An Introductory Note to Noam Agmon’s “Materials and Language” with Special Attention to the Issue of Biliteral Roots

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Abstract

Biliteral roots have been, and still are controversial. Because Noam Agmon’s paper, to which this note is an introduction, assumes the reality of biliteral roots, the issue is revisited. Several important arguments in support of the biliterality of $C_1C_2C_3$ and $C_1C_1C_2$ verbs were put forth in the course of the past thirty years. They are reviewed here, along with the criticisms they have triggered. It is concluded that the evidence weighs in favor of recognizing synchronically active biliteral roots subjected to templatic pressure. It is further suggested that a by-product of Agmon’s study and findings is a time frame for the emergence of templatic morphology in the Middle East.

Keywords
biliteral and triliteral roots; deaf verbs; templates; OCP; Arabic; Aramaic; Ethiopic; Chaha

0. Preamble

BAALL is primarily committed to the publication of theoretical and descriptive articles on the phonology, morphology, syntax, semantics and diachrony of Afroasiatic languages, including work of a comparative nature possibly involving non-Afroasiatic as well as Afroasiatic data. Nevertheless, at the invitation of one of the editors, BAALL may occasionally publish research conducted at the periphery of these subfields, along with an editorial comment aimed at providing perspective and highlighting the theoretical significance of the contribution. Our first such article is Noam Agmon’s “Materials and Language: Pre-Semitic Structural Change Concomitant with Transition to Agriculture”. Agmon is a theoretical physical chemist at the Hebrew University in Jerusalem.

*) I am grateful to Noam Agmon, Sabrina Bendjaballah, Yigal Bloch, Noam Faust, Brenda Laca, and Jamal Ouhalla for comments on this paper. Of course, I take full responsibility for positions expressed therein.
The research on which he reports in his paper was presented and discussed in several places, including an interdisciplinary group involving two archeologists, a philologist, and a computer scientist. It has also benefitted from the input of a geologist and a linguist. The copious etymological appendix at the end of the paper is due to Yigal Bloch, a doctoral candidate in Jewish Studies at the Hebrew University in Jerusalem.

1. Introduction

Proto-Semitic takes us approximately 6000 years back, that is some 4000 years after the completion of the agricultural revolution in Western Asia. Is it possible to go back further beyond those 6000 years without having to tap the much more speculative results of the reconstruction of proto-Afroasiatic? It is Agmon’s claim that consideration of astutely selected external evidence makes it possible to discern distinct layers in the proto-Semitic lexicon. Specifically, archeological evidence interpreted in the light of what is known of early technology yields the striking generalizations in (1).

(1) i. the names of materials and technological processes which could not possibly have been available before the agricultural revolution all involve triconsonantal roots

ii. biconsonantal roots exclusively underlie the names of materials and technological processes which had to be available before the agricultural revolution

Of course, Agmon’s thesis presupposes that there is such a thing as a biconsonantal root. As such, it naturally links up with, and possibly sheds light on, a great classic of Semitic linguistics, viz. does the currently prevailing triconsonantal root format stem entirely or partially from an earlier biconsonantal structure? The spectrum of emotions, attitudes, opinions, and postures that have been triggered by this query for over a millenium is unparalleled, ranging from sheer passion to cold dismissal of the issue itself.\footnote{\textsuperscript{1)} See for instance the summary dismissal of Mayer Lambert (1897)’s early theory of etymons by Kautzsch, the editor of various versions of Gesenius’s Hebrew Grammar (Gesenius himself died in 1842), starting with the 27th edition (1902) and reproduced thereafter in all subsequent editions.} For general discussion, cf. Goldenberg (2005), Voigt (1988), Zaborski (1991) and references therein.

This writer is entirely dispassionate with respect to the answer, or even the value of raising the question itself. Indeed, whether it can be established that Semitic
roots were originally biconsonantal, or alternatively triconsonantal, or whether both types have to be recognized, is an empirical issue. If it can be settled (one way or the other), a fact will have been brought to light. The importance of such a fact is exactly defined by a) the status of the question to which that fact is a possible answer, b) the theoretical framework from which the question itself derives.\textsuperscript{2}

In this brief note, I intend to offer a personal assessment of the importance of Agmon’s findings, one which may or may not exactly correspond to his own. I will proceed in roundabout fashion. First, in the next section (2.), I rapidly sketch out some of the arguments which have led to the idea that (some) Semitic roots might have originated as biconsonantal. In the following section (3.), I will revisit what I see as a highly significant trilogy of papers directly bearing on the issue, viz. a) McCarthy’s treatment of Arabic deaf verbs (McCarthy 1981), b) Chaha morphology (McCarthy 1983), and c) a brief but important note on Aramaic due to Georges Bohas (Bohas 1990). In a fourth section, I discuss and evaluate some of the objections that have been raised in connection with McCarthy’s proposals. Specifically, I argue on the basis of Chaha $C_1C_2C_2$ and $C_1C_1C_2$ verbs that the existence of the latter class does not invalidate McCarthy’s analysis of Arabic deaf verbs. Finally, in the fifth and concluding section, I return to Agmon’s paper proper. There, I suggest that Agmon may have dated the emergence of templatic morphology in Western Asia.

2. How did the issue of biradicality arise in the first place?

Two main considerations are involved. The first consideration has to do with the intriguing properties of Semitic roots in (2).

\begin{enumerate}
\item[i] systematic root triliterality is rare in the language families of the world, even in the Afroasiatic family
\item[ii] strictly consonantal roots are rare too, both outside and inside the Afroasiatic family
\end{enumerate}

A second consideration can be illustrated by means of the hypothetical array of roots in (3).\textsuperscript{3}

\textsuperscript{2} Sheer curiosity is also a possible source of questions, though in that case their relevance remains unspecified.

