

## 23. Language Games and Related Areas

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### 0 Introduction

Language games have had a long and uneasy relationship with phonological theory. There has been a general hesitancy to incorporate this linguistic behavior into mainstream phonological theory until fairly recently, and even now, language games are often seen as useful only to the extent that they can support a particular line of argumentation. Although it probably has multiple roots, this hesitancy stems largely from two factors intrinsic to the data themselves: (1) language game operations are superficially quite unlike ordinary language operations; and (2) language games are alternate linguistic systems which, although found in nearly every human language, have a relatively restricted sociolinguistic function, small speaker population, and uncertain acquisitional process. For these reasons, language games have been brought in to function as so-called external evidence to confirm or falsify the particular analysis of various aspects of the ordinary languages they are based upon, with little attempt to understand them as linguistic systems of their own.

Ironically, it was only with the advent of nonlinear theories of phonology that a better understanding of the true nature of language game mechanisms was gained, thereby allowing them to be taken more seriously. With the insights into phonological representation and nonconcatenative operations offered by autosegmental and prosodic models, language game operations were revealed to be systematic, principle-governed, and formally related to well-known phenomena in ordinary language such as reduplication, in spite of their surface appearances to the contrary. In other words, in terms of their formal structure, language games were shown to differ not so much *qualitatively* from ordinary language, but rather *quantitatively* in the degree to which ordinary language operations were modified or extended in the derivation of language game forms. This paved the way for insightful formalizations of the language game operations themselves. Still, the ultimate question most often asked was What do these systems tell us about the nonlinear representations, prosodic operations, etc., of their source languages? rather than, Why do these systems take the particular forms that they do, and how do they manifest the human linguistic capacity in its broadest sense? In this survey of the results of theoretical language game studies, responses to both of these (equally valid) questions will be addressed, although it will be shown that often the most significant insights have been gained by focusing on the second question.

In section 1, a brief survey of language games and their coverage in the literature will be provided. Then, the interaction of language games with linguistic theory will be explored in relation to three areas: the formalization of language game operations (section 2), the structure of nonlinear representations (section 3), and the location of language games within the larger model of the grammar (section 4). Section 5 will present some concluding remarks.

### 1 A Brief History of Ludling Studies

What exactly is a "language game"? Traditionally, definitions have focused on the sociolinguistic

functions that such systems perform, as revealed by their myriad names in the descriptive literature: language game, secret language, argot, code language, speech disguise, play language, word games, ritual language, speech play, and so on. The problem with such categories is that they obscure the formal similarities that are usually shared by these alternate linguistic systems regardless of their function – similarities that distinguish them as a group from other systems with identical functions but vastly different forms. While it is true that such languages are typically used to disguise the identity of their speakers and/ or facilitate private communication between them, or else to serve as a challenging (and fun) test of linguistic prowess, these functions are also performed by many other types of alternate language which would never be classified as “language games.”

For example, the merchant's argot used among Amharic speakers (Leslau 1964) is a “speech disguise” or “secret language,” but it simply involves a vocabulary (lexicon) which is distinct from the ordinary language: the phonological and morphological systems of the two languages are identical. The function of concealment may also be performed by a surrogate language (a language which uses a sound-producing mechanism other than the larynx, for example, a whistle pitch or musical

instrument): an example is the whistle language of Igbo adolescents described in Carrington (1949).<sup>1</sup> Another form of “speech disguise” is the purely phonetic modification found in *Fensterle*, a speech form of Swiss German in which pulmonic ingressive airstream is used to conceal the identity of the speaker in courtship situations (Catford 1977). Finally, within this same functional category one could probably also include Morse code: its use as a secret language is of course well known, and it is clear that from a functional perspective this phenomenon (and even more divergent systems) would be subsumed under the same general category.

In this chapter, language games will be defined in strictly formal terms, a move which is implicit in most current work on these systems but which was first suggested in Laycock (1972) and made fully explicit only in Bagemihl (1988a, 1988b). A significant advance in the classification of alternate languages was heralded by the appearance of Laycock (1972), in which attention was shifted away from the sociolinguistic functions of “play languages” to their formal properties. Laycock recognized that most of what had previously been labeled as play languages, secret languages, etc., share a very specific type of manipulation of linguistic structure; this property transcends the particular functions of these alternate linguistic systems and can be used as the basis for a more meaningful classification of them. Laycock coined the term *ludling* to refer to such systems, and I adopt this term here.<sup>2</sup>

For our purposes, a ludling is defined as a language which meets the following criteria: (1) its morphological system is limited to one or more operations drawn from the following: (a) infixing/affixing, (b) templatic, (c) reversal, (d) replacement; (2) its affixes (whether fully specified or defined only in prosodic or melodic terms) are limited to one or at most a handful of lexical items; and (3) its morphology is semantically empty.

