ → kora**tt**én | |
| 3PL. | /kor-a**t**-en/ → kora**t**én | |

It is crucial that the final /t/ of such extended-stem verbs (which are numerous and productively derived) differs in its behavior from ordinary verb-final /t/ as in (12) and (13). Metathesis affects /t/ in ordinary verbs, but /tn/ clusters undergo regressive assimilation in extended-stem verbs.

Based on these facts, we propose the following account. We contend that two factors led to the creation of metathesis in the formation of unextended verbs with /n/-initial suffixes. Within the Bayso verbal system, both factors in effect made it seem superficially plausible that forms with /n/-initial suffixes *should* be derived by metathesis. The creation of synchronic metathesis was thus a straightforward generalization based on an apparent pattern elsewhere in the language.

The first relevant factor was the regressive assimilation pattern seen in (14) and (15), and in particular the /tn/ → *nn* assimilation found in first person plural forms of extended-stem verbs. What these patterns suggest is that the direction of assimilation in CC clusters is regressive, not progressive. The second relevant factor was the /št/ → [tʃ] metathesis (with "coalescence") seen in (12a). At least for certain verb types, what this suggests is that metathesis is involved in the formation of paradigms such as the simple perfect.

Now consider the task confronted (by a language learner or a potential language changer) in analyzing the forms in (12b). In these forms, diachronically, a suffix-initial /t/ has assimilated to a stem-final coronal obstruent. But geminates derived by total assimilation are in principle ambiguous. They could reflect progressive or regressive assimilation, and the choice between these two analyses can only be based on other evidence in the language. Our proposal is that the geminates in (12b), though derived historically as shown by progressive assimilation, were reinterpreted synchronically as the result of regressive assimilation. In (16) we sketch this reinterpretation based on the examples in (12b). The reinterpretation generalized the metathesis pattern that independently arose in forms like the one in (12a), and it was further supported by the presence of regressive assimilation in the contexts in (14) and (15).

(16)

| | *Surface form* | *Originally* | *Reinterpreted as* | |
|---|---|---|---|---|
| a. | o**c**e (= [o**tʃ**e]) | /o**š**-**t**e/ | /o**tš**e/ | 'dig' |
| b. | doo**tt**e | /doo**t**-**t**e/ | /doo**tt**e/ | 'want' |
| | šigi**dd**e | /šigi**d**-**t**e/ | /šigi**td**e/ | 'anoint' |
| | wu**tʔtʔ**e | /wu**tʔ**-**t**e/ | /wu**ttʔ**e/ | 'sow' |
| | foo**cʔcʔ**e | /foo**cʔ**-**t**e/ | /foo**tcʔ**e/ | 'chew' |
| | ajee**ss**e | /ajee**s**-**t**e/ | /ajee**ts**e/ | 'speak' |

The only actual change suggested so far is a restructuring of synchronic intermediate representations: a "covert reanalysis" (Kiparsky 1998) with no visible effect. The

old structure /ajees-te/ and the new structure /ajeetse/ (synchronically the result of a metathesis from /ajees-/ + /-te/) both yielded the same surface form *ajeesse* 'speak' (simple perfect 3SG.F.). The crucial change occurred when metathesis was extended throughout the verbal paradigm of verbs ending in coronal obstruents. Once verbs of this phonotactic class were seen as inverting the position of their final consonant and a suffix-initial consonant, inversion was generalized for all suffix-initial consonants. Metathesis was thus extended to the context where it is now visible, with /n/-initial suffixes as in (13). Just as /ajee**s**-/ + /-**t**e/ now yielded a representation /ajee**ts**e/ (surface *ajee**ss**e*), so now /ajee**s**-/ + /-**n**e/ yielded /ajee**ns**e/. The latter underwent no assimilation, though, and surfaced intact as *ajee**ns**e*.

We have explained the creation of nasal-obstruent metathesis alternations as a generalization that was motivated (in part) by the opacity of derived geminates.[12] The fact that Bayso metathesis occurs only with coronal obstruents is a direct consequence, on our account, for the fact that only coronal obstruents triggered total progressive assimilation. Only in such cases was it plausible to reinterpret the historical reflex of a *Ct cluster as synchronically /tC/, that is, metathesized, and it is this pattern that was extended to original *Cn clusters.

