

## Chasing the Semitic root: The skeleton in the closet

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"Er will die Blume ohne Wurzel und Stengel: er will sie also vergebens."

Nietzsche, *Unzeitgemäße Betrachtungen*, II (KGW III/1, 325)

### 1. *Roots, patterns and stems*

Anyone who approaches a Semitic language for the first time is likely to feel mystified and frequently fascinated by the algebraic structure displayed by nominal patterns and verbal paradigms. For more than a millennium already, Semitic grammarians, both native and Western alike, have upheld the existence of a linguistic entity called "the Semitic root." This root is a discontinuous skeleton of consonants, in which vowels are interdigitated to create stems. The consonantal root, devoid of any vowels, conveys an array of possible meanings corresponding to a specific lexical field or subfield. Moreover, the pattern –which consists of a consonantal template and a vocalic sequence that fills specific slots in the template– adds flesh to this consonantal skeleton by incorporating specific vowels as well as a variety of optional morphophonological devices (gemination, prefixes, infixes, suffixes). To separate templatic pattern (or consonantal template) from vocalic melody (intercalated vowels) is unnecessarily cumbersome.<sup>1</sup> Such a distinction is highly artificial and leaves out other kinds of stem-producing affixes (*t*-infix, *mu*-prefix, etc.). It is true that a given consonantal pattern, to which a specific function is associated, can sometimes exhibit different vowels depending on the root, especially in the case of stem vowels in finite verbal forms. However, normally there is no choice involved in that vocalic variation, since the stem vowel is determined by the semantics of the root and the specific stem; e.g., C<sub>1</sub>aC<sub>2</sub>iC<sub>3</sub>- for the perfective of non-active verbs (Arabic *danifa* "he was very ill") and C<sub>1</sub>aC<sub>2</sub>aC<sub>3</sub>- for the perfective of transitive and active intransitive verbs (Arabic *qatala* "he killed"; *ḍahaba* "he went away"). Since the stem vowel is lexically determined by the pattern in the finite verbal forms in which it appears, it cannot be separated from the

1. Throughout the present contribution, the labels "pattern" and "template" are used interchangeably, since both the consonantal and vocalic templates are inseparable. However, the reader should be aware that many contemporary linguistic approaches to Semitic morphology distinguish between three, rather than two, elements: root, consonantal template, and vocalic pattern or melody; see, for instance, J.C.E Watson, *The phonology and morphology of Arabic* (Oxford, 2002), pp. 126-28.

consonantal template and its predictable vocalic melody.<sup>2</sup> Thus, the pattern marks syntactical relations or functions, in the same abstract fashion in which the consonantal root demarcates lexical meaning. The result of adding a pattern to a given root –the fleshing of the skeleton– is a stem.

Arabic	C <sub>1</sub> aC <sub>2</sub> aC <sub>3</sub> -	C <sub>1</sub> aC <sub>2</sub> C <sub>3</sub> -	C <sub>1</sub> aC <sub>2</sub> C <sub>2</sub> aC <sub>3</sub> -	C <sub>1</sub> aC <sub>2</sub> C <sub>2</sub> āC <sub>3</sub> -	maC <sub>1</sub> C <sub>2</sub> aC <sub>3</sub> -	muC <sub>1</sub> aC <sub>2</sub> C <sub>2</sub> iC <sub>3</sub> -	taC <sub>1</sub> C <sub>2</sub> iC <sub>3</sub> -
DRS	darasa <i>he studied</i>	darsun <i>lesson</i>	darrasa <i>he taught</i>	darrāsun <i>student</i>	madrasah <i>school</i>	mudarrisun <i>teacher</i>	tadrīsun <i>teaching</i>
NQB	naqaba <i>he bored</i>	naqbun <i>hole</i>	naqqaba <i>he drilled</i>	naqqābun <i>punch</i>	manqabah <i>defile</i>	munaqqibun <i>researcher</i>	tanqībun <i>inquiry</i>

Akkadian	aC <sub>1</sub> C <sub>2</sub> uC <sub>3</sub>	C <sub>1</sub> uC <sub>2</sub> uC <sub>3</sub>	taC <sub>1</sub> aC <sub>2</sub> C <sub>2</sub> āC <sub>3</sub>	ušaC <sub>1</sub> C <sub>2</sub> iC <sub>3</sub>	maC <sub>1</sub> C <sub>2</sub> aC <sub>3</sub> -	C <sub>1</sub> aC <sub>2</sub> C <sub>3</sub> -	C <sub>1</sub> iC <sub>2</sub> iC <sub>3</sub> t-
ŠKN	aškun <i>I placed</i>	šukun <i>put!</i>	tašakkan <i>you'll place</i>	ušaškin <i>I established</i>	maškanum <i>site, place</i>	šaknum <i>placed</i>	šikintu <i>allocation</i>
KŠR	aķšur <i>I tied</i>	kušur <i>bind!</i>	takaššar <i>you'll tie</i>	ušaķšir <i>I assembled</i>	maķšarum <i>bundle</i>	kašrum <i>tied</i>	kiširtum <i>constriction</i>

In a way quite similar to our modern, western analysis, native grammarians refer to meaning-carrying root (Arabic *ašl*) and frequently use paradigmatic models based on specific roots (*f*-<sup>c</sup>-*l* in Arabic and *p*-<sup>c</sup>-*l* and *q*-<sup>c</sup>-*l* in Aramaic and Hebrew).<sup>3</sup> The incarnation of a concrete root in a given pattern constitutes a stem, i.e., a lexical item, which is called *wazn* ("weight," pl. *awzān*), *binā*<sup>o</sup> ("formation, structure," pl. *abniyah*) or *binyah* (pl. *binan*), or *miθāl* ("pattern," pl. *amθilah*, *muθul*) in Arabic, and *mišqal* ("weight") or *binā*<sup>o</sup> ("formation, structure") in Hebrew. Nevertheless, the other technical uses of *ašl* in the Arabic grammatical tradition did not pertain to roots, but to: (1) the underlying level of meaning of a sentence (like *ma*<sup>c</sup>*nā* "meaning, intention"; see below);<sup>4</sup> (2) the unmarked term in an opposition or the basic form in a paradigm (as opposed to *far*<sup>c</sup> "branch → marked, derived");<sup>5</sup> and (3) the rules of descriptive grammar (as opposed to explanatory grammar, *īlal*).<sup>6</sup> In fact, the earliest usage of *ašl* in a grammatical tractate from the first half of the 8<sup>th</sup> century, the *Kitāb al-‘ayn*, attributed to al-Ḥalīl, does not seem to include "root" among its connotations: (1) an either actual or reconstructed form; (2) a "basic" form from which other words are derived, e.g., another 8<sup>th</sup>-century grammarian, al-Farrā<sup>o</sup>, argues that the apocopated cohortative imperfect (*yaktub*) is the origin (*ašl*) of the imperative ([<sup>o</sup>u]ktub);<sup>7</sup> (3) the function of a marker, as when al-Ḥalīl states that the *ašl* of /-t-/ marks the feminine;<sup>8</sup> and (4) an "original" form without affixes.<sup>9</sup>

2. See G. Buccellati, *A structural grammar of Babylonian* (Wiesbaden, 1996), p. 59; G. Goldenberg, "Principles of Semitic word-structure," in *Semitic and Cushitic studies* (ed. G. Goldenberg and Sh. Raz. Wiesbaden, 1994), pp. 29-64 (esp. 30) [= G. Goldenberg, *Studies in Semitic linguistics* (Jerusalem, 1998), pp. 10-45 (esp. 11)].

3. The paradigmatic use of *f*<sup>c</sup>*l* in Arabic grammar may have originated with the 8<sup>th</sup>-century grammarian Mu<sup>c</sup>āḏ al-Harrā<sup>o</sup>; see C.H.M. Versteegh, *Arabic grammar and Qur<sup>o</sup>ānic exegesis in Early Islam* (Leiden, 1993), p. 202. The use of *qtl* in Hebrew grammar is due to Syriac influence.

4. See G. Bohas and J.-P. Gillaume, *Études des théories des grammairiens arabes, I: Morphologie et phonologie* (Damascus, 1984), p. 23; K. Versteegh, *The Arabic linguistic tradition* (London, 1997), p. 50.

5. See H. Fleisch, *Traité de philologie arabe, I* (Beirut, 1961), pp. 3-4; J. Owens, *The foundations of grammar: An introduction to Medieval Arabic grammatical theory* (Amsterdam, 1988), pp. 27, 200, 204-207; *id.*, *Early Arabic grammatical theory: Heterogeneity and standardization* (Amsterdam, 1990), pp. 19-20.

6. See Versteegh, *The Arabic linguistic tradition*, p. 74.

7. See R. Talmon, *Eighth-century Iraqi grammar: A critical exploration of pre-Ḥalīlian Arabic linguistics* (HSS 53. Winona Lake, Ind., 2003), p. 244. For this passage, see Abū Zakariyyā<sup>o</sup> Yaḥyā ibn Ziyād al-Farrā<sup>o</sup>, *Ma<sup>c</sup>ānī l-Qur<sup>o</sup>ān* (ed.

In order to understand that these labels were used as abstractions rather than linguistic realities from the very beginning, one should remember that the plural of *aṣl*, *uṣūl*, can be used to refer to the "principles" or rules of grammar (i.e., descriptive grammar), as the 9<sup>th</sup>-century grammarian az-Zajjālī called them. One of az-Zajjālī's teachers, Ibn as-Sarrāj, wrote a book entitled *Kitāb al-ʿuṣūl*, which is a descriptive grammar, a collection of rules. Three centuries after Ibn as-Sarrāj, a grammarian from Granada, Abū Ḥayyān (1256-1345), employed the expression *ʿalā l-aṣl* "according to the principle, the underlying form."<sup>10</sup> Moreover, while these grammarians were using the term in a more restrictive manner, it was also possible to talk about *uṣūl al-fiqh* ("the principles of law") and *uṣūl al-kalām* ("the principles of theology").<sup>11</sup> As for the term *maʿnā* ("meaning"), it is actually employed by Ibn Yaʿīṣ (1158-1245) in the same sense in which we use "pattern" nowadays: as the function-marking structure of the stem.<sup>12</sup> The analysis of *taṣrīf* (verbal and nominal morphology) put forward by Ibn Yaʿīṣ clearly suggests the three-fold structure so familiar to all Semitists: *aṣl* ("root"), *maʿnā* ("pattern"), and *binyah* ("stem").<sup>13</sup>

<i>aṣl</i> ("root")	<i>maʿnā</i> ("pattern")	<i>binyah</i> ("stem")
<i>ḍ-r-b</i>	CvCvCv (perfect tense)	<i>ḍaraba</i> "he struck"

The employment of *maʿnā* for "pattern" originates in the earlier use of the term by the 8<sup>th</sup>-century grammarian Sībawayhi in his famous *Kitāb Sībawayhi*, as was mentioned above.<sup>14</sup> For Sībawayhi, *maʿnā*

Muḥammad ʿAlī n-Najjār. 3 vols. Cairo, 1955-1972), vol. I, 469.17. On al-Farrāʿ, see Owens, *Early Arabic grammatical theory*, pp. 136-141; Talmon, *Eighth-century Iraqi grammar*, pp. 14-19.

