Incorporation of Scientific and Technological Terminology in the Arab World and Israel: A Comparative Study

Sadok H. Masliyah

Follow this and additional works at: https://scholarsarchive.byu.edu/dlls
Incorporation of Scientific and Technological Terminology in the Arab World and Israel
A Comparative Study

By Sadok H. Masliyah
Weidner Communications, Provo

The growth of linguistic needs, the constant advance of science and technology, and the new fields of knowledge the Arab countries and Israel have been entering required terms in the realm of Law and Politics, the Army, the Navy, Aerospace, and the Natural Sciences to mention a few disciplines.

The contributions of earlier generations to the enrichment of both Arabic and Hebrew had been considerable, but they have been incapable of meeting the needs of modern sciences and technologies. To meet these needs, the language academies in some of the Arab countries and Israel undertook the task of coining new terminology in the various fields. The Hebrew Academy, unlike the Arabic academies had also to revive Hebrew as spoken language and make it a medium of public expression.

The immediate motivation to deal with the terminology of any particular profession or sphere came from pressing public need. Yet the words and terms these academies coined did not always become obligatory elements of the school and university syllabi.

The first language academy in the Arab world was founded in Damascus in 1919 (al-Majma‘ al-‘Ilmi al-‘Arabi Bidimasq). It was followed by the Royal Academy for the Arabic Language (Majma‘ al-Lughah al-‘Arabiyyah al-Malaki) established in Cairo by a royal decree in 1932. After the revolution of 1952 and the subsequent abolition of the monarchy in Egypt, the name was changed to what it is currently known as the Academy for the Arabic Language (Majma‘ al-Lughah al-‘Arabiyyah).

It was not until 1947 that the Iraqi Academy (al-Majma‘ al-‘Ilmi al-‘Iraqi) was founded. About thirty years later (1976), the Jordanian Academy for the Arabic Language was established. To coordinate and unify the linguistic activities of the Arabic academies, the Arab League financed the establishment of the Coordination Bureau of Arabization (Maktab Tansiq al-Ta‘rib) in 1956. Its center is Rabat, Morocco. The Academy of the Hebrew Language was founded in 1953 as a continuation of the Hebrew Language Committee (Va‘ad ha-La‘gon ha-‘Ivrit) which was active from 1890 until 1953.

The composition of the Arabic academies on one hand, and the Hebrew Academy on the other hand is alike. Many of their members are scholars in the domain of language and literature, professors, writers, and essayists. Some of the Arabic academies included foreign scholars and other members from Arab countries. The Egyptian Academy in 1935 consisted of twenty active members, ten of whom were native Egyptians, three Syrians, one Tunisian, and five orientalists, including A.A. Gibb (Great Britain), Louis Massignont (France), and C. Nallino (Italy).
Only the Iraqi Academy required its members to meet certain qualifications.

Whereas Arabic is the mother tongue of the majority of members in the Arabic academies, Hebrew is a second language for the members of the Hebrew Academy.

The numbers of members varies from one academy to another. When established, the Egyptian Academy had 20 members, the Syrian 8, the Iraqi 14, the Jordanian 8, and the Israeli 15–23. In a few academies, members are appointed, in others, they are chosen.

In all these language academies, the routine work of language formation and supervision is performed by a number of committees. The Syrian Academy, for example, consisted of two major committees: (1) a literary and linguistic committee, and (2) a scientific committee. The Egyptian Academy, however, had several committees, one for Mathematical and Natural Science terminology, another for compiling terminology in Biology and Social Science, and another in Belles Lettres and Arts, to mention few. The committee, often gathers linguistic material in discussion, then classify and analyse it. Later the material is presented to the full academy for further discussion. The suggestions of the committees are well documented and thoroughly researched. In most cases the great majority of the proposed terminology are accepted or modified; few are rejected.

Often, the various committees are assisted by advisers in the field under study. Such advisors are usually seconded by the relevant scientific institutions, professionals, and researchers, who submit lists of scientific words with thier etmologies for consideration. The Arabic Language academies made use of the scientific terms coined by linguists and literary men, so did the Hebrew Academy which benefited also from Ben Yehuda’s dictionary (d.1922).

