# Metathesis

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Introduction

Metathesis is a term used in linguistics to describe a language pattern where a sequence of two sounds occurs in one order in one context and in the opposite order in a related context. For example, a word might have two sounds in one order in its singular form but the opposite order in its plural form; or the relative ordering of two sounds within a word form might change over the history of a language; or a speaker might swap two sounds when speaking quickly. The literature on metathesis dates back at least a century and covers topics concerning its origin, typology, Conditioning Factors, and theoretical status, among others. This bibliography provides a broad overview of the research carried out on the topic. It should be noted, however, that the literature on metathesis is not as expansive as, for example, that of processes such as assimilation or deletion. One reason for this is because metathesis does not occur as pervasively across languages and, as a result, it has been given less attention than other more common processes. This has resulted in the status of metathesis as a regular process being questioned, as discussed in the articles listed under Regularity of Metathesis. While links between metathesis and speech errors have sometimes been assumed (Metathesis and Speech Errors), most work on metathesis focuses on more regular phonological or morphological patterns (Morphological Metathesis), and among these, on metathesis involving a consonant and vowel or two consonants (though see Uncommon Metathesis Patterns). There are several informative works on cross-linguistic patterns of metathesis (see Typological Studies) as well as in-depth studies of metathesis in particular languages (see Language Case Studies). The literature is generally divided as to whether metathesis is analyzed as a synchronic process (see Theoretical Phonology Approaches), or as sound change (see Historical Approaches). In addition to theoretical and descriptive studies, metathesis has been examined to a lesser extent from psycholinguistic and computational perspectives (see Psycholinguistic Approaches, Computational Approaches) and also in terms of first and second language learning (see Language Acquisition). Most articles contain information on the factors conditioning metathesis (see Phonetic and Phonological, Sociolinguistic, and Statistical) which has provided insight into its nature, and has revealed that most of the factors conditioning metathesis are the same as those involved in more common processes (see Conditioning Factors). The authors wish to thank Kylie Fitzgerald for her assistance with this project.

Typological Studies

There are few works that provide extensive cross-linguistic studies of metathesis. Ultan 1978 is a classic reference which describes the array of metathesis types observed in language. Buckley 2011 is more recent and a good starting point for those wanting to learn about the process. The most comprehensive collection of cases can be found on the metathesis website Metathesis in Language. Mielke and Hume 2000 uses the database to study the cross-linguistic distribution of metathesis within words. Additional works to be considered are Blevins and Garrett 1998 and Blevins and Garrett 2004 (cited under Historical Approaches) and the study Hume 2004 on consonant-consonant metathesis, all of which are extensive studies of metathesis patterns and their Conditioning Factors.

An in-depth study into how synchronic patterns of consonant-vowel (CV) metathesis develop historically. Two types are proposed to emerge through distinct historical pathways: perceptual and compensatory metathesis. A third type is classified as pseudo-metathesis. The article provides a good overview of CV metathesis and the types of factors that can influence sequences of sounds involved in the process.


An informative overview of metathesis with descriptions provided of typical examples of consonant-consonant, consonant-vowel, and vowel-vowel metathesis. The chapter offers a broad perspective and includes recent empirical, theoretical, and experimental research on metathesis. It also includes discussion of synchronic and diachronic cases, and related processes.


The goal of this study is to develop a model that predicts the conditions under which the order of two sounds may be reversed. Based on thirty-four cases of consonant-consonant metathesis, two general conditions are proposed. First, there is indeterminacy in the acoustic signal due to the listener’s experience with the two sounds and the quality of the sounds’ acoustic cues in context. Second, the phonotactic or syllable structure that is created by reversing the input order must be attested in the language.

**Metathesis in Language.**

This Ohio State University website contains a database of over one hundred cases of metathesis developed by Elizabeth Hume and students. Cases are organized by language and according to whether they involve two consonants or a consonant and vowel. Each entry provides a description of the specific example of metathesis with data, information on Conditioning Factors, and references.


The paper contributes to understanding why metathesis is less common than processes such as assimilation. Part of the reason, it is argued, is because metathesis can disrupt word recognition more so than processes like assimilation. This predicts metathesis to be less likely at word beginnings, important contexts for word recognition. Evidence supporting the hypothesis comes from patterns of metathesis in fifty-four languages.

This is the first cross-linguistic study of metathesis and provides an informative overview of the range of sounds involved in metathesis. The paper categorizes cases of metathesis according to the factors that condition its occurrence. The author furthers the proposition that metathesis is a regular process that occurs widely across languages.

**Historical Approaches**

The explanation for why certain sequences of sounds occur in different orders is controversial. At the most general level, the approach that a given linguist takes to analyze metathesis reflects different theoretical assumptions. Yet, there can also be disagreement among those working within a similar approach. Common to all studies in this section is the assumption that metathesis emerges as a result of one or more historical processes. Blevins and Garrett 1998 (cited under Typological Studies), Blevins and Garrett 2004, and Anderson 2004 argue that metathesis can be understood historically; for example, as the outcome of a series of phonetically natural sound changes, or as a phonetically natural sound change itself. Under the assumption that metathesis can be explained as a result of historical change, synchronic explanations are unnecessary. Anderson 2004 also proposes that synchronic productivity in Morphological Metathesis patterns is simply due to humans’ flexible ability to learn arbitrary linguistic patterns. This perspective contrasts with one in which metathesis is the direct product of generative devices in a speaker’s synchronic grammar. Articles assuming the latter appear in Theoretical Phonology Approaches. The other papers in this section each present a historical analysis of a metathesis pattern in a specific language, including Polish in Czaplicki 2009, Old English in Hogg 1977, Bulgarian in Koorbanoff 1992, Mandaic in Malone 1971, and Armenian in Picard 1989.