We cannot present equally detailed accounts of the nasal-obstruent metathesis alternations in other East Cushitic languages, but we do wish to note a striking fact that seems to us to support the general model we have applied to Bayso. In the three other East Cushitic cases (Qafar, Oromo, and a group of four Highland East Cushitic languages), the set of obstruents involved in *Cn > nC metathesis is always a subset of the set of obstruents that undergo total progressive assimilation in *Ct clusters (i.e., /Ct/ → [CC]). The relevant facts are summarized in (17), where the second and third columns show the classes of obstruents that undergo metathesis and assimilation.

(17)

| *Languages* | */Cn/ → [nC]* | */Ct/ → [CC]* |
|---|---|---|
| a. Qafar, northern dialect (Bliese 1981; Parker and Hayward 1985) | /ɖn/ → [ɳɖ] | coronal obstruents (i.e., /t ɖ s/) |
| b. Oromo, Wellegga dialect (Gragg 1976; Lloret 1995) | /t'n/ → [nɗ] | alveolar and palatal stops (i.e., /t d t' ɗ c j c'/) |
| c. Bayso (see above) | all coronals | all coronals other than /š/ (which metathesizes) |
| d. Highland East Cushitic languages other than Burji (Moreno 1940; Hudson 1976) | all nongeminate obstruents | all nongeminate obstruents |

On our account, the implicational relationship between elements in the second and third columns in (17) has a general explanation. The reinterpretation giving rise to metathesis alternations was based on a misanalysis of geminates that had resulted historically from progressive assimilation. Therefore, in each language showing metathesis, consonants undergo metathesis only if they also geminate. This is an accident if the cause of metathesis in each case was a *Cn > nC sound change.[13]

Though we have presented a detailed analysis for only one case in (17), we conclude that East Cushitic nasal-obstruent metathesis alternations do not pose a problem for the view (discussed in Blevins and Garrett 2002) that such alternations do not arise directly via sound change. In other words, nasal-obstruent metatheses are phonetically unnatural, and where they do exist they have evolved by processes of analogical change: the generalization to nasal-obstruent contexts of morphological alternations with independent sources.[14]

### 22.4 South-Central Dravidian

Though stop-stop metathesis does exist, we have argued elsewhere that metathesis of velar-labial (KP) stop sequences in particular is unnatural phonetically and undocumented as a sound change. By contrast, PK clusters do naturally and in several well-documented cases undergo metathesis.[15] In this section we discuss the only alleged KP > PK sound change known to us, and we argue that in fact it originated via analogical generalization of a fortuitous morphological pattern.

The seven languages belonging to the South-Central subgroup of Dravidian languages are shown in (18), together with the other major Dravidian subgroups and a few other relevant languages of the family.[16] The four Kondh languages are the locus of an apparent metathesis. All of them have synchronic alternations whereby underlying /kp/ and /gb/ sequences surface as *pk* and *bg*, respectively. Since there are no underlying or derived morpheme-internal /kp/ and /gb/ sequences and since the only suffixes beginning with labial stops are verbal suffixes, the relevant alternations are restricted to the verbal morphology and in particular the formation of verb stems.[17] In addition to those shown below, relevant suffixes include the Kūvi desiderative suffix /-p-/ (Israel 1979, 172) and a participial suffix /-pi-/ (with other allomorphs, including /-bi-/) used in various periphrastic and grammaticalized periphrastic constructions. Most of these suffixes show considerable allomorphy, but metathesis affects only allomorphs beginning with /p/ or /b/.

(18) South Dravidian: Tamil, Malayāḷam, Kannaḍa, and others
South-Central Dravidian
Telugu
Gonḍi

Konḍa
Kondh languages: Kūi, Kūvi, Pengo, Manḍa
Central Dravidian: Kolami, Naiki, and others
North Dravidian: Brahui and others

A context where metathesis is easily illustrated is the ''plural action'' formation, which is found in all Kondh languages and expresses plurality of actions or participants. This is marked by a suffix whose allomorphs include /-ka/, /-pa/, and /-ba/, shown for Pengo by the data in (19a–c), respectively.[18]

| (19) | *Verb root* | *Plural action stem* | *Verb gloss* |
|---|---|---|---|
| a. | kat- | kat-ka- | 'cut' |
| | keːr- | keːr-ka- | 'sing' |
| | hiːp- | hiːp-ka- | 'sweep' |
| | raz- | ras-ka- | 'cut' |
| b. | kap- | kap-pa- | 'bite' |
| | gruːt- | gruːt-pa- | 'fell' |
| | paɽ- | paɽ-pa- | 'break' |
| | hon- | hon-pa- | 'run' |
| c. | tuːb- | tuːb-ba- | 'blow' |
| | kaːḍ- | kaːḍ-ba- | 'burn' |
| | ven- | ven-ba- | 'hear' |
| | hiː- | hiː-ba- | 'give' |