The primary unifying characteristic of ludlings is that they exhibit an alternate and impoverished morphological system superimposed on the ordinary or non-ludling language. The four broad categories listed in (1) are not mutually exclusive (for example, a given ludling may combine infixation with reversal) and each includes a number of distinct subtypes, but the examples in (1) serve to illustrate the essence of each of these categories.

(1)

#### **Ludling operations**

- (a) **Infixing/affixing:** Tigrinya, *-gV- Infixation* (Bagemihl 1987)  
       bitša “yellow”       >       bigitšaga
- (b) **Templatic:** Amharic, *Cay(C)(C)CC Template* (McCarthy 1985)  
       bet “house”       >       baytat
- (c) **Reversing:** Tagalog, *Golagat* (Gil 1990)  
       puti “white”       >       itup
- (d) **Replacement:** Cuna, *i-Replacement* (Sherzer 1982)  
       nuka “name”       >       niki

The first and simplest type is the infixing or affixing ludling, which involves concatenation of a ludling affix in a non-ludling word. Typically the added element is an infix unspecified for its vowel or, less commonly, its consonant, although fully specified infixes and straight prefixes/suffixes are also attested.<sup>3</sup> The second major type of ludling morphology is templatic, in which the melodic portion of an ordinary language word is mapped onto a word-sized ludling template specified in terms of skeletal or perhaps more appropriately, prosodic structure. Sometimes certain segments in the template are prespecified or “overwritten,” and other phonological features such as nasality or voicelessness may be mapped onto the template as well. The third major category is the reversing ludling, involving many different possible types of operations such as total segment or syllable reversal, transposition (moving a peripheral constituent to the opposite end of the word), interchange (switching the first two or the last two syllables), false syllable reversal (syllable reversal with timing properties held constant), and so on. Some of these ludlings have been analyzed as forms of reduplication, for example in Yip (1982) and Bao (1990a), while Bagemihl (1989) presents a comprehensive analysis of all these types in terms of line-crossing. Finally, in replacement ludlings, all or most of the vowels in a non-ludling utterance are replaced by one or two segments in the ludling form: in the Cuna example, all vowels are replaced by *i*. Consonant replacement is also attested: in Chaga, for example, one ludling uses only the consonants *k, r,* and *j* (Raum 1937). These systems have not received a theoretical analysis in the literature, but it is quite likely that they are examples of the process of melodic overwriting proposed by McCarthy and Prince (1990) for the analysis of certain types of nonconcatenative morphology.<sup>4</sup>

Another crucial characteristic of ludlings is that their morphology (whether an affix, a template, or an inserted segment) is semantically empty (cf. McCarthy 1982, 1985; Bagemihl 1988a, 1988b): any added elements do not carry an identifiable meaning. Rather, “they signal that an exceptional register is being used to classify the speaker or hearer as belonging to a particular category of individuals... In particular, they cannot be considered to modify or combine with the meaning of the words they are attached to or to carry information about other words in the sentence as do meaningful affixes” (Bagemihl 1988a, pp. 37–38).

The relationship of ludlings to modern phonological theory goes back to the earliest works of generative phonology. In Chomsky and Halle (1968), Pig Latin data were used to argue for the necessity of rule ordering, while even earlier, Halle (1962) used Pig Latin to argue for the idea that language is a rule- and principle-governed grammar rather than a list of utterances. However, such use of ludling data was somewhat atypical for what we may refer to as the “first wave” of theoretical ludling studies. In early studies, ludlings were usually used as confirming evidence for aspects of the phonology of their source languages rather than for addressing (meta)theoretical questions. (Most of the time, however, ludlings were simply considered irrelevant and ignored altogether.) This sort of approach continues to this day, and the majority of ludling studies (historical to contemporary) divide almost uniformly into two categories: (1) descriptive, nontheoretical studies of individual ludling systems, and (2) ludlings used as external evidence. Examples of the first type range from early accounts with only a handful of data items, such as Hirschberg (1913) and Schlegel (1891) to recent, more detailed studies such as Demisse and Bender (1983).<sup>5</sup> A number of authors have also developed typologies of ludling systems within a descriptive vein, most notably Laycock (1972) and Haas (1967); see also Davis (1985) for a more recent survey, and Seppänen (1982) for a typology of Finnish ludlings from a computational perspective.

Studies in which ludlings are used as external evidence are, by now, fairly well established in the linguistic literature. Ohala (1986), in a survey of the relative merits of different types of evidence in phonological descriptions, ranks ludling data second only to experimental evidence; cf. Campbell (1986) for a similar endorsement. Perhaps the best known example of this type of study is Sherzer (1970), in which ludling data are used to argue for certain syllable structures and other aspects of the non-ludling phonological representations. Recent works such as Campbell (1980), Cowan, Braine, and Leavitt (1985), French (1988), and Demolin (1991) continue this tradition. A new type of study has also emerged fairly recently, one in which novel word games are created to test certain aspects of language structure; see Treiman (1983), Hombert (1986), and Campbell (1986).

