TOPICS IN TIBERIAN BIBLICAL HEBREW

METRICAL PHONOLOGY

AND PROSODICS

by

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Tiberian Hebrew Phrase-final Stress-shift Blocking and Strictly Non-Sequential Optimality Theory

In Tiberian Biblical Hebrew, a number of separate and independent phonological processes which result in non-default surface stress positionings (i.e. "stress shifts") are all blocked from applying within words that receive the higher-level prosodic prominence which is regularly assigned to the last word within each Hebrew phonological phrase. This generalization can be explained within a traditional theory of sequential derivations, but there does not seem to be any very satisfactory way to account for it within a strictly non-serial version of Optimality Theory. The phenomenon can technically be handled using Sympathy, but here Sympathy would not be used in order to account for opacity, and in fact would be misused – that is, used merely as a formal device that would allow sneaking in an intermediate derivational form (the Sympathy candidate) between input and output. And such a pseudo-Sympathy account would still not be as insightful and explanatory as a traditional sequential account, leaving Hebrew phrase-final stress-shift blocking as an unresolved problem for strictly non-serial Optimality Theory.

This is an excerpt from my dissertation, containing a slightly-revised version of Supplement (appendix) B to Chapter 2. There are references to other parts of the dissertation, but this appendix is fairly self-contained. The entire dissertation can currently be downloaded in Adobe Acrobat PDF format from the web page http://www.crossmyt.com/hc/linghebr/

Supplement B to Chapter 2: Hebrew Stress-shift Blocking and Optimality Theory

One thread that runs through all the chapters of this dissertation is the phenomenon that phonological processes which shift the position of a word's main stress do not apply in words in a "pausal" environment (i.e. words with the phrasal-level prosodic prominence regularly assigned in Hebrew to the last word in a prosodic phrase) – as discussed in §1.3.2.2, §2.7.1.1, §3.2, and used as a tool in the reconstruction of the historical development of Hebrew stress in §4.4-§4.5. This general phenomenon of pausal stress-shift blocking has been satisfactorily accounted for within the theory of sequential (serial) phonological derivations assumed in this dissertation, but it is not clear that Optimality Theory can account for pausal stress-shift blocking in an equally satisfactory way.

As discussed in section §3.2.1, there are four separate stress shifts involved (i.e. basically all the relevant stress-shift processes in Hebrew),[2.26] which are shown in (2.44)-(2.47) below, repeated from (3.34)-(3.37):

2.26 However, pausal stress-shift blocking is irrelevant for the rhythm rule of chapter 2, which only applies to shift the stress of non-phrase-final words. And the stress-shift of unsuffixed consecutive imperfect, jussive, and imperative verb forms derived from "lamedh-he" (i.e. final consonant *y*) roots – which has become dissociated from the general consecutive imperfect stress-shift process (2.45), because it shows the peculiarity that it is always accompanied by final-vowel truncation, and perhaps should not be analyzed as a simple stress-shift process synchronically – is not subject either to pausal stress-shift blocking, or to other general constraints on Hebrew stress-shift processes, as discussed in fn. 1.23, §1.3.2.2, §2.7.1.1, §3.2, and §4.5, and in connection with (1.6)-(1.7) in §1.2.3.

(2.44) Rightwards stress shift off a light penult onto word-final CVV syllable (with reduction of former main-stressed syllable):

Pausal:	(tooméruu →) tooméeruu]	“you (masc.pl.)
Non-pausal:	(tooméruu →) toomrúu	will say”

Pausal:	dəb̲aarék̲aa]	“your (masc.sing.)
Non-pausal:	dəb̲aark̲áa	word”

(2.45) Morphologized leftwards stress shift of the consecutive imperfect tense:

Pausal:	wayyaaqóom]	“and he stood up”
Non-pausal:	wayyáaqom	

(2.46) Morphologized rightwards stress shift of the 2nd.sing.masc. and 1st.sing. inflected forms of the consecutive perfect tense:

Pausal:	wəʔaamáartaa]	“and you (masc.sing.)
Non-pausal:	wəʔaamartáa	will say”

(2.47) Morphologized rightwards stress shift of the first and second person singular personal pronouns (and *ʕattáa* “now”):