\textsuperscript{3} Any resemblance between the hypothetical roots in (3) and actual Semitic roots should be viewed as irrelevant.
(3) a. √tff  f. √tfq  
b. √ytf  g. √rzq  
c. √tff  h. √wdq  
d. √ntf  i. √btq  
e. √dtf  j. √sgq  

Suppose the following:

(4) i. all the roots in the leftmost column in (3) share a core meaning, say ‘move’ 
ii. the initial n in (3d) can plausibly be analyzed as an affix, say an inchoative 
iii. the d in (3e) cannot be identified as a specific affix, but the fact that it violates a prohibition against homorganicity between adjacent consonants, singles it out as a likely augment of some sort
iv. all the roots in the rightmost column are realized as say, telic verbs; accordingly, the fact that they all share a final q suggests that q signals telicity; hence q is an augment, too

The conclusion is inescapable: √tf can be isolated as an ingredient, possibly a root. But suppose further (5).

(5) i. no known Semitic language displays a CVC noun, verb or adjective whose paradigm of realization exclusively includes ti̇f, or tȧf, or ti̇f (crucially, not ti̇ff or tȧff or ti̇ff)  
ii. no known single Semitic language displays the entirety of the array in (3); rather several, say 6, different Semitic languages were required for the sample in (3) to be put together

A qualification now appears to be required: if √tf is an ingredient (possibly a root), it can only pertain to an older, more ancient, reconstructed, layer. Thus, for Ewald (1870), √tf would be a proto-root (Urwurzel), while a corresponding, synchronically active, “truly alive” root (‘wirklich lebende Wurzel’) could only be triliteral, viz. √tff (cf. Goldenberg 2005 for a contemporary endorsement of Ewald’s position). But, if √tf is never a synchronically active root, is it more than just a linguistic fiction? One generation earlier, Gesenius (1834) had expressed similar misgivings, though in more tentative tone, noting that ‘monosyllabic (= biconsonantal) Hebrew roots are like the hidden root of a

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4) An argument of just that type is put forth in Kuryłowicz (1972).  
5) Arguments of that nature are developed in Bohas (1997, 2000) and Ehret (1989), though to different ends.
tree, of which only the trunk, the branches and the buds are visible’. He went on to say that the roots of words are proto-ingredients, ‘often unknown and problematic inasmuch as they do not occur as such, and can only be accessed by means of combinatorial procedures’, presumably of the kind sketched out in (4) above. Without making too much of it, and with all due respect, it is tempting to object that Gesenius’s botanical metaphor cuts both ways: invisible as it may be, the root of a tree is itself as alive as the trunk, the branches or the buds. In fact, there could be no tree without a root. In the next section, I examine a compelling bundle of arguments leading to a forceful rejection of the idea that the biradical root belongs in the world of fossils. On the contrary, it appears to be thriving in rich and fragrant synchronic soil. The following remarks are confined to two types of verbal formations, the deaf kind, $C_1C_2C_2$, and the stutterers, $C_1C_1C_2$.

3. Three important papers

A major conceptual breakthrough in the approach to the structure of Semitic roots is due to John McCarthy. In two important papers, (McCarthy 1981, 1983), McCarthy put forth arguments which have become impossible to ignore both by those who oppose the idea that some roots are biradical, e.g. Goldenberg (2005), and by those who question the very relevance of the root (cf. Faust & Hever (this volume) for discussion of such positions). A third important paper (Bohas 1990) completes the demonstration.

3.1. Classical Arabic deaf verbs

In his treatment of Classical Arabic verbal morphology, McCarthy (1981) proposes that consonantal roots link up to templatic positions as shown in (6), where the template directly represents the prosody of the derivational class in which the verb is realized. The examples in (6) describe the realization of roots $\sqrt{ktb}$ and $\sqrt{hmr}$ in Forms I and IX, respectively (cf. e.g. katab-tu ‘I wrote’, (ʔi)hmarar-na ‘we reddened’). The mode of association is one-to-one and left-to-right, as per the classic conventions of autosegmental phonology (Goldsmith 1976), reflected here in the numbering of arrows.

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6) Whereas Gesenius published his first grammar in 1813, he does not discuss the root until the 11th edition (Gesenius 1834).
7) Cf. also Nöldeke (1910).
8) For the sake of clarity, the vocalic melody, as well as inflectional and prothetic material, has been left out of the description in (6).
In (6a), the number of consonantal positions in the template is the same as the number of root consonants, and the effect of left-to-right association is not discernible. On the other hand, in (6b), the rightmost root consonant is seen to spread rightward, so as to allow for a full phonetic interpretation of all four templatic consonantal positions. In this case, the effect of directionality is clear.

McCarthy points out that if root consonants are mapped onto templates as sketched out above, a puzzle going back a millenium or more, is immediately solved. It had been noted, but left unexplained, that Classical Arabic and Biblical Hebrew display verbs with identical second and third consonants, such as Arabic madadna ‘we extended’ or Biblical Hebrew sōbēb ‘it goes round’, but no or very few verbs with identical first and second consonants such as *mamadna or *sōsēb.9,10 Under McCarthy’s scheme, madad is derived as shown in (7a).

madad, if viewed as crucially stemming from biradical root √md, results from (7a), but putative mamad (7b) is ruled out because move 2 in (7b) involves a violation of one-to-one association cum eventual spreading. However, ungrammatical mamad is not yet rendered impossible altogether. Indeed, if the root underlying madad is represented as triliteral, grammatical madad would

9) Cf. Greenberg (1950) for discussion.
10) In reality, there is a handful of such verbs in Biblical and in Modern Hebrew. Those colleagues who feel that they do form a pattern (as opposed to a collection of hapactic formations) must put forth some justification for why that putative pattern should be so scarcely exemplified.
certainly result (8a). But then, nothing would rule out the existence of a root such as √mmd, yielding *mamad (8b) without involving any violation of the association conventions.

