A Typological View of Metathesis

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ABSTRACT

Metathesis was examined as a more or less systematic process that tends to preserve segments or features that would otherwise be lost or changed through the effects of other processes, notably reduction, assimilation, epenthesis, et al. It was also shown that metathesis is recessive as opposed to most other competing processes. With one exception, a direct correlation between susceptibility to metathesis and resonancy of the segment type was established. Formal types and some of the major causes of metathesis were investigated: reduction, open syllable canon, analogy, phonological constraints, anticipation, et al.

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1. Introduction

1.1 Status

In most treatises on general or diachronic linguistics as well as in many grammars, both historical and descriptive, the process referred to as metathesis[1] is given rather short shrift. Sievers (1901), for instance, groups metathesis with dissimilation and certain kinds of assimilation as "springende Lautwechsel" reserving the term "Lautwandel," with its implication of regular change, for the other, gradual types of sound change. For him, metathesis is largely limited to isolated instances without any discernable patterns, although he does admit the possibility that such phenomena may on occasion develop into systematic processes.[2] An extreme view -- all the more surprising at this late date -- is taken by Lehmann (1962:170): "Metathesis, like dissimilatory change, is apparently attested only as sporadic change." The opposing thesis, that metathesis may be more systematic in nature, is clearly demonstrated for SLAVIC and FRENCH by Martinet (1955: 327, 350-64). The ultimate stage of this line of thought is exemplified by Grammont's extensive treatment of the subject as a regular process (1950: 239-49, 339-57). His introductory remarks to the chapter on interversion (p. 239) are worth repeating:

> "L'interversion est un phénomène qui consiste à placer deux phonèmes contigus dans un order plus commode. Par là on obtient une meilleure constitution des syllabes, on sauvegarde l'unité et l'harmonie du système phonique d'un parler en remplaçant les groupes insolites par des groupes usuels, on écarte les types imprononçables ou devenus imprononçables en leur substituant des types faciles, on evite des efforts articulatoires inutiles. C'est un phénomène intelligent, bien qu'il s'accomplisse d'une manière inconsciente. Il ne joue pas un grand rôle dans les langues, car la plus grosse part de leur vocabulaire est conforme à leur système phonique, puisque c'est elle qui le constitue; mais si quelque évolution phonétique amène une rencontre de phonèmes inaccoutumée, si des emprunts apportent une séquence inusitée, l'interversion, qui est déterminée

[1] More rarely dubbed transposition. Compare also GERMAN Umstellung, FRENCH interversion (contiguous) and métathèse (noncontiguous).

[2] Among others, see Passy 1890 and Wechssler 1900 for similar views on the subject.

> par des principes d'ordre, de clarté, d'esthétique, intervient; elle pourvoit à la bonne police du système et ramène à la norme tout ce qui fait tache dans l'ensemble. Et naturellement, là où elle apparait, elle accomplit son œuvre avec une régularité parfaite. [emphasis mine]

To my knowledge, Grammont's is the only typological analysis and classification of metathesis extant.

1.2 Purpose and scope

The purpose of the present paper is to reexamine the process of metathesis in the context of additional cross-language data, primarily in terms of formal types, causes and effects, and interrelations between metathesis and certain other processes, notably: umlaut, dissimilation, palatalization, aspiration, glottalization, diphthongization, syncope and apocope, epenthesis and anaptyxis, resyllabification, and others.

If metathesis is taken to include any transposition of linearly ordered elements, we should consider a number of possible formal types:

1. Inversion of syntactic constituents: He was here. vs. Was he here?
2. Transposition of syllables: TOBA (thieve's language): tema < mate 'dead.'
3. Transposition of sounds: irrevelant for irrelevant, or spoonerisms (transposition across word boundary of sounds occupying the same syllabic positions) like: a row of beery wenches for a row of weary benches.
4. Transposition of suprasegmental features: ímport (n.) vs. impórt (v.).
5. Transposition of phonological features: GREEK thríks (nom. sg.) vs. trikhós (gen. sg.) 'hair.'

In addition to these types, there are at least four parameters which should be taken into account: voluntariness, systematicity, permanence and motivation. There are involuntary metatheses that occur only as nonce forms, such as spoonerisms and other kinds of lapses, which may or may not be linguistically motivated.

Thus while the spoonerism cited above is not so motivated, Meringer and Mayer (1895: 82) note among others lapses like VIENNESE kšlaf for Sklave 'slave,' induced by analogy with the relatively higher frequency initial cluster kšl- (cf. g'schlafen, g'schliffen, etc.). Then there are systematic, permanent metatheses, found in various kinds of secret languages: argots, cants, jargons, etc. Compare, for example, PIG LATIN: opstay isthay arcay (stop this car) or Parisian butcher's argot: loe lušebem dü lwẽke (le boucher du coin). In the latter case, we have to do with a deliberately devised, socially motivated form of the base language, a quasi-artificial language, whereas in the former the metathesized forms are purely accidental and generally nonrecurrent. We also find voluntary, but usually nonsystematic,[3] not linguistically motivated (at least not directly so) and temporary, cases in the deliberate experimentation of young children or whimsical efforts of older speakers. It is essentially the remaining involuntary metatheses, which are the products of other phonological processes or are directly induced by phonological restrictions, now regularized, now irregularized by analogy or inhibited by other phonological developments, that are of immediate concern to us in the balance of this paper. These are all linguistically motivated, involuntary and permanent. They may be systematic ("regular") or nonsystematic ("sporadic").

This rough classification leads to a causal correlation which appears to be generally valid: voluntary metatheses imply non-phonological causes. The converse, that involuntary metatheses imply phonological causes, is not true. While many lapses appear to be relatable to phonological interference of one sort or another (see especially Meringer and Mayer 1895 and Meringer 1908), this does not seem to be generally so with spoonerisms. Also, metathesis may be brought on by purely grammatical factors, such as the analogical influence of the suffix -cla in VULGAR LATIN coacla < cloaca, or by lexicosemantic interference, as in GERMAN spucken 'to spit' < 18th century FRENCH escupir (or *escouper) contaminated by speien 'to spit.'

The foregoing discussion may be summarized in chart form (LM= linguistically motivated, Inv = involuntary, Per = permanent, Sys= systematic). The basically binary system of rating the various

[3] However, not necessarily so. Grammont (1950: 349) cites the case of a small French child (no age given) who invariably metathesized p...k: capè for paquet, coupè for bouquet, etc. In any event this does not appear to be an instance of deliberate experimentation.

categories is to be taken as a rough indication of prevalent tendencies rather than an absolute statement of the possibilities. Thus for example, while most metatheses induced by phonological analogy appear to be fundamentally systematic (e.g. r...l>l...r in OLD SPANISH due in part to the influence of a pattern of regressive dissimilation: r...r > l...r, as in peligro 'danger' < periglo, milagro < miraglo, palabra < parabla), some are not or at least cannot be shown to be so from the available evidence.

Sources and Pragmatic Types of Metathesis

	LM	Inv	Per	Sys
Phonologically induced	+	+	+	+
Analogically induced: phonological	+	+	+	+
grammatical	+	+	+	±
lexicosemantic	+	+	+	−
Secret language	−	−	+	+
Lapses	±	+	−	−
Child language experiment	−	−	−	−
Whimsy	−	−	−	−

Returning now to the five formal types of metathesis cited above, we omit from further consideration the inversion of syntactic constituents (1), since this type has no direct bearing on the phonology of metathesis, and the transposition of syllables (2) which, while superficially involving phonological units, is generally not phonologically induced. For the same reason, spoonerisms will not be dealt with. While type 4, transposition of suprasegmental features, may be relevant, lack of sufficient examples at present prevents us from including it.

Thus the scope of the investigation is limited to transpositions of phonological segments or features. These may involve reciprocal metathesis of two elements, as in irrevelant, or simple metathesis of one, as in BAGNÈRES-DE-LUCHON crabo < *cabro < LAT. capra 'goat.' Of course, the latter type may also be viewed as a special case of the former involving transposition of nonnull and null segments or features. Further, in the case of reciprocal metathesis, the two elements may be contiguous to one another, as in WEST SAXON fixas (fiksas) 'fish' (pl.) vs. fisc (fisk) 'fish,' or noncontiguous, as in irrevelant.

