Reduplicative Copying in Ancient Egyptian

Chris Reintges

0. Introduction

The formal properties of root-and-pattern systems, as prototypically found in Semitic languages, have received a considerable amount of attention in current morphological theorizing.[1] This type of morphological system is organized around *roots*, i.e. relatively abstract form-meaning representations, and *binyanim*, i.e. formal categories with strict phonological and rough semantic definitions. The root-and-pattern system of Ancient Egyptian differs from the Semitic neighbour languages in several respects, one of which is the variety of binyanim that involve reduplicative copying.[2] These copying processes fall into two classes. On the one hand, there are operations activated by a morphological trigger (full morpheme and partial reduplication). On the other hand, there are operations activated by a prosodic trigger (stem and syllable reduplication). In both cases, the applied procedures operate in a highly constrained fashion. That is, reduplicational copying has to satisfy minimality and maximality conditions on the verbal stem. Next to prosodic licensing, there is a blocking mechanism that prevents the cyclical application of what is phonologically the same. Before studying these phenomena in some detail, let us have a look at the overall organization of root-and-pattern systems.

1. The General Architecture of Root-and-Pattern Morphology

It is by now a standard assumption that nonconcatenative morphology is organized in hierarchically ordered levels of representation, each of which

---

[2] *Ancient Egyptian* is the oldest attested language of the Afro-Asiatic family (the oldest documents date from about the 3rd millennium BC). The language history is organized into several language stages, viz. Old Egyptian, Middle Egyptian, Late Egyptian, Demotic, and Coptic (i.e. the language of the Christian Egyptians, attested since the 4th c. AD). Although the empirical basis of this study is confined to Old and Middle Egyptian, recourse will be had to the Coptic language material. This is because hieroglyphic writing did not express vowels, only consonants. Therefore, the vowel melody and syllable structure of Old and Middle Egyptian words have to be reconstructed from their Coptic cognate forms.

contains a well-defined unit of morphological information (Broselow and McCarthy 1983, McCarthy 1979, 1981, 1982, 1989).

Within this formal model, the representation of the multi-morphemic verb stem like *s-romrem* 'cause to walk to and fro' will look like (1) below:
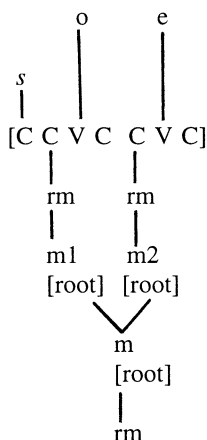
(1) Vocalic melody tier   o   e
                                                     | |
    s-morpheme tier   *s* | |
                                           | | |
    Prosodic template tier   [C C V C   C V C]
                                        | |
                                        rm   rm
                                        | |
    Morphemic template tier   m1   m2
                                    [root]   [root]
                                          \   /
                                            m
                                         [root]
                                            |
    Root tier   rm

Akin to Semitic, the Egyptian verb stem consists of three components, namely consonantism, vocalism and the prosodic template, each functioning as separate morphemes. These morphemes are segmentally discontinuous, since the vowel melody is inserted in between the root consonants. Note that the multi-level representation of verb stem *s-romrem* 'cause to walk to and fro' in (1) mirrors the successive stages of morphological derivation.

At the bottom of the morphological hierarchy, there is the root level, which contains the fundamental lexical unit. The root morpheme is phonologically underspecified for the major class features [segmental] and [syllabic] (McCarthy 1981:387); it basically consists of an ordered set of consonants shared by etymologically related stems (Hoberman 1991:61, fn.2). The combination of root consonants is constrained by a general phonological principle, the so-called 'Obligatory Contour Principle' [OCP] prohibiting adjacent identical or homorganic segments in a given lexical representation (McCarthy 1988:88).