Metathesis provides a case study to argue against including formal morphological devices as part of the human language faculty. Instead, it is argued that historical pathways can be used to explain different types of metatheses, as well as why metathesis is less common than affixation as a morphological marker.

Blevins, Juliette, and Andrew Garrett. 2004. The evolution of metathesis. In *Phonetically based phonology*. Edited by Bruce Hayes, Robert Kirchner, and Donca Steriade, 117–156. Cambridge, UK: Cambridge Univ. Press. DOI: [10.1017/CBO9780511486401.005](https://doi.org/10.1017/CBO9780511486401.005)

This paper proposes several historical pathways that can result in consonant-consonant metathesis, and argues that diachronic explanations for metathesis take precedence.
over synchronic ones. It presents a typology of consonant-consonant metathesis (perceptual, compensatory, coarticulatory, auditory), and concludes that most regular historical metatheses result from coarticulation that leads to ambiguous perception.


An account of vowel-consonant (VC) metathesis in Polish motivated largely by phonetic factors. The paper proposes that this metathesis arose diachronically in a nonoptimizing manner.


The author argues that a generative phonological account is unnecessary to explain regular r-metathesis in Old English. The patterns can instead be understood from the perspective of sound change and in a way that is consistent with a Neogrammrian approach.


This thesis includes both synchronic and diachronic analyses with the aim of creating a unified account of liquid metathesis in Bulgarian. The diachronic analysis shows that a majority of exceptions to the proposed phonological account entered the language after a crucial period in which syllabic liquids underwent phonemic reinterpretation. The synchronic account analyzes these exceptions.


A diachronic account of two metatheses in Mandaic, a Semitic language, and implications for other languages. One metathesis involves /t/ of the reflexive prefix before a sibilant, while the other involves a root-final /h/ and the preceding consonant.


The paper provides an analysis of Armenian prothesis and metathesis, and explores historical changes that resulted in vowel-r metathesis in Armenian.

### Regularity of Metathesis

The extent to which metathesis occurs as a regular pattern in language has been a matter of debate in the literature. Regularity here refers to systematic application within a language (e.g., Gascon in Duménil 1987, and Yuman in Langdon 1976). Works such as Stonham 1990 and Webb 1974 (cited under Transformational Rules) argue that there are no cases of regular synchronic metathesis, while the other contributors in this section attempt to
provide evidence that it is systematic. Hock 1985 and Hume 2001 both propose conditions under which metathesis may be regular. One challenge to recognizing metathesis as a regular process in a generative grammar is that allowing a string-reversal process in the grammar potentially opens the door to allowing a large variety of unattested phonological processes (see also Anderson 2004, cited under Historical Approaches). Canfield 2016 reviews evidence for systematic, productive metathesis, and argues that all attested metathesis processes can be analyzed within previously proposed formal limits on phonological processes. Given the many attested cases of metathesis reported in the literature, it is now generally accepted that metathesis can be a regular process.

Canfield, Tracy A. 2016. Metathesis is real, and it is a regular relation. PhD diss., Georgetown Univ.

This dissertation provides an extensive overview of many cases of metathesis. It is argued that metathesis can be a regular phenomenon and that the theoretical mechanisms that can be used to account for it are also regular in the sense of formal language theory. Useful discussion of previous approaches to diachronic and synchronic metathesis is included.


Metathesis of a cluster of stop and liquid in Gascon is shown to be predictable and rule-governed. The paper provides a large dataset along with insightful analyses. Syllable weight is argued to condition metathesis: a liquid shifts to the preceding syllable if that syllable is heavier than the original syllable.


Although previous works had discussed examples of regular metathesis, Hock tackles the question of ‘when’ metathesis may be regular. This paper posits that there must be a specific structural purpose served in order for metathesis to become regular.


The paper provides evidence that regular synchronic metathesis is attested cross-linguistically and is conditioned by natural language constraints. There is also detailed discussion of different formal accounts and of the linguistic and nonlinguistic factors that condition metathesis.


Provides evidence from Yuman supporting the notion that metathesis can be systematic. Yuman data is tested against universals proposed by Ultan 1978 (cited under
Typological Studies). The author suggests that greater integration of phonological and syntactic perspectives may facilitate work on this and other aspects of language.


The author argues that, despite observed patterns, metathesis is not used as a grammatical device to signal morphosyntactic properties in natural language, nor is it conditioned by any other morphological alternations.