1.3 Hypotheses

Examination of the available data leads to a few empirically based general hypotheses which will constitute the guidelines for what follows:

1) Metathesis is a conservative process. That is, aside from the change in order which constitutes the process, it serves to preserve phonological elements, or familiar patterns, that otherwise might be lost, merged with other elements or changed in shape due to the workings of other processes.[4] In this respect it differs fundamentally from most other processes: assimilation, dissimilation, syncope, epenthesis, and so on. Thus in KOREAN, for example, h is retained syllable-initially before a stressed vowel and lost elsewhere. In h-final verb stems, however, when the following suffix-initial is a voiceless stop, the resultant sequence h + stop > aspirated stop, thus preserving an h (as aspiration) which would otherwise be lost: jotha < joh-ta '(it) is good,' mantha < manh-ta '(they) are many.' In this case, metathesis would appear to be abetted (or induced?) by the analogical pressure of the existing voiceless aspirates. In OLD ARMENIAN, vowels of final syllables were subject to syncope but high vowels after penults containing a metathesized with the preceding consonant, thus preserving the original vowel as the offglide of the vowel of the preceding syllable: artawsr < *artásur (< IE *drakur) 'tear' (note also earlier metathesis of *dr).

2) Metathesis is a recessive process. That is, it tends to be inhibited or counteracted by other, more dominant processes. The traditional relegation of metathesis to the "minor sound changes" (along with dissimilation, epenthesis, apheresis, et al.) is a tacit admission of its recessiveness. This characteristic also helps to explain why instances of all-pervasive metathesis are so rare and why, as noted above, some scholars look upon all or most cases of metathesis as sporadic. However, a careful study of interference from other processes may often lead to a more accurate picture of metathesis as a regular process -- at least at some given period in the history of the language. Thus in ATTIC and IONIC GREEK,

[4] Compare also in this connection Winter's characterization of metathesis in ARMENIAN (1962: 260-1) "...a metathesis occurs when the regular developments would lead to a deviation from the established pattern."

the y of INDO-EUROPEAN presents in *-yo metathesized with the preceding stem-final nasal (or stop + nasal), liquid, s or w, incidentally preserving it: phaínō < *phanyō 'I show,' phtheíro < *phthery-ō 'I destroy,' telō (Homeric teleíō < *teleísō < *telesyō 'I complete,' klaíō < *klaíwō < *klawyō 'I weep.' But stem-final voiced or voiceless stops followed by y resulted in occlusivization, assibilation or assimilation of y. Intervocalically, y was lost and, following vowel +s or w, it was lost with palatalization of the latter consonants. In CLASSICAL GREEK, these developments result in a somewhat flawed picture. Synchronically, metathesis is considerably limited in scope, although evidently attributable to what must once have been regular phonological causes.

3) The proneness of different phonetic classes to metathesis tends to stand in direct correlation with a hierarchy of resonance. Mutatis mutandis, the more resonant a sound, the more susceptible it is to metathesis. In ARMENIAN, the evidence points to a chronological hierarchy in the introduction of metathesis of original clusters of the type consonant + semivowel. The first to metathesize were clusters containing semivowels, followed by the liquids, nasals, spirants, stops and possibly the affricates, in that order. In the EASTERN ESKIMO dialects, an earlier tendency toward uvularization of stressed vowels coupled with a regressive shift of word stress from the ultima to the antepenult with subsequent syncope of the penult vowel produced metathesis in the resulting consonant cluster when the second member was a voiced uvular spirant (r): GREENLANDIC marLuk 'two' (cf. ALASKAN malruk and MACKENZIE RIVER maloerok). This occurred primarily when the first member was a lateral or a nasal, more rarely when it was s or y. When the second member was a uvular stop (q), various kinds of assimilation took place dependent upon the point and manner of articulation of the first member. In TAGALOG, when the passive suffixes -án - ín, presumably bearing obligatory stress, are added to stems, the shift of stress to the ultima incurs syncope of the penult vowel and metathesis in the resultant consonant cluster, as in gikbán vs. gibík 'come with help.' While there is no specific information as to the frequency of or restrictions on particular classes of phonemes with regard to this metathesis, a simple count of the distribution of various types in the examples cited by Blake (1925: 54, 302-7) yields the following for the original first member of the cluster: liquids 9, nasals 2, voiced stops 3, voiceless stops 1, h 1. The GREEK y-metathesis referred to above was unrestricted as to the preceding vowel when the first consonant was w but limited to a or o before liquids and nasals.

The disproportionately high (and widespread) frequency of occurrence of liquids in metathesis is proverbial.[5] A partial list of languages for which this is true includes:

Liquids: BRETON, CORNISH, EASTERN ESKIMO, MIDDLE and OLD FRENCH, GAELIC, ANCIENT GREEK, OLD ICELANDIC, ILOKO, INDO-EUROPEAN, INDONESIAN, OLD IRISH, LATIN, MANDAIC ARAMAIC, PERSIAN, SOUTH SLAVIC, OLD SPANISH, TAGALOG and ZOQUE.

r only: ANGLO-NORMAN, ARMENIAN, AVESTIC (and ZEND), BAGNÈRES-DE-LUCHON, MIDDLE ENGLISH, ITALIAN (SOPRASELVA), KAMHMU?, MAURITIAN CREOLE, VEDIC SANSKRIT, SARDINIAN and TOBA.

l only: AMUZGO and YOKUTS.

Excluding cases of liquid metathesis, the majority of which include vowels, metathesis of sequences composed of consonant and vowel or of two vowels is, in terms of the present sample, almost as frequent as metathesis involving liquids. Furthermore, if we subsume in the same context metatheses involving semivowels, vocalic metathesis is considerably more common than liquid metathesis (or, for that matter, any other consonantal type). Thus in OLD FRENCH the loss of an intervocalic stop sometimes resulted in an unfamiliar or inadmissible sequence of two vowels, a difficulty which was resolved by metathesis: tiule (< LAT. tēgula) > tuile 'tile.' In COMMON SLAVIC the strong tendency toward the conversion of closed to open syllables (which also triggered liquid metathesis in OLD CHURCH SLAVIC) produced syllabic metathesis of the sequence e + semivowel within the same syllable, *ey and *ew becoming *ji and *ju respectively. See also the developments of consonant + semivowel in OLD ARMENIAN and GREEK mentioned above.

While the limited size of the sample precludes any absolute reliance on statistical data, it is interesting to note that the frequency of occurrence of the various classes of sounds as initial and final members of sequences subject to metathesis generally supports the

[5] In connection with this kind of instability it is interesting to note Leopold's claim (1953-4: 8) that liquids are among the last sounds to be mastered by children during the learning process.

resonance-hierarchy hypothesis, the only major exceptions being the sibilants (principally s) and stops. However, in all but three of the cases involving sibilants the other member of the sequence is a stop. Furthermore, 47 of the 53 formal types representative of instances of contiguous metathesis that did not appear to be purely sporadic consisted of sequences containing one or two resonants.

2. Formal Types

In this section, we will examine a sampling of formal types of metathesis encountered in the present study. Rather than give an exhaustive account, which would be in part repetitive, I have chosen enough cases to be fairly representative of the whole, extending preference to those with higher general frequency of occurrence but also to others of low frequency yet of interest for typological reasons. The general order of presentation follows as closely as possible the resonance-hierarchy noted above, in descending order of resonance. (V = vowel, W = semivowel, L = liquid, F = spirant, S = sibilant, N = nasal, P stop, C = unrestricted consonant).

2.1 Types with one or two resonants

$V_1 + V_2 > V_2V_1$. The only examples of this type were found in OLD FRENCH (see Sec. 1.3) and PORTUGUESE: doesto 'affront' < deosto < *denosto on the analogy of the more familiar sequence oe. Metathesis, however, did not occur as a result of d-syncope. Compare miolo [myolo] 'pith' (LAT. medulla).