(8) a. b.

Clearly, the triliteral analysis is too permissive: unlike the biliteral analysis in (7), it fails to rule out the unattested verbs. Indeed, it begs the question of their inexistence in Arabic. In order to rule out the analyses in (8), McCarthy invokes the Obligatory Contour Principle (henceforth OCP) of which a version appears in (9).11

(9) The adjacency of two identical objects results in ungrammaticality

The OCP will readily rule out both configurations in (8) on account of the adjacency of identical objects at the root level, d and d in (8a) and m and m in (8b). No such objection weighs against the biliteral analyses in (7), although (7b) is of course excluded on account of the violation of the association conventions pointed out above. As we see, given McCarthy’s framework, the Classical Arabic state of affairs falls out as a theorem. The results of McCarthy’s proposal with respect to Arabic deaf verbs can be summed up as in (10).

(10) i. C₁C₂C₂ verbs do not exist in Arabic because there is no possible source for them

ii. C₁C₂C₂ verbs can only proceed from a biliteral root

Beyond the striking formal elegance of an account directly addressing and answering a question which had baffled Semiticists since the Middle Ages, (10ii) is of special interest in the context of this note: the biradicality of deaf verbs can no longer be viewed as resulting from the freewheeling creativity

11 It is worth noting that the OCP was not devised to handle Semitic morphology or even the structure of consonant clusters in the languages of the world. Rather, its initial motivation is rooted in the analysis of tone systems (cf. Leben 1977). As such, the OCP is independently motivated, and its mobilization adds nothing to the cost of McCarthy’s explanatory scheme. For a detailed discussion of the OCP in connection with the structure of Tigrinya roots, cf. Buckley (1997a).
of unrealistic reconstructionists; rather, it is as synchronically real today as it must have been at every earlier stage, going as far back as proto-Semitic. As it turns out, further evidence comes forth in support of the biradical analysis.

3.2. Chaha 2nd person singular feminines

In McCarthy (1983), several processes of Chaha are reviewed and shown to provide very strong evidence for one-to-many associations of root consonants to templatic positions. 2nd Person Singular Feminine Palatalization will be discussed here. Impersonal formation will be briefly discussed in 4. below. 13

In Chaha, the 2nd Person Singular Feminine minimally differs in the following way from its corresponding Masculine in the Imperfective and Jussive paradigms: the 2nd Person Singular Feminine is realized by means of a floating palatalizing prosody affecting the rightmost palatalizable root consonant, a velar or an oral coronal obstruent. 14 Examples appear in (11), each paired with its corresponding Masculine for control. In (11a), the last root consonant is palatalizable. 15 Not so in (11b). In consequence, the Feminine exponent has to look further inside the root and eventually docks onto C2.

(11)  

<table>
<thead>
<tr>
<th></th>
<th>Imperfective</th>
<th>Jussive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2nd ms.</td>
<td>2nd fem.</td>
</tr>
<tr>
<td>a.</td>
<td>√dmd 'put together'</td>
<td>tıdämıd</td>
</tr>
<tr>
<td>b.</td>
<td>√rgf 'fall (leaves)'</td>
<td>tırägıf</td>
</tr>
</tbody>
</table>

If both the last and the penultimate root consonants are palatalizable, the last one only, crucially not both, will be affected, as shown in (12).

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12) See also Zygmunt Frajzyngier’s valuable contemporary paper (Frajzyngier 1979) which deals with very similar concerns.


14) Reconciling the floating behavior of the 2nd Feminine Singular exponent with its unquestionable suffixal identity, is a representational challenge. Cf. Lowenstamm (2000) for a proposal.

15) All palatalized coronals are realized as palatoalveolar stridents. For the sake of clarity, I follow McCarthy (1983), in representing all palatalized consonants, coronals as well as velars, with a superscript y, viz. C\text{y}.

16) [ā] and [ı] are central vowels, low and high, respectively. For an account of the proliferation of central vowels in Ethiopian Semitic, cf. Lowenstamm (1991). For a rejoinder based on Tigrinya evidence, cf. Buckley (1997b). [ı] is extremely unstable and drops out from the phonetic signal at the first opportunity. The effects of the syncope leading to its absence are not recorded in this paper.
(12) Imperfective Jussive

<table>
<thead>
<tr>
<th>2nd ms</th>
<th>2nd fem</th>
<th>2nd ms</th>
<th>2nd fem</th>
</tr>
</thead>
<tbody>
<tr>
<td>√dgs 'entertain'</td>
<td>tidāgs</td>
<td>tidāgs</td>
<td>√digs</td>
</tr>
<tr>
<td>*tidāg's</td>
<td>*díg's</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Now, deaf verbs such as sädädä 'he drove cattle', názázä 'he dreamed', fāgāgā 'he died without being slaughtered' provide a crucial test. If their roots are √sdd, √nzz, √fgg (as Ewald or Goldenberg would have it, contra the OCP), the rightmost instances only of the repeated consonant of each root should undergo palatalization, viz. tısädıd, tıräzız, tıfägıg. Indeed, Feminine palatalization never affects C₂ if C₃ is itself palatalizable, as evidenced in (12). If, on the other hand, the relevant roots are √sd, √nz, √fg, as McCarthy claims, the rightmost consonants are d, z, and g, respectively. They, that is both of their two instantiations, should palatalize in the context of 2nd Person Singular formation. That the facts vindicate the biliteral analysis is shown in (13).

(13) Imperfective Jussive

<table>
<thead>
<tr>
<th>2nd ms</th>
<th>2nd fem</th>
<th>2nd ms</th>
<th>2nd fem</th>
</tr>
</thead>
<tbody>
<tr>
<td>tısädıd</td>
<td>tısädıd</td>
<td>sıdıd</td>
<td>sıdıd</td>
</tr>
<tr>
<td>tıräzız</td>
<td>tıräzız</td>
<td>nızäz</td>
<td>nızäz</td>
</tr>
<tr>
<td>tıfägıg</td>
<td>tıfägıg</td>
<td>fıgıg</td>
<td>fıgıg</td>
</tr>
</tbody>
</table>

In the next subsection, I turn to Bohas’s diachronic evidence.

