THE PHONOLOGY AND MORPHOLOGY

OF TIBERIAN HEBREW

by

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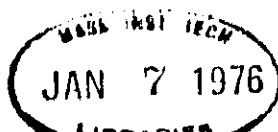MASSACHUSETTS INSTITUTE OF
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The Phonology and Morphology of Tiberian Hebrew

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ABSTRACT

This thesis investigates the phonology and certain of the morphological
structures of the Hebrew of the Biblical period. Principal attention
is focussed on the network of stress-related mutations of syllable
structure. The SPE theory of phonological formalism, which abjures
easy reference to the notion 'heavy syllable' is supported, as is the
linear ordering of rules. The prosodic theory of Liberman (1975) is
adapted to give insight into the stress-shifting phenomena of the
language. The reduction and deletion phenomena which so markedly
distinguish the language from Proto-North West Semitic (and from
related languages such as Classical Arabic) are shown to devolve from
a single rule of de-stressing that operates in an alternating fashion.
The phonology of the construct state is shown to be very simply related
to that of the rest of the language when it is understood that the
entire aggregation of nouns forms a single phonological word, in the
sense of SPE. Certain theses about exceptionality are advanced, and
minor rules, operating in contexts created by syntactic rather than
morphological combination, are shown to play a role in grammar.

To S.A.

que be·m vols mal

Acknowledgement

It has been well said, that works of light and the scholarly passions do not spring unaided from the brow of their genial creators, Minerva from Jupiter, grey-eyed and gleaming with new intelligence. There is a history here, deep beyond the accumulation of pages, not merely a history of ideas, that calls for a reckoning or for a formal feeling that evokes one.

My history has been much among the nimbus of ideas made by the advisors to this work: Noam Chomsky, Morris Halle, Paul Kiparsky. My first teacher of linguistics, Myrna Gopnik, with her inspired over-view of things, provided me with what proved to be a Pisgah sight of Palestine; with David Lightfoot I came across the border, taking an instructive run around the mountain (Mount Royal I mean) on the way.

Chomsky, Halle, and Kiparsky have contributed to the work here presented in ways that are quite fundamental, and often quite indirect as well, since I have mostly gathered from them my notions of what the subject is, or ought to be, about. Halle I especially acknowledge as teacher and mentor; his untiring instruction in the base matter of 'was die Wissenschaft ist', his endless ingenious encouragements,have made the difference.

I would also like to thank Professor T. O. Lambdin of Harvard University, a man of deep knowledge and fluid linguistic imagination, who taught me, one way or the other, a lot of what I know about the language. Often,too, he is the hidden interlocutor of these pages, the reader whose sharp questions I am attempting to answer.

Jean-Roger Vergnaud (one might say: il miglior fabbro), friend

and collaborator, has had much, multifariously, to do with the progress
of my opinions, in this and many another thing of substance. Mark Aronoff,
whose insightful (1971) paper is one root of the present inquiry, has
worked over with me many of the issues taken up herein. Mark Liberman,
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I am especially grateful to my parents, to my brothers and my
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All the errors, omissions, & compromises are on me.

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Prefatory Remarks

The language we shall be concerned with is the Hebrew of the

Bible, especially that major portion of Biblical literature which was

composed in the 600 year period preceding the Babylonian Exile of

587 B.C. This material was transmitted through antiquity in the form

of a text written with the 22 consonant signs of the Hebrew alphabet.

In the 9th and 10th centuries A.D. a group of Jewish scholars working

in Tiberias, Palestine -- the Masoretes (transmitters) -- perfected

an intricate tystem of diacritic markings designed to preserve, down

to fine phonetic detail, the accepted manner of reading the language;

these they interpolated the received consonantal text.

Masoretic Hebrew -- the Hebrew of the Bible as annotated by

the Masoretes for vowels, accent, spirantization (and its lack), and

gemination -- has the following sound system, according to the standard

interpretation, as presented in e.g. Lambdin (1971) and Gesenius (1910):

$$
\begin{array}{llllllllllll}
p & (f) & t & (\theta) & \underset{.}{t} & s & \underset{.}{s} & s & s & k & (x) & q & \underset{.}{h} & h \\
b & (v) & d & (\delta) & & z & & & & g & (\gamma) & & & ? \\
m & & n & l & r & & & & & & & & \\
y & w & & & & & & & & & & & \\
\end{array}
$$

$$
\begin{array}{llll}
i & u & \bar{i} & \bar{u} \\
e \ (\partial) \ o & & \bar{e} & \bar{o} \\
a & & \bar{a} & \\
\end{array}
$$

Remarks: The non-emphatic stops / p t k b d g / are spirantized in the

env. V--. As this is the only source for these spirants, we follow

traditional orthographic practice in writing them as the homorganic stop

with an under- or over-line: $\bar{p}$ = f ; $\underline{t}$ = θ ; $\underline{k}$ = x ; $\underline{b}$ = v ; $\underline{d}$ = δ ; $\bar{g}$ = γ .

A straightforward analysis of the non-syllabic sonorants, using the features of Kean (1975) provides a grammatically adequate classification of them.

	y	w	l	m	n	r	ḥ	ʕ	h	?
son	+	+	+	+	+	+	+	+	+	+
cns	-	-	+	+	+	-	-	-	-	-
low	-	-	-	-	-	-	+	+	+	+
high	+	+	-	-	-	-	-	-	-	-
back	-	+	-	-	-	-	+	+	-	-
St.V.C.	-	-	-	-	-	-	+	-	+	-
cor	-	-	+	-	+	+	-	-	-	-

The abbreviation 'St.V.C.' refers to the feature $\left[\text{Stiff Vocal Cords}\right]$. $\left[\text{+Stiff Vocal Cords}\right]$ signifies voicelessness.

The segments /ḥ ʕ h ?/ are the gutturals; /ʕ/ is the voiced pharyngeal fricative and /ḥ/ is its voiceless counterpart. They form the class $\left[\text{-syl, +son, +low}\right]$. They function as a class in a number of rules; their major effect upon neighboring vowels is lowering. A simple and very low level example of their influence is this: before a word-final guttural /ḥ ʕ h/, any non-low vowel picks up an a-off glide:

$$(0) \qquad \emptyset \;--\; a \Big/ \begin{bmatrix} V \\ \text{-low} \end{bmatrix} -- \begin{bmatrix} \text{+son} \\ \text{+low} \\ \text{+cnt} \end{bmatrix} \#$$

Characteristic instances of the rule are šōleah, hišmīaʕ, gāḇōah. The exclusion of /?/ may be an orthographic artifact, since in a form written as yōṣē?, the /?/ may well be phonetically absent. At any rate, the rule, which is totally universal in application, shows quite clearly the guttural affinity for lowness.

It may be that the feature $[\pm low]$ should be replaced, or supplemented, with the feature $[+\text{Constricted Pharynx}]$. However, it is not at all clear that /h ?/ involve pharyngeal constriction; but perfectly clear that they pattern with /ḥ ʕ/ and that they tie in with lowness; so I shall use $[\pm low]$ here.

The class $[-\text{syl}, -\text{cns}, -\text{hi}]$ comprises the gutturals plus /r/, excluding /y w l m n/. This class functions in a centrally important rule of the language, given as rule (11), chapter 2; this grouping-together has occasioned much comment over the years, but in the system of Kean (1975), where /r/ is treated as a glide, it is quite natural. The segments /ḥ ʕ h ? r/ are just the non-high glides.

The so-called emphatic consonants /ṭ ṣ q/ provide problems in phonetic analysis which are essentially insoluble because of the nature of the data -- an orthographic record of a language long dead. The segments /ṭ ṣ/ obviously have some kind of secondary articulation in common, for an assimilation in this articulation regularly takes place in the Hitpaʕʕel conjugation (its morphology is sketched immediately below). The /t/ of the hit- prefix metathesizes with a following coronal, and it assimilates in both voicing and 'emphasis' to that coronal.

Prefix	Stem	Combination
hit-	zakkēr	hizdakkér
	dabbēr	hiddaboér
	ṣaddēq	hiṣtaddéq
	tahēr	hittahér
	šammōr	hištammér

I take this as evidence that /ṭ ṣ/ share a feature which non-emphatics
like /t s/ lack. The exact character of this secondary articulation is
unclear, and in a well-studied modern language which has this series of
consonants -- Arabic -- it is the source of a traditionally heated contro-
versy. The emphatics are variously held to be pharyngealized, velarized,
or formed with tensing of the tongue-root (Brame 1970).

We have another source of structural information about /ṭ q/.
Unlike their non-emphatic counterparts /t k/, they do not undergo spir-
antization in the env. V--. This property they share with (ordinary) con-
sonants that stand as the first member of a geminate cluster: contrast
dā̆bār 'word' with dibbér 'he talked'. Geminates arise through derivation,
suffixal inflection, and phonological assimilation; whatever the source,
spirantization is blocked. What could be the motive for such recalcitrance?
Recall that Korean has a three-way distinction of consonant-types into
aspirated, non-aspirated, and 'fortis'. Kim (1975) shows that any
geminates arising through morphological combination become 'fortis'.
This suggests the possibility that Hebrew geminates are 'fortis', that
the emphatics are 'fortis' as well, and that spirantization does not
apply to 'fortis' consonants. Now, Kim identifies 'fortis' with glott-
alization, i.e. the feature specification +Constricted Glottis, -Spread
Glottis , and it may be that the Hebrew geminates should be glottalized
by a phonological rule. But 'fortis' cannot be simply identified with
'emphatic': the sequence -tt- is never written -ṭ- or -ṭṭ-; nor is -kk-
written -q- or -qq-. So it seems that the secondary articulation of /ṭ ṣ/
is something other than 'fortis' or [+C.G.] . 'Fortis' may be a 'tertiary'

articulation of these segments, but there is no necessity that forces us to such a conclusion. Assuming glottalization of geminates, the class of segments which spirantize post-vocalically can be characterized as [-son, -low, -C.G.] , taking [+low] (perhaps better is [+C.P.]) as the feature shared by /ṭ s q/.

The segment /s/, written with the letter sīn, is evidently a palatalized /s/. Unfortunately, it participates in no alternations that would betray the details of its character; but its reflexes in related languages are /s/ (Aramaic) and /s/ (Arabic, Ethiopic, Akkadian), which makes /s^y/ a likely enough candidate.

The following table is offered as a rudimentary characterization of the phonetic composition of the non-sonorant articulations of Hebrew. Those features which are omitted may be assumed to enjoy their unmarked value in the segments at hand.

	p	t	ṭ	s	ṣ	š	s	k	q	b	d	z	g
syl	-	-	-	-	-	-	-	-	-	-	-	-	-
cns	+	+	+	+	+	+	+	+	+	+	+	+	+
son	-	-	-	-	-	-	-	-	-	-	-	-	-
St.V.C.	+	+	+	+	+	+	+	+	-	-	-	-	-
low	-	-	+	-	+	-	-	-	+	-	-	-	-
high	-	-	-	-	-	+	+	+	-	-	-	-	-
back	-	-	-	-	-	-	-	+	+	-	-	-	+
cor	-	+	+	+	+	+	+	-	-	-	+	+	-
ant	+	+	+	+	+	+	-	-	-	-	+	+	-
cnt	-	-	-	+	+	+	+	-	-	-	-	+	-

Morphological Preliminaries

Hebrew distinguishes two categories of inflection: the verbal and the nominal. There is a distinction in the nominal system (which includes nouns _per se_, adjectives, participles) between masculine and feminine, and between singular and plural. The old dual has fallen into desuetude, being used only in a narrow range of forms, such as nouns referring to paired body parts or expressions conventionally related to a certain positive integer (2, 200, 'twice', 'two years'). Adjectives are inflected to agree with the noun they modify (the plural being used when the noun is dual). The usual nominal inflectio ; are displayed here attached to the adjective tŏḇ 'good'. (Like all adjectives, it may be used as a noun, signifying 'good one'.)

	Singular	Plural
masc.	tŏḇ	tōḇím
fem.	tōḇā́	tōḇṓt

The feminine singular ending -ā̄ will prove (1.11 infra) to be /-at/ underlyingly. The plural endings are /-ōt/ and /-ĩm/. The dual ending is -ayim, as in yāḏ 'hand', yāḏáyim '(2) hands'. Not all feminine nouns bear the mark -- yāḏ, for example, is feminine -- and there is a bit of sexual criss-crossing in the plural, so that the plural of ?āḇ 'father' is ?āḇṓt, the plural of šānā́ 'year' (fem.) is šānĩm. The dual ending comes out as /aym/ once the phonology of chapter 1.3 is recognized, and this indicates a further resolution of the non-singular endings into /ay+m/, /ĩ+m/. However, as it is my policy in this essay to mark by morpheme boundaries only the major units of structure unless more subtle division is strictly relevant to the

matter at hand, the reader will encounter / ...+im/ and so on.

Verbal inflection is almost equally simple. Two temporal categories are found, a perfective and an imperfective aspect. The perfect is inflected on the pattern of Perfect Stem--Affix, where the affix is chosen on the basis of person (1 2 3), gender (m f), and number (s p). The imperfect displays a somewhat different set of suffixes, and more strikingly, prefixes chosen according to person and number (and in the third person plural, gender): it has the pattern Pref--Impf Stem--Suff. (Some of the suffixes are $\emptyset$.) The shape of these morphemes will become apparent within the first few pages of the work itself.

Other verbal categories are the hortatory system (imperative, jussive), which is inflectionally related to the imperfect, the participles active and passive (an adjective), the infinitive (traditionally, 'infinitive construct'), and the 'infinitive absolute', which principally serves a kind of adverbial function (it corresponds to the surely in 'and you will surely die'). This latter will not be discussed, as it participates in no alternations. The imperative and the infinitive are treated in section 1.7; the participle surfaces in 1.5 and 2.3.

The finite verb thus has the inflectional structure (Pre) V (Suff). Now, it is not the case that just any amalgamation of vowels and consonants, arranged according to the phonological constraints of the language, will count as the term V in the formula. The V is in fact replete with internal structure. There are five frequent types of V, two of which have regular passives, giving rise to the seven major derived forms of the verb-stem (Hebrew name: binyáním). In the European

tradition these are called 'conjugations', a very misleading usage, since in the grammar of familiar Indo-European tongues the term 'conjugation' refers strictly to mode of inflection. The Hebrew verb has <u>one</u> mode of inflection and many stem shapes to which these inflections attach. However, the customary term 'conjugation' will be used here in its Semitic-grammatical sense of 'stem-category': caveat lector.

The morphologically simplest conjugation is called Qal, the word 'qal' meaning 'light' or 'simple'. The perfect has the stem $/Ca\ C\ V_1C/$, where V_1 may be /e a o/, any one of the three short vowels; the usual case is /a/. The imperfect has the stem $/CCV_1C/$, which is the shape regularly assumed by three consonant stems when prefixed; V_1 may again be any of the short vowels, and is usually /o/. (A more accurate account of the vocalism is given in 1.7).

The other principal conjugations are formed chiefly by the morphological processes of doubling-the-middle-consonant, and prefixation. They are named after the form that the root pĭl would assume in the 3rd person masculine singular of the perfect, if it appeared in the conjugation. This naming, derived from the practice of Arab grammarians, is doubly unfortunate: because in Hebrew the /ĭ/ cannot appear doubled on the surface, being always degeminated by a process discussed in 2.2; and because English has no such letter to write with. My practice will be to write the full of form of the name, using the character ĭ in the midst of the roman characters, disregarding the law of degemination, so that the reader will be reminded of the morphology by the name.

The individual conjugations are associated with such notions as

'causative', 'intensive', 'medio-passive', and the like, but as is

generally true of derivational processes, there is considerable lexical-

ization of meanings and no precise and uniform semantic analysis can be

given.

The doubled conjugations are three in number: Piᶜᶜēl, its

passive Puᶜᶜal, and Hitpaᶜᶜēl. The Piᶜᶜēl is described as intensive,

factitive, transitivizing. For example, the word gādṓl 'big' is related

to the Qal verb gādál 'to be big', and to the Piᶜᶜēl verb giddél, which

means 'to grow (tr.), to bring up (a person), to extol', all connected

with the central vague notion of 'making big'. Every Piᶜᶜēl has a Puᶜᶜal,

e.g. guddál, which is just the passive of whatever the Piᶜᶜēl verb

signifies. The Hitpaᶜᶜēl has the same inner stem as the Piᶜᶜēl, the a-i

alternation being predictable, accompanied by the prefix hit-, which

can be further analysed into h- and t-. According to Lambdin (1971,

p. 249), "Hitpaᶜᶜēl verbs are intransitive and often have a reciprocal or

reflexive meaning...". The verb hitgaddél means 'boast, show oneself

great'; hithallék means 'walk about'; hitpallél means 'pray'. In these

the semantic indeterminacy of derivation is quite manifest.

The Niᵖᶜal is intransitive, a kind of medio-passive. It is

marked by an n- prefix; the imperfect has the shape yippāᶜēl , where yi-

is the 3ms inflectional prefix and the n has assimilated (regularly, vide

1.4) to the first root consonant. The basic stem -pāᶜēl has a morpho-

logically lengthened /ā/ (non-deletable) and is distinct in shape from

other prefixed stems, which are always /CCVC/. This distinction can be

attributed either to the double prefixation, on the outside by inflection,

on the inside by derivation, or to the lengthening of the vowel. The

Nip̄ʿal is in no sense a regular passive (or middle) of Qal, although some
Nip̄ʿal verbs stand in a passive or middle relation to some Qal verbs. For
example, kāṯáḇ means 'to write' and niḵṯáḇ means 'to be written', but
niḇḥár means 'to be acceptable' where bāḥár means 'choose'; and a verb
like nip̄lā? 'to be wonderful, marvelous' has no Qal counterpart at all.

The prefix h- marks the Hip̄ʿíl and its passive counterpart Hop̄ʿal.
These conjugations are usually causative (with the range of semantic drift-
ing which that entails), but there is in Hip̄ʿíl, interestingly, a stative
subclass, as hilbín 'to be white', related to the adjective lāḇān 'white.'
Typical Hip̄ʿíl verbs are higdíl 'to make something great, do a great thing'
for, boast' and hismíaʿ 'proclaim, announce, summon, make or let someone
hear', related to the Qal verb sāmáʿ 'to hear'.

There are other rarer formations, such as Pōlēl (not too uncom-
mon), similar in use to Piʿʿēl, and the reduplicated Pilpēl (uncommon),
but we shall not be much concerned with them.

This morphological system gives the sense of the triliteral root
for which Semitic languages are famous. It is not just that word stems
happen to have (in general) three consonants, or even that three-conson-
ant groups have associated with them a kind of meaning; rather that the
canonical morphological patterns of the language -- the very definition
of what it takes to qualify as a word -- consist of rigidly fixed arrays
in which three distinguished consonants are called for to fill the
pattern.

Following Lambdin (1971), I will refer to the root consonants
by number: I, II, III. A root like gdl can be described as I-g, a root
like bḥr as II-ḥ; and so on.

CHAPTER 1

STRESS AND SYLLABLE STRUCTURE

1.1 Elements of Stress and Deletion

In words ending with a consonant, main stress falls on
final syllable: for example, dābár 'word', dbārīm 'words'.
Among vowel-final words there is variation between final and
penultimate stress. Consider the following paradigm, the per-
fect of the typical Qal verb kātáb 'to write'. (Verbs will
be cited in the third person masculine singular of the perfect,
the simplest form, and glossed with the English infinitive.)

		Singular	Plural
3	m	kātáb	⎰ kātb +ú
	f	kātb +á	⎱
2	m	kātáb+tā	ktab+tém
	f	kātáb+t	ktab+tén
1		kātáb+tī	kātáb+nū

Stress is evidently penultimate only in those forms that end
a suffix shaped +CV: (+tā 2ms), +tī (1s), +nū (1p). Otherwise,
if the word ends in a consonant, or if the suffix is wholly
vocalic, +á (3fs) and +ú (3p), stress is final. We can

formulate this observation into rule (1),

(1)   V → [+stress]/ --C$_0$ (+ C V) ##

This rule, however, fails to deal correctly with monosyllabic

verbs of the same conjugation (Qal). This is the perfect of

qām 'to arise':

		Singular	Plural
3	m	qám	qám+ū
	f	qám+ā	
2	m	qám+tā	qam+tém
	f	qám+t	qam+tén
1		qám+tī	qám+nū

Here we see that stress is penultimate whenever the form ends

in a vowel; it goes by a less restricted rule:

(2) <u>Main Stress</u>   V → [+stress]/ --C$_0$ (V) ##

   These rules differ on the third person feminine: kātb+á/

qám+ā: and on the third person plural kātb+ú/qám+ū. It is

in just these forms that kátab loses the vowel that would be

stressed by rule (2). I say <u>loses</u>, for kātāb must possess its

second stem vowel underlying. This is evident (1) from the

spirantization of the stem-final /b/ throughout the paradigm, which can only be occasicned by a preceding vowel, and (2) from the contrast with other verbs such as kābēd 'to be heavy', qāṭon 'to be small', which shows that the vowel is not predictable.

These considerations motivate a rule of vowel deletion. Let us accept (2) as the stress rule of Hebrew. It will prove to be essentially the first rule of phonology, the root of the complex syllabic mutations. We order Vowel Deletion after Main Stress, associating with it a condition that whenever a stressed vowel is deleted, the stress re-appears on the next syllable to the right. (We return to the matter of implementing such a condition.) Derivations like these will result from the ordering:

Main Stress	kātáb+ū	qám+ū
Vowel Deletion	kāt φb+ú	--
Output:	kātbú	qámū

The same pattern of deletion and stress-shift appears in the Qal imperfect:

	Singular		Plural		
3 m	yí+któb	yā+qúm	yí+ktb+ú	-!-	yā+qúm+ū
f	tí+któb	tā+qúm	tí+któb+nā		t+qúm+é+nā
2 m	tí+któb	tā+qúm	tí+ktb+ú	-!-	tā+qúm+ū
f	tí+ktb+í -!-	tā+qúm+í	tí+któb+nā		t+qúm+é+nā
1	?é+któb	?ā+qúm	ni+któb		nā+qúm

The exclamation-pointed forms are those where deletion has made a difference in the surface stress pattern. The -e- augment interposed between the stem and the -na f. pl. suffix is peculiar to imperfects with stem shape $C\bar{V}C$ (from 'hollow roots' like that of qám) or CVC_iC_i (from geminate roots in which radical II = radical III, e.g. sābáb 'to go around', t+subb+é+nā 'they/you fp will go around). The augment will prove to have the underlying shape /-ay-/.

Many of the consonant clusters produced by deletion will later in this essay broken up by schwa. The present purpose is to map the gross geography of syllable structure, and to this end we shall abstract away from the role of schwa.

The basic claim embodied in the embryonic two-rule system is this: main stress falls on a final vowel if and only if the penultimate vowel is deleted. There are numerous places in the inflection of the verb where this claim is put to the test. A survey of the relevant forms shows that it is indeed the case. Tabulated here is a representative sampling, to give the flavour of the phenomenon:

Conjugation/Asp.		3 ms.	Deletion/Final Str(3p)	No Del./Penult. Str.
Qal	pf.	katáb	kátb+u	kátab+ti (1s)
		qám	--	qám+u (3p)
	impf.	yi+któb	yi+ktb+ú	ti+któb+na (2-3 fp)
		ya+qúm	--	ya+qúm+u (3 mp)
		ya+sób	--	ya+sóbb+u (3 mp)
Niplal	pf.	ni+ktáb	ni+ktb+ú	ni+ktáb+ti (1s)
		na+kón	--	na+kón+u (3p)
		na+sáb	--	na+sább+u (3p)
	impf.	yi+k+katéb	yi+k+katb+ú	ti+k+katáb+na (2-3fp)
		yi+k+kón	--	yi+k+kón+u (3mp)
		yi+s+sáb	--	yi+s+sább+u (3mp)
Pillel	pf.	giddél	giddl+ú	giddál+ti (1s)
	impf.	y+gaddél	y+gaddl+ú	t+gaddel+na (2-3fp)
Hiplil	pf.	hi+smíd	--	hi+smíd+u (3p)
		he+qím	--	he+qím+u (3p)
		he+séb	--	he+sébb+u (3p)
	impf.	ya+smíd	--	ya+smíd+u (3mp)
		ya+qím	--	ya+qím+u (3mp)
		ya+seb	--	ya+sebb+u (3mp)

It is fair to conclude provisionally that rule (2) really is the main stress rule of the language, and that it interacts with a rule of Vowel Deletion to produce the characteristic patterns illustrated in the table.

What, then, is the nature of this rule of vowel deletion? Perusal of the data presented so far shows that the process occurs only in the env. --CV, never in the env. --CCV: contrast, for example, kāt∅b+ú with kātáb+tī. Notice also that in the form ktab+tém it is the first vowel of the stem /katab/ that suffers deletion, and not the second, which finds itself shut up in the env. --CC. For a vowel to delete, then, it is necessary, but not quite sufficient that it be located in an open syllable: yā+kōn+ú contrasts with yi+kt∅b+ú (cf. yi+któb).

We observe, however, that the deletable vowels belong to a series in which there is alternation between short and long vowels in positions where the non-deletable vowels retain length.

In the Construct State:

dābár 'word'

dbár ham-mélek 'the word of the king'

dibrē ham-mélek 'the words of the king'

pāqīd 'overseer'

pqīd hā-ʕám 'overseer of the people'

pqīde haʕám 'overseers of the people'

With certain suffixes

yi+šmōr 'he will observe'

yi+šmr+ú 'they will observe masc pl'

yi+šmor+kā 'he will observe you' (alternative form: yi+šmr+ekkā)

but: hi+smíd 'he destroyed'

        hi+smíd+ū 'they destroyed'

        hi+smīd+ká 'he destroyed you'

In Proclisis:

        yi+ttēn 'he will give'

        yi+ttn+ū 'they will give'

        yi+ttēn#lī 'he will give to me' lī = l- 'to' + ī 'me'

but: hi+ggíd#lī 'he told me'

Among the theories suggested by this data, and the one
we shall puruse, is that in the alternation $\emptyset$ - $\breve{V}$ - $\bar{V}$, it is
the short vowel that is underlying; and that the non-deleting,
non-shortening (in the above environments) vowels are just
those that are underlyingly long. This prima facie plausible
theory will gain credence if the vowel-lengthening rules
which it necessitates prove to be general in character and
coherently integrable into the rest of the phonology.

    We formulate these observations in a rule of Vowel
Deletion:

(3) <u>VD</u> $V \rightarrow \emptyset$ / --C V
        [-lng]

How does the rule VD apply? Does it delete every short
vowel that lies in an open syllable? Up to this point, we've
seen no evidence that would contradict this assumption; but

we shall see below (1.3) that the rule produces an alter-
nating pattern when it applies to a sequence of short vowels
in open syllables, as if it iterated from right to left.
In the configuration V̆ C V̄ or V̆ C V C C of course, the
short vowel will always go, no matter how the rule applies,
simultaneously, leftward, rightward, or whatever.

The reader should perhaps be forewarned that VD is
merely the larval form of the organism, that the rule will
go through a couple of metamorphoses before we find out
exactly <u>what</u> it does to vowels; but the inner sense of it,
which we happen on in 1.3, will remain invariant throughout.

1.2 Some Rules of Quantity

Returning to the paradigm of kātab, we see that each of
the stem vowels is susceptible to deletion: kātbū/ kₐabtém.
This implies that both are underlyingly short: the verb
stem must be /katab/.

The first stem vowel shows up long in all those forms
in which the second stem vowel receives stress by rule (2).
Here is the paradigm, repeated for convenience, with the
surface forms matched to approximately underlying forms after
Main Stress has applied:

	Sing.		Plural		
3 m	kātáb	/katáb/	kātbú	/ katáb+u/	(!)
f	kātbá	/katáb+ā/ (!)			

	Sing.		Plural	
2 m	kátabtā	/katab+ta/	ktabtém	/katab+tem/
f	kátábt	/katab+t/	ktabtén	/katab+ten/
1	kátábtī	/katab+tī/	kátábnū	/katab+nū/

Evidently, vowels lengthen in pre·stress position:
but, as the short a of ktabtem indicates, only in the env.
--CV. The 3p form kátbū and the 3fs form kátbá satisfy this
open syllable restriction before VD applies, and fail to
satisfy it afterwards. We therefore introduce the rule of
Pre-Tonic Lengthening, ordered before VD:

(4)   PTL   V → [+lng] / -- C V́

The mutations of the word dábár 'word, matter' make clear
the existence of another lengthening rule, whose function is
somewhat obscured by a peculiarity of verbal phonology. We
can investigate the character of the vowels of dábár by affix-
ing it so as to draw stress away from the stem. In the
plural form dbár+īm the loss of the first vowel to VD shows
that it is short underlyingly; its length in dábár is a
result of PTL. Adding the 3mp pronominal suffix to the
plural produces dibr+ē+hém 'their m words', a form in which
the second stem vowel has succumbed to VD, showing that it
too is short. (The appearance of i for a in the first syl-
lable is treated below, 1.3.) Surface dábár must come from

underlying /dabar/. We posit, therefore, a rule lengthen-
ing vowels under stress:

(5)   Tone-Lengthening   V   → [+ long]
                          [+ stress]

The reader who labored dutifully through the Deletion/Stress
table (p.21) will have in mind many instances where the oper-
ation of TL is apparent: e.g., in the Qal imperfect, we find
yi-któb--yi+ktb+ú ti+któb+nā, which requires /ktob/; in the
Piʕʕēl imperfect, long under stress: y+gaddēl, t+gaddēl+nā;
same vowel deleted t+gaddl+ī, y+gaddl+ū; requiring /gaddel/.
The peculiarity alluded to is that nowhere in the verbal
paradigm does stem-final a undergo TL, although, as we've
seen, both e and o do so regularly. Typically, we have
kātáb, yi+lmád, ni-ktáb, šilláh, etc.

Now this had led some scholars to argue that in fact
TL never does apply to any stem-final vowel in the verb. It
happens that there is some external evidence, from the trans-
literation of Hebrew into Greek letters in Origen's Hexapla
(ca. phps 3rd cent A.D.), that in some dialects of Hebrew
(id est, the one Origen was listening to) all these vowels
were short in the verb in stressed position: namely what the
Masoretes write as e (sere) and o (holem), which are else-
where uniformly transcribed by eta and omega respectively,
are in these positions regularly written with epsilon and
omicron. However, the Masoretes had the orthographic resources

to record these distinctions (at least in the case of e

(seghol) which can bear stress); that they did not, I take

as evidence that in the dialect under consideration,/e o/ did

show up long under stress in verbs.

Since the short stem vowels /e o/ in verb forms like

kābéd, yiktób do undergo TL, the rule is ordered after VD,

for its effect of lengthening does not block deletion. The

correct forms are kābdú (like kātbú), not kabédū, and yiktbú,

not yiktóbū (but yaqúmū). We arrive, then, at the following

order:

    (6)   a.   Stress

           b.   PTL

           c.   VD

           d.   TL

The ordering of PTL before VD, necessitated by the

form kātbú / *katbú, has a consequence which is quite un-

related to this motivating data: that pretonic vowels should

be immune to the elidatory effects of VD. This is quite

generally the case, as the typical word dbārím 'words'

illustrates.

The following derivations should make clear the func-

tioning of the posited rules.

	/katab+u/	/katab+tem/	/dabar/	/dabar+tīm/
Spir	t̲ b̲	t̲ b̲	b̲	b̲
Main Str.	katáb+ū	katab+tém	dabár	dabar+īm
PTL	kātáb+ū	--	dābár	dabār+īm
VD	kātØb+ū	kØtab+tém	--	dØbār+īm
TL	--	--(!)	ḋābár	--
Output:	kātbū	ktabtém	dābár	dbārīm

The keen-eyed reader will be wondering why TL fails in ktabtém. Why not ktabtém? The exceptionality is just a property of the suffix, or rather of a class of suffixes to which it belongs. Immediately below (1.4) we shall attempt to characterize this class, after we look a bit more closely at suffixal morphology.

The 'hollow' verbs like qām--so called because of their apparent lack of a middle radical--must have a long stem vowel, for it does not undergo deletion, either in the perfect (qāmū) or the imperfect (yāqúmū). Roots of this type originally had a glide, y̲ or w̲, as a middle radical; cf. the Arabic qawm[un], verbal noun of the cognate word. In Arabic verbs from these roots undergo complex alternations of the stem vowel (explored in Brame (1970)), and the w̲ or y̲ is prominently displayed in verbal derivation. In Hebrew of the pre-Exilic period, on the other hand, the few stem-

vowel alternations are simple reflexes of transparently

general processes, and the historical glide is nowhere in

evidence in the verbal paradigm. (Forms like qiyyēm,

Piꟼꟼel related to qām, only arise later, most likely under

Aramaic influence.) That is to say, evidence for an under-

lying glide is tantalizingly weak. However, even if a

glide is posited, the rules that map the stem-internal vowel

and glide combinations onto V̄ can be as early as possible,

and indeed must procede VD so that stress is retained on

the stem (qámū). Therefore, even if such rules exist, only

their output--the long vowel--is relevant to the present in-

quiry.

The stem vowel loses its length in the env. --CC:

qámt, qamtém contrast with qám, qámū. We need, therefore,

a rule of shortening:

(7)   Shortening   V → [-long] / -- C C

This rule is not invoked in the imperfect, because the only

consonant-initial suffix, -nā (fp), attaches with a vocalic

augment (tiktōbnā, but tqūmenā). In the imperative, which

has the same endings, we find the following:

	Sing.	Pl.
m	qúm	qúmū
f	qúmī	qómnā

The reader may have noticed that the rule TL, when it

applies to short vowels, has a non-high output: yiktób,

gaddél are characteristic. Observe that in the imperative
paradigm, the vowel appears non-high just where rule (7)
would shorten it and TL would lengthen it:

	/qū́m/	/qū́m+na/
Shortening	--	qum+na
Main Str.	qúm	qúm+na
TL.	qū́m	qōm+na
Other		qóm+nā
Output:	qúm	qómnā

How is the lowering to be accomplished?   In Chapter 2
it will be shown that there is a rule that makes short vowels
non-high:

(8) Lowering   V   →   [-high]

                        [-lng]

The order is Shortening-Lowering-TL.

   All final vowels are long, the only exceptions on the
surface being those that arise from combination with y:
yibné 'he will build' is at an earlier stage of derivation
/yibnay/. The mysterious 'other' in the above derivation is
the rule that insures this fact:

(9) V-final   V → [+long]/ ···#

Motivation for, and use of the rule will be found in 1.11.

These three rules (Shortening, Lowering, V-final) do
not play a significant role in the deliberations of this
chapter, and will therefore be essentially ignored. The
characteristic alternations in the short and shortened
vowels, i-e-ē and u-o-ō, will be studied in detail in Chapter
2. Here we shall focus on the laws of quantity and deletion.

1.2.1 Some Exceptions.

A kind of exceptionality that the system can tolerate
fairly easily occurs when a vowel known to be short does not
delete. If stressed, stress remains and does not shift.
Examples of this sort are found in the paradigm of pronominal
suffixation. The preposition la 'to' when suffixed with the
1p pronoun is: lánū 'to us'. But the vowel is deletable:
ldābár 'to a word'. But the appropriate underlying form
/la+nū/ generates *lnū, just as /katab+ū/ generates kātbū.
It turns out that vowels before -nū are quite generally
[-VD]. In section 1.11.2, after the treatment of deletion
phenomena has been deepened, or at least ramiculated, we re-
turn to the question of representing such cases.

A converse kind of exceptionality, in which stress
shifts to the end off a vowel that doesn't delete, is more
costly to express. This requires that a minor rule be added
to the grammar, a rule that forms must be marked to undergo.
In section 1.13 we find two words of this type (and only two):
the pronouns ?anōkí 'I", ?attá 'you ms'.

1.2.2 A Restriction on TL

As the following table of typical forms shows, TL
applies to any stressed /e o/ whatever, but fails to apply
to /a/ in the env. --CC:

ʔátt 'you fs'   yébk 'let them weep'   yākōl+t 'you fs can'

támm+ū 'they are finished' ʔélle 'these'   ya-sobb+ū 'they will go
                                                                      around'
qám+tī 'I arose'   hémmā 'they m'   qōm + nā 'arise! fp'

láylā 'night'   hésebb+ū 'they lead around' ktōb+nā 'write! fp'

lámmā 'why'   t+gaddél+nā 'they/you fp grew s.t.'

Observe that this configuration of data has nothing
whatever to do with Shortening, rule (7), which affects all
vowels and applies early, before TL is reached in the ordering.

The environments where TL does apply to /a/ are two:
--C##, as in dābār /dabar/, and --CV, in open syllables, when
VD (exceptionally) fails, as in lānū 'to us', ktābānū /katab+b+a+nū/
'he wrote us'. These environments collapse into the following
rule:

(10)   a → ā / -- C (V X) ##
        [+str]

Use of the familiar subscripted-parentheses notation allows
(10) to be combined with branch of TL that applies to non-low
vowels:

(11) Tone-Lengthening

$$\begin{bmatrix} V \\ +\text{stress} \\ (+\text{low})_a \end{bmatrix} \rightarrow [+\text{long}] \; / \; \text{--} \; C \; (\quad (V)_b \; X \;) \; \#\#$$

$$\underline{\text{Condition}}: \; a \supset b$$

When (a) is met--when the affected vowel is[+low],
i.e. /a/ -- rule (10) is generated by the implicational con-
dition. When (a) is not met--when the affected vowel is from
the set /e o/ -- the material in (b) is optional, and the rule
is:

(12) $\acute{V} \longrightarrow \bar{V} \; / \; \text{--} \; C \; (\; (V) \; X \;) \; \#\#$

The optional vowel imposes no restriction whatsoever; rule (12)
is equivalent to

(13) $\acute{V} \longrightarrow \bar{V} \; / \; \text{--} C \; (\; X \;) \; \#\#$

which, given the structure of the language, says that any
stressed vowel lengthens; just what should be said, once the
[+low] case is factored out.