Theoretical Phonology Approaches

The theoretical treatment of metathesis has been controversial. Part of this revolves around whether or not it exists as a regular process. Some works have claimed that it does not (Webb 1974 cited under Transformational Rules) while others argue against this position (Hume 2001 cited under Regularity of Metathesis). These views can be reflected in a theory’s capacity to represent metathesis. In rule-based phonology and Optimality Theory, metathesis is analyzed using the same theoretical machinery as other processes, while in nonlinear phonology, there is no straightforward means of describing metathesis as a single process. Metathesis has also been used as evidence for advancing particular theoretical claims (e.g., Bat-El 1988 and McCarthy 1989, both cited under Nonlinear Phonology).

Transformational Rules

Transformational rules were introduced most explicitly in Chomsky and Halle 1968. In that volume, it was proposed that metathesis can be described using the rule format presented in the theory. Kiparsky 1967 provides an example in support of the rule-based account of metathesis, while Webb 1974 argues against metathesis being described as rules.


Metathesis is discussed as an example of a process which changes multiple segments, alongside contraction and elision. All three processes are used in a description of nominal number marking in Kasem (Gur).


A diachronic study of metathesis and other processes involving sonorant consonants and /s/ in Greek. Explaining the data through the use of distinctive features and ordered rules is claimed to be better than through a historical linguistics approach that uses correspondences. The former is able to account for sound changes in Greek that had previously been considered anomalous.

A response to the claim in Chomsky and Halle 1968 that metathesis has the same status as other processes and is thus a regular phonological rule. Webb reexamines proposed cases of metathesis in Arabic and Greenlandic and concludes that there is no evidence for a synchronic rule of metathesis.

**Nonlinear Phonology**

The development of nonlinear and autosegmental phonology saw metathesis being used as evidence in new theoretical debates involving the relationships among tiers. Bat-El 1988, Hume 1991, and McCarthy 1989 address the extent to which morphemes and sounds are represented on the same or different tiers. In this approach, metathesis could not be analyzed as straightforwardly as more common processes such as assimilation and deletion. Lipski 1991 and Malone 1985, however, argue that some cases of metathesis could still be analyzed more parsimoniously than with Transformational Rules. The greater structural complexity in representing metathesis could be seen as a reflection of the process’s lower rate of occurrence cross-linguistically.


Metathesis (/t/ + [sibilant]) in Modern Hebrew provides evidence against the concept of tier conflation. This relates to a debate in the 1980s and 1990s where autosegmental tiers are used as a formal device to distinguish morphemes: each morpheme is represented on a different tier. The interaction of metathesis and voicing assimilation across morpheme boundaries suggests that tiers are not a sufficient mechanism for distinguishing morphemes.


The paper provides an example of metathesis being represented as a series of rules of vowel epenthesis and deletion, rather than as a single operation. Metathesis in the Maltese plural imperfective is also used as evidence to support the view that consonant and vowel features cannot be completely separated on different tiers throughout a derivation. An enriched model of feature organization is used.


The paper analyzed a collection of obstruent + /r/ metatheses in varieties of Spanish. A morpho-prosodic templatic approach proposed in the 1980s is used to formally represent metathesis and other morpho-phonological patterns.

Representing the interaction of /h/ assimilation and metathesis in Classical Mandaic serves as a test of the explanatory value of auto-segmental phonology. This analysis is then compared with earlier approaches.


The paper deals with a range of sound patterns including metathesis which appear to affect the ordering of sounds. It is argued that the segregation of vowels and consonants onto different representational planes is integral to providing a formal account of the patterns. A central insight of the paper is that segregation occurs when ordering is otherwise predictable.

**Optimality Theory**

With the advent of optimality theory (OT), metathesis was represented using the same theoretical tools (constraint ranking) as other phonological processes. This had consequences for the place of metathesis in phonological analyses. For example, a goal of Hume 2001 (cited in Regularity of Metathesis) is to show that a key reason for why metathesis was not previously considered to be a regular synchronic process in Nonlinear Phonology is because that theory did not include the requisite formalism to describe it as a single process. This changed with OT, in which metathesis can be described just as straightforwardly as any other process (see also Canfield 2016 in Regularity of Metathesis on metathesis in formal language theory in general and OT specifically). In particular, a violable constraint which penalizes ordering changes can be ranked above or below other standard faithfulness constraints in order to construct a simple phonological grammar that prefers metathesized output forms in some environments. Coetze 1999 is a good starting point for those with limited grounding in optimality theory, as no background in OT is assumed. Using constraints to describe processes also opened the door to examining the motivation for a particular constraint. Consequently, a greater emphasis was placed on the factors conditioning metathesis. For example, metathesis in Butskhrikidze and van de Weijer 2003 and Holt 2004 is driven by syllable-structure constraints that are ranked higher than the constraint on input order; while in Hume and Seo 2004, the higher-ranked constraints that cause metathesis are related to perceptual factors. Gerlach 2010 uses more complex constraints on sound order in an account of metathesis in child language. On the other hand, Jetchev 1997 does not refer to ordering constraints at all, but describes surface metathesis patterns as derived from complex underlying forms.


An optimality theoretic account of consonant-consonant (CC) metathesis in Georgian. Segmental and syllable structure constraints provide motivation for the metathesis of /v/, part of a thematic suffix, and the final sonorant consonant of the verb root.

Based on evidence from Tiberian Hebrew, the paper concludes that phonotactic constraints prohibiting certain contiguous segments should be included in the group of constraints that may lead to metathesis being selected as the output form.