In the “second wave” of theoretical studies, initiated primarily by the work of McCarthy (1979, 1982), phonologists discovered that ludling operations, rather than being bizarre or random, were

outstanding examples of non-concatenative morphology which lent themselves to elegant analyses under the emerging theories of nonlinear phonology/morphology. Where simple verbal descriptions of ludling operations sufficed in the first wave, explicit and rigorous formalizations now began to be offered, and ludlings were in many cases considered to have “mini-grammars” worthy of theoretical investigation in their own right. Studies such as Yip (1982) and Broselow and McCarthy (1983) continued this “second wave,” paving the way for a number of theoretically informed works devoted entirely to ludlings, such as Lefkowitz (1988), Bagemihl (1988b, 1989), Bao (1990), and Plénat (1991). Also falling into this category (and combining the “external evidence” approach) are studies in which ludlings are used as evidence for certain constructs in phonological theory (rather than aspects of their non-ludling language per se); examples include Vago (1985), Bagemihl (1987), and Tateishi (1989, 1991).

## 2 The Formalization of Ludling Operations

One of the most significant developments in the theoretical study of ludlings has been the recognition that ludling operations involve, to a large extent, modifications or extensions of ordinary language processes and principles. This discovery allowed ludling operations to be formalized as they had never been before, for nonlinear and prosodic models at last offered an idiom that was well-suited to the type of deformations performed by ludlings. At the same time, the fact that these frameworks could countenance naturally-occurring ludling operations while also excluding unattested ludling types, was powerful support for the models being developed. This is the sort of cross-fertilization between ludling systems and phonological theory that has led to some of the most important advances in each.

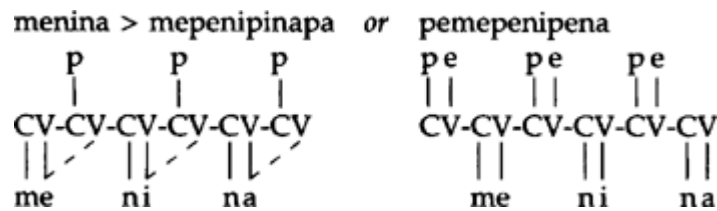
The first type of ludling to receive detailed theoretical attention was the infixing/affixing ludling, whose operations were used to argue for two basic constructs in the theories of nonlinear phonology/morphology: recognition of an independent level of timing structure or *skeleton* (see chap. 5, this volume, and also McCarthy 1982; Broselow and McCarthy 1983), and the placement of separate affixes on distinct morphological planes, sometimes known as the *Morphemic Tier Hypothesis* (McCarthy 1986; Cole 1987). Both of these assumptions were crucial in early nonlinear accounts of infixing ludlings to explain their apparent “vowel copying,” which was analyzed as the result of an empty vowel slot supplied by the ludling infix which received its segmental specification by spreading of the nearest non-ludling vowel. If the infixed segment occupied the same plane as the non-ludling word, spreading of a vowel from an adjacent syllable could not be achieved without crossing association lines.

The fundamental insight that ludling infixes involve an unspecified skeletal or prosodic position has remained intact with the continuing evolution in the representation of such structure through X-theory (Levin 1985a; Lowenstamm and Kaye 1986) to moraic theory (McCarthy and Prince 1986; Hayes 1989). However, ludling evidence for the Morphemic Tier Hypothesis has not remained nearly as strong, given recent developments in feature geometry. The Morphemic Tier Hypothesis is by no means unchallenged in non-ludling phonology (cf. Lieber 1987; McCarthy 1989b), and its validity is less immediately apparent for ludling systems. In particular, with a hierarchical model of feature geometry it is in principle no longer necessary to assume that ludling and non-ludling morphemes occupy separate planes: vowel features can spread across an intervening consonant without planar segregation, provided their class node is distinct from the consonant's (as in Clements's (1985) original proposal). However, for theories which distribute vowel features between two or more articulator class nodes (e.g., Sagey 1986; Steriade 1987), the Morphemic Tier Hypothesis must be assumed to account for the spreading onto ludling infixes: if [round] is dominated by the class node Labial, for example, while [low] is dominated by Dorsal, then it will not be possible to spread both features across a consonant without having to refer to each of these articulator nodes separately. On the other hand, for a theory which advocates entirely separate tiers for vowels and consonants (e.g., Clements 1990), the Morphemic Tier Hypothesis is no longer necessary, and it once again becomes an empirical issue as to whether ludling affixes do in fact occupy separate planes.