The multiple occurrence of the root morpheme stipulates another autosegmental tier composed of two morpheme positions, viz. the base and the reduplicating suffix. The morphemic tier is conceptually necessary, since reduplication is not confined to the copying of the phonemic melody of the root morpheme alone, as argued by Marantz (1982) and Ter Mors (1983) among others, but crucially involves the copying of the semantic features of the root. This being so, an additional level of representation is required which specifies both types of information. In line with the 'Weak Morphemic Plane Hypothesis' (McCarthy

1981, 1982, 1989), lexical formatives like the causative morpheme /s-/ are provided with their own levels of representation. Individual affix tiers contain morpheme positions which are characterized by a morpho-phonological feature distinct from the root morpheme. The placement of the causative prefix /s-/ to the left of the base (the reduplicated root *rm.rm* 'walk to and fro') shows that reduplicative copying precedes the affixation of lexical formatives, which motivates their representation on a higher autosegmental tier.

The vowel melody distinguishes between two inflectional paradigms in Coptic Egyptian, referred to as the Eventive and the Stative in this study, which impose an event and state reading on the depicted predication, respectively. The Stative and the Eventive are related to each other through morphologically conditioned Ablaut; in the case of *s-romrem*, the vowel melody /o e/ marks the Eventive, while the reversed pattern /e o/ indicates the Stative.

Finally, the various morphemic tiers are folded into a linear structure as the outcome of a general process, referred to as 'Tier Conflation'in the literature (cf. Bat-El 1988, McCarthy 1986 and the references cited therein). The resulting prosodic template is a string of consonantal and vocalic segments which serves as the input for syllabfication.
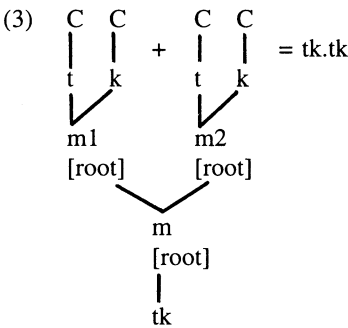
2. Morphemic Reduplication

So far we have seen that the formation of derivational classes or *binyanim* involves the association of separate autosegmental tiers, minimally the root tier, the vowel melody and a particular stem template. In reduplicative copying, the root morpheme is projected onto two identical positions of the superordinate level, and then associated with the stem template. However, to spell out the root morpheme twice, the prosodic template has to be readjusted and extended by copying and adding parts of the segmental string (see Broselow and McCarthy 1983, Marantz 1982, Kitagawa 1987, Ter Mors 1983 for some discussion). These mapping and readjustment procedures apply in a highly constrained fashion. That is, there is a network of morphological and prosodic constraints that filter out illformed representations.

2.1 Full Morpheme Reduplication. We will start by first considering reduplicational processes which involve the copying of an entire root morpheme. This nonconcatenative operation is well-attested in Egyptian root-and-pattern morphology, and pertains to mono-, bi- and triliteral roots (morpheme boundaries are marked by dots):

(2)   *root*   *stem*
 a   ꜥ   ʔꜥ.ꜥ   'translate, speak foreign language'
       ḥ   ḥ.ḥj   'look around, slip'
       h   jh.hj   'jubilate, be very excited'
 b   tk   tk.tk   'to approach s.o./ to attack'
       nǰ   nǰ.nǰ   'endure/ last forever'
       bn   bn.bn   'stand upright/ be sexually aroused'
 c   nǰm   nǰm.nǰm   'be sweet/ make love'
       dbn   dbn.dbn   'encircle/ go round and around'

Semantically, reduplicative copying adds a semantic feature [+ intensification] to the basic meaning of the root. Phonologically, reduplication adds a copy of the consonant melody of the root morpheme to the right edge of the base. (2a) shows that reduplication coincides with epenthesis in the case of monoconsonantal roots. It will be shown in section 3.1 that the spell-out of the theme affixes /ʔ j w/ is prosodically driven in that it alters a monomoraic stem into a bimoraic one, thereby satisfying a mimimality requirement of the template. (2b) makes evident that no such repair device is required in the case of biliteral roots. In this verb class, reduplication improves the prosodic acceptability of the resulting stem templates, since a monosyllabic stem is converted into a bisyllabic one, and hence conforms to a standard template. As shown in (2c), there are also reduplicated triliteral roots in the Egyptian dictionary. One might appeal to prosodic constraints again to explain why reduplicated triliteral roots are only marginally attested. The resulting stem template consists of three syllables, which is the maximal seize of prosodic words, and hence, the upper bound for what is prosodically acceptable. The formal analysis of full morpheme reduplication is given below:
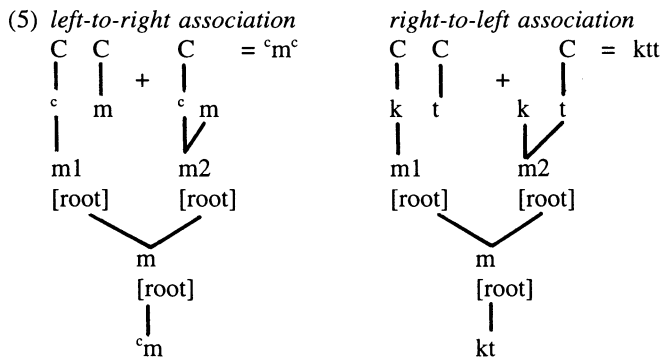
(3)   C   C   C   C
        | | + | | = tk.tk
        t   k   t   k
         \ /   \ /
         m1   m2
        [root]   [root]
              \   /
               m
             [root]
               |
               tk

