In H.-J. A. Do, L. Dominguez & A. Johansen (eds, 2001) *Proceedings of the 25th Annual Boston University Conference on Language Development.* Somerville, Mass: Cascadilla Press, pp. 307-318.

Assimilation Phenomena and Initial Constraint Ranking in Early Grammars

Heather Goad
McGill University

1. Preliminaries

Within generativist approaches to acquisition, it is commonly assumed that children's grammars are 'possible' grammars in the sense that, at every stage of development, they abide by the same constraints as do adult grammars (Pinker 1984). Two predictions of this premise are: (i) while children's grammars may contain processes that are not present in the target language, these processes must have direct correlates in other adult languages; and (ii) under the strongest interpretation, there is no maturation of primitives or operations.

In this paper, I will demonstrate that both of these *appear* to be problematic. There are assimilation processes common in adult languages which are absent from early grammars: Vowel Harmony (VH) (1a), and string-adjacent assimilations, for example Palatalization (1b). This appears to challenge (ii) concerning maturation. At the same time, other types of assimilations are common in early grammars: Consonant Harmony (CH) (1c) and Total Vowel Assimilation (TVA) (1d). The presence of CH seems to challenge (i), as there is no direct correlate of this process in adult grammars (modulo Coronal Harmony; Shaw 1991).

(1) **Asymmetries in Assimilation Processes:**

Process:	**Child Grammars?**	**Adult Grammars?**
a. Vowel Harmony	no	yes
b. String-adjacent Assim (e.g. Palatalization)	no	yes
c. Consonant Harmony	yes	no
d. Total Vowel Assim	yes	yes

The following questions arise in this context: 1. Why can child language tolerate some kinds of assimilation processes and not others? 2. Why are some of the processes that are tolerated in early grammars absent from adult grammars? The hypotheses that I will forward in response to these questions are as follows.

Hypothesis 1: For question 1, I propose that early child language does not permit *feature spreading* (sharing in nonderivational terms); that is, it

prohibits multiple association of features across positions (cf. Shahin 1995). Early child language does permit assimilations that involve *feature copy*.

Hypothesis 2: For question 2, I propose that child CH DOES have a correlate in adult grammars. Concerning its operation, it involves *melody copy*, parallel to reduplication. Concerning its motivation, both CH are reduplication are tied to positionally-determined constraints on *licensing*. The licensing requirements observed in CH are prosodic, akin to those observed for place in coda-onset sequences across adult languages. The licensing requirements observed in reduplication are morphological: a reduplicated affix must copy material from the base, as it cannot licence its own melodic content.

If Hypothesis 1 is correct, then VH and string-adjacent assimilations must involve spreading, as in (2a). This is the standard view in nonlinear phonology, as will be discussed in §3 and §5. Further, CH and Total Vowel Assimilation must involve feature copy, as in (2b). This will be argued for in §2 and §4.

(2) a. F F → *F F b. F F → F F
2
G G G G_i G_i

Importantly, in order to be able to express a formal difference between spreading and copying as in (2), it is crucial that a highly-articulated view of the internal structure of segments be maintained. Further, different constraints must be responsible for these operations, counter to the way that faithfulness is typically conceived of in Correspondence Theory (McCarthy & Prince 1995).

Given that all adult grammars have spreading, a further question arises from Hypothesis 1: is this hypothesis a problem for the oft-held view (since Jakobson 1941) that early grammars are structurally unmarked? In §6, I will argue no. I will show that if we adopt the view common in the optimality-theoretic acquisition literature that markedness constraints initially outrank faithfulness (e.g. Demuth 1995, Gnanadesikan 1995, Smolensky 1996), the absence of spreading will follow automatically. In §7, I will discuss the evidence that is available for reranking to permit spreading. Crucially, maturation will not be required.

2. Consonant Harmony

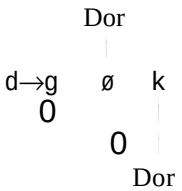
In the following sections, I will discuss each of the assimilation types in (1), beginning with Consonant Harmony. CH is a process where consonants which are not string adjacent assimilate to one another, usually for place. For our purposes, other relevant properties are that coronals are virtually always targets and that right-to-left application is more pervasive than left-to-right (see e.g. Smith 1973, Ingram 1974, Vihman 1978, Stemberger & Stoel-Gammon 1991). Examples of Amahl's right-to-left Velar Harmony are in (3). This process characterized Amahl's outputs from 2;2-2;8.