Evidence bearing on this question is difficult to find, but several cases discussed in McCarthy (1991) and Bagemihl (1988b) appear to show that in the unmarked case the Morphemic Tier Hypothesis is observed. The most compelling example concerns the fact that there is a major asymmetry in infixing

ludlings: when the infix follows the non-ludling syllable, its V-slot is unspecified (eventually acquiring the preceding non-ludling vowel through spreading), but when the infix precedes the non-ludling syllable, its vowel is always prespecified. This is illustrated by a ludling in Brazilian Portuguese (Sherzer 1982):

(2)



In this ludling, words can be formed in two different ways: one uses a postfix *-gpV-* with unspecified vowel, the other has a prefix *-pe-*. What we do not find is the opposite case: there do not appear to be any ludlings which infix a syllable unspecified for its vowel *in front* of a non-ludling syllable. Such a result follows from the planar segregation of ludling affixes, if we assume that in the unmarked case spreading applies to root nodes: for a postfix, the non-ludling vowel can spread rightward “across” the ludling consonant on a separate plane, whereas it cannot spread leftward to a hypothetical ludling infix with an empty V slot because of the non-ludling consonant intervening on the same plane. (However, this argument would not hold under the theory proposed in Clements (1990)). Similarly, cases of ludling affixes unspecified for consonants but specified for vowels (cf. examples in Swedish and Benkulu discussed in Bagemihl 1988b and McCarthy 1991) would also argue for the Morphemic Tier Hypothesis, unless Clements’s theory is assumed. For cases in Samoan and Tigrinya which seem to require ludling and non-ludling affixes on the *same* plane, see Bagemihl (1988b).

Like infixing ludlings, reversing and templatic ludlings first received theoretical attention in the context of the emerging theories of nonconcatenative morphology based on the CV-skeleton, in particular McCarthy’s (1979, 1981) theory of “root-and-pattern” morphology and Marantz’s (1982) theory of reduplication. Yip (1982) proposes that a particular class of Chinese reversing ludlings, the *fanqie* languages, are a startling example of prespecified reduplication/templatic morphology, in which the non-ludling phonemic melody is copied and then mapped onto a template with certain segments prespecified. Bao (1990) subsequently argued that Steriade’s (1988) theory of reduplication, involving full copy of syllables followed by (in this case) replacement of certain subsyllabic constituents with fixed ludling segments, offers a better analysis. Specifically, this approach can account for the behavior of glides and the full range of tone patterns in the ludling, among other properties.

While in this instance a full-copy approach may be preferable, neither Bao’s (1990) account nor Yip’s (1982) account extends to the full range of reversing ludlings which are found in human language. The Chinese *fanqie* languages represent simply one type of ludling known as Sequence Exchange, to use the terminology of Bagemihl (1989); examples of additional reversal types are given in (3).

(3)

- (a) Exchange
  - (i) *Segments*: Tagalog: dito > doti "here" (Conklin 1956)  
Javanese: satus > tasus "100" (Sadatano 1971)
  - (ii) *Sequence*: Hanunoo: rignuk > nugrik "tame" (Conklin 1959)  
Thai: khab rod > khod rab "to drive" (Surinramont 1973)  
Mandarin: ma > (ma key >) mey ka (Yip 1982, Bao 1990)
- (b) Total Reversal
  - (i) *Segments*: Javanese: dolanan > nanalod "play around" (Sadatano 1971)
  - (ii) *Syllables*: French: verite > terive "truth" (Lefkowitz 1987)
- (c) Transposition Fula: deftere > teredef "book" (Noye 1975)
- (d) Interchange Chasu: ikumi > imiku "ten" (Raum 1937)
- (e) "False" Reversals
  - (i) *Total*: Bakwiri: zeeya > yaaze "burn" (Hombert 1973)
  - (ii) *Interchange*: Sanga: mukweetu > mutuukwe (Coupez 1969)

The Chinese *fanqie* languages involve switching segments between a non-ludling word and a ludling "nonsense" word (e.g., *key* in the Mey-ka language); hence, reduplicative accounts are available for such ludlings because the segments of the nonsense word can always be construed as the prespecified information on the template (or the substituted onset/rhyme/etc.). However, sequence exchanges in many languages involve switching segments between consecutive non-ludling words, or within a single non-ludling word, and therefore cannot be analyzed as the substitution or prespecification of fixed information. Bagemihl (1989) proposes that these types of sequence exchanges as well as the full range of reversal types exemplified in (3) are derived through a combination of parameter settings which regulate the crossing of association lines. Line crossing is only available for ludling systems, and may combine with affixation of various prosodic constituents (e.g., syllables for transposition and interchange), template mapping (e.g., for total reversal), and segment spreading rules (e.g., for exchange processes). For example, a case of syllable transposition such as Fula *deftere* > *teredef* would result from suffixation of a maximal syllable, template satisfaction with maximum crossing of association lines, followed by movement of constituents to resolve the inconsistencies in linear ordering.<sup>6</sup>