The form of the reduplicational suffix is compatible with right-to-left association, which is the unmarked linking condition in Marantz' (1982) analysis of reduplication. Alternatively, one could analyze full morpheme reduplication in terms of Yip's (1982) 'edge-in association' implying that the outermost melodic

elements are linked to the outermost skeletal slots in a one-to-one fashion. To decide between these two proposals, one has to take a look at partial reduplication.

2.2 Partial Reduplication. Marantz (1982:438-9) gives a variety of examples where reduplication does not refer to the copying of the entire constituent. Egyptian lexical morphology has a comparable process where only a single root consonant in copied:

(4)   *simplex form*   *reduplicated form*
   a   jn   jnj   jnjn   'be angry/ be wrathful'
       ḥn   ḥnḥ   ḥnḥn   'go speedily/ hinder, detain'
       ᶜm   ᶜmᶜ   ᶜmᶜm   'swallow/ smear'
   b   čḥ   čḥḥ   čḥ.čḥ   'be happy/rejoice'
       tk   tkk   tk.tk   'approach/attack'
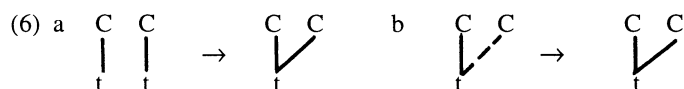   χb   χbb   χb.χb   'dance/ intrude'

The data in (4) make plain the absence of meaning distinctions between full morpheme and partial reduplication. In this respect, both operations may be regarded as functional equivalents. The reduplicational suffix either contains the first root consonant, as in (4a), or the second root consonant, as in (4b). In the former case, the directionality of association is left-to-right, while the directionality is reversed in the latter case (see Ter Mors 1983 and Broselow and McCarthy 1983 for some discussion of the directionality parameter in reduplicative copying). These two types of partial reduplication are represented below:

(5) *left-to-right association*   *right-to-left association*

$$
\begin{array}{llll}
\text{C} & \text{C} & \text{C} & = \text{{}^c m^c} \\
| & | \,+ & | & \\
{}^c & m & {}^c \; m & \\
| & & \vee & \\
m1 & & m2 & \\
[\text{root}] & & [\text{root}] & \\
\end{array}
\qquad
\begin{array}{llll}
\text{C} & \text{C} & \text{C} & = \text{ktt} \\
| & | \,+ & | & \\
k & t & k \; t & \\
| & & \vee & \\
m1 & & m2 & \\
[\text{root}] & & [\text{root}] & \\
\end{array}
$$

          m   m
       [root]   [root]
          | |
         ᶜm   kt

The analysis given in (5) implying that Egyptian reduplication grammar has two options for associating the phoneme melody of the root morpheme with the prosodic template requires more elaborate argumentation. While it is relatively

clear that forms like $^{c}m^{c}$ 'smear' and ẖnẖ 'hinder' are derived by partial reduplication through left-to-right association, it is not entirely obvious that forms like *ktt* 'be very small' and *tkk* 'attack' are derived by reduplication as well through right-to-left association. One might argue that some other process is at work here, say, geminating to be construed of as spreading over an empty final slot (cf. Hoberman 1988 and McCarthy 1979, 1981, 1986). This leads to the important question of whether reduplication is 'a mechanism separate from autosegmental spreading', already addressed in Goldsmith (1990:336, fn.20). In the following discussion, I want to present some arguments in favour of the nondistinctness of reduplication and gemination.