$V_1 + W_2 > W_1V_2$ or syllabic metathesis. This type has already been cited for COMMON SLAVIC (Sec. 1.3); it is also found in OLD FRENCH: angoisse - anguisse (angóis < LAT. angustia becomes angwɛs, MODERN āgwas) 'anguish' or paroisse (parói < LAT. parochia becomes parwɛs, MODERN parwas) 'parish.' Note also in both these examples earlier metathesis of consonant (st,k) + i following or concomitant with the weakening of unstressed final vowels.

V + L > LV. OLD IRISH túaslucud < earlier túasulcud 'opening' or OLD CHURCH SLAVIC prasę 'suckling pig' (cf. LAT. porcus, LITH. paršzas, RUSS. porosá).

L + V > VL. In SOPRASELVA ITALIAN rV > Vr in unstressed syllables: carstiaun < christianu. Note also metathesis of final CV. In late MIDDLE ENGLISH ri > ər before dentals: brid > bird.

C + V > VC. In ROTUMAN most words have two different forms corresponding to the grammatical contrast completive-incompletive. When the final vowel of the completive phase is more sonorous than the vowel of the preceding syllable, metathesis of the final CV in the incompletive occurs: leka (comp.) vs. leak or lyak (incomp.) 'go.' This type of metathesis appears to be fairly common in AUSTRONESIAN. Among others it is also found in KWARA'AE, ROWA and KUPANGESE. Similar to this is the type C + V (high) > WC found in ARMENIAN (see example in Sec. 1.3), GREEK (see 1.3), MANDAIC ARAMAIC, and OLD SPANISH and PORTUGUESE. While this occurred in ARMENIAN when the vowel of the preceding syllable was a, in SPANISH and PORTUGUESE the range was extended to include all nonhigh vowels. Compare PORT. coube < LAT. caput 'I took' and caibo < LAT. capio 'I take' (PORT. i and u represent semivowels here).

W + C > CW. Aside from wr > rw or ru, which constitutes a subtype of VL > LV above, the only observed examples of this type show y as the semivowel. Thus in ZOQUE an original sequence y + C is morphophonemically subject to metathesis as follows: y + t > t^y initially and yt^y elsewhere; y + T (any other dental) > T^y everywhere; y + C (any other C) > Cy initially, after nasals and vowels other than e. Metathesis also takes place across intervening h. Examples: t^yatah 'his father' < y-tatah, počuʔkumu 'he went out running' < poy-cuʔkum-, nwyihtu 'you walked' < Ny-wiht-, kamah-čowa 'oak-cotton gall' < kamayh-cowa. This type also appears in MIXE and YAGUA. In CASTILIAN SPANISH the earlier sequence *yt (< kt) yielded č: fecho - hecho vs. ARAGONESE and PORTUGUESE feito 'done, fact.'

F + L > LF. In CORNISH θl in final position following a vowel was subject to metathesis: whelth 'narration' vs. whethlow (pl.). Compare GALLIC chwedl. In OLD ICELANDIC we find: bílda 'ax' < *bídla, alfe 'force' < *afle, et al. Additional examples may be found in GAELIC, SPANISH, PORTUGUESE, PERSIAN and OLD ENGLISH.

P + L > LP. In CAMPIDANIAN SARDINIAN the original sequence PL metathesized intervocalically: arbili < aprile 'April,' sorgu < socru 'mother-in-law.' In OLD ENGLISH this occurred in word-final position: seld < setl 'seat.' In OLD ARMENIAN this was a systematic device for eliminating initial and medial clusters with liquids by redistribution of their members: ełbayr 'brother' (with prothetic vowel and r-dissimilation, cf. LAT. frāter and example in Sec. 1.3), kʿirtn 'sweat' (cf. GREEK hidrós). Further examples

of this type may be found in ILOKO, some INDONESIAN languages (e.g. TOBA), OLD FRENCH and SPANISH, and as a recurrent drift throughout the history of IRISH from the OLD IRISH period up to the present.

P+N > NP. Many of the examples of this type appear in some of the older INDO-EUROPEAN languages or groups, especially SANSKRIT, GREEK, LATIN and BALTIC, in connection with the nasal presents and nouns derived from them: SKT. limpā́mi, LITH. limpù vs. OCS prilĭ(p)na (from *leip- 'smear, stick'); LAT. fundus, GREEK púndaks vs. SKT. budhnás 'bottom' (note also ENGLISH bottom, GERMAN Boden). Examples of this type may also be found in ILOKO and OLD SPANISH.

2.2 Types without resonants

P+S > SP. Extremely common in the present sample, this type is particularly well represented in many INDO-EUROPEAN and SEMITIC languages. In BIBLICAL HEBREW when the 3rd sg. perf. refl. prefix hit- was added to stems with initial sibilants, metathesis took place: hištammer 'he watched himself' < *hit-šammer, hizdakkex 'he purified himself' < *hit-zakkex. Loan words beginning with ps- in LOW LATIN were regularly subject to metathesis: spyche (GREEK psykhḗ), spitacus (GREEK psittakós). Similarly, in VULGAR FRENCH word-final -ks, largely in learned terms, is transposed: tasque vs. STANDARD FRENCH taxe, lusque vs. luxe.

S+P > PS. The inverse of the immediately preceding this type does not appear to be as common as the former nor as regular. However, in LITHUANIAN verbs descended from INDO-EUROPEAN presents in *-sko, metathesis regularly occurs before the dentals of the infinitive (-ti) and future (-s) suffixes: drẽ̀ks 'tear (fut.)' vs. drẽ̀skia (3rd pres.), rė́ikšti 'to mean' vs. rė́iškė (3rd pret.). While examples of metathesis of an original sequence composed of dental (or alveolar) stop + sibilant are fairly abundant: SAVOYARD initial st < *ts < LAT. c[k] as in stanta 'sing' < cantare, MANDAIC estar vs. SYRIAC ette' sar (Macuch 1965: 90, no glosses) as a result of syncope of the vowel and glottal stop due to shift of stress to the suffix vowel, OCS mešto 'I throw' < *metšǫ < *metyǫ, I find no examples of the converse. Thus there seems to be a general preference for clusters of the type sibilant + dental stop over those with the inverse order. This observation leads to a tentative universal: clusters with the order dental (or alveolar) stop + sibilant (i.e. spirant) may metathesize but those with the inverse order do not. The more interesting generalization to the effect that dental + sibilant implies the presence of sibilant + dental may prove to be valid for phonological (as opposed to phonetic) clusters if dental, alveolar and palatal affricates are viewed as unit phonemes.

h+P Ph. This type has already been cited for KOREAN (see Sec. 1.3). According to Cho (1967), the analogous metathesis of ʔ + voiceless plain stop or s also occurs in KOREAN in certain verb forms and in substantival compounds: na:tk'ari 'haystack' < na:t-ʔ-kari, iśol 'toothbrush' i-ʔ-sor. However, this analysis rests on the positing of a suffix -ʔ "...whose morphological meaning is emphatic compounding..." (p. 150), a view that differs from that of other KOREAN scholars. Of course, what is of immediate interest to us in the present context is the possibility that such metatheses may on occasion be the sources of or at least contributing factors to the origins of aspirated and glottalized consonants. Compare also Bartholomae's Law in SANSKRIT and GREEK (see Sec. 2.4).

C+h > hC. In MANDAIC ARAMAIC many class III verbs originally had h (< ḥ) as third radical. Some of these lost h, some tended to retain it in "protected" position before t or n of the verbal suffix, and still others retained it by metathesis with the second radical: pāhra 'he flies' (cf. SYRIAC pārah), mehšī 'he measured it' (cf. SYRIAC mašḥēh). Particularly noteworthy is the fact that, although there appear to be no restrictions on the nature of the second radical, liquids are most often involved. With the exception of poholθa 'worship' (cf. also pihla and SYRIAC plaḥ),[6] all forms cited by Macuch (1965: especially pp. 85, 86, 88) show contiguous metathesis. Kiparsky (1967: 621) proposes an earlier, indirectly attested metathesis of this kind for PROTO-GREEK: LESBIAN ékrinna ~ ATTIC, et al. ékrĩna 'judged' < *ekrihna < *ekrinha < *ekrinsa, LESBIAN and THESSALIAN krĩnnō ~ ATTIC, et al. krĩnō 'judge' < *krihnō < *krinhō < *krinyō, which exactly parallels the y-metathesis in that language (see Sec. 1.3).