8. Al-Ḥalīl's renowned pupil, Sībawayhi, would later resort to *maʿnā* for this functional label; see below.

9. R. Talmon, *Arabic grammar in its formative age* (Leiden, 1997), p. 162; *id.*, *Eighth-century Iraqi grammar*, p. 143.

The standard edition of the tractate by Abū ʿAbd ar-Raḥmān al-Ḥalīl ibn Aḥmad al-Farāhīdī, the *Kitāb al-ʿayn*, is that of Maḥdī l-Maḥzūmī and Ibrāhīm as-Sāmarrāʿī (8 vols. Qum, 1980-85/Baghdad, 1980-85; reprint Beirut, 1988). On the attribution of the *Kitāb al-ʿayn* to al-Ḥalīl, see Talmon, *Arabic grammar in its formative age*, pp. 91-126; *id.*, *Eighth-century Iraqi grammar*, pp. 24-25.

10. See Versteegh, *The Arabic linguistic tradition*, pp. 68, 130, 171.

11. On the possible relation between Arabic grammatical terminology and legal terminology, see M.G. Carter, "Les origines de la grammaire arabe," *Revue des études islamiques* 40 (1972): 69-97; Versteegh, *Arabic grammar and Qurʾānic exegesis in Early Islam*, pp. 33-36.

12. Muwaffaq ad-Dīn Yaʿīṣ ibn ʿAlī ibn Yaʿīṣ an-Naḥwī, *Ṣarḥ al-mulūkī fī t-taṣrīf* (ed. Faḥd Fāwih. Aleppo, 1973), pp. 108-9, 509.

13. Bohas and Gillaume, *Études des théories des grammairiens arabes, I*, pp. 26-31; Owens, *The foundations of grammar*, pp. 96, 232, 243-45. On *taṣrīf*, see Bohas and Gillaume, *op.cit.*, pp. 15-21; Talmon, *Arabic grammar in its formative age*, p. 164. Muʿāḍ al-Harrāʿ was probably the grammarian who introduced *taṣrīf* in the 8<sup>th</sup> century; see N. Abbott, *Studies in Arabic literary papyri, III: Language and literature* (OIP 77. Chicago, 1972), p. 6. The terms *ṣarfa* and *taṣrīf* (*ṣarafa* "he turned, diverted," *ṣarrafa* "he caused to flow off, conjugated [a verb], inflected [a word], declined [a noun]") were perhaps inspired by the Greek word for grammatical case, πτωσις (literally "fall," from πιπτειν "to fall"). Likewise, *iʿrāb* (originally "declension," and eventually the label for all final short vowels) came from ʿarab "the Beduins, the Arabs" and *aʿrābī* "Arab," the same way that ἐλληνισμός was used for the act of speaking Greek, probably as opposed to ἀττικισμός. See C.H.M. Versteegh, *Greek elements in Arabic linguistic thinking* (Leiden, 1977), pp. 64-67.

14. Abū Bīṣr ʿAmr ibn ʿUṯmān Sībawayhi, *Kitāb Sībawayhi*. The two most common modern editions are those of H. Derenbourg, *Le livre de Sībawaihi: Traité de grammaire arabe par Sīboûya, dit Sībawaihi, I-II* (Paris, 1881-89; reprint Hildesheim, 1970) and ʿAbd as-Salām Muḥammad Hārūn (6 vols. Cairo, 1966-1977). Derenbourg's edition is far superior, since it presents a modern *apparatus criticus* based on manuscripts from Cairo, El Escorial, Oxford, Paris, Petersburg, and Vienna; see G. Humbert, *Les voies de la transmission du Kitāb de Sībawayhi* (Leiden, 1995), pp. 33-34. For an annotated translation, which relies on Derenbourg's edition and the 10<sup>th</sup>-century commentary by Sīrāfī (Abū Saʿīd al-Ḥasan ibn ʿAbdallāh as-Sīrāfī), see G.

entailed two different things: (1) "meaning" as the intention of the speaker, to be distinguished from the underlying level or principles (*uṣūl*) unraveled and studied by grammarians; and (2) the label for the different functions of the elements of speech –e.g., the morpheme /-t-/ has as its *ma<sup>c</sup>nā* the marking of feminine in nominal and verbal forms, for which al-Ḥalīl had used the label *aṣl*.<sup>15</sup> Then as now, grammarians realized that function was marked by the pattern (*ma<sup>c</sup>nā*) that was superimposed upon a root (*aṣl*) in order to generate a stem (*binā<sup>w</sup>/binyah*).

Along with the explicit grammatical discourse on roots, this implicit model of how lexical items are generated in Semitic languages has constituted the basis of lexicography for more than a millennium. Already in the 8<sup>th</sup> century, the *Kitāb al-<sup>c</sup>ayn* of al-Ḥalīl arranged Arabic words by their consonantal roots, although the roots were clumsily grouped according to apparently permutational occurrences (*ktb* would be listed together with *kbt*, *bkt*, *tbk*, and *btk*) and no semantic links were actually established between different stems of the same root.<sup>16</sup> This anagrammatic arrangement of Arabic roots was the norm for early Arabic lexicographers until the arrival of the rhyme arrangement that characterizes most medieval Arabic dictionaries since al-Jawharī's *aṣ-Ṣaḥāḥ* –on the exceptions, Ibn Fāris and Sa<sup>c</sup>adiyah Ga<sup>w</sup>on, see below.<sup>17</sup>

The struggle with the actual structure of the Semitic root, the number of radicals, and possibility of permutations characterized early Hebrew lexicography as well. Around 958 in Al-Andalus, Menaḥem ben Saruq completed his dictionary of Hebrew roots in the Bible, the *Maḥberet*, in which he included roots formed by a consonantal skeleton that could go from one to five consonants.<sup>18</sup> As a response to the work of Menaḥem, Dunaš ben Labraṭ wrote a collection of 180 philological and theological replies, the *Tešubot*.<sup>19</sup> However, neither Menaḥem nor Dunaš ever stated the principle of tri-radicalism. During the 10<sup>th</sup> century, Ibn Jinnī, an Arabic scholar born in Mosul, articulated a theory on the Arabic root and its triconsonantic basic structure, according to which the different stems from the same root shared a general semantic range and constituted a lexical field.<sup>20</sup> The orthodox, anti-Mu<sup>c</sup>tazillite scholar Ibn Fāris followed the same approach established by Ibn Jinnī.<sup>21</sup> Moreover, this root-based understanding of Arabic

Jahn, *Sībawaihi's Buch über die Grammatik nach der Ausgabe von H. Derenbourg und dem Commentar des Sîrâfi, I-II* (Berlin, 1895-1900; reprint Hildesheim, 1969). On Sībawayhi and the structuralism *avant la lettre* that characterizes his *Kitāb*, see A.A. (<sup>c</sup>Abd al-Mun<sup>c</sup>im <sup>c</sup>Abd al-Amīr) al-Nassir [an-Nāṣir], *Sībawayh the phonologist (Sībawayh <sup>c</sup>ālim al-aṣwāt*. London, 1993); M.G. Carter, "An Arab grammarian of the 8<sup>th</sup> century A.D.," *JAOS* 93 (1973): 146.157; *id.*, *Sībawayhi* (London, 2004).

15. Versteegh, *The Arabic linguistic tradition*, pp. 50-51.

16. See J.A. Haywood, *Arabic lexicography* (Leiden, 1965), pp. 28-37; Versteegh, *The Arabic linguistic tradition*, pp. 26-27, 111. On al-Ḥalīl and the *Kitāb al-<sup>c</sup>ayn*, see footnote 9 above.

17. Abū Naṣr Ismā<sup>c</sup>īl ibn Ḥammād al-Fārābī I-Jawharī, *Tāj al-luḡah wa-ṣaḥāḥ al-<sup>c</sup>arabiyya* (ed. Aḥmad <sup>c</sup>Abd al-Ġaffār <sup>c</sup>Aḥḥār. 6 vols. 3<sup>rd</sup> ed. Beirut, 1984). See Haywood, *Arabic lexicography*, pp. 68-76; Versteegh, *The Arabic linguistic tradition*, pp. 31-32.

18. Menaḥem ben Saruq, *Maḥberet* (ed. A. Sáenz-Badillos. Granada, 1986).

19. Dunaš ben Labraṭ, *Tešubot* (ed. A. Sáenz-Badillos. Granada, 1980).

20. See Abū l-Faṭḥ <sup>c</sup>Uṯmān ibn Jinnī, *al-Ḥaṣā<sup>w</sup>is* (ed. Muḥammad <sup>c</sup>Alī n-Najjār. 3 vols. Cairo, 1952-1956), vol. 1, pp. 56ff. See also A. Méhiri, *Les théories grammaticales d'Ibn Jinnī* (Tunis, 1973), pp. 247 ff.; and C.H.M. Versteegh, "La 'grande étymologie' d'Ibn Jinnī," in *La linguistique fantastique* (ed. S. Auroux *et al.* Paris, 1985), pp. 44-50; *id.*, *The Arabic linguistic tradition*, pp. 111-12; Owens, *The foundations of grammar*, pp. 95-96.