(3) **Right-to-left Velar Harmony: Amahl** (Smith 1973):

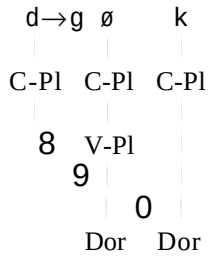
'dog'	[gɔg]	'duck'	[gøk]	'desk'	[gɛk]
'sticky'	[gigi]	'sing'	[giŋ]	'neck'	[nɛk]

The standard analysis of CH is that it involves SPREADING of the Place node or of individual articulators (e.g. Spencer 1986, Stemberger & Stoel-Gammon 1991, Dinnsen, Barlow & Morrisette 1997). However, this analysis faces a Locality problem; as the data in (3) reveal, CH can skip vowels of any quality. To circumvent this, McDonough & Myers (1991) and Macken (1992) have proposed that child language has planar segregation: the melodies of consonants and vowels define different planes which enables C-to-C spreading to take place without being blocked by intervening vowels; see *duck* → [gøk] in (4a).

(4) a. **Planar Segregation:**



b. **Partial Segregation:**

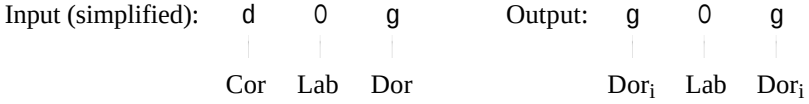


When viewed in the larger context, (4a) runs into a number of problems. First, Velar CH (3) is productive in Amahl's grammar when planar segregation is no longer motivated (Goad 1997; see Levelt 1994 on other children), as determined by the criteria set out in McCarthy (1989). Second, adult languages for which planar segregation has been independently motivated do not exhibit CH.

A second solution to the Locality problem which invokes spreading would be to adopt a Clements–Hume (1995) type geometry, that is, one with partial CV segregation, as in (4b). While such a geometry enables CH to be expressed through spreading, it predicts unrestricted CH in adult languages (cf. (1c)).

The circumvent Locality, I have proposed earlier that CH involves MELODY COPY (Goad 1997). In contrast to the earlier proposal, I will argue in §8 that copying is forced by the demands of licensing (see also Rose 2000). In brief, coda /g/ cannot license marked place features like Dor in (5). Thus, Dor must be copied to onset position where it can be licensed. In this sense, CH parallels place licensing observed in coda-onset sequences across languages (Itô 1986).

(5) **Solution in Brief: CH as Melody Copy** (*dog* → [gɔg]):



In short, CH involves MELODY COPY, not spreading. From this point of view, it formally resembles reduplication rather than vowel harmony.

3. Vowel Harmony (VH)

We turn now to Vowel Harmony. VH can be described as assimilation for *one* feature throughout some prosodically-defined domain (usually the word). The standard analysis of VH is that it involves SPREADING. Across languages, we find that harmonies fall into three types. There are one harmony systems; there are two harmony systems, where the harmonies are subject to independent constraints (cf. Eastern Cheremis where the two harmonies are subject to identical constraints); and there are parasitic systems where one feature is dependent on the behaviour of another. What appear to be unattested are total vowel harmonies. From this, we can conclude that VH involves spreading of one feature.

Let us consider child language in this context. As I am focussing on early English, one might question why we would expect to find VH in children's grammars, given that it is absent from the target language. It is well-documented that early grammars contain processes which are not present in the target grammar, so there is no reason a priori why some English child should not spontaneously create Vowel Harmony, especially if there is something to be gained from an articulatory point of view. What is striking, however, is that spontaneous VH seems to be unattested. This will be elaborated on in §4.