The dissertation presents a longitudinal study of the acquisition of English by one child, focusing on processes affecting consonants. Consonant-consonant metathesis occurring across a vowel is one of the sound patterns examined. The analyses are cast within the framework of optimality theory.


An optimality theoretic account of CC metathesis in Spanish, which is shown to be motivated by syllable structure constraints. Interesting discussion of the Real Academia Española de la Lengua (1713–1714), proposed to have been an external force influencing which forms persisted in the language.


Similar fricative-stop metatheses in Faroese and Lithuanian are shown to be conditioned by prosodic and segmental factors. It is proposed that metathesis enhances the perceptibility of the consonants involved. An optimality theoretic account is presented which includes a potential case of derivational opacity.


A study of liquid/schwa metathesis in Bulgarian with extensive discussion of the contexts and Conditioning Factors; included as part of an analysis of vowel alternations in Bulgarian and French. A syllable-based account is proposed within an optimality theoretic framework.

**Morphological Metathesis**

Metathesis is commonly classified as a phonological process, but in some cases, the transposition of sounds serves a morphological function in the language such that different word functions are distinguished through segment order. Thompson and Thompson 1969, Janda 1984 and Stonham 1990 (cited in *Regularity of Metathesis*) are especially useful sources for


Chapter 5 (Linearity-based morphotactics) analyzes metathesis in several languages within the formal theory of distributed morphology. Basque is given special attention.


Spanish plural inflections are analyzed within a distributed morphology framework. The paper argues that metathesis can be expressed formally as a special case of partial reduplication in this framework.


The psycholinguistic study examines metathesis of consonants in Arabic and French in the speech of a dyslexic Arabic-French bilingual, building on an earlier study by the same authors (Prunet, et al. 2000, cited in this section). Metathesis of nonadjacent consonants in Arabic is argued to provide evidence for the morphemic status of the consonantal root.


It is argued that morphological metathesis is uncommon because diachronically, the possible sources that could lead to metathesis are themselves uncommon.


Written in French, the paper focuses on alternations between the CVCC and CCVC forms of words in Tunisian Arabic. The differences are argued to be due to morphological metathesis, where CVCC characterizes verbs and CCVC denotes the nominal counterpart. A detailed discussion is provided of the nature of the morphological metathesis rule and its interaction with other rules.

Metathesis errors in the aphasic speech of an Arabic speaker are argued to provide evidence for the status of consonantal roots as independent morphological units that native Arabic speakers access.


At the time this paper was written, various studies had cited examples of morphophonemic metathesis, though few had suggested that it served as a grammatical process. Using examples from Rotuman (*Austronesian*) and Clallam (Straits Salish), the authors argue for the consideration of metathesis as a grammatical device that signals semantic contrast.

### Psycholinguistic Approaches

An increasing amount of research examines metathesis experimentally. In the psycholinguistic literature, metathesis is more often called ‘transposition’ (especially when discussing written forms) or ‘exchange’ (see also *Metathesis and Speech Errors*). Guerrera and Forster 2008; Lupker, et al. 2008; and Perea and Carreiras 2008 investigate how letter transposition influences priming effects, with the goal of learning more about word recognition systems in general. Lupker, et al. 2008 and Perea and Carreiras 2008 find that written word recognition is relatively more robust to letter transpositions than other spelling perturbations, but this may be partially due to the kinds of letter strings that tend to be formed by transposition. In the auditory modality, Makashay 2001 (cited in *Statistical*) points toward a variety of other factors that influence recognition of transposed forms in speech, and Mielke and Hume 2000 (cited in *Typological Studies*) argues that languages tend to avoid initial metathesis, which might be relatively disruptive to word recognition. Prunet, et al. 2000 and Idrissi, et al. 2008 (both cited in *Morphological Metathesis*) examine metathesis patterns in speakers with aphasia and dyslexia in order to inform linguistic theorizing.


This paper demonstrates the flexibility of word recognition systems in terms of letter position. Strong priming effects are observed when up to six letters of an eight-letter word are transposed. Three models of letter coding are reviewed in light of the results.

This paper corroborates Spanish findings (with English), showing that transposed-letter non-word primes are more effective than replacement-letter non-word primes, but that this advantage only exists for the transposition of consonants, not vowels. A further experiment shows this may be at least partly attributable to vowels being more frequent.


A study of whether transposed-letter effects in masked priming experiments are affected by the result of being an illegal or legal cluster. The finding that an illegal bigram had a greater priming effect is important for those conducting lexical activation studies.

### Computational Approaches

Studies approaching metathesis from a computational perspective are rare. The only examples found of this type, Canfield 2016 (cited in *Regularity of Metathesis*) and Chandlee, et al. 2012, both discuss how metathesis can be formalized in terms of finite state transducers.


Three categories of metathesis (adjacent, bounded, unbounded long distance) are proposed and formalized as finite state transducers. The relative computational complexity of the types is argued to be reflected typologically in patterns of metathesis.