3.3. Classical Arabic, proto-Semitic, and Aramaic

Let us assume with Moscati and many others (cf. Moscati 1964, and references therein) that proto-Semitic possessed a voiced emphatic interdental (possibly lateral) consonant, Δ. The Arabic reflex of this consonant is an emphatic dental stop D. Its Syriac reflex is the guttural s. Some examples given by Bohas appear in (14).

(14) Syriac Arabic

<table>
<thead>
<tr>
<th>Action</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>In root-initial position ʕfō ‘increase’</td>
<td>Dafā ‘be abundant’</td>
</tr>
<tr>
<td>In root-medial position rțē ‘content with’</td>
<td>raDiya ‘content with’</td>
</tr>
<tr>
<td>In root-final position ?arțō ‘earth’</td>
<td>?arD ‘earth’</td>
</tr>
</tbody>
</table>

Bohas next examines the reaction of Syriac when the historical change under discussion, Δ → ʕ, affects a root already containing a ʕ. The necessary
comparison is provided by Arabic roots displaying D and ŋ in adjacent positions. For instance, if Arabic √Dŋf ‘to double’ arises from proto-Semitic √Δŋf, the Syriac reflex of proto-Semitic Δ being ŋ, a sequence such as <ŋŋf> should arise. Similarly, if the Arabic root √צד ‘prune a tree’ reflects proto-Semitic √צד, a sequence such as <צצד> should arise in Syriac. In both cases, the adjacency of the gutturals in the Syriac output of Δ → ŋ amounts to a violation of the OCP. Yet, Syriac in both cases manifests deaf verbal or deverbal formations instead of the offending sequences, e.g. צספ ‘double’, צספ ‘multiplication’ corresponding to *<צצf>, and צצו ‘weeded’ corresponding to *<צצd>. Bohas interprets the intermediate change whereby deaf roots arose, as in (15).

\[(15) \quad \text{a.} \quad \text{b.} \quad \text{c.}\]

\[
\begin{align*}
\sqrt{\text{צ}} \text{צ} \text{ד} & \quad \sqrt{\text{צ}} \text{ד} & \quad \sqrt{\text{צ}} \text{ד} \\
\downarrow & \quad \downarrow & \quad \downarrow \\
\text{C} & \quad \text{V} \text{V} & \quad \text{C} & \quad \text{V} \text{V}
\end{align*}
\]

(15a) is the offending Syriac output of Δ → ŋ. The violation of the OCP is immediately dealt with by removing one of the gutturals. A bilateral root (15b) results. When matched with a template, it behaves as expected with rightward spreading of C₂.¹⁷

No less elegant than McCarthy’s demonstration, Bohas’s adds a new argument against Ewald’s skepticism with respect to the reality of biradical roots: biradical roots can evolve from triradical roots through the course of history.

In the next section, additional evidence in support of the reality of biradical roots is considered.

### 4. The OCP and the Ethiopian ‘challenge’

#### 4.1. The challenge

Unlike Classical Arabic, Ethiopian Semitic languages display numerous C₁C₁C₂ verbs. This fact seems to have been interpreted by Gideon Goldenberg as weakening McCarthy’s proposal on Classical Arabic deaf verbs (Goldenberg 1998, 2005). It is entirely legitimate to bring Ethiopian Semitic into the discussion in an attempt to evaluate McCarthy’s predictions in that area,

¹⁷) The template in (15c) is meant as underlying צד. The vocalic melody /i-ə/ has been left out.
yet things are perhaps not as simple as it might seem. Consider for instance the two propositions in (16).

(16) i. All aquatic creatures have scales  
   ii. Scales make it possible for trouts to resist buoyancy

_A priori_, both (16i) and (16ii) could be true, or both false, or (16i) could be true while (16ii) is false, or (16i) could be false while (16ii) is true. In reality, we know (16i) is false, and we wonder about (16ii). The point here is that the truth (or falseness) of (16i) is of no help in the assessment of (16ii): (16ii) could be false for a number of reasons, but surely not because (16i) is false.

Now, consider the two propositions in (17).

(17) i. All languages exhibiting non-concatenative morphology reject \(C_1C_1C_2\) verbs  
   ii. McCarthy's explanation of the absence of \(C_1C_1C_2\) verbs in Classical Arabic is the correct explanation of that phenomenon

The system in (17) replicates the same possible _non sequitur_ as could be observed in (16) in the sense that the falseness of the first proposition sheds no light on the status of the second: (17ii) may well be false, but certainly not because (17i) itself is false. Clearly, a bit more elaboration is required before we can assess the possible relevance of Ethiopian Semitic with respect to evaluating (17ii). Perhaps, the problem should be reframed in such way that we can have a sense of what can be expected and what can not be expected.

I suggest the following two moves. First, that McCarthy’s proposal be considered against the background of the whole of Arabic (henceforth ‘Arabic’), i.e. not just Classical Arabic, but also the modern dialects. Two possibilities now arise with respect to consistency, and they will be considered in turn: either ‘Arabic’ is consistent with respect to the ban on \(C_1C_1C_2\) verbs, or inconsistent. By _inconsistent_, I refer to a hypothetical state of affairs such that some dialects of Arabic would enforce the prohibition, while others would not. Then, depending on whether ‘Arabic’ is consistent or not, we can ask what can be expected from the Ethiopian evidence, depending on whether Ethiopian Semitic languages (henceforth ‘Ethiopic’) are consistent in their toleration of \(C_1C_1C_2\) verbs, or not. The four logical possibilities in (18) arise:

(18) a. b. c. d.  
   ‘A’ – consistent – consistent + consistent + consistent  
   ‘E’ – consistent + consistent – consistent + consistent
(18a) and (18b), both represent the hypothetical situation in which ‘Arabic’ would inconsistently enforce the ban on $C_1C_1C_2$ verbs. This hypothetical inconsistency will suffice to cast doubt on McCarthy’s program and analysis. Whether ‘Ethiopic’ consistently or inconsistently tolerates $C_1C_1C_2$ verbs provides no insight into the issue at hand.