4. Total Vowel Assimilation (TVA)

If child language does not permit spreading, we have an explanation for why VH is absent and why CH is permitted. There are processes in child language which are described in the literature as 'vowel harmony'. However, they do not have the characteristics described above: they do not involve assimilation for one feature; they involve agreement for *all* features. I will label this process Total Vowel Assimilation to distinguish it from VH. TVA may be described as follows: an epenthesized vowel agrees for ALL features with a prosodically or morphologically prominent vowel; consonants of any quality can intervene.

Some examples from Padmint at 21 mos are provided in (6). In Padmint's grammar, a final vowel is epenthesized to satisfy a constraint against codas. This vowel acquires all of its features from the preceding root vowel.

(6) **Final Epenthesis: Padmint** (Ross 1937):

[tɔpɔ]	'top'	[bɝ́d́]	'bird'	[bagga]	'(sleeping)-bag'
[buku]	'book'	[bi̪hi]	'beach'	[bi̪ki]	'(toy) brick'

We find TVA in adult grammars as well (see (1d)), and similar to Padmint's grammar, TVA satisfies constraints on syllable structure. In Selayarese, for

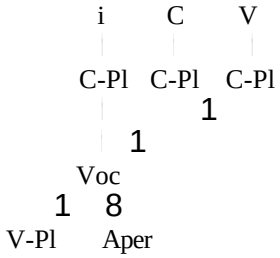
example, consonant-final words are limited to [/,N] which are licit codas in the language. Since roots can also end in [s,r,l], in words where roots of this shape appear without suffixes, epenthesis takes place. The examples in (7) reveal that the epenthetic vowel is a copy of the preceding root vowel.

(7) **Final Epenthesis: Selayarese** (Mithun & Basri 1986):

/tulis/	[tulisi]	'write'	/potol/	[potolo]	'pencil'
/lamber/	[lambere]	'long'	/beras/	[berasa]	'rice'

The question that arises at this point is whether TVA involves spreading or copying. The only type of geometry where spreading can take place without crossing association lines some of the time is a Clements & Hume (1995) type geometry; see (8). The problem is that if TVA involves spreading (of Vocalic), there should be languages where –like VH– it applies to *all* vowels within the word. In reality, TVA applies once, to fill a position which has been epenthesized to satisfy constraints on prosodic structure. We do not find languages where all vowels in a word are completely identical as discussed in §3.

(8) **Spreading of Vocalic:**



If, on the other hand, TVA involves melody copy, we expect it to apply only once, because languages do not copy material freely. Copying only occurs when the phonology or morphology demands that some position be filled.

In short, Total Vowel Assimilation and Vowel Harmony are formally different: TVA involves MELODY COPY while VH involves SPREADING.

5. String-adjacent Assimilations

We turn finally to string-adjacent assimilations. I will focus on Palatalization (Pal), given that it is so frequently attested across languages. Pal manifests itself in two ways. There are languages like Korean (9a) where it is an allophonic process. There are also languages like Polish (9b) where it is a lexical process (Rubach 1984).

The standard analysis for string-adjacent assimilations is that they involve SPREADING. In Clements & Hume (1995), Pal would be expressed as in (10).

(9) a. **Korean:** Allophonic Palatalization:

[Sigan], *[sigan]	'time, hour'	
[saaram]	'man, person'	
[sos´l]	'novel'	

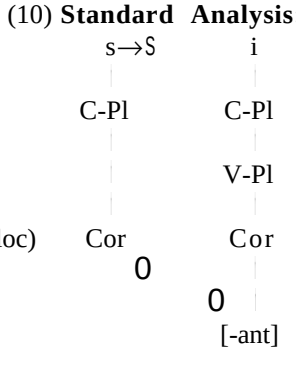
b. **Polish:** Lexical Palatalization:

pie[s]	p[ç-i]na	'dog' (nom; dim)
serwi[s]	serwi[ç-e]	'auto service' (nom; loc)

cf. morpheme-internal:

mak[si]m-um	'maximum'
[se]jm	'parliament'

(10) **Standard Analysis:**



To determine whether Pal is present in early grammars, we will start by considering the acquisition of (word-initial) sibilant fricatives in English. The table in (11) outlines four stages in their acquisition before all vowels *including* /i/ (based on e.g. Smith 1973, Ingram 1978a).