### Language Acquisition

In recent years, a growing amount of research has been devoted to the status of metathesis in first and second language learning. Children may have a limited ability to produce complex consonant sequences while their speech apparatus is still developing, and both L1 and L2 learners may lack experience in producing such complex sequences. Metathesis is one way that learners simplify complex syllable structures. Keren-Portnoy, et al. 2009 and Łukaszewicz 2007 illustrate metathesis in child language learning, which they argue may result from restrictions on syllable structure at an intermediate stage of language development. Kløve and Young-Scholten 2001 makes a similar argument from L2 production data. The long-distance metathesis studied in Gerlach 2010 (cited in *Optimality Theory*) is less likely to be the result of syllable simplification, but it might still be accounted for by a limited ability to plan certain consonant sequences. On the other hand, Fukazawa and Miglio 2008 also points toward spelling analogies as an additional cause of metathesis in L2 production, and
it is clear that the study of metathesis during language acquisition is an area of investigation that is ripe for further exploration.


This paper addresses the question of whether metathesis in first language acquisition differs from that in second language acquisition. Data come from the speech of a monolingual Japanese child, a trilingual child, and Japanese adults learning English. The authors conclude that metathesis in L1 and L2 differs crucially in that analogy to spelling patterns is an important factor in adult L2 patterns.


A study of the phonological development of four Italian children up to age 2. The transcribed productions included in the paper include some examples of metathesis. The authors argue that one of the factors influencing the children’s speech is the acquisition and preference for particular CV templates.


A production study on the role of metathesis as a syllable structure repair strategy in adult L2 Polish (by native speakers of English and Japanese) and L2 Norwegian (by native speakers of Cantonese).

Łukaszewicz, Beata. 2007. Reduction in syllable onsets in the acquisition of Polish: Deletion, coalescence, metathesis and gemination. Journal of Child Language 34.1 (February): 53–82. DOI: 10.1017/S0305000906007707

A case study of onset reduction strategies of a child acquiring Polish. Metathesis is used to resolve word-medial consonant clusters. Gemination is also used word-medially although deletion or coalescence occurs in word-initial clusters. The analyses are formalized within an optimality theoretic framework.

**Conditioning Factors**

Understanding the factors that contribute to the occurrence of metathesis has drawn considerable attention. Four types of factors are considered in this section: phonological, phonetic, Sociolinguistic, and Statistical. Most of the literature on metathesis makes reference to the phonological and phonetic properties of sounds involved in metathesis and their conditioning contexts. Thus while only a sampling of articles is presented in this section, many
articles throughout the bibliography are relevant. More unique are those papers dealing with sociolinguistic or statistical properties, such as those included below.

**Phonetic and Phonological**

The typical phonetic and phonological properties involved in metathesis are now fairly well understood. The cross-linguistic studies Blevins and Garrett 1998 (cited under Typological Studies), Blevins and Garrett 2004 (cited under Historical Approaches), and Hume 2004 (cited under Typological Studies with Hume 1998 being an earlier study included here) are particularly informative in this regard. The other papers included in this section focus more on metathesis in a particular language, including varieties of English (Anttila, et al. 2008 and Makashay 2001, cited under Statistical); Faroese and Lithuanian (Hume and Seo 2004, cited under Optimality Theory); L2 Polish and L2 Norwegian (Kløve and Young-Scholten 2001, cited under Language Acquisition); Bulgarian (Jetchev 1997, cited under Optimality Theory); and German (Park 2006). Park 2006 additionally includes typological evidence to support the hypothesis that greater variability in gestural coordination is associated with metathesis.


A valuable empirical contribution to the study of metathesis. Data collected from speakers of Singapore English provide a significant number of cases of CC metathesis. Statistical analyses show that the following lexical segment or boundary conditions metathesis. The process is argued to be a lexical rather than a postlexical process.


This is the first detailed study of the perceptual motivation behind cross-linguistic patterns of consonant-consonant metathesis. It is superseded by Hume 2004 (cited under Typological Studies), where it is shown that by taking into account both phonetic factors and cluster frequency, the resultant order of consonants in metathesis can be predicted.


Consonant-consonant metathesis is examined from an articulatory phonology approach. It is argued that consonant clusters with greater variability in gestural timing are more prone to metathesis.
Sociolinguistic

At the current time, Keshavarz 2000 is the only study of metathesis that takes into account sociolinguistic factors. The paucity of research on the topic is likely due in part to the observation that metathesis is less common than many other processes affecting sounds.


This is perhaps the only sociolinguistic study of metathesis to date. A production experiment involving native speakers of Persian shows that age, sex, and social class influence the use of the metathesized variant of a given word.

Statistical

Research taking into account the statistical nature of language as it relates to metathesis is, at present, rare. This is likely due to the fact that probabilistic approaches to understanding sound patterns (and language more generally) were relatively uncommon until more recently. Hume 2004 (cited under Typological Studies) proposes that metathesis is conditioned by language-users’ experience with a particular order of sounds, including the frequency of that order in the language. Makashay 2001 provides experimental evidence that the frequency of consonant clusters in English influences the degree to which clusters are perceptually metathesized by listeners.


This paper tests claims about perceptibility as a motivating factor in consonant-consonant metathesis. It shows that for English, both the perceptual cues of the adjacent consonants as well as the frequency of the clusters influence the degree to which clusters are perceptually metathesized by subjects in an experiment.