Examples of the /-pa/ and /-ba/ allomorphs with metathesis are shown in (20). Metathesis yielding *pk* is found only with verb roots ending in /k/, as in (20a), but as seen in (20b,c), respectively, roots in /k/ and /g/ can also select the /-ba/ allomorph (yielding surface *bg*). The examples in (19) and (20) all involve the Pengo plural action form, but metathesis is found in all Kondh languages.

| (20) | *Verb root* | *Plural action stem* | *Verb gloss* |
|---|---|---|---|
| a. | ḍrik- | ḍri**pk**a- | 'break' |
| | kuːk- | kuː**pk**a- | 'call' |
| | ḍeːk | ḍeː**pk**a- | 'seek' |
| b. | kak- | ka**bg**a- (/kak-ba-/) | 'vomit' |
| | ɽaːk- | ɽaː**bg**a- (/ɽaːk-ba-/) | 'sacrifice' |
| | hoːk- | hoː**bg**a- (/hoːk-ba-/) | 'wash (clothes)' |
| c. | paːg- | paː**bg**a- | 'kill' |
| | pag- | pa**bg**a- | 'be split' |
| | tog- | to**bg**a- | 'trample' |

The roots of the Kondh metathesis lie in Proto-Dravidian. In Dravidian languages, there are two widespread morphological mechanisms for deriving causative

verbs or transitive counterparts of intransitive verbs. Devoicing a stem-final consonant is one mechanism, and the other involves a suffix containing a *-*p*-.[19] The two types of causative-transitive formation are illustrated in (21) with a few examples from the Kondh language Kūi.

| (21) | *Base verb* | | *Derived verb* | |
|---|---|---|---|---|
| a. | ko:**g**- | 'be small' | ko:**k**- | 'reduce' |
| | mu:**g**- | 'be complete' | mu:**k**- | 'complete' |
| | a**ɖ**- | 'be joined to' | a**ʈ**- | 'join in' |
| b. | e- | 'arrive' | e-**p**- | 'cause to arrive' |
| | d͡ʒa:- | 'descend' | d͡ʒa:-**p**- | 'bring down' |
| | v͡ɽe:- | 'return (INTR.)' | v͡ɽe:-**p**- | 'return (TRANS.)' |

Especially relevant here is the causative formation in *-*p*-. Evidence from several Dravidian languages shows that there was originally also a formation in which the *-*p*- suffix *replaced* the root-final consonant rather than simply being *added* to the verb root. We cite data from three languages in support of this claim.[20]

Telugu has several types of causative formation synchronically. One of these is shown in (22) with data from Krishnamurti (1961).

| (22) | *Base verb* | | *Derived verb* | |
|---|---|---|---|---|
| | ã:**gu** | 'to stop, stay' | ã:-**pu** | 'to hold back, restrain' |
| | uɖu**gu** | 'to end' | uɖu-**pu** | 'to cause to end' |
| | medu**gu** | 'to be pounded' | medu-**pu** | 'to pound' |
| | cu:**cu** | 'to see' | cu:-**pu** | 'to show' |
| | nil(u)**cu** | 'to stand, cease' | nil(u)-**pu** | 'to set up, stop' |
| | ma:**yu** | 'to be hidden' | ma:-**pu** | 'to hide, screen, destroy' |

According to Subrahmanyam (1971, 25), "*-pu* is substituted for the final syllable of some verbs ending in *gu*, *cu*, and *yu*," though a simpler analysis synchronically might be that *p* replaces the final /g/, /c/, or /y/ of a causative base. In either case the point is that there is a substitution.[21] (The final consonant of a Kondh verb stem corresponds via vowel reduction to a Telugu final CV sequence.)