True templatic ludlings (i.e., those which do not involve any reversal) have received less theoretical attention than other types. The few examples that have been considered argue for the recognition of the independence of the segmental and prosodic levels of representation, as well as operations which can take the melodic content of one word and map it onto a new skeletal/prosodic frame. For example, McCarthy (1985, 1986) utilizes an Amharic templatic ludling to argue for the autonomy of the CV-skeleton, as well as the effect of the OCP in limiting consecutive occurrences of the same segment to a single element on the melodic tier.<sup>7</sup> Bagemihl (1988a) explores the theoretical implications of an Inuit vocal behavior known as *Katajjait* or throat games, arguing that they are a well-developed form of templatic ludling. In this system, Inuktitut and/ or nonsense words are mapped onto a number of different ludling templates (which may themselves be reduplicated or triplicated); metrical structure is then constructed on top of this, governing the association of independent features regulating voicing and direction of airflow.

### 3 Nonlinear Representations

From their earliest treatments in the linguistic literature, ludlings have been used to argue for the psychological reality of phonological units such as the segment or phoneme. In more recent guises, ludlings provide important evidence for many aspects of nonlinear representations and prosodic categories. As we have seen, ludling data have fueled the recognition of a CV or timing tier precisely because many of their operations involve affixes which are unspecified for segmental material or involve manipulation of the melodic portion of a word independently of its timing properties. These



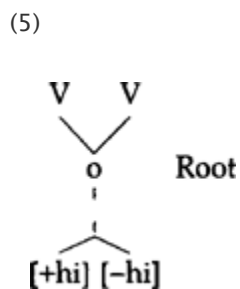
characteristics have also been important diagnostics for some specific aspects of multidimensional structures, in particular the representation of long vowels and diphthongs and the autosegmental status of tone features.

Vago (1985) demonstrates that ludlings provide clear support for the nonlinear representation of long vowels, in which a single melodic element is doubly-linked to two V-slots or prosodic positions. In particular, ludlings of the “false syllable reversal” or “false interchange” types, as well as sequence exchange ludlings, reverse elements at the segmental level while leaving the skeleton or prosodic framework of the word intact (cf. the examples in (3a, e)). The Finnish sequence exchange ludling *kontti kieli* also provides evidence for recognizing a structural difference between heavy diphthongs (two segments linked to two V-slots/moras) and light diphthongs (two segments linked to one V-slot/mora):

- (4) Heavy: /veitsi/ “knife” > veitsi + kontti > koitsi ventti  
 Light: /tee/ “road” > tie > tie + kontti > koo tientti

Heavy diphthongs are present underlyingly; as can be seen, only the first half of such a sequence participates in the reversal. Light diphthongs are derived from underlying long vowels, and in this case the entire diphthong behaves as a single unit in the reversal (with the replacing vowel o then occupying both of the original V-slots). Vago shows that this difference derives from the structural distinction between these two diphthongs. The ludlings affects only the first CV sequence at the melodic level (his analysis is couched within a CV-framework); assuming that root nodes are being manipulated,<sup>8</sup> the difference between the two diphthongs follows from the fact that a light diphthong involves a many-to-one linking while a heavy diphthong involves a many-to-one linking while a heavy diphthong is a one-to-one linking.

However, McCarthy (1991) examines the behavior of (derived) heavy diphthongs in English with respect to infixing ludlings and concludes that they also involve a many-to-one linking. Because such diphthongs act as single short vowels in the ludling (but are structurally long segments), we must consider these diphthongs to be a single segment (root node) linked to two prosodic positions, with branching only of the features that the two halves differ in:



Such structures are compatible with the *kontti kieli* data only if we assume that in Finnish the ludling is manipulating units below the level of the root node.

The independence of tone from segmental features provided much of the original impetus for the development of autosegmental phonology; many of the earliest theoretical treatments of ludlings have also focused on this aspect. Hombert (1986) points out that reversing ludlings which affect segments while leaving tones intact provide strong evidence for what he refers to as the “suprasegmental” status of tones. A number of researchers have subsequently developed more detailed analyses of the relationship between tones, segments, and prosodic structure. Bagmihl (1989) develops a theory of ludling reversals in which elements can be reversed at either the segmental or the prosodic levels (through crossing of association lines); if the reversal is segmental (i.e., affects root nodes), tones are unaffected, while if reversal is prosodic, i.e., affects syllables, tones will also move. Furthermore, tone reversal is tied to the reversal of length: timing patterns are predicted to reverse whenever tone reverses, since both are achieved by manipulating elements at the prosodic level. Bao (1990) makes similar observations concerning *fanqie* languages: if segmental units

are manipulated (through an operation of substitution) tones are unaffected, while if prosodic units are manipulated (e.g., various syllable subparts) then tones will be replaced as well.