The rule TL, thus constrained, allows an understanding
of an otherwise puzzling phenomenon. Among the monosyllables in
/a/ we find those with the expected long vowel, like dám 'blood'
yad 'hand', and those with a superficially unexpected short
vowel, like Çám 'people' ráb 'many' dál 'poor'. The short
vowel'd monosyllables uniformly show a doubled final consonant
in suffixation, the long ones only the single consonant surfacely

visible: ʕammī́m 'peoples' rabbī́m 'many pl.' dallī́m 'poor

pl.', as against dāmī́m 'bloods' yādáyim '(two) hands'. This

consonantal alternation evidences an underlying distinction

between single and double consonants that is neutralized

finally by degemination:

    (14) Word Final $C_i C_i \rightarrow C_i \,/\, \text{--} \#$
             Degemination

The underlying distinction serves to block TL, giving the

noted distribution of data. Rule (14), WFD, therefore follows

TL in the ordering.

    As predicted, in the e-class of monosyllables, there

is no surface distinction in vowel quantity between geminate

tri-literal stems like héṣ 'arrow' (pl. hiṣṣī́m), ʔém 'mother'

(pl. ʔimmṓt), léḇ 'heart' (pl. libbṓt), and truly biliteral

stems like bén 'son' (pl. bānī́m, the ā is irreg.) and šém

(pl. šemṓt). Of monosyllables in /o/ there are no biliteral

examples. The impossibility of finding any is guaranteed

by a peculiarity of stem-final /o/ in nouns and adjectives;

instead of pretonic lengthening, doubling of the final stem

consonant is found, as ʕārṓm 'naked', ʕārummī́m 'pl.'

As this phenomenon is quite general, let us record it:

    (15) O-Closure   S.D.   o C]$_{\text{stem of N,A}}$

                                        1 2 3

                S.C.   1 2 2 3

Note that the presence of an affix need not be required.
Because TL is unrestricted for /o/, a form /ʕēromm/ will lead
to ʕēróm (via WFD) as surely as /ʕērom/ will. Rule (15)
functions, like Shortening, as a very early adjustment.

Some derivations to illustrate these principles:

	/dam/	/ʕamm/	/hess/	/ʕērom/
O-Closure				ʕēromm
Main Stress	dám	ʕámm	héss	ʕērómm
TL	dām	--	hēss	ʕērōmm
WFD	--	ʕám	hes	ʕēróm
Output:	dām	ʕám	hēs	ʕērōm

Rule (14), WFD, was written intentionally with a single
word boundary (#) at the right extremity. Consider the al-
ternations of the preposition ?et- 'with': ?et#Dāwīd 'with
David', but ?itt+á+nū 'with us'. Clearly the word ends in
a geminate underlyingly. The reader will recall that SPE
provides for only one word boundary between preposition and NP
object (cf. also Selkirk 1972, 1974).

Forms like gmall+ím 'camels', gmall+ē+hém 'their m
camels' indicate that there is a minor rule of pre-suffixal
gemination; minor, because it applies to small number of
forms, unpredictably; a rule, because a putative base-form
*/gamall/ neither meets the constraint of triliterality nor
falls into a derivational pattern (like the tetra-consonantal

Piꞓꞓēl stem, for example). Therefore, the unaffixed form

gámal̩ with its long stressed vowel, is not a counterexample

to the proposed restriction on TL. Also to be treated this

way is the alternation yám -- yammím 'sea--seas'. (This is

near to history for gāmāl, cf Arabic gamal[un], not so for yām,

Arabic yamm[un]).

(16) Minor Doubling   S.D.   C +

                                     1 2

                              S.C.   1 1 2

The doubling in gmallím is often described as kind of

consonantal version of Pre-Tonic Lengthening (see, for example,

Blake 1952), the intuition being that the pre-tonic syllable

must be __heavy__, and that this restriction is implemented

either by PTL or by doubling (which of course excludes PTL).

However, forms like gmallēhém, in which doubling regularly

occurs at some remove from the stress, show that the desiderat-

um is, as rule (16) requires, suffixation, not proximity to

stress. The phenomenon has nothing to do with PTL.

1.3 Segholates and the Mode of Vowel Deletion

There is a class of nouns which show penultimate

stress: e.g. mélek 'king' séꝑer 'book' qódeš 'holiness'. The

traditional account mirrors history in regarding these forms

as underlyingly monosyllabic -- /malk/ /seꝑr/ /qodš/ -- so that

stress falls upon the stem vowel, and then is made to appear

penultimate by a later rule of epenthesis. This analysis

is well-supported. To take such forms as underlyingly

bisyllabic would not only require a complication of the other-

wise limpid stress rule, it would also require enriching the

segmental inventory to include a special /e/ that (1) could

be distinguished as the vowel to be skipped over in the stress

rule, and (2) could provide a lengthening-immune source for

the stressed-short [e] of mélek that alternates with [a], as

malkí, 'my king'. Further, the quality of the final unstressed

vowel is with 2 or 3 exceptions, predictable: it is usually

[e] (Hebrew name: seghol), but appears as [a] when abutted on

either side by any one of the gutturals /ʔ h ḥ ʕ/, as náʕar

'boy', pésaḥ 'passover', póʕal 'work'.

A crushing argument for the insertion analysis can

be garnered from the behaviour of verbs with a 'weak' third

root consonant (historically /y w /). Verbs of this root

type in the imperfect of all conjugations end in -é, e.g.,

tipné (from tipnáy) 'she will turn'. To form the jussive

of the unsuffixed forms, these verbs strip off the final vow-

el, yielding, in this case, tépen 'let her turn', from /tipn/

via TL (and Lowering). It is revealing that in certain

verbs the vowel insertion fails to take place, for example,

yébk 'let him weep' from yibké, an irregularity which clearly

displays the jussive formation process as a truncation. There

is no intelligible way to read the /e/ into the underlying

form of the imperfect: not only would such a move require a

special rule to get rid of the /e/ in forms like yēb̲k, but,

more seriously, it would rupture the canonical pattern CCVC

which is assumed by tri-consonantal stems after all prefix-

es of derivation and inflexion.

Noting that these nouns appear in their monosyllabic

guise before pronominal suffixes, as in malkī 'my king',

sip̲rī 'my book', qod̲šī 'my holiness', we postulate the fol-

lowing rule of insertion:

(17) Segholation $\emptyset \rightarrow e$ / C -- C #

Another rule is needed to describe the a-e alternation

found in words like mēlek̲ -- malki. We propose rule (18),

consequent to Segholation:

$$(18) \qquad \begin{bmatrix} a \\ -\text{lng} \\ +\text{str} \end{bmatrix} \rightarrow e / \text{--} \underset{[-\text{gutt}]}{C} \quad V$$

Observe that in the underlying /e/ and /o/ stems, the

stem vowel surfaces long due to the effect of TL: sēper,

qōd̲eš: but in the /a/ stems, the basic vowel, whether mutat-

ed to [e] or not, appears short: mélek̲, naḯar. This is ob-

viously a consequence of the single-consonant restriction on

the tone lengthening of /a/. Segholation therefore follows TL

in the ordering. In pause, the single consonant restriction

is usually lifted, and we find for ṣ́ēb̲ed̲, ṣ́āb̲ed̲, confirming

both the choice of /a/ as the underlying vowel in such forms,
and the [-long] restriction in rule (18).

There are no segholated forms in which the last two
consonants are identical: from /ʕamm/ comes ʕám, never ʕémem.
When in the course of derivation such a configuration arises,
degemination occurs, not segholation. So from yitté 'he will
extend', we get yét 'let him extend'. Segholation therefore
follows Word Final Degemination, which destroys its two-con-
sonant environment.

This gives an ordering WFD--Segholation. Recall that
one of the results of 1.2.2 was the ordering TL-WFD. By
transitivity of ordering, these two orderings go together
to force the linear arrangement TL--WFD--Segholation. Thus
the ordering TL--Segholation, necessary to insure the short-
ness of the stressed vowel in mélek, náʕar, is predicted
by independent considerations.

The plural of melek is not, as one might guess, *malkím,
with the plural affix attached directly to the underlying stem,
but mlākím, in which a new vowel has dramatically appeared in-
side the stem-final consonant cluster. This vowel does not
appear in all surface forms of the plural stem: e.g., malkē
'kings of ...', malkēhém 'their m kings': but its one-time
residence in the spot is revealed by spirantization of the /k/,
as observed by Aronoff (1971).

I assume, then, a morphological rule epenthesizing /a/
--short because deletable--into the stem-final cluster in all

plural forms:

    (19)   Plural Breaking ∅ → a / C -- C + Plural

The inserted vowel should be expected to come and go in accordance with the rule of Vowel Deletion. The following range of forms is found:

mlākím /malak+īm/ 'kings'   spārím /separ+īm/ 'books' qmasím /qomas̱+īm/ 'hand- fuls'

malkéhém /malak+ē+hem/   siprēhém /separ+ē+hem/ qoms̱-ēhém/qomas̱+ē+hem/

What is remarkable is the preservation of the underlying stem vowel in the forms on the second line. This implies that the rule VD applies in an alternating fashion, chopping out every other vowel in a string of weak syllables; deletion of the plural infix then precludes deletion of the stem vowel.

A complication appears when we examine the same forms of an ordinary bisyllabic noun like dābár.

       dbārím   /daba· īm/
       dibrēhém /dabar+ē+hem/

Here the stem vowel is not preserved. Looking at this form alone, and it is representative, one might wish to conclude that both vowels are in fact effaced and the initial 3 consonant cluster is broken up by a rule of epenthesis. Indeed, such a rule will come to light in 1.6. However, this view is

incompatible with the data of stem mutations in the plural

segholates, which demands an alternating mode of deletion.

Further, there is a scattering of exceptions to the pattern--

for example, kanáp 'wing' has kanpehém/*kinpehém, and zanáb

'tail' has zanbehém / *zinbehém -- in which the underlying

vowel is preserved. These data suggest we admit the follow-

ing rule:

(20)   A to I   a → i / #C -- CC

(When we consider the segmental system in detail, we shall see

that a rule like this is involved in a number of character-

istic alternations in the verb: e.g. giddél -- ygaddél,

yi-któb--ya-qúm, ni-ktáb -- nakón, etc.)

With rule (12) in the grammar, we should expect that

the plural forms of mélek, since they are based on the stem

malak-, should conform in every respect to those of dabár.

The point of difference -- preservation of the stem vowel in

its underlying form in malkehém /* milkehém -- we must

attribute to a lexical marking of mélek as being [-AI].

In addition to the three major classes of segholates --

the mélek type with the characteristic stem-vowel alternation

e/a, the séper type é/i, and the qódeš type ó/o -- there is a

fourth, hybrid type e/i, seen for example in the word qéber

'grave', qibrí 'my grave'. That the stem-vowel surfaces as

short e under stress suggests that it comes from /a/ (cf. /malk/),

as does the pausal (sentence-final) form qáḇer. It might

appear from these data that qéḇer is distinguished from

mélek only in that qéḇer undergoes the rule A-to-I when it

is suffixed, whereas mélek does not; hence qiḇrām from the

putative source /qabr+a+m/, contrasting with malkām /malk+a+m/.

However, many of the qeḇer-type e/i have doublets in ē/i;

e.g. séter/sēter/ 'hiding place', néḇel/nēḇel 'harp',

néder/nēder 'vow'. Even those with such doublets show ā

in pause: sāter, nāder, nāḇel. This suggests an underlying

shape /qebr/ etc., with an early rule turning e to a under

stress; the rule is evidently ordered before TL. We shall

adduce such a rule in Chapter 2, on independent grounds.

(It is the synchronic reflex of Philippi's Law.)

Removing qéḇer and its look-alikes from the A-to-I

nexus clears the way for the following generalization: no

member of the segholate class - no morpheme shaped /CVCC/ --

undergoes the rule A-to-I. While exceptionality is not

to be applauded, in this case it can be seen to follow its

own strict law.

1.3.1 Two Further Remarks on Segholation

(I) There is a class of forms which never undergoes

Segholation: those created by suffixation of the 2fs

morpheme /-t/. Always found is kāṭáḇt 'you fs wrote',

never **kāṭéḇet, apparently from /katab+t/. The 2fs of

the perfect has another peculiarity, in that WFD, rule

(10), never simplifies a final geminate cluster produced

by inflection: so in the verb kārát 'to cut (off), to make

(a covenant, brít)', we find kārátt 'you fs cut off',

evidently from /karat+t/.

The root of this pair of idiosyncrasies becomes

apparent when the 2fs perfect is pronominally suffixed:

ktabim 'you fs wrote them m', krattím 'you fs cut them m off'.

Contrast the 2ms forms ktabtám, krattám, which show that

the suffix is just -m: /katab+ta+m/, karat+ta+m/.

From the suffixed forms it appears that the 2fs morpheme

is really /-tī/. If such were the case on the surface,

neither Segholation nor WFD would get a shot at 2fs perfect

forms like *katábtī, *karáttī. We therefore posit a

late rule of truncation, following Segholation and WFD,

which removes the suffix vowel word-finally.

Further analysis can be performed on the suffix /-tī/.

Recall that the 2fs imperfect ending is /ī/, as in tiktbī,

taqumī. It appears, then, that the 2fs morpheme for the

verb as a whole is /ī/, and that the perfect is specially

marked by a stem-augment /-t-/ in the second person and

first person singular. The ultimate underlying form of

katábt is /katab+t+ī/.

We posit the following rule:

(21) 2fs Truncation   ī → ∅/+t+ -- # / 2fs

(Note that the rule does not apply to the phonologically
identical ls form kātā́bti.) Rule (21) is also responsible
for the preservation of the final geminate in the 2fs
subject pronoun ʔátt /ʔan+t+ī/. We return to the matter
of suffixes immediately below (1.4).

Observe that rule (21) truncates a specific morpheme,
which it must name. Aronoff (1976) postulates that rules
of truncation that depend on morphological information
can only remove whole morphemes, not parts thereof; the
present case is consistent with his constraint. Note too
that although the rule depends on morphological information--
that it is in some sense a rule of morphology--it is ordered
into the phonology, and rather late at that.

(II) The vowel epenthesized by Segholation appears
as i when it follows y. The base /bayt/ leads to phonetic
báyit. A low-level adjustment suffices to correct the out-
put of Segholation:

(22) Y-Adjust   e → i/y --

Rule (22) is also operative, as would be expected, in words
like ʔōyibkā́ /ʔōyeb+e+ka/ 'your ms enemy', related to
ʔōyéb 'enemy', where the affected e is a survivor from
the lexicon, not an inserted element. (See 1.4 on the
morphological analysis.)

1.3.2 Remark on Plural Breaking

Plural Breaking must be constrained not to disrupt
a sequence of two identical consonants: rabbīm /*rbābīm
'many pl.' From this it might be argued that the ordering
argument placing WFD before Segholation is artifactual,
since there may be a general constraint against separating
identical consonants. However, where the constraint against
forms like *rébeb is absolute, the constraint on plural
breaking has a few exceptions, as sēl 'shadow', slālīm
'shadows'. It is fitting, then, that the two similar con-
straints be differently implemented in the grammar.

1.4   Pronouns and Suffixes

Pronominal suffixes attach to the noun to indicate possession, to verb and preposition as object, to the infinitive as subject or object.   In this excursion we shall explore the basic morphology of these suffixes, tracing the network of relationships between the free (subject) forms of the pronouns, the pronominal suffixes, and the inflectional suffixes of the perfect verb.

The 2nd person possessive suffixes provide interesting problems to start with.   Here are two typical nouns, a masculine and a feminine, suffixed with the 2nd person possessors of both singular and plural.

	dābār 'word'		tōrā 'law'	
	s.	pl.	s.	pl.
m.	dbārká	dbarkém	tōrátká	tōratkém
f.	dbārék	dbarkén	tōráték	tōratkén

The properties of the feminine affix /-at/ are taken up in 1.11: the feminine noun is cited here merely to illustrate its conformity to the pattern seen in the masculine -- non-derived -- noun-class.

The suffixes are evidently -kā (ms), -ēk (fs), -kem (mp) -ken (fp).   Several features of this paradigm are remarkable: (1) stress in final on -kā even though it ends in a vowel, (2) the vowel in the syllable preceding -kā is long

even though it is separated from the stress by two consonants,
(3) the /k/ shared by these formatives is always spirantized,
but no vowel stands before it, (4) the vowel of the plural
suffixes is short even though it is stressed. Let us defer
an account of (4) until we look at the third person, which
shows the same behaviour.

The triple cluster of apparently aberrant properties
(1), (2), (3) will make coherent sense, given the rule-system
we have motivated, if it's assumed that there is underlyingly
a linking vowel that joins these endings to the stems they
attach to. Since ē shows up in the feminine singular, let us
take /e/ as the Bindevokal. Derivations like these will pro-
duce the surface forms:

	/dabar+e+ka/	/dabar+e+k/	/dabar+e+kem/
Spir, V-Final	dabar+e+kā	dabar+e+k	dabar+e+kem
Main Stress	dabar+é+kā	dabar+é+k	dabar+e+kém
PTL	ā	ā	--
VD	dØbar+Ø+ká	dØbar+é+k	dØbar+Ø+kém
TL	---	dbar+ é+k	---
Output	dbārká	dbārék	dbarkém

Observe the crucial role played by the alternating character
of VD in generating the word dbarkem.

This solution has a cost attached to it, evident in
the third column: the linking vowel /-e-/ must be marked

[-PTL] so that VD will be able to remove it. Nevertheless,
this exceptionality -- which can perhaps be resolved upon
deeper understanding of the relevant morphology -- should
not obscure the fact that the three rather disparate idio-
syncrasies follow from the linking-vowel hypothesis.

In the case of -kem/-ken the proposed solution is ab-
stract in that the linking vowel never appears phonetically
in propria persona; in the case of -ēk it is of course
there for all to see; in the case of -kā it makes an appear-
ance at the end of sentences, in the pausal form, where de-
letion of stressed vowels is inhibited (vide 1.13): here we
find dbārékā. Here the linking vowel appears under stress,
and does not lengthen; it must be exceptional to TL in the
2ms: note, however, that this peculiarity is overt in the
data, and must occasion discomfort in any account.

When the plural noun is suffixed with these pronouns,
it looks like this:

dbārīm 'words'

	s.	p.
m.	dbārékā	dibrēkém
f.	dbāráyik	dibrēkén

Here the plural morpheme -īm is evidently supplanted by some
sort of augment. (The exact mechanism of replacement is in-
vestigated in 1.12: for the present, we can accept it as a
fait accompli.) The fs form is obviously /dabar+ay+k/, with

Segholation (17) and Y-Adjustment (22) applying to give the

surface form of the suffix. Only slightly less obviously,

the plural pronouns are connected by the same augment:

/dabar+ay+kem/,/dabar+ay+ken/. Diphtongs a̲y̲, a̲w̲, when

unstressed, regularly turn to e̲,o̲ (respectively) in the

env. --C. This uniformly regular alternation is seen, for

example, in báyi̲t̲ 'house' -- bētká̲ 'your ms house', záyi̲t̲

'olive tree'--zētí̲m 'olive trees'. Under stress, the diph-

thong is preserved: báyt̲ā /bayt+a/ 'to a house', where /a/

is the directional suffix. The general rule is then:

    (23) De-Diphthongization-I a̮y, a̮w → ē, ō / --[+cns]

(The rule is more carefully formulated as (5) of Chapter 2.)

    What, then, of the short stressed e̲ that links /-ka/

to the stem? All other things being equal, we'd expect

-áyk̲ā in the 2ms slot, phonetically parallel to báyt̲ā. The

reader who is familiar with the language will recall that

the /y/ is actually present in the orthography, the consonantal

spelling of db̲ārék̲ā being DBRYK. However, the /y/ is not

pointed with a schwa-sign, the necessary marker of pronounced

syllable-final consonants inside words, and therefore could

not have been regarded by the Masoretes as phonetically

manifest. Recall too that /y/ is orthographically present

throughout the entire paradigm of plural noun + suffixes, a

clear case of morphophonomic spelling.

A special rule is required to handle the case of stressed /ay/, perhaps rather a special clause of rule (32). It is dependent on boundary information, for although base forms like /bayt+a/ and /dabar+ay+ka/ share the relevant feature of purely segmental make-up, a diphthong destined to bear stress, they are readily distinguishable in terms of morphological structure. The rule must look like this:

(23 a)   De-Diphth. II $áy \rightarrow e$ / -- + C V

The rule DD-II clarifies the underlying shape of the augment -e- that we noticed above (1.1) in certain imperfects: tqūménā 'they/you fp will arise', tsubbénā 'they/you fp will go around. It is /-ay-/, and behaves exactly like the morpheme we are looking at.

DD-II must be ordered after VD, so that the underlying glide protects the vowel from deletion.

Turning now to the first person, we find the following:

	dābār + suff.		dḇārīm + suff. /dabar+ay/
s.	p.	s.	p.
dḇarí	dḇārénu	dḇāráy	dḇārénu

The augments we found in the 2nd person paradigm are discernible, through a little phonology. The form dḇarí appears strange, because a vocalic final bears stress; the form dḇāráy appears to lack a pronoun altogether. If we assume that the 1s ending is /-y/, then the augments we saw in the

2nd person will get us close to the surface forms: /dabar+e+y/,
/dabar+ay+y/. The /y/ functions as a final consonant, insur-
ing final stress; the plural form comes out of the rules we've
seen, since Word-Final Degemination will simplify the final
geminate. The singular demands a rule taking /e+y/ to ī;
this hints that the vowel we are representing as /e/, which
is the short front vowel of the language, should perhaps be
represented most deeply as /i/, from which it descended
historically. I shall persist with /e/, since it is this
vowel that participates in the quantity alternations which
are germane to the subject of the overall investigation. In
Chapter 2, this detail of representation will be sorted out.
For the present, we postulate the following:

(23b) High Glide   e y → ī / -- #

From the plural form (on the plural noun) /dabar+ay+nū/,
we expect *dbāráynū, or rather, through the effects of DD-II,
*dbārénū, with the stressed vowel short. Evidently, the rule
DD-I,(32), disregards in this case the [-stress] condition
that preserves the diphthong in e.g. báytā.

On the singular noun, from /dabar+e+nū/, we should
get by VD *dbārnú. What actually happens is preservation of
the augment and consequent lengthening of it by the normal
action of TL: dbārénū. This (as opposed to the appearance of
the long vowel ē in the plural) is the reflex of a significant
sub-regularity among the suffixes: of those shaped +CV

only /-ka/ serves as a context for VD. In 1.11 an integra-
tive account of the fact is given. Recognizing this, and
factoring it out, the form d̄b̠ārḗn̄ū 'our word' supports choos-
ing /e/ as the linking vowel attached to the singular noun.

At this point, we have reached the following analysis
of suffixation:

	<u>s.</u>	<u>p.</u>
1	-AUG + y	-AUG + n̄ū
2m	-AUG + ka	-AUG + kem
2f	-AUG + k	-AUG + ken

The character of AUG is determined by the number of the noun;
singular, it is /e/, in the plural /ay/.

Clearly the /k/ that is constant throughout the 2nd
person stands as a morpheme on its own. With this in mind,
recall the look of the 2nd person inflection of the perfect:

2m	kātá̱btā	ktabtém
2f	katá̱bt /t+ī/	ktab̠én

The inflectional affixes parallel the pronouns point-
for-point: -ta/-ka (ms); -t/-k (fs), -tem/-kem (mp), -ten/-ken
(fp). Recall that the underlying /-ī/ termination of the f.s.
is a feature of the inflected verb <u>per</u> <u>se</u>, appearing in
the imperfect (and imperative) as well. Based on this parallel-
ism, we can further analyze the 2nd person affix as a structure
C+M, where C = /k/ or /t/ depending on syntactic category,
and M varies with the number and gender of the pronoun.

<u>M-forms</u>

	<u>s.</u>	<u>p.</u>
m.	a	em
f.	∅	en

The subject pronouns of the first and second persons have this form:

	<u>s.</u>	<u>p.</u>
1	?aní	?anáhnū
2m	?attá	?attém
2f	?átt	?attén

These are based on a stem /?an/. Full progressive assimilation of /n/ is the norm in the language, and it explains the doubling of the /t/ in the second person.

(24) N-Assimilation $\qquad$ $n \rightarrow c_i / \text{--} c_i$

The rule operates across a morpheme boundary in the Niṗ̄al imperfect, producing e.g. yikkátēb from /ya+n+kateb/; across a single word boundary optionally with the preposition min- 'from', as mibbáyit or min-báyit 'from a house' (though perhaps the optionality is to be located in a rule weakening the word boundary in a string like min#bayit); and stem internally in e.g. yittén /ya+nten/ 'he will give', higgíd/ he+ngíd/ (Hiṗ̄īl). The rule has wrinkles: across a boundary /n/ will assimilate to anything; inside a stem, it does not assimilate to gutturals (2 exceptions), as a form

like yinhál 'he will obtain (property)' illustrates; fur-
thermore, in the verb, a stem-final /n/ will not assimilate:
nākōntā /na+kon+ta/ 'you ms stood firm' (Nip̄īal) is the
regular case. The verb natán 'to give' is the only excep-
tion to the last provision, always assimilating at both ends
whenever possible: nātáttā /natan+ta/ 'you ms. gave'.

   The fs pronoun ʔátt does not indicate, as might be
thought, that N-assimilation precedes WFD, but rather that
the pronoun, like the verb-suffix, ends in /-ī/, being
therefore /ʔan+t+ī/. In other cases where N-assimilation
interacts with WFD, degemination always occurs. Consider
the jussive yét 'let him extend', truncated from yittḗ
/ya+n+tay/; compare yébk 'let him weep' truncated from
yibkḗ /ya+bkay/.

   Now, if we took the suffixes we found above and at-
tached them to the stem /ʔan/, we'd get the following under-
lying forms:

	s.	p.
1	ʔan+y	ʔan+nū
2m	ʔan+t+a	ʔan+t+em
2f	ʔan+t+ī	ʔan+t+en

   The 1s form demands a rule of glide vocalization, and
an early one, so that stress can be shifted onto the
vocalized glide by VD (the ă of ʔănī́ is due to the initial

guttural, cf. rule $(^{44})$, section 1.6 'Schwa-to-A'). Such

a rule of vocalization will in fact be motivated quite

independently in 1.9.

The 1p form given needs the infix -ah- to underly

?anáhnū. This morpheme makes no other appearance in the

language. Note the failure of PTL; *?ānáhnū is certainly

the expected form.

The 2ms form ?attā should of course be penultimately

stressed, but is so only in sentence-final position. A

minor rule is at hand; cf. 1.13 where sentence-final forms

are discussed.

The characteristic 2nd person consonant t/k can now

be seen for what it is. The /t/ appears as the <u>inflection</u>

expressing the notion· 'subject of the finite verb'; the

/k/ elsewhere, ·as possessor on nouns, object on verbs, sub-

ject or object of the infinitive.

Turning now to the third person, a slightly different

situation presents itself:

	dābār		dbārīm	
	<u>s.</u>	<u>pl.</u>	<u>s.</u>	<u>pl.</u>
m.	dbarō	dbāram	dbāraw	dibrēhem
f.	dbārah	dbāran	dbārehā	dibrehén

Looking at the plural pronouns, we see repeated the

use of /m/ in the masculine, /n/ in feminine, establishing

these as separate morphemes. The augment on the singular
noun, where it is obvious, is /a/, not the /e/ of the other
person.

The feminine plural pronoun is clearly /ha/. Being
of the form CV, like /ka/, it is susceptible to DD II, and
the short vowel is indeed what's there. In the singular only
the /h/ remains. This is no feature of the singular noun,
but a reflex of a-augmentation. On the verb, for examp. :, in
the imperfect, the augment is /e/, and the full form of the
pronoun remains: yišmrēhā /ya+šmor+e+ha/ 'he will guard her'.
In tne perfect, when an /a/ precedes, the form is just /h/:
smārah /šamar+ a+ha/ 'he guarded her', where the /a/ is an
augment; šmartāh /šamar+ta+ha/ 'you ms guarded her; where
the /a/ is part of the 2ms inflection. Note too šmartīha
/samar+t+ī+ha/, where a non-a vowel precedes.

These forms indicate that there is a rule chopping
off /a/:

(25) A-After-A $a \rightarrow \emptyset \; / \; a + C \; \text{--}\#$

It is instructive to look at the subject forms for the 3rd
person.

	s.	p.
m.	hū	hēm, hēmmā
f.	hī	hēnnā

Clearly, the 3rd person pronouns are based on the stem /h-/. Subtracting this in the plural leaves a remainder that is very similar to what's left when the /t/ or /k/ is stripped from the 2 plural forms.

Observe that the plural forms, when extended with /-a/, show a geminate consonant: hémmā, hénnā (?attēnnā is an alternate form for the 2fp ?attēn). This implies that in hēm, and by extension, -hem, -hen, -kem, -ken, -ten, -tem, the final nasal is geminated. Is it then the case that the masculine morpheme is really -mm-, the feminine -nn-? This cannot be correct, because in dbārám the stressed vowel is lengthened. I suggest rather that we see the augment /-en-/ interposed between the pronominal consonant and the gender marker: the 3 mp is /h+en+m/, the 3 fp is /h+en+n/. The rule of nasal assimilation, (33), will produce the geminates, the rule WFD, (14), will simplify them when abut a word boundary.

The augment /-en-/ functions elsewhere in the system. To the imperfect there are two species of pronominal attachment, one mediated by /-e-/, the other by /-en-/. As well as yišmorkā /ya+smor+e+ka/, there is yišmrékkā; beside yišmrénū, there is yišmrénnū /ya+šmor+en+nū/.

Observe that, in the imperfect examples, the vowel of the augment fails to lengthen under stress. This, then, is the root of the exceptionality to TL that bedevils all affixes related to the 2 and 3 pl. pronouns. The morpheme /-en-/ is exceptional to TL: but only when it is not the first

syllable of a word, as hém, hénnā illustrate.

The organization of the (non-1st person) plural pronouns emerges as PERS-en- GEN, where PERS is a single consonant -- h for 3rd person, k/t for the 2nd -- and GEN is m̲ for masculine, n̲ for reminine.

Now, the masculine singular suffixes -ō and -āw do not stand in a totally perspicuous relationship to the free subject pronoun hū 'he', but the relationship is not impenetrable either. The form hū does make regular appearances in the paradigm of suffixation. One may say either šmāró or šmārāhū, meaning 'he guarded him'; one may say either šmartíhū or šmartíw, if one means 'I guarded him'. The last example suggests a derivational path:/ay+hū/→/ay+w/ →/aw+w/. The last is an appropriate source for -āw. Degemination will simplify the final cluster, TL will lengthen the vowel. But! says the keen-eyed reader: the vowel is followed by a cluster, and should not lengthen; just as it does not lengthen in the 1st person /-ay+y/. True enough, but /w/ does not count in the blocking of TL: contrast máwet̲ /mawt/ 'death' with b̲ayit̲ 'house'. A truly final version of TL would record this.

Since the rules relating the alternants of the 3ms suffix are of very narrow scope, and since the type of machinery they use is of a familiar sort, I am not going to elaborate them.

Observe finally in the fs pronoun hī /h+ī/ the morpheme /ī/ that we have seen in the verb and on the pronoun 2fs. The fs object suffix cannot be /k+ī/ because Segholation

occurs on the plural noun: dḇāráyik̠. Contrast the failure

of Segholation in kāṯáḇt /katab+t+í/. The distribution of

this /í/ is thus parallel to the distribution of the /t/ in

the 2nd person: it shows up only in inflection that refers

to the subject of finite verbs.

The results of the excursus can be tabulated as

follows:

Suffixes

	Sing.	Plural
1	-y	-nū
2m	k/t + a	k/t+ en +m
2f	k/t	k/t +en +n
3m	h +ū	h +en +m
3f	h +a	h +en +n

On the noun, the augment before the suffixes is /ay/ in

the plural; in the singular it is /e/ for the 1st and 2nd

persons, /a/ for the 3rd.

I have led this rather brisk sight-seeing tour through

the gates and alleys of pronominal morphology to clarify the

geography of suffixation in the language; and to show how

certain phonological correlates of suffixation, particularly

of the 2nd person suffixes (-ka, -kem) find a reasonable ex-

planation in terms of the rule-set developed so far, within an

analysis of the morphology that provides a general account

of the structural regularities of the system.

This done, I shall not represent the ultimate results

of the analysis in every cited underlying form, e.g.

/dabar+ay+h+en+m/; for purposes of clarity, I will use boundaries

to mark the major divisions, as between stem and suffix, aug-

ment and pronoun.

1.5 On the correct formulation of PTL

1.5.1 Let us turn now to a variety of deletion which is not dealt with correctly in the system developed so far.

The non-low vowels /e o/, when they appear in the env. V̄C--CV or VCC-CV -- when they lie after a heavy syllable-- regularly suffer deletion. According to the present rules, however, when they appear in the env. --CV́, they should lengthen by PTL, and therefore be immune to VD. Only /a/ behaves in the predicted way. These examples present the facts:

V̄C--CV		VCC--CV	
/šopet/	/ʕolam/	/ma+qaddeš/	/ma+špat/
šopet	ʕolam	mqaddeš	mišpat
šoptim	ʕolamim	mqaddšim	mišpatim

(šopet:a judge; ʕolam: eternity; mqaddeš: sanctifying (part. Piʕʕel); mišpat: judgment)

The same contrast between /e o/ and /a/ is found in the forms of the imperfect verb when it is suffixed with object pronouns. Consider what happens when the suffix -enī 'me' is attached to the m.s.:

/ya+šmor/	yišmór	yišmrenī	'he will guard/me'
/ya+ntén/	yitten	yittnenī	'he will give/me'
/ya+šmaʕ/	yišmaʕ	yišmaʕenī	'he will hear/me'

(The total progressive assimilation of the stem-initial n͟

of yittēn is absolutely regular; the process   was   touched

on in 1.4.)

Traditionally, this phenomenon has been thought to im-

ply the existence of another rule of vowel deletion, operating

in the env. $\left\{\begin{matrix} VC \\ \bar{V} \end{matrix}\right\}$ C--CV.   Aronoff (1971) orders the rule early,

before PTL has a chance to lengthen the vowels.

If this approach is correct, then a key feature of the

SPE theory stands in need of revision.   Eschewing direct

representation of the notion 'syllable', SPE only allows

reference to concatenations of segments.   This restricted mode

of analysis characterizes V̆C--the weak syllable--as a natural

element in phonological description, because it is expressible

as a simple concatenation.   But the two disjuncts of the

notion 'heavy syllable' -- to be 'heavy' is either to contain

a long vowel or to be closed with a consonant -- do not co-

alesce into one entity in SPE theory.   To express 'heaviness'

requies a clumsy list, braced together, as we've just seen in

stating the environment for the alleged Hebrew process.   Great

success has been attained in eliminating the 'heavy syllable'

from the analysis of stress-phonology, where it has been a

touchstone in traditional description.   The theory of dis-

junction allows it to be treated as the (unstated) complement

of the natural unit 'weak syllable'.   For example, consider a

not unusual stress-assignment situation: main stress falls on

the last syllable if it contains a long vowel or if it has
the shape VCC; otherwise, stress falls on the penult. We
write:

(26)   V → [+stress] / -- C_o (V̆ (C)) #

This notation says: stress the penult if the final syllable
consists of a short vowel followed by at most one consonant;
otherwise, stress the final syllable. But the difference is
not merely verbal. The SPE theory entails that natural
languages will manifest only such patterns as are expressible
in this fashion. The present example of deletion seems to de-
mand positive reference to a heavy syllable, and thus con-
stitutes an interesting challenge to the SPE claim.

     In terms of the Hebrew rule-system, too, there is good
ground for suspicion. A new, early rule of Post-Heavy Syllable-
Deletion (PHD) repeats essential respects of the richly motivat-
ed VD, since it applies like VD only to short vowels in open
syllables. Because of this, if the vowels under consideration
do not undergo PTL, the rule of VD as given will remove them,
all by itself.

     Let us turn the question around, then, and ask not
where /e o/ delete, but where they lengthen pre-tonically.
There are really only two environments, as the following table
illustrates:

	#C--CV			VC--CV	
lḗbab	/lebab/	'heart'	zqḗním	/zaqen/	'old man'
mḗʔa	/meʔ+at/	'100'	nbḗla	/nabel+at/	'corpse'
ꞮꞮḗsah	/ꞮꞮes+at+ha/	'her tree'	yrḗkah	/yarek+at+ha/	'her thigh'
šḗmot	/šem+ot/	'names'	zqḗnka	/zaqen+e+ka/	'yr ms. old man'

(The fs. affix -at is discussed in 1.11.)