2.3 Quantitative metathesis

This type differs in substance from those just described but not in principle. There are undoubtedly a number of formally distinct subtypes but only two of these appear in the present sample. In ATTIC and IONIC GREEK the earlier sequence ē̆o > eō as a result of the regular shortening of vowels before vowels (and semi-

[6] Malone (1971), however, refers to this root as "exceptionally nonmetathesizing" citing Classical polhā́nā 'worship.'

vowels): IONIC teθneõtes 'the dead' < teθnɛ̄(w)ótes, ATTIC hippéōs 'horseman (gen. sg.)' < hippɛ̄(w)os. In this case, metathesis served to preserve the overall quantity of the original vocalic sequence following operation of the earlier vowel-shortening rule. In SIERRA MIWOK simple, regular verb stems have three or four different allomorphs depending in part on the syllabic shape of the basic present form and otherwise determined by occurrence with the future or recent past suffixes, the habitual or iterative suffixes, or in the syntactically identifiable environments of infinitive, denominative verb or deverbative noun (the latter three morphologically marked by stem-internal metathesis). Disyllabic present stems, regardless of their internal sequential arrangements of consonants, vowels and length, thus assume the same distinct canonical shapes in each of the three relevant environments, e.g. tuya·ŋ- (pres.) ~ tuyaŋ·- (fut./past) ~ tuy·aŋ- (hab./iter.) ~ tuyŋa- (inf./deverb. or denom.) 'jump.' Aside from the VC > CV metathesis in the second syllable of the fourth form, there are rather complex metatheses of syllable quantity that serve to distinguish one form from another. CV or stem-final CVC constitute short syllables; all other sequences are long (length is construed as a consonant). Thus the first (base) form is composed of a short +a long syllable (CV·C), the second short + long (CVC·), the third long (CVC) + short (·VC) and the last long (CVC) + short (CV). This kind of metathesis depends on a quantitative interplay between alternating long and short stem syllables, each of which may be represented by one of two (short) or more (long) forms. The system is in part morphophonemic (with accompanying suffixes), in part morphological (without suffixes). In the latter instance, the formal differences between two or more stem allomorphs serve to mark a grammatical contrast: ʔumc̆u 'winter' (stem 4) < ʔumu·c̆ 'approach winter' (stem 1). Although the causes may differ, quantitative and syllabic metathesis are formally but slightly different aspects of the same phenomenon. Thus the OLD FRENCH syllabic metathesis (Sec. 1.3) involved shortening and desonorization of o̲ simultaneously with lengthening and sonorization of i̲.

2.4 Noncontiguous types

Up to this point, we have limited the discussion to contiguous metathesis. The remainder of this section will be devoted to cases of noncontiguous metathesis. Generally speaking, the latter appear to be less systematic than the former, although there are still many examples of systematic noncontiguous metathesis. If this observation should be validated by a larger sample than the present one, it would point to a direct relationship between systematicity — and probably proneness to metathesis — and contiguity of the two elements involved in reciprocal metathesis. Following criteria of selection for noncontiguous types similar to those applied to contiguous ones, I will discuss here only those that are either frequent and systematic or are of additional typological interest.

$V_1 \ldots V_2 > V_2 \ldots V_1$. This type occurs frequently in INDONESIAN. Thus in some MADAGASCAN dialects, an original *ikur 'tail' (cf. also MALAYAN ikur) > uhi (< earlier ukir).

Simple metathesis of liquids. In BAGNÈRES-DE-LUCHON the liquid of a noninitial sequence of stop + liquid was regularly shifted to the corresponding postocclusive position in the originally initial syllable: trende 'tender' < *tendro < VULG. LAT. teneru, esplingo 'pin' < *espingla < spinula. While the noninitial cluster str was not affected by this metathesis, the analogous spr was: brespes 'vespers' < *bespras < vesperas. A similar instance of the same formal type reported by Grammont (p. 347), also systematically applied, is from the speech of an infant (from 20 to 22 months) based on STANDARD FRENCH. In this case the subject avoided cluster-final syllable-initial r, except word-initially, and syllable-final r: vrente 'belly' for ventre, proter 'carry' for porter.

Reciprocal metathesis of liquids. This kind is found in a number of different subtypes. In GAYO, for example, the widespread INDONESIAN type consisting of metathesis of the second and third consonants of the word affects all original sequences of lV_2r: INDONESIAN *tēlur > GAYO tĕrul 'egg.' In LOWER LEONESE (BRETON) r...l > l...r due to the analogous product of a regressive r-dissimilation (i.e. r...r > l...r): melver 'to die' < mervel, teũler 'to throw' (cf. LEON. teũrel), blérim 'grindstone' < brélim. Similarly in SPANISH we find milagro 'miracle' < O. SPAN. miraglo, palabra < parabla, etc. The formally related type n...l > l...n is found in several languages, e.g. PROVENÇAL culugno 'distaff' (cf. LANGUEDOC, GASCON cunulho, FRENCH quenouille) or lèuno 'the void' ~ nèulo (< nebula).

Reciprocal metathesis of nasals. Throughout AUSTRONESIAN an active-passive contrast is marked by prefixes that alternate with infixes of the same or similar shape. Thus in TAGALOG the active um- and passive in- prefixes are infixed before stems with initial consonants: íbig vs. umíbig 'wish' but súlat vs. sumúlat 'write.' Some stems beginning with resonants (vowel, l or y) take ni-, an interverted variant of in-: niunáhan 'was preceded by' but ináral 'was taught.' This same alternation in the prefixal allomorphs of

the passive is also found in ILOKO and NGGELA while the mu- allomorph of the active prefix occurs in NIAS and MENTAWAY. In the BRETON spoken at Vannes combined contiguous metathesis and subsequent (?) anaptyxis have produced forms like kanivet 'cobweb' (cf. LEON. kefniden 'spider') and kinivy 'moss' (O.LEON. kifny).

Reciprocal metathesis of spirants. In the meridional FRENCH spoken in the neighborhood of Agde and in the FRENCH-based CARIBBEAN CREOLE spoken in Dominica when s and š of STANDARD FRENCH occur in the same syllable in that order, metathesis is the rule: AGDE šɛs for FRENCH sèche 'dries,' šus for souche 'stump;' DOMINICA šasfam for sage-femme 'midwife.' Paralleling the contiguous type PS > SP noted above is a noncontiguous type with the same formal characteristics. In the PORTUGUESE of the Algarve, for instance, we find due to the analogical influence of the common prefixes es and estra- forms like: espetola < pistola 'pistol' and estrapôr < traspôr 'fade away, set (of the sun).'

Simple metathesis of aspiration. In MARATHI aspirated stops in word-final position would normally lose the component of aspiration due to the relatively weak articulation characteristic of that position. Instead, aspiration is preserved by a metathesis to word-initial position: khāṃk 'armpit' < kāṃkh, hoṃṭ < oṃṭh. This regular process has produced a tendency to shift word-medial aspiration to initial position as well: mhais 'buffalo' (SKT. mahiṣī), phattar 'stone' < earlier patthar. Cases of apparent aspirate metathesis are found in SANSKRIT and ANCIENT GREEK as a result of the operation of two different phonological processes. Thus Bartholomae's Law accounts for a shift of aspiration due presumably to the inadmissibility of a sequence of aspirated stop + obstruent. Briefly stated, when such a cluster arises due to morphological juxtaposition, the aspirated release shifts to cluster-final position: IE *k^{w}ṇthskō > *k^{w}ṇtskhō > PROTO-GREEK *pátskho > GREEK páskho 'I suffer' vs. páthos 'suffering, disease,' IE *lubhtós > SKT. lubdhás 'covetous' vs. SKT. lubhyāmi 'I yearn.' The other case is Grassmann's Law which describes a process of dissimilation: no syllable may begin and end with aspirated stops, and when two successive syllables begin with aspirated stops, the first of them to appear in the string is deaspirated. However, this rule is subject to various kinds of interference from other processes. For example, in the SANSKRIT reduplicated present of a verb such as dhā- 'put, place,' the first dual active indicative is dadhvás < *dhadhvas in accordance with the rule but the third dual is dhattás < *dhadhtas rather than the expected *daddhás which both Bartholomae's and Grassmann's Laws would have yielded. Similarly the earlier mentioned GREEK thríks (nom. sg.) < *thríkhs vs. trikhós (gen. sg.) < *thrikhós shows apparent metathesis within the paradigm actually due to dissimilation.