In addition to enhancing our understanding of melodic-prosodic interactions, ludlings have recently offered support for the recognition and structure of strictly prosodic units such as the syllable, mora, and foot. Of course, syllable-reversing ludlings such as the examples given earlier were offered in the early generative literature as compelling evidence for recognition of the syllable as a bona fide phonological unit. More recently, the question of subsyllabic structure has come to the forefront. Originally, sequence exchange ludlings such as English Pig Latin were taken to support an onset-rhyme subdivision of the syllable, since in this ludling all word-initial pre-vocalic consonants (the putative onset) are affected: *street eetstray*. However, Yip's (1982) templatic analysis of the similar Chinese ludlings demonstrated that prespecification on a fixed prosodic frame could account for the same type of facts without recognizing any internal syllabic constituency; this approach is echoed in McCarthy and Prince (1986) within a prosodic morphology framework. Bao (1990) advocates a return to subsyllabic constituency in the analysis of *fanqie* languages, utilizing a version of Steriade's (1988) framework where units such as onset, rhyme, nucleus, etc., can be replaced by fixed material (see chap. 6, this volume). The debate is far from resolved, however: Bagemihl (1989) shows that whatever mechanism is used for sequence exchanges with fixed material (e.g., Pig Latin, *fanqie* languages), it will not necessarily generalize to ludlings that exchange segments between or within non-ludling words. A line-crossing account, involving (iterative) segment-spreading rules, can account for all such cases without reference to an onset-rhyme division. Moreover, parallel to cases of putative rhyme manipulation (where a syllable-final VC sequence is moved, as in the Thai example in (3aii) above), we find cases where an initial CV sequence excluding any coda consonants is affected (e.g., Hanunoo in (3aii)). If we assume that ludlings can only manipulate phonological constituents, these ludlings are potentially problematic within traditional theories of syllable structure since this  $C_0V$  sequence does not form a constituent. Bagemihl (1989) analyzes these as consecutive spreading (exchange) of the prenuclear consonant(s) and vowel (since both consonant and vowel exchange are attested as independent operations; cf. (3ai)). Alternatively, in some theories which recognize the mora as a prosodic unit, the first  $C_0V$  sequence of a syllable is dominated by the same mora (see chaps. 5 and 6, this volume; see also Hyman 1985; Zec 1988), so it could be that these ludlings are accessing moras rather than segments or any other subsyllabic constituents.

The Japanese *Musician's Language* discussed in Tateishi (1989, 1991), Poser (1990), and Permutter (1991) provides further evidence for the mora as a subsyllabic constituent, as well as for the prosodic unit of foot. In this ludling, the largest rightmost constituent that does not exhaustively cover the word is transposed to the beginning of the word and mapped onto a bimoraic foot; the remainder of the word is also mapped onto a bimoraic foot (if only a single segment is transposed, a copy of it remains in the original syllable).

(6)

(a) Foot	ku[suri] <sub>F</sub>	"medication"	>	surikuu
	mane[zyaa] <sub>F</sub>	"manager"	>	zyaamane
(b) Syllable	ha[ra] <sub>σ</sub>	"stomach"	>	raahaa
(c) Mora	ha[i] <sub>μ</sub>	"lungs"	>	iihaa
(d) Segment	hi	"fire"	>	iihii

As can be seen, this ludling accesses both feet and moras in addition to syllables and segments.<sup>9</sup> These data have also been used to argue for right-to-left foot construction in Japanese, since in trisyllabic words left-to-right construction would incorrectly bracket together the first two syllables as a foot. This directionality is also consistent with a number of other phonological/ morphological processes in Japanese such as the accentuation of noun-noun compounds and loanwords, and the gemination in intensive mimetics.<sup>10</sup>