An integral part of the academies’ work is the publication of their decisions in the form of complete, specialized, professional dictionaries, terminological lists or system of rules. Studies in the field of Arabic Language and literature and articles relating to the history of the Arabic Language are published in these journals. Leading scholars make contributions to the journals. The Hebrew Academy and the Academy of Damascus also concern themselves with gathering and editing manuscripts and publishing books. The first issues of the Egyptian Academy are particularly valuable, because they contain the minutes of the meetings on coining new terminology. These minutes are an indispensible source for studying the motives for accepting or rejecting new coinages.

Comparing the suggested terms with those accepted show the following:

A. A trend to preciseness, as in accepting al-kammahah (root meaning ‘restrain’) instead of al-mizalah for ‘brake train’. Al-naggab (root meaning ‘to pierce, make holes’) was rejected for the French word ‘commissaire’ (‘conductor in the train’) using it for the man who checks the tickets before entering the train. The word
'biologist,' al-ṣālim al-hayawi was rejected, because 'hayawi' means 'vital'.

B. A limitation of the meaning of words, as in accepting al-sabbag (root meaning - 'exceed') for 'rapid train' instead of al-jahiz because the latter is out of use.

C. A tendency towards giving Arabic terms meaningful meanings as in accepting al-waggaf (root meaning - 'to stand,' 'to stop') for 'omni-bus', because of its slowness and the many stops it makes in stations.

The reason the Syrian Academy rejected the committee's recommendation of ṭaṣakīfīḥ ('shapeless') for 'amorphous,' and accepting ghayr mutabalwir is because the European distinguishes between 'not crystallized' and 'shapeless bodies.' The Iraqi Academy decided on ṭasfīyah (root meaning - 'purify'), for 'refining' instead of ṭakrir (root meaning 'do again'), because the literal meaning of 'refining' is 'to refine again,' which the term takrir does not fulfill.

D. Avoiding coining compounds as much as possible.

E. Preference of adopting terms already in use to coining new ones. Because of the widespread use of mawqūd it was chosen over waqqād for 'stove.'

The main objects declared by the Arabic and Hebrew academies are basically the same. All the academies agree to revive and preserve the purity of their languages, compile a historical dictionary of their national languages and coin scientific and technological terms.

The methods employed by the Arabic and the Hebrew academies to create new terms show striking similarities. It stands to reason that the similarity between Hebrew and Arabic led to identical means of coining new terms. The main methods may be illustrated as follows:

1. Translation

Translation from English and French to the target language is the most common method. All the academies tried to avoid compound equivalents and multiple meanings. They agreed on that the translated target words should be in agreement with the morphological rules and analogy, and are to be derived from roots found in the literatures. In translating from the source language, one should aim at the essential signification, not the literal meaning of the terms of the source language.

2. Arabization or hebraization - foreign words may be arabized or hebraized, i.e. Transliterating the source word into Arabic or Hebrew letters accordingly. Al-Maghribī, for instance, justifies arabization by saying that it is not an innovation in the Arabic Language nor does the existence of arabized words constitute a foreign element in the language. He further suggested that an arabized word should be capable
of giving new derivations. The same rationale may be found also among members of the Hebrew Academy. Both the Arabic and the Hebrew academies tried to use target words phonetically resembling the foreign words whose meanings they were to take over. Most of the borrowed words are in science, for example:

A. Units of measurement and names of coins, such as: kilometer, liter, meter, Mark, Lira, etc are retained in both Arabic and Hebrew.

B. Electrical units which are named after their innovators: Ampère, Ohm, Watt. These are part of international vocabulary.

C. Sometimes one finds variants where, in addition to the arabized word there is an Arabic equivalent, such as ديموشرفيه and جمع السكان for 'demography'; دیدشغیه and علم التربیة for 'pedagogy'; سواکا and امنیا for 'to insure'.

The academies permitted also to arabize or hebraize words derived from proper nouns, as in باستاره (Ar.) and پستور (Heb.) for 'pasteurization'; گلولنایه (Ar.) and گالوانیزیه (Heb.) for galvanization. However, in the event of restoring Arabic words from foreign languages, the original Arabic is maintained as in الماء instead of الماء.