A second language showing this kind of replacement is Kolami (Emeneau 1961). The relevant causative surfaces as *-(i)p*- as in (23a). Shown in (23b) are cases where the causative suffix replaces the final consonant of the base verb.

| (23) | *Base verb* | | *Derived verb* | |
|---|---|---|---|---|
| a. | ser- | 'go' | ser-**p**- | 'let (cattle) get lost' |
| | a:r- | 'become dry' | a:r-**p**- | 'dry (TRANS.)' |
| | ud- | 'sit' | ud-**ip**- | 'make to sit' |
| b. | nega**y**- | 'fly' | nega-**p**- | 'make to fly' |
| | nera**y**- | 'be spread' | nera-**p**- | 'spread (TRANS.)' |

| | | | |
|---|---|---|---|
| mel**g**- | 'shake (INTR.)' | mel-**p**- | 'shake (TRANS.)' |
| per**g**- | 'grow (INTR.)' | per-**p**- | 'rear' |
| di**g**- | 'descend' | di-**p**- | 'make descend' |

As in Telugu, /y/ and /g/ are among the replaced consonants in these cases. A similar pattern is seen in Kolami's close relative Naiki, whose *g*/*p* pairs are typically the exact cognates of their Kolami counterparts, to judge from the data cited by Emeneau (1961) and Subrahmanyam (1971, 42).

Within South-Central Dravidian, the same pattern is seen not only in Telugu but also in Gondi, a language generally considered to be very closely related to the Kondh languages. The examples in (24) are from the Koya dialect of Gondi.

(24)

| *Base verb* | | *Derived verb* | |
|---|---|---|---|
| a:**ŋ**- | 'to stop (INTR.)' | a:-**p**- | 'to stop (TRANS.)' |
| ka:**ŋ**- | 'to be boiled' | ka:-**p**- | 'to make boil' |
| ḍi**gg**- | 'to descend' | ḍi-**pp**- | 'to cause to get down' |

Note that the first pair in (24) and the first pair in (22) are cognate, and the last pair in (24) and the last pair in (23b) are cognate; the second pair in (24) also has Kolami cognates. (We do not know the cause of the gemination recorded in the last Gondi example by Subrahmanyam 1968.)

We conclude, for verbs ending in **g*, that the Kondh languages inherited three mechanisms of causative-transitive formation: **p* suffixation; devoicing (**g* → **k*), which operated very generally; and the more restricted **g* → **p* replacement. Our analysis is based on this conclusion.

A **g* → **p* rule for causative formation would have been opaque and extremely vulnerable to a reinterpretation of some sort. A very natural reinterpretation of surface causatives with **p* would have been that surface **p* reflected underlying /kp/ via a synchronic /kp/ → **p* reduction. The /p/ would then be analyzed as the ordinary causative suffix, with voicing assimilation and loss of the resulting /k/ (i.e., /g/ → /k/ → ∅ before /p/). Hypothetical ("Proto-Kondh") causatives like those in (25) would have been reanalyzed as shown. What is crucial here is that forms that had originated via the **g* → **p* replacement process were construed as evidence for a synchronic /kp/ → **p* reduction.

(25)

| *Base verb* | | *Derived verb reanalyzed as* | |
|---|---|---|---|
| *a:g- | 'to stop (INTR.)' | *a:p- (TRANS.) | /a:g-p-/ → /a:kp-/ → /a:p-/ |
| *pag- | 'to be split' | *pap- (TRANS.) | /pag-p-/ → /pakp-/ → /pap-/ |

The newly created process could then be extended to other contexts where a **p*-initial suffix was added to a velar-final root. In particular, we contend that this /kp/ → **p* process was employed in the formation of plural action verbs. The lexical

details cannot be known (since they have been obliterated by subsequent changes), but two hypothetical examples are shown in (26). In each case, the result of the creation of a /kp/ → *_p_ reduction process was a new plural action form in *_p_, not *_kp_ (as would previously have been the case).

(26)

| *Base verb* | | *Plural action form* |
|---|---|---|
| *ku:**k**- | 'call' | /ku:**k**-**p**-/ → *ku:**p**- |
| *pa**k**- | 'split (TRANS.)' | /pa**k**-**p**-/ → *pa**p**- |

Note that *_pak_- is the other productive causative-transitive of *_pag_- 'to be split' (i.e., derived by devoicing).

The developments posited so far include only a relatively straightforward extension based on a demonstrably inherited Dravidian alternation. There is direct evidence also for the next step we posit: the hypercharacterization (double marking) of plural action forms like *_ku:p_- and *_pap_- in (26). It is crucial here that the plural action formation has two basic suffix variants in the Kondh languages, /-p-/ and /-k-/. We propose that new plural action forms from verbs in *_k_ were created as shown in (27).