21. Abū l-Ḥusayn Aḥmad ibn Fāris, *Kitāb al-Firaq* (ed. Ramaḍān at-Tawwāb. Cairo: Maktabat al-Ḥanjī, 1982), p. 51; *id.*, *Kitāb al-iḥba<sup>c</sup> wa-l-muzāwajah* (ed. Muḥammad Adīb <sup>c</sup>Abd al-Wāḥid Jamrān. Damascus, 1995). The term *iḥba<sup>c</sup>* refers to a kind of *Reimwortbildung* in which the second word cannot normally be used on its own: *ḥasan basan* (*ḥasan* "beautiful, good");

lexicography transpires in the dictionaries Ibn Fāris compiled, the *Maqāyīs al-luġah* and the *Mujmal al-luġah*, which give a general meaning for each consonantal root, but not for the different patterns from each root. Ibn Fāris' lexicographic works arranged, seemingly for the first time, entries according to the alphabetic order of the roots –as opposed to the early Ḥalīlilian anagrammatic system and the typically medieval rhyme arrangement.<sup>22</sup> Almost two centuries before Ibn Fāris and al-Jawharī, the famous Jewish scholar Sa'adiah Ga'on had compiled a dictionary, *ha-ʿEgron*, which had two parts: the first was arranged according to the initial letters (the modern system, anticipating Ibn Fāris), the second according to the final ones (i.e., the rhyme arrangement, anticipating al-Jawharī).<sup>23</sup>

Towards the end of the 10<sup>th</sup> century, Abū Zakariyyā Yaḥyā ibn Dāwud of Fez (Yehudah ben David), called Ḥayyūj, perhaps influenced by the works of Arabic grammarians, explicitly noticed the tri-consonantal nature of the Hebrew root and regarded the behavior of the weak verbs in the light of this root-based approach.<sup>24</sup> Nevertheless, still in the 11<sup>th</sup> century Rashi assumed that most Hebrew roots were biradical. In the same century, Yonah ibn Janāḥ wrote a complete description of Biblical Hebrew in Arabic, the *Kitāb at-tanqīḥ*, which is of paramount importance in the history of Semitic linguistics because of its extensive use of comparative (Arabic and Aramaic) materials and its full understanding of the tri-consonantal nature of the Semitic root.<sup>25</sup> By the time David Qimḥi (ca. 1160-1236) wrote his *Sefer ha-šorašim*, both the model of trilateralism and the concept of consonantal root were common currency.<sup>26</sup>

This model, explicitly and implicitly developed by Medieval Arabic and Hebrew grammarians and lexicographers, remains at the core of the modern Western approach to Semitic morphology.<sup>27</sup> In recent

*kaḥīr baḥīr* (*kaḥīr* "much, many"). When the second word of an *iḥbāʿ* formation can be used independently with the same meaning, it is called *muzāwajah*. However, in some early Arabic grammars, *iḥbāʿ* is the term used for vowel harmony (as is the case in Sībawayhi's *Kitāb*); see A. Zaborski, "Biconsonantal roots and triconsonantal root variation in Semitic: Solutions and prospects," in *Semitic studies in honor of Wolf Leslau* (ed. A.S. Kaye. Wiesbaden, 1991), pp. 1675-1703. Frequently, Arabic grammarians seem to blur the distinction between *iḥbāʿ* and *ibdāl*, especially lexical *ibdāl* (*ibdāl luġawī*), which labels the alleged phenomenon of semantically related doublets with some consonantal changes (e.g., *damala* and *damana* "he manured ground with dung"); see J. Hämeen-Anttila, *Lexical ibdāl, I* (StOr 71. Helsinki, 1993), pp. 20-21.

22. *Muʿjam maqāyīs al-luġah* (ed. ʿAbd as-Salām Muḥammad Hārūn. 6 vols. Cairo, 1946-52); *Mujmal al-luġah* (ed. Hādī Ḥasan Ḥammūdī. 6 vols. Kuwait, 1985). See Haywood, *Arabic lexicography*, pp. 98-102.

23. Sa'adiah ben Yoseph (Sa'dīya ibn Yūsuf al-Fayyūmī), *ha-ʿEgron: Kitāb uṣul aš-šīʿr al-ʿibrānī* (ed. N. Allony. Jerusalem, 1969). See Haywood, *Arabic lexicography*, pp. 68-69, 120-21. In order to shed light on the meaning of some Hebrew words, Sa'adiah also pioneered the use of implicit (and sometimes explicit) comparisons with Arabic and Aramaic; see A. Maman, *Comparative Semitic philology in the Middle Ages* (Leiden, 2004), pp. 162-179.

24. Ḥayyūj, *The weak and geminative verbs in Hebrew: Kitāb al-afʿāl ḍawāt ḥurūf al-līn wa-kitāb al-afʿāl ḍawāt al-miḥlāyān* (ed. M. Jastrow. Leiden, 1897). See also A. Maman, *Comparative Semitic philology in the Middle Ages*, pp. 39-40.

25. Abū l-Walīd Marwān ibn Janāḥ, *The book of Hebrew roots* (ed. W. Bacher and A. Neubauer. Amsterdam, 1968 [reprint of 1875 ed.]). The *Kitāb at-tanqīḥ* consists of two parts: *Kitāb al-lumaʿ* (*Sefer ha-riqmah*) and *Kitāb al-uṣūl* (*Sefer ha-šorašim*). See also Maman, *Comparative Semitic philology in the Middle Ages*, pp. 299-370.

26. David Qimḥi, *Sefer ha-šorašim* (ed. J.H.R. Biesenthal and F. Lebrecht. Berlin, 1847 [reprint. Jerusalem, 1966]).

27. For traditional formulations of this system, see C. Brockelmann, *Grundriß der vergleichenden Grammatik der semitischen Sprachen, I* (Berlin, 1908), pp. 286-87; J. Cantineau, "Racines et schèmes," in *Mélanges William Marçais* (Paris, 1950), pp. 119-124; *id.*, "La notion de 'schème' et son altération dans diverses langues sémitiques," *Semitica* 3 (1950): 73-83; K. Petráček, "Die innere Flexion in den semitischen Sprachen," *Archiv Orientální* 28 (1960): 547-606; 29 (1961): 513-545; 30 (1962): 361-408; 31 (1963): 577-624; 32 (1964): 185-222; S. Moscati, A. Spitaler, E. Ullendorff, and W. von Soden, *An introduction to the comparative grammar of the Semitic languages* (Wiesbaden, 1969), pp. 71-75. For an overview of different

years, this purely root-based approach has been partly modified in order to accept, for instance, the existence of monosyllabic roots with a fixed vowel.<sup>28</sup> This has opened the door to a stem-based analysis of Semitic morphology.<sup>29</sup>

## 2. *Speaker's awareness?*

One could argue that, long before the articulation of any linguistic theory about the Semitic root, there were some earlier isolated instances that might bear witness to the awareness of a meaning-bearing consonantal structure on the part of native speakers. Perhaps one of the earliest examples can be found in the Babylonian "Story of creation," or *Enūma eliš* (V 57):

*naḥlapti apluḥti pulḥāti ḥalipma*

HLP PLḤ // PLḤ HLP

"He (Marduk) was dressed with a fearful armored garment."

Nevertheless, this may well be a mere case of alliteration, of an alliterative-iterative chiasmus exhibiting stems from the same two roots, a phenomenon of which there are several examples in Ugaritic and the Hebrew Bible as well.<sup>30</sup> Although the *Enūma eliš* was an erudite and linguistically artificial work aimed at a mostly scholarly readership, there is an excellent chance that the co-occurrence of roots in this line is simply a matter of felicitous serendipity. Nonetheless, examples like this raise the question of speaker's awareness. Before entering any theoretical discussion of the root model in Semitic morphology, one may want to ask to which extent native speakers were and are naturally aware of roots as lexical entities. Of course, this cannot be truly tested with dead languages, but there is no dearth of speakers of living Semitic languages. Moreover, looking into this seemingly psychological question will introduce us into the more theoretical problems of the root model.

Some psycholinguistic studies show that aphasic speakers metathesize the root consonants but leave affixed consonants (prefixes, suffixes, and infixes) unaltered, a phenomenon that would seem explained if

approaches to the Semitic root, see R.M. Voigt, *Die infirmen Verbaltypen des Arabischen und das Biradikalismus-Problem* (Stuttgart, 1988), pp. 17-46.

28. Besides verbs *mediae infirmae*, some very common lexical items (kinship and anatomic terms, for instance) may have been biradical, i.e., monosyllabic stems with a fixed vowel; see A. Militarev and L. Kogan, *Semitic etymological dictionary, I: Anatomy of man and animals* (AOAT 278/1. Münster, 2000), p. CXXXIX. However, diachronically this might not have been so in all cases, since in Semitic sonants were probably able to vocalize without leaving any consonantal trace; see I.M. Diakonoff, "Problems of root structure in proto-Semitic," *Archiv Orientalní* 38 (1970): 453-480.

29. A comprehensive history of the question in the last half a century can be found in G. del Olmo Lete, *Questions de linguistique sémitique: Racine et lexème; Histoire de la recherche (1940-2000)* (Antiquités sémitiques, 5. Paris, 2003). Among recent overviews of Semitic linguistics, a moderate approach is exemplified by B. Kienast, *Historische Semitische Sprachwissenschaft* (Wiesbaden, 2001), pp. 59-68. A more radical and frequently idiosyncratic take is that of E. Lipiński, *Semitic languages: Outline of a comparative grammar* (2<sup>nd</sup> ed. Leuven, 2001), pp. 205-215.