Influenced by the source languages, the Hebrew and the Arabic academies created names of doctrines, philosophies, and political currents from the proper noun: مارکسیه and لئینیه and دیگلیه from 'Marxism,' 'Leninism,' and 'De Gaullism' respectively. But in a few cases Arabic مذهب - 'doctrine' was used as in المذهب الرماندی for 'romanticism'. Hebrew transliterated the suffix -یذم as in مارکیذم, لئینیذم, and دیگلیذم respectively.

It should be noted that in borrowing loan words of international character the Arabic academies preferred Arabic equivalents as much as possible, as in هیاد for 'neutrality', while the Hebrew نوترالیپت is hebraized. In the process of arabization and hebraization new sounds with their symbols entered Arabic and Hebrew.

3. Giving a new meaning to old words

Both the Arabic academies and the Hebrew Academy resorted to expanding the vocabulary by referring to ancient sources, especially to works on Medicine, Mathematics, Astronomy, Botany, etc. In many cases, however, they formed new terms for concepts that had already been expressed by other words in the past. This method led to the expansion or limitation of the meaning. Some examples from Arabic:

A. The word استنمر had a positive connotation 'cultivation' in the Koran (11:61-64), but it now has a negative one 'colonialism.'

B. طیراه نافثا - 'jet aircraft.' The word نافثا means 'waste' in the Koran (113:4). Also the current use of یتار
Now a few examples from Hebrew:

A. The Biblical التצלם (tzalelem) 'image' had been used to form צלם (tzilem) 'to photograph,' תצלום (tatzlum) 'photograph;' מצלמה (matzlema) 'camera,' and צלמונה (tzalmaniyah) 'photographic studio.'

B. In medieval literature, the Hebrew תייוור (tiyyur) stood for דרכון (darkon) 'coin,' but the ancient word דרכון (darkon) 'coin' was accepted for דרכון (darkon) 'passport.'

C. מוקס (moke) in the Bible means מוקס 'trap,' but the Hebrew Academy went along its current meaning for מוקס 'mine' (explosive).

As a result of this method, many religious words were given secular contents: This occurred in Hebrew more than in Arabic. Hebrew מוסף (mossaf), a term used for one of the weekly prayers has become a אוסף (mosaf) 'supplement' (of a newspaper), and מנה (minha) which stood for a noon prayer has become מנה (minha) 'rest.'

4. Composition

Another method which gained considerable acceptance by the Hebrew Academy, and to much less degree by the Arabic Academies, is creating new terms by combining elements of two words (Arabic- نايت). The opposition to restoring to such methods in Arabic is exemplified in the attitude of Dr. Mustafa al-Sihabi, one of the most active members in the Syrian Academy. In many lengthy articles he objects to using composition in coining new terminology, claiming that the new Arabic words are hard to pronounce and that often they are not understood. To prove his point, he gives ample examples taken from recent scientific dictionaries. He says the French "coleopteres" should be expressed in two words غمبية الأجنحة (ghamjina9iyat) not غمبيبة الأجنحة (ghamjinahiyat), because the student does not understand the first part غم of the word غمبيبة الأجنحة (ghamjinahiyat). The same may be said about غمبية التاريخ (gabtarah), 'prehistory,' which is composed of غمب 'before' and تارих 'history.' All the Arabic academies, however, agree that composition should be used only when there is a 'scientific need,' provided that the terms coined in this way are pleasant to the ear and clear. Thus we find دوكيميا for 'photochemical,' where the glottal stop حمزة (hamza) of دو 'light' is deleted when combined with كيمياء (kimya) 'chemical.'