#### 4 The Organization of the Grammar

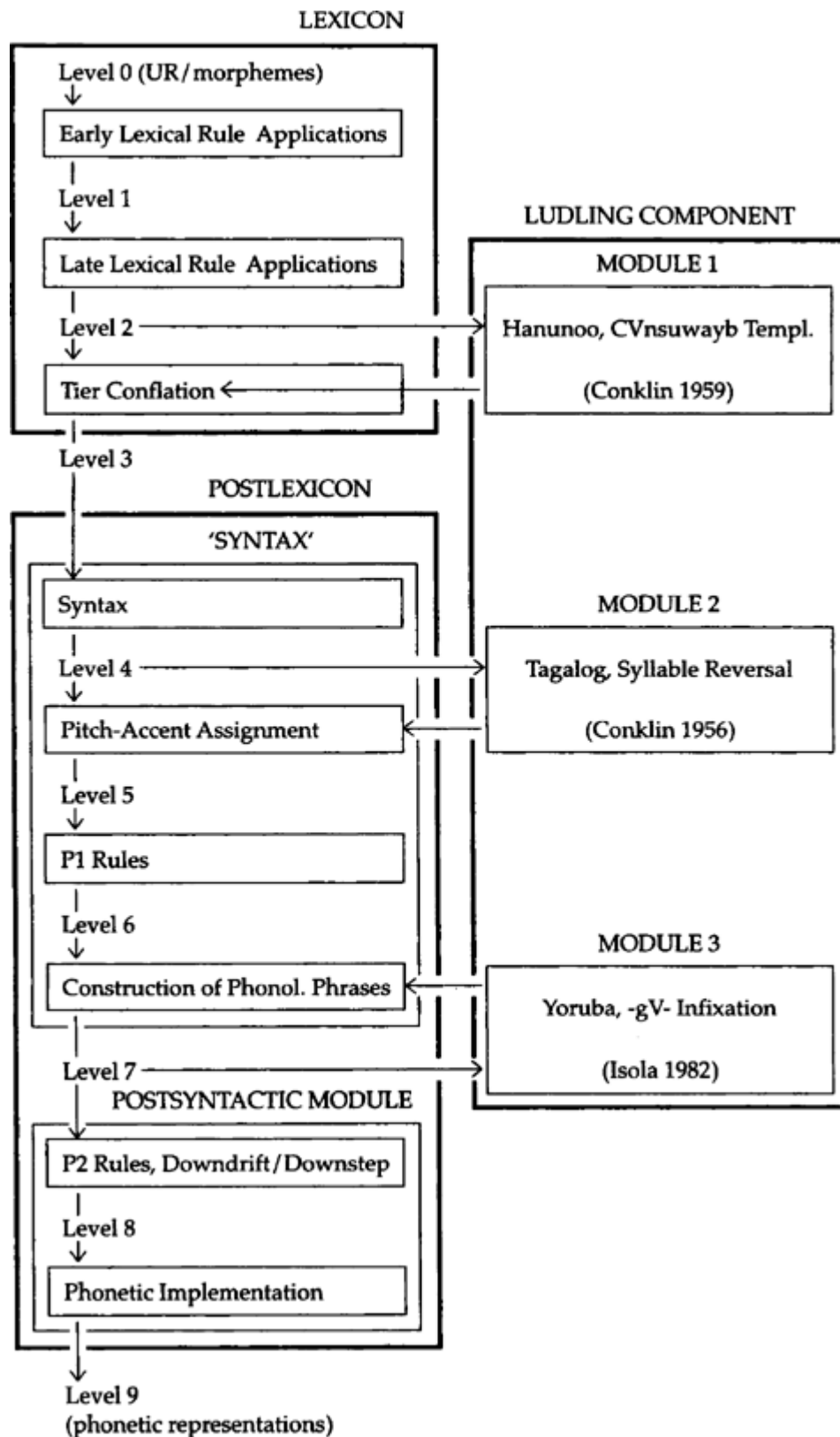


Although many descriptive and theoretical accounts of ludlings are now available, there are few definitive proposals regarding where ludling conversion is located within the larger model of the grammar. The most explicit early proposal is that of Mohanan (1982) who places the ludling component (where all ludling-specific phonology and morphology takes place) between the lexical and post-lexical components (within the framework of lexical phonology). This is based on two fundamental observations: all ludlings follow (non-ludling) morphological operations and lexical phonological rules. A number of other authors have made passing statements about which level(s) of representation they consider to serve as input to the particular ludling they are examining (e.g., Yip 1982, p. 640; McCarthy 1986, p. 229; Cowan, Braine, and Leavitt 1985, p. 687; Churma 1979, p. 90). While there is no overall consensus on the location of ludlings, these authors seem to share the observation that ludling conversion may take place at some intermediate level or levels of representation within the phonology. Some authors also hypothesize that either quite shallow (surface) representations as well as fairly deep (lexical or underlying) representations may serve as input.

The most comprehensive proposal put forward is that of Bagemihl (1988b), who presents a detailed model of the ludling component based on data from more than fifty ludlings; this is schematized in (7). This model (also couched within the lexical phonology framework) preserves Mohanan's (and others') essential insight about an intermediate location for the ludling component, but posits a highly modularized internal structure to account for the cross-ludling variations. The basis of this model is a highly articulated conception of the post-lexical phonology-syntax interface, combining proposals of Selkirk (1984, 1986), Kaisse (1985a), Pulleyblank (1986a), Mohanan (1986), Rice (1990), and others, which converge in the recognition of at least five distinct post-lexical levels of representation within the non-ludling phonology.

According to this model, there are three points in the grammar where the ludling component can access the phonological representation, each corresponding to a particularly salient juncture within the grammar. The first module is located at the output of the lexicon prior to Tier Conflation,<sup>11</sup> the

(7)



second at the output of the syntax prior to the post-lexical phonology, and the third at the division between the syntactic and postsyntactic modules of the postlexicon. Depending on which module a ludling is assigned to, it will exhibit a variety of distinctive properties which are specific to that location, summarized in (8).