(27)

| *Base verb* | | *Plural action form* |
|---|---|---|
| *ku:**k**- | 'call' | *ku:**p**- → ku:**p**-**k**- |
| *pa**k**- | 'split (TRANS.)' | *pa**p**- → pa**p**-**k**- |

Here the basic idea is that *_ku:p_-, and so on, were insufficiently clear as plural action forms, and so the productive (default) plural action suffix *-_k_- was added. This hypercharacterization process is generally comparable to the English creation of plurals like *children* and *kine* (in which a plural suffix with an *n* was added to preexisting plural forms), and there is evidence for the same process elsewhere in the system of Kondh plural action forms. For a set of six Kūi verbs whose apparent plural action suffix is /-pk-/, Emeneau (1975/1994, 228) suggests "that they should be compared with the remainder of the verbs of that ['3RD'] conjugation ..., which have -v- as the plural action allomorph and that -pk- should be regarded as representing a suffixal doubling (-v-k- > -pk-)." The schematic representation in (28) is modeled after the proposed change in (27).

(28)

| *Kūi base* | | *(Pengo)* | *Plural action form* |
|---|---|---|---|
| a:- | 'be, become' | (= a:-) | *a:-**v**- (= *Pengo* a:-**b**-) → a:**pk**- |
| si:- | 'give' | (= hi:-) | *si:-**v**- (= *Pengo* hi:-**b**-) → si:**pk**- |

For the Kūi forms in (28) the only result of hypercharacterization was that a small set of verbs came to have /-pk-/ as their plural action suffix, but for Proto-Kondh forms like those in (27) the result was far more profound. Here, because the base

forms (e.g., **pak-* 'split') also accidentally had a **k*, the *-pk-* sequence that arose from double marking looked exactly like the result of a metathesis.

Precisely this appearance was taken as linguistic reality, in our view. Plural action forms like those in (27) were reinterpreted as the result of a synchronic /kp/ → **pk* metathesis. Obviously the motivation was that /kp/ is what these sequences ought to be underlyingly, since they were formed from verbs in **k* and a suffix **-p-*. Here it is important to distinguish the basis for the reinterpretation we propose from its result. The result was that plural action forms like **papk-* were interpreted as underlyingly /pak-p-/, with synchronic metathesis; but diachronically the **k* originated as a (hypercharacterizing) form of the plural action suffix.

Two additional trivial changes occurred en route to the attested state of affairs. First, the new /kp/ → **pk* metathesis pattern was extended to all suffixes beginning with **p*, not just the plural action suffix. Second, because of the productive causative relationship between verbs in **g* (e.g., **pag-* 'be split') and **k* (e.g., **pak-* 'split'), the metathesis was also generalized to voiced velar stops. As a result, verbs like Kūi /pag-/ 'be split' have plural action forms like *pabg-*. These two changes completed the creation of a synchronic KP → PK metathesis. Though unnatural phonetically, this process is pervasive in the morphology and apparently exceptionless in the language.

## 22.5 Conclusion

We have discussed three cases in which regular morphophonological patterns arose via analogical extension of fortuitous morphological patterns. The extensions are summarized in (29).

(29)

| | *Fortuitous pattern* | *Extended to* |
|---|---|---|
| a. Greek | Prevalence of T → *s* in the perfect middle, leading to paradigm leveling and first person T → *s* | Other suffixes with /m/ |
| b. Bayso | Independent assimilation patterns, causing regressive coronal stop + /t/ assimilation to look like metathesis | Other endings (i.e., with /n/) |
| c. Kondh | Hypercharacterization (with *k*) of forms derived by /k/ → *p* substitution; then reinterpreted as metathesis | Other suffixes with /p/, /b/ |

The resulting sound patterns are schematically characterized in (30).

(30) a. Greek: T → s / ____ m
b. Bayso: TN → NT
c. Kondh: KP → PK

Each alternation in (30) is restricted morphologically, operating only in verbs or verbal derivatives, but each is regular within its morphological domain. For the Kondh languages in particular, moreover, since underlying KP sequences do not arise elsewhere in the grammar, the alternation in (30c) is exceptionless.

These patterns are of interest because (as far as we know) they could not occur (and are not attested) as sound changes. Two general conclusions follow.