Whereas the Arabic academies limited the usage of composition to scientific terminology, mainly to Chemistry and Physics, the Hebrew Academy expanded its use to other domains. It seems that it followed certain guidelines:

a. Simple composition, as in קולנוע, 'cinema' derived from קול- 'sound' and נע- 'movement'.

b. Joining elements of two words into one is facilitated by both words having one or more consonants in common, as in קדדור -
and regel-'foot' where x end the first word and begins the second. Combining the two words results in kadduregel - 'soccer.'

c. Blending a verbal root and a noun, as in ramzor - 'a traffic light,' from the root rmz - 'to wink' and or - 'light,' whose initial glottal stop hamza is elided.

d. Blending of two verbal roots, as in dappor - 'bulldozer,' which has the roots dhr - 'push' and hfr - 'dig,' with the recurring pair h and (f(p)) inserted only once. The sequence d,h,f(p),x is left and shaped into a noun with the vowel sequence a,0 frequent in Hebrew nouns.

In a few cases, the Hebrew Academy gave sanction to common use of new words coined from contractions and initials. From din ve-hegbon - 'account, report' first acrostic du'ah came into use, then the verb divah - was formed with the artificial root dvh. Furthermore, initials in Hebrew became independent words as ramatkal - 'Commander in Chief of the Army', and asaf - 'P.L.O.'. Such formation of initials are rare in Arabic. English initials NATO, UN are translated into Arabic. Whether the Arabic academies will approve the recent usage of English initials in Arabic as independent words like yunesku or alyunesk - 'UNESCO,' opek or alopek for 'OPEC' remains to be seen.

5. Derivation

In word formation, the Arabic and Hebrew academies follow the methods inherited from former stages of their corresponding languages. Yet, some possibilities of derivation and combination that in older Hebrew or in medieval Arabic were realized in relatively small measure are now put to use more excessively. The following deserve special mention:

A) Names of diseases. The pattern for the names of diseases, gatelet, already found in Hebrew sources, is applied to form the names of many diseases known to modern medicine. For example, 'tuberculosis' - sahefet (built on a root meaning 'thin') and nazelet - 'cold' (root meaning 'to flow'), etc. were coined by the Hebrew Academy. This pattern became so productive that public wit applied it to parliamentary 'diseases' such as sahevet (root meaning 'drag') for 'red tape' and daberef - 'talking disease'. The Arabic academies allowed the patterns fiCal and facal, whether they are derived from verbs or not, to be used for names of diseases, as in suda - 'headache'; araQ - 'insomnia'.

B) Names of tools. These may be formed in any of the Arabic patterns, mif'al, na'al, mif'al, faC'al. Example include mibrad - 'file'; mixraah - 'lathe'; mithqal - 'drill;' and barradah - 'refrigerator.' The Iraqi Academy allowed another pattern fi' as in si'am - 'valve.' The Hebrew Academy, however, derived names of tools from the most common patterns magtel and miqatelet, as in maghetz - 'iron' and mikteret - 'smoking pipe.'
C) **Scientific words.** The Arabic academies permitted derivation from concrete nouns and substances in sciences, as mukahrab – 'electrified' from kahrab – ‘electricity’ and mumaghnat – ‘magnetized’ from mighnatis – ‘magnet.’ Such derivation is widespread in Hebrew, hence the Hebrew academy used it extensively.

D) Both the Arabic and Hebrew academies preferred to derive words from existing roots. In forming words from roots with second character glide (w,y), Hebrew and Arabic differ quantitively. Since Arabic enjoys a rich vocabulary it does not need to create as many new roots as Hebrew does. While Arabic does not create new roots from roots whose second character is a glide by adding prefixes (t,m) or suffix (n), Hebrew does so. This feature was used by the Hebrew Academy to derive the verb lehatni – ‘to start a motor’ from nuk – ‘movement’ and lemakem – ‘to place’ from gwm – ‘stand’. In order to obtain a Hebrew verb for ‘to egyptianize’ the verb mitzer is created from mitzrayim – ‘Egypt’ in the same way that Arabic did assara from assar – ‘Egypt.’

E) Many of these new Arabic and Hebrew coined verbs are derived from nouns with prefixed or suffixed formatives, thereby new roots mostly quadiliteral have entered these languages. For example, mirkez (Heb.) or markaza (Ar.) – ‘to centralized,’ with the passive participle memurkaz (Heb.) or mumarkaz (Ar.). The Hebrew pattern piheaded and the Arabic faheaded are the most productive.