Pausal:	ʔáattaa]	“you (masc.sing.)”
Non-pausal:	ʔattáa	

Pausal:	ʔaanóok̲ii]	“I”
Non-pausal:	ʔaanook̲íi	

Here "]" stands for the location of a major, "pausal"-level, phrasal constituency break, and those lengthened vowels seen in the main-stressed syllables of pausal forms which are not also present in the corresponding syllables of non-pausal forms are due to the lengthening processes conditioned by phrasal-level prosodic prominence mentioned in §1.2.2 above.[2.27] Since basic (unshifted) main stress is generally placed on the penultimate syllable of underlyingly -CVV final words, and on the word-final syllable of underlyingly consonant-final words (as discussed in §1.1.2 above), and since none of the forms above changes its consonant-final or vowel-final status between underived representation and surface representation, therefore it is the pausal surface forms which show the initially-assigned position of the main-stress here, while non-pausal forms show the results of a stress-shift. Note that one of the four processes above, (2.45), shifts stress away from the end of the word, while the three others shift stress towards the end of the word; and one of the four, (2.44) has conditioning factors which are basically phonological in nature (with certain morphological exceptions), while the other three are morphologically determined (though subject to various general phonological restrictions on Hebrew stress-shifts).

As discussed in §2.7.1.1 and §3.2.2, in an analysis using serial phonological derivations, pausal stress-shift blocking can be explained by the Strong Domain constraint of Kager and Visch (1988) (according to which stress cannot shift within a domain which is strong at a higher level). Hayes (1995:389) reduces this condition to Prince's (1983) Continuous Column constraint (requiring that a prosodic head at any level must also be a head at

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2.27 Note that such "pausal lengthening" is not itself a conditioning factor in pausal stress-shift blocking, as has sometimes been proposed; this can be seen from the vowels of the stressed syllables of *ʔaanóoki̲i* and *də̲baaré̲kaa* above, which have not undergone lengthening, and from the existence of alternative "minor pausal" forms, such as *ʔáttaa* and *wəʔaamártaa*, which show pausal main-stress position but not pausal vowel lengthening, as discussed in §3.2.1.

all lower levels), under the assumption that only one grid mark may be moved at a time, and the result of each grid-mark movement must be a well-formed representation. This has the effect that a column of grid marks cannot be shifted as a unit:

(2.48) Word in Non-Pausal Environment (stress-shift does not involve any ill-formed intermediate representations):

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Word/Foot      x                 x
Syllable       x  x     →        x  x
              ʔáttaa            ʔattáa
```

(2.49) Word in Pausal Environment (stress-shift would necessarily involve an ill-formed intermediate representation):

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Phrase         x                 x              x
Word/Foot      x              x                 x
Syllable       x  x     →     x  x     →       x x
              ʔáttaa

Phrase         x              x                 x
Word/Foot      x                 x              x
Syllable       x  x     →     x  x     →       x x
              ʔáttaa
```

(According to the analysis of §1.3, the prosodic layer labeled “Syllable” in (2.48)-(2.49) should actually be the layer of reduction-structure metrical constituents, but this makes no difference here.) A first rough incomplete attempt at expressing this sequential account within an Optimality Theory framework might have a constraint ordering that looks something like this:

(2.50)

Continuous Column Constraint » Stress-shift Constraint » Main-stress Positioning Constraints

Here the “Main-stress Positioning Constraints” are some set of constraints (not necessary to be specified in detail here) which together govern the normal unshifted placement of Hebrew stress (i.e. basically on the penultimate syllable of words ending in underlying -CVV#, and on the word-final syllable of underlyingly consonant-final words, as mentioned above). The “Stress-shift Constraint” (which could override the default main-stress positioning constraints, because higher-ranking) would be different in each of the four cases mentioned above; it would be a constraint against allowing sub-minimal (monomoraic) reduction-structure prosodic constituents in the case of the stress-shift off a light penult (as discussed in §1.3.2.2 above), and would be a specific morphological constraint on stress-positioning in the cases of the other three stress shifts affected by pausal stress-shift blocking (so that there are four separate “stress-shift” constraints).[2.28] Finally, the Continuous Column grid constraint (in some form) would have the effect of rendering any stress-shift constraint without effect on the output whenever a word is assigned phrasal-level prosodic prominence, and so would allow the default lower-ranking main-stress positioning constraints to determine stress placement. (The allocation of phrasal-level prosodic prominence itself would be determined by different constraints, which only deal with whether or not words as a whole receive phrasal prominence, and not with the placement of stress within individual words – so that such higher-level constraints would not interact with the constraints of (2.50) which govern word-internal stress positioning, except through the Continuous Column constraint.)