Reciprocal metathesis of obstruents. Most of the examples of this type seem to be sporadic. However, there is the case of the FRENCH child already mentioned (see note 3) and the somewhat unique instance of mazaguin [mæzægɛ̃] independently evolved in popular, infant and dialectal (e.g. BEARNAIS and GASCON) FRENCH from magasin.[7]

3. Cause and Effect

As early as 1900, Wechssler (pp. 496-7) suggested that a more fruitful approach to the problem of determining the status of metathesis than a purely formal one would be a classification based on the effects of metathesis on syllabic structure.[8] With particular attention to the situation in WESTERN ROMANCE, he speculated that the ultimate causes of metathesis were to be discovered in the replacement of a rarer with a commoner pattern of ordering and in lingering substratum influence. I quite agree that both premises are valid although of course the second one can only be invoked where applicable. However, examination of the more immediate causes of metathesis can be expected to shed some light on the interrelations between that process and others while providing support for the underlying cause. Therefore in this section we will attempt to investigate as well as we can, given the available information, those conditions that have resulted in metathesis in some of the languages sampled.

3.1 Reduction

Of all the phonological, grammatical and lexico-semantic processes responsible for metathesis, various kinds of reduction phenomena figure as the most important in terms of the present sample. For our purposes, these may be divided into two

[7] As I was composing this paper, Karl Zimmer informed me that his son Paul (age 3.2 years at the time) said maezaegín for magazine.

[8] This led him to the general conclusion that: "Der Grund des Vorgangs [metathesis] ist stets, dass dem Sprechenden die Reihenfolge der Laute und die Silbentrennung ungewohnt sind und daher Mühe machen." (op. cit., p. 497).

categories: imminent and actual reduction. With the former, a process of or tendency toward reduction is arrested or prevented by metathesis of the reduction-prone segment or feature with another one; with the latter, the fait accompli of reduction triggers metathesis, usually simultaneously. Thus in the first instance, metathesis serves as a vaccine or preventive medicine and in the second as a therapeutic device.

3.1.1 Imminent reduction The tendency toward apocope of unaccented final vowels frequently leads to metathesis with the preceding consonant. ROTUMAN provides an excellent illustration of this kind of development, not only because of the metathesis involved but also because of related developments leading to umlaut and vowel syncope. Due to an original penult stress in most words which was shifted to the ultima before certain enclitics, completive (i.e. definite) phase forms retained final vowels whereas in the incompletive phase the unstressed final was subject to different developments depending on the nature of both the original (i.e. completive form) ultima and penult vowels. As noted earlier (Sec. 2.1) if the ultima was lower than the penult, the former metathesized with the preceding consonant: hoas[9] < hosa 'flower,' tiok < tiko 'flesh.' If the ultima was a front or high vowel and nonidentical with the penult, an umlauted vowel was the result, in accordance with the following formulas: 1) back vowel + i > front rounded: fŭt < futi 'to pull,' hŏt < hoti 'to embark,' marɔ̈r < marari 'smooth;' 2) unrounded nonhigh vowel + u > rounded: ʔŏf < ʔefu 'bamboo,' hɔg < hagu 'to awaken;' 3) nonhigh back vowel + e > front: mɔ̈s < mose 'to sleep,' laej < laje 'coral.' All remaining combinations resulted in syncope (or apocope?) of the ultima: 1) when both vowels were identical: hag < haga 'to feed,' fuʔ < fuʔu 'to stay;' 2) when the ultima was as high as or higher than the penult: ʔaf < ʔafo 'basket,' fol < folu 'three,' heʔ < heʔo 'to call.' All three processes are clearly relatable if for umlaut and syncope an earlier stage of metathesis is posited (see Biggs 1959: 25 and 1965: 388-9): fŭt < *fuit. Thus metathesis served to preserve most of those vowels that might otherwise have been lost in unstressed final position. Furthermore, the secondary umlauting produced five new vowel phonemes, doubling the original five-vowel system. The grammatical contrast completive-incompletive, earlier syntactically marked by enclitics or postposed determiners, is now marked by stem allomorphy. A very similar

[9] Vowel sequences resulting from metathesis are analyzed by Biggs (1959: 25) as semivowel + vowel: hwas for hoas, tyok for tiok, etc.

situation existed in GERMANIC with i-umlaut forms like OLD ENGLISH fēt < *fŏt < *fōit (?) < GMC. *fōti(z). The threat of syncope in post-tonic position also produced metathesis and subsequent umlaut in WESTERN ROMANCE. Developments in IBERIAN are of particular interest since the PORTUGUESE forms often show the products of metathesis vis-à-vis the equivalent SPANISH forms which show the later stage of umlaut. The process is especially noticeable in the descendants of LATIN -io presents and -ui perfects: PORT. caibo, O.SPAN. quepo (< *caypo) < LAT. capio 'I take;' PORT. soube, O.SPAN. sope (< *sawpi) < LAT. sapuī 'I know.' The tendency still exists; compare VULG. SPANISH naide for nadie 'no one.' See also the above-cited examples from OLD FRENCH (Sec. 2.1). In IBERIAN metathesis was probably abetted by the process of diphthongization and fracture of accented vowels that was taking place at the same time. In any event, metathesis had the effect of preserving unstressed high vowels that might not otherwise have survived. Additional examples of this type of metathesis brought on by similar circumstances have been referred to above in OLD ARMENIAN, ATTIC and IONIC GREEK (Sec. 1.3) and MANDAIC ARAMAIC (cf. seynā < sanyā 'ugly,' qeyna < qanya 'reed' -- this occurred only with an original sequence of sonorant + y).

Another formal type that tends to be preserved by metathesis is aspiration or h. In ANCIENT GREEK h (< IE *s) was lost intervocalically but retained initially before a vowel. When the preterite augment e- was prefixed to an h- stem, metathesis occurred: heipómēn 'we followed' < *ehepómān, heírpon 'they crept' < *eherpon. Compare also hierós 'sacred' < *iherós. Thus the effect of the metathesis was to prevent the loss of intervocalic h. In OLD ARMENIAN one of the sources of the voiceless aspirates in initial position was through metathesis. INDO-EUROPEAN initial *s before vowel was lost in ARMENIAN except in two instances where it became h: *sp > pʿ as in pʿoitʿ 'haste' (cf. GK. spoudḗ), apparently via *hp > *ph, and *sw > kʿ as in kʿoir 'sister' < *swesōr, via *hw > *wh > *gh > *kh (intervocalic *s also lost). In much the same way, imminent loss of syllable-final h in KOREAN was avoided and additional voiceless aspirates produced (see Sec. 1.3). In MARATHI threatened loss of word-final aspiration and subsequent metathesis to word-initial position, followed by the analogical shift of word-medial aspiration (see Sec. 2.4), have the ultimate effect of altering the distribution of h and the aspirated occlusives. The MANDAIC ARAMAIC example cited in Sec. 2.2 appears to have been provoked in part by word-final zeroing of h and in part by vowel syncope between the second and third radicals.