F) the Arabic academies expanded the use of ḫ attached to scientific terms, as in lasilki – ‘wireless’ or lamarkazi – ‘decentralized.’ They also allowed the use of ḫ al-nisbah with broken plurals as in himdiyyah – ‘acidity’ and hassisiyyah – ‘sensitivity.’ The Hebrew Academy, on the other hand derived many nouns and adjectives from a noun basis by adding suffixes such as -an for the masculine (mahpexan – ‘revolutionary’) and -anit for the feminine. It revived the suffixes, -ay for the masculine and ayt for the feminine (citonay, citonyait – ‘journalist.’

It is worth mentioning that the Arabic academies made no use of other Semitic language in coining new terms. The Hebrew Academy, however, accepted Aramaic words provided they were reshaped to fit Hebrew patterns and grammar. For example, the Aramaic ʿovada (m.) – ‘fact’ became ʿuvdah in Hebrew, changing both its vocalization and gender. The Hebrew Academy approved some terms after the Arabic zharrar – ‘cressa’ (Heb. carer); sablah (Ar.) – ‘orchis’ (Heb. sablah) and the Arabic kummah – ‘skullcap’ is Hebrew kumtah for ‘beret.’

**Latin and Greek Prefixes and Suffixes**

Following are a few examples on treating these prefixes and suffixes:

A) **Prefixes**

a. Hyper
Most Arabic academies translated this prefix to *fart* as in *fart al-daght*, 'hypertension'.

b. Hypo

The Egyptian Academy translated it into *habt*, while the Iraqi Academy chose *hat* as in *hat al-daght* for 'hypothyroidism'. The Hebrew Academy borrowed the Aramaic prefix *tat*, as in *natran tat kloriti* - 'sodium hypochlorite'.

c. Re

This prefix was translated to many words by the Arabic academies: *cawdah, i'adah, kar* and *thaniyatan*.

B) Suffixes

a. Ible and Able

The Hebrew Academy produced dozens of adjectives indicating possibility. They are something like English adjectives in -able and -ible: *šavir* - 'breakable' and *gamiš* - 'flexible' (pattern *gatil*). This academy also coined such adjectives with passive participle, as in *mitat tel* - 'portable', or combined *ben* or *bar* with abstract nouns, as *bar bitul* - 'abolishable' and *ben halaf* - 'passable'. The Egyptian Academy, however, preferred the traditional way by using the passive imperfect, as in *yu'kal* - 'eatable'; *yu'krab* - 'drinkable'. In the dictionaries published by the Arabic academies, one finds in addition *gābil lī* and *sālih lī* followed by the verbal noun e.g., *sālih lil'jurb* - 'drinkable'; *gābil lil'indikhat* - 'compressible'. The Iraqi Academy used the active participle too: *munṣim* - 'adjustable'.

b. Ate

Suffix -ate is arabized, e.g. *labanāt* (EA), 'lactate'; *kibritāt* (IA), 'sulphate' and *fahmāt* (SA), 'carbonate'. The Hebrew Academy used, however, the common suffix *ati*, as in *natran klorati* for 'sodium chlorate'.

c. Ite

This suffix is arabized in Chemistry but in medical terms it is translated to *iltihāb* as in *iltihāb al-mafāsil*, - 'arthrite' (Fr.). Hebrew has the the suffix *iti*, e.g. *natran kloriti* - 'sodium chlorite'.

d. Oide

In most cases *oide* is translated by the Arabic academies into *šibh* as in *šibh gharawī* (also found in a composition *šibgharawī*) for 'colloide'. The Iraqi Academy also employed the suffix *k* as a prefix: *kalqāli* for 'alkaloide'.
Suffixes *scope* and *meter* are translated into Arabic into *kāṣīf* (kāṣīf al-līwā' - 'radioscope') and *mīqās* (mīqās al-folt - 'voltmeter' respectively, but mostly the Arabic term is a single word in the pattern of mīfāl, e.g. mīṣār 'microscope'. In Hebrew such terms ending in *scope* and *meter* are hebraized: *elektroskop* for 'electroscope' and *elektrometer* for 'electrometer'.