30. See V.A. Hurowitz, "Alliterative allusions, rebus writing, and paronomastic punishment: Some aspects of word play in Akkadian literature," in *Puns and pundits: Word play in the Hebrew Bible and Ancient Near Eastern literature* (ed. S.B. Noegel. Bethesda, Md., 2000), pp. 63-87 (esp. 68); E. Zurro, *Procedimientos iterativos en la poesía ugarítica y hebrea* (Roma/Valencia, 1987), pp. 191-217; K. Hecker, *Untersuchungen zur akkadischen Epik* (AOATS 8. Kevelaer/Neukirchen-Vluyn, 1974), pp. 139-141

the root had an actual mental representation in the competence of Semitic speakers.<sup>31</sup> However, the behavior of these aphasic speakers could be explained in a different way. Many studies have been devoted to patients with Broca's aphasia in Japanese. According to early works, Japanese-speaking patients with Broca's aphasia were able to write a dictated word correctly in *kanji* (i.e., logograms, normally used to write lexical morphemes), but not in *kana* (i.e., syllabograms, customarily employed for morphological markers). Moreover, among dyslexic Japanese-speaking children, their condition affected their performance with *kana* more than that with *kanji*.<sup>32</sup> The early, vast bibliography of studies on this matter, produced mostly by native scholars, seems to come almost unanimously to the same conclusion: *kanji* signs would be right-hemisphere lateralized, whereas *kana* would be left-hemisphere lateralized. Nevertheless, more recent research has yielded a more complicated picture, with different combinations of abilities and inabilities to use *kanji* and *kana* in cases of dyslexia, dysgraphia, aphasia, alexia, and agraphia, which cannot be explained with an oversimplistic approach to the neurology of lateralization.<sup>33</sup> In fact, if anything, the study of different brain lesions and injuries implies that both graphemic sets seem to be processed in the left hemisphere: *kana* in the temporal region and *kanji* in the occipito-parietal region.<sup>34</sup> Moreover, one can appreciate sharp differences in the processing of various morphological suffixes (written with *kana*, i.e., syllabograms), depending on the specific lesion of a patient.<sup>35</sup> Thus, the variables do not lie in the graphematic opposition *kana/kanji*, but rather in the morphological one between inflection and derivation.<sup>36</sup>

This would apply directly to the case of Semitic languages, in which derivational morphology seems template- or pattern-based, and inflection stem-based. However, in terms of language processing and acquisition, the pattern-based nature of derivational morphology may be solely apparent. When a loanword such as Arabic *bābūr* "locomotive, steamer" (< Spanish *vapor*) has an internal plural *bawābir* (along with *bābūrāt*), the process taking place is simple analogy due to the nativizing analysis of *bābūr* as exhibiting a quadriliteral template similar to, for instance, that of *qālab* "mold" (pl. *qawālib*). Likewise, throughout the whole history of Arabic, verbs such *dabbaja* ("he embellished," form II), *tawarrada* ("he became rose colored, i.e., red," form V), and *talfana* ("he telephoned") have been created on the basis of

31. See J.-F. Prunet, R. Béland, and A. Idrissi, "The mental representation of Semitic words," *Linguistic inquiry* 31 (2000): 609-648 -see also J. Sanmartín's contribution in this volume.

32. See, for instance, K. Makita, "The rarity of reading disability in Japanese children," *American Journal of Orthopsychiatry* 38 (1968): 599-614.

33. M. Paradis, H. Hagiwara, and N. Hildebrandt, *Neurolinguistic aspects of the Japanese writing system* (New York, 1985).

34. See Paradis *et al.*, *Neurolinguistic aspects of the Japanese writing system*, p. 196.

35. H. Hagiwara, Y. Sugioka, T. Ito, M. Kawamura, and J. Shiota, "Neurolinguistic evidence for rule-based nominal suffixation," *Language* 75 (1999): 739-763. Hagiwara *et al.* study two nominalizing suffixes in Japanese, *-sa* and *-mi*, which fulfill very similar, if not identical, functions, but which appear in different distributions: *-sa* is very frequent and generates abstract nouns, whose meanings are very predictable or semantically transparent, whereas *-mi* is far less productive and generates concrete nouns, whose meanings are not immediately predictable. It is probably the variable of semantic transparency that determines their different behavior in the presence of brain lesions: "a patient with a focalized lesion in Broca's area, i.e., a Broca's patient, would have difficulties in dealing with *-sa* suffixation, whereas the Gogi patients, the Wernicke's patients, the transcortical motor aphasic patients and the normal controls would not have such difficulties (...) a patient with a lesion in the left middle and inferior temporal areas, i.e. a Gogi aphasic patient, would have difficulties with *-mi* suffixation, whereas the Broca's aphasic patients would not" (p. 750).

36. Hagiwara *et al.*, *Language* 75 (1999): 756: "the derivational process of *-sa* suffixation is based on the same mental mechanism of computation as regular inflection."

borrowed nouns: *dībāj* (pl. *dabābāj*, "silk brocade" < Persian *dībā* "brocade"), *ward* (pl. *wurūd*, "rose" < Persian *ward*), and *tilifūn* (< *telephone*). Such formations –in which a consonantal skeleton would seem abstracted from a non-Semitic loanword– are simple instances of analogy (Arabic *qiyās*), a phenomenon well known throughout the history of the Arabic language. Already in Classical Arabic, early loanwords underwent a process of Arabization (*ta<sup>c</sup>rīb*).<sup>37</sup>

In a recent collection of studies concerning the nature of Semitic morphology from the point of view of language processing and acquisition, the emerging consensus casts serious doubts on the linguistic reality of consonantal roots.<sup>38</sup> Nonetheless, in the same volume, the psycholinguistic experiments would appear to uphold the existence of roots as mere consonantal skeletons in the mental lexicon.<sup>39</sup> However, the traditional, root-based approach to Semitic morphology seems not so much a reflection of a linguistic entity –the possible existence of a mental lexicon of consonantal roots devoid of vowels– as rather a construct devised by Medieval and Modern grammarians through the same analogical and associative mechanisms manifested in some psycholinguistic experiments.<sup>40</sup> In this regard, it is worth looking into the amazingly productive role Semitic morphology has played in modern phonological and morphological theory.

### 3. *Skeletons and non-concatenative models in phonology and morphology*

To this point, the term "skeleton" has been used here in a non-technical way, as a synonym of non-concatenative consonantal sequence. In prosodic phonology or moraic theory, *skeletons* refer to the second or anchor tier in a three-tier analysis:

syllable tier	$\sigma$	$\sigma$	
	/	/   \	
skeletal tier	C V	C V C	
segmental tier	b I	ʃ ə p	(English <i>bishop</i> )

In autosegmental phonology, *skeleton* can have the sense of *quantity tier* or *timing tier*, in which short segments are linked to one unit and long ones to two. More specifically, McCarthy's model of

37. See Versteegh, *The Arabic language* (New York, 1997), pp. 179-181; Cl. Holes, *Modern Arabic* (rev.ed. Washington, D.C., 2004), pp. 305-307.

38. J. Shimron (ed.), *Language processing and acquisition in languages of Semitic, root-based, morphology* (Amsterdam, 2003); see especially Shimron's introductory summary, "Semitic languages: Are they really root-based?" pp. 1-28.

39. See I. Berent and J. Shimron, "What is a root?: Evidence from the obligatory contour principle," in *Language processing and acquisition in languages of Semitic, root-based, morphology*, pp. 201-222. On the mental lexicon, see J. Aitchison, *Words in the mind: An introduction to the mental lexicon* (3<sup>rd</sup> ed. Oxford, 2003).

40. For a slightly more timid approach within the same context, see Sh. Bolozky, "The 'roots' of denominative Hebrew verbs," in *Language processing and acquisition in languages of Semitic, root-based, morphology*, pp. 131-146.



autosegmental phonology, grounded in the seemingly non-concatenative structure of Semitic morphology, labels as *skeletal tier* the tier that anchors the two *melodic tiers* (i.e., the *root tier* and the *scheme tier*):<sup>41</sup>

Akkadian <i>šukun</i> "put!" (impv.)			
root tier	š   k   n		"(to) put"
skeletal tier	C V C V C		"IMPERFECTIVE"
scheme/vowel tier	u   u		"IMPERATIVE"
Arabic ( <sup>ʔ</sup> <i>u</i> ) <i>ktub</i> "write!" (impv.)			
root tier	k   t   b		"(to) write"
skeletal tier	V   C   C   V   C		"IMPERFECTIVE"
scheme/vowel tier	u   u		"IMPERATIVE"

In modern discussions of phonological and morphological theory, the idea of a Semitic consonantal root has played a fundamental and very productive role. When defining the relation between syllables and segments, as well as the underlying structure of morphological units, the traditional concept of Semitic root offers a unique model of non-concatenative morphology and of discontinuous segmental sequence. A very important corollary of the use of Semitic languages in modern phonological and morphological theory constitutes one of the pillars of autosegmental phonology: the Obligatory Contour Principle (OCP), which, in McCarthy's version, would require that "multiple occurrences of a consonant in the stem be represented by a single element of the root melody"; so the underlying representation of seemingly R<sub>1</sub>R<sub>2</sub>R<sub>2</sub> roots would be basically R<sub>1</sub>R<sub>2</sub>.<sup>42</sup> In *linear* phonology, any lexical item is a sequence of speech sounds or, in abstraction, segments (formerly known as "phonemes"), and each of these sounds/segments are characterized as a matrix of features:<sup>43</sup>

Linear analysis of Akkadian *šakin* "it exists" (stative):

+ cons	- cons	+ cons	- cons	+ cons
- sonor	+ sonor	- sonor	+ sonor	+ sonor
+ contin	+ contin	- contin	+ contin	+ contin
+ coron	+ low	+ dorsal	+ high	+ dental
- anter	- back	+ velar	- back	+ nasal
- voiced	+ voiced	- voiced	+ voiced	+ voiced

The use of feature trees instead of matrices leads to a different (more relational or associative) understanding of these features in a nonlinear but geometric context:

41. J.J. McCarthy, "Formal problems in Semitic phonology and morphology," MIT Ph.D. diss., 1979; *id.*, "A prosodic theory of nonconcatenative morphology," *Linguistic inquiry* 12 (1981): 373-418; M. Kenstowicz, *Phonology in generative grammar* (Oxford, 1994), pp. 395-450.

42. J.J. McCarthy, "Lexical phonology and non-concatenative morphology in the history of Chaha," *Revue québécoise de linguistique* 16 (1986): 209-228.

43. See, for instance, A. Manaster Ramer, "The phoneme in generative phonology and in phonological change," *Diachronica* 5 (1988): 109-139.

root tier	š	k	n
skeletal tier	C	V	C V C
scheme/vowel tier	a	i	

This geometric approach eliminates the one-to-one relation between segments and features, so each feature can be an autosegment, i.e., an autonomous phonological entity independent of the segment with which it is associated. Autosegmental phonology is especially productive when studying assimilatory phenomena involving non-consecutive segments (vowel harmony, consonantal harmony), contour rules, tones, etc.