Within a version of Optimality Theory that allows some type of serial/sequential derivation – almost no matter how limited (such as a lexical optimality grammar chaining to a post-lexical optimality grammar, as

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2.28 Of course, the term “stress-shift constraint” is a misnomer in the context of a non-serial Optimality Theory framework, in which stress does not actually “shift” in any true sense, but the term is crudely descriptive and conveniently shorter than “constraint which sometimes has the effect of causing the output form to have a main-stress positioning different from the default main-stress positioning”.

suggested by McCarthy and Prince 1993:24) – it is easy to develop the general outline schema of (2.50) into a detailed account which works correctly in handling Hebrew stress-shift blocking under phrasal prosodic prominence. This would be done by putting the default main-stress positioning constraints in the first stratum, and the stress-shift constraints only in the second stratum, so that the stress-shift constraints don't simply outrank the main-stress positioning constraints, but also apply after them (and the output of the first stratum in which the main-stress positioning constraints apply exclusively would be the input to the second stratum in which the stress-shift constraints apply). Here the Continuous Column constraint would presumably be a universally high-ranking faithfulness constraint, which would happen to be irrelevant in the first stratum, but in the second stratum would prevent the location of the stress in the output of the second stratum from differing from the location of the stress in the input to the second stratum, in case the change could only be accomplished by moving a column of prosodic grid marks together as a unit.[2.29]

But the above serial analysis would not be possible within more recent versions of Optimality Theory, since it is now more-or-less generally considered desirable to eliminate all sequential derivations from Optimality Theory (McCarthy 1998:9-10). However, attempting to implement the outline schema of (2.50) within a basic version of Optimality Theory in which serialism is rigorously excluded runs into difficulties. This is because the Continuous Column constraint on grid-mark movement must be formulated as a constraint governing the relationship between prosodified input representations and prosodified output representations – i.e. it can only forbid the position of a prosodic prominence which is definitely and actually present in the metrical representations of the input (however this position may have been arrived at, which is irrelevant to the constraint) from being shifted in the actually-occurring metrical representations of the output.

2.29 Ignoring the fact that in (2.49) stress-shift blocking is explained by restrictions on grid-mark movement at additional intermediate stages of derivation.

Therefore in the most basic non-serial Optimality model, in which a single stratum of interacting constraints acts on underlying input representations to produce surface representations as output, the Continuous Column constraint would simply have no effect (i.e. since there are no phonemic prosodic prominences in the input, a constraint against shifting the location of prosodic prominence between input and output would be effectively vacuous). It would be undesirable to try to get around this by allowing faithfulness constraints to refer to main-stresses posited to be already present in underlying (input) representations, since in the vast majority of cases in Hebrew the positioning of unshifted main stress is predictable from a word's underlying segmental shape (with the few sporadic morphologized exceptions discussed in §1.1.2 above); this is similar to the "richness of the base" problem (McCarthy 1998:5-6, etc.).

Furthermore, until rather recently none of the commonly-proposed non-serial extensions to this basic model of Optimality Theory seem to have been able to provide an account of Hebrew pausal stress-shift blocking that is even merely adequate. For example, replacing the Continuous Column constraint with four different phrasal-prominence-sensitive "Output-Output" constraints (i.e. the synchronic surface paradigm analogy processes of Benua 1997 discussed in fn. 1.94) might work to some degree in the case of the stress shifts of the consecutive tenses, (2.45) and (2.46), since here there are related verb tenses without the *waC-* and *wə-* prefixes which do not undergo main-stress shift (though in the case of the consecutive imperfect tense, the related tense without prefixed *waC-* shows various surface segmental phonological differences, such as regular imperfect *yaaqúum* vs. pausal consecutive imperfect *wayyaaqóom* discussed in fn. 4.24, so that the Output-Output constraint would have to specifically focus on main-stress position).