First, reduplication and gemination differ from each other only with respect to derivation, not with respect to output representations. This is so, because a sequence of two identical segments will automatically be fused into a geminate consonant or vowel through Tier Conflation (Yip 1988:69-70), regardless of whether the sequence [αF] ... [αF] is derived by reduplication, as in (6a), or autosegmental spreading, as in (6b):

(6) a   C   C   C   C   b   C   C   C   C
        | | →   \ /   \ /   →   \ /
        t   t   t   t   t

Now, suppose that a cluster /tt/ is derived by two formally distinct processes. In this case, there is no principled reason why both operations could not occur side by side in a given derivation. However, no such structures are attested in the documentation, suggesting that the cyclical application of nonconcatenative operations yielded illformed phonological representation. In the case of lexical derivation, the cooccurrence restriction on reduplication and spreading could easily be explained in terms of economy principles (Chomsky 1991). Since both operations are alternative means of spelling out a given semantic feature, their repeated application would be redundant. This line of reasoning does not hold for syntactic derivation, where nonconcatenative operations realize different morphosyntactic features, viz. imperfective aspect (7a) or the obsolete geminating passive (7b):

(7) a   ḥ^{c}.^{c} R^{c} hrw   nb   r   sḏm   mdw   N   pn
        rejoice.impf:act$_{Eventive}$ Re   day   every   to   hear   word   N   this
        'Re is looking forward to listen to the word of this N every day'
        (CT IV, 59:1 [B1Bo])

   b   ḥsq.q   n - k   smn
        behead-pass$_{Eventive}$ for-you$_{sg:mas}$ goose
        'The goose is beheaded for you' (PT 746a)

Verb forms that combine with nonconcatenative morphology in the lexicon are in complementary distribution with verb forms that combine with nonconcatenative operations in the syntax. With respect to the latter, there is an opposition between forms that can be marked for imperfective aspect, and forms that can be marked for the geminating passive. These distributional facts should be interpreted in terms of a phonologically driven filter which blocks the cyclical application of what is formally the same. Presumably, this phonological filter is a corollary of the OCP operative at the level of Tier Conflation. Since derivational and inflectional devices are brought in a linearized pattern through this general process, there is no way of identifying two adjacent identical segments as tautomorphemic and the derivation will crash. In conclusion, the nondistinctness of reduplication and gemination with respect to output representations and cooccurrence restrictions supports the view that they are not two formally distinct operations, but rather two instances of the one and the same mechanism, namely reduplicative copying.

2.3 The Interaction between Root Reduplication and Affixation. We have seen in section 1 that the affix tiers specify morpho-phonological information phonologically and semantically unrelated to the root morpheme. Egyptian has a number of lexical formatives which can be attached either to the simplex or derived root:

(8)   *simplex form*   *reduplicated form*
   a   *N*-hm   *N*-hm.hm   'shout/ roar'
       ḥ-tm   ḥ-tm.tm   'destroy/ destroy totally'
       ḥ-nm   ḥ-nm.nm   'pass around/ sneak'
   b   *N*-hd   *N*-hdh   'be fierce/ tremble'
       S-bn   *S*-bnn   'lift upright/ erect'
       N-qd   *N*-qdd   'sleep/sleep very deep'

(8) illustrates that concatenative operations apply after nonconcatenative ones. Notice that edge-in association is coordinated with a right-left association: first, the reduplication suffix (either the full or partial root morpheme, as in 8a/b) is attached to the right edge of the base, then the lexical formative is added to its left edge. While the right edge may contain only one reduplicational suffix, due to the blocking effect, more than one lexical prefix may be attached to the left edge:

(9)   s-N-χb.χb   'break open'
        s-N-fχ.fχ   'make disappear'
        s-N-kt.kt   'make whisper, gossip'
        ḥ-N-g?.g?   'gaggle/ exult'
        ḥ-N-b?.b?   'extinct' (of Horus-eye)
        s-ḥ-bn.bn   'cause to become a
                                                   phoenix'