The alternating AUSTRONESIAN prefix and infix allomorphs referred to earlier (Sec. 2.4) should also be considered for possible inclusion in the present causal category. As Brandstetter (1916: 322) noted: "Most commonly a word is abbreviated at the beginning, less often at the end, and least frequently in its interior. ...In ACHINESE in consequence of the accentuation of the last syllable, the first syllable of many WB's [word bases] is dropped. ...In CHAM we meet with similar abbreviations..." [capitals mine]. Furthermore, the syllable preceding the accented syllable is weaker than the one following it. The accent is usually on the penult or ultima of the word base and when a prefix is appended, the accent remains on the appropriate word-base syllable. With few isolated exceptions, AUSTRONESIAN languages allow only one consonant word-initially. Some languages allow one, others two consonants intervocalically and these are limited to nasal + stop or stop + stop (due to reduplication). The general tendency toward word-initial apheresis appears to have triggered metathesis of the prefixes. Since initial consonant clusters are not permitted, the infixes could only assume the VC-form, which explains why the prefixes are found in some languages with both CV- and VC- allomorphs as opposed to -VC- for the infixes.

In CLASSICAL LATIN loan words with initial ps-, the inadmissible cluster was resolved by reduction: sabulum 'sand' < GREEK psámmos. However, as noted above (Sec. 2.2), the same difficulty was resolved in LOW LATIN by means of metathesis, thus preserving both phonemes of the original cluster.

The quantitative metathesis found in ATTIC and IONIC GREEK (Sec. 2.2) provides a slightly different example of the preventive function of metathesis. Here the dilemma created by the prior shortening of vowels before vowels vis-à-vis the tendency to preserve syllabic length was resolved by compensatory lengthening of the second vowel; in other words, first partial reduction, then increment, the combined effect being quantitative metathesis.

3.1.2 Actual reduction Most of the instances of contiguous metathesis examined in the course of the present study were immediately caused by vowel syncope. The syncope itself was often brought on by accentual conditions. In CHOWCHILA YOKUTS, for example, with few isolated exceptions word stress is on the penult. Thus when either -haliy consequent adjunctive or -ilin intensive possessor is suffixed to the absolutive stem (i.e. in word-final position) stress falls on the first syllable of the suffix. However, when the suffix precedes an oblique suffix (all examples show vocalic

forms) stress is retained on the original penult of the absolutive and the new penult (the second vowel of the disyllabic suffix) is syncopated with metathesis of the two resonants of the resultant inadmissible cluster: xamithaliy (abs.) vs. xamithayla (obj., glottalization lost postconsonantally) 'scythe,' pitɬilin (abs.) vs. patɬinli (obj.) 'one with many body lice.' In Sec. 1.3 we noted a metathesis of the second and third consonants of the stem before -án ~ -ín in TAGALOG. A similar case found in the VIGAN dialect of ILOKO, another INDONESIAN language, shows metathesis of {t, k} + sonorant and change of stop to ʔ before stressed final syllables: limʔút < *likmút, linʔáw < *litnáw, daldalʔág < *datdatlág (cited without glosses, Vanoverbergh 1955?:40). Stress may occur on either the ultima or the penult. Since the sources of INDONESIAN medial consonant clusters are either reduplication or syllable-final nasal + syllable-initial stop, it seems likely that there was originally an intervening vowel which was syncopated due to a shift of stress to the final syllable. While in the TAGALOG and ILOKO examples the ultimate cause of syncope and metathesis was a progressive shift of word stress, in ESKIMO (Sec. 1.3) the motivating factor behind the same processes was regressive stress. The metathesis of t + sibilant noted above (Sec. 2.2) in HEBREW also occurred in PROTO-ARAMAIC. Over a millenium after that metathesis, a second one of precisely the same nature recurred in early MANDAIC as a result of stress-induced syncope. In ARAMAIC word stress shifts to the ultima in strong verbs and pretonic short vowels in open syllables are lost. While other ARAMAIC dialects either retained an original interconsonantal ʔə, vocalized it to e or assimilated ʔ to the preceding consonant, MANDAIC syncopated the entire sequence with the shift of stress to the ultima thus recreating the necessary condition (contiguity of the two consonants) for metathesis: ʔesθár (later ésθar) < *ʔeθsár < PRE-MANDAIC *ʔeθʔəsár 'he was bound.' Note that before unstressed inflectional suffixes, ʔ is lost but the vowel is retained, hence no metathesis: metesrīn (cf. SYRIAC meṯe'srīn).

Metathesis in consonant clusters resulting from syncope that does not stem from accentual shifts is found with a high degree of systematicity in OLD SPANISH. In VULGAR LATIN posttonic vowels other than a between liquids or s and occlusives or between k and l disappeared. This syncope was later generalized to posttonic vowels between any two consonants (although the remaining environments consisted largely of prevocalic occlusive and postvocalic liquid: letra < littera, pueblo < populu, etc.) in SPANISH and most of WESTERN ROMANCE. Clusters of the general type occlusive + liquid thus produced, many of which had no counterpart

in the pre-existing canons of the language, were subject to epenthesis, when the occlusive was a nasal: hombro 'shoulder' < humeru, temblar 'to tremble' < tremulare, engendrar 'to engender' < ingenerare, fortition in the case of r: honrar 'to honor' < honorare, or metathesis: viernes 'Friday' < Veneris '[day] of Venus,' colmo 'limit (of one's patience, etc.)' < cumulu, cernada - cendrada 'ashes (for soap)' < *cinerata, but also: cabildo 'municipal council' < capitulu, molde 'mold' < modulu (cf. OLD FRENCH espalde 'shoulder' < spatula) and the analogous candado 'padlock' < catenatu with a nasal instead of a liquid. Another instance of metathesis caused by simple syncope appears to be the treatment of sequences of the type V_1 + $^{?}V_2$ (where + represents morpheme boundary) in ZOQUE. Glottal stop cannot figure as the final member of a consonant cluster. Reduction of V_1, either through loss or semivocalization, is sometimes optional, its occurrence being directly correlated with high frequency of occurrence of the particular sequence of morphemes (vowel quality does not seem to figure as a causal factor). Once either degree of reduction has taken place, metathesis is obligatory: ?ʌ?wa?ŋi 'to that one' < ?ʌ?wa-?aŋi, mina? 'come now!' < *mina?? < minʌ-?a?, ?upa?u 'it foamed' < ?upu-?ah.

Apocope of final vowels appears to have triggered metathesis of an earlier spirant + liquid in PERSIAN: surx 'red' vs. ZEND suxra, žarf 'deep' vs. ZEND jafra, ars 'tears' vs. ZEND asru. In MANDAIC ARAMAIC borrowed ARABIC nouns of the general type FVᶜL(un), especially those with liquid third radicals, were subject to apheresis of the tanwīn (-un nom. indef.) thus producing an inadmissible final cluster which was usually resolved by inserting an anaptyctic vowel between the two consonants: ᶜomer 'age' ᶜumr(un), baɣal 'mule' < baǧl(un), but some forms with liquid resolved the cluster by metathesis: qolf 'lock' < qufl(un).

For examples of metathesis of two adjacent vowels induced by prior syncope of an intervening occlusive, compare OLD FRENCH tuile (Sec. 1.3) and OLD PORTUGUESE doesto (Sec. 2.1).

3.2 Open syllable canon

In languages undergoing a change from a mixed or relatively free syllable canon to a purely or largely open syllable type there are bound to be rather far-reaching repercussions in sequential arrangements of phonemes. This general process sometimes engenders metathesis. A particularly appropriate case in point is related to the development of open syllables in SOUTH SLAVIC. The general nature of the process is manifest in terms of a number of developments:

–Medial sequences consisting of stop + occlusive or s across original syllable boundary lost the syllable-final stop. The remaining analogous sequences: stop + liquid or semivowel, gn and s + stop, which also occurred commonly in word-initial position, were retained as comparable syllable-initial clusters, hence giving rise to a certain amount of resyllabification. Probably in part related to this process is the metathesis of COMMON SLAVIC *ty and *dy to OCS št and žd respectively: OCS meždа 'boundary' < *medyā (cf. SKT. mádhyā), OCS mešto 'I throw' < *metyą.

– Sequences of e + semivowel in the same syllable were subjected to syllabic metathesis; a + semivowel resulted in syncope of a and vocalization of the semivowel. Thus falling diphthongs were eliminated.