Uncommon Metathesis Patterns

Virtually all cases of metathesis discussed thus far have involved two consonants or a consonant and vowel. Vowel-vowel (VV) metathesis is rare, thus making the cases of Hawu (Blust 2012) and Kasem (Burton 1989, and Chomsky and Halle 1968 [cited in Transformational Rules]) especially interesting. However, Burton 1989 provides a reanalysis of the Kasem data that does not treat it as VV metathesis. Also uncommon is the metathesis of tones, as discussed in Holscher, et al. 1991.


A rare case of regular vowel-vowel metathesis is proposed to occur in Hawu under the conditions that (1) the height of the first vowel is higher than that of the second, and
the vowels are separated by a consonant. Although alternative explanations are
explored, the evidence supports the view that the change involves direct segmental
transposition.

Burton, Strang. 1989. Kasem coalescence and metathesis: A particle anal-

This paper provides an analysis of metathesis in Kasem, proposed as a case of VV
metathesis in Chomsky and Halle 1968 (see section Transformational Rules), but rean-
alyzed by many authors since. In this account, the author argues that particle theory
is able to provide a better account of the pattern than an account using distinctive
features.

Holscher, Daniel P., Monica Macaulay, and Marnie Jo Petray. 1991. Tone
metathesis in the Dangme imperative. Annual Meeting of the Berkeley
Linguistics Society (25 July):120–133. DOI: 10.3765/bls.v17i2.1660

This paper proposes that a rare case of tonal metathesis occurs in the Kwa language,
Dangme, spoken in Ghana. Positing metathesis is intended to account for the un-
expected patterning in certain imperative forms of the potential aspect marker high
tone.

Language Case Studies

The majority of research on metathesis focuses on specific language cases and in this research,
certain languages have received a disproportionate amount of attention. Particularly notable
are Austronesian and Romance Languages where metathesis is widespread, as well as some
Native North American Languages. Several articles have also been devoted to metathesis
in Arabic, English, and Slavic languages, among others. Metathesis in Greenlandic has
been included in this section as an example of early debates about whether metathesis is
phonological or morphological, and whether it is a single process or involves several distinct
processes.

Arabic

Arabic has been the focus of several papers on metathesis since the order of vowels and
consonants in a word corresponds to a morphological class. Despite this observation, differ-
ences in the linear order of sounds are not typically treated as a single process of metathesis.
More commonly, the sounds that make up a word are assumed to map onto a distinct mor-
phological template which itself specifies the order of the sounds (for related discussion, see
in Morphological Metathesis); and Kilani-Schoch and Dressler 1986 (cited in Morphological
Metathesis) all use metathesis as evidence for these morphological templates.

Suvremena Lingvistika 35.67: 1–21.
The article, written in French, proposes that Semitic triconsonantal roots are composed of a biconsonantal root and a matrix of phonetic features. One source of evidence for biconsonantal roots is the reversibility (metathesis) of consonants in semantically related words. It is argued that the proposed account is better able to capture regularities in the lexicon than alternatives.

**Austronesian**

Sound reversals are pervasive in Austronesian languages and, as a result, they have received considerable attention in the literature on metathesis. The cases are of particular interest given the various **Conditioning Factors** involved which, aside from common phonological factors, also include speech style, as discussed in Sohn 1980 and Heinz 2005. Besnier 1987, Biggs 1965, and Schmidt 2003 discuss a well-known case of morphological metathesis in Rotuman (see also Thompson and Thompson 1969 cited under Morphological Metathesis). However, McCarthy 2000 shows that it is also conditioned by prosodic structure. Laycock 1982 and Steinhauer 1996 discuss morphological metathesis in Dawanese. Among other languages noted below, Bonthuis 2001, Hume 1998, van der Hulst and van Engelenhoven 1995, and van Engelenhoven 1996 discuss a case in Leti which shows that metathesis can serve to mark whether or not a word is at the end of a phrase.


The author argues that an autosegmental phonological account of sound patterns in Rotuman provides a simpler explanation than previous approaches. Word-final vowels in CV structures are truncated and then reassociated leftward with the preceding vowel.


A seminal paper on the Rotuman sound system in which comparative diachronic data are presented showing that CV metathesis in the language distinguishes words in complete and incomplete morphological phases. The historical origins of the patterns are discussed.


A study of the use of CV metathesis in Leti as a grammatical device to mark phrase edges.

Metathesis data from Kwara’ae show the process involving pairs of words differing in register (citation versus normal speech), as previously noted in Sohn 1980, cited in this section. Metathesis is claimed to originate as a process of copy and deletion of a following vowel. Stress interacts with vowel deletion in some forms.


A study of metathesis in the Austronesian language, Leti. Two types of CV metathesis are examined. The first is motivated by a requirement that all phrases end in a vowel, and the second, by syllable well-formedness conditions: syllables have onsets and tautosyllabic consonant clusters are avoided. Using phonological evidence, it is argued that the direction of metathesis is opposite to that proposed in van Engelenhoven 1996 (cited in this section) and van der Hulst and van Engelenhoven 1995 (cited in this section).


Metathesis in Ririo and other Austronesian languages is compared, arguing that there is no evidence that these systems are the same. The paper provides a useful overview of types of metathesis and discussion of the systematicity of metathesis, and whether it can result from “play language.”