(11)

Target	Stage 1	Stage 2	Stage 3	Stage 4
[s] [S]	[t] [t]	[ts] [ts]	[s] [s]	[s] [S]
cf. [tS]	[t]	[ts]	[ts]	[tS]

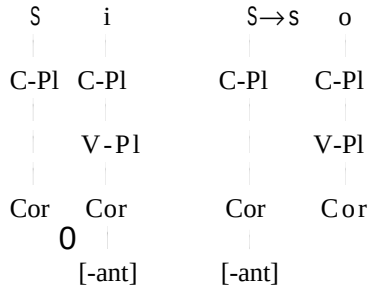
Importantly, frication emerges (St 3) before coronal sub-place (St 4). That is, there is a point in development (St 3) where both /s/ and /S/ are realized as [s]. (There may be free variation between [s] and [S] at St 3; crucially, it is not the case that [S] surfaces before [i], and [s] elsewhere, as will be discussed below.)

A reasonable analysis of Stage 3 is that /S/ is realized as [s] because [ant] (or [-ant]) cannot be licensed by a consonant at this point. We might have expected other things at St 3, that some instances of [s] would be realized as [S], or that target [S] would surface as [S] only before [i], parallel to (9). There are various options along these lines in (12)-(14). All of these involve sharing of [-ant] between the fricative and following vowel, yet they all appear to be unattested.

The first unattested option is (12) where, to a great extent, the child's outputs mirror the lexical rule scenario observed in languages like Polish (9b). If the child 'knows' that the adult outputs contain both [s] and [S] but s/he cannot produce the contrast, s/he could take advantage of parasitic licensing to realize [s] as [S] before [i]. [S] would thus sound adult-like some of the time; that is, it would better approximate the target than does Stage 3 in (11). The structures next to (12) should make this clear: [-ant] would only be present on a segment when this feature is multiply linked to (and thus licensed by) a following vowel.

(12) **Option 1:** Parasitic Licensing:

Target	Unattested Stage 3
[si]	[si]
[Si]	[Si]
[so]	[so]
[So]	☹ [so]



The second option we might have expected (13) is where target [Si] and [So] surface as in (12) due to parasitic licensing, but where there is also assimilation of [s] to [S] before [i]. In this case, the child's outputs would parallel the allophonic distribution seen for Korean (9a). Finally, under (14), all sibilants would assimilate to [S] before [i], but [s] and [S] would otherwise surface as target-like. This also appears to be unattested. In short, although outputs like those in (12)-(14) are found in many languages, early grammars does not seem to exhibit assimilations of this sort. Significantly, all of these options require spreading.

(13) **Option 2:** Par Lic + Oblig Assim:

Target	Unattested Stage 3
[si]	☹ [Si]
[Si]	[Si]
[so]	[so]
[So]	☹ [so]

(14) **Option 3:** Oblig Assim only:

Target	Unattested Stage 3
[si]	☹ [Si]
[Si]	[Si]
[so]	[so]
[So]	[So]

6. Initial Constraint Ranking

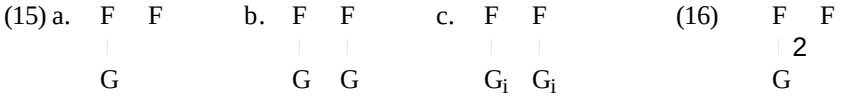
Of the processes discussed thus far, we have seen that two are attested in early grammars, those which involve melody copy: CH and TVA. While the remaining processes, VH and Pal, are commonly attested in adult grammars, they are not observed in early grammars. The explanation put forth here is that this is due to the absence of spreading (sharing) at early stages.

We are now in a position to return to the premise that was introduced in §1: children's grammars are 'possible' grammars. Two predictions of this premise were provided as follows: (i) while early grammars may contain processes that are not present in the target language, these processes must have direct correlates in other adult languages; (ii) under the strongest interpretation, there is no maturation of primitives or operations. It would seem that (i) does not hold: there

appears to be no correlate of CH in adult grammars. We will return to this in §8.