(18c), whereby ‘Arabic’ consistently behaves as expected by McCarthy validates his claim in the strongest fashion, but ‘Ethiopic’, if inconsistent in the relevant respect, again fails to contribute anything.

Finally, (18d), the hypothetical situation whereby ‘Arabic’ consistently rejects what ‘Ethiopic’ consistently tolerates, is the only configuration in which ‘Ethiopic’ can possibly be of relevance to the assessment of McCarthy’s idea. But an obligation now weighs on those who wish to jointly discuss ‘Arabic’ and ‘Ethiopic’: if ‘Ethiopic’ is systematic in the relevant respect (by hypothesis (18d)), its contribution can no longer be the raw data of the group’s languages. Rather, it must be an analysis of what makes it possible for $C_1C_1C_2$ verbs to proliferate in Ethiopian Semitic.

As it turns out, the hypothetical configuration in (18d) exactly matches the empirical situation on the ground, as we know: a) no Arabic dialect has been reported to tolerate $C_1C_1C_2$ verbs, other than in exceptional fashion, b) all Ethiopian Semitic languages (to the best of my knowledge) display verbs of that type. Of course, the reality of differences of that nature is what motivates the recognition of distinct ‘groups’ or ‘branches’ in the Afroasiatic family, in the first place. Consequently, we have no choice but to assume that the differential behavior of ‘Arabic’ and ‘Ethiopic’ with respect to $C_1C_1C_2$ verbs, rather than being an isolated fact, proceeds from a more general system of differences distinguishing the two groups. In the case at hand, the obvious place to look for an answer is the fundamental difference in the organization of the verbal systems of the two groups.

The facts are well known, and will be summed up only briefly. A root in Arabic, here $\sqrt{ktb}$ ‘write’, can be realized in more than one of the various conjugation classes, of which three are given in Roman numerals in (19a). Depending on the conjugation, the argument structure of the verb will be modified as the glosses suggest. Moreover, each conjugation is characterized by formal properties: initial vowel length in III, gemination of the medial consonant in II, short vowels and no gemination in I. The ethiopian state of affairs can be illustrated by means of Tigrinya, a member of the Northern subgroup of Ethiopic. Tigrinya, as the other Ethiopian Semitic languages, shows three types of verbs characterized by formal properties reminiscent of those exhibited by the three

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18) This is a good thing to keep in mind when evidence from one group is marshalled to evaluate an analysis resting on data from a different group.
‘measures’ of Arabic illustrated in (19). The similarity goes no further, however. Indeed, a root can be realized in no more than one type. This is reflected in the fact that three different verbs have been necessary for the illustration of each type. Moreover, no type carries specific argument structure.19

(19) a. b.

<table>
<thead>
<tr>
<th>Arabic</th>
<th>Tigrinya</th>
</tr>
</thead>
<tbody>
<tr>
<td>I katab-a ‘he wrote’</td>
<td>Type A säbär-ā ‘he broke’</td>
</tr>
<tr>
<td>II kattab-a ‘he cause (x) to write’</td>
<td>Type B wässäx-ā ‘he added’</td>
</tr>
<tr>
<td>III katab-u ‘they corresponded’</td>
<td>Type C bäräx-ā ‘he blessed’</td>
</tr>
</tbody>
</table>

Chaha, a member of the Gurage cluster of the Southern subgroup of Ethiopic, displays all three types, as well. But because of specific developments in Southern Ethiopic in general, and because of the opacity of the gemination patterns of Chaha in particular, the Perfective paradigm does not indicate type membership as crisply as say, Tigrinya. Accordingly, a different criterion—not justified here—will be used for type detection in Chaha, viz. the type specific vocalization of the stem of the Jussive paradigm.20 This is illustrated in (20). An important point is the specific status of verbs from quadriliteral roots. They are exceptionlessly assigned to Type B, as shown with the example of sräpätä ‘he spent time away’.

(20) Typical Perfective Jussive Root Vocalization Pattern

<table>
<thead>
<tr>
<th>Type A₁</th>
<th>kätäťa</th>
<th>yä-kťtf</th>
<th>√ktf</th>
<th>ı-ı</th>
<th>‘chop meat’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A₂</td>
<td>sänxä</td>
<td>yä-srän</td>
<td>√sx</td>
<td>ı-ä</td>
<td>‘be impure’</td>
</tr>
<tr>
<td>Type  B</td>
<td>qämärä</td>
<td>yä-qämır</td>
<td>√qımır</td>
<td>ā-ı</td>
<td>‘become strong’</td>
</tr>
<tr>
<td></td>
<td>sräpätä</td>
<td>yä-s ámbt</td>
<td>√sbmt</td>
<td>‘take a sabbatical’</td>
<td></td>
</tr>
<tr>
<td>Type  C</td>
<td>čafwärä</td>
<td>yä-čafsır</td>
<td>√čfsır</td>
<td>a-ı</td>
<td>‘scratch’</td>
</tr>
</tbody>
</table>

19) The seemingly arbitrary assignment of a given root to a type is reminiscent of the Romance verbal system where verbs are similarly assigned to a unique conjugation type identifiable by the thematic vowel of the infinitive, e. g. Spanish dorm-i-r ‘sleep’, tom-a-r ‘drink’, com-e-r ‘eat’.
20) Another criterion, Type B palatalization, will be discussed in 4.3.
21) [č] is an ejective palato-alveolar.
Armed with this criterion, we can immediately bring to light a significant
difference between $C_1C_2C_2$ verbs and $C_1C_1C_2$ verbs: while deaf verbs appear
in all types, $C_1C_1C_2$ verbs appear in one type only. The fact that $C_1C_2C_2$ verbs
can belong to any type is illustrated in (21).