These two environments can be collapsed readily in an SPE-type notation (See Vergnaud 1974; Halle, Prince, & Vergnaud 1975 for details):

(27) $\begin{matrix} V \\ [-low] \end{matrix}$ → [+long] / ##(X V̆) C -- C V́

The words bēn 'son' and šēm 'name' are peculiar in that they lose their stem vowel before pronominal suffixes: bnáh 'her son', šmáh 'her name'. That this is a peculiarity, not a phonological condition on the rule, is shown by the tabulated form ꞮꞮḗsah 'her tree', in which lengthening does take place. Apparently the two words are subject to a condition that can be expressed in a minor rule of exception-feature assignment:

(28) /šem/, /ben/ → [-PTL]/ --+Pron

The specialized rule of PTL for non-low vowels fits into the less restricted rule that applies to /a/:

(29) PTL $\begin{bmatrix} V \\ (-lo)_a \end{bmatrix}$ → [+long] / ## (X (V̆)$_b$) C -- C V́

Condition: a ⊃ b

When (a) is satisfied, the condition generates rule (27).
When (a) is not satisfied--when PTL applies to a [+low] vowel--,
the following rule emerges:

$$(30) \qquad V \rightarrow [+long] \: / \: \#\# \: (\: X \: (V) \:) \: C \: \text{--} \: C \: \acute{V}$$

As with TL, the parenthesized vowel places no restriction,
since it abuts a variable. The rule is equivalent to

$$(31) \qquad V \rightarrow [+long] \: / \: \#\# \: (\: X \:) \: C \: \text{--} \: C \: \acute{V}$$

which says that lengthening occurs wherever the right-hand
environment is met; exactly what we want to say, once /e o/
are removed from consideration.

The unwieldy notion of a heavy syllable thus proves to
be replaceable by its readily expressible complement, the light
syllable, with a minimum of conditional decoration.

The two thories, however, are not mere notational
variants. Recall that the Heavy Syllable Theory require an
order PHD--PTL(--VD), so that the deleted vowel of e.g. sōptim
/šōpet+īm/ is gone before PTL has a chance to preserve it.
This ordering raises the possibility that two vowels in a
row could be deleted, one by PHD, one by VD, which follows it.
In the Weak Syllable Theory here expounded, this is an out-
and-out impossibility; there being just one rule of vowel de-
letion (VD), a rule which applies in an alternating fashion,
never doing two-in-a-row. The crucial examples exist. Suppose

we affix a Qal imperfect like yišmōr /ya+šmor/ or a Piꞓꞓēl

perfect like giddēl /gaddel/ with the 2ms object pronoun

+e+ka. Forms like /ya+šmor+e+ka/, /gaddel+e+ka/ have the

requisite two-vowel line-up, the non-low stem vowels occuring

after a heavy syllable, and the vocalic augment +e+ being sub-

ject to VD. What happens is preservation, not deletion, of

the stem vowels, as predicted by the Weak Syllable or VD-only

theory.

	/ya+šmor+e+ka/	/gaddel+e+ka/ 'he brought you up'
Spir,V-Final	kā	kā
Main Stress	ya+šmor+é+kā	gaddel+é+kā
PTL	--	--
VD	ya+šmor+∅+kā	giddel+∅+kā́
A-to-I	yi+šmor+ ká	giddel+ ká
Output:	yišmorká	giddelká

The most general version of Heavy Syllable Theory

predicts the unheard-of forms **yismrkā, **giddlkā. The VD-

only theory not only accords with SPE; it has the virtue of

being right.

It may be instructive to derive the same verb forms

affixed with the other incarnation of the 2ms pronoun, -ekka

/en+ka/.

	/ya+šmor+en+ka/	/gaddel+en+ka/
N-Assimil, V-Final	ek+kā	ek+kā
Main Stress	ya+šmor+ék+kā	gaddel+ék+kā
PTL	---	---
VD	ya+šmØr+ék+kā	gaddØl+ék+ka
A-to-I	yi+šmr+ ek+kā	giddl+ ék+kā
Output:	yišmrékkā	gaddlékkā

1.5.2 Countermoves

Against the proposal to restrict PTL rather than
introduce a new rule of deletion along the lines of PHD,
there are at least two clear lines of argument.

(I) It might be alleged that in an overzealous pursuit
of regularity, all occurences of -kā as a noun and verb suf-
fix have been reduced to -e + ka, thereby artifactually cre-
ating a complex situation which arises in no other way. The
proper tonic for this excess would be a realism that posits
-kā where it sees -kā: yišmorkā is just /yišmor + ka/,
and the ɔ is short simply because it never occurs -- C V́. In
this view ᴖhe allomorphs of the 2ms pronominal suffix when
attached to the imperfect are -ekkā /en+ka/ and -ka /ka/.
This proposal is tested by the behaviour of verbs with im-
perfects in /a/, such as šāláḥ 'to send', impf. yišláḥ. The
realistic theory that posits /ka/ (and attendant mechanisms to
get the stress final) predicts that the a-stem vowel will
remain short, as the environment for PTL is not met in a string

like /ya+šlaḥ+kā/. The theory that uses /+e+ka/ will, on
the other hand, predict lengthening by PTL of the low stem-
vowel in /ya+šlaḥ+e+ka/, there being no restriction on the
pre-tonic lengthening of /a/.

Lengthening occurs: yislāḥᵃkā is the attested form.
(The raised a is a predictable concomitant of the guttural:
see 1.6 infra: a short, unstressed echo). This is strong
evidence for /-e+ka/, strong evidence against the mere /-ka/.

Now, in Piꜥꜥēl it happens that this lengthening does
not take place: from šillaḥ 'to send' (same root), impf. yšallaḥ,
comes šillaḥᵃkā, yšallaḥᵃkā 'he sent/ will send you'. (Cf.
Qal šmārkā /šamar+e+ka/ 'he guarded you', šlāḥᵃkā /šalaḥ+e+ka/
'he sent you', with the expected lengthening). This failure
of PTL in Piꜥꜥēl occurs uniformly before all pronominal suf-
fixes, not just before -e+ka, and in both perfect and imperfect.
With the 1s suffix (impf.) -ēni, for example, we find yšallhēnī
'he will send me'. Here, failure of PTL has meant loss of the
stem-vowel via VD. Contrast the Qal version yišlāḥēnī,
where the expected pre-tonic lengthening is evident.

Why does /a/ behave peculiarly in Piꜥꜥēl? More funda-
mentally, one might ask: what is /a/ doing in the Piꜥꜥēl
anyway? The characteristic vowel of the Piꜥꜥēl, as the name
suggests, is /e/, as in giddēl 'to grow, raise (tr)', biqqēš

'to seek', qillḗl 'to curse' (same root, qll, as Qal),

hillḗl 'to praise', qiddḗš 'to sanctify'. Evidently the

characteristic vowel turns to /a/ before gutturals, as in

šillaḥ, but behaves like /e/ with respect to PTL, failing

to lengthen after VCC--. This indicates that the requisite

rule follows PTL. It is simplest to order it before TL,

so that the general prohibition against lengthening /a/

under stress in verbs can be invoked to explain the quantity

properties; after TL, the simplest rule, a mere lowering

(and backing) would map ē onto ā.

The story does not end here, however. Many Piˁ̄ˁel

verbs allow an alternate perfect in /a/, regardless of the

character of the final consonant: so qiddḗš may also be

vocalized qiddáš, šillḗm 'make whole' as šillám, berḗk

/berrek/ 'bless' as berák, and so on. (Vide Ch. 2 for the

first syllable vocalism of berḗk). This alternation, or

equivocation, seems to be by-and large optional, lthough

some verbs, e.g. limmád 'to teach', apparently only allow

/a/. This phenomenon only occurs in the perfect; all other

forms -- imperfect, participle, infinitive, imperative --

take /e/ with total uniformity: e.g. ylammḗd 'he will

teach'. The guttural-final stems show /a/ everywhere

(yšalláh) except in the participle, which is mšalléah

/ma+šalleh/.

Two rules are at hand, then, one which uniformly

affects /e/ before gutturals in verbs (not adjectives, like

the participle), another which affects /e/ in the Piʕʕēl

perfect. Both are ordered between PTL and TL, because

the vowel they affect acts like /e/ with respect to PTL

and /a/ with respect to TL.

(32) Verb-Guttural   e → a / --G# / in verbs

(33) Piʕʕēl-A   e → a / --C# / in Piʕʕēl
perfect

Rule (33) is either optional or minor, perhaps both, depend-

ing on the actual distribution of /a/ and /e/ in the verbs

of the language, a kind of fact that may be lost in the

folds of time.

Both rules are ordered so as to effect a kind of para-

digmatic regularity. The /a/ of Piʕʕēl, whether it arise

through guttural influence or through the option of rule (33),

mimics the basic e-vowel of the conjugation in deletability

and pre-tonic lengthen-ability. A form like qiddašká

parallels qiddešká more perfectly than the *qiddāšká one

might expect on general grounds, looking at ktáhká, dbárká,

or yilbašká.

The Piʕʕēl data, then, give no comfort to the

proposal that the 2ms suffix -ka is attached directly in the

imperfect, without its linking vowel. Quite the contrary:

the deletion before other suffixes, such as in šillhám/

*šillāhám is explicable by the same principles that secure

retention of the vowel as short in e.g. qiddašká, šillah^aká.

The surfacist who denies -ka its linking vowel forfeits
an understanding of the behaviour of Piꟿel verbs before
suffixes, and at the same time misses an explanation of the
difference in PTL-properties between e.g. yilbāska͞ (long
vowel, Qal) and qiddaŝka͞ (short vowel, Piꟿel).

(II) The proposal I am making is that PTL be re-
stricted in its application to non-low vowels, with VD
responsible for all deletions; call this the Restriction
Hypothesis (RH). The most obvious counterproposal, based
on traditional accounts, would hold that PTL is unlimited
and adduce a separate, earlier (before VD) rule of deletion,
PHD, that elides non-low vowels (short ones) after a heavy
syllable; call this the Heavy Syllable Theory (HST). It is
possible to construct an argument for the Heavy Syllable
Theory, based on a kind of data that is dealt with very
clumsily in the Restriction Hypothesis. The argument has a
rather subtle coloration: it urges the existence of the rule
PHD because there are forms that are exceptional to it;
in HST they can be treated as simple exceptions, but in
the RH which I propose, a special minor rule must be con-
cocted. This mode of argument may seem a bit rarified, but
I think it's important to pursue it, since it is based on a
clear empirical difference between the two theories and not
many such differences can be found. The counterargument
will show (1) that when HST is elaborated to the point where

it <u>works</u> (gets facts like non-deletion in yišmorkā, dis-
cussed above), significant generalizations about the lang-
uage are inexpressible in it, and (2) that very similar
data require a minor rule treatment in HST, anyway. The
counterargument will vindicate the RH offered above, and
with it the SPE theory of natural phonological elements.

The difficult data arises in the derivation of certain
feminine nouns from Qal participles. Participles Qal of
ordinary triliteral verbs are, in the masculine singular,
shaped /CōCeC/, as in kōteb 'writing ms', kōtbīm 'mp'.
Observe, in the plural form, the regular deletion (rather
than lengthening) of the pre-tonic /e/. The participial
feminine is formed in the singular by affixation of /-t/
instead of the usual fs morpheme /-at/ (cf. 1.11): kōtébet
/kōteb+t/. (The shortness of the stressed vowel is due
to Philippi's Law, Ch. 2). In the plural, affixation of
the fp morpheme /-ōt/ produces, as expected, kōtbōt.

So far, no wrinkles. But a small number of nouns are
formed by affixation of the full fs ending /-at/ to the
participial stem. Examples are yōlēdā /yōlֶd+at/ 'woman in
travail', related to the verb yālád 'to give birth', and
tṓֿֿebā /tṓֿֿeb+at/ 'abominable thing', from the root tֿ́b.
In these words, strikingly, the /e/ is not only retained, but
<u>lengthened</u>. If PTL is restricted to apply to non-low vowels
only in the environment ## (X V̆) C--CV, it cannot possibly

lengthen the underlying short stem vowel of yōlēdā. How-
ever, in HST, the word class Participle Stem+/at/ can be
regarded as simply exceptional to PHD, as a consequence of
which the unrestricted rule of PTL will lengthen the surviv-
ing vowel. In the RH some special rule must be created to
lengthen the pre-tonic vowel in just these cases.

Before the argument can be evaluated, the HST has got
to be explicitly formulated, and in such a way that it
handles the central body of regular data. Observe that if
the rule PHD is constructed to be inapplicable to the pre-
served non-low stem vowels in yišmorkā /ya+šmor+e+ka/,
giddelkā /gaddel+e+ka/, then PTL must still be constrained
from applying to them; the Restriction Hypothesis re-surfaces.
This problem breaks into two parts, there being two relevant
vowels: the treatment of /o/ and the treatment of /e/.

As for /o/, it can be excluded from PTL altogether,
since there are no forms in the ordinary language that re-
quire it to be lengthened pre-tonically. This is because,
as we noted above, stems ending -oC# always geminate the
consonant, due to rule (15), as in ʔayom 'afraid' -- ʔayummīm
'pl.'. In his exhaustive survey of the treatment of pre-
tonic vowels, F. R. Blake is able to come up with only two
cases (JNES, 1950): (1) the word gbōhīm 'high' singular:
gābōah, (2) before the archaic imperfect affixes -ūn 2 & 3
m pl, for -ū, and -īn 2 f sing, for -ī. Example (1) is,

alas, irrelevant: from the expected geminated plural

form /g̃abohh+īm/ would come, by a general process dis-

cussed in Ch. 2, the observed g<u>bo</u>hím, with its long vowel.

Example (2) can be brushed off as archaism operating out-

side the normal patterns of the language. Supporting this

view is the fact that these cases should be susceptible to

the syncopatory action of Post-Heavy Syllable Deletion:

yi<u>ktobu</u>n, ti<u>ktobu</u>n, ti<u>kto</u>Lín. Gesenius (par. 47m) notes

that these occur mainly in pause, where the usual forms

are yi<u>kto</u>bū, ti<u>kto</u>bū, ti<u>kto</u>bī; this suggests a conscious

archaizing, perhaps distorted by hypercorrection. Finally,

there simply are no stems /CoCVC/ in the language, an arbi-

trary restriction on canonical form. Therefore, in HST, we

exclude /o/ from PTL, allowing the rule to apply only to the

non-round vowels /e a/.

This done, it becomes clear that PHD need not (and

must not) apply to /o/ either. Since the round vowel never

lengthens by PTL, the deletion evident in a word like

yišmrēm /ya+šmor+e+m/ 'he will guard them m' is accomplished

by VD; it's not necessary to invoke PHD. And in yišmor<u>ka</u>

/ya+šmor+e+ka/ the vowel that lies after the heavy syllable

is preserved: VD may not delete it, because it deletes the

augment -e-; PHD cannot be allowed to delete it either. The

rule PHD therefore applies only to /e/.

The vowel /e/ cannot be denied pre-tonic lengthening:
recall examples like zqēnká /zaqen+e+ka/, šemót /šem+ōt/.
However, once the rule PHD is constrained from deleting /o/,
once it is allowed to delete, in fact, only one vowel, it
is a small matter to see the e of giddelkā or šomerkā
/šomer+e+ka/ 'your ms guardian' as being epenthesized to
break up the four-consonant cluster that results from dele-
tion in adjacent syllables. An observationally satisfactory
version of HST thus requires the following system of rules:

(34)   a.   PHD $e \rightarrow \emptyset \ / \left\{ \begin{matrix} VC \\ \bar{V} \end{matrix} \right\} C \ -- \ CV$

      b.   PTL' $V \rightarrow$ [+long]/ __ C V́
                      [-round]

      c.   VD, as above, rule (3)

      d.   e-Insertion

      e.   TL, as above, rule (11)

(The rule of e-Insertion may seem damagingly ad-hoc, but
within the revised system we present below (1.6) something
very like it is motivated.)

These rules would function in derivation like this:

	/gaddel+e+ka/	/ya+smor+e+ka/	/ya+smor+e+em/
(Spir, V-Final)	kā	kā	
Main Stress	gaddel+é+kā	ya+smor+é+kā	ya+smor+é+m
PHD	gaddl +é+kā	---	---
PTL'	---	---	---
VD	gaddl +ká	ya+smor+ +ká	ya+smr +é+m
e-Ins	gaddel +kā	---	---
A-to-I	giddel +ká	yi+smor+ká	yi+smr +é+m
TL	---	---	yi+smr +é+m
Output:	giddelká	yismorká	yismrém

Although this solution is observationally adequate, and not totally implausible, it is not very acceptable. Leaving aside the fact that rules (34a, b) are more discursive than the restricted version of PTL, rule (29), observe that the exclusion of /o/ from PHD and PTL' is an ad-hoc measure aimed at forms of the yismorká class. Under the Restriction Hypothesis, there is no need to accord /o/ special status in the rules: the properties of /o/ are consequent upon the peculiarities of its distribution, which must be stated in any grammar. In the Heavy Syllable Theory, /o/ has the same set of distributional restrictions in morphemes, but their effects must be redundantly re-specified in the phonological rules; and specified twice, independently in each relevant rule (PHD, PTL').

Returning to the data of the argument, note that
the plural of yōlēdā is yōldōt /yōled+ōt/, which is regular;
the plural of tōlēbā is tōlēbōt, which is exceptional in the
same way as the singular. These data are not particularly
illuminating. But if we look at the derivational class
/ma+CCeC/, we find a similarly widespread and erratic excep-
tionality. Consider the word massēbā /ma+nṣeb+at/ 'standing-
stone', in which the pre-tonic vowel is lengthened exception-
ally, not deleted. The plural massēbōt, like tōlēbōt, but
when pronominal suffixes are added to draw the accent away,
eliminating the possibility of PTL, the long ē remains:
massēbōtēhém /ma+nṣeb+ōt+ay+hemm/, massēbōtéka /ma+nṣeb+ōt+ay+ka/.
The same situation prevails in e.g. maggēpā /ma+ngep+at/
'plague', plural suffixed, maggēpōtáy /ma+ngep+ōt+ay+y/ 'my
plagues'. We know the surface ē is short underlying (1) on
general grounds, since these forms are clearly derived by
/-at/-affixation from the stem /ma+CCeC/, which is quite
regular in the masculine, e.g. mizbéah 'altar', pl. mizbhōt,
and (2) at least some of the members of this class show de-
letion in the construct state, e.g. massbàt, massbōt 'stand-
ing-stone(s) of'. (See 1.12 for an account of construct
phonology).

Consequently, any theory is doomed to a minor rule
lengthening these vowels in variety of morphological circum-
stances, which vary for each individual word. Some undergo
the rule uniformly in all inflections (maggēpā), some
everywhere but in the construct state (massēbā). And there

is no reason not to invoke this rule in the yōlēdā-type of case, which displays an exactly similar kind of irregularity.

To conclude: we have seen that only the solution embodied in rule (29), the annotated version of PTL, can explain both the quantity and the deletion properties of /e o/ in terms of a single restriction, the limitation of the rule to the env. ## (X V̆) C -- CV́ when it applies to non-low vowels. The Heavy Syllable Theory can be elaborated to the point of obervational adequacy, but it must impose two independent restrictions on the processing of /o/, one in PTL', one in PHD, both aimed ad hoc at the yišmorká-type of case. The single restriction in the RH is, on the other hand, motivated independently of the behaviour of /o/ by facts like the šópēt/šoptīm alternation; and, because of this, in the RH the distributional restrictions on /o/ in morphemes (and the rule of O-Closure (15)) provide a real explanation for the character of its surface alternants.

On a more crassly empirical level, we found that the data upon which the argument for the HST was based could easily be subsumed under a minor rule that must be an appurtenance of any grammar of the language.

1.6 Schwas, Spirantization, Silence

The discussion so far has been eased by a simplification: where standard grammars transcribe schwa, I have omitted indication of a vowel. In Lambdin (1971) for example, there is found dəbārím for my dbārím, kátəbú for kátbū, yiktəbū for yiktbū. Two issues present themselves, one phonetic, the other phonological: (1) to what extent is the standard transcription justified, and (2) to that extent, what is the role of schwa in the system of Hebrew grammar.

The phonetic issue arises because the Masoretes used one diacritic to mark both vowellessness and schwa. This sign, a vertically oriented pair of dots, is placed under consonants in basically two environments, like this: ÇCV, ÇÇ#. Our examples thus appear: dbārím kátbū yiktbū. Word-final two consonant clusters arise regularly through truncation in the 2fs (vide supra 1.4), e.g. ʔatt 'you fs', nāpalt 'you fs fell'; and appear irregularly in such forms as yebk 'let him weep' (truncated from yibké).

The transcription we have used comes out of the orthography _via_ the simple principle of ignoring the schwa-sign. Traditional grammar distinguishes the quiescent schwa, Ø, marking the end of the syllable, from the vocal schwa, ə, the reduced vowel. According to the view of Lambdin (1971) and Gesenius (1910), which is ultimately based upon that

expressed in R. David Qimhi's <u>Mikhlol</u>, an important mid-
1200's compilation of the results of 3 centuries of grammat-
ical research, the schwa is vocal in three contexts: #C---,
V C C--- , V̄ C---; that is, everywhere except after a weak
syllable V̆ C --

    This view deserves skepsis because it is the child of
two theories, neither of which is acceptable. First, that
spirantization of the unemphatic stops /b g d k p t/ occurs
after <u>surface</u> - manifest vowels. If vocal schwas are not
hypothesized, then in each of our examples -- dḇārím, kāṯḇú,
yiḵṯḇú -- known spirants will occur post-consonantally. In
a theory with rule ordering, this evidence does not carry
weight; and besides, the raw data of the language refutes
the statement of distribution: in malḵè 'kings of ...',
malḵēhém'their m. kings', as we discovered in our
discussion of the segholate nouns, the root final consonant
is spirantized because of the underlying presence of a vowel--
the infixed plural marker /-a-/ -- which even under the
standard theory of schwa is completely absent phonetically.
(Apparently there were some die-hard surfacists among the
earlier medieval grammarians who urged the pronunciation
malᵊḵē, etc., just to obtain the transparency of spirantiza-
tion. ref: W. Chomsky). Second is Qimḥi's theory that
unstressed long vowels could only occur in open syllables
(again, on the surface), so that dḇārᵏā 'your m.s. word' must
be in the relevant respect vocalized as dḇārᵊḵā. But there

is no good reason to accept this as an accurate generaliza-
tion about Hebrew structure, and indeed certain other
grammarians, among them Ben Asher, Ibn Balᶜam, and Ibn
Ezra, did not work with it. (W. Chomsky p. 44, n. 19). All
the grammarians agree that schwa is vocal in the env. V C C--C.

There is, however, evidence from outside the grammatical
tradition which bears on the point. Transliterations of
Hebrew words into Greek letters in the Hexapla (2-3 c. A.D.)
and the Septuagint (2nd c. B.C.), a translation of the Bible
into greek prepared for the Jews of Alexandria, clearly show
vocalization of certain schwa-signs. In the LXX, we find the
following:

English	Hebrew	Greek
Samuel	šmūʔēl	Σαμουήλ
Sodom	sdōm	Σόδομα
cherubim	krūbīm	Χερουβίμ
Solomon	šlōmō	Σαλωμών

These transliterations clearly support the view that word-
initial schwa was actually pronounced. (They also evidence
assimilations of schwa to the following vowel, even more ex-
tensive than is provided for in Qimhi (par. 4 b-d), a level
of detail that is not recoverable from Masoretic orthography.)
The antepenultimate stress in the Greek of Sodom (sódoma) is
presumably the result of applying to it the Greek principle

of recessive accent (cf. Kiparsky 1973). (The word does
look like a neuter.) The initial of 'cherub' does not in-
dicate spirantization, but rather that Hebrew k was per-
ceived as being closer to the aspirated chi = k^h than the
unaspirated kappa = k.). This is not the place to take up
the philological issues in serious detail: the interested
reader is directed to M. L. Margolis, AJSL. XXVI, p. 62 ff.
and to Einar Brønno, Studien über hebräische Morphologie
und Vokalismus auf Grundlage der mercatischen Fragmente der
zweiten Kolumne der Hexapla des Origenes.

Another argument that schwa was in some cases vocal-
ized, pointed out by T. O. Lambdin (pers. comm.), comes
from the character of the consonantal text. Between two
identical consonants, according to the standard view, a
reduced vowel is retained always: so, from sābáb 'go around'
we get sābabū 'they went around', from sēl 'shadow' we get
ṣlālīm 'shadows', silalē 'shadows of ...'. In the con-
sonantal text, sābabū appears as SBBW, silalē as SLLY. It
is crucial that in examples like this the consonant is
written twice: phonetic geminates are always written
with a single letter, so sabbōtém /sabb+ō+temm/ 'you mp went
around' is SBWTM, and sillī/sell+e+y/ 'my shadow' is ṢLY.
The consonants themselves, which are certifiably ancient,
testify that a vowel was pronounced in these syllables
where we hypothesize VD to operate.

Let us assume, then, that schwa is pronounced in the env. #C--C and V CC--C. I am going to assume, with Ibn Ezra, silence after V̄C--, but this decision is arbitrary and could be reversed in the system to be proposed by the addition of one feature to one rule. At any rate, nothing much should ride upon details of this type, which can certainly be expected to vary widely from place to place and time to time.

Can the rule of VD be maintained, supplemented with a late rule of schwa-insertion? The appearance of schwa, not Ø, between identical consonants in the output of VD shows this to be untenable, for after VD has applied, it is impossible to distinguish between sillḛ /selal+ay/ 'shadows of' and sillî́ /sell+e+y/ 'my shadow', yet sillḛ must be schwa-inserted to produce the surface output silᵊlḛ. The rule VD is therefore reconceived as accomplishing a reduction to schwa:

(35)   Vowel Reduction   V   → ə / --C V
                         [-lng]

To tailor the output of VR to accord with the pattern of schwa - Ø distribution we have accepted, we need a rule to make appropriate eliminations:

(36)   Schwa-Deletion   ə →   Ø / VC_a--C_b Condition C_a≠C_b

Initial consonant clusters are broken up by schwa. Does this phonetic generalization entail a rule of schwa-

insertion? The nouns do not provide a clear answer: words

like barāká, previously cited as brāká, 'blessing' need not

be lexicalized as brak + at/; an underlying vowel can be

hypothesized, say /barak+at/, and VR would supply the schwa.

Indeed, as ι, shall see at 2.1, CCV̆C is not a possible stem

shape for an unaffixed noun. That it appears on the sur-

face before the feminine affix -at can be ascribed to the

effects of phonology on the combination of canonically-shaped

morphemes, /CVCVC/ plus /VC/. On the other hand, nouns like

gəbūl 'boundary', bərīt 'covenant', show no vowel but schwa

in the first syllable, and there is no general process in

the language to reduce a vowel that might be underlyingly

present in the first syllable. The frame CCV̄C can, without

loss, be stipulated as a canonical stem-form. However, the

historical provenance of gəbūl and words like it from either

*gibūl or *qubūl via a rule of reduction that wiped out /i u/

(= our /e o/) in the env. #C--C V̄ left a gaping hole in

the lexicon, and the canonical pattern CCV̄C could be 'derived'

by re-instating the historical forms and the historical rule,

i...o the grammar of Hebrew.

The behavior of the Qal infinitive, however, shows

that #CC clusters must be dealt with in the phonology. The

following forms are relevant:

i.   ka̅to̅b   'to write'   / ktob /

ii. likto̅b   'to write'   / la+ ktob/   la = to (inf.
                                               marker)

iii. likto̅b   'when writing' /ba# ktob / ba = in

All Qal infinitives of ordinary tri-literal stems follow
the same pattern.

Looking at form (i), ka̅to̅b, one might suspect an under-
lying initial vowel that does not behave properly with re-
gard to PTL. The nonspirant /t/ of form (ii), likto̅b, is
inconsistent with such a hypothesis, if the disappearance
of the vowel comes about through the offices of the reduc-
tion and deletion rules already in the grammar, for they do
not interfere with spirantization. Nailing down the non-
existence of an early rule of (complete) syncope will take
us deep into details, and we shall put it off briefly until
the outlines of the basic system become somewhat clearer.
Under present assumptions, then, forms (i, ii) evidence a
rule inserting schwa into initial consonant clusters:

(37) $\emptyset \rightarrow \vartheta$ / #C--C

Rule (37) closely resembles Segholation, rule (17).
It is not improbable, in fact, that the vowel written e̲
that appears unstressed in segholates had the phonetic value
or schwa; if it did, the Masoretic orthography would have
had no direct way to indicate it, the schwa-sign itself
being used to mark final clusters, and writing e̲ would be
a satisfactory compromise, phonetically not far distant

and easy to interpret. If it did not, we need a trivial
low-level adjustment. So let us dispense with Segholation,
and using the mirror image convention generalize rule (37)
to break up both initial and final clusters:

(38) Cluster Break-Up $\emptyset \rightarrow \partial // \#C\text{---}C$

Form (iii), bik\underline{tób}, with its spirantized \underline{t}, shows that
Cluster Break-Up applies to the inner word #ktob of
/ba#ktob/, sparking Spirantization, after which Schwa-Dele-
tion removes the inserted schwa. The infinitive as object
of a true preposition, occurring in a structure
$[_{PP}\# \ P[_{NP} \ \#N]\#]$, retains its integrity as a word (as the
syntax predicts), and only differs from the free form k\underline{atób}
because the preposition provides the context for Schwa-Dele-
tion.

This array of data thus compells the ordering:

Cluster Break Up (schwa insertion)

Spirantization

Schwa Deletion

There's a slight wrinkle here: this rule-system will
delete all schwas inserted by the segholation clause of
Cluster Break-Up; the schwa of mel\underline{k} is certainly in the
env. VC---. This falsification can be amended by ordering
a rule of adjustment before Schwa-Deletion, bleeding it:

(39) Segholate Adjustment $\partial \rightarrow e \; / \; C \; \text{--} \; C \; \#$

However, if it <u>is</u> true, as I suggested, that the unstressed

e of mélek is an orthographic dodge for representing a

schwa-quality vowel, then Segholate Adjustment is arti-

factual. Surely too, a vowel like that epenthesized into

the final clusters of segholates, being unstressed, is liable

to great dialectal variation. (Think of the multitudinous

phonations of reduced vowels in English.) I am hesitant,

therefore, to make a detail of its value (+back) a principal

desideratum of surface word-shape. Schwa-Deletion is easily

amended to cover the case:

(40) Schwa-Deletion $\quad \partial \; \rightarrow \; \emptyset \; / \; VC_a \; \text{--}C_b \; V$

Condition $C_a \neq C_b$

(The environment of rule (40) recalls the notion 'doubly

open syllable'of Kuroda 1967.)

A question arises as to the correct form of the

preposition b- 'in', whether it is /ba/ or just /b/. Of

the infinitive marker 1- we can be sure, because its

vocalism alternates regularly, li- before --CC, lā- before

--C V́, as lāšébet /la + šʻb + t/ 'to sit or dwell', root

yšb. The real prepositions 1- 'to', b- 'in', k- 'like'

never display the ā-vocalism before nouns in the env.--C V́,

except for 1- in a few fixed phrases (see Gesenius, p. 299f-i

for a list of them). Before certain pronominal suffixes,

the /ā/ shows up, as lākém bākém kākém 'to, in, like you

mp'. This does stand as evidence for la,ba,ka. To get

this to work, VR must be allowed to operate across a single

word-boundary. PTL as it is stated in rule (13) does not

apply across #, so that in strings like /la#ĭamm/ 'to a

people', VR outputs ləĭam. If these prepositions are to

be analyzed as merely consonantal, a rule will be needed

to turn schwa to /i/ in the env. --CC; and indeed such a

rule is motivated by alternations in the paradigm of the

Qal imperative:

	sing.		Write!	pl.	
m.	kətób	/ktob/		kitbú	/ktob + ū/
f.	kitbí	/ktob + ī/		kətóbnā	/ktob + na/

This paradigm also gives evidence for Cluster Break-Up,

because the i-vowel in the fs and mp has no plausible source

in either /ʌ/ or /e/, as both undergo PTL in the env. #C-CV́

with regularity. Consequently, the i-vowel can have no

other source than the inserted schwa which gets trapped

behind two consonants. We require, therefore, rule (41):

(41) Schwa-to-I   ə → i / --CC

The relationship of rule (41) to the rule of A-to-I operat-

ing in essentially the same environment will be explored

in detail when we turn to examine the segmental alterna-
tions. Rule (41) follows Schwa Deletion, being fed by it.
A derivation may clarify the operation of the rule system
thus far developed.

$$/ \text{ ktob} + \bar{\text{u}}/$$

Stress	
VR	ktəb + ú̄
Cluster Break-Up	kətəb + ú̄
Spirantization	kə<u>t</u>ə<u>b</u> + ú̄
Schwa Deletion	kə<u>tb</u> + ú̄
Schwa-to-I	ki<u>tb</u> + ú̄
Output	**ki<u>tb</u>ū** **'you all boys write!'**

The cited infinitive forms derive as follows:

	/ktob/	/la+ktob/	ba#ktob/
Main Stress	któb	la+któb	ba#któb
PTL	--	--	--
VR	--	--	ba#któb
TL	któb	la+któb	ba#któb
Cluster Break-Up	k tób	--	ba#kətób
Spir	k <u>tób</u>	la+k<u>tób</u>	ba#kə<u>tób</u>
Schwa-Del	--	--	ba#<u>któb</u>
A-to-I, Schwa-to-I	--	li+k<u>tób</u>	bi#<u>któb</u>
Output:	kə<u>tób</u>	lik<u>tób</u>	bik<u>tób</u>

This analysis has several features worthy of comment.

First, in relation to problems of lexical structure
and canonical form of underlying representations, it ob-
viates the necessity for positing a vocalic source for
first syllable schwas that alternate only with Ø, as gəbúl
'boundary', ligbúl 'to a boundary'; or only with Ø and
/i/, as bəraká 'blessing', birkótáy 'my blessings', kibraká
'like a blessing'. Underlying forms like /gebūl/ or /gobūl/,
can be abandoned in favor of /gbūl/, in which the Ø alternate
is chosen as base, without altering the output: the rules
dealing with schwa that are in the grammar to describe
alternations in other morphological categories would treat
these base forms properly. This fact of course does not
decide the question of underlying form in these cases, but
it shows that the decision is without phonological content.

Similarly, the schwa-/i/ alternation in the vocalism
of the monoconsonal prepositions b- 1- k- could be treated
as reflex of vowel-lessness without modifying any rules.

Second, in relation to the structure of the rule-
system, observe that the ordering of Schwa-Deletion and
Spirantization was discovered by examining only forms like
biktob where the crucial schwa -- the one that spirantizes
the t -- is inserted by rule. This ordering predicts that
all underlying vowels will induce spirantization of
immediately following stops, because the syncope of reduced
vowels is accomplished by the same rule that deletes inserted

schwas. Not only is this prediction borne out, as forms
like malkēhem /mal-a-k + ay + hemm/ 'their m. kings' and
kanpēhém /kanap + ay + hemm/ attest, but for the situation
to be otherwise would necessitate a complication of the
grammar. Recall that the treatment of VR-VD as reduction-
to-schwa rather than outright deletion is motivated by the
identical consonant facts -- sābəbú/*sābbú -- and thus a
Hebrew in which the correct forms were *kanpēhém and *malkēhém
would have another rule of schwa deletion, identical to the
first, but ordered before spirantization.

It is significant that the system of early reduction
and late deletion receives this kind of empirical support,
for the rule of Spirantization runs into serious ordering
problems in the first grammar we proposed, with VD, rule
(3), accomplishing complete syncope.

For purposes of discussion, let's assume the distribu-
tion of schwa could be handled by late rules of insertion,
and return to the VD-Grammar we started out with, attempting
to place Spirantization with respect to the other rules,
whose order has been successfully determined.

Observe first that Spirantization must be early, must
in fact precede VD. Forms like kanpēhém /kanap+ay+hemm/
and kātbū /katab+ū/ have a vowel deleted which is never re-
placed by schwa; yet the consonant that follows the deleted
vowel is spirantized. Spirantization must occur before the

conditioning vowel is removed by VD. The order is:

Spirantization

VD

Segholation, rule (17), feeds Spirantization: from
/malk/ we get mélek̲, never ***mélek. Therefore, Seghola-
tion precedes Spirantization. But Segholation is rather
late among the rules presented. It must follow Word-Final
Degemination, rule (14), so that from a base form /rabb/ we
obtain ráb̲, not **réb̲eb̲. Word-Final Degemination applies
after TL, rule (11), so that /rabb/ leads to ráb̲, with a
short vowel because of the terminal cluster, not *rā́b̲, which
has the shape assumed by biconsonantal words like dā́m /dam/.
Transitivity of ordering gives

TL

WFD

Segholation

Spirantization.

We know on other grounds that Segholation must follow TL,
since the final cluster in, e.g., /malk/, /naˤr/ inhibits
lengthening of a̲, giving mélek̲, naˤar with short stressed
vowels.

But, as we argued above (1.2), VD comes before TL.
If it did not, TL would apply to a form like /kab̲ed̲+ū/,
producing /kab̲ēd̲+ū/, and the lengthened stem-vowel should

remain; but it's gone: kābdū, not *kābedū, is found on

the surface. This gives

> VD
>
> TL.

This ordered pair is the link that allows us to chain all

the rules mentioned into one linear order:

> Spirantization
>
> VD
>
> TL
>
> WFD
>
> Segholation
>
> Spirantization

A nasty result.

   A simpler and therefore more devastating paradox

arises in the phonology of gutturals. When a guttural

/ʔ h ʕ h/ closes an unstressed syllable, i.e. occurs as G

in the context V G C, a (short) copy of the vowel appears

after the guttural on the surface. Typically, we find naʕarām

/naʕr+a+m/ 'their m boy', noʕoram /noʕr+a+m/ 'their m early

life', yaʕabōd /ya+ʕbod/ 'he will work'. In the orthography,

these copied vowels are written with special signs, called

hātep's (henceforth: hateph), which consist of the ordinary

sign for /a e o/ flanked on the right by the schwa-sign.

Traditional grammars set these apart from the non-reduced

vowels, describing them as ultra-short, murmured, a species

of schwa. Since the hateph signs are used only in the env.--C V, the peculiar quality of these vowels should be ascribed to their being short vowels in unstressed open syllables. No third degree of length (or shortness) need be taken as primitive, and we identify them completely with the ordinary short vowels they are semiotically cognate to.