As concerns (ii), we must address the question of where spreading comes from. We have seen that it is not assimilation per se that is absent from early grammars, but only assimilation that involves spreading. Given that assimilation can be expressed both as spreading and as copying, we must ensure that the evidence for spreading is robustly present in the input to which children are exposed. Further, if the evidence is truly robust, we must question why early grammars do not permit this operation in the first place. For the latter, I will propose that the absence of spreading falls out of independently-motivated constraint ranking. Concerning the former, I will argue that the reranking required to permit spreading can be achieved on the basis of positive evidence.

As stated in §1, in the OT acquisition literature, it is widely accepted that markedness constraints initially outrank faithfulness. As concerns spreading/sharing, constraints that demand one-to-one association between features and dominating material are markedness constraints; thus, they must initially rank above faith. Accordingly, outputs like those in (15) are favoured to that in (16). (16) violates what I will call NOSHARING, a family of constraints that prohibits one-to-many association of G to F where F immediately dominates G.



Concerning feature copy (15c), from a structural viewpoint, it does not violate markedness as it does not involve multiple association. In fact, as we will see in §8, the copying observed in CH *improves* segmental markedness. Before we turn to this, we first consider what drives grammars to change to allow for spreading.

7. What Drives Grammars to Change to Permit Spreading?

I propose that there are two types of processes that force grammars to permit spreading. One is the acquisition of morphophonemic alternation. The other is the acquisition of word-internal codas. Naturally, these will often overlap. I will briefly discuss the former, using VH as an example. In VH, affixes usually share the harmonic feature F with root vowels. Initially, the child has no knowledge of how the morphology works; as a result, each vowel bears its own F, linked one-to-one. Once the affixes have been segmented, the child will come to see how the harmony works and optimize his/her inputs accordingly. The result is that alternating morphemes no longer bear F in inputs (Inkelas 1994). They must then acquire this feature through spreading. In short, it is the understanding of the morphophonology that drives the grammar to change to allow for spreading.

Let us turn more concretely to the word-internal coda case. Stage 1 in development (17a) is typified by a preference for CV syllables (e.g. Jakobson 1941,

Ingram 1978b, Fikkert 1994). When codas emerge, they must satisfy cross-linguistic restrictions on coda shape: they must share features that they cannot license with a following onset (Itô 1986). This is seen most clearly with place in NC clusters, as place-sharing nasals are the least marked coda type. Thus, at Stage 2, when the nasal emerges in words like *bumpy* (17b), it must share Labial with the onset licenser in order to be well-formed. In short, it is the acquisition of the coda nasal that leads the grammar to change to permit spreading.

Some examples of early NC clusters are in (18) from Mollie at 22-24 mos. I have chosen to focus on this child, as she creates coda-onset strings that are not present in the target forms. I argue that foot well-formedness triggers the (partial) geminate structures in (18b). In order for Mollie's grammar to build moraic trochees and observe final extraprosodicity –and avoid long vowels (Fikkert 1994)– she must epenthesize a position to yield a heavy first syllable in CVCV targets, e.g. (høh)ti, (bìb)bi. Since epenthesis yields a form with an NC cluster (in the former case), the nasal must share place to be licit. Thus, it is coda well-formedness –here, brought on by foot well-formedness– that compels sharing and this, in turn, causes demotion of NOSHARING.

(17) a. 'bumpy' → [bøpi]

Lab

b. 'bumpy' → [bømpi]

8

Lab

(18) **Early Codas: Mollie** (Holmes 1927):

a. Target Appropriate:

[pEnt´] 'pencil [hœNki] 'hanky'

b. (Partial) Gemination:

[hønti] 'honey' [bìbbi] 'bib'

[ponti] 'pony' [penni] 'penny'

8. Consonant Harmony Revisited: Licensing

In this final section, I will elaborate on the analysis of Consonant Harmony. In §1, the question was posed as to why child language exhibits CH while adult languages do not. In §2, I argued that CH involves melody copy; thus, it resembles reduplication in adult languages and so, as concerns its *operation*, it has an adult correlate. What *motivates* CH? Here I will argue that, like reduplication, CH is tied to positionally-determined constraints on licensing. The two processes differ in that the licensing observed in CH is prosodic, parallel to that found in coda-onset clusters. The licensing observed in reduplication is morphological: melody copy occurs to give content to an affix which cannot itself license any such material. As we will see, the latter cannot hold of child CH and this is where the difference between the two processes lies.