(8)

Ludling Properties	Module: 1	2	3
(a) Follow all lexical phonological/morphological processes	+	+	+
(b) Precede P2 post-lexical rules and phonetic implementation	+	+	+
(c) Follow Tier/Plane Conflation	-	+	+
(d) May violate Melodic Conservation	-	+	+
(e) May apply between words/access sentence position	-	+	+
(f) Precede intonation/pitch-accent assignment	+	+	-
(g) Precede P1 post-lexical rules	+	+	-
(h) May access post-lexical prosodic constituents	-	-	+
(i) May violate geminate integrity, OCP	-	-	+
(j) May ignore function words	-	-	+
(k) Are structure-violating	-	-	+

In addition to accounting for the cluster of properties associated with each conversion location, the use of several modules within the ludling component has a number of other important consequences. For example, it predicts that a given language can have ludlings located in different modules (e.g., Tagalog *Galagat* (segment reversal) is a Module 1 ludling, while *Syllable Reversal* in the same language is a Module 3 ludling). In addition, the operations associated with a single ludling may be distributed across more than one module: for example, one Hanunoo ludling involves reduplication of non-ludling syllables (a Module 1 operation) and insertion of clitics between words and at phrase boundaries (a Module 3 operation). Finally, this model allows us to account for different dialects of the same ludling which differ in their location with respect to the operation of non-ludling rules (e.g., the dialects of the Cuna transposition ludling, *Sorsik Sunmakke*, reported in Sherzer (1970)).

## 5 Conclusion

As we have seen, the relationship between ludlings and phonological theory has finally developed into one that is mutually beneficial: by addressing the phenomena found in ludlings, linguistic theory has found important independent evidence as well as challenges for many of its hypotheses, and by incorporating the advances of phonological theory, ludlings have received insightful explanations for why they take the forms that they do. It is vital that this two-way interaction continue. Three things are necessary for such a continuation: (1) more primary data are required, and longitudinal studies into the acquisition of ludlings must be initiated.<sup>12</sup> (2) Detailed theoretical studies of individual ludlings should be pursued, as in Tateishi (1991) and Gil (1990). (3) Informed synthesis of the theoretical implications of these studies must be made, now that a broad theoretical base has been established. Finally, the rightful place of ludling data in theoretical discussions must not be forgotten: ludlings are an integral part of the human linguistic capacity and as such, an integral part of linguistic theory.

1 For a more detailed discussion of surrogate languages, including a theoretical treatment, see Bagemihl (1988a).

2 This term was actually first introduced into the *linguistic* literature in Laycock (1969); it also appeared as the Esperanto word for “language game” in Otsikrev (1963). The origin of the coining is the Latin *ludus* “game” and *lingua* “language” (Laycock 1969, p. 14).

3 Actually, the term “infix” is something of a misnomer in this case. Often the ludling will treat each syllable of the non-ludling word as an individual (prosodic) word to which the affix is added, giving the impression of infixation; cf. McCarthy and Prince (1986), Bagemihl (1988a).

4 It follows that a linguistic behavior which has been labeled a “language game” but whose formal operations do not fit into any of these categories would not be classified as a ludling. For example, Katada (1990) describes a Japanese language game which involves turn-taking between two speakers, each of

whom must say a word which begins with the same mora sequence that the previous speaker's word ended with (see the discussion of this in chap. 5, this volume). Unless it can be shown that this involves, for example, some sort of templatic operation, this language game is not a ludling.

5 For more extensive bibliographic listings, see Laycock (1972), Kirshenblatt-Gimblett (1976), Bagemihl (1988b), and Plénat (1991).

6 Tateishi (1989, 1991) examines ludlings in Japanese and Buin which involve, among other processes, transposition of a bimoraic foot; these cases would be analyzed under a line-crossing account as prefixation or suffixation of this prosodic constituent, combined with maximum crossing.

7 For another example of the use of ludling data to argue for the OCP, see Yip (1988).

8 See Bagemihl (1989) for a full discussion of this operation. It is also possible that this ludling is manipulating the first mora in the word.

9 The recognition that this ludling can manipulate segments is due to Perlmutter (1991), who also claims that morphemes and words can be accessed (e.g., in compounds). Tateishi (1991) shows that apparent cases of morpheme reversal actually reduce to the operation of the ludling on cyclically-constructed feet, and this may be true of the apparent word-reversal examples as well.

10 One templatic process, the formation of Rustic Girls' Names, seems to require the opposite directionality; cf. Poser (1990).

11 This is assuming that Tier (or Plane) Conflation applies only once, at the end of the lexicon, as proposed by Cole (1987).

12 Two studies which begin to look at the ludling acquisitional process are Cowan (1989) and Cowan and Leavitt (1987).

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