It's clear that the hateᵐh vowel in e.g. noˁŏrám has no place in the underlying string; is inserted by rule. The bare bones of the process look like this:

(42)   Hateph Formation   S.D.   V   G   C
                                        [-str]

                                         1   2   3

                              S.C.   1   2 1 3

Now, in the first grammr proposed, the rule VD will create the sequence V G C when it deletes a vowel lying between the G and the C. These sequences are broken up by Hateph Formation. Consider the word póˁal, meaning 'work', a segholate noun like mélek̲, but with an a̲ in the second syllable because of the ˁ̲. The stem /poˁl/ is augmented in the plural by rule (19) to /poˁal/, just as /malk/ becomes /malak/. Adding the 3 mp suffix to the plural form looses VD on the inserted vowel, yielding malk̲ehém and -- poˁŏlēhém, from the intermediate form /poˁlēhem/. Similarly, a disyllabic like nāhā́r 'river' gives nahărōt̲ehém from the intermediate vowel-deleted form /nahr+ōt̲+ē+hem/.

	/poˤ-a-l+ay+hemm	/nahar+ōt+ay+hemm/
Stress	poˤal+ay+hémm	nahar+ōt+ay+hémm
Spir	--	nahar+ot̲+ay+hémm
VD	poˤl + ay+hémm	nahr + ōt̲+ay+hémm
HF	poˤol+ay+hémm	nahar+ōt̲+ay+hémm
Other:	poˤol+ē+hém	nahar+ōt̲+ē+hém
Output:	poˤolēhém	naharōt̲ēhém

Hateph Formation must follow VD.

But Hateph Formation, like all rules inserting vowels,
feeds and thus precedes Spirantization: consider yaˤăbṓd̲
/ya + ˤbod/ 'he will labor' heˤĕḇīr /he + ˤbīr/ 'he led
across'. Spirantization does not pass across gutturals, as
is shown by šămáˤtī /šamaˤ+t̲ī/ 'I heard', which does not
meet the SDof Hateph Formation because of stress, and by tehdar
/te+hdar/ 'you m.s. will favor', which is simply exceptional
with regard to HF.

So Spirantization, which precedes VD, must apply to
the output of HF, which follows VD.

> Spirantization
>
> VD
>
> Hateph Formation
>
> Spirantization

The paradox is simple, and inescapable.

These data might set one to thinking of global rules,
of local ordering, or -- of dividing VD into an early reduc-
tion and a late deletion. We have seen that the last al-
ternative is abundantly supported by considerations entirely
unrelated to the paradoxes at hand.

At this point it might be instructive to see how the
new grammar with Vowel Reduction replacing Vowel Deletion
handles the phenomenon of the hateph vowels.

Actually, there's no possibility of a serious problem
developing. Although Schwa-Deletion in a string V G∂ C V
would create an environment for Hateph Formation, it's not
necessary to wait for Schwa-Deletion to come along: the
rule Hateph Formation can be expanded to affect schwa as well
as ∅, assimilating schwa to the preceding vowel, replacing
∅ with a copy of the vowel.

(43) Hateph Formation   S.D.   V   G   (∂)   C
                                       [-str]

                                         1   2   3   4

                             S.C.   1   2   1   4

There is another rule in the grammar that deals with
schwa following a guttural: whereas dābár gives rise to pl.
dəbarím, ʔadắm 'man has pl. ʔădāmím; where mélek has
məlākím, ʕébed 'servant' has ʕăbādím. The vowels written

ă are spelt with the hateph-sign. Evidently, where schwa
is generally predicted, a preceding guttural induces an
a-quality vowel; an assimilation, since the gutturals are
low sonorants.

The phenomenon is not restricted to initial position.
Qal participles like kōtéb/kōteb/ 'writing' lose the short
vowel in the plural due to the limitation on PTL: kōtbím
/kōteb+ím/. In a verb II-guttural, like saḷáq 'cry out',
participle soḷéq, the vowel reduces as expected but instead
of going all the way to Ø, it survives as a: soḷăqím.

These facts evidence a rule lowering post-guttural
schwas:

    (44) Schwa-to-A   ə → a / G --

Rule (44) precedes Schwa-Deletion, robbing it of schwas
to delete. It must follow Hateph Formation, rule (43),
since whenever the two conflict, Hateph Formation wins.
In the form poḷoléhém /poḷ-a-l+ay+hemm/, for example, the
o-hateph is a descendent of a VR created schwa; if Schwa-to-A
had first crack, the form would be *poḷaléhém. In fact, if
Schwa-to-A preceded HF, there would be no motivation for
the new schwa-clause in HF, since all schwas would be sent to
a in the environment V G -- C.

The rule Schwa-to-A also plays a role in determining
the vocalism of segholates. A base form like /CVGC/ under-
goes Cluster Break-Up, becoming CVG C; Schwa-to-A applies,

outputting CVGaC. This is, of course, correct: a base like /noᶜr/ yields noᶜar.

The ordering presupposed, Cluster Break-Up -- Schwa-to-A, is confirmed by the behaviour of forms with initial clusters. Infinitives and imperatives from roots I-guttural (except /ʔ/ show the a-hateph: ʕaḇṓd /ʕbod/, hazáq /hzaq/ 'be strong'. The roots I-ʔ have e̱ in the parallel forms, e.g. ʔeḵṓl /ʔkol/ 'to eat'; this is due to a rather specialized rule affecting schwa between ʔ and ō̱ (vide Ch. 2). Words from underlying /CCV̄C/, like bərīt 'covenant', when they begin with a guttural, also conform to the expected pattern: hazīr /hzir/.

The order of the various rules relating to schwas is as follows:

As a final flourish, let us formulate the rule in its detail:

(45) Spirantization $\begin{bmatrix} -son \\ -low \\ -C.G. \end{bmatrix}$ → [+cnt] / $\begin{bmatrix} -cns \\ +voi \\ -cor \end{bmatrix}$ ___

The [-low] restriction excludes the emphatics /ṭ q/. The
environment is intended to include all vowels and the
glides /y w/ but not /? h r/. Observe habbaytā 'homeward'
/ha#bayt+ ā/ and yehdar 'he will favor' /ya + hdar/. I
know of only five exceptions to the rule, which is not a
bad record for a rule that is in Kiparsky's sense opaque--
one whose conditioning environment is not always visible
on the surface. Not applying where expected: kaspēhém
/kas-a-p+ay+hemm/ ;their m. money (pl.)', birkàt /barak+at/
'blessing of ...'. Here there is nothing to say but that
certain plural forms of késep /kasp/ 'money, silver' are built
on the singular stem; aid the construct state of is based
irregularly on a truncated form of the stem. Applying to
consonant not post-vocalic: kaspénū (kasp + ēnū) 'our
money (sing)', bigdí (bigd+ī) 'my garment', yiqbékā
(yiqb + e + ka)' your m.s. wine-vat'. These anomalies can
be rendered tractable by attaching the pronominal suffix
with a word boundary, #, rather than the usual morpheme-
weight boundary, + : kasp#ēnū, bigd#ī, yiqb#e+ka. They are
now liable to Cluster Break-Up, which inserts a schwa into
the cluster, causing spirantization. Unlike the ordinary
case of segholation, the inserted schwa now appears in the
env. VC-CV, and is therefore removed by Schwa-Deletion.
Only spirantization is left as a trace of its brief existence
inside the cluster.

1.7 The Remaining Deletion and Reduction Cases

The infinitive and imperative Qal have in their un-
affixed forms the underlying shape C C V C: kətób 'you m.s.
write!', kətōb 'to write'; bəhár 'you m.s. choose!', bəhōr
'to choose'. Now it happens that this word-shape is not
found elsewhere in the verbal system; indeed it is not found
in the lexicon at all, with a couple of exceptions (dəbaš
'honey', šəkem 'shoulder' are the ones I am aware of). Words
like zə?éb 'wolf', bə?ér 'well' are not real exceptions, for
as D. Guttman (1970) observes, there are no segholates
Cē?aC, the expected surface reflex of /Ce?C/; apparently an
early metathesis turns e.g. /ze?b/ into /z?eb/. This meta-
thesis enables us to clear the dictionary of nouns /CCVC/,
and provides another set of forms for which Cluster Break-Up
is necessary.

The shape C C V C is universally assumed by three-
consonant stems when they are singly prefixed in the course
of derivation or inflection. The prefixes of the imperfect,
y-, t-, ?-, n-; the verbal derivational prefixes, n- (Nip̄ʿal),
h- (Hip̄ʿīl, Hop̄ʿal), m- (participial); the nominal prefixes
m-, t-; all of these attach to the same stem shape. When the
stem has four consonants, due to a derivational process such
as doubling the middle radical or reduplication, or because
the root is one of the very rare quadrilaterals, the stem
shape remains invariant under prefixation: in Piʿʿēl, for
example, we find characteristically giddēl (pf.), yəgaddēl

(impf.), m gaddēl (part.). The four consonants are always
arrayed CVCCVC.

Now it also happens to be the case that the impera-
tive mirrors the imperfect due to minutiae: it has the
same pattern of reduction, modulo initial cluster phenomena,
and, even more strikingly, it has the same stem-vowel. And
the stem-vowel of the imperfect is not always predictable.
Usually it is /o/: yiḵtób. When a guttural is the second
or third root-consonant, it is /a/: yishág 'he will laugh';
yišmáʕ 'he will hear'. When the perfect has /e/ or /o/,
it is /a/: qātón 'he is small', impf. yiqtán; kābēd 'he is
heavy', impf. yiḵbád. When the verb is stative, it is /a/:
hāzaq 'he is strong', impf. yehezáq. But the vowel is un-
predictably /a/ in a handful of cases, e.g. lāmád 'to learn',
impf. yilmád; and unpredictably /e/ in yittén 'he will give',
impf. of nātán.

In all these cases, whether the stem-vowel is predict-
able or idiosyncratic, the imperative follows the imperfect:
kətób səhág, šəmáʕ; ləmád, ten.

Contrast the imperative and the imperfect in inflec-
tion:

	2nd Pers Imperf.	Imper.
m.s.	tiḵtób	kətób
m.p.	tiḵtəbū	kitbū
f.s.	tiḵtəbī	kitbtī
f.p.	tiḵtóbnā	kətóbnā

These considerations suggest that the Imperative
is literally derived from the Imperfect by truncation of
the inflectional prefix, explaining in one blow the vocalism,
inflection, and peculiar stem-shape. (This idea about the
imperative has, not surprisingly, been around for a while.
Its most recent appearance in the modern tradition is in
Gutman (1970)).

Using a rule of prefix-removal to get the imperative
opens the way to explain certain features of the derived
conjugations. In Piꞔꞔēl, the imperfect has the shape illustrat-
ed in yₐgaddēl: if we assume here the same stem /gaddel/,
the rule A-to-I will operate on the first syllable to produce
the observed form. The imperative is gaddēl. If it's
assumed to come simply from /gaddel/, it is unclear why it
should not follow the perfect in vocalism, being equally
liable to A-to-I. But if it's derived from an imperfect-like
form /ta+gaddel/, the rule that takes away the prefix can be
ordered <u>after</u> A-to-I, which only applies to first syllables.
The vocalic parellelism between imperfect and imperative will
thus be attributed to the same source, prefixation.

In Hipꞔīl, the characteristic h-prefix is quite
visible in the perfect: e.g. hišmīdū 'they destroyed'. Not
so in the imperfect: yašmīdū. But it reappears in the im-
perfect (and in the infinitive); hašmīdū 'destroy!' If we
assume that it is underlyingly present in the imperfect, and

obscured by loss of the h-, then the prefix a-vocalism (where i is found elsewhere in the verb) follows from the restriction of A-to-I to the env. #C-CC; and the form of the infinitive, with its a-vocalism and h-prefix, follows from the existence of the rule removing prefixes.

What of the infinitive? Surely it is senseless to encumber it at any stage with person-number prefixes, and if we must stipulate its form, the argument for truncation in the imperative is correspondingly weakened. But there is a prefix waiting in the wings: to wit, la-, which is similar to and historically derived from the ordinary preposition l- 'to'.

The infinitive marker can be readily distinguished from the related preposition on both syntactic and phonological grounds. The unmarked infinitive,which may appear with subject, object, and other clausal accoutrements, has essentially the distribution of a noun: it may function as subject of a sentence, as in "man's being by himself is not good" (Gen.2.18); as adjunct to a noun, as in "a time to mourn and a time to dance"; as object of a preposition, result-ing in structures best given periphrastic clausal translations, "because, until, when, as, after, than . . . " (The bare infinitive may also appear as complement to verbs like know(how), begin, be able, etc.). For present purposes the

most relevant of these uses is the prepositional construction,
specifically the idiom in which the monosyllabic prepositions,
b- 'in', k- 'like', l- 'to', take the infinitive, producing a
temporal clause translatable with when, as, while and the like.
(This is easily the most common way of forming such clauses.)
The prepositions b-, k- are used more frequently than l- for
this purpose, but there are a number of clear instances of l-
in this temporal usage. Gesenius (p. 348, n.1) cites Dt 23.12,
Ex. 14.27, Ju 19.26; and 2 S 18.29. The reader who is dil-
igent enough to pursue the references will find that the first
three involve the phrase lipnōt + noun referring to time of
day, meaning 'as it became e.g. morning'; the last is an
authentic temporal clause, 'when (=l-) Joab sent (infinitive)
the king's servant and your servant (= me).'

Contrasting with this is the infinitive marked with l-:
it appears as complement to equi-type verbs like be able, begin,
cease, finish, be willing to, desire, refuse, expect, hasten,
continue, learn (how), understand how, know how; it appears
in adsentential and ad-verb-phrasal complements of purpose
and result; and it is used in certain locutions with the verb
'to be' and its equivalents to express the modal notions of
incipience, possibility, and obligation. It seems to be the
case that the l-marked infinitive does not allow the expression
of an overt subject, a fact which has evidently gone unnoticed.
By the time of Mishnaic Hebrew, first attested 400 - 300 B.C.,

at least five hundred years after the mid-point of the period
we are focusing on, the infinitive was always marked with l-.
Concomitantly, all of the constructions of the bare, nominal
infinitive had disappeared. It is interesting, then, that
Segal (1927) remarks: "the pronominal suffixes attached to
this [Mishnaic infinitive prefixed with l-] are however . ..
always of an objective force." It seems that in fact the
syntactic situation in Mishnaic Hebrew is simply a direct
continuation of that in Biblical Hebrew, and the differences
are attributable to loss of the bare infinitive, with its
noun-like distribution and sentence-like structure.

The phonological distinction is equally clearly marked,
as we saw above. There is a contrast in spirantization be-
tween the l- prefixed infinitive and the infinitive that fol-
lows a real preposition: liḳtób with [t],vs. biḳtób with [t].
The infinitive as prepositional object has the spirantization
properties of the bare infinitive; the prefixed case is like
the imperfect yiḳtób: we conclude therefore that the prefix
is attached with a morpheme boundary, +, and the preposition
with a word boundary, #. Of course, these boundary assignments
follow from the general principles of the theory, once we note
that l- is a true prefix, distinct from its cognate preposition.
A further distinction in vocalism has been noted above:
the prefix l- shows the alternation lā-/li-, as lāšébet/liḳtób,
where šébet is the infinitive of yāšáb 'dwell' formed by

processes we discuss below; but the preposition b-, l-, k-
show an alternation between [ə] and [i] in parallel circum-
stances: bədā́bā̄r/bidbā́rī̄m. In the rule-system we have
developed, this also falls out from the morpho-syntactic
distinction of boundary-type.

The result of these lucubrations is that the infini-
tive has a prefix that behaves in every phonological respect
like the inflectional prefixes on the imperfect. We there-
fore attribute the infinitive stem shape CCVC to the existence
and character of this prefix, just as we attribute the other
regular occurences of this stem-shape to prefixation. The
direct way to model this observation is to take the prefix
to be part of the underlying form of every infinitive and
remove i: by rule when appropriate, parallel to the removal
of the person-number prefix to form the imperative from the
imperfect. When is appropriate? A crude formulation, sug-
gested by our brief review of infinitive syntax is: (1) when-
ever it serves a noun-like function, and (2) optionally after
verbs of which it is the complement. It is quite striking that
the environment for the proposed deletion is basically syntac-
tic rather than morphological; the same is true of the imper-
ative, perhaps less obviously. If the prefix-truncation
proposal is correct, then the imperative is just a kind of 2nd
person variant of the imperfect in a certain syntactic environ-
ment: observe that the imperfect is also used with commandatory

force: yiḱtōb can mean 'let him write'. Further, the impera-
tive per se appears only in positive commands; after nega-
tives, the full, prefixed imperfect is used. The rule of
imperfect prefix truncation, if there be such, must be con-
syrained from applying in negative sentences. The rule looks
like this:

(46)   Prefix Stripping   S.D.   # CV +

                                        1 2

                               S.C.   1 ∅

                    Condition: Constrained syntactically and

                                morphologically as described

We might pursue the question of stem-shape a bit further
and ask how it comes about that post-prefixal stems assume
the form CCVC. Two general approaches to modeling phenomena
of this type suggest themselves: one we may designate 'inter-
pretive', like that of Halle (1973), in which a positive con-
dition is placed upon the lexicon requiring the structure
CV+CCVC] $_{stem}$ for all prefixed items; the other, which we may
term 'generative', more closely analogous to familiar phono-
logical modes of thinking, in which one stem form is taken
as basic and a battery of rules apply to mold it to its various
environments. Let us look at the phonological consequences
of one way of developing the generative approach.

Observing an alternation in stem form such as that
between the perfect kāt́ab /katab/ 'he wrote' and the imperfect

yiktób /ya+ktob/, it is plausible to take the form as base

and posit a simple rule to take out the stem-initial vowel, a

rule which we know to be quite general:

(47) 3-Syllable Rule   S.D. CV + C V C V C stem

                               1   2   3

                         S.C. 1   Ø   3

Such an account will, of course, be supplemented with

the various rules of ablaut whose effects we briefly discussed

above.

The possibility of the 3-Syllable Rule is important at

this point because it fulfills the portentous description

found in the discussion of Schwa-Insertion (37): an early

rule of complete syncope. This opens the way to a new analysis

of the initial cluster data. If we order Prefix Stripping

before the 3-Syllable Rule, then both bare infinitives and

imperatives are going to have two stem vowels, the first of

which could underly schwa, /i/, or any other initial vowel,

thus eliminating the need for the posited rule of schwa-

insertion (37). Some complex and unexpected data from the

behavior of the infinitive when suffixed pronominally might

seem to give a measure of support to such a move. The entire

paradigm runs as follows:

Suff.		Sing.		Pl.
1		kotb-í		kotb-ēnū
2m.	a.	kətobká	a.	kətobkém
	b.	kotb-əká	b.	kotb-əkém
2f		kotb-ēk	a.	kətob-əkén
			b.	kotb-əkén
3m		kotb-ó		kotbám
3f		kotb-áh		kotb-ān

As is often the case with individual lexical items, not
every form given here actually appears in the text: those
which do not are projected from citations of phonologically
parallel words. The 2nd person feminine plural forms are
projected directly from the 2nd person masculine plural
forms; although there are no citations of these forms at
all, there is no reason to expect that they would diverge
from the elsewhere (on nouns) always parallel masculine form.
More important to our analysis are the (b) forms of the 2nd
person masculine. The crucial point is the non-spirantization
of the third root consonant, which contrasts markedly to its
spirantization elsewhere in the paradigm. These forms of
kātab do not appear in the Bible. But this projection is
supported by the forms like bə?ospəká 'when thou m. hast
gathered', Ex.23.16, and bə?ospəkém 'when ye have gathered',
Lev.23.39, from the verb ?āsap 'gather'. Gesenius (p. 162 par.61a)
says " ... before -ka and -kem also the syllable is completely

closed ... ", where by 'complete closure' he means merely
to indicate the failure of spirantization. Other supporting
evidence known to me is the occurence of šokbəkā́ 'when thou
m. liest down' from sākáb, at Dt 6.7 and twice elsewhere.
The form 2m(a) pl. is supported by Gesenius' authority and
by ʔakolkém 'your eating' from ʔākal, Gen. 3.5.

I have tarried over these details because they are
significant in the argument. The non-spirantization in the
2m(b) forms show that they do not arise from the operation
of VR as we know it; they evidence a rule of metathesis which
applies optionally, and early, to 2nd person forms.

(48)   2nd Pers. Metath.   SC. C C V $\underbrace{\text{C + 2nd Pers Pron}}$

                                     1 2 3   4

                               SC. 1 3 2   4

The occasional maverick form from other persons, like hopk-ī́
'my overturning' from hāpák, or nogp-ó 'his striking' from
nāgáp (Ex.12.27), suggests that this rule may apply sporadical-
ly outside its proper domain. This rule is an early adjust-
ment, applying before VR.

Let us now examine the paradigm without the (b) forms,
which are handled correctly and completely by the rule 2nd
Person Metathesis. The remaining stem mutations are just those
that would arise from application of the rules to a base
/kotob/, given that PTL does not apply.

	/kotob/	/kotob+a+m/	kotob+e+ka/	/kotob+e+kemm/
V-final			ā	
Stress	kotób	kotob+á+m	kotob+é+kā	kotob+e+kémm
PTL	---	---	---	---
VR	kətób	kotəb+á+m	kətob+ə+kā	kətob+ə+kémm
TL	kətob	kotəb+ā+m	vac.	---
WFD	---	---	---	---
Spir	kətob	kotəb+ā+m	kətob+ə+kā	kə tob+ə kém
Schwa-Del	---	kotb +ā+m	kətob +ka	kətob +kém
Output:	kətob	kotbam	k tobka	kətobkém

What this observation suggests is that the infinitive stem be set up as /kotob/; when prefixed, /la+kotob/ goes to /la+ktob/ by the 3-syllable Rule; unprefixed, the vowel remains to partake of the alternations observed, granting the non-applicability of PTL.

The proposal to employ the 3-Syllable Rule in this fashion loses plausibility when it is realized that the suffixed infinitive has the same form whether or not it is marked with l-: kotb-í/ lakotb-í 'to write me'. This proposal predicts, on the contrary, *liktabí, parallel to the authentic tiktabí 'you f.s. will write' from /ta+ktob+í/. Of course, the 3-Syllable Rule could be altered ad hoc to not apply to suffixed infinitives, a strange restriction for a rule of such generality to exhibit.

Rather than seeing the infinitive stem alternations
as the result of lacunae in otherwise general processes --
PTL, the 3-Syllable Rule -- I propose a special rule that
copies the stem vowel into the initial cluster of suffixed
forms:

(49)   Echo   S.D.   C C V C + Pron.
       (First Version)   1 2 3   4

              S.C.   1 2 3   4

To what categories does this rule apply? Clearly, not
to the imperfect: we have seen yismor-k̄a 'he will guard
you', not *y somr k̄a. In the imperative, however, interesting
data is found. Displayed here are the relevant forms:

Imper. m.s.   +1.s.suff   Imper.m.p.   +1.s.suff
šə̆mȯr   šŏmr-ēnī   šĭmrú   šimrū-nī 'guard (me)'

šə̆maˊʕ   šə̆maʕ̄-ēnī   šĭmʕú   šə̆maʕ̄u-nī 'hear (me)'

Contrast these data with the parallel forms of the imperfect:

Impf.m.s.   Imperf.m.p.
tišmȯr   tismə̆r-ēnī   tišmə̆rú   tišmə̆rū-nī

tišmaˊʕ   tismaʕ̄-ēnī   tišməʕ̄u   tišmaʕ̄-ēnī

Remarkably, the fate of the stem vowel is imperfect and im-
perative is point-for-point identical, modulo deletion of
schwa.

Under the analysis developed above, the fate of the stem
vowel in the pronominally suffixed forms is determined by

the applicability of PTL, since stress happens to fall always
on the immediately post-stem syllable. In the imperfect, the
fact that non-initial Pre-Tonic lengthening of /e o/ is lim-
ited to the env. V C --C V means that /e o/ will remain short
and be subsequently reduced, where stem -vowel /a/ will be
lengthened and preserved. In the imperative, what guarantees
the same patterning? If Prefix-Stripping follows PTL, then
the imperative will inherit the quantity, and hence reduction,
properties of the parent imperfect, since they are formally
identical until beyond the point where quantity differences
relevant to reduction are introduced. Observe that the same
ordering explains the shortness of the preserved vowel in
kətobká, if it comes from /la + ktob + e + ka/.

Other approaches might be imagined, though. It will
not do to allege that PTL simply doesn't apply to /o/,
because imperatives in /e/ have identical reduction properties.
For example, tén, 'give' from nátán (we discuss its aberrant
stem shape below) shows tənú-ni 'you all m. give me' and
tən-éni 'you m.s. give me!' It might be suggested that
PTL is restricted in the env. # C C --, that is, that it only
applies to word initial non-low vowels in the env. # C --.
Now there can be evidence against this only if there are
underlying #CC sequences in the lexicon other than those
of the imperative/ infinitive. Words like nəbelá 'corpse'
can be pointed to, where an underlying /nbel + at/ produces

correct surface forms. (The /e/ is deletable, as in niḅlàt,

'corpses of'). Of course, an underlying form like /nabel + at/

works equally well in terms of the present system, is

preferable in terms of the restrictions on canonical form of

2.1, and so it does not provide much of a case.

Returning to the main theme, observe that the rule

of Echo has applied to the pronominally suffixed form of

the m.s. imperative: šomr-énī 'guard me', not as we might ex-

pect, *šimr-énī parallel to simrū-nī (pl.). The rule does

not apply to the plural form, but then there is no reason to

expect that it should, because its shape, CCVC+V+Pron, does

not satisfy the S.D. of the Echo rule, which is CCVC+Pron.

This rather subtle detail provides confirmation for the view

that analogical relations between categories must be developed

through rules defined over elements of structure, not through

the exploitation of gross correspondences.

The appearance of the echo phenomenon in imperative

inflection gives clear evidence that a rule is operating,

that we are not merely witnessing the emergence into daylight

of an underlying stem vowel usually suppressed. If the im-

perative had such a stem vowel, V_i in a proposed base like

/kV$_i$tob/, it would have to be able to modulate to /i/ upon

deletion of the second stem vowel, as in the mp. kiṭbū and

the f.s. kiṭbī. Plausible candidates are /a/ and /e/,

certainly not /o/. If basic imperative/imperfect stems

like /katob/ or /ketob/ are set up, with the 3 Syllable Rule

used to trim them in the presence of prefixes, the rule Echo

could easily be re-stated as an assimilation of the first

vowel to the second, rather than a copying. But we should

expect phonetic kātób or ketób for the bare m.s. imperative,

not the observed kətób. Thus, attempting to use the 3-Syllable

Rule to account for alternations in stem-shape in the impera-

tive and infinitive leads to postulating a variety of irregu-

larities: in the 3-Syllable Rule itself, with regard to the

suffixed infinitive which is marked with l-, discussed above;

and in the operation of PTL upon the hypothesized stem vowel,

I conclude therefore that, for purposes of phonology, there

never is a vowel between C_1 and C_2 in the imperative/imperfect/

infinitive stem $C_1C_2VC_3$. The implicit promise in the dis-

cussion of schwa-insertion, to nail down the non-existence

of an early phonological rule of complete syncope, has been

met. The 3-Syllable Rule, if it exists, plays no role in

phonology; the internal workings of morphology remain as in-

scrutable as activity inside the En-Soph.

Where does the rule Echo fit into the phonology? If

the stem-initial CC cluster is to play a crucial role in in-

hibiting PTL in the infinitive and imperative, Echo, which

breaks up this cluster, must apply after PTL. This necessitates

a slight complication of the rule, for it cannot copy the pre-

tonically lengthened /ā/ of šəmāʕénī; it would wrongly output

*šamaȻéní. If Echo applied before PTL, no such problem would arise: the copied (short) /a/ would always be liable to reduction. Ordering Echo after PTL, as we must, three equally complex possible corrections of Echo come to mind: (1) restrict the vowel to be copied to be [+round], i.e. /o/; (2) restrict the vowel to be copied to be [-long], ultimately another way of referring to /o/ in this environment; (3) leave the S.D. general, but make the copy [-long], so that a copied /ā/ goes to /a/ and thence to schwa. At this point I have found no way to decide between the alternatives; I shall arbitrarily accept possibility (2) in formulating the fule.

The fact that Echo does occur in prefixed infinitives must be stipulated. A direct approach gives us this rule:

(50a) Echo (A)   S.D.   # (C V +)ₐ C C   V   C + Pron
                          └──1──┘   2 3 [-long] └──4──┘

                 S.C.   1   3 2 3   4

Condition: a only if form is infinitive

However, the S.D. of the rule can be simplified by <u>excluding</u> the imperfect rather than letting in the infinitive:

(50b) Echo (B) S.D.   V-Stem[C C   V   C + Pron
                         └─1─┘ 2 3 [-lng] └──4──┘

                S.C.   1   3 2 3   4

Condition: does not apply to imperfect.

The (A) form of the rule must be ordered after prefix-stripping
so that the imperative will meet its S.D. The (B) form need
not; since the rule of prefix stripping is obligatory in the
imperative, no forms like *təkotbēm 'write them!' will be gen-
erated. Since prefix-stripping is not universal in its applica-
tion to infinitives, both kotbám and ləkotbám will emerge.
Since the (A) version redundantly repeats the condition on
the infinitive, I opt for (B).

Let us derive a few forms to illustrate the operation of
the rules:

	/la+ktob+a+m/	/ta+ktob+e_m/	/ta+šlah+e+m/
Stress	la+ktob+á+m	ta+ktob+é+m	ta+šlah+é+m
PTL	n.a.	n.a.	ta+šlāh+é+m
Pref. Strip	(declined)	ktob+é+m	šlāh+é+m
Echo	la+kotob+á+m	kotob+é+m	--
VR	lə+kotəb+á+m	kot ə b+é+m	--
TL	lə+kotəb+ā+m	kotəb+ē+m	šlāh+ē+m
Cluster B-U	--	--	šəlāh+ē+m
Spir	lə+kotəb+á+m	kot ə b+ē+m	--
Schwa-Del	lə+kot b+ā+m	kot b+ē+m	--
Output:	ləkotbám	kotbém	šəlāhém

(Gloss: to write them m, write ms then m!, send ms them m!)

To complete our discussion of imperative/infinitive
phonology, we deal first with two relatively minor matters
of detail and then turn to a problem of some interest in 1.8.

(I) Infinitives in /a/. A small group of regular tri-
literal stems takes /a/, not /o/, in the imperfect/imperative:
predictably, verbs with non-a perfects like kābēd 'be heavy',
qātōn 'be small'; unpredictably, a handful comprising lāmad
'learn', rākab 'ride', šakab 'lie down'. The infinitives for
this class are very poorly attested: the question is, whether
there is an infinitive form in /a/ and how it behaves with
regard to the Echo-ing process we have explored. Of the
verbs with non-a perfects, neither kābēd nor qātōn has an
infinitive cited, but the phonologically similar verbs
yāsēn 'sleep', yārē? 'fear', śānē? 'hate' all exhibit regular
infinitives: yəšōn, yərō?, śənō? I conclude that the non-ā
perfects (and its allied class of stative verbs like qārab
'be near') take /o/ in the infinitive.

Of those unpredictably a in the imperfect, rākab has
only the form lirkōb attested, which is perfectly ordinary:
lāmad has only lomd-ī, again ordinary; but sākab has šəkab,
the type we have been seeking. With suffixes, we find šikb-āh
'her lying down' and šokb-əkā 'your m.s. lying down'. Observe
that, because of the non-spirantized /b/, both forms have
been subjected to the early rule we have termed '2nd Person
Metathesis'; the first apparently coming from a stem /škab/, the

second from /škob/. Further evidence that a regular /o/ in-
finitive exists is the attested proclitic form liškob-,
which is, as it happens, the end of our information about
this verb. Of the behaviour of /a/ before suffixes we have
no evidence. I conclude tentatively that, although an /a/
form did exist, every verb could have a regular /o/ form.

(II) Extended Imperatives. The affix -ā can be added
to m.s. imperatives and 1st person imperfects with imperative
force: ʔektób, ʔektəbā 'let me write'; niktób, niktəbā 'let
us write'; kətób, kotbā 'write, you m.s.!' . In the impera-
tive the Echo phenomenon is quite visible suggesting that
we extend the Echo rule to apply before this suffix as well.
What of a-imperatives? According to Lambdin (1971), these
show not o but i: šəlaḥ, šilḥā 'send'; šakáb, šikbā 'lie
down'. This is just what we'd expect if Echo copied the /a/,
for it would go to /i/ regularly in the env #C--CC by A-to-I;
on the other hand, it is also just what we'd expect if Echo
didn't copy /a/, but Schwa-to-I (rule 41). There is no illum-
ination of the proper constraint on Echo to be found here.

1.8 'Short' Imperatives and Infinitives in /t/

Two classes of verbs have 'short', that is, biconsonant-
al, imperatives: (1) verbs I-y with /e/-stem vowel in the im-
perfect, such as yāšáb 'dwell', imperfect yēšéb /ye+šeb/,
imperative: šéb, šəbu etc., from the stem /šeb/; (2) verbs
I-n with /a e/ in the imperfect, such as nāsáʕ 'set out on a
journey', imperfect yissáʕ /ya+nasʕ/, imperative sáʕ, səʕu
etc.; or nātán 'give', imperfect yittēn/ya+ntēn/, imperative
tēn, tənu.

Y-loss in class (1) is due to a rule of tremendous an-
tiquity. It appears in Brame's thesis as 'W-Occultation',
relating e.g. waθaba 'he dwelt' to yaθibu 'he will dwell'
/ya+θib+u/. T. O. Lambdin reports (pers. comm.) that there are
alternations of this type in Egyptian. At any rate, the rule
is quite limited in scope, and we shall simply assume that its
output is available to the phonology we are studying.

Shortening in Class (2) is clearly mediated by the as-
similation of root-initial n to the following consonant. If
we allow the rule of Prefix-Stripping to apply to the assimil-
ated forms, we'd get *ttēn, *ssaʕ, and so on. But there are
no initial geminates in the language, as there are no final
geminates: the rule of Word-Final DeGemination can be
easily generalized by the mirror-image convention to accomodate
these cases:

(51) Degem. at Word Boundary $C_iC_i \rightarrow C_i$ // #--

Not all verbs I-n follow this pattern. Those with
o̱-imperfects, such as nāpal 'fall', impf. yippōl, have regular
triconsonantal imperatives derived from the non-assimilated
underlying stem: nəpōl, niplū. A simple and direct way to
handle this is to mark these verbs [-assimilation] in the
imperative.

Surveying just this range of data, it appears that a
satisfactory solution to the I-n short imperative phenomenon
has been found; with no new rules and with one exception feat-
ureassigned by clear principle, the shpae of the imperative
has been related to the assimilation observed in the imperfect.
The I-n verbs with ordinary imperatives, such as nəpōl 'fall!'
and nədōr 'vow!' from nādar, have ordinary infinitives and
the n remains unassimilated even when they are prefixed: linpōl,
lindōr. (Note the regular lack of spirantization.). This is
perfectly consistent with the prefix-stripping hypothesis, and
shows that the marking of these verbs as [-assimilation] is
general over both imperative and infinitive, tnus supporting
the proposal that they are to be treated as exceptions.

In the Mishnaic period, the system of short infinitives
was lost a; prefix-stripping no longer applied to the infinitive
marker, and the infinitive was brought into perfect parallelism
with the imperfect. Concomitant with the disappearance of
forms like nəpōl, nədōr in the imperative was the regular-
ization of the infinitive to lippōl, liddōr. This is exactly

what you'd expect if the change was, as suggested, loss of

exceptionality in the appliation of N-assimilation. The

short infinitives from I-y stems were replaced by forms

like lēšéb /le+seb/, which mirror exactly the structure

of the imperfect yēšéb /ye+šeb/. Presumably the rules

applying in the env. of the imperfect prefixes were simply

generalized to apply equally to the infinitive prefix.

Confirmation of the general drift of the analysis,

tnat the o-imperfects are irregular rather than the a,e ones,

comes from the historical development of the system into the

Mishnaic period, in which all assimilated imperfects have a

short imperative: pōl/*nəpōl. In our terms this state of

uniformity was attained by eliminating a peculiarity in the

treatment of the o-class.

However, a complication enters the theoretical picture

when the infinitives associated with the I-n and I-y verbs

are taken into account. The infinitive of yāšáb is not the

expected yəšōb, but šébet, suffixed šibt-í. This form be-

haves exactly like the segholate noun of the qéber-type;

evidently the /t/ is a derivational suffix added to the stem

common to the imperfect and imperative, giving a phonologically

relevant base form /šeb+t/. In parallel fashion the

shortening I-n verbs allow an infinitive in -t formed from

the biconsonantal stem: tét /ten+t/, suffixed titt -í

/ten+t+e+y/, of nātan; sáʕat /saʕ+t/, saʕt-í, from nāsaʕ.

(The I-n verbs also allow a regular infinitive: nəṯ̄ôn (not common), nəsóaↄ).

The generalization governing the -t infinitives is evidently this: if a verb has a short imperative, then it has a short infinitive formed on the short imperative stem. This is not limited to the regular I-n and I-y cases; the occasional maverick which imitates them also falls under this law: hālaḵ 'go' has impf. yēlēḵ /ye+lek/, imper. lēḵ, inf. lēḵeṯ /lek+t/; lāqah̬ 'take' has impf. yiqqah̬, with irregular assimilation, giving rise to imper. qáh̬, inf. qáh̬at. But the notion <u>short</u> <u>imperative</u> -- one with stem-structure CVC -- is not clearly represented at the underlying level, but only at the surface level after N-assimilation, Prefix-Stripping, and, crucially, Degemination have rather extensively modified the imperative base.