Pater (1997) attributes the child–adult asymmetry in CH to a child-specific constraint REPEAT (cf. Yip 1995). At some point in development, REPEAT must be removed from the grammar. Otherwise, it would be expected to show an effect under 'emergence of the unmarked' (McCarthy & Prince 1994). Since unmarked

structures may emerge in contexts where licensing options are restricted, for example in affixes, we might expect to find a language where consonants in affixes harmonize to consonants in roots. The result would be adult CH, with the effects of REPEAT arising in affixes. Do we observe such a scenario? I believe we do, in adult reduplication. After all, reduplicants are affixes. Indeed, CH especially looks like languages where reduplication involves consonants only, that is, where the vowel in the reduplicant is prespecified, as in e.g. Akan.

The goal is to remove child-specific constraints from the grammar. The claim is that CH per se may be absent from adult systems, but it has a correlate in adult reduplication. We must now ask why, in child grammars, inputs like /d0g/ surface as [g0g] and not as *[d0-d0g] or *[di-d0g]; i.e., why is the parallel between adult and child grammars not complete? I argue that this is due to the lack of productive affixation at early stages in development. CH characterizes the 'one-word' stage in acquisition. At this point, the only productive morphology in languages like English is compounding. (Early diminutives would seem to argue against this; for an alternative explanation of these forms, see Goad 1996.)

If in CH, copying is not driven by the need to provide an affix with melodic content, what drives it? My claim is that it is driven by prosodic licensing (on the link between harmony and licensing, see Steriade 1995:§3, Beckman 1997, Piggott 1997, 2000, Rose 2000). Recall from §2 that CH typically targets coronals and applies from right-to-left. The triggers are thus marked features, Lab and Dor, which occur in prosodically-weak positions (e.g. codas, foot-internal onsets). If weak positions cannot license marked place features, these features must be licensed by association to a prosodically-strong position (e.g. foot-edge onset). Association can be achieved in three ways: metathesis, spreading/sharing, or copying. Focussing on the last two, sharing is observed in coda-onset sequences, as was seen in (17b). However, at the earlier CH stage, only feature copy is permitted. Thus, licensing must be satisfied through copy: /d0g/ → [g_i0g_i], as was seen in (5). Importantly, feature copy in this context improves segmental markedness, as Dorsal is licensed by association to a strong position.

9. Conclusion

I have argued that assimilation in early grammars is limited to melody copy; spreading/sharing is not licit. This accounts for the absence of VH and string-adjacent assimilations like Pal, and for the presence of CH and TVA. I proposed further that the absence of spreading follows from the initial ranking of constraints, markedness >> faith. Next, I demonstrated how the acquisition of place-sharing codas and morphophonemic alternation drives grammars to change to permit spreading. Finally, although CH is absent from adult grammars, I argued that it has a correlate in reduplication: both are tied to licensing. However, CH differs from reduplication in that the licensing requirements for the former are prosodic, akin to those observed for place in coda-onset strings.

Endnotes

* Earlier versions of this paper were presented at SOAS, Univ of Durham, and Indiana Univ. I would like to thank all of the audiences for questions and comments. This research was supported by grants from FCAR (to H. Goad) and from SSHRC (to G.L. Piggott and H. Goad). e-mail: hgoad@po-box.mcgill.ca.

References

Beckman, Jill (1997) Positional faithfulness, positional neutralisation and Shona vowel harmony. *Ph* 14: 1-46.

Clements, George N. & Elizabeth Hume (1995) The internal organization of speech sounds. In John Goldsmith (ed) *The handbook of phonological theory.* Blackwell, pp. 245-306.

Demuth, Katherine (1995) Markedness and the development of prosodic structure. *NELS* 25: 13-25.

Dinnsen, Daniel, Jessica Barlow & Michelle Morrisette (1997) Long-distance place assimilation with an interacting error pattern in phonological acquisition. *Clinical Linguistics & Phonetics* 11: 319-338.

Fikkert, Paula (1994) *On the acquisition of prosodic structure.* PhD thesis, Leiden University.

Gnanadesikan, Amalia (1995) Markedness and faithfulness constraints in child phonology. Ms., Rutgers University.