Within this theoretical framework, William Leben formulated the Obligatory Contour Principle as a suprasegmental rule of incompatibility in underlying representations.<sup>44</sup> According to OCP, adjacent identical tones are banned from the lexical representation of a morpheme, as in this Hausa (Chadic) example –notice that Hausa has three surface tones: high (H) { $\emptyset$ }; low (L) { $\grave{}$ }; and falling (F) { $\wedge$ }.<sup>45</sup>

lilimàn		lilimàn	"liniment"
	→ OCP →	∨	
H L L		H L	

McCarthy applied this principle to the Semitic root and, as has been mentioned already, concluded that "multiple occurrences of a consonant in the stem be represented by a single element of the root melody":<sup>46</sup>

Arabic <i>madad-tu</i> "I extended"; <i>madad-nā</i> "we extended"...	
	m d
OCP→	^
	CVCVC-
SURFACE REPRESENTATION →	UNDERLYING REPRESENTATIONS
m-d-d ("to extend")→	m-d
s-m-m ("to poison")→	s-m

The extension of this principle from suprasegmental features (such as tone) to segments is not without problems. If one happens to be a strict constructionist in these matters or a stickler for the original application of a rule, the extension of this principle on the basis of a rather loose isomorphism is methodologically questionable. Moreover, as Gideon Goldenberg has pointed out, if verbs *mediae geminatae* are regarded synchronically as biliteral, one has to wonder what would be then the functional yield of consonantal gemination and reduplication in Semitic.<sup>47</sup> One should remember here that McCarthy is not really arguing that these verbs originated from biliteral roots; seemingly he is not preoccupied with

44. W. Leben, "Suprasegmental phonology," Ph.D. diss. MIT. Cambridge, Mass., 1973.

45. P. Newman, *The Hausa language* (New Haven, 2000), pp. 597-614; P.J. Jaggard, *Hausa* (Amsterdam, 2001), pp. 12-19.

46. McCarthy, *Revue québécoise de linguistique* 16 (1986): 212.

47. G. Goldenberg, "Principles of Semitic word-structure," in *Semitic and Cushitic studies* (ed. G. Goldenberg and Sh. Raz. Wiesbaden, 1994), pp. 29-64 (esp. 53-55) [= G. Goldenberg, *Studies in Semitic linguistics* (Jerusalem, 1998), pp. 10-45 (esp. 34-36)].

diachronic problems.<sup>48</sup> He is referring to underlying representations. Thus, according to McCarthy, roots whose surface representation is that of *mediae geminatae* would have a biliteral underlying representation.

Here one is confronted again with the issue of the possible awareness of the Semitic consonantal root on the part of native speakers. A recent study by Frisch and Zawaydeh has argued for the psychological reality of the Obligatory Contour Principle among Arabic speakers.<sup>49</sup> Their experiment consisted in submitting a number of novel, mostly made-up verbal roots to native speakers of Arabic. A subset of these roots contained repeated homorganic consonants, so they violated a rather generous application of McCarthy's OCP. Speakers tended to reject these roots more frequently than those that did not exhibit repeated homorganic consonants. Frisch and Zawaydeh conclude that native speakers (at least in the case of Arabic) are aware of the Obligatory Contour Principle and prefer roots without repeated homorganic consonants. Furthermore, they regard this sense of well-formedness as proof of the psychological synchronic reality of consonantal roots as the source of lexical items.

More compelling evidence of OCP and roots in the mental lexicon can seemingly be found in a well-known phonotactic restriction. Whereas Semitic languages have no dearth of roots in which the second and third radicals are identical (*ʿayin-ʿayin* or *mediae geminatae* roots), the occurrence of identical consonants as first and second radicals is exceedingly uncommon.<sup>50</sup> In an experiment with Israeli Hebrew speakers, made-up roots exhibiting a template  $C_1C_2C_2$  were far more acceptable than those with a template  $C_1C_1C_2$ .<sup>51</sup> Nevertheless, as seen above, one can still question whether these psycholinguistic data necessarily point to the independent existence of "skeletal, consonantal roots" in the mental lexicon, or these experiments simply show how analogical and associative mechanisms shape a merely transactional awareness of such roots in native speakers.

The applicability of the Obligatory Contour Principle has multiple exceptions, which McCarthy, as well as Frisch and Zawaydeh, fail to notice. For instance, as Bernard Bachra has shown in his study of the phonological structure of verbal roots in Arabic and Hebrew, quadriliteral verbs are preferred when they contain consonants with the same place or manner of articulation, a preference that violates the Obligatory Contour Principle in a whole set of roots.<sup>52</sup> This study may have produced substantially different results if the speakers had been given whole paradigms. In Arabic, *verba mediae geminatae* exhibit an interesting alternation conditioned by syllabification in the form I or basic stem –in actuality, these verbs should be called reduplicated instead of geminated:

*radda* (he returned), *raddū* (they returned)  
*radadtu* (I returned), *radadnā* (we returned)

48. For a proposal concerning the diachronic evolution from  $C_1C_2$  to  $C_1C_2C_2$  roots, see J. Kuryłowicz, *Studies in Semitic grammar and metrics* (Warsaw, 1972), p. 14; Z. Frajzyngier, "Notes on the  $R_1R_2R_2$  stems in Semitic," *Journal of Semitic Studies* 24 (1979): 1-12.

49. S.A. Frisch and B.A. Zawaydeh, "The psychological reality of OCP-place in Arabic," *Language* 77 (2001): 91-106.

50. See J. Cantineau, "Esquisse d'une phonologie de l'Arabe classique," *Bulletin de la Société Linguistique de Paris* 43 (1946): 93-140; J. Greenberg, "The patterning of morphemes in Semitic," *Word* 6 (1950): 162-181.

51. I. Berent and J. Shimron, "What is a root?: Evidence from the obligatory contour principle," in *Language processing and acquisition in languages of Semitic, root-based, morphology*, pp. 201-222.

52. B.N. Bachra, *The phonological structure of the verbal roots in Arabic and Hebrew* (Leiden, 2001), pp. 94-97, 120-22, 187-88.

Arabic verbs with identical second and third radicals do not exhibit their stem vowel between the second and third radicals if they have a suffix that begins with a vowel; the stem vowel is preserved when the suffix starts with a consonant. Both the traditional and generative approaches to this phenomenon tend to explain it somehow as a morphological alternation. However, as Gafos has recently pointed out, these forms with and without stem vowel are the result of a phonotactic constraint: the impossibility of clusters of three consonants.<sup>53</sup>

ARABIC	PERFECTIVE	IMPERFECTIVE
I	C <sub>1</sub> aC <sub>2</sub> vC <sub>3</sub> - <b>C<sub>1</sub>aC<sub>2</sub>vC<sub>2</sub>- / C<sub>1</sub>aC<sub>2</sub>C<sub>2</sub>-</b> C <sub>1</sub> vC <sub>2</sub> - / C <sub>1</sub> ṽC <sub>2</sub> -	ya-C <sub>1</sub> C <sub>2</sub> vC <sub>3</sub> - <b>ya-C<sub>1</sub>C<sub>2</sub>vC<sub>2</sub>- / ya-C<sub>1</sub>vC<sub>2</sub>C<sub>2</sub>-</b> ya-C <sub>1</sub> vC <sub>2</sub> - / ya-C <sub>1</sub> ṽC <sub>2</sub> -
II	C <sub>1</sub> aC <sub>2</sub> C <sub>2</sub> aC <sub>3</sub> - <b>C<sub>1</sub>aC<sub>2</sub>C<sub>2</sub>aC<sub>2</sub>-</b>	yu-C <sub>1</sub> aC <sub>2</sub> C <sub>2</sub> iC <sub>3</sub> - <b>yu-C<sub>1</sub>aC<sub>2</sub>C<sub>2</sub>iC<sub>2</sub>-</b>
III	C <sub>1</sub> āC <sub>2</sub> aC <sub>3</sub> - <b>C<sub>1</sub>āC<sub>2</sub>C<sub>2</sub>-</b>	yu-C <sub>1</sub> āC <sub>2</sub> iC <sub>3</sub> - <b>yu-C<sub>1</sub>āC<sub>2</sub>C<sub>2</sub>-</b>
IV	<sup>ʔ</sup> aC <sub>1</sub> C <sub>2</sub> aC <sub>3</sub> - <b><sup>ʔ</sup>aC<sub>1</sub>C<sub>2</sub>aC<sub>2</sub>- / <sup>ʔ</sup>aC<sub>1</sub>aC<sub>2</sub>C<sub>2</sub>-</b> <sup>ʔ</sup> aC <sub>1</sub> aC <sub>2</sub> - / <sup>ʔ</sup> aC <sub>1</sub> āC <sub>2</sub> -	yu-C <sub>1</sub> C <sub>2</sub> iC <sub>3</sub> - <b>yu-C<sub>1</sub>C<sub>2</sub>iC<sub>2</sub>- / yu-C<sub>1</sub>iC<sub>2</sub>C<sub>2</sub>-</b> yu-C <sub>1</sub> iC <sub>2</sub> - / yu-C <sub>1</sub> īC <sub>2</sub> -
V	taC <sub>1</sub> aC <sub>2</sub> C <sub>2</sub> aC <sub>3</sub> - <b>taC<sub>1</sub>aC<sub>2</sub>C<sub>2</sub>aC<sub>2</sub>-</b>	ya-taC <sub>1</sub> aC <sub>2</sub> C <sub>2</sub> aC <sub>3</sub> - <b>ya-taC<sub>1</sub>aC<sub>2</sub>C<sub>2</sub>aC<sub>2</sub>-</b>
VI	taC <sub>1</sub> āC <sub>2</sub> aC <sub>3</sub> - <b>taC<sub>1</sub>āC<sub>2</sub>C<sub>2</sub>- (/taC<sub>1</sub>āC<sub>2</sub>C<sub>2</sub>aC<sub>2</sub>-)</b>	ya-taC <sub>1</sub> āC <sub>2</sub> aC <sub>3</sub> - <b>ya-taC<sub>1</sub>āC<sub>2</sub>C<sub>2</sub>- (/ya-taC<sub>1</sub>āC<sub>2</sub>C<sub>2</sub>aC<sub>2</sub>-)<sup>54</sup></b>
VII	( <sup>ʔ</sup> i)nC <sub>1</sub> aC <sub>2</sub> aC <sub>3</sub> - <b>(<sup>ʔ</sup>i)nC<sub>1</sub>aC<sub>2</sub>aC<sub>2</sub>- / (<sup>ʔ</sup>i)nC<sub>1</sub>aC<sub>2</sub>C<sub>2</sub>-</b> ( <sup>ʔ</sup> i)nC <sub>1</sub> aC <sub>2</sub> - / ( <sup>ʔ</sup> i)nC <sub>1</sub> āC <sub>2</sub> -	ya-nC <sub>1</sub> aC <sub>2</sub> iC <sub>3</sub> - <b>ya-nC<sub>1</sub>aC<sub>2</sub>iC<sub>2</sub>- / ya-nC<sub>1</sub>aC<sub>2</sub>C<sub>2</sub>-</b> ya-nC <sub>1</sub> aC <sub>2</sub> - / ya-nC <sub>1</sub> āC <sub>2</sub> -
VIII	C <sub>1</sub> taC <sub>2</sub> aC <sub>3</sub> - <b>C<sub>1</sub>taC<sub>2</sub>aC<sub>2</sub>- / C<sub>1</sub>taC<sub>2</sub>C<sub>3</sub>-</b> C <sub>1</sub> taC <sub>2</sub> - / C <sub>1</sub> tāC <sub>2</sub> -	ya-C <sub>1</sub> taC <sub>2</sub> iC <sub>3</sub> - <b>ya-C<sub>1</sub>taC<sub>2</sub>iC<sub>2</sub>- / ya-C<sub>1</sub>taC<sub>2</sub>C<sub>3</sub>-</b> ya-C <sub>1</sub> taC <sub>2</sub> - / ya-C <sub>1</sub> tāC <sub>2</sub> -
IX	( <sup>ʔ</sup> i)C <sub>1</sub> C <sub>2</sub> aC <sub>3</sub> aC <sub>3</sub> - / ( <sup>ʔ</sup> i)C <sub>1</sub> C <sub>2</sub> aC <sub>3</sub> C <sub>3</sub> - [( <sup>ʔ</sup> i)C <sub>1</sub> āC <sub>2</sub> aC <sub>2</sub> -]	ya-C <sub>1</sub> C <sub>2</sub> aC <sub>3</sub> iC <sub>3</sub> - / ya-C <sub>1</sub> C <sub>2</sub> aC <sub>3</sub> C <sub>3</sub> - ya-C <sub>1</sub> āC <sub>2</sub> aC <sub>2</sub> -]
X	( <sup>ʔ</sup> i)staC <sub>1</sub> C <sub>2</sub> aC <sub>3</sub> - <b>(<sup>ʔ</sup>i)staC<sub>1</sub>C<sub>2</sub>aC<sub>2</sub>- / (<sup>ʔ</sup>i)staC<sub>1</sub>aC<sub>2</sub>C<sub>2</sub>-</b> ( <sup>ʔ</sup> i)staC <sub>1</sub> aC <sub>2</sub> - / ( <sup>ʔ</sup> i)staC <sub>1</sub> āC <sub>2</sub> -	ya-staC <sub>1</sub> C <sub>2</sub> iC <sub>3</sub> - <b>ya-staC<sub>1</sub>C<sub>2</sub>iC<sub>2</sub>- / ya-staC<sub>1</sub>iC<sub>2</sub>C<sub>2</sub>-</b> ya-staC <sub>1</sub> iC <sub>2</sub> - / ya-staC <sub>1</sub> īC <sub>2</sub> -