Idosyncrasies of N-assimilation are mirrored clearly in infinitive formation. Thus the stem-initial <u>n</u> generally fails to assimilate to a following guttural: nāh̬ál 'obtain property' has impf. yinh̬ál, and due to this failure, imper. nəh̬ál, inf. nəh̬ṓl. Thus the short imperative is not simply a feature of verbs I-n with <u>a</u>,<u>e</u>-imperfects, but is conditional upon assimilation, as the analysis working via Degemination predicts.

One way to approach the problem, preserving the phonological account of shortness, is to impose a 'global transderivational constraint' in the sense of Siegel (1971) upon the operation of t-affixation, stating the rule may apply to a

verb only if, on the surface, the shape of the imperative stem
is CVC. This drastic and clumsy measure fails, however. For
nátán, it allows the underlying infinitive form /la+nten+t/,
because of imper. tēn. Given free operation of the rules,
this comes out *littēt, an impossible form: correct is
lātét, evidently from /la+ten+t/. The short infinitive,
shockingly, behaves under prefixation as if it had but one
initial consonant; as if it was formed from a stem that had
undergone already the phonological rules of N-assimilation
and Degemination.

It is clearly undesirable to abandon the natural
phonological account of the form of an imperative like tēn,
deriving it from /ta+nten/ via the sequence ta+ntēn →
ta+ttēn → ttēn → tēn, in which each step has a measure of
independent motivation. The alternative is to posit a set
of morphological rules that would mirror the effects of the
phonology that is already in the grammar. Yet the infinitive
form requires a rule to do exactly that, removing the initial
/n/ to form a stem shaped CVC that is liable to /-t/ affixation,
opening the prefix syllable of lātét /la+ten+t/, so that PTL
can affect it. And PTL is an early rule, much earlier than
the rule Degemination, which might be revised ad hoc to
simplify the geminate cluster after the infinitive prefix
/la-/.

So: the present rule-system (and the theory of phon-
ology and morphology behind it) provides insight into the
apparently abberrant imperatives like tén by deriving them
from base forms like /ta+nten/, which are the same as those
of any 'regular' imperative, e.g. kətób /ta+ktob/. But the
approach fails with infinitives like tét, because a base
/la+nten+t/ leads to *littét. It would seem that we require
for the infinitive the morphological rules we avoided in the
imperative; and the effect of the rules is to make the in-
finitive look like the imperative on the surface, even though
their derivations are not parallel. Up to this point we have
succeeded in explaining the striking similarities between
infinitive and imperative on the basis of underlying struc-
tural parallelism; here we seem to find underlying disparity--
/la+ten+t/ vs. /ta+nten/ -- mapped by special rules into sur-
face parallelism. This result does not disconfirm the analysis
of the imperative, but indicates a shortcoming in our under-
stading, either of the rules of Hebrew or of the character of
morphological processes.

               *   *   *

      This is the end of our excursion into the complexities
of infinitive/imperative phonology. The major systematic
goal has been to demonstrate the existence of a #CC structure

relevant to phonology, supporting the rule Cluster Break-Up
(38) and therefore the conclusions that follow from it about
the treatment of schwa in the grammar. Other results have
been (1) the irrelevance of the 3-Syllable Rule to phonological
alternation, (2) the relevance of the rule Prefix-Stripping,
which is constrained by morphological and syntactic informa-
tion, and (3) the problematic quasi-phonological quasi-morpho-
logical character of imperative/infinitive formation in verbs
I-n.

1.9 The Nature of Vowel Reduction

There is a small class of nouns -- perhaps 20 to 30
members--which have, unsuffixed, the shape C V̆ C í where
V̆ is schwa, a reflex thereof, or /o/. Characteristic examples
from the schwa family are tabulated here.

Item	Gloss	Pausal Form	Sing+Pron Suff	PL	Pl + Suff
pərí	fruit	péri̅	piryí, piry-ó piry-ám (3m.p.) peryək̄a, peryək̄ém pəri̅-hém (3m.p.)	-	-
kəlí	utensil	kéli̅	kely-ək̄á	kéli̅m	kēl-ạy̱ (1s) kēl-enú (ip) kəl-ēk̄ém (2 mp)
šəbí	captivity	šébi̅	šiby-ó (3ms) šeby- ək̄á šəbi̅-kém	-	-
hasí	half	hési̅	ḥesy-ọ́, ḥesy-áh (3fs) - ḥesy-ēnū, ḥesy-ám	-	-

Looking at the entries in column 1, it might be surmised
that these arise from underlying CCí; however, the pausal
forms show a vowel intruding in the initial cluster, and not
a predictable one: note hési̅ vs. kéli̅. Furthermore, there is
the plural kēli̅m, evidently from /kel+ím/, a form in which
truncation of the stem-final segment (y̱ or i̅) should not
blind us to the preservation of the vowel.

The alternations in the suffixed forms, though virtually
limited to this class of words, show obvious regularities.
The ī shows up as y before vowels, including those that re-
duce to schwa: contrast piry-ī, pery-əká with pərī-hém and
šəbī-kém (here the Bindevokal has truncated, as it regularly
does after vowels). This suggests either glide-formation,
if the ī is underlying, or vocalization, if the y is. General
considerations of lexical structure suggest that the y must be
the third root consonant missing in phonetic C V C ī; the base
/CVCy/ is thus a subtype of the familiar segholate stem shape
/CVCC/.

> (𝟏𝟐) Glide Vocalization: y → ī /C--(C X) #

Leaving aside hasí, where the guttural damps alternation,
we see that the stem vowel is i in the env. --CyV, e in the
env. --CyV̆; and schwa where it should be by the laws of reduc-
tion we have expounded. What stem vowel should be set up?
The alternations discussed could happen to either e or a; the
lack of lengthening in the pausal forms when the vowel is
stressed suggests a, as in mélek; but the plural kēlīm needs
e. To minimize irregularity, let us set up /pary/, /šaby/,
/kely/ -- which is [-TL]. The word hasī is clearly /hesy/
because of the long vowel in the pausal form.

Now if Glide Vocalization is early, the current rule
system produces exactly the correct forms:

	/pary/	/pary+a+m/	/pary+hemm/
Glide Voc.	parī	–	parī+hem
Stress	párī	pary+ám	parī+hém
PTL	–	–	–
VR	pərī́	–	pərī+hém
TL	–	pary+ám	–
Other	–	piry+ām	–
Output:	pərī́	piryā́m	pərīhém

The smoothness with which these somewhat odd looking forms can be integrated into the grammar is a measure of confirmation for the proposed rule system. However, the round vowel forms pose something of a problem. They look like this:

Item	Gloss	Pause	S.+Suff.	Pl.	Pl+Suff	Other
holī́	sickness	hŏlī̄	holy-ó	hŏlāyim	hŏlāyenū	
ʕŏnī́	affliction	ʕŏnī̄	ʕony-í			
			ʕony-ék			
ʔonī́	fleet					ʔoniyyā́ 'ship'
*ʕŏpī́	branch			ʕŏpāyim		
roʔī́	appearance					
*yŏpī́	beauty	yŏpī̄	yŏpy-ó			cstr. yəpī̄
sŏrī́	a resin					also ūsrī́
domī́	rest					cstr. dŏmī̄ (1x)
dŏlī̄	bucket			doly-áw		(this form is
				(3m.s.)		dual)

Philology: * means the form isn't attested. The form ʕŏpāyim is noted by Masoretes as the correct reading (Qŏrē?) for what is

written (Kǝtīb): ꞩōpā?īm

Of these, only the last is well-behaved: the underlying o reduces to schwa in the unaffixed form, just as it should. In the others o persists through the entire paradigm, regardless of the syllable structure. Now, in a form like holāyīm, the o could be regarded as just exceptional to Vowel Reduction. (Note the regular segholate type of plural formation, clearly evidencing an underlying /holy/ with /y/.) Such a move is inadequate for holí, because the stress has shifted onto the final vowel, an effect which is supposedly concomitant upon application of Vowel Reduction. This threatens the integrity of VR-Stress Shift in a rather serious way, showing a kind of independence in the two processes.

Resistance of o to deletion is fairly widespread. In segholates of the type /CoCC/, the plural is quite frequently CoCāCīm, rather than the expected CǝCāCīm. For example, qōdeš 'holiness', hōdeš 'month'., gōren 'threshing floor', have qodāsīm, gorānīm, respectively. T. O. Lambdin has suggested speculatively (pers. comm.) that the apparent retention might possibly be due not to simple preservation of o, but rather to an indirect process whereby the o causes labialization of the preceding segment, so that qódeš is actually qʷódeš; then, when reduction takes place, the result, qʷǝdāší m, either becomes, or is written approximately as, qodāší m. This suggestion would gain plausibility if a specific phonetic class of segments were affected by the

hypothesized mediating rule of labialization. It is un-
fortunate, and remarkable, that the greatest potential
source of evidence, the reduction in the Qal imperfect
(yiktób --yiktɵbú), never shows retention of o̲. This
morphologically general source lacking, we are left to
the vagaries of the lexicon, where uniformity is scarce.
It striking that of the 8 problematic nouns listed above,
5 commence with gutturals or /r/--back consonants. But
the others cannot be erased (coronals, /y/). A similar
preference for backness is evident among the o̲-class ordin-
ary segholates which don't reduce to schwa, and it is strik-
ing that bóqer 'morning' and póʕal 'work' do exhibit re-
duction, labials plausibly being resistant to labialization.
However, šóreš 'root' has for plural šoraším; and beside
qódeš, there is qómeṣ 'handful' pl. qɵmāṣím. I conclude
that although o̲-retention may have a phonetic basis, at the
state of the language we are examining, it is essentially
an option of lexical items. Observe that if it were
mediated phonetically in the way Lambdin suggests, there
would be no problem with the rule VR. However, the failure
of o-retention in the imperfect essentially proves that it
cannot be mediated by a simple phonetic process.

  The solution to the dilemma lies in a more care-
ful consideration of the nature of vowel reduction. The
rule has been written as if its principal effect were to

adjust the quality of certain eligible vowels, making them nonround, back, nonlow, nonhigh. But <u>reduction</u> also signifies a de-stressing of the affected vowel, and the stress-differential between reduced and non-reduced vowels has not been explicitly represented. Similarly, in discussing the hateph-vowels we observed that their 'reduced' character was due to their being short, <u>unstressed</u> vowels in open syllables, but again no account was offered of how the hateph's neighbors came to bear a secondary, or relatively-greater-zero, stress-level.

The essential feature of the rule VR, then, is that it indicates where the totally stressless vowels lie. The rule of Hateph-Formation inserts un-stressed vowels. All other vowels in the word bear, in comparison, a modicum of stress. The stress facts can be modelled quite directly, preserving the rule structure we have articulated, if it is assumed that <u>all</u> underlying vowels are [+stress]. The rule VR is re-conceived as a rule of simple de-stressing. Non-stressed short vowels either delete by the principles discussed above, or they turn to schwa and its reflexes, except for certain lexically marked cases of /o/. It is thus to the process of shift-to-schwa that certain rounded vowels are exceptional, and not to the early, and phonologically central processing of de-stressing.

Now, an alternating pattern of stresses such as the one implemented by VR is usually approached from the opposite conceptual direction: it is assumed that all vowels are underlyingly [-stress], and therefore that the observed stresses must be placed in the string by rule. Should VR be turned inside out and re-fashioned as a rule of secondary stressing?

There is, of course, no problem with stating the class of vowels Secondary Stress would apply to: (1) every long vowel (underlying or lengthened by PTL), (2) every vowel in the env. --CC (closed syllables), and (3) in a string of weak syllables ... V̆C V̆C V̆C V̆C V́...., the even ones, counting back from the stress: ...V̀C VC V̀C VC V́. Readers of contemporary phonological literature will recognize this as the archetypical rule of alternating stress: stress all heavy syllables, and alternate across stretches of weak syllables. The superficially disparate provisions of the rule can be brought under one generalization if we assume moraic representation of long vowels ($\bar{V}_i = V_i V_i$). The rule of alternating stress then becomes

(54)   Alternating Stress   V→[+stress] / -- C_o [+seg] C(V) V́

The rule is presumed to apply iteratively left-ward.

The term (V) in the rule AS means that stress appears 2 moras back from a stressed syllable, not a stressed mora.

The input dabaariím must yield output dabáariím, not

dábaáriím, in which every other mora is stressed without

regard to its place in the syllable.

The term [+seg] is the mora that is skipped over.

It may be a vowel, or it may be a consonant in the env. --C,

i.e. a syllable-closing consonant.

```
        m   a   l   k   á   m        'their m king'
           /   |   |   |
        --[+seg]C   V

    d   a   b   a   r   e   k   é   m   'your mp word'
           |   /   |   \   |
        --  C  [+seg]C   V

    d   a   b   a   a   r   i   i   m   'words'
           |   |   \   \   |
        --[+seg]  C   V   V
```

Rather than explore the issues of representation and

formalism that are associated with a rule like AS, let us

inquire into the (for us) more fundamental issue of its

appropriateness to the present nexus of problems. In favor

of such a 'positive' reformulation of VR, it might be pointed

out that there is some evidence in the text for a rule of

alternating stress. If it is the same as (29), then surely

that counts as evidence for it over VR.

The evidence comes from the placement of diacritic

'metheg', which Gesenius treats as marking, in part, the

'counter-tone' or secondary stress. He gives the following

description of its use in this capacity (p.64, par.16d)

> [it appears] as a rule in the second (open) syllable before the
> tone, e.g. hā?adām ['the man'] (cf. also such cases as mèlek-ṣor
> ['king of Tyre']); but also in the third when the second is closed,
> e.g. ha?arbāʿīm ['the forty'] (also such cases as ʿebed-hammèlek
> ['the king's servant']), and when the third is not suitable for
> it, even in the fourth (open) syllable before the tone. This
> Metheg may be repeated in the fourth syllable before the tone,
> when it already stands in the second, e.g. šabūlotekém
> ['your mp.weeks'] .

This metheg is used to mark vowels which occur in open syllables before

main stress. A simple rule can be given, covering his cases, iterating

leftward:

(54a) Metheg Placement: $V \longrightarrow [+\text{metheg}] \quad / -- C \begin{bmatrix} V \\ -\text{metheg} \\ -\text{main stress} \end{bmatrix}$

This is an orthographic rule, describing the basic practice of the

Masoretic editors.

Is it really a stress rule? The issue is unfortunately clouded

by the other principal use of the metheg, which is to specially mark

long vowels that occur where they might not be expected. Basically,

this means in the env. --CC: so in ?āk̲l-á 'she ate' (from ?ák̲ál 'eat'),

the first vowel carries a metheg, which contrasts it visibly with

?ok̲lá 'food', which is otherwise graphically identical. Hence the name

accorded it by medieval grammarians: ma?arík̲ 'lengthener'. It might

be argued that the cases mentioned by Gesenius fall into this category

as well; in hā?adám, say, the first ā deserves a mark because it's so

far from main stress, and in an open syllable, where schwa or a reflex

of schwa is phonetically expected. However, this does not explain

the phrasal cases adduced by Gesenius (mèlek-ṣór, ʿèbed-hammélek̲), in

which length is not of the issue.

Here, metheg is used to mark secondary stress. And the
alternating pattern marked in šabū̄otēkém cannot be ex-
plained in a simple 'length-marker' hypothesis.

Even if it is granted that metheg marks stress in
some uses -- and granted that those uses can be identified --
the pattern of its occurrence simply does not accord with
the output of Alternating Stress.   AS places stress on all
strong syllables, open with a long vowel, closed with a
short; Metheg Placement puts methegs only on open syllables,
and not on every one, but alternatingly. Further, and per-
haps more damaging to any attempt at conflation, the two
rules disagree on what weak syllables get stress: given an
input dabārim, AS outputs dabārim, but Metheg Placement
outputs dabārim, a form which is unsuitable as input to
the rule taking unstressed short vowels to schwa.

I conclude, therefore, that Metheg Placement cannot
be identified with the early rule that determines the stress
pattern of words. If it really is a rule pertaining to
stress, then it is a low-level rhythm rule adjusting the
relative levels of stresses whose positions are determined
much earlier in derivation.

The rule of Secondary Stress thus functions solely
as the dual counterpart of VR, and cannot subsume the rhythmic
phenomena signaled by the metheg.

This gives us clear and substantial grounds for pre-
ferring VR to Secondary Stressing: the generalization with
which this essay began, that the simple, motivated rule
of reduction, applying freely, affected the main-stressed
vowel just in the cases where a stress-shift occurred.
A theory of secondary stressing can in principle have
nothing to say about this 'coincidence'; but in a theory
of stress-removal, loss of the main stress from certain
positions is a predicted result.

How is the re-appearance of main stress one syllable
to the right to be accounted for, preserving its organic
connection with loss of stress?   Current theorizing offers
two main avenues of approach, which we may designate the
tonological and the metrical.   The tonological line is essen-
tially that of Halle's (1973) description of Russian and
Kiparsky's (1973) of Greek, Skt., and Lithuanian: it is
assumed that the word is assigned a two-level tonal contour,
say M M M H H, one tone per syllable, where the point of
level-shift (Tonbruch) -- the first H bordering an M -- marks
the place where the accent will be perceived.   The accent
rules determine the syllable where the Tonbruch lies.
Suppose that the accented syllable is deleted, or that
its H-tone is otherwise removed: our model word M M M H H
becomes M M M ∅ H, or M M M M H.   In such a case the
Tonbruch automatically moves one syllable to the right,

causing the accent to appear there. Observe that a high-
nonhigh contour, say H H H M M, would be associated with a
shift in the opposite direction. Clearly, this kind of
technology can be adapted to the case at hand. It fits
easiest into a scheme where there is complete deletion,
the type of system we started out with; a deleted vowel,
in this view, takes its tone with it, and accent-shift is
the consequence. It has been shown, however, that the rule
originally treated as deletion must rather accomplish a de-
stressing of the affected vowels. The problem thus has
two dimensions, non-orthogonal, one being the disposition
of the feature [±stress] (this is the dimension of vowel
reduction), the other being the disposition of the tonal
feature [±H] (stress-shift). Now, the stress-category is
already partly subsumed in the tone category by the concept
of Tonbruch, which locates main stress. It is technically
a small step to go all the way: let us assume that the rule
VR assigns L, low tone. The rule we have called Stress
locates the Tonbruch; the basic Hebrew melody we assume to be
M H. Consider the fate of a word like /dabar+e+ka/:

	dabar+e+ka
Stress	*
(Interprets as:)	dabar+e+ka
	M M H H
PTL	ā
VD-VR	dabār+e+ka
	L M L H

Main stress is determined by the same principle of

Tonbruch: $V \atop [+H]$ $\rightarrow$ [1stress] / $V \atop [-H]$ C_0 __ .

Low tone vowels are interpreted as stressless, and are

accorded the appropriate treatment.

This formally successful resolution of the problem

is rendered suspect by substantive aspects of tone rules.

Alternating de-stressing is well-attested: but alternating

tonal contours are not. (Recitativo or chant, rather than

yodeling, is the preferred mode of laryngeal activity).

Again, reduction to schwa is widely associated with lack

of stress, but with low tone?

Another range of possibilities is suggested by

recent work of my colleague Liberman (1975): the metrical.

Hebrew is evidently a stress-timed language, witness the

fact of extensive vowel reduction. (Observe the terrace-

tone languages do not admit vowel reduction; or so goes

the current lore). Liberman proposes that apparent stress-

timing is correlate to the imposition of a metrical pattern,

basically a tree-structure composed of S's and W's. The

basic rule is that S must dominate a stressed syllable.

In his work such a structure mediates between stress-

assignment and tone-contour assignment. For our purposes

we need to posit a basic metrical pattern (W) S, where S

comprehends the last two syllables of a (polysyllabic) word.

Thus, the 'big' S breaks into S W --penultimate stress--
or W S -- final stress; the rule of Main Stress determines
which, as in these examples:

$$
\begin{array}{ccc}
& R & \\
/ & & \backslash \\
W & & S \\
/ & / & \backslash \\
& W & S \\
/ & | & \backslash \\
d \ \vartheta \ b & \bar{a} \ r & \bar{\imath} \ m
\end{array}
\qquad
\begin{array}{ccc}
& R & \\
/ & & \backslash \\
W & & S \\
/ & / & \backslash \\
& S & W \\
/ & | & \backslash \\
h \ i \ \check{s} & m \ \bar{\imath} & d \ \bar{u}
\end{array}
$$

The idea is that the 'big' S always takes two syllables,
if there are two, and the most highly stressed of those
gets the lowest S. Main stress can be determined by follow-
ing the chain of S's down from the root, R. When VD-VR
affects the prominent vowel, de-stressing it, relations in-
side the big S are readjusted, by a convention of universal
import.

Let us make the idea precise. Following Liberman
(1975), we need (1) a principle that determines the basic
geometry of the metrical tree, and (2) a principle that
determines the assignment of S (strong position) and W (weak
position) to the nodes of the tree whose shape is given by
(1).

The essential fact of tree-structure is binary
branching.   If N is a node in the tree, it either dominates
a vowel (or syllable), or it dominates a pair of nodes. The
essential fact of labelling is that in a structure

$$
\begin{array}{c}
N \\
\diagup \quad \diagdown \\
N_1 \qquad N_2
\end{array}
$$

one of the sister nodes N_1, N_2 must be S and the other W.

The sense of this is that metrical structure is inherently

relational; each metrically significant unit consists of two

parts, one of which is relatively stronger than the other.

The abstract notion of 'strength' plays a central role in

formally reconstructing intuitive perception of degrees of

stress, in assigning intonational contours, and in determin-

ing rhythm and timing.   (This is the matter of Liberman 1975).

Individual languages impose more specific constraints

on metrical tree shape, within the basic binary plan. Our

proposal will be that in Hebrew the last two syllables

always form a single metrical constituent (there being more

than one syllable), so that   the tree is built

up in a right-branching fashion like this:

(55)   Hebrew Tree Structure

$$
\ldots C_0 \; V \; C_0 \; V \; C_0 \; VC_0 \quad VC_0 \#
$$

How do the nodes get their labels? We convert

the observation encodea in Main Stress, rule (2), origin-

ally couched as a statement about segments, into a state-

ment about metrical nodes.

(56) Node Labelling. In a metrical configuration

[M N], where M,N are sister nodes in the

metrical tree, N is S, unless it directly

dominates V#.

The principle is phrased so that it can be applied to every

node in the tree. It means that the right hand node of

every pair will be S (generating the pattern W S), except

for the lowest, rightmost pair when the word ends in a vowel.

In order to get the W's into the tree, we state the

following convention:

(57) Principle of Relation. In a metrical configura-

tion [M N], where

M, N are sisters, if M is S, then N is W; if N is

S, then M is W.

Applying these three principles (Hebrew Tree Structure,

the rule of Node Labelling, and the universal Principle of

Relation) to examples which are familiar will generate the

following representations:

```
              R
           ╱    ╲
          W      S
          │    ╱   ╲
          │   S     W
          │   │     │
          k   a  t  a  b  u
```

What is the relationship between S and the segmental
feature [+stress]? Although clever manipulation of the
metrical system could undoubtedly eliminate the segmental
feature, Liberman shows that this is inappropriate, that
the notion 'degree of stress' is properly in the domain of
metrical representation and that the distinction stressed-
stressless is properly represented on segments, and implement-
ed by segmental rather than metrical rules.

Nevertheless (and obviously) the two notions are not
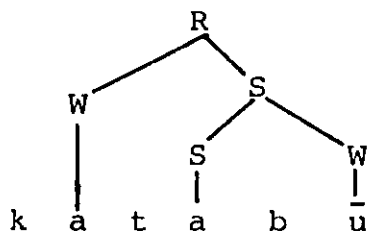independent, or <u>orthogonal</u>, to use the language of linear
algebra. Metrical S may directly dominate only vowels which
are [+stress]. Since we are assuming all vowels in Hebrew
to be underlyingly stressed, the metrical representations
given just above are well-formed.

The rule that we have called VR, in its new form as a
rule of de-stressing, is a segmental rule that wipes out
stresses, including those which occupy the strong (S)
metrical position. When this happens, the S is replaced
by W, evidently; this indicates that the relationship between
S and [+stress] must hold at all levels of representation,

throughout derivation. When a phonological rule disrupts
the connection, as by removing stress, the metrical pattern
is automatically re-adjusted. Let us specify this property
as follows:

> (58) Weakening Convention. The metrical category
> label S must dominate a vowel that is [+stress].
> If in the course of derivation a vowel dominat-
> ed directly by S is marked [-stress], that S is
> turned to W.

Taken together with a suitable interpretation of the
Principle of Relation, the Weakening Convention entails that
in a metrical unit [S W], if the S is weakened concomitant to
de-stressing, the W will automatically be re-interpreted as
S, converting the unit to an iamb [W S].

This gives us exactly the desired description of the
stress-shifting phenomenon we have studied, the change from
/kátab+ū/ to /katáb+ū/ that is consequent upon the operation
of the general de-stressing process we treated first as VD
and VR. The only real enrichment of Liberman's theory
that we have introduced is the Weakening Convention, and that
is not so much an accretion as a making-precise of how the
theory is to treat a situation that did not arise in the
(English) data he is concerned with.

Further evidence that is indeed the correct theory

of Hebrew stress phenomena comes from the regular retraction

of stress in certain syntactic uses of the verb. The jussive

(indirect imperative) is used after the conjunction wa-'and'

to express perfect aspect in narration. In this use of

the conjunction (only), the initial consonant of the verb

is doubled: wayyiktób /wa#ya+ktob/ 'and he wrote'. The

conjunction wa+doubling is called 'waw-consecutive', 'waw'

being the name of the consonant /w/ which is the root of the

conjunction. In the regular or 'sound' triliteral Qal verb,

the jussive is identical to the imperfect (yiktób = 'he will

write' or 'let him write'), and consequently traditional

grammars (e.g. Gesenius) refer to this construction as the

'converted imperfect'. However, in certain places in the

verbal system there is a distinction: Qal hollows --

yāqúm /ya+qúm/ 'he will arise', but yāqóm /ya+qom/ 'let him

arise'; Verbs III-w,y -- tipné /ta+pnay/ 'she will turn',

but tépen /te+pn/ (by the truncation mentioned in 1.3) 'let

her turn'; in the conjugation Hipᶜil -- yašmíd /y+ha+šmīd/

'he will destroy', but yašméd /y+ha+šmed/ 'let him destroy'.

In all these cases it is the unmistakable jussive that shows

up after waw-consecutive: wattépen, wayyašméd, wayyáqom.

Hence we shall say 'converted jussive'.

Certain of the converted jussives, as the last

example cited shows, are susceptible to a rule of stress

retraction when they do not immediately precede a major
sentence boundary (occur 'in pause', vide 1.13). The form
that this rule would take in conventional description where
vowels are assumed to be underlyingly stressless and the
features [± stress] is used to represent the prosodic peak
of the word, would be approximately the following:

$$
\begin{array}{llllll}
(59) & \text{Consecutive Retraction} & \text{S.D.} & V & C\underset{\begin{bmatrix}-lng\\-lo\end{bmatrix}}{V} & C_o\ \#\# \\
& & & 1 & 2\quad 3 & 4 \\
& & \text{S.C.} & 1 & 2\quad 3 & 4 \\
& & & [+\text{str}] & [-\text{str}] &
\end{array}
$$

The rule is responsible for alternations like:
yāqóm/wayyáqom, yēšéb/wayyéšeb (from yāšáb 'to sit down,
dwell', impf. and jussive yēšéb /ye+šeb/).

It is striking, in the context of the present dis-
cussion, that Consecutive Retraction pulls stress back
exactly one syllable, just as stress shifts one syllable
forward under the influence of VR. The overarching general-
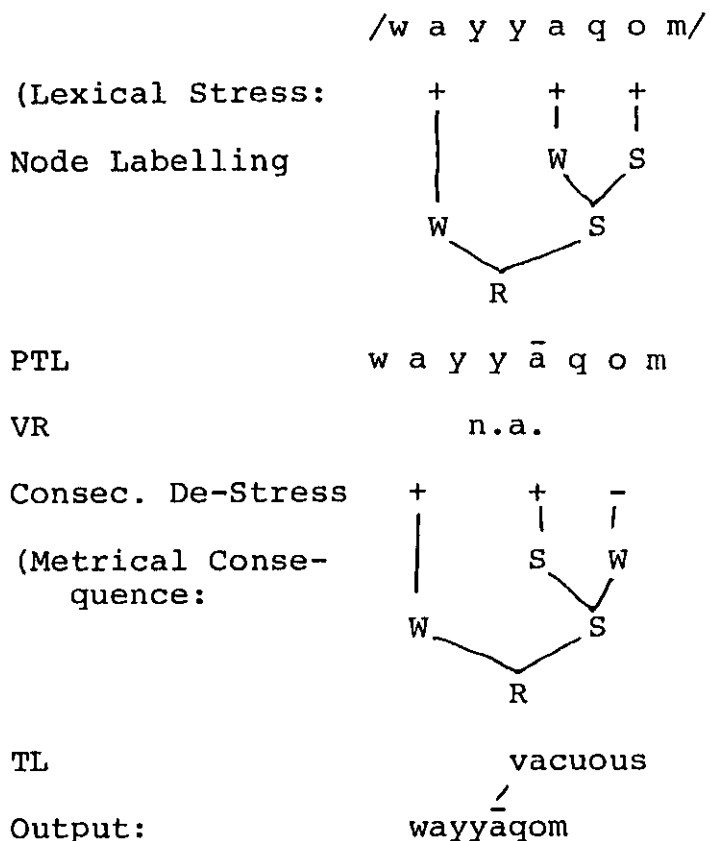ization is that stress remains on the last two syllables.

In the metrical theory proposed here this is a
consequence of what we have called Hebrew Tree Structure,
by virtue of which the last two syllables form a metrical
unit. Consecutive Retraction, in our view, accomplishes a
simple de-stressing of the final syllable, and the

re-appearance of main-stress, along with the place of its
appearance, is explained in terms of the general principles
of Libermanesque metrical theory. The rule now becomes:

> (60) Consecutive De-Stressing   S.D. same as above
>
> S.C.   3 →[-stress]

This rule marks a tremendous advance over the Pre-
liminary Version. The PV had to make simultaneous changes
in two parts of the input string, failing utterly to re-
flect the fact that the two changes are intrinsically re-
lated, one in fact being a necessary correlate of the
other, failing as well to reflect that the locus of re-
stressing (term 1 in the S.D.) is not arbitrary. The PV
is nothing but a descriptive patch-up job.

Observe that Consecutive De-Stressing is a rule of
word level phonology. It must precede TL, for the vowel
from which stress is withdrawn appears short. It must fol-
low PTL: the prefix vowel in e.g. wayyáqom must be length-
ened by PTL so that it will not be debilitated by VR;
recall that TL does not protect vowels from reduction,
being ordered after the reduction (=de-stressing) process VR.
Derivation therefore precedes like this:

/w a y y a q o m/

(Lexical Stress:

Node Labelling

PTL   w a y y ā q o m

VR   n.a.

Consec. De-Stress

(Metrical Conse-
quence:

TL   vacuous

Output: wayyāqom

Further evidence supporting the metrical theory comes from the two phrasal rules of stress-movement that are found in the language.

The first, called Nāsōg ʔAḥōr by the grammarians, closely resembles the so-called 'thirteen men' rule of English, treated at length in Liberman (1975). As in English (for example, the word for 13 is pronounced thirteen phrase finally, but thirteen as a modifier in e.g. thirteen men, so in Hebrew a word like tōḵál 'she will eat' appears with penultimate stress in close connection: tōḵal léḥem 'she will eat bread'. Under traditional assumptions the rule must be formulated in the following unrevealing complexity:

(61) N̄asōḡ ?āhọ̄r   S.D.   V C_0 V C_0 # (#) C_0 V

(Traditional   1   2   3
Version)   S.C.   1   2   3   4
[+stress]   [-stress]

Here, again, the main stress goes back one syllable;
and here again, the given rule is subject to the kind of
criticism that was leveled against the preliminary version
of Consecutive Retraction.

N̄asōḡ ?Āhọ̄r is not really a rule of segmental de-
stressing; like its English counterpart it accomplishes
re-distribution of primary and secondary stresses on the
phrasal. Note ?ōk̄él léhẹm 'eater of bread', where the
lengthened ẹ̄ of /?ōkel/ remains. The rule therefore per-
tains to metrical structure; this is an approximate version:

(62)   N̄asōḡ ?Āhọ̄r   S.D.   S   S
                                                     |
                                                     VC$_0$
                                                     1   2

                          S.C.   1 →   W

(Term 1 of the S.D. is meant to signify that the S affected
must be on the lowest rank of the tree.)

The second phrasal rule moves stress <u>forward</u> one
syllable in the 2ms perfect when it is used after wa- (no
doubling) to express imperfective aspect in narration:
/wa/ plus /katab+ta/ comes out wạkāṯábtā 'and you will
write'. Observe that the <u>vocalism</u> of the verb is exactly

that which it assumes elsewhere: kātáḇtā 'you wrote'. Here
again, a (late) rule of metrical weakening is the optimal
representation of the process.

(63) 2ms-Forward   S.   S̰ / in 2ms perfect after wa-
                              V
                              1

       S.C.   1 → W

To summarize the results of the present excursion:
the 'reduced' vowels of Hebrew, the 'half-vowels' of Gesen-
ius, -- schwas and hatephs -- are unstressed short vowels
occuring in open syllables, and these properties account for
their being traditionally described as 'extra-short',
'murmured', 'indistinct'. For example, the second vowel in
the word naharōṯáy 'my rivers' falls into this category.
But the first vowel does not, although it is short and in
an open syllable. The notion of reduction thus demands a
contrast: not only must the second vowel be [-stress], the
first must be [+stress]. The most uniform way to implement
the necessary contrast is to provide all non-reduced vowels
with stress. It has been argued here that the correct way
to achieve this pattern is to regard all vowels as under-
lyingly stressed, destressing certain of them according to
the principle behind the rules VD and VR. This rule of
alternating de-stressing, which supplants VR in the grammar,
has this final form:

(64) Alternating De-Stressing   V → [-stress] / -- C V́
                                  [-long]

Heuristically, the rule may be conceived of as iterating leftward, although the proposals of Halle, Prince, Vergnaud 1975 allow its expression with the constraint of simultaneous application. As the rule is of the standard type that does not distinguish the iterative and (revised) simultaneous theories, I shall not urge the matter of exact formalization.

Coupled with the metrical theory, the rule AD permits an explanation of both the occurrence and the direction of stress shift. A metrical theory, based on that expounded in Liberman (1975), was articulated and argued for on grounds both descriptive and explanatory: namely, that by preserving the generalization that stress must fall on the last two syllables of the Hebrew word, it allowed significant clarification of all rules effecting movement of main stress; and that this simplification eliminated the need for 'two-operation' rules in this area, supporting the general claim that such rules do not exist.

1.10. Cumulative Rule Census

The adoption of Alternating De-Stressing compels the
introduction of a rule mapping short stressless vowels onto
schwa.

(65) Ultimate Reduction

$$V \longrightarrow \vartheta$$
$$\begin{bmatrix} -\text{lng} \\ -\text{str} \end{bmatrix}$$

Where does this fit in the ordering? The end is a likely spot:
earlier rules affecting schwa could be rephrased to affect
short, stressless vowels. But we know there are rules that
produce or affect short stressless vowels -- Hateph Formation
(43), Schwa-t-A (44) -- and the output of these rules is not
reduced to schwa, although it meets the S.D. of Ultimate Re-
duction. Minimally, the new rule UR must precede Schwa-t-A,
so that the stressless [a]'s produced by that rule don't get
reduced.

Note that if UR did follow HF and Schwa-to-A, it would
completely undo their effects. Under the Elsewhere Convention,
proposed by Kiparsky (1973), this kind of relation between
rules entails disjuntivity between them, and UR then could
be the last rule of grammar. This actually opens a number of
possibilities for reanalyzing the system of late rules dealing
with inserted vowels: instead of schwa, an i-quality vowel
might be inserted by Cluster Break-Up; the rule of Schwa De-
letion could be refashioned as Short-Vowel Deletion, and have

as a side clause that those short unstressed vowels that
are not deleted, turn (in the env. -- CV) to the real schwa.

This certainly deserves close scrutiny, as it bears
on the interesting questions raised by Kiparsky (1973), For
the present, however, we shall remain with the ordering
solution.

At this point, we have accumulated a fair number of
rules. So that the reader may be able to better evaluate
the system, I pause here to present them in their order. I
divide them into three classes heuristically.

(Table on next page.)

(I)   Early Adjustments

Plural Breaking (19), p. 4

2nd Person Metathesis (48), p. 111

O-Closure (15), p. 35

(II) Node Labelling (56), p. 143

(III) Phonology Proper

Shortening (7), p.30

Lowering   (8), p.31

Glide Voc. (53), p. 129

Nas. Assim.   (24), p.54

PTL (29), p.65

Echo (50), p.117

AD (64), p.151

A-to-I (20), p.42 [see comment below]

Ult. Red. (55), p.153

TL (11), p.34

Prefix-Strip (46), p.108

DeGem (51), p.121

HF (43), p.97

Cluster Break-Up (38), p.87

Schwa-to-A (44), p.98

Spir (45), p.99

Y-Adjust (22), p.45

Schwa Del. (40), p.88

a →e (18), p.39

Schwa-to-I (41), p.89

2fs Trunc. (21), p.44

The central spine of rules under (III) is linearly
ordered; the arrows show the other ordering relations that
arguments exist for. The partial order represented here
could easily be collapsed into (one of several equivalent)
strict linear orders; I have shown it as above to make clear
where ordering arguments exist.