Goad, Heather (1996) Codas, word minimality, and empty-headed syllables. *Child Language Research Forum* 28: 113-122.

Goad, Heather (1997) Consonant harmony in child language: An optimality-theoretic account. In S.J. Hannahs & Martha Young-Scholten (eds) *Focus on phonological acquisition.* Benjamins, pp. 113-142.

Ingram, David (1974) Phonological rules in young children. *JCL* 1: 49-64.

Ingram, David (1978a) The production of word-initial fricatives and affricates by normal and linguistically deviant children. In Alfonso Caramazza & Edgar Zurif (eds) *Language acquisition and language breakdown.* Johns Hopkins University Press, pp. 63-85.

Ingram, David (1978b) The role of the syllable in phonological development. In Alan Bell & Joan B. Hooper (eds) *Syllables and segments.* North-Holland.

Inkelas, Sharon (1994) The consequences of optimization for underspecification. Ms., UC Berkeley.

Itô, Junko (1986) *Syllable theory in prosodic phonology*. PhD thesis, University of Massachusetts Amherst.

Jakobson, Roman (1941) *Child language, aphasia, and phonological universals*. Mouton. Translated 1968.

Levelt, Clara (1994) *On the acquisition of place.* PhD thesis, Leiden University.

Macken, Marlys (1992) Where's phonology? In Charles Ferguson, Lise Menn & Carol Stoel-Gammon (eds) *Phonological development.* York Press.
McCarthy, John (1989) Linear order in phonological representation. *LI* 20: 71-99.
McCarthy, John & Alan Prince (1994) The emergence of the unmarked: Optimality in prosodic morphology. *NELS* 24: 333-379.
McCarthy, John & Alan Prince (1995) Faithfulness and reduplicative identity. *University of Massachusetts Occasional Papers* 18: 249-384.
McDonough, Joyce & Scott Myers (1991) Consonant harmony and planar segregation in child language. Ms., UCLA and University of Texas Austin.
Mithun, Marianne & Hasan Basri (1986) The phonology of Selayarese. *Oceanic Linguistics* 25: 210-254.
Pater, Joseph (1997) Minimal violation and phonological development. *Language Acquisition* 6: 201-253.
Piggott, Glyne L. (1997) Licensing and alignment. *Ph* 15: 437-477.
Piggott, Glyne L. (2000) Against featural alignment. *JL* 36: 85-129.
Pinker, Steven (1984) *Language learnability and language development.* Harvard University Press.
Rose, Yvan (2000) *Headedness and prosodic licensing in the L1 acquisition of phonology.* PhD Thesis, McGill University.
Ross, Alan S.C. (1937) An example of vowel-harmony in a young child. *Modern Language Notes,* November, pp. 508-509.
Rubach, Jerzy (1984) *Cyclic and lexical phonology.* Foris.
Shahin, Kimary (1995) Child language evidence on Palestinian Arabic phonology. *Child Language Research Forum* 26: 104-116.
Shaw, Patricia A. (1991) Consonant harmony systems. In Carole Paradis & Jean-François Prunet (eds) *The special status of coronals.* Academic Press.
Smith, Neil V. (1973) *The acquisition of phonology: A case study.* CUP.
Smolensky, Paul (1996) On the comprehension/production dilemma in child language. *LI* 27: 720-731.
Spencer, Andrew (1986) Towards a theory of phonological development. *Lingua* 68: 3-38.
Stemberger, Joseph & Carol Stoel-Gammon (1991) The underspecification of coronals: Evidence from language acquisition and performance errors. In Carole Paradis & Jean-François Prunet (eds) *The special status of coronals.* Academic Press, pp. 181-199.
Steriade, Donca (1995) Underspecification and markedness. In John Goldsmith (ed) *The handbook of phonological theory.* Blackwell, pp. 114-174.
Vihman, Marilyn M. (1978) Consonant harmony: Its scope and function in child language. In Joseph H. Greenberg (ed), *Universals of human language, Vol. 2: Phonology.* Stanford University Press, pp. 281-334.
Yip, Moira (1995) Identity avoidance in phonology and morphology. Ms., UC Irvine.