There is further evidence that supports Gafos' phonotactic approach. The fact is that the same alternation in verbs *mediae geminatae* occurs also in a morphologically reduplicated stem, form IX: (<sup>ʔ</sup>i)ʃ<sup>ʕ</sup>alla/yaf<sup>ʕ</sup>allu. The IX stem in Arabic is usually a denominative class originating in nouns designating colors and physical features (pattern <sup>ʔ</sup>af<sup>ʕ</sup>alu). Cognate stems exist in several Semitic languages (e.g.,

53. A. Gafos, "An argument for a stem-based view of Arabic morphology: Double verbs revisited," in *Perspectives on Arabic linguistics, XIII-XIV* (ed. D. B. Parkinson and E. Banmamoun. Amsterdam, 2002), pp. 59-86.

54. Cp. VI-stem perfective forms *tašādada* and *tašādda*, corresponding to a I-stem *šadda* ("he was strong; he made strong"), meaning "to argue with one another" in the VI-stem.

Akkadian *namuš[š]ušum* "to die" ← *namāšum* "to depart"), as well as Berber.<sup>55</sup> These R-stems, or reduplicated verbal stems, would exhibit a consonantal template C<sub>1</sub>C<sub>2</sub>C<sub>3</sub>C<sub>3</sub>. If both lexical reduplication (in the case of verbs *mediae geminatae*) and morphological reduplication (in the IX stem) follow the same rule when taking personal suffixes, then this rule cannot be morphological but phonotactic:

Arabic <sup>ʔ</sup>*asfaru* "yellow" → form IX  
 (ʔ*i*)*šfarra* (he turned yellow), (ʔ*i*)*šfarrū* (they turned yellow)  
 (ʔ*i*)*šfarartu* (I turned yellow), (ʔ*i*)*šfararnā* (we turned yellow)

An immediate corollary of this approach to the problem of verbs *mediae geminatae* is that, rather than an underlying root, what we have here is an underlying stem subject to phonotactic rules that shape the surface representation of this stem. As Gafos argues, these forms derive synchronically from the position of basicness of C<sub>1</sub>vC<sub>2</sub>C<sub>2</sub> and they point to a stem-based morphological system, not to a template-based and root-based morphology. Coincidentally, this (C<sub>1</sub>vC<sub>2</sub>C<sub>2</sub>) is the analysis of <sup>ʕ</sup>*ayin*-<sup>ʕ</sup>*ayin* verbs in Gesenius-Kautzsch, the classical reference for Biblical Hebrew grammar.<sup>56</sup>

#### 4. From root to stem

The last decade or so has witnessed a gradual shift from the traditional template-based and root-based understanding of Semitic –rephrased and formalized, but ultimately parroted in early generative phonological and morphological theory– to a new approach that grants a much more important role to stems. In fact, long before this shift, Kuryłowicz had stressed the derivational role played by apophony or *Ablaut* in Semitic.<sup>57</sup> Moreover, others have advocated in favor of abandoning the strict root model, which requires the existence of patterns or templates to generate lexical morphemes, and embracing apophony as the mechanism that generates stems in Semitic languages.<sup>58</sup> It is important to notice that the apophonic approach does not necessarily deny the existence of consonantal roots, but it links these to the patterns.<sup>59</sup> Within the framework of apophony, both roots and patterns would be discontinuous morphemes, but they would not enjoy an existence independent from each other in the speaker's competence. Even without the explanatory device of apophony, one has to accept that root and pattern are bound in the simultaneous

55. See R.M. Whiting, "The R stem(s) in Akkadian," *Orientalia* n.s. 50 (1981): 1-39; K.-G. Prasse, *Manuel de grammaire touaregue (tāhāggart)*, VI-VII: *Verbe* (Copenhagen, 1973), pp. 227-232, 255-56; Lipiński, *Semitic languages* (2<sup>nd</sup> ed. Leuven, 2001), pp. 414-15. Pace Kienast, *Historische Semitische Sprachwissenschaft* (Wiesbaden, 2001), pp. 235-36.

56. Gesenius-Kautzsch, *Gesenius' Hebrew grammar* (Oxford, 1910 [repr. 1988]), pp. 175-76.

57. J. Kuryłowicz, *L'apophonie en sémitique* (Warsaw, 1961), p. 73; *id.*, *Studies in Semitic grammar and metrics* (Warsaw, 1972), pp. 32-52.

58. G.M. Schramm, "Semitic morpheme structure typology," in *Semitic studies in honor of Wolf Leslau* (ed. A. S. Kaye. Wiesbaden, 1991), pp. 1402-1408; P. Ségéral, "Théorie de l'apophonie et organisation des schèmes en sémitique," in *Research in Afroasiatic grammar: Papers from the Third Conference on Afroasiatic Languages, Sophia Antipolis, 1996* (ed. J. Lecarme, J. Lowenstamm, and U. Shlonsky. Amsterdam, 2000), pp. 263-299.

59. See Goldenberg, "Principles of Semitic word-structure," pp. 32-33 [= G. Goldenberg, *Studies in Semitic linguistics*, pp. 13-14].

input of lexeme formation; a symptom of this boundness is the fact that none of them can be realized by itself in the output.<sup>60</sup>

The best example of productive apophony can be found in Indo-European languages, in which a root can occur with different grades of vocalic (and consonantal) *Ablaut*.<sup>61</sup> Indo-European roots can exhibit two kinds of apophony: qualitative and quantitative. The different alternations (*e/o/ø/ē/ō*) are named according to a gradual scale:

- *e/o* → full grade (Sanskrit *guṇa*, *Voll-/Hochstufe*, *degré plein*, *grado pleno*)
- *ē/ō* → lengthened grade (Sanskrit *vr̥ddhi*, *Dehnstufe*, *degré long*, *grado largo*)
- *ø* → zero grade (*Null-/Schwundstufe*, *degré zéro*, *grado cero*)

	<i>e</i> -grade	<i>o</i> -grade	zero grade
Greek	<i>leíp-ō</i> "I leave"	<i>lé-loip-a</i> "I have left"	<i>é-lip-on</i> "I left"

Indo-European *Ablaut* constitutes a morphological marker; e.g., thematic present stems tend to have *e*-grade; the perfect tense has *o*-grade in the singular (Greek *oída* "I know" → *ídmen* "we know"), etc. Thus, one can draw an isomorphic parallel between the notions of root and stem in Semitic and Indo-European on a strictly functional basis.<sup>62</sup>

	ROOT	STEMS
Indo-European	* <i>sed-</i>	<i>he sits</i> (< * <i>sed-</i> ), <i>he sat</i> (< * <i>sod-</i> ), <i>nest</i> (< * <i>ni-sd-o-</i> ), <i>seat</i> (< * <i>sēd-</i> ), <i>soot</i> (< * <i>sōd-</i> )
Semitic	* <i>ktb</i>	<i>kataba</i> (he wrote), <i>kitāb</i> (book), <i>kutub</i> (books), <i>maktab</i> (office), <i>maktabah</i> (library), <i>kātib</i> (writer), <i>istikṭāb</i> (dictation)