However, in the case of the stress shift off a light penult (2.44) and the stress shift of the 1st. and 2nd. sing. pronouns (2.47), there are simply no particularly relevant surface forms from which such paradigm analogies could be constructed (so that Output-Output constraints could not account for

pausal stress-shift blocking). In the case of the stress shift off a light penult, related forms within the same paradigm, and forms with the same morphological status derived from a different root, will either have the same underlying syllable structure, and so show the same pattern of stress-shift and stress-shift blocking, or will have a different underlying syllable structure which leads to a different stress pattern which makes them irrelevant for purposes of the necessary paradigm analogy. The best that could be done here is to posit some kind of vaguer type of nonspecific output-output constraint (affecting words with phrasal prosodic prominence) which analogizes to the overall typical (unshifted) pattern of Hebrew surface main stress positioning in general. However, this is also problematic, because the typical unshifted Hebrew main stress positioning pattern can only be defined in a simple way on *underlying* representations (i.e. whether underlying forms are consonant-final or vowel-final), so that the constraint could not actually be an output-output constraint.

Another device would be to posit two different phonologies, with two different constraint rankings, one to handle the pausal forms and the other to handle the non-pausal forms. Here the difference between the two phonologies would be that in the non-pausal phonology, the four stress-shift constraints would rank above the set of default main-stress positioning constraints (as in (2.50) above), while in the pausal phonology the four stress-shift constraints would rank below the set of default main-stress positioning constraints. However, it would seem to be a mere accidental coincidence that these four separate constraints all happen to have different rankings in the two phonologies, and there is no generalization about a single cause of pausal stress-shift blocking – even though pausal stress-shift blocking affects all synchronically-productive Biblical Hebrew stress-shift processes that could apply to words with phrasal prosodic prominence (as discussed in fn. 2.26). (Note that the constraint against prosodically sub-minimal reduction-structure constituents – which causes the stress shift off a light penult, with reduction of the formerly-stressed vowel – actually has very little in common with the three other constraints responsible for morphologized stress shifts without

reduction, so that it's difficult to see how these four constraints could comprise any kind of "natural class" in formal terms, if the fact that they all have effects on stress positioning is not taken as the crucial factor.) Since such a major loosening of basic Optimality Theory as allowing separate phonologies for words in different phrasal contexts (phrase-final vs. non-phrase-final) can only ultimately be justified if it makes possible more compelling explanations, here this device must be judged a failure.

The proposed non-serial extension to a basic model of Optimality Theory which can account for Hebrew pausal stress-shift blocking somewhat adequately is the "Sympathy" proposal of McCarthy (1998). In this theory, phonological opacity is handled by giving one constraint a special status in the phonology of a language; then in every derivation the candidate surface form which would be selected as most harmonic if this designated constraint were highest-ranked (with the other constraint-rankings unaltered) is defined as the "sympathy candidate", and a constraint requiring faithfulness to this sympathy candidate is added in among the constraints which determine the actually harmonic candidate (i.e. attested output form).

Such a theory can accommodate a functional equivalent of the Continuous Column constraint, since even though the theory is formally non-serial, the sympathy candidate can in some sense serve as a prosodified intermediate form between (effectively) unprosodified underlying input representations and prosodified output representations. In a Sympathy account of Hebrew stress-shift blocking, it would be the set of default main-stress positioning constraints that would collectively serve as the designated constraint which (when counterfactually considered to be highest-ranking) determines the sympathy candidate.[2.30] Then a constraint requiring stress-faithfulness to the sympathy candidate would prevent the four stress-shift constraints from having any effect when a word receives phrasal-level prosodic prominence (so that in this environment the main-stress positioning constraints remain surface-transparent, instead of being made opaque by stress shifts).

Here the basic ranking of (2.50) is implemented as shown schematically in the following tableau, where the default main-stress positioning constraints determine the Sympathy candidate (which is called “unshifted” on the left), and a functional equivalent to the Continuous Column constraint requires the output to show faithfulness in stress positioning to the Sympathy candidate (if a word is assigned phrasal-level prosodic prominence). The result is that the (unshifted) Sympathy candidate is also the output candidate if a word is assigned phrasal-level prosodic prominence; but when a word does not have phrasal-level prosodic prominence, and a stress-shift constraint is relevant for the form, then a “shifted” candidate emerges as the output (i.e. the output then does not satisfy the default main-stress positioning constraints):

(2.51)