(21) Typical Vocalization

<table>
<thead>
<tr>
<th>Perfective</th>
<th>Jussive</th>
<th>Root</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A₁</td>
<td>gämämä</td>
<td>yä-gımım</td>
<td>√gm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘chip’</td>
</tr>
<tr>
<td>Type A₂</td>
<td>fäzäzä</td>
<td>yä-fızäz</td>
<td>√fz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘surpass’</td>
</tr>
<tr>
<td>Type B</td>
<td>m*ätätä</td>
<td>yä-m*ätät</td>
<td>√m*t</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘coax’</td>
</tr>
<tr>
<td>Type C</td>
<td>bazäzä</td>
<td>yä-baziz</td>
<td>√bz</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘feel lonely’</td>
</tr>
</tbody>
</table>

The fact that $C_1C_1C_2$ verbs are restricted to one type only is shown by means
of several examples in (22). The issue of the composition of the root will be
taken up below.

(22) Typical Vocalization

<table>
<thead>
<tr>
<th>Perfective</th>
<th>Jussive</th>
<th>Root</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A₁</td>
<td></td>
<td></td>
<td>ı-ı</td>
</tr>
<tr>
<td>Type A₂</td>
<td></td>
<td></td>
<td>ı-ā</td>
</tr>
<tr>
<td>Type B</td>
<td>käkärä</td>
<td>yä-käktür</td>
<td>√?</td>
</tr>
<tr>
<td></td>
<td>gäktätä</td>
<td>yä-gükkt</td>
<td>√?</td>
</tr>
<tr>
<td>Type C</td>
<td>qaqäsä</td>
<td>yä-qaqäs</td>
<td>√?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘become burnt’</td>
</tr>
</tbody>
</table>

Even before we ask why $C_1C_1C_2$ verbs are exclusively of Type B, one thing
is already abundantly clear: deaf verbs are treated as ‘regular’ with respect to
type membership; $C_1C_1C_2$ verbs are not. Thus, while Chaha tolerates such
verbs, there are obvious signals that their makeup must be quite different from

22) For the absence of palatalization in the Jussive, see below.
deaf verbs. \(C_1C_1C_2\) verbs are simply not the mirror image of \(C_1C_2C_2\) verbs. Accordingly, the contention that the existence of one kind bears on the analysis of the other recedes, or at least calls for informed qualification. In the next subsection, I turn to a proposal as to what the makeup of \(C_1C_1C_2\) verbs might be.

4.2. Banksira’s account of \(C_1C_1C_2\) verbs

Degif Petros Banksira (Banksira 2000) offers a number of arguments to the effect that \(C_1C_1C_2\) verbs are a ‘maimed’ version of reduplicated biradicals \((C_1C_2+C_1C_2 \rightarrow C_1C_1C_2)\) as shown in (23a), where the second consonant of the first root conjunct remains unrealized.\(^{23}\) One of the arguments in support of this view runs like this: if \(C_1C_1C_2\) verbs are essentially special quadriliterals of type \(√C_1C_2+C_1C_2\), it follows that they should exclusively be realized in Type B, as we just saw.\(^{24}\) If Banksira’s claim is correct, then the “plain” left-to-right association invoked by McCarthy in connection with Classical Arabic deaf verbs is not put into any kind of difficulty by the existence of Ethiopian \(C_1C_1C_2\) verbs, simply because a different strategy of association is involved in the derivation of such verbs. Nevertheless, a question remains as to the status of the OCP: does it regulate the output of Banksira’s reduplicative scenario plus clipping (23a), or not? To put it differently, after the second consonant of the first root conjunct disappears, do the first two consonants of a \(C_1C_1C_2\) verb behave as two independent objects (23b), or one (23c)?

\[
(23) \quad a. \quad b. \quad c.
\]

\[
\begin{align*}
q^w s + q^w s & \quad q^w s & \quad q^w s + s \\
C & \quad V & \quad X & \quad C & \quad C & \quad V & \quad X & \quad C & \quad C & \quad V & \quad C
\end{align*}
\]

In the first case, the OCP will be found wanting, and Goldenberg will be justified in his vigorous rejection of the principle. In the second case, the OCP will be vindicated. I turn to this issue in the next subsection.

\(^{23}\) Cf. Banksira (2000) for the complex interaction of various operations leading up to the \(C_1C_1C_2\) format. Cf. also Barillot (2002) for a similar interpretation of \(C_1C_1C_2\) formations in Cushitic.

\(^{24}\) Banksira (2000) pushes the connection to the extreme, claiming that all Type B verbs are quadriradicals. However, the argument that the exclusive realization of \(C_1C_1C_2\) verbs in Type B finds an explanation under the view that they are quadriradicals, does not depend on prior acceptation of Banksira’s contention.
4.3. The OCP

Here, I adduce evidence, already mentioned in Banksira (2000), from the behavior of Chaha C₁C₂C₂ verbs of Type B. To appreciate the point, a further piece of information about Type B exponence is necessary. Under specific conditions pertaining to the consonantal composition of the root, Type B membership may be marked by a palatalization prosody accompanying the realization of the Perfective and Imperfective paradigms, crucially not the Jussive. This may take different forms: in order of preference, palatalization of C₁ or C₂, never both C₁ and C₂. Both kinds are exemplified in (24a) and (24b), respectively. (24c) is meant to document the fact that Type B palatalization never affects two different consonants of the same root: palatalization of C₁ in (24a) precludes concomitant palatalization of C₂, eventhough k in root medial position is a possible target of Type B palatalization when C₁ itself is incapable of sustaining palatalization, to wit (24b).