However, one cannot fail to see the substantial difference between the Indo-European situation and the Semitic one. Although Indo-European *Ablaut* is a morphological marker, it is not generally a productive morphological device in historical Indo-European languages. By contrast, an apophonic derivational system of Semitic stems would need to be fully productive. Moreover, in Indo-European, qualitative apophony originally depended on stress or accent (i.e., it was triggered by suprasegmentals), and quantitative apophony resulted from compensatory lengthening after the loss of laryngeals (i.e., it originated in the loss of specific segments). Nonetheless, although apophony might have been triggered in substantially different ways in Indo-European and Semitic, the fact is that apophony can be a

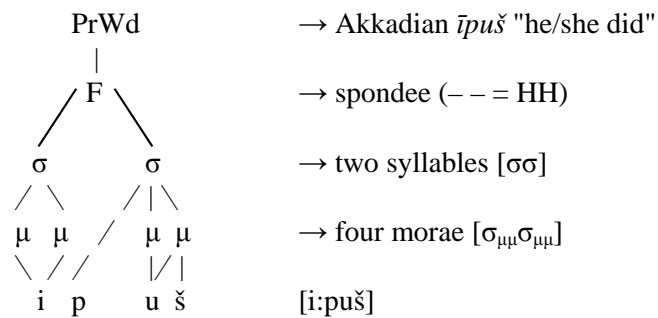
60. See M. Ephratt, "Hebrew morphology by itself," *Journal of Northwest Semitic Languages* 28 (2002): 83-99. In a loose way, this issue can be connected to the problematic relation between phonologically permissible and phonetically possible segments; see R. Walker and G.K. Pullum, "Possible and impossible segments," *Language* 75 (1999): 764-780.

61. J. Kuryłowicz, *L'apophonie en indo-européen* (Warsaw, 1956); O.J.L. Szemerényi, *Introduction to Indo-European linguistics* (Oxford, 1994), pp. 111-121; R.S.P. Beekes, *Comparative Indo-European linguistics* (Amsterdam, 1995), pp. 164-67; B.W. Fortson IV, *Indo-European language and culture* (Oxford, 2004), pp. 70-76.

62. See, for instance, D. Baggioni and P. Larcher, "Note sur la racine en indo-européen et en sémitique," in *La sémitologie, aujourd'hui* (ed. P. Cassuto and P. Larcher. Travaux 16. Aix-en-Provence, 2000), pp. 121-131.

morphological device in Semitic, a device whose functional yield closely resembles Indo-European apophony.

Questioning the actual entity of roots, whether by proposing an apophony model or by challenging the independent existence of consonantal roots and patterns, is nothing new. None other than Brockelmann argued that the concept of root was useless in morphology.<sup>63</sup> Likewise, Marcel Cohen argued that the Semitic (and in general the Afroasiatic or "chamito-sémitique") root was only an apparent entity.<sup>64</sup> In more recent years, it was McCarthy himself who in a 1993 article seemed to back away somehow from his maximalist approach to Semitic morphology.<sup>65</sup> Analyzing examples from Arabic and Akkadian, he applied the Prosodic Morphological Hypothesis, which states that "templates are defined in terms of the authentic units of prosody."<sup>66</sup> This means that templates must have direct prosodic representations in a hierarchic chain: mora ( $\mu$ ), syllable ( $\sigma$ ), metrical foot (F), and prosodic word (PrWd):



Affixation in nominal and verbal derivation does not conform to the requirements of prosody, so it belongs to the realm of a-templatic morphology –i.e., in nominal and verbal derivation there are no patterns or templates. Furthermore, the patterns exhibited by the so-called broken or internal plurals as well as diminutive nouns, can be explained by a device known as prosodic circumscription. In prosodic circumscription, one can separate phonological representations into two pieces, for instance, affixation and infixation. The general procedure (affixation) would tend to be stem-based, while the specific one (infixation) would assume a template. Thus, noun derivation by affixation, the generation of internal plurals and diminutives by infixation and affixation (mostly infixation of prosodic moras, timing units), as well as the verbal derivation of different stems through affixation, all exhibit a-templatic morphology, so they do not require templates or patterns:

- affixational noun derivation: Arabic *salb* (negation) → *salbī* (negative) → *salbīyah* (negativism)

63. Brockelmann, *Grundriß der vergleichenden Grammatik der semitischen Sprachen, I* (Berlin, 1908), p. 287: "... so ist auch der Begriff der Wurzel für die Formenlehre unbrauchbar." In actuality, Brockelmann's statement seems to refer especially to the assumption of a diachronic entity for the consonantal root; see Goldenberg, "Principles of Semitic word-structure," p. 31 n. 12 [= Goldenberg, *Studies in Semitic linguistics*, p. 12 n. 12].

64. See references in Baggioni and Larcher, "Note sur la racine en indo-européen et en sémitique," in *La sémitologie, aujourd'hui*, pp. 122-24.

65. J.J. McCarthy, "Template form in prosodic morphology," in *Papers from the Third Annual Formal Linguistics Society of Mid-America Conference* (ed. L. Smith Stran. Bloomington, Ind., 1993), pp. 187-218.

66. See M. Kenstowicz, *Phonology in generative grammar* (Oxford, 1994), pp. 622-58; J.J. McCarthy and A.S. Prince, "Prosodic morphology," in *The handbook of phonological theory* (ed. J.A. Goldsmith. Oxford, 1995), pp. 318-366.

- affixational verbal derivation: Akkadian *nabalkit* (cross! *intr.*) → *šubalkit* (cross! *trans.*)

This is particularly consistent in the case of internal plurals and diminutives within the realm of nominal morphology:

ARABIC	SINGULAR	PLURAL	DIMINUTIVE
"locust"	<i>jundub</i>	<i>janādib</i>	<i>junaydib</i>
"judgment"	<i>ḥukm</i>	<i>aḥkām</i>	<i>ḥukaym</i>
"mountain"	<i>jabal</i>	<i>jibāl/ajbāl</i>	<i>jubayl</i>
"grape"	<i>ʿinab</i>	<i>aʿnāb</i>	<i>ʿunayb</i>
"island"	<i>jazīrah</i>	<i>jazāʾir/juzur</i>	<i>juzayyir</i>

Although it is interesting that McCarthy now accepts that not all Semitic morphology is template-bound and root-based, his approach still deserves detailed criticism. For instance, he assumes that anti-iambic feet –i.e., trochaic sequences ( – ˘ = HL), as in basic participles such as *kātib* "writer"– do follow a templatic pattern because they exhibit the affixation of a mora. Since this is based on the assumption that there is no trochaic sequences in moraic theory, the idea of moraic affixation in this case seems rather arguable.<sup>67</sup>

The important element in McCarthy's more recent work is that he is now accepting that stems do play an important role in Semitic morphology, and that templates cannot explain all formations, especially in the nominal system. In a similar fashion but with a more ambitious scope, Bat-El has argued for a non-templatic treatment of the verb in Modern Hebrew, based on the transfer of consonants from base noun to derived verb.<sup>68</sup> In an even more challenging fashion, McOmber has argued that there are no discontinuous roots in the lexicon of any Semitic language or of any other language whatsoever.<sup>69</sup> Morphemes have edges, i.e., they have a first and a last segment. The edges of these morphemes build upon concatenation. The morphemes in question can be monosegmental: a *t* infix; the lengthening of a vowel (which would entail an infixated vowel in the underlying representation), etc. Thus, for McOmber, the apparent discontinuity of the Semitic root is simply a by-product of the infixation process. One should remember here that many languages outside the Semitic family exhibit infixation of one kind or another –for instance, the Tagalog infix *um* 'ACTIVE' added to *sulat* "write" → *sumulat* "write 'ACTIVE'"– but nobody argues that the lexica of those languages consist of non-concatenative, discontinuous roots. Nonetheless, as Bat-El has noticed, there is no other language family that combines the three morphological properties so characteristic of Semitic languages and that exhibits the three of them so prominently: prosodic enforcement (i.e., preservation of the prosodic structure of each stem throughout its inflection), apophony, and phonotactic constraints on the cooccurrence of surface non-adjacent segments.<sup>70</sup>

67. Pace McCarthy and in favor of trochees in moraic theory, see, for instance, M. Halle and M. Kenstowicz, "The free element condition and cyclic versus noncyclic stress," *Linguistic Inquiry* 22 (1991): 457-501.

68. O. Bat-El, "Stem modification and cluster transfer in Modern Hebrew," *Natural language & linguistic theory* 12 (1994): 571-596.

69. M.L. McOmber, "Morpheme edges and Arabic infixation," in *Perspectives on Arabic linguistics VII* (ed. M. Eid. Amsterdam, 1995), pp. 173-189.

70. O. Bat-El, "Semitic verb structure within a universal perspective," in *Language processing and acquisition in languages of Semitic, root-based, morphology* (ed. J. Shimron. Amsterdam, 2003), pp. 29-59. On the phonotactic constraints, see J. Cantineau, "Esquisse d'une phonologie de l'Arabe classique," *Bulletin de la Société Linguistique de Paris* 43 (1946): 93-140; J. Greenberg, "The patterning of morphemes in Semitic," *Word* 6 (1950): 162-181; and A. Zaborski, "Exceptionless incompatibility



Attacks against the traditional templatic, root-based model (the naked skeleton of consonants that are interdigitated with vowels) keep coming from all directions. For instance, Ratcliffe has argued that templates are not morphemes, but a "well-formedness condition on the output of morphological rules."<sup>71</sup> This is to say that templates (i.e., verbal and nominal patterns) are mere constraints, which manifest themselves in the preponderance of lexical morphemes with three consonants, as if the templates were Procrustean beds on which to force the Semitic lexicon. It is no coincidence that the object of Ratcliffe's study is the so-called broken plurals, which were also the basis for McCarthy's 1993 article. As Ratcliffe adroitly points out, the template model overspecifies since "much of what is specified by the template is either carried over from the base form (as in the case of plurals and diminutives) or supplied later by default phonological rules (as in the case of syllabification of derived verbs IV, VII, VIII, and X)."<sup>72</sup>