	“Continuous Column”	»	Stress-shift Constraint	»	Main-stress Positioning Constraints
shifted	(*)				*
unshifted			*		

Within this Sympathy analysis, the Continuous Column functional equivalent constraint seems somewhat strange if it is considered to be a simple unitary constraint (since it is not a simple constraint of faithfulness to the sympathy form); and it seems natural to break this constraint down into a combination of a simple constraint requiring faithfulness in main-stress position between the sympathy candidate and the output, together with another constraint which refers to whether or not the word has phrase-level prosodic prominence. It turns out here that the pseudo-“Continuous Column”

2.30 If the Hebrew default main-stress positioning constraints were examined in detail, then it might be formally possible to designate only one constraint (or conjunction of constraints) as determining the sympathy candidate, but I will not explore such details within this very brief appendix.

constraint can be considered to be a simple conjunction of a constraint requiring stress-position faithfulness to the sympathy candidate, together with another constraint which unconditionally requires a word not to have higher-level phrasal prosodic prominence. Such a composite conjoined constraint (i.e. logical "and" relationship between constraints) will only assign a mark in case both of its component constraints assign a mark – that is, if a potential output candidate representation of the word has phrasal prominence and also violates stress-position faithfulness to the sympathy candidate. This means that if a word is not in fact phrasally-prominent (due to the overriding constraints, mentioned in the paragraph following (2.50) above, which determine the actual distribution of phrasal-level prosodic prominence), then the composite constraint cannot assign any bad marks to a candidate, so that the sub-constraint requiring stress-position faithfulness to the sympathy candidate cannot have any effect on the output. It is only when the other sub-constraint requiring a word not to have phrasal prominence is violated that the constraint of stress-faithfulness to the sympathy candidate can come into play, and serve to block non-default ("shifted") main stress-positionings.

While this Sympathy account is able to handle the facts of Hebrew pausal stress-shift blocking, it has some potential problems in Optimality Theory-internal terms, and is inferior in some respects to the serial derivational analysis sketched in (2.48)-(2.49). One of the possible theory-internal difficulties, is that here the designated constraint which determines the sympathy candidate is not an Input-Output Faithfulness constraint, as required in McCarthy (1998); this extension to McCarthy's original theory of Sympathy has been proposed in Itô and Mester (1997). Another difficulty is that it is possible that the designated constraint which determines the sympathy candidate may in fact have to be a set of constraints (see fn. 2.30). Also, this analysis might be considered slightly peculiar, in that it combines two separate theoretical mechanisms which have been invoked to explain opacity in Optimality Theory (i.e. Sympathy and also the Faithfulness-Markedness constraint conjunction of Itô and Mester 1998), but doesn't use these devices to handle opacity at all – but rather transparency. That is, if

there were no phrasal conditioning on the non-default stress positionings seen in the non-pausal forms of (2.44)-(2.47), so that pausal forms had the same stress location as the non-pausal forms, then there would be no need for a Sympathy analysis (the four "stress shift" constraints would simply outrank the default main-stress positioning constraints); it is only because these non-default stress-positionings are blocked under phrasal prosodic prominence – which has the effect of extending the surface transparency of default main-stress positioning – that a Sympathy analysis is needed. (It is hard to see how pausal stress-shift blocking could be considered to increase the opacity of the four "stress-shift" processes/constraints; rather, it merely restricts the range of environments in which they can have an effect on the output.)

And the Sympathy account of Hebrew pausal stress-shift blocking is still inferior to the serial derivational account of (2.48)-(2.49). This is because in the analysis of (2.51), there is still no real explanation as to why the constraints responsible for the four separate stress-shift processes of (2.44)-(2.47) all have the same ranking. Since there is nothing which would inherently prevent one or more of these constraints from ranking higher than the composite constraint (consisting of a constraint requiring stress-position faithfulness to the sympathy candidate conjoined together with a constraint requiring a word not to have higher-level phrasal prosodic prominence) – in which case, the resulting non-default stress positionings would occur in both pausal and non-pausal environments – it must be considered somewhat accidental that the four stress-shift constraints all have the same ranking (with respect to other relevant constraints) in this analysis. By contrast, in the analysis of (2.48)-(2.49), pausal stress-shift blocking is predicted to be a natural and inevitable consequence of any stress-shift process which applies in the post-lexical phonology (after phrasal prominence relations have been specified), and there is no need to explicitly specify that the Continuous Column constraint restrains each of the four separate synchronically-productive Hebrew stress-shift processes that could apply to words with phrase-final prosodic prominence. Even though the specifications of these four processes actually have very little in common (as mentioned above, one

of the stress shifts is phonologically-triggered, while the other three stress shifts are morphologically triggered; and one is leftwards, while the other three – a different three – are rightwards), they do form a natural class with respect to the sequential (true) Continuous Column constraint by the very fact of all being post-lexical stress-shift processes.