– Sequences of vowel + liquid were eliminated in various ways. Thus high vowel (phonetically short) + liquid remained largely unchanged but mid vowel (phonetically long) + liquid, which exceeded the permitted syllabic quantity, developed in one of the following ways: 1) resyllabification, the liquid offglide becoming a syllable-initial consonant; 2) vowel syncope with syllabification and lengthening of the liquid (which could be construed as a special type of quantitative metathesis); 3) loss of the liquid; 4) metathesis of the two segments resulting in a nonsyllabic liquid + a (phonetically) long vowel: OCS prasę 'suckling pig' (cf. LAT. porcus, LITH. paršzas), OCS vlěką 'I draw' (cf. GK. hélkō < *wélkō, LITH. velkù). Thus liquid metathesis as well as the earlier syllabic type are not merely isolated phenomena, rather two of the several links in the chain of developments that ultimately led to a uniform open syllable canon.

In many respects, the evolution of open syllables in FRENCH is strikingly similar to the corresponding processing in SLAVIC. Geminates were simplified, thus eliminating many syllable-final consonants; syllable-final s was lost; postvocalic nasals were lost with accompanying nasalization of the preceding vowel (this was also the case with some VN-sequences in SOUTH SLAVIC); and falling diphthongs were removed by syllabic metathesis (see examples in Sec. 2.1). Probably connected with this chain of events was the tendency to metathesize syllable-final r with the preceding vowel: brebis 'young lamb' < vervecem, troubler 'to disturb, worry' < torbler, fromage 'cheese' < *formaticum, but compare also the counterexample: pour 'for' < pro. Compare also the structurally similar examples cited above (Sec. 2.4) from MODERN FRENCH infant speech.

The effects of an open syllable canon on CLASSICAL ARMENIAN were even further complicated by the fact that the only permitted consonant clusters were composed of sibilant + stop (post-vocalic preconsonantal resonants functioned as offglides). Some of the devices used to eliminate clusters were reduction of stops in original stop + liquid clusters, but also metathesis of the latter (see Sec. 2.2) and earlier *tθ (< IE *dt) which became wt via *θt: giwt 'find' < *widtim, various reductions and assimilations of occlusive + semivowel or s, metathesis of *ks (> *sk > c^h): vec^h 'six' < *wesk (cf. GK. 'weks, LAT. sex) vs. veš-tasan 'sixteen' *wekš-, prothesis before sibilants or liquids, anaptyxis between consonant and nasal, and metathesis of hw (see Sec. 3.1.1).

3.3 Phonotactic constraints

Many metatheses are automatically induced by morphological juxtaposition that results in phonotactically inadmissible sequences. That is, metathesis constitutes a regular morphophonemic process in such instances. Still other metatheses are brought about by the introduction of noncanonic sequences in loan words. The same, of course, applies to much of what has been discussed in 3.1 and 3.2. Thus the morphophonemic function of metathesis represents a superficial level, usually symptomatic of more general, underlying causes. Unfortunately, for many of the systematic cases of metathesis examined pertinent historical information as to the ultimate causes of the process was lacking and I can only attempt to relate some of these to probable causes in terms of formal and distributional resemblances to historically better attested cases of metathesis.

In SOPRASELVA ITALIAN and BAGNÈRES-DE-LUCHON cluster-final syllable-initial r metathesizes with a following unstressed vowel unless the preceding consonants are s + dental stop: SOP. fartont vs. ITAL. frattanto 'meanwhile,' SOP. parneit vs. ITAL. prendete 'you take,' SOP. parschun vs. ITAL. prigione 'prison;' B-D-L. pardyó 'meadow near a stable' < *pratina (cf. SPAN. prado), burdakin 'buskin' (cf. FRENCH brodequin). In BAGNÈRES-DE-LUCHON this metathesis is not only inhibited by a following continuant; the latter provokes an inverse metathesis: grumant 'gourmand,' presék < *persicu 'peach.' A closely related kind of metathesis is found in CAMPIDANIAN SARDINIAN (see examples in 2.1). In all three languages there is a preference for single-consonant initials in syllables. In most INDONESIAN languages clusters composed of stop + liquid are non-native. Thus when such sequences enter the language in loan words they are automatically metathesized: TOBA purti 'daughter' SKT. putrī.

The noncontiguous metathesis r...l > l...r noted above in SPANISH may be in part due to the analogous product of r-dissimilation but is also attributable to the substitutionof the more frequently occurring gr for the disfavored gl. Thus word-initial gl > l and medial kl > x, tl and dl > ld (3.1.2), but initial bl remained intact (compare also O. SPAN. blago 'staff' < *baglo < *baculu). The formally similar case from BAGNÈRES-DE-LUCHON discussed in 2.4 seems to stem from different reasons -- anticipation of an awkward cluster which, especially because of its would-be occurrence in pretonic position, looms large in the awareness of the speaker. Presumably in an unconscious effort to deal with the difficulty as soon as possible, the original cluster is resolved by simple liquid metathesis to an initial postocclusive position. This, of course, does not resolve the problem; it merely prolongs the solution which, in BAGNÈRES-DE-LUCHON, was forthcoming at a later date in the form of a second metathesis (contiguous); Carbyewles ~Crabyewles 'Crabioules (name of a mountain)' < *capriolas. Anticipation may also explain in part forms like SPANISH blago.

Aside from cases of liquid metathesis produced by infrequent clusters, there are many instances where the phonotactics of the language in question absolutely rule out certain clusters containing liquids. For example, in ARMORICAN BRETON an initial cluster composed of gw + liquid was inadmissible, hence: gloan 'wool' vs. GALLIC gwlân, groac'h 'old women' vs. GALLIC gwrâch (o = w). In AMUZGO (Mexico) while lk may occur intervocalically, it does not initially. Furthermore, most initial sequences of l + C are reduced to single consonants through reduction and assimilation and initial clusters of more than two consonants are not tolerated. The plural of nouns is marked by a prefix l- (cf. l?a (pl.) vs. c?a (sg.) 'chile') which, when it precedes a k-initial noun stem,[10] triggers metathesis of the prefix to the nearest acceptable position, following the vowel of the stem-initial syllable: kalue? (pl.) vs. kacue? (sg.) 'dog' (lc > l), kalhɔ (pl.) vs. kachɔ (sg.) 'scorpion.' Thus the plural marker is preserved in the form of an infix. The above-noted ZOQUE restriction on the occurrence of ? as final member of clusters which, subsequent to vowel syncope, was responsible for metathesis of ? +vowel also accounts for the transposition of nasals or liquids followed by ?: pʌ?nis 'of the man'< pʌn-?is, luga?royh 'at the place'< lugar-?oyh (< SPAN.).

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10 I have no information as to the participation of other stops in this metathesis.

The cause of metathesis of root-final consonant + n-suffix that took place in INDO-EUROPEAN (cf. 2.2) probably lies in a phonological analogy based on the fairly common nasal + stop type of cluster as opposed to the relatively infrequent inverse. This impression is supported by the fact that only root-final stops or spirants are found in the metathesized nasal-infix class while the corresponding nasal-suffix class has finals in liquids, nasals or vowels but none in stops or spirants. Also a few related roots have a voiceless root-final corresponding to the voiced stop appearing in the nasal-infix present: LAT. pangō 'I fasten' but pāx, pācis 'cord,' pandere 'to extend' but patēre 'to be open, exposed.'

One of the effects of the phonotactically determined metathesis of yC sequences in ZOQUE and MIXE (2.1) is the creation of additional occurrences of the palatalized consonants. In these languages palatalization constitutes an important process and the phonemic system is richly endowed with a full complement of palatals. One wonders whether this sort of metathesis might not have originally given rise to these consonants or at least have been partially responsible. Alternatively, the existence of the palatals could have supplied added impetus to the metathesis. The latter explanation seems to be appropriate to the development of CASTILIAN č < *yt < LAT. kt (2.1).

Analogous to the ZOQUE situation is the KOREAN metathesis of ʔ + occlusive (2.2) which theoretically could have been a factor in the origin of the glottalized series or, conversely, could have been favored by the presence of glottalized consonants.