In addition to the morphological status of Rotuman metathesis, the author proposes that a prosodic difference between the complete and incomplete phases conditions metathesis. Optimality theoretic constraints that compare potential surface forms are proposed in order to account for the differences.


A summary of seven accounts of the Rotuman morphophonological processes, all proposing metathesis, but differing in the stage when metathesis occurs and the other processes involved. The author builds on these accounts to propose his own theory. A useful resource for considering how metathesis interacts with other morphophonological processes. Edited by John Lynch.


Primary data is presented showing synchronic CV metathesis in Kwara’ae as a regular phonologically conditioned process that can serve a morphological function. It can also
be conditioned by the formality of the situation (informal versus formal), a conditioning factor not commonly observed. Linear phonological rules are used to formalize the process.


The article shows metathesis to occur in all major word classes in Dawanese, and is conditioned by morphology and the phonemic structure of the root. The author suggests that metathesis can be analyzed as strengthening lexical border signals, rather than weakening the phonological integrity of lexemes. The author also critiques Laycock 1982, cited in this section.


A government phonology analysis of metathesis in Leti. Crucial to the account is the assumption that syllable structure is strictly onset/nucleus. Hume 1998 (cited in this section) provides a critical assessment of this analysis.


The author, a native speaker, presents data and discussion of metathesis in Leti which occurs across word boundaries and phrase-finally. Metathesis can also serve a semantic function. The data have been analyzed in several works including van der Hulst and van Engelenhoven 1995 (cited in this section) and Hume 1998 (cited in this section).

**English**

While metathesis is less pervasive in varieties of English than in some other languages, it is nonetheless observed both historically and synchronically. Alexander 1985 and Keyser 1975 provide rule-based accounts of alternations with the latter proposing typologically uncommon vowel-vowel metathesis though the alternations only occur at an abstract level of representation. Anttila, et al. 2008 (cited under Phonetic and Phonological) offers insight into a contemporary variety of English which includes a productive process of metathesis.


Examples of r-vowel metathesis collected from various dialects of English from the Oxford English Dictionary, among other sources. Metathesis is argued to be rule governed.
A rule of vowel-vowel metathesis is proposed for classes of weak verbs in Old English. Metathesis operates at an abstract level so that the sounds never occur in the metathesized order on the surface. The reordering creates the context for subsequent rules of vowel deletion to apply.

Greenlandic

The literature on metathesis in Greenlandic has been included in this section as an example of early debates about metathesis. Cearley 1970 addresses whether metathesis is phonological or morphological, and Pyle 1970, Sadock 1972, and Underhill 1971 discuss whether it is a single process or involves several distinct processes.


Cearley offers ordered sets of phonological processes (including metathesis) that Greenlandic words arguably go through to reach their derived form. In a footnote added some years later, Cearley claims that although fundamentally correct, the rules should have been morphologically based, rather than phonological.


Although metathesis is not the main theme of the paper, the author follows some earlier works in assuming that certain attested forms in Greenlandic can be accounted for by processes of metathesis, followed by assimilation.


The author supports the approach taken in Pyle 1970 (cited in this section) and disputes many of the points made in Underhill 1971 (cited in this section). It is stated that Underhill’s argument cannot entirely remove metathesis as an explanation though it is acknowledged that ad hoc accounts have often been proposed to explain the data.


In disputing Pyle 1970 (cited in this section) analysis, the author argues that gemination provides a better account of the observed data than does metathesis and assimilation. However, the gemination process is considered to be so old that it is difficult to create a systematic account of the modern forms.
Native North American Languages

The native languages of North America provide a rich source of data on metathesis. Most cases serve the function of distinguishing morphological classes, such as verb aspect in Saanich (Montler 1989) and Lummi (Demers 1974). Thompson and Thompson 1969 (cited under Morphological Metathesis) is one of the earliest papers to show that metathesis can play a role in signaling a semantic contrast. Stress, syllable weight and other phonological factors are also relevant, as in Alsea (Buckley 2007), Mutsun (Okrand 1979), and Sierra Miwok (Davis 2002). Flemming 1996 describes a case in Cherokee where aspiration may appear before, after, or instead of a vowel, depending on the surrounding consonants. Okrand 1979 hypothesizes about the history of metathesis in the Ohlone languages (also called Costanoan). Powell 1985 compares a variety of explanations for metathesis in Chimakum and Quileute, with the goal of evaluating proposed cross-linguistic metathesis tendencies.


A careful study of VC metathesis in this Amerindian language. For some alternating pairs, metathesis serves a morphosemantic function, signaling aspectual differences between words. Phonological factors also play a role: it is proposed that syllable weight is a conditioning factor explaining why only sonorant consonants metathesize.


A chapter in the dissertation is devoted to metathesis involving a subset of the possessive morphemes. The author argues that this is different from the more typical segment-based metathesis as it involves the displacement of an entire morpheme. Metathesis is phonologically conditioned (by syllable structure) though proposed to be a morphological process.


The paper presents data from the Salish language, Lummi, in which aspectual differences between verbs involves the CCV in one form corresponding to CVC in another. The author does not treat this as metathesis but rather gives a linear rule-based account involving vowel deletion in order to account for the patterns.