It seems from the above that the Arabic academies translated most of the prefixes and suffixes into Arabic equivalents, yet they produced many variants for the same prefix or suffix. The Hebrew Academy, however, used Hebrew and Aramaic prefixes and suffixes, hebraized the foreign terms or translated them.

It should be mentioned that these differences among the Arabic academies do not exist only in their treatment of Latin-Greek prefixes and suffixes, but also are reflected in the terminology they coined in various fields of knowledge. Examples follow:

- 'pendule': raqqās (Iraq), bandūl (Egypt), nāwās (Syria).
- 'Acceleration': 'ajalāh (Egypt), isrā (Iraq).
- 'Calorie': sufr (Egypt), Hurayrah (Syria).
- 'Physics': *ilm al-tabi'ah or al-fizyā' (Egypt), al-fizyā' (Syria and Iraq).
- 'Court of Cassation': mahkamat al-tamyiz (Syria), mahkamat al-naqāl wilābām (Egypt).
- 'Constitution': dustūr (Syria and Egypt), qānūn asāsī (Iraq).

More such examples, may be found in the fields of Military, Administration, Philosophy, History, Sociology, and Anthropology Arabic terminology. The main causes for the diversities of Arabic terminology go back not only to the multiplicity of synonyms in Arabic and lack of coordination among the Arabic academies, but also to the following factors:

A) Multiplicity of linguistic sources. English and French are the prime source languages. When these languages have different terms for the same concepts, Arabic has two variant terms for the same concept, e.g., nitrūjīn and āṣūt are transliteration of 'nitrogen' (Eng.) and 'Azote' (Fr.).

B) Duplication of terminology in the source language, e.g., 'electronic tube' in American English, is 'electronic valve' in British English. Arabic has unbubah elektrōniyyah and simām elektronī respectively.

C) Synonyms and polysemous words in the source languages. For example, there are two phrases for 'hand pump' in French: 'pompe à bras' and 'pompe à main'. This results in Arabic minfāx bildhīrāʾ.
Despite the issuing of standardized English-French-Arabic dictionaries by the Coordination Bureau of Arabization, the question of standardizing Arabic terminology remained unresolved. Many suggestions have been offered to the problem of unifying the scientific terminology in the Arab world. One suggestion says to establish a central computerized terminology bank, another tries to enforce the usage of the unified terminology by law, believing that all needed is Arab commitment. But all these suggestions treat standardization of Arabic terminology from a political point of view. They consider that the multiplicity of Arabic academies and the different terms they produce for the same concept are damaging to Arab solidarity and undermining Arab unity.

The problem of Arabic terminology lies chiefly in assuring that new terms gain acceptance at the press, universities, and vocational schools, and in creating more advanced society for them.

Notes
1. About the various activities of this Bureau, see LA, Vol.10, Part 2, Rabat, 1973, pp.15-36.
2. These terms were discussed in Majma‘ al-Lughah al-‘Arabiyyah al-Malaki, Vol. 2, Cairo, 1937, pp.200 -201.
3. Ibid., p.203.
12. Yehushua Blau, Tehiyat Ha‘ivrit u-Tehiyat Ha‘aravit Hasifrurit,
Jerusalem, 196, p.104-105.


22. MMII, Part 17, Baghdad, 1969, p.34.


29. Ibid., p.118.


34. Ibid. See also Monteil, op. cit, p. 146.

35. See note 32.

36. Ibid.


39. Ibid.


42. Ibid., p. 19.

43. Ibid.


Abbreviations

Ar. = Arabic
EA = Egyptian Academy
Eng. = English
Fr. = French
Heb. = Hebrew
IA = Iraqi Academy
LA = Al-Lisān al-‘Arabi
MMIAD = Majallat al-Majma‘ al-‘Ilmī al-‘Arabi Bi’dimāsīq
MMII = Majallat al-Majma‘ al-‘Ilmī al-‘Irāqī
MMLA = Majallat Majma‘ al-Lughah al-‘Arabiyyah
MMLAD = Majallat Majma‘ al-Lughah al-‘Arabiyyah Bi’dimāsīq
SA = Syrian Academy