Most of the examples of PS > SP encountered in this study appear to be attributable to inadmissible or unfamiliar clusters. This is also true of some instances of the converse SP > PS but others may be due to other causes. Thus in WEST SAXON this metathesis generally occurred between stressed vowel and back vowel or between stressed back vowel and consonant or word juncture: dixas (pl.) vs. disc (nom. sg.), disces (gen.sg.) 'dish,' tūx < tūsc 'tusk,' hūxlic 'scornful' (cf. OLD ENGLISH hūsc, MIDDLE HIGH GERMAN hosche 'scorn'). However, considerable intraparadigmatic leveling eventually nullified the original phonological conditions.

3.4 Miscellaneous causes

The motivating factors discussed in this section, while just as different from one another as any of them are from those already discussed, are lumped together here simply because they are either uniquely or infrequently represented in the present sample.

3.4.1 Attraction and repulsion In late MIDDLE ENGLISH the sequence ri of stressed syllables tended to metathesize to or before dentals: bird, dirt, third < brid, drit, þridde, and also: burn, burst < brennen, bresten. Similarly, in LATIN ri in initial syllables before dentals was often metathesized: tertius < *tritios 'third,' cernō < *crinō 'I separate,' while lu underwent the same process before labials and velars: pulmō < *plumō 'lung,' dulcis < *dlukwis 'sweet.' Such cases illustrate the contributory effect of a process which may be called attraction. Thus while in both ENGLISH and LATIN initial clusters of the type Cr- were admissible, a postvocalic dental apparently exerted a strong attraction on the phonetically similar prevocalic r. This may have been strengthened by the general preference for simpler initial consonantal margins and the availability of a common CVC syllable type. On the other hand, an inverse metathesis occurred in ENGLISH when Vr was followed by a velar spirant + t: wright, wrought vs. WEST SAXON wyrhta, worhte, and fright < fyrɜt, bright vs. OLD ENGLISH berht. Here the dissimilarity of articulation between r and h[x] evidently produced a repulsion of r in spite of the other pressures to retain r in postvocalic position. Another case in point is found in the FRENCH spoken in the suburbs of Le Havre when rV > Vr before dentals: kɛrsō < cresson 'watercress,' gɛrlote < grelotter 'to shiver,' but Vr > rV before m and v: pruvie < épervier 'hawk.'

3.4.2 Anticipation When a sound that would normally occur later in a given string is shifted to a prior position due to an expected (subconsciously so) difficulty of articulation inherent in the original sequence, the metathesis is anticipatory. This essentially psychological explanation has been applied to cases of noncontiguous metathesis like the one cited from BAGNÈRES-DE-LUCHON (2.4) but also by many scholars to the C + V > VC (where V may be either vowel or semivowel) type noted in ROTUMAN and IBERIAN (2.1; 3.1.1) among others, the P + L > LP of ARMENIAN (2.1) or the P + N > NP type found, for instance, in INDO-EUROPEAN (2.2; 3.3). Wherever possible I have preferred to seek a phonologically based explanation for such phenomena; however, anticipation cannot be entirely ruled out as a contributing factor in many cases. This is perhaps more obvious in certain kinds of slips and spoonerisms. All the types that have been dubbed anticipatory are of necessity closely analogous to regressive assimilations or dissimilations. Thus the ultimate development of the C + V > VC type is umlaut.

3.4.3 Diphthongization When metathesis incidentally results in the formation of a diphthong or diphthongs that are not only current in the language but are themselves in process of spreading, the analogical pressure of diphthongization may be a contributing factor in some cases of metathesis. While I cannot state with certainty that this was so in SPANISH (3.1.1), PORTUGUESE (2.1; 3.1.1), FRENCH (2.1) and GREEK (1.3), it does seem likely in all of them. It may also have been true of MANDAIC ARAMAIC (3.1.1) but I have no information on the relative chronology of metathesis and monophthongization which apparently began rather early in the history of that language.

3.4.4 Dissimilation Another kind of phonological analogy which may induce or at least contribute to metathesis is the presence in the language of a strong dissimilatory pattern as was suggested for SPANISH milagro < *miraglo above. In MANDAIC ARAMAIC quadriliteral roots containing two l's generally dissimilate the first to r: garg(ə)la 'wheel' vs. HEBREW galgal. A number of loan words show metathesis of the type l...r > r...l: šarwāla (~šalwāra) < PERS. šalwār 'trousers,' raškal (~laškar) < PERS. laškær 'army.' Thus the products of metathesis and dissimilation (the more regular process of the two in this instance) converge, the former modeled after the latter.

3.4.5 Quantitative equilibrium The preservation of syllable- or word-internal quantity may be a factor in some cases of metathesis. Thus in the SLAVIC liquid metathesis (3.2), in addition to the pressure of the open-syllable tendency, syllabic quantity could not exceed the length of a long vowel. The syllabic nucleus mid vowel (phonetically long or half-long) + liquid (offglide) hence constituted an untenable sequence, resolved in part by metathesis. The ATTIC and IONIC metathesis ēo > eō is another case in point involving a shift of vowel length instead of transposition of syllabic segments. The "length mobile," to coin a phrase, of MIWOK, along with the VC > CV metathesis characteristic of fourth base forms is indicative of a system which tends to preserve a balance of alternating long and short syllables within the word.

4. Summary

In the course of the present paper, we have proposed and offered evidence in support of the following theses:

1. Metathesis preserves segments or features that would otherwise have been subject to loss or mutation through: syncope, apocope or apheresis; assimilation; epenthesis or anaptyxis; consonantization; fortition; palatalization; or monophthongization.

2. Since metathesis is usually recessive in comparison with most other processes, it is prone to greater interference from more dominant ones like: reduction, assimilation, dissimilation, and epenthesis or anaptyxis.

3. Generally speaking, the more resonant a segment is the greater the likelihood it will be affected by metathesis given the necessary conditions therefor. The sole exception involves an original sequence of voiceless stop + sibilant, metathesis of which was found to be fairly common and widespread.

Examination of causes and effects showed that, while the superficial cause of most metatheses is conversion of a phonologically inadmissible or disfavored sequence into an acceptable one, the underlying causes that produce such sequences fall into a number of different types:

1. The threatened or imminent reduction of a segment or feature (by apocope, syncope, or apheresis) due to accentual shift or other ultimate causes.

2. The actual reduction of a segment or feature, also due to accentual shift, grammatical process (e.g. the elimination of the tanwīn in ARABIC loans in MANDAIC ARAMAIC, see 3.1.2), lenition (of intervocalic occlusives in OLD FRENCH and OLD PORTUGUESE, see 2.1) or other causes.

3. A change from a mixed to a predominantly open syllable canon produced by several processes, one of which is metathesis. The ultimate cause of such a change would seem to stem from unusually weak articulation of syllable-final consonants.

4. The necessity for maintaining a specific syllable or word quantity.

5. Phonological constraints of a morphophonemic nature violated by accidents of morphological juxtaposition, introduction of noncanonical sequences in loan words, etc.

6. Analogical processes reflecting existing models of dissimilation, palatalization, glottalization, diphthongization, favored sequences, and the like.

7. Attraction and repulsion of phonetically similar and dissimilar, respectively, segments or features.

8. Anticipation of disfavored sequences.

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Phonological Processes

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ABSTRACT

Two phonological processes, (1) d → ð and (2) ð → d, are examined in some detail in SPANISH, GREEK, ENGLISH, ARABIC, ARAMAIC, and DANISH in order to see the kinds of universals whic extensive cross-linguistic investigation of phonological processes might yield. For each language, attention is paid to directionality of the process(es), degree of inclusiveness in larger schemata, favoring conditions for operation of the process(es), genetic vs. areal diffusion, and evidence from language acquisition and pidginization. Process (1) tends to be highly context-sensitive (assimilatory), part of a larger schema of spirantization, and readily diffusable. Process (2) tends to be relatively context-free (simplifying), restricted or isolated, and frequent in language acquisition and pidginization. In both, the stop is favored initially and after nasal, the spirant postvocalically. Exceptions to the proposed 'universals' are noted. The research strategy is found productive, but requires reliable, comparable processual data (including diachronic changes) from many languages.