It appears that there is a upper bound $n \leq 2$ for lexical formatives. This
maximality requirement interacts with a language specific rule of affix order:

(10)   *Ordering of lexical formatives*
       [S- ... ḥ- ... N- ... ROOT]

The joint operation of affix order and the maximality constraint rules out
representations that violate it, such as *s-ḥ-N-b?b? 'make extinct' (by the
maximality constraint) or *N-ḥ-b?b? 'extinct' (by lexical formative order). Both
constraints are, however, different in nature. Affix ordering is a language specific
morphological requirement, while the maximality constraint pertains to prosodic
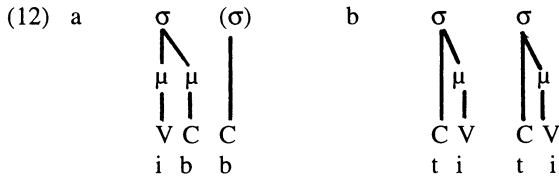wellformedness conditions on the verbal template.

3. Template Satisfaction and Prosodic Reduplication

In the preceding analysis of morphemic reduplication, we have seen that copying
processes have to be prosodically licensed, that is, have to satisfy certain
minimality/maximality constraints of the stem template. Roughly following Itô
(1989) and McCarthy and Prince (1990), I will briefly dwell into the prosodic
underpinning of Egyptian reduplication grammar.

3.1 Template Satisfaction. Recall from section 2.1 that monoconsonantal roots
require epenthesis in addition to reduplication:

(11)   *root*   *stem*
   a   ꜥ   ?ꜥ.ꜥ   'translate/ speak foreign language'
          ḥ   ḥ.ḥj   'look around/ slip'
          h   jh.hj   'jubilate/ be very excited'
          b   jb.b   'silent/mute'
   b   t   tj.tj, čj.čj   'stamp/ trample underfoot'
          ḥ   ḥ?.ḥ?   'look around/ slip'
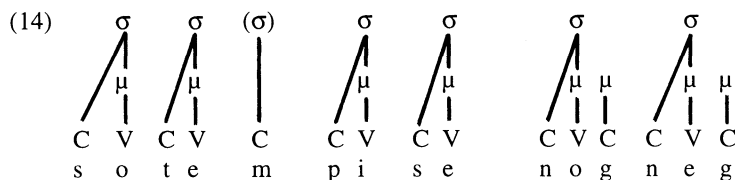   b   b?.b?   'be moist/well up'

The data make evident that epenthesis may precede or follow full morpheme reduplication (11a/b). Epenthesis is prosodically driven in that it serves as a repair device which allows a reduplicated monoliteral root to satisfy a bimoraic minimality condition on stem plates, as illustrated below (moras are indicated by μ):

(12) a   σ   (σ)   b   σ   σ

The cognate forms of *jbb* 'be mute' and *tjtj* 'stamp' in Coptic Egyptian are *empo* and *titi*, respectively showing that the glides could have a vocalic interpretation. In the case of *jbb*, the first geminate fills the coda and hence, the second mora position, whereas the second geminate forms an extrametrical syllable. In the case of *tjtj*, there are two light syllables to satisfy the bimoraic minimality condition of the template. Notice that the occupation of two syllable position is not an accident. Instead, the joint operation of reduplication and epenthesis in this verb class yields a bisyllabic template, which is somehow a prosodically optimal form. That bisyllabic templates constitute some kind of standard pattern appears from the fact that the majority of Egyptian verb stems consist of three consonants to be organized into two syllables. This is why biliteral roots frequently undergo epenthesis or reduplicative copying, by means of which a monosyllabic stem is converted into a bisyllabic one:

(13)   *roots*   *epenth. stems*   *reduplic. stems*
       ?χ   *j?χj*   ?χ.?χ   'be green/ be inundated'
       ?m   *j?m*   ?m.m   'burn/ roast'
       hm   *jhm*   hm.hm   'shout, sigh/ roar'
       ꜥr   *ꜥrj*   ꜥr.ꜥr   'climb/ ascend (of flood)'

(13) illustrates that epenthesis and reduplicative copying improve the prosodic acceptability of the output representation by converting a monosyllabic stem into a bisyllabic one, according to a model template:

(14)