One aspect of the ordering that deserves comment is the
placement of A-to-I. The rule we first posited as (20) cannot
fit there, for it is fed by Schwa-Deletion, one of the last
rules. Yet the rule must precede Prefix-Stripping, if facts
like the stem-vowel alternation in giddēl-y gaddēl-gaddēl are
to be handled by it: presence of the underlying prefix in the
imperative inhibits the rule (vide 1.7).

The rule must also precede TL. Truncation of an imperfect
like yibke /ya+bkay/ 'he will weep' puts main stress on the
prefix vowel, and it lengthens by TL: yēb'.. The non-high
quality of the vowel suggests that the rule really should
take /a/ to /e/. In Chapter 2, discussing this and related
phenomena, we shall see that this occasions no complication of
the grammar.

Now, it is not really necessary to postpose A-to-I
(perhaps I should say A-to-E) all the way to the end. After
AD has applied, those forms to which A-to-E applies are
clearly distinguishable from all others: they have the
structure #C--CC[-str]. The feature [-str] is, of course,
implanted by the rule AD; but it is also an underlying

feature of all consonants. (This mode of analysis is developed with care in Vergnaud 1974, from which I borrow the idea.)

The final version of the rule will then be:

(66) A-to-E   a → e / #C --C[-stress]

1.11 Residual Matters

(I) The ordinary feminine singular affix is clearly /at/, on the noun, on the adjective, on the 3rd person of the perfect verb. These are its characteristic alternations:

Category	Citation Form	Gloss	Construct	+Suffix
Noun	ʔem-á	fear	ʔēmat	ʔēmat-ó 'his ... '
				ʔēm-at-kém 'your m.p. ...'
Adjective	ṭōb-á	good	ṭōbàt	ṭōb-āt-ó
				ṭōb-at-kém
Verb	kātb-á	write	---	kətāb-at-am '... them mp.'
				kətāb-át-nī '... me'
	qám-ā	arise	---	---

(The peculiarities of the f.s. verb with suffixes are the subject of (III) below.)

Glancing over this table, one sees that the 3fs. ending's vocalism is just that of an underlying short a. It lengthens pretonically, shows up short in the env. --CC, otherwise lengthens under main stress. It also shows up long when final, as in qámā; it shares this property with all other word final a's, as for example the a of -ka and -ta in pīkā 'your mouth', kātábtā 'you ms. wrote'; the directional ending -a, as ʔárṣ-ā 'to the land'; the irregular vocalic final of

láylā 'night'. Clearly, a lengthening is at hand:

(67)   a →[+long]/ --#

But this is just a sub-clause of rule (9), V-final, which insures
that <u>all</u> word-final vowels are long.

The most striking feature of the paradigm is the dis-
appearance of the /t/ from the free form. Assuming that the
construct state is marked by just one word boundary (justified
below), the appropriate rule is simply

(68)   T-Drop   t → Ø / +a -- ##

It is necessary to spell out the +<u>a</u>, because other
<u>t</u>'s do not delete, as for example the truncated form of this
very affix visible in such forms as šení-<u>t</u> 'second f.', masc:
šení; and the third root consonant of kārat 'cut off'.

The rule T-Drop evidently precedes and feeds V-final.

But where does T-Drop stand in relation to Main Stress?
In nouns and adjectives, the feminine suffix, when final, bears
main stress, as if it ended in a consonant.

In verbs, the 3fs of the perfect is penultimately
stressed, as if the ending were vocalic when Main Stress applies.
Adjectives and nouns evidence the order Main Stress, then T-Drop;
verbs, just the opposite.

There are two basic lines of approach to resolving
the dilemma: (1) w.r.t T-Drop, (a) order the rule differently

depending on the category to which it applies (b) split it
into Verbal T-Drop and Non-Verbal T-Drop, ordered before and
after Stress; (2) w.r.t. Main Stress, (a) if T-Drop follows,
complicate the rule to let /+at/ be skipped over, (b) if
T-Drop precedes, disallow the parenthesized V of Stress from
analyzing the nominal f.s. ending.

Line (1) is out: (a) is not possible in current
theory, (b) amounts to dropping the obvious generalization
about the f.s. affix. Line (2a) portrays as coincidental the
fact that all regular penultimately stressed words end in
vowels; the rule T-Drop just happens to make /+at/ conform
to general case. If T-Drop is early, the penultimate stress
of the 3fs perfect is <u>because</u> the form is vowel final. This
leaves (2b); stipulating that nominal /at/ may not count as a
vocalic final for purposes of stress.

If this argument is correct, then certain morphological
adjustments (e.g. T-drop) must take place before the rule of
Node-Labelling, which replaces Main Stress, can be allowed to
work on phonological strings.

(II) There are some cases where stress-shift fails to occur
although the environment for Alternate Deletion is met: (1)
with certain pronominal suffixes, (2) with the directional
affix /-a/, (3) in nouns like ʔáhū 'reeds', šáhū 'swimming',
(4) in the 3rd person fem. sing of the perfect, suffixed:
šəmārátam 'she guarded them m.'. (Case 4 falls under the next
topic).

The characteristics of the pronominal suffixes are
most clearly revealed in the imperfect, where the relevant
morphology is quite simple. Two paradigms of attachment
are available: one, irrelevant to the present issue, in
which the suffixes are linked to the stem by the augment
/-en-/; one in which the suffixes are linked by the vowel
/-e-/. The second looks like this:

yišmōr + pron. suff. 'he will guard ...'

Pers/Gen	Sing.	Pl.
1	yišmər-é-nī	yišmər-é-nū
2 m	yišmor-ká	--
f	yišmər-é-k	--
3 m	yišmər-é-hū	yišmər-é-m
f	yišmər-é-hā	yišmər-é-n

(The 2nd person pl. suffixes do not attach to the verb.)

The paradigm speaks for itself. Of those suffixes
which should occasion AD--namely, -nī (1s), -nū (1p), -hū (3ms),
-ha (3fs), -ka (2ms) -- it is -ka alone that allows it.

This pattern repeats itself whenever the morphology
sets up the right conditions. In the perfect, šəmārká
/samar+e+ka/ contrasts with šəmār-á-hū, šəmār-á-nū, šəmar-á-nī,
(with an idiosyncratically short a). On the singular noun,
dəbār-ká contrasts with dəbār-é-nū. On the prepositions
l- 'to, b- 'in', ləká, bəká contrast with lā-nū, bā-nū.

(Forms not cited from other persons are rendered irrelevant by rules of morphological combination.)

A direct way to represent these data, given that AD applies in the env. --CV, is to lexically mark the non-2nd person suffixes as [-stress]. With this formulation of the environment of AD -- necessary if the rule is iterative, not so if simultaneous -- a lexical mark [-stress] comes to signify [-stressable]. Such a division of affixes into intrinsically stressed and intrinsically unstressed is familiar from the work of Halle and Kiparsky on Indo-European accentuation (Halle, Kiparsky, in preparation).

When AD fails to apply, TL lengthens the persistent main-stressed vowel, outputting the correct quantity, as this derivation illustrates:

	/šamar+a+hū/	/dabar+e+nū/
(Lexical Stress:	+ + + −	+ + + −
Main Stress	S W / W S / W S / R	S W / W S / W S / R
PTL	šamār+á+hū	dabār+é+nū
AD	− + + −	− + + −
TL	ā	ē
UltRed	ə	ə
Spir		b
Output:	šəmāráhū	dəbārénū

A similar remark holds for the directional suffix
-a̲: mid̲bár 'wilderness', mid̲bā́rā 'to the wilderness'; tēmā́n
'south', tēmā́nā 'southward' -- not *mid̲b ̍ rā, *tēmnā́, as
we'd expect under the most general assumptions. It's not
possible to posit a word boundary separating affix from
stem, for segholates show non-spirantized root final conson-
ants: nég̲eb̲ 'Negev', nég̲bā: Cluster Break-Up would certainly
occur at a word boundary, and the results of such schwa-
insertion would be clearly visible as spirantization. (The
vocalism of the form is puzzling, but irrelevant; nág̲bā is
expected.)

Nouns ending in -ū are few in number and rare in occur-
ence: ʔáhū 'reeds' -- 3x, šáhū 'swimming' --1x, tóhū 'con-
fusion, nothingness', bóhū -- always in the phrase tóhū
wab̲óhū 'chaos'; maybe some others. Furthermore, they do
not appear suffixed or in construct and therefore display
no alternations that might give evidence about their inner
form. Because of the replacement of the third root consonant
by a long vowel -- just like the pərí, holí type --, and
because of the relationship to the class of vowel final verbs,
the example being šāhá 'to swim', paralleling pārā́ 'to be
fruitful' related to pərí 'fruit', it can be concluded that
these should be w̲-final underlying. This rule Glide
Vocalization (53) can be generalized to apply to w; if the
words are listed as exceptional to AD, the correct forms

result. Another possibility is that derivation procedes

without glide vocalization: tóhw $\xrightarrow{TL}$ tóhw $\xrightarrow{CB}$ tóhəw, which

then goes to tóhū by a rule əw → ū. However, those with

stem vowel a apparently do not follow the mélek pattern:

*?éhū, *séhū. As a final counter-quibble on this tiny

point, it should be noted that the one occurence of śāhū,

at Ezech. 47.5, bears the accent Zāqēp Qāton, indicating

that it ends the first half of the second hemistich of the

verse, meaning that it may well be a pausal form, and thus

regular, like qāber, ſābed, hēsī for qéber, ſébed, hasī.

At any rate, the solution via generalization of rule

(53) and lexical exceptionality does the observational job,

and the skimpy evidence certainly supports no enrichment of

the gramar.

(III) The paradigm of the 3fs perfect plus pronominal suf-
fixes displays several surprising features:

Pers/Gen		Sing	Pl.	
1		šəmārát-nī	śəmārát-nū	
2	m	šəmārát-kā (!)	--	
	f	šəmārāt-ek (!)	--	
3	m	{ šəmārát-hū	šəmārāt-am	(!)
		{ šəmārát-tū		
	f	šəmārát-tā	šəmārāt-an	(!)

A regular feature that we have not seen before is the assimilation retrogressively of h̲ across a morpheme boundary: optional apparently in 3ms, obligatory elsewhere.

(69)   H-Assimil. $h \rightarrow C_i \ / \ C_i \ + \ --$

The operation of the rule is visible in the augmented imperfect endings -ennū /en+hū/ 'him', -enna /en+ha/ 'her', and in the suffixing of the preposition min 'from' with pronouns: mimménnū /min+min+hū/ 'from him', mimménnā /min+min+ha/ 'from her' (the reduplication is idiosyncratic but obvious). In this last case, N-assimilation obviously occurs as well. The rule of H-Assimilation should be ordered before spirantization, as a non-spirantized element is copied.

Viewed as a self-contained unit, the paradigm appears severely regular. Stress falls always on the inflectional affix -at̲. The only stem-alternation in the paradigm is in the length of the vowel in -at̲, again completely regular: it's long in the env. --C V, short in the env. --C C.

This regularity is purchased, however, at the cost of considerable divergence from the phonological norms of the language. The consonant final forms should be finally stressed; they are penultimately stressed: šəmārátek, šəmārátam, šəmārát̲an. Some sort of special rule is needed to accomplish this stressing, and it must certainly be early,

for PTL, which applies to the same vowel throughout the
paradigm, depends on the -at being stressed. Furthermore,
in just these cases, the rule AD should apply to destress
the -at being stressed. Furthermore, in just these cases,
the rule AD should apply to destress the -at, fating its vowel
to an eventual deletion which never happens. The morpheme
-at must apparently be marked [-AD]. (Observe that this is
the only morphological environment in which -at is susceptible
to reduction.)

The form šamarátkā is also problematic. If it comes
from /šamar+át+e+ka/, then the stressed vowel should be
long, since it occurs in a syllable open at the time TL applies.
Further, such a form contravenes the proposed generalization,
not challenged by the consonant-final forms, that stress
falls always on one of the last two syllables. If it comes
from /šamar+at+ka/, then the stress and length properties
are normal, but the /k/ of the pronoun should remain un-
spirantized.

The historical provenance of the situation is relatively
clear. In Proto-North-West-Semitic -- Proto-Hebrew, the
paradigm must have looked like this:

Pers/Gen		Sing.	Pl.
1		šamarát-nī	šamarát-nū
2	m	šamarát-ka	--
	f	šamarát-ki	--
3	m	šamarát-hū	--
	f	šamarát-ha	--

Assuming a Classical-Arabic type of accent rule --
accent the first heavy syllable from the end, skipping
the last syllable -- or even the rule we have found in
the later language, stress is always penultimate, on the -at.

The 2nd and 3rd person plural pronominal suffixes are
reconstructable roughly as *kimm, *kinn, *himm, *hinn. The
3rd person form shows up in the independent pronoun: hém
'ils', hénnā 'elles'; after certain prepositions, lāhém,
lāhén 'to them'; and on the plural noun, e.g. dibr-ē-hém,-hén.
Elsewhere it is /am,an/: on the singular noun, dəbār-ám, -án;
on the perfect verb, šəmār-ám, -án; on the imperfect, with
truncation, yišmər-é-m, -n.

Now, in the Biblical period of the language, no 2nd
person plural object pronouns are ever affixed to the
verb; when a 2nd person pronoun is a verbal object, the
free (object) form is always found. Because of this, I
have left their position in the table b.ank, making the not
implausible assumption that the Biblical situation accurately
reflects Proto-Hebrew. Since the ur-3 pl. pronouns (*himm,
*himm) have the same shape as the ur-2 pl pronouns (*kimm,
*kinn), and since the Hebrew 3 pl verbal suffixes (-am,-an)
do not descend directly from these ur-forms, I assume that
at some point both the 2nd and the 3rd pl. suffixes were
banned from the verb, presumably for some phonological
reason now obscure (stress?).

After the endings /am,an/ developed in the nominal
system by phonological reduction involving the case-ending
/a/ (acc.) plus /himm, hinn/, we can speculate that the new
3 pl endings (am,an) were introduced into the verbal system;
thereby reintroducing the once excluded category of 3rd
person plural object suffixes. Since all the available
forms were stressed on the at, this feature was apparently
maintained. If the stress had been normalized, considerable
disruption of the stem would have followed: from /šamar+at+am/,
the usual rules give šimrātām, just as from /dabar+ē+hem/,
with the same structure, there comes dibrēhém.

Similarly, in the 2nd person fem., samarátki, when the
ending -ki was replaced by -ik or -ek everywhere, the
original stress was maintained, producing səmarátek, not
šimrātek. This form cannot be derived from /šamar+at+k/,
for although the e would be inserted properly, the stressed
vowel would not lengthen, since it's in the env. --C C, and
the output would have to be *səmārétek, like mélek /malk/.

In the 2nd person masc., nothing much happened--except
that the k of -ka was spirantized, regardless of the fact
that no vowel ever stood before it. This paradigm is the
one place in the entire language where the pronominal
suffixes were preceded by a consonant; elsewhere they followed
the case-endings (-u nom., -i gen., -a accusative), or vocalic
endings on the verbs, some of which were lost when final short

vowels dropped.   Can it be said that -ka was simply re-
analysed everywhere as -e+ka?   Of the three consequences
of such re-analysis, -stress-shift onto ka, lengthening of
the vowel in -at and spirantization of the /k/, -only the
last is visible, suggesting rather that the /k/ was simply
spirantized to make the ending look like its other occurences.

Rather than explore any of the various ad hoc mechanisms
which can be concocted to force this paradigm into the rest
of the grammar, I am going to let it stand as problematic,
waiting for a real illumination of the something that is
going on here.

1.12   The Construct State

A genitival relationship is expressed by concatenation:

a.	qol	han-nabi?	'the voice of the prophet'
	voice	the prophet	
b.	qolot	han-nabi?	'the voices of the prophet'
c.	yad	han-nabi?	'the hand of the prophet'
	hand		
d.	bɘnot	han-nɘbi?im	'the daughters of the prophets'
e.	dɘbar	ham-melek	'the word of the king'
f.	dɘbar	melek	'a word of a king'
g.	nɘhar	ham-melek	'the river of the king'
h.	melek	han-nahar	'the king of the river'
i.	nɘhar	ham-mɘlakim	'the river of the kings'
j.	malke	han-nahar	'the kings of the river'
k.	dibre	mɘlakim	'words of kings'
l.	ben	Dawid	'the son of David'
m.	ben-	Dawid	'the son of David'
n.	dibre ʕebed bɘne Yisra?el		'the words of the servant of the sons of Isr!'
o.	šomer	hat-tora	'one who observes the Law'
p.	torat	Yisra?el	'the law of Israel'
q.	hoq	Dawid	'the statute of David'
r.	hoq-	Dawid	'the statute of David'
s.	huqqe	Dawid	'the statutes of David'
t.	dɘbar bɘne haʔelohim nɘbi?		'the word of the sons of the prophet of the Lord'
u.	ʔarsa kɘnaʕan		'to the land of Canaan'

Every noun in the chain but the last is said to be in the construct state; the last is said to be in the absolute state, meaning that its form is just that which it assumes alone. The definiteness of each noun in the phrase is the same, and is determined by the definiteness of the last noun. Only the last noun, the noun in the absolute state may bear the definite article. Adjectives in Hebrew follow the noun they modify, but any adjective associated with a noun in construct must follow the whole phrase, and only one noun in a phrase may be modified. If a noun is intrinsically definite -- a personal name, for example -- the whole phrase is definite, as in exs. 1-n,p-s,u. A genitival phrase with mixed definiteness -- 'a son of David', 'a horse of the king' -- must be expressed periphrastically with the preposition 'to', as, literally, 'horse to the king', 'son to David'. Similar constraints on definiteness hold true of the genitive in English, when it is expressed with a case-ending ('s), rather than a prepositional phrase; 'the king's horse' is 'the horse of the king', 'the king's cousin's army' is 'the army of the cousin of the king', 'my mother's piano' is 'the piano of my mother'; 'a king's horse' is 'a horse of a king', and so on.

The chief morphological feature of the construct state is the replacement of the (predominantly) masculine plural ending -īm by ē, which proves to be /ay/. This replacement also occurs when an -īm plural is suffixed, as in dibr-ē-hém

'their m. books' = /dabar+īm/ + /hemm/.

The masoretic system of textual accents (təʕāmīm) is quite detailed enough to indicate that the principal stress of the phrase falls on the last member, the word-stress of nouns in construct being subordinated to that of the noun in absolute; sometimes, when marked by a dash, to the point of complete loss, as in exs. (m),(r).

Perhaps the most striking difference between the absolute and the construct state lies in the realm of syllable structure: dā́bār shows up in construct as dəbàr, bānī́m 'sons' as bənḕ, dəbārī́m as dibrḕ, tōrā́ (a feminine) as tōrà́t. Let us distinguish two classes of phonological characteristics: (1) the shape of the last syllable, and (2) the pattern of reductions.

In the last syllable of a word in construct, underlying short a appears short; but underlying e and o are lengthened as usual under the principal word stress: dəbàr (short), as against šōmḕr (example o.), bèn (l.), hòq (q.). Underlyingly long vowels remain long, as in qṑl (a.), qōlṑt /qōl+ōt/ (b.). As noted above (l.11), the feminine singular ending /-at/ retains its t.

Reduction of vowels in the construct state affects the same class of segments as the processes we have studied so far--vowels which are underlyingly short: note the contrast between exs. (b.) and (d.), qōlòt /qōl+ōt/ vs. bənòt /ban+ōt/ Further, it operates in the same basic environment, --CV, and in the same alternating manner, producing stem mutations that

are already familiar to us: dibrē (cstr.), from /dabar+ay/,

recalls dibrēhém, from /dabar+ay+hemm/; dəbàr (cstr.) recalls

dəbārká and dəbarkém. Evidently, the same network of de-

stressing-reduction-deletion rules is at work here, but

different segments are affected: and the difference is quite

straightforward. Where in the absolute state PTL removes pre-

tonic vowels from the grasp of the reduction processes, in

the construct state PTL simply does not apply and those same

vowels now start the alternating chain of reduction:

	dabar (cstr)	dabar (abs)	dabar+ay (cstr)	dabar+im (abs)
(Lex.Str	+ +	+ +	+ + +	+ + +
Main St	+ S	+ S	+ + S	+ + S
PTL	n.a.	ā	n.a.	ā
AD	- S	n.a.	+ - S	- + S
Other:	dəbàr	dabár	dibrē	dəbarím

What changes in the rule system are needed to model

this diversity of facts?

Let us suppose that the nouns in the construct chain

are separated by a single word boundary, so that, for example,

dəbàr Dāwíd 'the word of David' is underlyingly ##dabar#Dawíd##.

The import of such representation is that the whole phrase is

analysed by the phonology as a single word. The rules we

have discussed apply to words, hence to the construct phrase

as a word, not to the individual nouns which make it up:

except for one rule, Main Stress, which must locate the
peak stress of each constituent noun, even if that peak
stress ultimately comes to have only secondary prominence in
the entire phrase. Main Stress is thus a #-level, rather
than ##-level rule. Note that both final and penultimate
options are evidenced: dəbàr hamme\u0301lek̲ (e), ?àrsā̄ kəna\u0301ĭan (u).

The first consequence of this mode of representation
is that the last syllable length facts -- a vs. ē ō -- are
predicted by the rule of TL we have already established.
Recall that whereas /e o/ lengthened under principal word
stress without condition, /a/ lengthened only in the env --C##
and --C V. This restriction was written into rule (11),p.34,
of which we repeat the relevant subrule dealing with a̲:

$$(70) \quad TL(a) \qquad a \rightarrow \bar{a} \ / \ \underset{S}{\overset{|}{---}} \ (\ V \ X \ ) \ \#\#$$

The 'S' is meant to indicate that the affected vowel must
occupy a 'strong' prosòdic position, i.e. be under a
principal word stress.

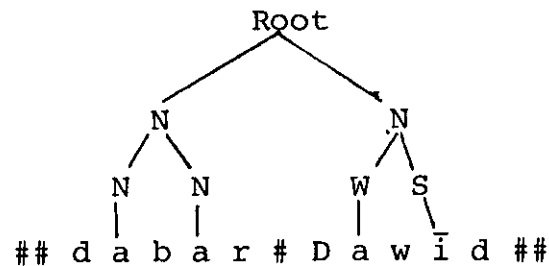Now, it is quite clear that the main-stressed vowel
of dəbàr in a phrase like ##dabàr#hamme\u0301lek## does not satisfy
the environmental conditions for the rule TL. It is not in
the env. --C##, since only one word boundary follows; and
it is not in the env. -- C V, nor can it ever be since (1)
all words begin with a consonant or glide, and (2) even so,
the env. -- C V does not allow a word-boundary to intervene

between the C and the V. Thus, the shortness of a in dəbàr

is controlled by the same principle that governs the short-

ness of the stressed vowel in such words as kātábtī 'I wrote',

Ɛ́ám 'people', mélek 'king'. There is in fact no elegant

re-formulation of (70) to suspend the restriction in the

construct; the best that could be done would be to re-write

the env. as --C ($\left\{ \begin{matrix} V \\ \# \end{matrix} \right\}$ X) ##, a monstrosity. The quantity

situation in the final syllable of words in construct

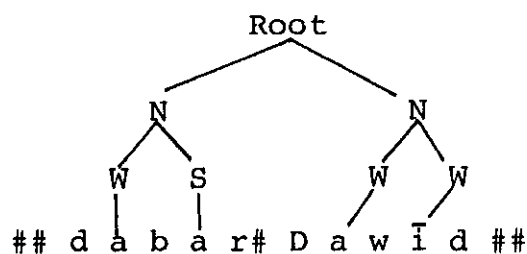is actually a reflex of the situation in the language at large.

What of the pattern of reductions in the construct state?

It was noted that if PTL does not apply to construct forms,

the observed pattern falls out of the motivated rules. But,

of course, PTL applies in the absolute state. The rule could

be restricted to apply to the last word in the phrase by adding

on to the r.h.s. of the Structural Description, like so,

--C V̩ Q ##, where the interpretation of the Q-variable (see

Halle, Vergnaud, Prince, 1975; Prince 1975 ms.) is such that

only the nearest main-stressed vowel to the end of the phono-

logical word (= construct chain) can satisfy the SD. However,

this very vowel is independently identified as the peak

stress of the whole super-word. If the rule PTL is modified

as suggested, then it is portrayed as a grammatical accident

that PTL is conditioned only by the principal stress of the

entire phonological word: PTL happens to apply in the absolute

state only, and peak-stress happens to fall on the absolute

noun. Let us eliminate this 'coincidence' -- and maintain the

simplicity of PTL -- by conditioning PTL upon a ##-peak

stress and not just a locally strong one.

How is this peak to be located? Let us articulate

the Libermanesque 'metrical' theory presented above. The

prosidid structure of a phrase like dᵊbàr Dāwīd at a point

before any rules apply, according to the principles given,

would be:

```
                    Root
                   /    \
                  N      N
                 / \    / \
                N   N  W   S
                |   |  |    \
             ## d a b a r # D a w i d ##
```

The rule of Main Stress places final stress on the constituent

words by labeling the metrical nodes as follows:

```
                    Root
                   /    \
                  N      N
                 / \    / \
                W   S  W   W
                |   |  /    /
             ## d a b a r# D a w i d ##
```

To complete the labelling of the tree, a W must be assigned

on the left, an S on the right.

```
                    R
            W              S
        W       S      W       S
        |       |      |       |
   ##d  a   b   a   r # D   a   w   ī   d
```

What principle stands behind this assignment? Recall the

principle of node labelling that functions in the #-domain:

(7l)   In a metrical configuration [M N], where M, N

         are sister nodes in the metrical tree, N is S,

         unless it dominates V#.

This was be stated in the familiar format for phonological

rules as:

(7z)   Node Labelling $N \rightarrow S$ / `--` $\left(\begin{smallmatrix} N \\ | \\ V\# \end{smallmatrix} \right)\Big]$

(The left-bracket in the rule represents the end of metrical

'foot', and the rule applies 'cyclically', i.e. it determines

the relationship between sisters, insuring that each foot

is either WS or SW.)

Now, this principle, unless further articulated, gives

exactly the correct assignment of lablels; for the node N

above Dawīd direclty dominates a pair of metrical codes, not

V#, and therefore, as the rightmost of the pair, it receives

the designation S.

Main Stress, as in 1.9, is determined by following the

S's down from the root.

Thus, under the rather obviously necessary assumption that a phonological word forms a metrical unit, the pattern of the construct state appears as the simplest projection of the #-word pattern, requiring no enrichment of the principle of main-stress assignment (node-labelling). If this result is correct, then it provides strong support for the general hypothesis of metrical structure, and for the particular way we have chosen of expressing node-labelling, via the parenthesis-disjunction formalism of SPE.

At this point, a little notation is needed to permit direct reference to the peak stress. Let us use the symbol S_{max} with a vowel to indicate that it is dominated in prosidic structure by a maximal chain of S's -- maximal within the domain of application of the rule. We may now state a final version of PTL:

(44) Pre-Peak Lengthening

$$\begin{bmatrix} V \\ (-\text{low})_a \end{bmatrix} \longrightarrow [+\text{long}] \ / \ \#\#C_0 \ (\ X \ (\ V \ ) \ _bC\text{--}C \ \overset{\acute{}}{\underset{\underset{max}{S}}{V}}$$

Condition: $a \supset b$

Under these assumptions, the construct chain derives like this:

```
            ##D a b a r # D a w ī d##
```

(Lex.Str.	+ +		+ +	
	W S		W S	
Node-Labelling	W		S	
Pre-Peak Lengthening			ā	
A.Destressing	- +		+ +	
T.L.	n.a.		vacuous	
Ult. Reduct.				
Spir.	b		d	
Output:	dəbàr		Dāwíd	

The phonology of the construct chain emerges from its
inner architecture. A string of nouns separated by single
word boundaries, it is treated as a single word. The
boundary structure entails the failure of TL to apply to a
inside the chain. It does not entail the restriction on
PTL, that it apply only before main stress of the phonological
word (defined by ##), but it provides the necessary context
for expressing the restriction. Its being a single word is
compatible with allowing the principle of node-labelling
for lexical items to determine its stress pattern; perhaps
the theory should be enriched so that this is a necessary
consequence of the ##-word representation, not just a plausible
happenstance. Thus the use of single word boundaries (#)

to separate members of the construct chain provides a
successful reconstruction of the descriptive notions 'close
connection' and 'partial proclisis', and, through a single
refinement in the rule PTL, allows construct phonology to be
understood as a principled reflex of the situation in the
language at large.

Those cases where word stress on the construct noun
is completely absent, such as ben-Dāwíd (m.), hoq-Dāwíd (r.),
the cases of real procliticization, might be marked by reduc-
tion of the original ## all the way to +. Thus the construct
nouns would lose their right to the S assigned to the last
two syllables of all independent words (p.143), and no cycle
takes place on them. As these words have no S position, TL
cannot apply to them, and underlying short vowels appear short.
Another possibility is that the boundaries remain constant
but that a special rule of proclisis optionally applies to
wipe out all S's from the word in construct. Evidence that
this approach is to be preferred comes from the behaviour
of underlyingly long vowels such as the one in hōd /hōd/
'glory'. They remain long even under proclitic S-loss, but,
as we saw above (1.2), long vowels shorten in the env. --C+C.
In a phrase like hōd-?ēl 'the glory of God', retention on the
long vowel militates against a representation ##hōd?el##.
On the basis of this evidence, then, we reject the reduction
to +-boundary solution, and adduce a rule of proclitic   :

destressing that may optionally apply in the construct state.
We leave the exact formulation of the rule open. A natural
constraint on rules of boundary adjustment would be that ## can
be weakened only one step to # and no further. This would rule
out the +-boundary solution in principle, setting a limit on
the extent to which syntactic juxtaposition can affect the
phonological integrity of words. The failure of the +-boundary
solution in this instance supports such a constraint.

The boundary structure of the construct chain provides
an unambiguous environment for certain processes of suppletion.
The most general, mentioned above, is the replacement of the
plural suffix /-īm/ by /ay/. This occurs as well when the
plural is pronominally suffixed, most clearly see in the 2fs.
d bāráyik̲ /dabar+ay+k/ 'your words' = /dabar+īm/ + /k/.
Interestingly, the feminine plural ending /-ōt/ is supplemented
by /ay/ before the suffixes, e.g. tōrōt̲-áyik /tōr+ōt+ay+k/
'you- fs. laws' = /tōrōt/ + /k/. This suggests that rather
than simple replacement of īm in a certain environment, we
have first insertion of the augment -ay-, then truncation
of -īm:

(74)   Plural Augmentation $\emptyset \rightarrow +$ // $\begin{bmatrix} +\text{plural} \\ (+\text{fem})_a \end{bmatrix}$—$\left(\begin{bmatrix} -\text{seg} \\ (-\text{WB})_b \end{bmatrix}\right)$[+seg]

                    Condition a ⊃ b

(75)   Emasculation   īm → ∅ / - +

The condition on rule (74) states that $\bar{o}t$ is augmented before + but not #, i.e. before pronominal suffixes, not in the construct state. Rule (74) need not mention $a\underline{y}$ specifically, because this is the one place in the language where $\bar{I}m$ is followed by a morpheme boundary. The rules work like this:

	#dabar+ïm#malk#	#dabar+Īm+k#	#tōr+ōt+k#
Pl. Aug.	#dabar+Īm+ay#malk#	#dabar+Īm+ay+k#	#tōr+ōt+ay+k#
Emasc.	#dabar+ ay+malk#	#dabar+ ay+k#	--

The forms are then input to the phonology we have described.

This example raises a couple of points of some theoretical interest. For one thing, it illustrates the existence of a natural class of single unit boundaries #,+ , showing that the boundaries are not each primitive, but are sub-classified among themselves along the lines suggested by the SPE feature analysis. For another, it gives clear evidence that rules of morpheme truncation are a necessary part of the descriptive apparatus made available to the language learner by the theory of grammar. The evidence is not only grammar-internal but comes as well from the historical development of the distributional data just presented.

Originally -- or rather, as far back as we need to go -- the language had the following sytem of case endings:

	Sing.	Dual	Pl.	
			m.	f.
Nom.	u	ā	ū	u
Gen.	i			
Acc.	a	ay	ī	i

These endings were added on to the bare stem of the masculine, e.g. *dabaru, and onto the derivational ending of the feminine, -at in the singular and dual, -āt in the plural, as in *nabilatu, *nabilātu 'corpse, corpses nom.'. In addition to the case-system, Proto North-West Semitic distinguished between bound and unbound forms of the noun: a noun was bound if pronominally suffixed or if in the construct state, unbound otherwise. Unbound forms were marked with memation (or nun-ation), a suffix added on to the case ending, consisting of an m (or n) plus V, where V = a or i depending on aategory of case, no., gender: *dabaruma ' word nom.', *dabarāmi 'two words nom.', *dabarūma 'words nom.', *dabarīma 'words gen-acc.'

Then the language was rent by change. Final short vowels drop everywhere, wreaking havoc with the case system. Furthermore, the memated forms of words that ended in short vowels (all singulars, fem. plurals) disappear as well. The earlier *dabaru-, *dabaruma, *nabilatu-, *nabilatuma become simply *dabar, *nabilat; *nabilātuma (nom pl.), *nabilātima (gen-acc pl) likewise become *nabilāt. At this point the case-

system of the unpossessed noun can be maintained only in the

dual (-ā nom., -ay gen-acc.) and the masculine plural

(-ū nom., -ī gen. -acc.). However, a contrast between

dabarū(m) and dabarī(m) does not last long, and it is re-

solved in favor of the oblique form in both dual and plural,

yielding the system:

Sing. bound/unbound	Du. bound	unbound	Pl. bound	unbound
m. dabar	dabaray	dabaraym	dabarī	dabarīm
f. nabilat	nabilatay	nabilataym	nabilāt(i)	nabilāt

The final change that brings the masculine noun into direct

ancestry of Hebrew is the replacement of the plural bound form

in -ī by the dual in -ay; this yields ultimately constructs

like dibrē/dabar+ay/ and suffixed forms like dabaráyik̲/dabar+ay+k/

and dibrēhém/dabar+ay+hemm/. What of the feminine?

It is clear that no such replacement of the plural by

the dual took place in the fe-inine bound forms; otherwise

the feminine plural construct would come from e.g. nabilatay,

leading to the incorrect niblᵊtē /nabel+at+ay/. The actual

form is, of course, niblōt̲ /nabel+ōt/, from the historical

plural bound form nabilāt. Similarly, if such a replacement

had taken place, the suffixed feminine plural would be in

Hebrew niblātáyik̲ /nabel+at+ay+k/, from the historical nabilatayk.

The actual form, niblōtáyik̲ /nabel+ōt+ay+k/ cannot descend

from nabilatayk, but only from a form based on the authentic

plural nabilātayk (long a in the feminine morpheme).

The question is, how did the -ay- morpheme get attached
to the fem. pl. -āt in pre-suffixal position? The feminine
dual uses -ay- as a straightforward number marker, and there-
fore provides no source for an 'empty' augment. But the new
masculine plural pre-suffixal form, dabaray-, shows the
morpheme in a way that demands special interpretation, since
it is not dual and since the free plural form looks quite
different: dabarīm. Suppose that a suffixal form like
*dabarayk (pl.) is analyzed as coming from *dabarīm +ay+k
(by the speaker-learner) via a process of truncation. This
means that the -ay- is here interpreted as the augment of
the pronoun bears when it suffixes plurals. The interprtation
is re-inforced by the fact that pronouns are augmented (by
selected remains of the case endings) on the singular noun,
suggesting a canonical form stem+augment+pronoun. The next
step is to generalize the augment -ay- to all plurals, masculine
and feminine, producing the necessary ancestor (nabilātayk.

It should be noted that there is no plausible analogical
source for the innovation. A proportion dabarīm: dabarayk : :
nabilāt: x solves as x= nabilayk. Only when the analysis is
mediated by special rule of -īm truncation does the re-inter-
pretation of -ay- begin to make sense.

Certain other processes also take place in the phono-
logical environment of the construct chain. Quite regularly,
feminine nouns of the shape CVCCVC+at undergo truncation of
the suffixal vowel: so mamlā́kā /ma+mlak+at/ 'kingdom' has
for the construct mamlèket, transparently derived from
/ma+mlak+t/ by the same route that mélek comes from /malk/.
This truncation is apparent also in the pronominally suffixed
forms: mamlaktí /ma+mlak+t+ī/ 'my kingdom'. This means that
there is an early rule of adjustment:

(76)   Fem.Sing.Syncop: $a \rightarrow \emptyset$/C V C C V C+ -- t [-seg][+seg]

Other examples of this type are mišpā́hā /ma+špah+at/, cstr.
mišpàhat, suff. mišpahtí; milhā́mā /ma+lham+at/ 'war', cstr.
milhèmet,   , suff. milhamtí. Observe in rule (76)
the appearance of the class 'single boundary' (+ or #), which
accurately defines the notion 'bound form', insofar as it is
relevant to the grammar.

Some words assume a different underlying stem shape in
the construct state: yaré̄k /yarek/ 'thigh' has cstr. yèrek
/yark/; kātép /katep/ 'shoulder', cstr. kètep /katp/; ʕarél
/ʕarel/ 'uncircumcised', cstr. ʕèrel /ʕarl/; sēláʕ/selaʕ/
'rib', cstr. sèlaʕ/selʕ/. Evidently these forms are susceptible
to a minor rule -- a rule that applies only to specially marked
forms -- that syncopates the 2nd stem vowel in the construct
state. (The suffixed forms are regular, e.g. yərēkí 'my
thigh' /yarek+ī,'). There seems to be some sort of curious

redundancy involving body parts, or crucial reference thereto.