Metathesis data comes from the author’s fieldwork with a speaker of Cherokee. The process, analyzed within Optimality Theory, involves the metathesis of the laryngeal fricative /h/ across a vowel to an unaspirated consonant resulting in the consonant becoming aspirated.

This paper argues that in Saanich (a North Straits Salish dialect), reduplication, infixation, and metathesis are ways of achieving a closed (CVCC) environment for the stressed vowel in ACTUAL aspect. An important point is that the processes are phonologically related in their goal and therefore need to be studied together.


Metatheses in the Costanoan language, Mutsun, serve a morphological function but are also constrained by phonology. The author provides a detailed account of the patterns based on historical records.


Cognate sets with metathesis in Chimakum and Quileute in which consonants arguably metathesize across a vowel. The author suggests that the patterns are consistent with the cross-linguistic tendency for metathesis to preserve segments that would have otherwise been lost (Ultan 1978 cited in Typological Studies).

**Romance Languages**

Metathesis patterns are observed diachronically and synchronically in French, Sardinian, and Spanish. The data in the majority of cases involve liquid consonants (especially /r/) metathesizing with a consonant or vowel, such as in the classic studies of varieties of French in Grammont 1907 and Grammont 1933. For those unable to read French, similar patterns are discussed in Lyche 1995 and Spence 1990. For those interested in understanding metathesis from a historical perspective, Wiltshire and Graczyk 1989, Wireback 2002, and Wireback 2005, all in Spanish, are recommended. Other papers use metathesis to argue for a particular theoretical approach, such as optimality theory (Bradley 2007, Webb and Bradley 2009, and Holt 2004 cited under Optimality Theory) and distributed morphology (Harris and Halle 2005 cited under Morphological Metathesis). The sole paper on Sardinian, Molinu 1999, is a solid study based on extensive data.


Consonant-consonant metathesis in Judeo-Spanish changes intervocalic liquid-stop sequences. An optimality theoretic account is proposed with one pattern being motivated by syllable contact restrictions and another by the avoidance of adjacent segments sharing place, manner, and voice features.


An early and informative study of metathesis, written in French. Over forty examples of vowel/r metathesis are presented from the variety of French spoken in Pléchâtel in
northwestern France. The author argues that metathesis is regular and follows general principles in the language, themes that recur in the literature on metathesis.


An insightful account, written in French, that proposes different categories of metathesis based on explanatory factors, including syllable structure, articulatory complexity, and analogy to the order of sounds in other words.


Metathesis of /r/ + schwa in a French variety spoken in the United States; the case is similar to patterns presented in Grammont 1907 (cited in Romance Languages). The vowel metathesizes with a preceding /r/ occurring word-initially or when preceded by an obstruent. A unified treatment of the two types is given using a single epenthesis rule.


An extensive study of vowel/r metathesis in the language varieties of Sardinia. The article, written in French, is rich in data and offers good discussion of potential causes of metathesis.


CV metathesis, most involving /r/, is one of the processes discussed in this paper. The patterns are similar to those discussed in other French varieties included in this section.


Metathesis is used to test claims that rhotics are a single class of sounds that share a common feature. Rhotic metathesis in French and Spanish are analyzed within Optimality Theory.

An in-depth historical study of metathesis, primarily in Spanish. A lot of ground is covered in a relatively short paper: pseudo-metathesis; actual metathesis; metathesis of adjacent consonants; long-distance metathesis; historical origins; and phonetic, phonological, and morphological factors. Well worth reading for those interested in understanding metathesis in Spanish.


Assuming a four-stage model of consonant-glide metathesis, Wireback uses a combination of evidence from intermediary sounds evidenced in Hispano-Romance languages and perceptual and phonetic evidence to propose which stages are essential and which may be bypassed. Evidence is presented for different consonants, and similarities are drawn between consonant-glide metathesis and consonant-consonant metathesis.

**Wireback, Kenneth.** 2005. *On the regularization of consonant + consonant metathesis in the history of Spanish.* *Bulletin of Hispanic Studies* 82.2 (May): 137–158. DOI: 10.3828/bhs.82.2.1

The paper compares four instances of CC metathesis in Spanish, which became regular, with cases that did not gain regularity. It finds that less regular cases lacked one or more of the following factors: misperception due to adjacency, phonetic similarity, stretched out acoustic cues, and in some cases possible blended intermediate articulations.

**Metathesis and Speech Errors**

A few articles on speech errors are included since in some cases the reordering of sounds is observed. Fromkin 1971 and MacKay 1970 are classic articles on speech errors, and Nooteboom and Quené 2013 presents experimental elicitation data in which exchange errors are the most common kind of error. However, the similarities and differences between reorderings in metathesis patterns and speech errors has not, to date, been systematically investigated. This would be a fruitful area of research and one that could provide insight into whether some metatheses arise as a result of production errors.


Classic study of speech errors. Transpositions, also referred to in this paper as metathesis, are among the most common in the examined dataset.


A mathematically rigorous study of a large number of involuntary sound reversals produced by speakers of German in order to discover the contributing factors. These include, among others, phoneme frequency, proximity of affected sounds, phonetic similarity, and syllable structure.

The paper presents evidence that the exchanges of sounds, viewed as a form of speech error, may be more prevalent than previous studies have found.