**Aspects of Scientific Translation:  
English into Arabic Translation as a Case Study**

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**Abstract**

*It is unquestionable that English–Arabic scientific translation is increasingly becoming a topic of much concern and importance today. Oil on the Arab side and technology on the Western side contribute to this importance. This paper highlights the problems that are likely to be encountered in English–Arabic scientific translation and tries to establish certain possible factors which may finally lead to a theory of this sort of translation. It also identifies certain differences that exist between scientific texts and literary ones. The paper also proposes a model for English–Arabic scientific translation in further attempts driving at a more extensive study.*

**1. Introduction**

As science and technology develop, new English words used to express new concepts, techniques and inventions come into existence. These words have developed more rapidly during the last decades that dictionaries can by no means trigger of. This development has brought to Arabic serious linguistic problems of expressing this ever–expanding wave of newly–founded concepts and techniques for which no equivalents in Arabic exist. But while coinage, borrowing, transliteration and other means of transfer made for a huge bulk of English scientific terminology, translating of full technical texts from English into Arabic still poses a major intellectual challenge (Nida,1964:223).  
  
It is axiomatic that not all ideas or information are recorded in one single language. In pure science, for instance, 70% of the research indexed in 1970 in the Science Abstract were in English and 30% were in Russian and other languages. This statistical fact clearly stresses the paramount importance of scientific translation into Arabic. We also notice that the need for this type of translation into Arabic is getting increasingly important because many Arab countries are currently undergoing a large-scale modernization process.

It is interesting to note that Nida (ibid.) has, in his discourse on scientific translation, pointed to this challenge. He said:

*If, however, the translation of scientific texts from one language to another participating in modern cultural development is not too difficult, it is not surprising that the converse is true- that translating scientific material from a modern Indo-European language into a language largely outside the reach of Western science is extremely difficult. This is one of the really pressing problems confronting linguists in Asia today.*  
  
Scientific translation, thus, becomes a prerequisite not only for the acquisition of technology, but to its introduction, installation, and operation as well.

**2. Requirements of Scientific translator**

According to London Institute of Linguistics, to be a scientific translator one should have:

1. broad knowledge of the subject-matter of the text to be translated;

2. a well-developed imagination that enables the translator to visualize the equipment or process being described;

3. intelligence, to be able to fill in the missing links in the original text;

4. a sense of discrimination, to be able to choose the most suitable equivalent term from the literature of the field or from dictionaries;

5. the ability to use one’s owns language with clarity, conciseness and precision; and

6. practical experience in translating from related fields. In short, to be technical translator one must be a scientist, or engineer, a linguist and a writer (cf. Gasagrade, 1954: 335-40; Giles, 1995; Latfipour, 1996).

Out of the six requirements listed above, the first deserves special consideration because it bears on the early attempts to found a theory of translation advocating that the text whether literary or scientific should be dealt with according to the way language is used in them (Adams, 1967: 87). This means that it is a theory which goes back to the old epistemological controversy over the objective and the subjective sides of reality, and which may imply, when extended to language varieties, a dichotomy between science and literature. According to Adams (ibid.) “it took more than a century to reorganize these two terms” properly as illustrated in the following columns:

|  |  |
| --- | --- |
| **Science** | **Literature** |
| - Denotative adequacy. | - Unbridled connotation. |
| - Logical expository and/or argumentative progression. | - Lack of argumentative progression. |
| - Precision. | - Vagueness. |
| - Intellect. | - Imagination or intuition. |
| - Reason. | - Emotion. |
| - Truth to particular truth. | - Truth to the ideal and universal. |

The points of contrast mentioned above side with Ilyas (1989: 109) who describes the nature of scientific texts as follows:

*In scientific works, subject-matter takes priority over the style of the linguistic medium which aims at expressing facts, experiments, hypothesis, etc. The reader of such scientific works does not read it for any sensuous pleasure which a reader of literary work usually seeks, but he is after the information it contains. All that is required in fact is that of verbal accuracy and lucidity of expression. This is applicable to the translator’s language as well. Scientific words differ from ordinary and literary words since they do not accumulate emotional associations and implications. This explains why the translation of a scientific work is supposed to be more direct, freer from alternatives, and much less artistic than the other kinds of prose. The language of scientific and technical language is characterized by impersonal style, simpler syntax, use of acronyms, and clarity.*

This distinction has one significant implication for the translator of scientific texts: he has to possess some knowledge of the subject-matter of the text he is working on, over the rest of the pre-requisites which he shares with translators of other text types.