(77)   Minor Surgery   V → ∅ / -- C # C
                         [+D]

This phenomenon provides evidence for having phonological minor rules, rather than only a collection of allomorphy statements in the lexicon. For 'construct state' is not a lexical category, but a syntactic one; to list the construct stems in the lexicon involves senseless duplication, as the vast majority of construct stems are either identical to or directly projectable from the aosolute stems. Being in the construct state means being in a certain simple syntectico-phonological environment; therefore, direct reference can be made to the environment without a mediating notion [+construct]. But since the environment results from syntactic combination, it cannot be stated inside the lexicon, referring to single items. Therefore, the features of the construct state that are not otherwise predictable, as for example, the truncations just discussed, must be represented through phonological rules, both of the regular type, like Fem. Sing. syncope and of the type suitable to expressing exceptionality, like Minor Surgery.

The real interest of the example is that it shows a minor rule doing something besides making corrections in the

output of derivational morphology. Aronoff (1976) argues

for elimination of the diacritic feature-minor rule apparatus

in favor of what he calls rules of allomorphy, which are

basically morpheme-specific rules of adjustment limited in

domain to the lexical word. For example, he argues that the

relationship between nouns in ism, e.g. formalism, and

adjectives in -istic, e.g. formalistic/*formalismic, should

be expressed as an allomorphy rule replacing ism by ist

(actually m by t) in the env. -ic. Although Aronoff's

theory may well be suitable for the area of morphology it

is aimed at, i.e. derivational, it does not extend to the type

of case dealt with the rule Minor Surgery, for which the

minor rule device is well-motivated, --cases involving the

phonological rather than the lexical word. Further, Aronoff's

theory, with its rules specifying the shape of a single

morpheme, predicts no relation between the suppletive

processes that apply to different morpheme; the minor rule

theory favors cases like the present one in which irregularities

can be subsumed under a structural generalization.

Halle (1973) notices that although the output of the

rules inflecting Russian words for case and number are by-and-

large regular, there are occasional idosyncrasies; so word W

(for example) is exceptional to rule N but only in the

inessive singular. Halle suggests that each and every form

produced by inflection be listed in the dictionary so that

the entry for the inessive case of W has the annotation

[-rule N]. The Halleic principle of full disclosure is only

necessary if it's hypothesized that rule features are simply

listed with each entry; if we assume greater richness in the

structure of an entry, allowing implicational conditions,

say, we could enter the observation [+instr] ⊃ [-rule N] beside

the word W. Now the case at hand falls under the narrow con-

ception of entry-form, since, as has been shown, it is

incorrect to assume a feature [+cstr] that would play a role

in a conditional [+cstr] ⊃ [rule 48]. (Note that this would

allow a slight simpli˜ication of rule (77); the environment

need only be --C#, not -- C#C). The environmental condition

on rule (48) permits a simple listing of the feature [+rule MS]

in the entry for a word like yārek.

However, the example does undermine a kind of intuition

that Halle's proposal appeals to: that exceptionality is a

property of items in themselves, rather than of items in

context. Since the inessive case of W, W_i, a surface word,

is irregular, from this point of view Wi must be an autonomous

item in the lexicon, not just a function of W in the context

[+instr]. In the interests of uniformity, all inessives

must be listed, and indeed, all case forms. The construct

state is clearly not a lexical category -- as [inessive]

may be thought to be -- but rather a phonological relfex of

syntactic structure; yet it is the locus of a certain amount

of irregularity, showing that idiosyncrasy can creep into,

or be preserved in, surface as well as deep categories.

Given this, it would seem that since W_i is a surface

word, it can suffer irregularity; and it is not necessary

to read it back into the dictionary as a full entry -- a

deep word -- in order to give grounds for its exceptionality.

Real uniformity of treatment can be obtained through the

minor rule mechanism, perhaps extended to assign rule-features

as well, so that our word W would have in its entry [+minor

rule M], where rule M says something like [+iness.] → [-rule N]

just as yārék has in its entry [+Minor Surgery], a rule which

also applies in a syntactically given environment.

1.13 The Pausal Forms

In a series of coruscating essays, J. W. Bresnan has argued that the Nuclear Stress Rule of English -- the rule that locates the phrasal peak stress -- applies as the last rule of the syntactic cycle. The most elegant implementation of this idea would have the other rules of word and phase stress (MSR, CSR) apply with the NSR, so that the NSR functions to re-shape their output directly, marking as prominent phrasally a syllable that has already been singled out for prominence in a narrower domain. This formulation is not, of course, logically necessary, for one could easily concoct an accounting system in which the NSR marked not words (or rather syllables in words) but phrase nodes, these marks being stored throughout the syntactic derivation; then at the surface after the other stress rules run through their own cycle assigning local prominence, the results of the NSR calculation, tabulated on phrase nodes, could be transferred onto the appropriate segmental location.

Let us explore the first alternative, which is more native to the genius of Bresnan's proposal. The syntactic cycle and the phonological cycle are identified; grammar is a single movement from part to whole. Starting from the smallest bracketed domain, in which only the rules of word stress apply, the grammar advances to the lowest cyclic nodes, where first the syntax and then the phonological rules of

prosody accomplish their processing; thence upward to the root, in the same fashion. At the surface, the cycle completed, the rules of word-level phonology confront a string of segments punctuated only by boundaries: +,#,##. These rules do not apply cyclically, do not refer to bracketting, and concomitantly, do not refer to lexical category type (noun, verb ... , as prosodic rules may.

This picture is rather different from the one limned by the authors of S.P.E. For them, all phonology must await the end of syntax, after which it re-begins the cycle, defined this time on the bracketting of surface structure. The word-level rules fall in the middle of this cycle, applying when the boundary sequence ## comes into the expanding purview of the phonology. Such an organization has as an important consequence that phonology has no access to the inner workings of syntax, the deeper stages of derivation whose geometry may be all but lost in the spare architecture of the surface. This proposition could not be sustained, and J. W. Bresnan demonstrated the syntactic configurations to which the NSR is sensitive are exactly those which obtain at the end of a cycle; hence the Ordering Hypothesis.

Now, the Ordering Hypothesis -- and its articulation into what might be called Unified Cycle Theory -- entails that a certain amount of phonological information will be available as syntactic processing is under way. Why then do

transformations never refer to phonological properties?
Actually, the question is ill-conceived; even under the
earlier, bi-cyclic view, lexical insertion involved phono-
logical material -- underlying forms -- and yet transforma-
tions could not depend on any phonological feature that a
lexical item might possess. It is simply the case that
the vocabulary in which syntactic rules are couched does
not contain expressions that refer to phonological entities,
just as it does not contain expressions referring to semantic
or pragmatic entities. We should no more expect a rule of
syntax to depend on nasality or stress-prominence than we
should expect it to depend on co-reference or speaker-
attitude.

A more interesting consequence of the distribution of
information within the Unified Cycle Theory is this: since
the word-level rules apply after all prosodic processing
has been completed, they should be able to refer to aspects
of _phrasal_ prosody and not merely to the word-internal accentual
information to which SPE theory limited them. In short, we
should expect to find cases where the segmental form of a
word varies lawfully with its position in phrase and clause.
Does morphophonemics have access to phrasal information?
In the Unified Cycle Theory there can be no good reason why
not, since the phrasal information is both available and of
the type the rules refer to anyway. The question thus provides

a useful demarcation between the two theories: if it is answered affirmatively, the S.P.E. theory is basically disconfirmed; if negatively, the Unified Cycle Theory must be modified ad hoc to meet the facts, i.e. to accommodate what SPE effortlessly predicts.

In Hebrew, words which lie immediately before a major phrase boundary -- usually a sentence (clause) -- are said to be in pause, and they undergo certain modifications there, producing what are known as pausal forms. In terms of the rule system developed in this essay, the principal pause effects are two in number: (1) the condition on lengthening of a under stress is suspended, so that all a's, even those in closed syllables, may be lengthened by TL; (2) the rule A.D. does not destress any vowel which bears peak word stress, so that no stress-shift occurs in pause. Characteristic examples of these phenomena look like this:

	Word	Gloss	Underlying Form	Sentence-Final (Pausal) Form
(1)	katábtā	you m.s. wrote	/katab+ta/	katábtā
	ʕám	people	/ʕamm/	ʕám
	máyim	water	/may+m/	máyim
	ʔéres	land	/ʔars/	ʔáres
(2)	kátbū	they wrote	/katab+u/	katábū
	záqnū	they're old	/zaqen+u/	zāqénū
	yiktábū	they m will write	/ya+ktob+u/	yiktóbū

Word	Gloss	Underlying Form	Sentence-Final (Pausal) Form
parí	fruit	/pary/	perī
hăsí	half	/hesy/	hesī
hŏlí	sickness	/holy/	holī
dəbarká	your m.s. word	/dabar+e+ka/	dəbaréka
yiŠmorká	he will guard you	/ya+Šmor+e+ka/	yiŠməréka

A third effect of the "pause" is to inhibit the retrac-
tion of stress in the converted jussive (given as rule (32),
p. 64), evoking a contrast like that between wayyámot̲ ʔádam
'and Adam died', with retraction, and wayyāmót: 'and he died:',
without retraction because the word ends a sentence.

What is it about clause-final position that could pro-
duce this constellation of effects? The traditional answer
is that pausal phenomena are reflexes of the peak stress
associated with the last word in a clause. This strikes me
as a highly plausible account: first, because the type of
phenomenon -- lengthening, resistance to stress removal (by
A.D. and by rule (Ɩ2), Consecutive Retraction) -- are char-
acteristic correlates of high stress; secondly, because it
is reasonable to believe that the clausal prosodic prominence
really did fall at the end -- this is because it is a usual
pattern (English has it, essentially), and because it accords
with the end-stressing clearly visible in the lexical word and
in the construct state.

Notice too that the restitutions in pause (see (2)
on the table) are neither random nor superficial -- the full

vowels of the pausal forms which stand where schwas and zeroes do in non-pausal forms cannot be inserted late, for they are not surface-predictable; they faithfully reflect the character of the underlying representation.

Under the reasonable assumption that the pausal alternations are stress-conditioned, we are presented with a clear case of word phonology (A.D., T.L., Consec. Retraction) being dependent upon phrasal prosodic information of exactly the type that Unified Cycle Theory predicts should be available. A more compelling and systematic exploitation of the theory's resources could hardly be hoped for.

It might be argued that the data is not to be taken seriously, that it is a literary artifact, the result of distortions introduced by exaggerated liturgical cantillation of the text, and perhaps further ramified by the corrective activities of regularity-mad grammarians. This argument is not deep. To effectively discredit the pausal data, it must assume that the pausal forms were literally invented, begotten from the normal forms by essentially extra-linguistic (oratorical, cantillatory) pressures. For even if the present text contains a somewhat regularized and extended -- literarified -- version of a true earlier phenomenon, there remains the earlier phenomenon, which must have been in the same mode of phrasal influence on word-shape as the pausal data found in the text. But on the face of things, it would seem unlikely

that the pausal forms could have been projected from the
ordinary forms by a desire to restore reduced vowels when
they should bear stress: for in such a case we would ex-
pect a simple law of replacement, operating on the surface,
a rule uniformly replacing penultimate schwas with some
favored vowel, like ā or ō. What we find, of course, is
morphophonemics. Looking more carefully into the full range
of forms, we find a certain amount of irregularity in both
the distribution and the phonological shape of pausal items,
and it is the kind of non-uniformity that indicates the moiled
grain of reality, not mere lacunae in the smooth pages of
the grammarian.

For example, the word mélek retains its vocalism in
pause, never becoming málek. Certain verbs with a perfect
show up occasionally with e in pause: qāráb 'to be near',
qārébā 'she is near:' gādál 'to be big', gādélā 'she is big';
šāmáʕ 'to hear', šāméʕū 'they heard'. Why? Because these
verbs originally had e (actually *i) perfects, cf. Arabic samiʕa
'hear', and the relic forms are preserved in pause. Verbs
which were originally III-y restore the archaic glide in
pause: for ḥasū 'they sought refuge', ḥāsāyū (Dt 32.37);
this must of course be represented in the consonantal text,
and can hardly be ascribed to the vowelling of the masoretes.
And the 2nd person masculine pronominal suffix -ka usually

shows itself as -ekā, in pause, but on the prepositions l-,b-
it attaches as in lāk, bāk, for ordinary lakā́, bakā́, rather
than the lḗkā, békā which might easily be expected.

A more considered line of counter-argumentation would
concentrate on the assumption that it is stress per se that
conditions the pausal effects. Perhaps it is the syntactic
position alone that determines the distribution of pausal
forms; the feature ± pause, then, is not a correlate of
+ Clause Peak Stress, but functions more like ± accusative,
say, and is implanted by a syntactic rule before phonology,
in the SPE manner, begins on surface structure. In this view
it is a mere coincidence that the chief phrasal stress falls also
on the word marked [+Pause]; and a coincidence that the pausal
effects are by-and-large of the type induced by high stress.
There are important empirical differences between the syntactic
and the phonological approaches: no language is so rigid as
to not allow some variety in the patterns of clausal stressing;
if the occurence of pausal forms is stress-determined, we
might expect them to turn up non-finally where stress has
been wrenched from its normal course by emphasis or parallelism,
and not to occur finally in just those circumstances. Now,
according to Gesenius, there is great regularity under the two
major accents Sillūq (at verse-end) and ʔAṯnāḥ (mid-point),
optionality with the lesser accents marking further subdivisions
of the verse (Səḡōltā, Zāqēp Qāṭōn, Rəḇīaʕ), dwindling to in-
frequence (Pašṭā, Ṭīp̄ḥā, Gereš, even Pāzēr).

It may well be that the pattern of 'optionality' can be explained in terms of stress; but I have not made a serious inquiry into this complex area, and I shall have to leave the issue open, contenting myself and the indulgent reader with an outline of the logic of the situation and a pointer to the data that may decide.

Ultimately, however, it's hard to imagine that phenomena of the pause could have arisen any other way than through the phonological influence of stress. If this is correct, then at some stage the full descriptive resources of Unified Cycle Theory were called upon as phrasal prosodic structure played a direct role in morphophonemics. Of course, that was in another country and the language is dead; no details are forthcoming. But the character of the available data suggests that the Unified Cycle Theory deserves serious consideration.

Formal note 1: Both sides of the binary distinction phrase-peak --non-phrase-peak play a role in rules. The negative side is apparent in the three major phenomena. The rule AD must be re-written as:

$$(79) \quad AD \quad \begin{bmatrix} V \\ -long \\ -P \end{bmatrix} \rightarrow [-stress] \, / \, -- \, C \quad \begin{matrix} V \\ [+str] \end{matrix}$$

The rule TL as

$$(79) \quad \begin{bmatrix} V \\ \langle +low \rangle \\ \langle \Gamma \rangle_a \end{bmatrix} \rightarrow [+long] \, / \, -- \, C \, (\, (V)_b X) \, \#\# \quad \text{Condition: } a \supset b$$

The rule Consecutive Retraction as

$$(80) \quad \begin{bmatrix} V \\ -low \\ -P \end{bmatrix} \rightarrow [-stress] \, / \quad V \, C \, -- \, C \, \#\#$$

The import of these revisions is that AD and CH apply only to non-peaks, and the condition on the tone-lengthening of a holds only when the relevant a is not under maximal phrase stress.

The notion [+P] functions in some rules of smaller scope. For example, in Hitpaℭℭēl, the stem final ē shows up in pause as ā, e.g. yithallā́k /y+hi+t+hallek/ 'he will walk about' (Jb 18.8). This This can be accomadated in an early rule:

(8ı) Hitpaℭℭēl Pause $\underset{[+P]}{V} \rightarrow a$ / -- C # / in Hitpaℭℭēl

Two words show stress peculiarity: ?ānokī́ 'I' (archaic, majestic, divine) is pausally ?ánŏkī ; ?attá 'you m.s.' , ?áttā. Notice' that it is really the non-pausal forms that are peculiar; the pausal penultimate pattern is what's expected in both cases. Evidently these two words are subject to their own rule of forward stress (in our metrical terms, penultimate de-stressing), which rule, like AD --which is mimics-- is inhibited in pause. This rule follows PTL, hence the always long first vowel of ?ānŏkī́.

(8²) Minor Movement $\underset{[-P]}{V} \rightarrow$ [stress] / -- C$_0$ V

This is the kind of 'pernicious' stress-shifting, which would if it were widespread disconfirm the assertion that stress-shift is a concomitant of AD, since neither form meets the SD of AD, /?ānŏkī/ having a long vowel penultimate, /?áttā/having a closed penultimate syllable. Formal Note 2: The relic forms in pause require a suppletory apparatus to relate them to their non-pausal incarnations. Here, as with the construct state, we are dealing with an obviously non-lexical category, and the device of minor rules is similary appropriate.

Retrospective Glance

At this point all the stress-related alternations in syllable structure have been discussed. The method of exposition has been to call upon particular fields of data as they are relevant to the working of a posited rule or system of rules. This stands in contrast to the traditional, pedagogically motivated manner of progressing through the form-classes of the language, exploring each in detail, giving many rules of rather narrow scope, often limited to a morphological or syntactic class. Behind our method is the hypothesis that the morphologically diverse alternations reflect the interaction of a few general principles. In order to better fix in mind the look of the territory covered, let us for a moment change our focus from the inner form to the outer articulation of the data.

A more-or-less traditional account of deletion-reduction phenomena would distinguish the following cases:

(1) Propretonic Reduction. i.e. of short vowels in open syllables 2 (or more) syllables before the stress, as dābár--dǝbārím

(2) Post-Heavy Syllable Reduction. Of non-low vowels after VCC or V̄C, as šópét--šóptím,

(3) Verbal Vowel Reduction

(a) in the perfect and imperfect: kātáb-- katbú; yiktób--yíktǝbú

(b)   In the imperative: kǝtṓb--kíṯbū,
         tén--tǝnū

(4)   Infinitive with Suffixes: kǝtṓb--koṯbī

(5)   Weak Segholates: pǝrī -- peryǝkā -- pérī

(6)   The Construct State

This welter of mutations is generated by a single rule,

Alternating De-Stressing, as it interacts with the stress

pattern and with pre-tonic lengthening. A certain amount

of morphologically conditioned variation feeds into the

crucial AD-PTL nexus -- differential treatment of /-at/

in nouns and verbs, amplification of imperatives and in-

finitives by the rule Echo, the distinction between -ka and

the other pronominal suffixes -- and the real character of

these phenomena is illuminated by the central principles we

have studied.

The regular cases where main-stress has undergone

some kind of movement are these:

(1)   The Verb: katbū, yiktǝbū,kitbū

(2)   The Weak Segholates: holī, pǝrī

(3)   The Pronominal Suffix -ka: dǝbarkā, šǝmārkā,
         yišmorkā

(4)   Consecutive Retraction: wayyāmot vs. yāmōt
              ('and he died ...' vs. let him die)

(5) Nāsōq ʔĀhōr: tōkal lehem → tōkal lehem 'she will
                                                    eat bread

(6)   2ms-Forward: kātabtā vs. wǝkātabtā

The last two syllables of a word are grouped into a single prosodic unit by the principle of right-branching we called Hebrew Tree Structure (1.9). In terms of the general theory we elaborated, based on the work of Liberman (1975), a de-stressing or a metrical weakening of either one of the last two syllables automatically puts the other into prominence. An immediate consequence is that cases (1), (2), and (3) are governed by the same principle that determines the location of reduced vowels. Cases (4), (5), and (6) require rules of their own; the rules are simple de-stressings or weakenings rather than complex and uninsightful two-change transformations. Both the direction of shift and the distance travelled by the shifting stress (one syllable) follow from the character of the tree-structure under general principles of metrical theory.

Successful integration of data of this degree of categorial diversity into a grammar of phonological rules basically confirms the hypothesis of generality that has guided the investigation.

Chapter 2

Segmental Issues

2.1 Geometry of the Vowel System

The canonical form of Hebrew lexical items is severely limited. The simple noun or adjective, unadorned by affixes, unreduplicated, has three consonants in it, arrayed CVCC (mélek̲), CVCC (g∂b̲úl), or CVCVC (dāb̲ár). Holding the consonant frame constant and allowing the vowel(s) to vary will trace the basic dimensions of the underlying vowel-system. If there are n vowels, we expect there to be (at most) n monosyllable types, n^2 bisyllable types, and so on.

In the segholates (CVCC) we have seen three basic types: (i) mélek̲ -- malk-í, (ii) sép̄er -- sip̄r-í̃ (iii) qṓdeš -- qodš-í. We know these to be underlyingly short, first because of their reducibility (pl. m∂lāk̲im, s∂p̄ārím), secondly because of the general restriction on morpheme structure that allows only short vowels in the env. -- C C. So this subclassification of the segholates argues for a three member short-vowel set. There is, as it happens, a fourth alternation type, a kind of hybrid of (i) and (ii), that goes like ṣédeq -- ṣidq-í̃. We shall look into the matter below, finding a phonological rule rather than an underlying distinction; the segholates like

sedeq will prove to be vagrants from type (ii).

In monosyllables CVС́ĭС́ĭ , a perfectly parallel typology
is manifest: (i) ráḇ--rabbím,(ii)?ém -- ?imm-í, (iii) hóq --
huqqím. Again, a fourth, mixed type shows up, as sáp̄ --
sippím 'thresh-hold, sing. and pl.', sáḏ -- siddím 'side'.

These typologies point toward a triangular short
vowel system, but do not suffice to establish the exact
quality of the two non-low vowels. Let us represent them
expositionally as I, U, as we investigate which of /i,e/
and /u,o/ should be chosen.

The type CCVC, in native words, has always a long
vowel, and the classification, as among the short vowels,
is tripartite: (i) ḥazír 'swine' (ii) gəḇúl ·boundary)
(iii) ḥamōr 'ass:Equus asinus'. Recall that the a of
examples (i) and (ii) is a reflex of schwa after gutturals.
These vowels are demonstrably long because they neither
reduce under he influence of AD, nor appear short in
enclisis. This form-type clearly suggests a long vowel
system / ī ū ō/. There are a very few words which display
an /ā/ that is sturdily constant in shape, neither reducing
nor shortening, like kəṯāḇ 'book', but they are pretty
obviously loan-words from Aramic.

With a tripartite short vowel system -- a, I, U -- and
a tripartite long vowel system -- ī ū ō -- the canon CVCVC

should beget 36 fully-vowelled subclasses; but the number
of possibilities is substantially smaller. In the frame
CaCVC, however, substitution is free, and there are as
expected six instances, three long, three short:

(1) /a/   dābār   /o/   gādōl   'big

     /I/   zāqēn   'old'   /ī/   pāqīd   'overseer'

     /U/   ?āyōm   'afraid'   /u/   ?ārum   'subtil'

Of the remaining 30 possibilities, only 5 are realized,
and most of these rather scantily:

(2) /I/ -/a/   lēbab   'heart'   /ī/-/ō/ qītōr   'smoke'

               šēkar   'beer'   /u/-/ā/ śūʕāl   'goat'

               śēʕār   'hair'   gūnāb   'pipe'

               ʕēnāb   'grape bunch'   /ō/-/ā/ ʕōlām   'eternity'

               sēlaʕ   'rib'   šōpar   'ram's horn'

                                        /ō/-/I/ šōpeṭ   'judge' + Qal particip.
                                                         =1000's of items

The lists here are not meant to be exhaustive, but suggestive
of relative size. Of these classes only the ō-I series, which
is characteristic of Qal participles and of the agentive
nouns related to them, is heavily populated. The other long-
vowel classes are indeed rather undernourished. The question
of frequency is not identical with the question of phonological
possibility, and it might be asked, what sort of general pat-
terns are reflected in the range of admissible word shapes.

Observe that /a/ retains popularity as a second vowel.
A rule of distributional thumb might be: a̲ goes with every-
thing (a-V), everything goes with a̲ (V-a). The second clause
needs emendation: (1) there are no types /CU̲CVC/ (2) the type
ī-a is not attested, (3) the type ī-ō is, (4) Qal participles
have I̲, not a̲ in the second syllable.

Now, the vowel pattern of the Qal participle (and its
nominal derivatives) must be specified by a rule of Ablaut or
its equivalent, so we can rule it out of consideration as we
focus on the patterning of underived ouns (and adjectives).
Of the other 3 restrictions, only (1) carries much weight;
except for the Qal participle type, the others shaped CV̄CVC
are quite rare, and it can be considered accidental that ī-ō
is in and ī-a is (apparently) out. The central formal require-
ments can thus be expressed in two clauses:

$$C \ V_1 \ C \ V_2 \ C$$

(3) Either V_1 = /a/ or V_2 = /a/

(4) $V_1 \neq$ /U/

Most important for the present inquiry is the fact
that the range of forms CVCVC falls well within that predict-
ed by assuming an essentially tripartite division within the
short and long vowels. This gives us the geometry of the
system, leaving open the question of the exact location of
the underlying vowels. The short vowel system has its

complexities, so let us first explore the simplicities of
the long vowels.

The long vowels present two issues: (I) can you
really get away with just 3? (II) is ō really ā, from which
it came?

(I) The appearance of /ā/ in a few loan words like
katā̲b /ktāb/, and in a few anomalous native forms like harā́š
'artificer', which has pl. cstr. harā́šē /harraš+ay/ rather
than *haršē, shows merely that there is an ā marginally
present in the lexicon, and indeed that it is not integrated
into the mainstream of the language.

A little more problematic is the appearance of ē in
a certain few words: ʕḗ̲d 'witness', réáʕ 'companion', hḗq 'bosom,
lap', ʔḗd 'final disaster', perhaps some others. This ē is
non-deletable, non-shortenable; hence long. It stands out,
because the other irreducible ē's of the language occur as
a reflex of -ay-, which de-diphthongizes when it does not
bear main-stress. The forms of báyi̲t 'house' tell the story:

    báyi̲t   'house'   bē̲t-í   'my house'
    habbáy̲tā   'to the house' bè̲t hammélek 'the king's house'

Parallel facts obtain with underlying -aw-: compare māwe̲t
'death', mō̲t-í 'my death'. A diphthongal sequence does not
undergo the rule if it is followed by a glide or a vowel, as
in hayyím 'life', hawwá 'tent-camp' , hāyá 'to live'. The

rule thus takes the form:

$$
(5) \quad \text{Coalesence} \quad \text{SC.} \begin{bmatrix} +\text{back} \\ -\text{hi} \end{bmatrix} \quad \begin{bmatrix} -\text{cns} \\ +\text{hi} \\ \alpha\text{back} \end{bmatrix} \quad \begin{bmatrix} +\text{cns} \end{bmatrix}
$$

$$
 1 2 3
$$

$$
\text{SD.} \quad 1 \; 2 \; \rightarrow \begin{bmatrix} \alpha\text{back} \\ -\text{lo} \\ +\text{long} \end{bmatrix}
$$

Condition: 1 is not S_{max}, i.e. is
dominated at some level
by W in metrical structure.

The effects of rule (5) are regularly felt in words like
?emā /?aym+at/ 'fear', clearly related to ?āyōm 'afraid',
where the diphthong is always coalesced, and in derivationally
prefixed forms beginning with y or w, as hōlĩd 'he begat'
/ha+wlĩd/ hētĩb 'he did good to' /ha+ytĩb/.

Apparently, rule (5) overshoots the mark in certain
cases, disregarding the stipulation that the affected vowel
not bear main-stress. So we find šōr 'ox' taking seɈholate-
type broken plural səwārim, clearly pointing to an underlying
form /šawr/. Noting that the word hēl 'outer bulwark' is
clearly related to the noun háyil 'power', we can hypothesize
that the cases of /ē/ under stress are due to the same over-
application, or relaxation, of rule (5) that produces šōr
from /šawr/.

(II) About 1500 B.C., in the land of Canaan, speakers
commenced to say ō where their fathers and grandfathers,
mothers and grandmothers had said simply ā. To eastward the
wandering Aramaeans paid no heed (hence kətāb).

Did this new mode of phonation force a change in the underlying vowel system, from the maximally simple and unmarked / ī ā ū/ to the marked /ī ō ū/? The answer to the question depends essentially on theoretical assumptions about lexical complexity: if simplicity of the segmental paradigm is granted ascendancy, held to be a goal worth a little phonological complexity, then it can be argued: there's nothing to stop you but the marginal cost of an early rule ā→ō; on the other hand, if it's assumed that divergences between the underlying and superficial segment repertory must be justified in language-specific terms, there exists very little in Hebrew sound structure that argues for maintaining the archaic analysis.

There is one alternation that is mediated by the historical "Canaanite Shift'. Among verbs I-? there is a small class which do not form the imperfect in a perfectly straightforward fashion. From ?āmár 'to say', we'd expect something like ya?amōr /ya+amor/ 'he will say'; what we find is yōmár. The a-stem vowel, though marked and unpredictable, is found elsewhere; what's surprising is the coalescence of the prefix vowel and the stem-initial /?/ to form ō. Evidently this coalescence took place before the Canaanite Shift, producing the natural outcome ā, which fell together with all the other ā's of the language, and like them was rounded and raised when the time came. In synchronic terms however there

is no reason not to collapse the process into a single step:

(6) I-? Shift   SC   a + ? C [-round]
                        1   2 3

              SD   12 ⋅ ō

              Condition: 1 belongs to an imperfect
                          prefix

The rule is written to apply only to no -u imperfects; the
following table of forms illustrates the restriction:

Pf.	Gloss	Impf.
?ākál	eat	yōkál
?āmár	say	yōmár
?ābád	perish	yōbád
?āsár	bind	ye?esór
?aház	hold	{ ye?ehōz yōhéz (n.b.)

The only other verbs to which rule (6) regularly applies are
?āpā 'to bake', ?ābā 'to be willing'. The verb ?aháb 'to
love' has an a-imperfect, but shows mixed forms: ?ōhab 'I
will love' /?a+?hab/, ye?ehab 'he will love' /ya+?hab/. It
is optionally exceptional to rule (6).

The prefix vocalism of the o-imperfects -- e rather
than the a expected before gutturals -- is due to a late
rule, applying even after Schwa Deletion, so that ye?esōr
'he will bind' contrasts with ya?asrú /ya+?sor +ú/ 'they
will bind'; the rule depends on the presence of an o in
the following syllable.

This narrowly circumscribed a-ō alternation does not provide the grounds for symmetrizing the vowel system by taking /ō/ to be deeply /ā/.

2.2 Short Vowels

Itis the short vowels that take part in the major
vocalic alternations of the language, and which therefore
provide the most interesting problem for analysis. The
vowel /a/ behaves in a straightforward fashion, lengthening
and shortening in accord with the principles of Chapter 1.
But the non-low vowels alternate between high and non-high
variants in a way that wants a little sorutiny.

The underlying three-way distinction gives rise to a
surface series of five distinct vowels (disregarding schwa):
[i e a o u] . Due to the effects of the rules of lengthening,
reduction, and deletion, these vowels appear mostly in the
environment -- C C, i. e., in closed syllables. The principal
exceptions to the generalization are the reflexes of schwa in
a guttural environment (halōm 'dream', never **həlōm) and at
word-end in segholates (mélek̲), the hateph. vowels (yeh̆ĕzaq),
the o̲'s that fail to reduce (qodā́šīm). These 'exceptions' fall
under rules of their own.

The distribution of the round vowel's alternants is
quite clear, and has been frequently noted in the literature:
u̲ appears before geminate consonants, o̲ elsewhere. Consider,
for example, the fate of the passive marker - u̲:

Conjugation	Root	Active	Passive
Doubled ('intensive')	gdl	giddél 'he grew s.t.'	guddál 'he was grown'
H- ('causative')	gdl	higdíl 'he made st. big'	hogdál 'he was made great'
	ngd	higgíd 'he told'	huggád 'he was told'

There's a few exceptions, like sulhān 'table', but they have apparently no systematic import.

The distribution of i-e is not so transparent, but it is in the main lawful. As u is, so is i necessary before geminates: qissī 'my end' ?imm-í 'my mother, hăsibbōtém 'you m.p. make s.t. go around', ?ikkātēb 'I will be written'. The high front vowel appears elsewhere as well: initially in closed syllables (of course, unstressed) as in siprī 'my book', yiktōb 'he will write', dibrēhém 'their m. words'; medially, in the underlying environment -- C+C as yəlidtén 'you f.p. gave birth' /yalid+ten/, gəbirt-ī 'my mistress' /gbir+t+ī/. Observe that the surface env. --C+C is not appropriate, for as typified by šomerká /šomer+e+ka/ 'your ms guardian', the non-high e is found there. Gutturals -- low sonorants / ? h ḥ ʕ/ -- discourage the high vowel: i never shows in the env. -- G C, only e as yehĕzaq 'he will be strong' (the ĕ being a hateph, introduced by rule (43), ch. 1.); further, in the env. G--C C, the non-high variant usually shows: ʕezₓr-ī 'my help', ?ektōb 'I will write', with just a couple of exceptions: ʕīmq-í 'my valley', hizq-i 'my strong one'. Observe that the selection of high variants before geminates triumphs over the guttural restriction: ?ikkātēb 'I will be

written', ʕinnəb̄ē 'grapes of' (irreg. construct plural of
ʕēnāb̄ 'grapes').

We may summarize the discussion in four statements of
distribution:

(7)   a. i,u in the env. -- C_iC_i

      b. i   in the env. # C_1 -- C_2C, where C_2 is never

                                              C_1 almost never guttural

      c. i   in the env. --C + C (underlying)

      d. e,o elsewhere

These distributional properties do not enforce a choice of
underlying system, but they do rather suggest one. Since it
is the <u>high</u> variants that occur in natural, positively
characterizable environments, it is a small matter to raise
the non-high /e o/ in just these positions. Actually, there's
a technical way to duck this argument: instead of writing
e.g.:

(8) o → u / -- C_iC_i

one could write

(9)   a. u → u / -- C_iC_i

      b.   o / elsewhere

In fact, rule (9ab) can be compactly expressed in SPE-type
notation as

$$(10) \quad \begin{bmatrix} +\text{high} \\ +\text{rnd} \end{bmatrix} \quad --- \quad \left[(+\text{high})_a \right] \quad -- \quad (\ c_i c_i)_b X \ \#\#$$

Condition: $a \cong b$

Rule (10), by feature counting, is no more complex than rule (8), which only makes reference to the natural environment 'before a geminate'. Rule (10) manages to sneak in the complementary notion 'everywhere except before a geminate' as the environment for the non-vacuous part of the rule.

A priori, the device of vacuity and disjunction used in rule (10) is undesirable because it allows a tremendous range of descriptive license; a posteriori, it simply does not accord with the wealth of phonological practice to identify in complexity the notions 'natural environment' and 'complement of natural environment'. The notion of complement may have its uses (vide Kiparsky 1973, Halle, Prince, Vergnaud 1975), but the sheer infrequency with which an environmental complement is significant (outside, perhaps. of stress rules) argues that the complement notion, if admitted, involves a complexity not present in a simple positive statement. Although a principled resolution of the issue is well worth seeking, ad hoc prohibition of sub-rules that are always vacuous improves the theory, eliminating (10) from the canon of possible rules.

Assuming, therefore, that the facts of distribution do imply a direction of derivation from /e o/ to /i u/, it does

not follow that /e o/ are <u>underlying</u>, only that the short

vowels must be non-high at the stage of derivation when

the rules of distribution apply. At the latest, this is

just prior to schwa-deletion, which collapses the pronominal

ending structure +V+C ... with the inflectioal ending

structure +C..., thus obscuring the relevant distinction

between, for example, +ten (yəlidtén) and +e+ka (gaddelká).

To probe the earlier stages of derivation, working back

toward the lexicon, we must examine the character and

effects of the centrally important rules that lengthen

vowels.

It is the effect of TL, when it applies to vowels

underlyingly short, to output non-high vowels /ē ā ō/.

The following table registers the typical facts:

	Products of TL	Gloss	Short Occurrence		Reduced Occurence	
ē	ʔém	mother	ʔimm-í	'my ...'	--	
	kābéd	he's heavy	-		kābdú	'they're ...'
	giddél	he raised (grew)	giddelká	'... you ms'	giddəlú	'they ...'
	seper	book	sipr-í	'my...'	səparím	'books'
	yebᴋ	let him weep	yibké	'he will...'	--	
ō	hōq	statute	huqqím	'statutes'	--	
	ʔāyóm	afraid	ʔayummím	'pl.'	--	
	qodeš	holiness	qodš-í	'my...'	qodaším	'pl.'
	sōb	go around (inf.)	subb-í	'for me to...'	---	
	yiktób	he will write	yiktob-ká	'...you m.s.'	yiktəbú	'they m. ...'

These data suggest that at the time of TL the short vowels

are /e a o/. If not -- if the non-low vowels are /i u/ --

a special lowering clause must be written into TL.

The rule PTL outputs the same class of segments as

TL:

PTL Product	Gloss	Short Occ.	Gloss	Red. Occ.	Gloss
ꭎ- /ˊ sem+ot	names	ˇ simka /ˊ	your ms. ...	ˇ sᴣmot /ˊ	names of
lebab ̄ˊ	heart	--		lᴣbabot ̄ˊ	hearts
yedaʕ ̄ˊ	he will know ---			yᴣdaʕeha ̄ˊ	he'll know her

As noted above (1.5), the vowel u-o never occurs in the environ-

ment of pretonic lengthening, because (1) it doesn't occur in

stems C-CCVC, and (2) even when it occurs in the env. CVC-C,

the final consonant is doubled by O-Closure, thereby ousting

the round vowel from the --C V̸ configuration demanded by PTL.