σ	σ	(σ)	σ	σ	σ	σ

	μ	μ			μ		μ		μ μ		μ μ	

C	V	C	V	C	C	V	C	V	C	V	C	C	V	C
s	o	t	e	m	p	i	s	e	n	o	g	n	e	g

Akin to Arabic, Egyptian triliteral stems like *sotem* 'hear' have the final consonant as an extrametrical syllable (cf. McCarthy and Prince 1990:14-5). Epenthezised stems like *pise* 'cook' derived from *psj* consist of two light syllables, the coda consonant in reduplicated biliteral roots occupy a moraic position.
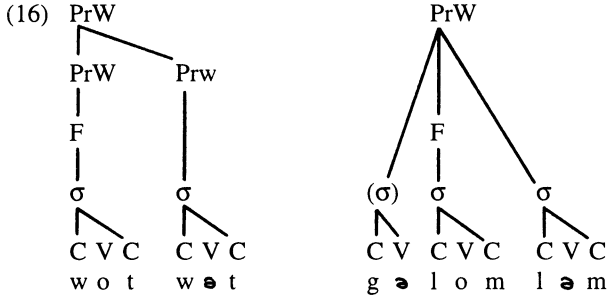
We have seen in the case of reduplicated triliteral roots that deviations from the bisyllabic stem template are licensed. However, a trisyllabic template marks the upper bound of what is a prosodically wellformed verb stem. This maximal stem constraint also explains, why reduplicated biliteral roots cannot contain more than two lexical formatives. While two prefixes can be grouped together in a closed syllable resulting in a trisyllabic template, three prefixes would require an extrametrical initial syllable, thereby violating maximality. The same rationale applies to the blocking of reduplication in the case of quadriliteral roots. Again, a morphological operation would result in a four-syllabic template, and hence is too heavy to pass prosodic licensing.

3.2 Syllable Reduplication. Another aspect of the prosodic underpinning of Egyptian reduplication grammar is prosodic reduplication, where the input of the copying process is a prosodic constituent:

(15)

	simplex form	*reduplicated form*	
a	wʔj	wʔj.wʔj	'be green/ be very green'
	wdn	wdn.wdn	'be heavy/ be very heavy'
	Nχb	Nχb.Nχb	'open (a mine)/ throw open'
	ħbn	ħbn.ħbn	'cause to be a phoenix/
			cause to cry like a phoenix'
b	knm	g.lm.lm	'wrap/ enclose'
	btk	b.tk.tk	'be slimy, slippery/ slip'
	gwʔ	g.wʔ.wʔ	'tie up/ be imprisoned'
	ʔχf	ʔ.χf.χf	'have appetite/ be fiery' (of flame)
	nkj	n.kj.kj	'copulate/bugger'

Prosodic reduplication takes either the prosodic word (15a) or the stressed (antepenultimate) syllable as the input of the copying process, and hence has a

prosodic trigger. That this is indeed the case is evident from the fact that epenthetic material is copied as part of the prosodic word:

(16)

The Coptic forms *wot.wət* 'be very green' and *gəlomləm* 'enclose' derived from *w?j.w?j* and *knm.nm*, respectively illustrate that verb stem are quantity sensitives trochees, with the antepenultimate being stressed. In the case of word and syllable reduplication, the nucleus of the unstressed syllable is reduced to schwa (Steindorff, 1951:121-2, par. 263-4, see also McCarthy 1982:409 for syllable reduplication in Biblical Hebrew). Observe that in syllable reduplication, the first root consonant is treated like a prefix in that it is assigned an extrametrical syllable position, presumably directly linked to the prosodic word.