(24)  Perfective  Imperfective  Jussive  Root
a.  s\‘ākātā  yis\‘ākt  yāsākt  √skt ‘fix’
b.  māk\‘ārā  yimāk\‘ir  yāmākür  √mkr ‘burn’
c.  *s\‘āk\‘ātā  *yis\‘āk\‘it

An important point for what follows, just mentioned but worth stressing again, is the systematic absence of the palatalization prosody characteristic of Type B in the Jussive paradigm (*yās\‘ākt, *yāmākür).

With these rough elements of description of Type B palatalization in mind, consider now the formation of the Impersonal person. The Impersonal involves a complex suffix consisting of a floating labialization prosody, followed by suffix +i. The labialization agent will dock onto the rightmost labializable consonant, if there is one. Unless the rightmost labializable consonant is itself the rightmost radical consonant, the +i suffix will palatalize the last root consonant

25) Because palatalization in s\‘ākātā, yis\‘ākt, māk\‘ārā, and yimāk\‘ir is a consequence of Type B membership, it has been factored out of the characterization of the relevant roots; hence √skt, √mkr not *√skt, *√mkr.

26) The Impersonal equipment can be represented as [\(\ldots +/w+y/\)] or [\(\ldots +/u+i/\)]. Mohammed El Medlaoui gets credit for noting the striking similarity between the Impersonal melody of Chaha and the Passive melody of Classical Arabic, cf. kuttub\‘a ‘it was written’ (El Medlaoui 1995). At this point, no one is in a position to implement the correlation in the form of an articulated proposal, as El Medlaoui (p.c.) is the first to emphasize. We do know however that passives are often mobilized for the expression of the Impersonal, cf. Latin fertur ‘it is reported’, German es wurde getanzt ‘dancing took place’.
(if palatalizable). An example of full realization of the entire set of characteristics of the Impersonal is given in (25b), along with the third person masculine singular for comparison in (25a).

(25)  
<table>
<thead>
<tr>
<th></th>
<th>Perfective</th>
<th>Imperfective</th>
<th>Jussive</th>
<th>Root</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>käfat</td>
<td>yikäft</td>
<td>yäkft</td>
<td>√kft 'open'</td>
</tr>
<tr>
<td>b</td>
<td>käfät'i</td>
<td>yikäft'i</td>
<td>yäkft'i</td>
<td></td>
</tr>
</tbody>
</table>

An interesting example of the interaction between the three phenomenologies discussed here, Type B palatalization, Impersonal Formation, and deaf verbs is afforded by verb *k¹ásasä* 'he accused', of which the relevant forms of 3rd person singular masculine (not impersonal!) appear in (26). Because the number of consonants involved in the makeup of the root is precisely what is at stake here, it has been left undecided in (26). On the other hand, because palatalization is credited to type membership, it has been left out of the characterization of the root.

(26)  
<table>
<thead>
<tr>
<th></th>
<th>Perfective</th>
<th>Imperfective</th>
<th>Jussive</th>
<th>Root</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>k¹ásasä</td>
<td>yik¹ásis</td>
<td>yäk¹äsis</td>
<td>√ks or √kss?</td>
</tr>
</tbody>
</table>

The ä-ı vocalization of the Jussive clearly indicates membership in Type B. So does the selective palatalization, present in both the Perfective and the Imperfective, but absent from the Jussive. Now, consider the Impersonal realizations for verb *k¹ásasä*, in (27).

(27) a.  
<table>
<thead>
<tr>
<th></th>
<th>Perfective</th>
<th>Imperfective</th>
<th>Jussive</th>
<th>Root</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>k¹ásas'i</td>
<td>yik¹ásis'i</td>
<td>yäk¹ásis'i</td>
<td>√ks</td>
</tr>
</tbody>
</table>

The first thing to note is the double palatalization of the last two root consonants. This is reminiscent of the behavior of the 2nd Person Feminine illustrated with the examples in (13). As McCarthy (1983) had pointed out, this is further proof of the biliteral character of roots underlying deaf verbs in Chaha. Note, moreover, that Type B palatalization, stable throughout both the Perfective and Imperfective paradigms precludes the realization of the labializing component of the Impersonal. On the other hand, the regular absence of

---

27) The fact that Type B palatalization on a potentially labializable radical (such as a velar, as in (27a,b)) has not yielded to the labializing component of the Impersonal, rather has forced it to
type B palatalization in the Jussive makes room for the expression of the full complex Impersonal affix, with both labialization on C₁, the important point here, and palatalization of the two instances of C₂, viz. yäkʷävštǐi.

Having reviewed the behavior of Type B C₁C₂C₂ verbs and the formation of their Impersonal, we can now turn to C₁C₂C₂ verbs in similar contexts and see whether the evidence militates in favor of a biradical or triradical analysis of the roots involved. Consider k'äk'ärä ‘he hugged’.

(28) Perfective Imperfective Jussive Root

\[
\begin{align*}
\text{k'äk'ärä} & \quad \text{yik'äk'ir} & \quad \text{yäkärir} & \quad \sqrt{kr} \text{ or } \sqrt{kkr}\?
\end{align*}
\]

In view of the vocalization of its Jussive, we can safely conclude that k'äk'ärä is a Type B verb. This is corroborated by the distribution of palatalization, present in the Perfective and Imperfective, but absent from the Jussive.