A particularly convincing argument has been put forward by Benmamoun.<sup>73</sup> He argues that Arabic word formation (both verbal and nominal *Wortbildung*) is word-based (that is, stem-based), rather than root-based. This theory stems from his analysis of the imperfective as the default (unmarked) verbal form in the ATM system (Aspect-Tense-Mood). The uses and versatility of the imperfective point to the fact that this verbal form is not really specified for tense, whereas the perfective does mark past tense. The default status of the imperfective would explain its productivity in word formation. Thus, the pattern C<sub>1</sub>C<sub>2</sub>vC<sub>3</sub> –which lies behind the imperfective (the least semantically marked verbal form) and the imperative (the least morphologically marked verbal form)– would be the basic derivational "matrix" in the Arabic (and by extension, in the Semitic) lexicon. Furthermore, as several have pointed out, an apophony-grounded and stem-based approach to Arabic (and Semitic) morphology better accounts for some puzzling complications in verbal morphology, such as the origin of glides in the so-called weak –sometimes inadequately called "defective"– verbs; e.g., Arabic *qāma* ("he stood"), *qumtu* ("I stood"), *yaqūmu* ("he will stand"), *yuqawwimu* (form II, "he will set upright"), *yuqāwimu* (form III, "he will resist"), *uqīma* (form IV, "I will straighten"), *yuqāmu* (form IV, "he will straighten"), *(u)stuqīma* (form X, "I will rise"), *yustaqāmu* (form X, "he will rise").<sup>74</sup>

In the midst of the siege under which the old root-and-pattern model of Semitic morphology is right now, there are also some rather conciliatory ventures. In a recent article, Gafos points out that stem-based morphology dominates Semitic grammar, whereas morphological processing seems root-based, templatic

rules and verbal root structure in Semitic," in *Semitic and Cushitic studies* (ed. G. Goldenberg and Sh. Raz. Wiesbaden, 1994), pp. 1-18. For a general linguistic context, see T. Scheer, "A theory of consonantal interaction," *Folia Linguistica* 32 (1999): 201-237.

71. R.R. Ratcliffe, *The "broken" plural problem in Arabic and comparative Semitic: Allomorphy and analogy in non-concatenative morphology* (Amsterdam, 1998), esp. pp. 22-67.

72. Ratcliffe, *op.cit.*, p. 31.

73. E. Benmamoun, "Arabic morphology: The central role of the imperfective," *Lingua* 108 (1999): 175-201.

74. See A. Chekayri and T. Scheer, "The apophonic origin of glides in the verbal system of Classical Arabic," in *Studies in Afroasiatic Grammar: Papers from the Second Conference on Afroasiatic Languages, Sophia Antipolis, 1994* (ed. J. Lecarme, J. Lowenstamm, and U. Shlonsky. The Hague, 1996), pp. 62-76; Chekayri and Scheer, "The appearance of glides in Classical Arabic defective verbs," *Folia Orientalia* 40 (2004): 7-33; Chekayri, "Weak verbs in Arabic," in *Investigating Arabic: Current parameters in analysis and learning* (ed. A. Elgiballi. Leiden, 2005), pp. 65-83. For an analysis of the extensions of biliteral roots (through free association, epenthesis, and reduplication) and the occurrence of glides, see G. Bohas and A. Chekayri, "Les réalisations des racines bilitères en arabe," in *Semitica: Serta philologica Constantino Tsereteli dedicata* (ed. R. Contini *et al.* Turin, 1993), pp. 1-13.

in the traditional sense.<sup>75</sup> Competence grammar (including phonology and morphology) operates on the basis of stem variation (apophony, affixation), but, according to this, language processing would involve a templatic model.

One should conclude that the pattern (or template) is simply the source of formative constraints that shape the processing of the stems. Templates or patterns are not simply abstractions based on the actual lexicon. They are processual parameters. Moreover, the mental lexicon of the speaker of a Semitic language does not consist of a parade of skeletons, of naked consonantal roots waiting to be fleshed out by interdigitated vowels, but it is likely to contain exclusively actual stems and, therefore, real words, with consonants and vowels. Thus, with the exception of certain monosyllabic nominal stems, two notional variables define the input of the Semitic lexicon: (1) the non-concatenative root; (2) the template or pattern, which is shaped by phonotactic and prosodic molds of consonantal structure and vocalic interdigitation, all of which determine grammatical function. The actual stem is the output of both variables, but these variables do not constitute truly independent entities in the mental lexicon.

The abundant instances of apparent root awareness among Semitic speakers do not necessarily point to the reality of the root in the speakers' competence, but rather to analogical and associative mechanisms. In a way, the association involved in this psycholinguistic process resembles the phenomenon known as phonaesthesia. Phonaesthemes are the result of pairing meanings with sounds, sequences of sounds, or combinations of sounds.<sup>76</sup> For instance, in English certain initial consonantal clusters are associated with some semantic fields: *gl-* with "light" and "vision" (*glow, glitter, gleam, glimmer, glisten*, etc.); *sl-* with "oiliness" and "greasiness" (*sloppy, slimy, sleazy, slip, slippery, slide*, etc.); *sn-* with "nose" and "mouth" (*sneeze, sniff, snort, snarl, snout, snore, snack*, etc.). Although phonaesthemes enjoy a status of psychological reality among speakers, they do not constitute truly morphological or lexical entities, either synchronically or diachronically. In Semitic, roots are abstracted and extracted from the lexicon both by native speakers and grammarians. However, differently from phonaesthemes, Semitic roots do seem to have a role in shaping the lexicon, synchronically and diachronically, although they do so not as independent entities. The bulk of the Semitic lexicon is, therefore, generated by two input variables that are inextricably bound and can be differentiated only on the basis of analogy or abstract analysis: a limited, finite set of patterns or templates, and a theoretically unlimited, open set of consonantal roots. Roots are to the lexicon what individual features in a matrix are to linear phonology, and templates are the constraints and meaning-bearing molds by which the minimal descriptive unit called "root" is processed and shaped for actual lexical items to exist.

In diachronic terms, an inquiry into the true linguistic nature of the non-concatenative root in Semitic has important corollaries. For instance, gemination is morphologically very productive in Semitic languages, among which reduplication (a device that changes the syllabic structure of words) is normally not productive anymore (with the exceptions of Modern Hebrew and Ethiopic Semitic). In Berber, gemination is as productive as in Semitic, but reduplication plays a more important role. Nevertheless, in

75. A.I. Gafos, "Greenberg's asymmetry in Arabic: A consequence of stems on paradigms," *Language* 79 (2003): 317-355. The label "Greenberg's asymmetry" refers to the phenomenon mentioned above and first noticed actually by Cantineau: <sup>◌</sup>*ayin*-<sup>◌</sup>*ayin* roots (incorrectly called "geminates") and their alternation can occur at the end of a root (C<sub>1</sub>V<sub>2</sub>C<sub>2</sub>/C<sub>1</sub>aC<sub>2</sub>V<sub>2</sub>), but not at the beginning (\*\*C<sub>1</sub>C<sub>1</sub>V<sub>2</sub>/\*\*C<sub>1</sub>aC<sub>1</sub>V<sub>2</sub>); see Cantineau, *Bulletin de la Société Linguistique de Paris* 43 (1946): 93-140; Greenberg, *Word* 6 (1950): 162-181.

76. See B.K. Bergen, "The psychological reality of phonaesthemes," *Language* 80 (2004): 290-311.

the other Afroasiatic families the situation is the opposite: reduplication tends to be more productive than gemination.<sup>77</sup> This may indicate that the template model is a processing constraint in Semitic –a constraint that defines the processing of roots– but it has a much more limited role in the other Afroasiatic families. The lack of this templatic constraint lies behind the biconsonantal roots that are much more numerous in Chadic, Cushitic, and Omotic.<sup>78</sup> However, this opens a completely different closet, the Pandora's box of biliteralism.<sup>79</sup> Classical Arabic grammarians used the label *ibdāl al-ḥurūf* for small sets of words that seem semantically related, with either similar or opposite meanings, but that are distinguishable by only one consonant (e.g., Akkadian *našāku* "to bite" and *našāqu* "to kiss," *šarāqu* "to steal" and *šarāku* "to give"). All these seemingly related roots can be explained away as instances of *ibdāl al-ḥurūf*, *iṭbāʿ*, mere phonaesthesia, and so forth.<sup>80</sup> Nevertheless, the multifarious issue of biliteralism is unlikely to leave the stage and go back to the closet of linguistic constructs, the closet from which the Semitic root is still arranging dictionaries and presiding over paradigms.

77. As noticed by T.L. Holm, "Mimicking reality: Iconicity and verbal gemination in Semitic," paper read at the 211<sup>th</sup> meeting of the American Oriental Society (Toronto, March 30<sup>th</sup> 2000). See also A. Zaborski, *The morphology of nominal plural in the Cushitic languages* (Vienna, 1986); P. Newman, *Nominal and verbal plurality in Chadic* (Dordrecht, 1990); *id.*, *The Hausa language* (New Haven, 2000), pp. 508-521; P.J. Jaggar, *Hausa* (Amsterdam, 2001), pp. 64-65, 83-87, 279-284; J. Saeed, *Somali* (Amsterdam, 1999), pp. 48-51, 61; G.J. Dimmendaal, "Morphology," in *African languages: An introduction* (ed. B. Heine and D. Nurse. Cambridge, 2000), pp. 161-193 (esp. 166-67); Lipiński, *Semitic languages*, pp. 213-15, 244-45, 404-6.

78. On the Afroasiatic root, see K. Petráček, "La structure de la racine et la classification des langues hatimosémiques," *Phonetica Pragensia (Acta Universitatis Carolinae, Philologica IV)* 4 (1974): 115-121.

79. In favor biliteralism in Semitic, see, for instance, Ch. Ehret, "The origin of third consonants in Semitic roots: An internal reconstruction (applied to Arabic)," *Journal of Afroasiatic Languages* 2 (1989): 109-202; *id.*, *Reconstructing proto-Afroasiatic (proto-Afrasian)* (Berkeley, 1995); G. Bohas, *Matrices, étymons, racines: Éléments d'une théorie lexicologique du vocabulaire arabe* (Leuven, 1997).

80. On *iṭbāʿ*, see footnote 21. In general, see A.J. Militarëv's introduction to S.S. Majzel (Майзель), *Пути развития корневого фонда семитских языков* (Moscow, 1983); A. Zaborski, "Biconsonantal roots and triconsonantal root variation in Semitic: Solutions and prospects," in *Semitic studies in honor of Wolf Leslau* (ed. A.S. Kaye. Wiesbaden, 1991), pp. 1675-1703.