First, the new class of sound patterns identified here fills out the diachronic typology of morphophonological alternations. It is well known that "crazy rules" can evolve over time due to the cumulative effect of changes that are each phonetically motivated but have a collectively arbitrary effect. It is also well known that phonetically natural morphophonological patterns can arise by the mechanism of "morphophonemic analogy" (Moulton 1960, 1967). Yet it is usually assumed that morphophonological patterns as in (30) correspond to earlier purely phonological patterns. We have shown here that phonetically unnatural patterns can also arise by analogical processes. Since they are phonetically unnatural, they do not have purely phonological origins but reflect instead the generalization of fortuitous morphological patterns.

A second conclusion is that even the most regular morphophonological patterns may lack phonetic origins. Phonological theories must therefore be broad enough to encompass phonetically unnatural alternations as well as natural ones. At the same time, theories must be properly constrained so that the two types are not confused, since confusion would falsely predict that alternations like those in (30) could arise through ordinary sound change.[22]

In sum, diachronic typology supports the traditional dichotomy between phonetically motivated sound change and word-based analogical change. As a concrete case where diachrony informs synchrony, analogical morphophonology reopens Kiparsky's (1968b, 174) "window on the form of linguistic competence." Once we recognize unnatural sound patterns with nonphonetic grammatical origins, constrained models of phonetically motivated sound change come into view.

## Notes

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The following abbreviations apply throughout this essay: SING = singular; PL = plural; 1SG = first person singular; 2SG = second person singular; 2SG.F = second person singular, feminine; 3SG.M = third person singular, masculine; 1PL = first person plural; 2PL = second

person plural; 3PL = third person plural; INTR = intransitive; TRANS = transitive; TR = transitive.

1. For further discussion see also Wurzel (1980) and Anderson (1992, 339–346).

2. The phonetic origins of this deletion and related English sound patterns deserve further study.

3. The pattern in (1) is retained in some (e.g., West and Northwest Midlands) English dialects (Wells 1982).

4. The second and third cases, which constitute the bulk of this chapter, also contribute to our ongoing research on the diachronic origins of synchronic metathesis patterns (Blevins and Garrett 1998, 2004).

5. A phonetic explanation appealing to ''rhinoglottophilia'' (Matisoff 1975; Ohala 1975; Blevins and Garrett 1993) is implausible given the restriction to /m/ and coronal stops and because this change (unlike ordinary sound changes) did not operate morpheme internally.

6. Steriade (1982, 257) states the process as follows: [+cor, −son] → [+cont] / ____ [+lab, +nas]. Basic references on Greek historical phonology and morphology include Schwyzer (1953), Lejeune (1972), Meillet and Vendryes (1979), and Rix (1992).

7. Note that no suffixes beginning with /m/ are productively added to consonant-final noun stems. For discussion and data collections see Stratton (1899), Chantraine (1933), and Buck and Petersen (1945). Morpheme-internal clusters were apparently sometimes reinterpreted as heteromorphemic, leading to sporadic replacements like *ba**t**h**m**ós* > *bas**m**ós* 'step' and *rhu**t**h**m**ós* 'rhythm' > *rhus**m**ós*.

The coronal spirantization before /m/ discussed here should be distinguished from a more specific process, restricted to the Attic dialect (Threatte 1980), whereby original **dm* > *sm* without exception, even morpheme internally (e.g., in the proper name *Ká**dm**os* > *Ká**sm**os*). A likely explanation is that coda *d* became a fricative [ð], and then [ð] > [z] (spelled *s*) (cf. Schwyzer 1953, 208).

8. A chronologically later change not shown here is the degemination of *ss*, for example, in the 2SG. forms.

9. A synchronic stem-based analysis is also possible. Bases ending in coronal stops could be analyzed as having /s/-stems in the perfect middle, with the /s/-stem also phonologically conditioned by /m/-initial suffixes. But the alternation remains phonetically unnatural whether it is characterized as phonologically conditioned stem selection or a segmental process T → s / ____ m. For a relevant general discussion, see, for example, Kiparsky 1996a, 1996b.

10. See Blevins and Garrett (2004). Outside the domain of sound change, it is well known that sporadic metatheses are often unexpected phonetically, as in the typical folk-etymological case underlying the Old Icelandic variants ***ros**m**h**valr* and ***rom**s**v**al* 'wal**rus**' < ****m**o**r**s**a* < Sami *morršša* (V. Kiparsky 1952, 30–44).