Here again the non-high output militates for a non-

high input, /e o/ rather than /i u/. If we hold on to /i u/,

we are stuck for an account of why both PTL and TL accomplish

a lowering: to write lowering into each rule is to claim a

merely accidental resemblance. And this is an accident

which is all the more striking because the surface distribu-

tional facts imply that short vowels are basically non-high, *high*

only in special circumstances. The generalization that seems

to be emerging is this: for purposes of phonology, short

vowels -- lengthened or not -- behave as if they were non-high.

There is in the grammar of Hebrew yet a third rule of
lengthening. The gutturals -- /ʔ h ḥ ʕ r / -- may not stand
geminated at the surface. Whenever the grammar produces
a doubled guttural, there is simplification; and if the
geminate is not word final, there is lengthening (compensa-
tory one might say) of t. ˑ preceding vowel. Such clusters
arise (1) when gemination of the 2nd radical is used as a
derivational device: in the conjugations Piʕʕēl, Puʕʕal,
Hitpaʕʕēl; in the nomina opificum, as gannāb 'thief' from
ganāb 'to steal'; in the adjectives of defect, as gibbēn
'hump-backed'; (2) when n assimilates to a following consonant:
as in the verbs I-n like nāpál, impf. yippōl /ya+npol/; with
the preposition min- 'with' (optionally), as mibbáyit
'from a house' /min#bayt/; in the imperfect Nipʕal, e.g.
yikkātēb 'it will be written' from /ya+n+kāteb/, where the
n- is the marker of the conjugation; (3) in roots where the
second and third consonants are identical, as rbb, which is
connected with a verb ráb 'to be numerous' (3 pl. rábbū),
and adjective rab (pl. rabbím), and nouns rəbābā 'myriad',
ráb 'captain, chief (great one)' (pl. rabbím); (4) after
certain grammatical particles, most prominently the
definite article ha-, as habbáyit 'the house' and the
conjugation wa- in the convert-d jussive construction
wayyiktōb 'and he wrote'. (Geminates also arise
through morpheme concatenation, as in kāráttī 'I cut'
/karat+tī/, but since no suffixes begin with gutturals, this

configuration never produces releveant material.) In all these
categories there are cases where the consonant geminated is
guttural. The results are tabulated below:

Category	Root	Expected Form	Form	Gloss
Pi꜄꜄ēl	m?n	*mi??én	me?én	he refused
	brk	*birrák	berák	he blessed
	bꜥr	*biꜥꜥér	biꜥér	he burned
Puꜥꜥal	brk	*burrák	borák	he was blessed
Hitpaꜥꜥēl	brk	*hitbarrék	hitbárek	he called himself happy
Nom. Op.	prš	*parraš	paráš	horseman
Adj. Def.	hrš	*hirreš	hereš	deaf
Verb I-n	nht	*yinhát *yihhát	yehát	he marched down
Nipꜥal	?mn	*yi??amén	ye?amén	he will be trustworthy
	nhm	*ninhám *nihhám	nihám	he was sorry (/na+nham/)
Min + ...	ꜥbd	*miꜥꜥebed	meꜥébed	from a servant
Gem. Root	rꜥꜥ	*ráꜥꜥ	ráꜥ	evil, or 'he is evil'
		*raꜥꜥím	raꜥím	evil ones
		*ráꜥꜥu	raꜥu	they are evil
		*raꜥꜥotém	raꜥotém	you m.p. are evil
Gram. Part.		*wa??ektób	wa?ektób	and I wrote (/wa#?a+ktob/)
Gram. Part		*haꜥꜥír	haꜥír	the city (/ha#ꜥir/)

These data testify to the existence of a rule like this:

(11) Guttural Lengthening   S.C.   V $\begin{bmatrix} + \text{ C.P.} \\ +\text{son} \end{bmatrix}$ $\begin{bmatrix} + \text{ C.I.} \\ +\text{son} \end{bmatrix}$

                                              1   2   3

Condition: 2=3

S.D. a. 1 → [+long], b. 2 → ∅

The rule must be ordered after Degemination (rule 1.51).

The doubled guttural of ra´ʕ 'evil' /raʕʕ/ does not induce

lengthening: indeed, like any other two consonant sequence

word-final guttural geminates thus does not procede by

Guttural Lengthening; and application of WFD to a form like

/raʕʕ/ destroys the crucial geminate context in which

lengthening occurs. It is advantageous to order Guttural

Lengthening before Hateph-Formation, because H.F. in its

most general form (V̆ G C → V G V C) would disrupt the en-

vironment for Guttural Lengthening. A form like **raʕăʕím

is totally impossible; this is expressible without complication

of the rules by ordering the loss of geminate gutturals before

H.F. (Observe that, if the opposite order is permitted, and

HF allowed to apply to geminate gutturalforms, the S.D. of

Guttural Lengthening must be complicated to V G_i (V) G_i,

where the first three terms are mapped onto V̄; the optionality

of the 3rd term is required because in a form like ráʕʕū,

H.F. would never apply to the stressed vowel: yet the output

is ráʕū.)

Most pertinent to the present inquiry is the character

of the rule's output: the non-high vowels /ē ā ō/. This

means that there are three widely sepatated and formally

dissimilar rules in the grammar which accomplish the same

mapping of short vowels onto non-high long vowels. Taken

with the distributional evidence, the behaviour of the

three rules, PTL, TL, and GL virtually demonstrates that the

short vowels of the language are /e a o/ at the quite early

point of derivation when PTL applies.   The question then

arises, whether there is any motivation for an early lowering

rule: whether in fact the underlyinc system is not simply

/e a o/.

Before we turn to tighten the garrotte of ratiocination

aroundthe neck of this question, let us look a little harder

at the phenomenon and the rule of Guttural Lengthening.

In the doubled conjugations (piꟻꟻēl, Puꟻꟻal, Hitpaꟻꟻel),

there is a considerable amount of exceptionality to the

lengthening provision of GL. In the table, the verb biꟻēr

'burn' was presented as a characteristic example. The rule

seems to be (cf. Lambdin 1971, p. 195) that r always causes

lengthening but that with the others /ʔ h ḥ ꟻ) there is a

free choice which is made consistently fɹr each verb. Thus

mē?ēn undergoes the rule in all persons, numbers, tenses;

ni?ēṣ 'spurn' undergoes the rule in none of them. (Exception

to generalization: root nhl, which gives rise to nēhēl 'he

guided' in the perfect, but yʌnahél /ya⁻nʌhel/ 'he will

guide' in the imperfect, for expected *yʌnāhél; part. mʌnahēl

/ma+nahhel/, *mʌnāhél.) Patterns of exceptionality give

evidence about the organization of the lexicon; this one

supports the view, put forward by Aronoff (1976) among

others, that exception features adhere to the morpheme -- in

this case to the stem morpheme of the doubled conjugations.

Regarding exceptionality as an intrinsic property of

morphemes -- formally allowing simple exception features

$[-R_i]$ to be attached lexically to morphemes rather than seg-

ments or polymorphemic words-- predicts that any exceptionality

not so definable is of greater complexity, therefore less

likely to be found, more likely to be regularized, and so

on. Contextual exceptionality -- such as that of a word in

the construct state, a syntactic environment; or of a word

in certain case; or of a morpheme when it abuts another

morpheme -- is relegated to the mechanism of minor rules, which

is appropriately unwieldy and feature-consuming. Following

the proposal of chapter 1, if a word W is exceptional to a

phonological rule R in a (morphological or syntactic) context

C, let us stipulate that this is expressed by a minor rule of

feature assignment of the form (12).

(12)   [+D] → [-R] / --C

where [+D[is an ad hoc diacritic mark entered with W in

the lexicon. Any exceptionality displayed by a polymorphem-

ic complex thus eats up a considerable number of features in

being expressed.

It is not surprising, then, that when the context for

Guttural Lengthening is supplied by combination of morphemes,

the rule is uniformly regular. In the Niṕ̄ial imperfect,

which has the structure Prefix-n-Stem, the rule always

applies when assimilation of the conjugation marker n̲ to a

stem-initial guttural creates the context: as in the given

example yē?āmēn, from /ya+n+?āmen/. With the preposition

min- 'from', when the optional assimilation of the final n̲

produces a geminate guttural, the word takes the form mē always,

as in mēhabbáyit̲ 'from the house' /min#ha#bayt/. Without

assimilation, you get min-habbáyit̲, of course, since the rule

is simply not invoked. The conjunction wa- always shows up as

wā before the 1 pers. sing. jussive, the only form which

begins with a guttural: wā?ektōb̲ /wa#?a+ktob/, where the

prefix ?a-signifies ego.

The situation with the definite article ha- is a little

more complicated, but still revealing. Since ha- causes

gemination of the word-initial consonant that follows it (and

all words begin witha consonant), the form hā is expected to

occur uniformly before words beginning gutturally. This is

not the case. Lambdin summarizes the article's alternations

as follows (1971, p. 8):

a. Before ? and r the article is hā-

?íš	a man	hā?íš	the man
rāʕáb	a famine	hārāʕáb	the famine

b. Before ʕ the article is normally hā-, but if the ʕ is followed by an unaccented a, the article is he-

ʕír	a city	hāʕír	the city
ʕārîm	cities	heʕārîm	the cities
ʕāpár	dust	heʕāpár	the dust

c. Before ḥ and ḥ the article is normally ha- [short a]. But if ḥ is followed by an unaccented a, or if ḥ is followed by an accented or unaccented ā, the article is he-

hēkál	a palace	hahēkál	the palace
ḥéreb	a sword	haḥéreb	the sword
ḥākám	a wise man	heḥākám	the wise man
hārîm	mountains	hehārîm	the mountains

The reference to the accented-unaccented distinction can be eliminated in favor of a special rule dealing with the accented (for the most part monosyllabic) cases. Monosyllables-- even those which end in two consonants, like gán /gann/ 'garden', ʕám /ʕamm/ 'people' -- generally take on a long vowel when prefixed with the definite article, contrary to the usual restriction on TL: haggán, hāʕám. Correlate to this is the appearance of ā inthe article where it's not expected, i.e., before ḥ, which never induces lengthening of the article's

vowel, and before ʕa, where dissimilation to e should occur.

Characteristic examples of the phenomenon are:

Indef.	Expected Def.	Real Def.	Gloss
ʕám	*heʕā́m	hāʕā́m	people
hár	*hehā́r	hāhā́r	mountain
hárā	*hehā́rā	hāhā́rā	to a/the mountain
hág̣	=real	hahā́g̣	festival

Note that h is resistant to this assimilation of quantity.

Let us leave open the exact formulation of the rule: it

may be a rule unto itself, or a rider on Guttural Lengthening.

These cases handled appropriately, we can reformulate

Lambdin's description without reference to stress:

(1) Word initial ẖ, h never cause lengthening in the

article.

(ii) The article ha- is he- before surface words

shaped #Ḡā ..., where G=h, ẖ, ḥ, ʕ.

(iii) Elsewhere before a guttural, the article is hā-

The dissimilation (ii) occurs elsewhere in the grammar.

There is a minor rule that apparently doubles ḥ in certain

words, just when it occurs before word stress:

(13)   Minor Ḥ Doubling   ḥ → ḥḥ /-V́
/in certain forms
S

The rule is visible in the plural of ʔāḥ /ʔaḥ/ 'brother',

which is ʔaḥī́m /ʔaḥḥī́m/, where the doubling inhibits PTL.

When the pronominal suffixes are added, this is what happens:

		Sing	Plural
1		ʔaháy, pause: ʔehāy	ʔahēnū
3	m.	ʔehāw [ʔahhāw]	ʔăhēhém
	f.	ʔahéhā	ʔăhēhém

It is clear from the orthography that before stress only a short vowel appears; and when the stress does not immediately follow the h, a reduced vowel, a schwa-reflex, is written, indicating that doubling has never taken place. Of interest to the present discussion is the 1 pers sing. pausal form ʔehāy, and the 3 pers. m. sing. form ʔehāw, in which the underlying /a/ has dissimilated in exactly the same environment that the process occurs in the definite article. The numeral ʔehād 'one' appears as ʔahàd in the construct state, indicating that to the underlying form /ʔahad/ the rule (13) applies. In construct, the final /a/ is not lengthened, so no dissimilation occurs. The forms evidence a rule of this form:

(14)   Guttural Dissimilation $a \rightarrow e$ / -- G_i G_i $\bar{a}$

There are certain problems in building rule (14) into the grammar, mainly due to the ambidextrous character of ʕ. Concentraint on other gutturals /ʔ r h ḥ/, it is efficacious to order Guttural Dissimilation after Guttural Lengthening. Since GD applies to short vowels, it functions to pick up

the pieces--the **unlengthened** exceptions -- left behind by
Guttural Lengthening. This ordering explains why there are
no he- type articles before ?, r: because GL is totally
successful before them, always outputting hā-, which is not
susceptiblr to GD by virtue of its long vowel. This ordering
accords as well with the data from the plural of ?āh: since
the morpheme is exceptional to GL, it provides material for
dissimilation. The opposite situation, a non-exceptionality
that would produce *?āháy from /?ahhay/, along with a pausal
form, ?eháy, does not occur, as the ordering predicts.

But Ꞌ stands in the middle: whereas /h h/ associate
shortness and dissimilation, / ? r/ length and non-dissimila-
tion, before Ꞌ, ha- either lengthens or dissimilates, never
surfacing with a short a. Compare these derivations under the
GL-GD hypothesis:

	/ha#?adam/	/ha#Ꞌīr/	/ha#Ꞌarīm/	/ha#hakam/
Early Rules	ha??ādám	haꞋꞋír	haꞋꞋārím	habhākám
Gutt. Length.	hā??ādám	hāꞋꞋír	hāꞋarīm	—
Gutt. Diss.	--	--	*-	hebhākám
Other:	hā?ādám	hāꞋír	**hāꞋarīm	hehākám

The correct form, of course, is heꞋārím 'the cities'. Various
possible modifications come to mind, all deficient. Inverting
the order of the rules (1) drops the explanation for non-
dissimilation before /? r/, necessitating an ad hoc complica-
tion of GD to exclude them, and (2) leaves one wondering why
the form is not *heꞋārím, with the dissimilated vowel

lengthening. Keeping the order GL-GD requipes either a special restriction on GL to the effect that lengthening is blocked before $\underline{\Upsilon}$ just in case the enfironment for dissimilation is met, an egregious pleonasm, or a complication of GD so that it takes $\bar{a}$ to e but only before Υ, and only when the following vowel is unstressed--i.e., when the $\bar{ha}$ has not arisen from the special rule dealing with $h\bar{a}h\acute{\bar{a}}r$, $h\bar{a}\Upsilon\bar{a}m$.

Even without resolving the problem, however, we can perceive the salient features of the phenomeon. It seems likely that there were historically two principal stages of simplification: the first; affecting mainly /? r Υ/, accomplished a compensatory lengthening; the second simply and thoroughly degeminated all remaining double geminates, without lengthening, leaving the vowel structure as it was. In between the two events dissimilation occurred at those places where failure of the first compensating simplification had left a short vowel in the appropriate environment. The morpheme-internal exceptionality so abundant in the doubled conjugations is a testament to the somewhat sporadic character of the first change. But all such testimony is absent from the morpheme-concatenatory environment of definite article-plus-noun. Here the effects of the change have been completely regularized, and the regularized alternations of the definite article have been cast in entirely phonological terms. Under the proposal advanced here, any contextual

exceptionality would have to be expressed in the format

(15)   ha → [-R$_i$]/ --W   , W- a word.

Rule (15) says that for the particular word W, its definite

form ha#W fails to undergo the Rule R$_i$ (which would be

either GL or GD). Any word that displayed peculiarity would

be associated with one such rule; a tremendous cost. This

stands opposed to a theory which allows features like

[- context R$_i$] to indicate that a certain morpheme or seg-

ment does not condition R$_i$; it also stands opposed to a

theory which would list every definite form in the dictionary,

allowing the form to bear a simple exception feature [-R$_i$].

The proposal at hand is essentially equivalent to putting

only non-predictable material in the lexicon, and charging

for it -- the classical idea that the lexicon is the repository

of idiosyncrasy. What is interesting is that the idea has

actual predictive power, and that the predictions are borne

out in data of some complexity.

We have seen a variety of forms in which Guttural Length-

ening fails to take place, but none in which by consequence

a guttural appears on the surface geminated. There is,

evidently, a rule that simplifies all doubled gutturals.

(13) Gutt. Simp. $G_i G_i \rightarrow G_i$

By the logic of parsimony used above in reference to GL, rule
(k3) must precede Hateph-Formation. It follows, GL, cleaning
up after it.

Rule (13) is the synchronic image of the second historical
stage of loss. Under current assumptions about phonological
structure, it obviates the necessity for rule (11b), the de-
letion of 1/2 of Guttural Lengthening which accomplishes de-
gemination. Guttural Lengthening is therefore merely a length-
ening, and not a combination of two correlative processes.
This accords with the claim of Chapter I that phonological
rules are limited to making but one 'change'.

However, there was, if the historical account given is
correct, a period before Gutt. Simp. entered the language
during which Guttural Lengthening was operative in its original
form, as a rule of degemination-and-compensatory len-thening.
In this period no bifurcation of function could be maintained,
for those doubled gutturals that did not degeminate-and-lengthen
apparently remained in the language in geminate form. To posit
two separate single-change rules for this stage compels marking
the survivor geminates exceptional to both rules, missing the
point. (The point being that degemination occurred if and
only if lengthening did.) This does not imply that we must
loosen our control of the formalism, but rather that we should
improve our grasp of phonological structure.

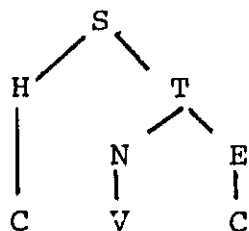Under this laudable aegis, then, let us indulge in a
little speculation.

(A) Assume that any (tautosyllabic?) sequence

of two identical short vowels is, according to universal con-
vention, analysable as a single long vowel. The rule GL can
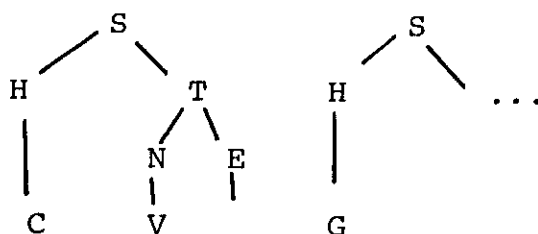be reconceived as a rule of total assimilation:

(14) Gutt. Assimil.   S.D.   V G G

                               1 2 3   Cond. 2=3

                       S.C.   2 → 1

From an input $V_j G_i G_i$, the rule outputs $V_j V_j G_i$, and the con-
vention allows $V_j V_j$ to be interpreted as $\bar{V}_j$, even though
the language does not otherwise make use of 'moras' in the
rules we have studied. The basic empirical claim of an
approach like this is that rules of compensatory lengthening
will be constrained by the notion 'possible assimilation'.
In the case at hand, assimilation is not wildly unthinkable,
since gutturals are, like vowels, sonorant and non-consonantal.
Unexplained, perhaps, is why the rule should affect only
geminate gutturals, and not just any guttural in the environ-
ment V -- C.

(b) Assume that the syllable is a unit of phonological
organization, and further that syllables are given a hierarchic-
al structure along the often suggested lines:

```
              S
           /  ⟍
         H       T
         |      / ⟍
         |     N      E
         |     |      |
         C     V      C
```

(Syllable, Head, Tail, Nucleus, End). In this conception
length is regarded not as an intrinsic property of segments,
but as structural property given by the syllable tree: a
long vowel holds down two slots, a short vowel but one.
Suppose that the rule of Guttural Lengthening consists in
deleting the first of a sequence of two identical gutturals,
without altering the syllable structure. This leaves a
structure like this:

```
        S                    S
    /  / \            /  / \
   H      T          H      \  ...
   |     / \         |
   |    N   E        |
   |    |   |        |
   C    V            G
```

What could such a configuration signify? A plausible inter-
pretation is that E is to be associated with the material
under its sister node N. The vowel V thus 'expands' to
occupy both slots under T, making it long.

THis approach associates compensatory lengthening with
thy class of natural deletions, perhaps also with re-syllabi-
fications.

2.3   The Short Vowels Analyzed

To return to the theme of the investigation: we have assembled
what amounts to proof that, for purposes of phonology, short vowels
must be treated as non-high. Evidence has come from two conceptually
distinct areas. We saw first that the distribution of high and non-high
variants could be naturally expressed by taking the non-high vowels
/e o/ as (relatively) basic and raising them in a certain few environments.
Second, we reviewed the phonological lengthening rules of the language and
found that they all output non-high vowels, a generalization that should
not be scattered among the various rules as a (coincidentally) repeated
stipulation.

Assuming a non-high input, then, let us formulate the rules of
distribution implicit in (7) above. Raising occurs universally before
geminates:

(17)   Pre-Geminate Raising
$$\begin{bmatrix} V \\ -low \\ -lng \end{bmatrix} \longrightarrow [+hi] \ / \ -- \ c_1 c_1$$

Rule (17) can be quite tightly ordered in the grammar. It must follow
Guttural Lengthening, rule (11); otherwise Guttural Lengthening would
output not bōrák 'he was blessed', from /borrak/, but **būrák. And it must
precede Gutt. Simp., rule (16), because geminate gutturals, even though
simplified on the surface, induce raising, as in words like bīḷer /biḷḷer/
'he burned'.

The high-vowel i is seen in the env. --C+C: cf. yǝliḏtén/ *y ledten;
g birtī/*gǝbertī from gǝbéreṯ /gbir+t/. These contrast, as noted above,
with forms in which the two-consonant cluster is created by pronominal
suffixation: šōmerḵa /šōmer+e+ka/. Since the pronominal suffixes are

attached with a linking vowel (Ch. 1.4), such clusters are brought about

only through the process of Schwa-Deletion.

We therefore posit rule (18), ordered anywhere before Schwa-Deletion:

(18) Pre-Suffixal Raising   e $\rightarrow$ i / -- C + C

Rule (18) is not quite as universal as rule (17); the word $\check{s}\bar{a}\acute{k}\bar{e}n$ /šaken/

'neighbor, inhabitant', when derivationally feminized and subsequently

affixed, shows $\check{s}\partial\acute{k}ent\bar{a}h$ 'her woman neighbor', for expected $*s\partial\acute{k}int\bar{a}h$,

from /šaken+t/ plus /a+ha/.

In closed initial syllables, /i/ appears.

(19) Initial Raising   e $\rightarrow$ i / $\#C$ -- C   C
(preliminary)   [-gutt] [-gutt]

The feature [-gutt] is, of course, an abbreviation for $\left\{\begin{smallmatrix}-lo\\-son\end{smallmatrix}\right\}$. Restricting

the rule in this way means that e.g. tehdar   'she will favor', rather

than *tihdar, will be output. As noted above, there are some exceptions

when the first consonant is guttural: $\bar{\text{ì}}$imqĩ 'my valley', ḥizqĩ 'my strong

one'. Exceptions when the second consonant is guttural are found in the

imperfect inflection of the verbs $h\bar{a}y\acute{a}$ 'to be', $h\bar{a}y\acute{a}$ ' to live':

yihyé, yìhyé.

This pattern of exceptionality suggests that we purify Initial

Raising of its restrictions, and introduce a rule to deal with the

guttural phenomena.

(20) Guttural-E   i $\rightarrow$ e / # $\begin{bmatrix}+lo\\+son\\-syl\end{bmatrix}_a$ -- $\begin{bmatrix}+lo\\+son\\-syl\end{bmatrix}_b$ $\begin{bmatrix}-syl\end{bmatrix}$

Condition: a or b

Rule (19) then appears as:

(21) Initial Raising   e $\rightarrow$ i / # C -- C C
(2nd Vers.)

Now, the rule Initial Raising (in either version) is virtually

identical to Schwa-to-I, rule (41) of chapter 1, and indeed falls in the

same place in the ordering, since both are fed by Schwa-Deletion.

We therefore combine the two rules:

(22) Initial Raising $\begin{bmatrix} +syl \\ -rnd \\ -lo \end{bmatrix} \rightarrow \begin{bmatrix} +hi \end{bmatrix} \ / \ \# \ \begin{bmatrix} -syl \end{bmatrix} -- \begin{bmatrix} -syl \end{bmatrix} \begin{bmatrix} -syl \end{bmatrix}$

The obvious question raised by rule (22) is whether it can be identified

with the rule responsible for raising the vowel in dibrehém /dabar+ay+hemm/,

yiχtób /ya+ktob/ and in cases of that ilk, the rule first identified as

A-to-I (rule (20), chapter 1). Let us briefly defer this question until

we've completed the analysis of short vowels.

Is there an early rule lowering short vowels? The evidence for

such a rule comes from the shortening of any underlying long vowels which

end up in the env. --CC due to processes of derivation or inflection.

This is quite palpably visible in the Hollow verbs like qám, in which the

morphologically lengthened ā of the stem appears short whenever a consonant-

initial affix is attached, e.g. qamtém, qámtī.

The question then becomes: what happens to the high long vowels

/ī ū/ when they are shortened. Do they fall into the paradigm of the

underlying short vowels, behaving as non-high with respect to the lengthen-

ing and distribution processes, or do they retain an identity of their own?

The answer is, as foreshadowed in 1.2, that they merge completely with the

short vowels. We reviewed some of the data of /ū/ in 1.2; here let us

look at /ī/ data, of which there is an abundance in the Hipíil.

First, observe that when geminate roots $(C_1C_2C_2)$ are mapped onto

a stem that is prefixed, they never adopt the otherwise universal shape

CCVC. In the Qal imperfect, for example, instead of **yisbób (from

sābab 'to go around'), the correct form is yasob /ya+sobb/. Evidently, a

general rule of metathesis re-arranges any such configurations that

would be created by the morphology:

(23) Like-Cns Metath.   S.D.   C C V C

                                 1 2 3 4

                         S.C.   1 3 2 4

The rule applies, of course, in Hipíil, and the surface result for the

same root is hēsēb (3ms), which has hēsébbū (3p) and hasibbótī (1s),

where the ō is a linking vowel regularly interpolated after stems that

are not 'normal', i.e., shaped -CCVC-, namely hollows (haqīmótī) and geminates.

Note the short i that appears when main stress does not lie on the stem vowel.

These data find an explanation if the rule of Lowering (Ch. rule 8),

is accepted in the grammar.

(24) Lowering $\begin{bmatrix} V \\ -\text{lng} \end{bmatrix} \rightarrow [-\text{low}]$

The rule necessarily precedes TL, which depends crucially on its output to

function correctly (hēsəbbū). With a rule like (24) in the grammar, it

becomes quite moot phonologically whether the underlying short vowels are

/i u/ or /e o/, or any combination thereof. (If they are /i u/, then

Lowering must precede BTL).

For convenience, I re-state the rule of Shortening:

(25) Shortening $V \rightarrow [-\text{long}] /$ ── C C

Further evidence for the operation of the rule is seen in the paradigm

of the Hipíil perfect:

hišmíd 'destroy'

	s	pl
3m	hišmíd	hišmídū
f	hišmídū	
2m	hišmádtā	hišmadtém
f	hišmadt	hišmadtén
1	hišmádtī	hišmadnū

Everywhere but in the 3rd person, the inflection affix begins with a consonant, and the vowel appears short.

What of the quality change? A quite general process in the language, prominent especially in verbal inflection, produces /a/ in the env. --C+C. A similar alternation is found in Qal verbs like kābéd 'to be heavy', and in those conjugations (Piṣṣēl, Hitpaṣṣēl) which regularly have e-perfects.

kābēd			giddēl		
	s	pl		s	pl
3m	kābéd	kábdū		giddēl	giddəlū
f	kábdā			giddəlā	
2m	kābádtā	kbadtém		giddáltā	giddaltém
f	kābadt	kbadtén		giddált	giddaltén
1	kābádtī	kābádnū		giddáltī	giddálnū

These data call for a rule that looks like this:

(26) Phillippi's Law $\quad \left[-\text{rnd}\right] \longrightarrow \text{e} \quad / \quad \text{--C+C}$

The morpheme boundary is necessary to keep the rule from applying in geminate roots, as in hēsébbū, hasibbótem.

The rule is not limited in domain to the inflected verb. Qal participles are formed from a stem /kōteb/, transparently visible in the unaffixed masculine singular kōtéb. To form the feminie singular, the affix /-t/ is attached, yielding kōtébet /kōteb+t/. It can only be the intervention of Philippi's Law that produces the short stressed vowel; otherwise, we should expect *kōtébet, like séper, rather than kōtébet, like mélek.

This result is consistent with the ordering necessitated by the finite-verbal data. Philippi's Law must precede TL, because the /a/ it outputs remains short, as the low-vowel restriction on TL would perdict.

The forms that we cited to motivate Pre-Suffixal raising, rule (18), are exceptional to Philippi's Law: yəlídten should be yəladten. They are relics left over from original form of the rule (as it was actually proposed by Philippi in the 19th century), in which it applied only to stressed vowels. It was generalized in the verb to the form it has in (26), regularizing the paradigm. In the participle, too, it attained freedom from the exigencies of stress-placement: the participle yōlédet 'giving birth', used nominally (agentively) can be suffixed, and comes out, e.g., yōladtō /yoled+t+a+hū/. The appearance of /a/ under suffixation confirms the proposal to invoke Philippi's Law in yōlédet, showing that after the application of the rule, the feminine participle merges with the mélek /malk/ class of segholates.

However, there are scraps of the old stress-dependency left in the language. Derivation of infinitives by affixation of /-t/, discussed in 1.8, sets up the context for Philippi's Law, and it does apply, netting us śébet (rather than *śébet) 'to dwell', where the imperative from the

same stem is šéḇ. Suffixed pronominally we find šiḇtám /seḇ+t+a+m/ 'for them m. to dwell', where Philippi's Law is passed by when stress is drawn away.

Again, the noun gᵊḇéreṯ 'mistress' is derived from the noun gᵊḇír 'master' by affixation of /-t/. A form like /gbír+t/ will undergo shortening, but without the intervention of Philippi's Law, the stem vowel would be lengthened to ē under stress by TL, to produce ʳgᵊḇéreṯ. Suffixed, the high front vowel shows it colours: gᵊḇirtṓ 'his mistress', the stress falling on the ending.

Finally, if our discussion of the hybrid class of segholates (qéḇer - qiṭrám) in 1.3 is correct, then in these forms we are witnessing application of a rule very like the Philippi's Law we have seen in the t-infinitives and nouns, a rule that turns /e/ (or /i/) to /a/ under stress, before TL. This rule differs from TL in that it doesn't require a morpheme boundary to separate the consonants of the conditioning cluster; and, of course, in that it is minor, since forms must be marked to undergo it. But these are mere fine-print riders: the rule is the same as the ordinary rule of Philippi's Law in its effects, its environment (stressed, closed syllable), and in its ordering. Therefore, we enrich rule (26), the first statement of Philippi's Law, to comprehend this range of collateral phenomena.

(27) Philippi's Law
(Annotated) $\begin{bmatrix} -\text{rnd} \\ (+D)_a \end{bmatrix} \rightarrow [+\text{low}] \ / \ \begin{bmatrix} -- \\ ((+\text{str})_b) \end{bmatrix} C \ (+)_c C$

Conditions (1) a $>$ -c

(2) In nouns and infinitives, b.

The diacritic $\begin{bmatrix} +D \end{bmatrix}$ is to be assigned to those nouns like qéber /qebr/ which undergo the rule.

There are certain words like yíggaš (root ngš) 'he will approach' (no perfect), which have an imperative in /a/: gaš ' approach! m.s.' Even these participate in the e-i vowel alternation in the infinitive gešet--gistí. If we assumed that the imperative stem vowel persists in the infinitive, we'd expect *gastí. Now, the infinitive vowel of the regular katób -type is /o/ even when the imperfect/imperative axis uses /a/ (vide supra 1.8), showing that the infinitive stem-vowel cannot be simply associated with that of the imperf.-imperative. Similarly, we may stipulate that infinitives in /-t/ -- stem-shape CVC -- must always take /e/.

One might attempt to account for forms like gistí by invoking the rule of A-to-I. However, if the i-a alternations occasioned by prefixation --as in biddél-yagaddél --are to form a basis for explaining the vocalism of imperatives (gaddél) and infinitives (gaddél), as was proposed in 1.7, then the rule of prefix-stripping must crucially follow A-to-I, since the underlying prefixes block application of the rule. Now, gistí is an infinitive, and therefore prefixed underlyingly, and that prefix removes the possibility of A-to-I just as it does in gaddél /la+gaddel/. So we settle on the first solution, stipulating /e/ for the 'short' infinitive, noting that this is supported by the fact of a parallel type of stipulation in the regular triliteral infinitives.

This necessary ordering A-to-I -- Prefix Stripping effectively isolates A-to-I from the similar process of Initial Raising. Prefix-Stripping must precede Cluster Break-Up, so that the initial cluster it

reveals (tiktob -> ktob) can be schwa-inserted. But Initial Raising
affects some of these inserted schwas (kitbí), and so must follow the
insertion rule. If Initial Raising is generalized to affect /a/ as
well, it will undo all the good work that Prefix Stripping accomplished,
for the /a/ of gaddḗl, yašmíd /y+ha+smid/, and so on, will no longer be
protected from the rule.

As was pointed out in 1.10 (when we re-named the rule A-to-E),
there is yet another force that stands between the proposed rule A-to-I
and its confrere Initial Raising, and that is TL. For the i-vowel of
the imperfect-jussive prefixes can come to bear stress, and when it does,
it often lengthens just like any other vowel. The process of truncating
the last syllable to form jussives in verbs III-y (vocalic endings on
the surface) exposes the prefix vowel to main-stress, so from yibké
'he will weep', comes yébk 'let him weep'. The transmutation from
underlying /ya/ must come before TL. And TL is right in the middle of
the ordering, whereas as Initial Raising is at the bottom. (The
reader is invited to re-access the chart in 1.10 so that these structural
matters may be clearer.)

An alternative choice of /ye/ as a basic, with a rule turning
it to /ya/ in the env. -- C V, loses the connection with the giddḗl-
yagaddḗl and the dābár-dibrehem phenomena, and makes initial syllable
vocalism even more conspiratorial than does the separation of A-to-I
and Initial Raising.

The final statement of the rule A-to-I given at 1.10 was this:

(28)   a   ->   e / # C -- C [-stress]

It is unfortunate that the rule cannot be ordered on principled grounds

before Lowering. Lacking such a principle, it becomes coincidental that

the rule outputs a non-high vowel, suitable for lengthening by TL. In

terms of the present proposal, it could just as well output /i/, giving

*yībk, which is clearly not possible. And, in fact, if we do ultimately

opt for /i u/ as the short non-low vowel system, Lowering must precede

PTL: but A-to-I has to follow AD, since its environment is crucially

determined by the operation of the de-stressing rule. In such a grammar,

there is no way that A-to-I could be placed before Lowering.

These considerations indicate that there is still thinking to be

done about the system of rules that handles the short vowels. The

principle that the lengthening rules must non-vacuously output /ē ā ō/

is almost, but not quite, captured by introducing the rule Lowering.

The fact that rules of raising fail to intercede before the lengthenings

must, in present system, be regarded as a providential accident; but

the feel of the language is that this failure is a necessity, a defining

feature of the lengthening system.

The rule A-to-I does not leave its mark when a guttural is the

first root consonant: contrast yaˁamṓḏ 'he will stand' with yiḵtṓḇ

'he will write'. Is this due to a restriction written into the rule?

There is actually a rule in the grammar that accomplishes a lowering in

the env. --G C#. It is visible in Hipˁīl, if you play your radicals

right. Pick a geminate root where the last two consonants are guttural,

like rˁˁ 'pertaining to evil'; in Hipˁīl it comes out hēraˁ́ /he+rīˁˁ/

'to do evil' (represented after Like-Consonant Metathesis). All other

things equal, we'd expect *hēréaˁ, but apparently the vowel, once

shortened, is lowered: recall the similar process at work in Piˁˁel.

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producing e.g. šillah for *šilleah. That it only applies to short

vowels is evident from roots where only one guttural follows the

I-stem vowel, as in hišmiaʕ 'cause to hear: announce'. We therefore

revise rule (32), chapter 1.5, to accord with the Hipʕil data:

(29) Guttural Lowering   e → a /   --G(C)#

This rule can easily be expanded to accomodate the yaʕamod cases:

(30) Gutt. Low   e → a /   -- (+)ₐG (C X)_b(C)#

Condition: b⊃a

The condition is necessary because the rule doesn't operate inside

morphemes, such as, for example, the Piʕʕel stem. Found are berek

or biʕer, not barek or baʕer (in the perfect). This rule can be fitted

in between A-to-I and TL. It must precede TL so that the a-vowel of

šillah is kept short.)

What then of the forms where A-to-I has apparently applied to

verbs I-guttural: those like yehezaq, tehdar, which have e-prefix

vocalism throughout the paradigm? The central fact about these verbs

is that they always have a-imperfects. This suggests a dissimilation

of the prefix vowel, over-riding the guttural preference for lowness

expressed in rules like (30). And indeed we have seen just such a

dissimilation in the definite article, given above as rule (14),

Guttural Dissimilation. There is a distinction between the two cases,

in that the definite article requires a long a in the next syllable to

occasion the dissimilation, and the verbal prefix never even catches

sight of a long a, but this a mere detail, a morphological dependency

can easily be encoded, in the spirit of reckoning the obvious

generality of the process and maintaining the non-essential details
in a subordinate position.

(31) Gutt. Dissim. $a \rightarrow e \ /\text{--}G \ (\#)_a C \begin{bmatrix} a \\ (+\text{lng})_b \end{bmatrix}$

                   Condition: $a \supset b$

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