Also, the original serial Continuous Column constraint on grid-mark movement is superior to the Sympathy functional equivalent to the Continuous Column constraint from the point of view of non-arbitrary substantive content. This is because within a sequential derivational theory of metrical phonology, the Continuous Column constraint emerges as the result of natural well-formedness constraints on stress representations and stress shifts; while in the Sympathy account, there is no necessary reason why the particular conjoined constraint – requiring stress-position faithfulness to the sympathy candidate, and that a word not have phrasal prosodic prominence – should exist (and should tend to be ranked higher than constraints which cause non-default main-stress positioning).

Therefore I conclude that so far, there is no non-serial Optimality Theory account of general Tiberian Biblical Hebrew pausal stress-shift blocking, that I can find, which is as insightful as a traditional serial account. And in the only non-serial account which is at all adequate (i.e. a Sympathy analysis), it does not seem as if Sympathy is being used for its intended purpose, but is merely being seized upon as a convenient formal device for sneaking in an intermediate derivational form between input and output. All these difficulties arise from the fact that the Continuous Column explanation of stress-shift blocking is essentially sequential in nature, since the constraint on grid-mark movement forbids changing the actually-occurring position of a prosodic prominence (however this position may have been arrived at) from one stage of the derivation to the next stage of the derivation – and there has not appeared to be any satisfactory way in which this sequential grid-mark-movement explanation can either be explained away, or appropriately accommodated, within a strictly non-serial Optimality Theory account.

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Table of Contents (condensed)

TOPICS IN TIBERIAN BIBLICAL HEBREW

METRICAL PHONOLOGY

AND PROSODICS

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This dissertation examines a number of linguistic issues in the phonology of ancient Hebrew, using the extremely rich prosodic information available in the Tiberian orthography of Biblical Hebrew. In addition to a basic analysis of syllabification and stress-assignment, and an examination of the exact linguistic interpretation of the orthography, a detailed analysis of Hebrew vowel reduction has been undertaken. Explaining the occurrences of reduced and unreduced vowels requires the creation of a layer of foot-like constituents below the level of feet responsible for stress in the usual sense. Also, certain previously-unconsidered linguistic patterns provide evidence that the distribution of syllable types in Hebrew phonological representations obeys a trochaic "Trimoraic Law" generalization, and that the metrical constituents governing vowel reduction are systematically maximally trimoraic in certain contexts.

It is also shown that the Hebrew rhythm rule does not apply in a fundamentally different way from that of rhythm rules in other languages – though the particular nature of Hebrew metrical representations does have certain effects on the rhythm-rule (casting some light on the nature of rhythm rules in general). The analyses of vowel reduction and the rhythm rule

together throw doubt on the necessity and desirability of multiplanar metrical analyses of Hebrew (or in general).

The relationship between two distinct sources of phrasal prosodic constituency information provided by the orthography is also examined in detail. The first is the system of Tiberian cantillational "accents" (Hebrew *ṭəʕaamíim*), which provides an Immediate Constituent parse (largely prosodic in nature) for the Hebrew Bible. The second is a set of phonological phenomena which are sensitive to the greater prominence connected with phonological-phrase final (or "pausal") position. A computer-assisted empirical textual-statistical study of the congruences and discrepancies between the accentual system and such pausal phonology was undertaken, which throws light on the linguistic nature of the accentual system. A number of biblical verses that show apparent discrepancies between accentual and pausal constituency are collected and individually discussed, and while the accentual and pausal constituency systems are often parallel, they cannot always be fully reconciled as variant orthographic manifestations of a single type of linguistic/prosodic constituency.

Finally, the history of Hebrew main stress and the origins of the consecutive imperfect stress shift are discussed.

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