4. Conclusions

In this article, the morphological and the prosodic aspects of Egyptian reduplication grammar have been explored in some detail. We have seen that the mapping between the root tier and the stem template is established by the interaction of edge-in association and different directionality parameters. Moreover, reduplicative copying is constrained by the prosodic requirements of the template. Next to morphemic reduplication, there is prosodic reduplication which takes an authentic unit of the prosodic hierarchy (the stressed syllable or the prosodic word) as the input of the copying process. The main patterns of reduplicative copying are summarized in table 1 (epenthetic elements are marked by @, prefixes are indicated by P):

Table 1: A synopsis of reduplicative copying in Egyptian

	C1	C1C2	C1C2C3
morphemic reduplication	C1.C1@ @C1.C1@ @C1.C1 *C1.C1	C1C2.C1C2 C1C2.C2 C1C2.C1 P1.C1C2.C1C2 P1.P2.C1C2.C1C2 *P1 P2 P3.C1C2.C1C2	C1C2C3.C1C2C3 C1C2C3.C3 *P1.C1C2C3.C1C2C3
prosodic reduplication	C1@.C1@	PC1C2.PC1C2 @C1C2.@C1C2 C1.C2@.C2@	C1.C2C3.C2C3

References

Bat-El, O. (1988) 'Remarks on Tier Conflation', *Linguistic Inquiry* 19, 477-485.

Broselow, E. and J.J. McCarthy (1983) 'A Theory of Internal Reduplication', *The Lin. Rev.* 3, 25-88.

Chomsky, N. (1991) 'Some Notes on Economy of Derivation', in I. Laka and A. Mahajan, eds., *Functional Heads and Clause Structure*, MIT Working Papers in Linguistics 10, 43-74.

Edel, E. (1955) *Altägyptische Grammatik*, Pontificium Institutum Biblicum, Rome.

Goldsmith, J. (1990) *Autosegmental and Metrical Phonology*, Basil Blackwell, Oxford.

Hoberman, R. (1988) 'Local and Long-Distance Spreading in Semitic Morphology', *NLLT* 6, 541-549.

Hoberman, R. (1991) 'Formal Properties of the Conjugations in Modern Aramaic', in G. Booij and J. van Maarle, eds., *Yearbook of Morphology 1991*, 49-64.

Itô, J. (1989) 'A Prosodic Theory of Epenthesis', *Natural Language and Linguistic Theory* 7, 217-259.

Kitagwa, Y. (1987) 'Redoing Reduplication: A Preliminary Sketch' in G.J. Huck and A.E. Ojeda, eds,, *Discontinuous Constituency* (Syntax and Semantics 20), Academic Press, New York, 71-106.

Marantz, A. (1982) 'Re Reduplication', *Linguistic Inquiry* 13, 435-482.

McCarthy, J.J. (1979) *Formal Problems in Semitic Phonology and Morphology*, Garland Pub., NY.

McCarthy, J.J. (1981) 'A Prosodic Theory of Nonconcatenative Morphology', *Linguistic Inquiry* 12, 373-418.

McCarthy, J.J. (1982) 'Prosodic Templates, Morphemic Templates and Morphemic tiers', in H. van der Hulst and N.Smith, eds., *The Structure of Phonological Representation*, Foris, Dordrecht, 191-223.

McCarthy, J.J. (1986) 'OCP effects: Gemination and Antigemination', *Linguistic Inquiry* 17, 207-263.

McCarthy, J.J. (1988) 'Feature Geometry and Dependency: A Review', *Phonetica* 45, 84-108.

McCarthy, J.J. (1989) 'Linear Order in Phonological Representation', *Linguistic Inquiry* 20, 71-99.

McCarthy, J.J. (in press) 'The Phonetics and Phonology of Semitic Pharyngeals', in P. Keating, ed., *Papers in Laboratory Phonology 3*, Cambridge University Press, Cambridge.

McCarthy, J.J. and A. Prince (1990) 'Prosodic Morphology and Templatic Morphology', in M. Eid and J.J. McCarthy, eds., *Perspectives on Arabic Linguistics II*, John Benjamins, Amsterdam, 1-54.

Mors ter, C. (1983) 'Affix to X°', *The Linguistic Review* 3, 275-298.

Otto, E. (1954) 'Die Verba Iae inf. und die ihnen verwandten im Ägyptischen', *Zeitschrift für Ägyptische Sprache* 79, 41-52.

Simons, S.K. (1982) *A Structural Study of Expanded Verbal Bases in Egyptian*, Ph.D., Berkeley.

Steindorff, G. (1951) *Lehrbuch der Koptischen Grammatik*, The University of Chicago Press, Chicago.

Yip, M. (1988) 'The Obligatory Contour Principle and Phonological Rules: A Loss of Identity', *Linguistic Inquiry* 19, 65-100.