11. The four Highland languages with nasal-obstruent metathesis apparently form a subgroup within Highland East Cushitic. Note that since not all East Cushitic languages are well documented, similar metathesis alternations may well exist in other languages not highlighted in (9).

12. See Sasse (1976, 219), who also invokes a reinterpretation of opaque assimilated clusters to explain how /n/-initial verbal endings were replaced by /t/-initial endings in Dasenech.

13. Note that Qafar retroflex /ɖ/ and the Oromo implosive /ɗ/ are cognate, reflecting Proto-Eastern-Cushitic **d'* (Sasse 1979; Ehret 1991); we do not know what bearing this may have on the distribution of metathesis in the two languages.

14. Joe Malone calls to our attention a similar sequence of changes in Classical Mandaic. (See also Malone 1971, 1985.) In that language, a synchronic alternation involves total regressive assimilation in /nC/ clusters; for example, the causative form of /npq/ 'go out' is /(h)anpeq/ 'bring out', which surfaces as [appéq]. Variation appears in suffixed third person masculine singular forms (e.g., [appəqíi] ~ [hanpəqíi]). In such cases, it is unclear whether the regressive assimilation rule itself is subject to variability or whether some subsequent change of geminates into nasal-stop clusters is in progress (nC > CC > nC). Internal evidence supports the second account. Like most other Aramaic languages, Classical Mandaic has a minor rule (applying only to certain roots) by which /Cl/ → [CC]. From a root /slq/ 'go up' ([səleq] 'he went up'), which undergoes this minor rule, the attested causatives [asséq] and [hanséq] point to a sequence of developments *sl* > *ss* > *ns*. In this case *ss* > *ns* is not by morphological analogy; the direction of change has been determined by the dominant source of derived geminates from nasal-stop clusters. The sequence of changes *sl* > *ss* > *ns* is similar to the cases we discuss here.

15. See Blevins and Garrett (2004) for discussion. The existence of PK > KP changes but not KP > PK changes is related to general properties of unordered labial + dorsal gestures.

16. For general information about Dravidian (especially phonology), we have relied heavily on Emeneau (1970), Zvelebil (1970), Subrahmanyam (1971, 1983), Burrow and Emeneau (1984), and Steever (1998b). For information about South-Central Dravidian languages, we have used these sources: Burrow and Bhattacharya (1960), Subrahmanyam (1968), and Steever (1998a) on Gonḍi; Krishnamurti (1969) and Krishnamurti and Benham (1998) on Koṇḍa; Winfield (1928, 1929) and Burrow and Bhattacharya (1961) on Kūi; Burrow and Bhattacharya (1963) and Israel (1979) on Kūvi; Burrow (1976) on Maṇḍa; and Burrow and Bhattacharya (1970) on Pengo. We have profited from analyses of the Kondh plural action formation by Subrahmanyam (1965), Emeneau (1975/1994, 223–262), and Steever (1993).

17. Once derived, infinitives may also be potential nouns, and some may be used in other functions. The point is that the suffix undergoing metathesis is one that derives a verb stem.

18. The distribution of the three suffix allomorphs is only partly predictable based on the shape of the verb root. For details see Burrow and Bhattacharya (1970, 82–85), who use the term "intensive-frequentative" for this formation.

19. See in general Subrahmanyam (1971, 1–101). What surfaces as a voicing alternation in the Kondh languages (and some other Dravidian languages) is elsewhere a consonant length alternation (with voiceless consonants corresponding to geminates); the correct reconstruction for Proto-Dravidian is debated. For convenience we will treat this here as a voicing alternation.

20. Since these languages belong to the South-Central and Central branches of Dravidian, it is possible that the process was restricted to those branches (and was not Proto-Dravidian). This is immaterial here, since the Kondh languages are South-Central Dravidian languages.

21. Historically it seems that distinct suffixes are reflected here, but synchronically, though the labial suffix has a clear function, there is no segmentable suffix /-gu/.

22. See Hyman (2001). For the view that phonetically grounded constraints interact to determine phonological structure see Archangeli and Pulleyblank (1994), Flemming (1995), Hume (1997, 2001), Hayes (1999a), Steriade (1999b, 2001), Kirchner (2000), and Hayes, Kirchner, and Steriade (2001).