Less straightforward is the fact that both instances of the velar are palatalized. Indeed, we saw earlier that type B palatalization never affects simultaneously C₁ and C₂ (cf. s'äkätä ‘he fixed’, not *s'äk'ätä), and targets C₁ preferentially. Clearly, if the root is √kkr, ungrammatical *k'äkärä is expected. In order to avoid this embarrassment, an exceptionless generalization regarding what consonants palatalize or not in Type B would now have to be amended so as to make room for cases where C₁ and C₂ are identical, clearly an ad hoc move. On the other hand, under the view that a) the root of k'äk'ärä is √kr, and b) it has been restructured as in (29) as a consequence of the OCP, double palatalization follows with no need to bend the relevant generalization.

(29) a. b. c.

\[
\begin{align*}
\text{Perfective} & \quad \text{Imperfective} & \quad \text{Jussive} \\
\text{k'ë} & \quad \text{r} & \quad \text{yik'ëk'ir} & \quad \text{yäk'ëk'ir} & \quad \sqrt{kr} & \text{or } \sqrt{kkr} \\
\text{C} & \quad \text{VX} & \quad \text{C} & \quad \text{V} & \quad \text{C} & \quad \text{V} & \quad \text{C} & \quad \text{V} & \quad \text{C} & \quad \text{V} \\
\end{align*}
\]

But in addition, a prediction now follows regarding the form of the Impersonal of k'äk'ärä. The careful reader will remember that Type B palatalization does not yield to the labializing portion of the impersonal. Again, this has been noted by means of the parenthesized symbol, (w), in (30a,b). By contrast, the

remain in a kind of limbo, is graphically represented by the parenthesized (w) next to its otherwise expected docking site.
canonical absence of Type B palatalization in the Jussive will no longer thwart the expression of the labializing component of the Impersonal, noted therefore without parentheses in (30c).

(30)  

\[
\begin{array}{ccc}
\text{Perfective} & \text{Imperfective} & \text{Jussive} \\
\text{(w)} k^2 & k^2 & k^2 \\
C & V & C \\
\end{array}
\]

Under the biliteral proposal in (30), it is expected that both instantiations of the velar in (30c) will undergo labialization. This is the correct outcome, as shown in (31).

(31)  

\[
\begin{array}{cccc}
\text{Perfective} & \text{Imperfective} & \text{Jussive} & \text{Root} \\
k^2 & k^2 & k^2 & k \\
y & r & r & \sqrt{kr} \\
\end{array}
\]

Under the rival triliteral hypothesis, √kkt, ungrammatical *yākākiri was expected.

Based on the evidence presented in 2. and 3., I conclude that the biliteral root is well alive in Chaha today. There is no reason to suppose that biradical roots were not equally alive at every other earlier synchronic stage. We know indeed from Leslau (1950) and Polotsky (1938) that Chaha was not significantly different, in the relevant respects, half a century ago. Why should McCarthy’s analysis of Classical Arabic deaf verbs not be valid at every synchronic stage of the language? Why should proto-Semitic itself not have had synchronically very real biradical roots, as well? The burden of the proof squarely rests with the opposition. It is incumbent on the opposition to address the Chaha evidence.

In the next section, I return to Agmon’s paper.

5. Concluding remarks

Agmon’s results can be appreciated from a variety of viewpoints. For instance, some readers (of which I am not) might be especially interested in the vistas opened on the origin of language. Possibly, some such readers will point out that Western Asia is unlikely to be the cradle of human language. Others might retort that one of the paths to the origin of language necessarily runs through one of the better documented parts of the world, both linguistically
and archeologically, etc., etc. The focus of these concluding remarks is rather different. Indeed, I am interested here in a portion of prehistory that lies much closer to us, namely the period during which the pressure towards triliteralism became irresistible, and reached a point of no return. This is clearly a Semitic development, for no other Afroasiatic subfamily has enforced triliteralism as determinedly. Why did this happen at all? The best conceptual tool available to us for construing this development is templatic pressure. Given a template with a fixed shape, roots will adjust, as in the case of a Chaha deaf verb gämämä ‘chip’ (32a), while reduplicated biradicals will give up C₂ of their first conjunct as argued in Banksira (2000), yielding qₚ w'ₚ qₚ wₚ ṣā 'he became burnt' (32b) from \(\sqrt{qₚ w'ₚ qₚ wₚ}s\).

(32)  

\[\begin{array}{c}
gₚ \downarrow m \downarrow C \downarrow V \downarrow C \downarrow V \downarrow C \\
qₚ \downarrow s \downarrow (s) \downarrow qₚ \downarrow wₚ \downarrow s \downarrow (s) \downarrow qₚ \downarrow s \downarrow s \downarrow VXC \downarrow C \downarrow V \downarrow C
\end{array}\]

But what is it that gives templates the power to exert the sort of pressure described in (32), in the first place? Does the sturdiness templates so consistently display reflect a necessary property, or set of properties of their makeup? In this respect, verbs are more likely than nouns to yield insight into this question, for Semitic nominal formations are vastly more numerous than their verbal counterparts. The fact that the range of variation for verb types is much more restricted than it is for noun types suggests that a limited number of more tightly arranged ingredients is involved in their architecture. Guerssel & Lowenstamm (1990) proposed that the entire array of Classical Arabic verbal forms can be derived from a unique template. Building on these results, Arbaoui (2010a,b) argues that the unique template of Guerssel & Lowenstamm, in fact, reflects the canonical order of projections sketched out in (33a). According to Arbaoui’s deconstructive scheme, heads such as Agr, Asp, and V have no segmental content of their own. This is not to say that they lack phonetic content altogether. Rather, their phonetic content boils down to pure space, viz. the light syllable CV. As the root and superordinate heads move up per Head movement, their respective CV’s line up as shown in (33b), thus forming the template onto which positions root consonants will dock.

If this is on the right track, then the templatic pressure effect follows. Indeed, if templates have internal architecture, and that architecture is syntactic structure itself, the root will be expected to adapt to the template, not vice versa. In offering a time frame for dating the drive towards root triliteralism, Agmon may actually have dated the rise of root-and-template (binyanic) morphology.

References