Furthermore, this distinction is useful in so far as it is conjoined to possible leading factors for a theory of scientific translation because most of the literature on translation has given extensive consideration to literary texts ending with specific rules and theories and establishing relevant terminology of literary translation. The word **deviation** for instance, expresses one of the frequent concepts in the description of literary texts where deviation rarely occurs in scientific ones. By this we mean the deviation from the linguistic norms flourishing in poetry and prose, the quality which scientific texts often lack. However, certain rules which are applicable to theories of literary translation can be safely applied to scientific translation in general and to English-Arabic scientific translation in particular.  
  
In this respect, we have to mention that Arabic, despite its adherence to prescriptive and conventional rules, can - in certain cases- provide for English word-for-word equivalence by different ways such as coinage, borrowing and transliteration by forcing into its paradigmatic moulds English words such as the substantive; so words like ‘*faylasuf*’ for philosopher; ‘*jiyulujiya*’ for geology; ‘*istatiki*’ for static……etc found their way uninterrupted into Arabic. Beeston (1970: 115) says to this effect:

*The need for a large new vocabulary dealing with technological and scientific matters is, however, the least interesting feature of the new lexical development; more fascinating, though more elusive, is the evolution of new words for intellectual concepts.*

However, a part from the cultural gap, the problem of scientific translation from English into Arabic remains mostly a matter of understanding and representing the techniques, the processes, and the details which science and technology involve. In this regard, Farghal and Shunnaq (1999:210) state that “the major problem facing translators at present is terminology standardization and dissemination in the sphere of science and technology”. “When it comes to Arabic”, they continue, “scientific discourse is a translation activity, as Arabic is usually a target language, and creation and reasoning are done in another language”.

The above-mentioned requirements for competence in scientific translation can be further expanded and detailed by the following model of the processes involved in this type of translation:

**3. A Suggested Model for Scientific Translation**

As far as English-Arabic scientific translation is concerned, the procedures mentioned in the suggested model *(the model itself can be obtained from the Author – note by TranslationDirectory.com)* can be used to analyze the code of English scientific texts. They mainly depend on the successful handling of the linguistic elements of both English and Arabic including grammar, lexicon, and field-related registers. They also harbor translating competence, which includes **structurization**, **contextualization**, mastery over programs of expression in both English and Arabic, and knowledge of the alternative standards of equivalence. Moreover, the model necessitates the ability to transfer linguistic and translating competencies to areas reserved for comparison and imagination. Subsequently, corresponding structural and lexical elements are identified and assigned functions in the sorting process within compensatory strategies resulting in an almost perfect mental representation which, when textualized and normalized, ends up in an accurately-translated Arabic product. We also have to emphasize that in scientific texts there will be no motive on the translator’s side to create additional impressionistic or aesthetic effects beyond that of simple information transmission.

The above description necessitates the identification of the characteristics of the scientific register on which this model operates. These characteristics are briefly discussed in the following section.

**4. Scientific Register**

Generally speaking, the technical use of language manifests itself in several ways. The most obvious one is non-deviation from ordinary grammar, logically and argumentative progression. This may entail the adherence to items that are conventionally used. There is no **insertion**, **substitution**, or **permutation** (cf. van Dijk, 1976; Bell,1991; Ghassib,1996). There is no blocking or stopping to the automatic processing. In contrast to their literary counterparts, scientific texts underline the information content without bothering about features that are characteristic of poetic texts, such as rhyme, and connotative or symbolic meaning. Let alone other aesthetically features, which Schmidt (1971: 59) has defined as “polyfunctionality.”

We also notice that most of the elements in scientific texts are not unexpected. One might even define the meaning of these texts according to the actual use of items to refer to things in the real world or to the “extension” as contrasted to the potential meaning of things as they are perceived, conceived, or represented in terms other than their actual appearance and/or function by the perceiving man, or to the ‘intention’ of their producers (Weinrich, 1976: 14).

For the purpose of more vivid characterization of these texts, we shall mention some major ones of these features by referring to Bakr-Serex (1997: 54-7):

First, this register is characterized by the logical order of utterances with clear indication of their interrelations and interdependence.

Second, it flourishes the use of terms specific to each given branch of science; in modern science; however, there is a tendency to exchange terms between various branches of science.

Third, another characteristic feature of this register is the frequent use of specific sentence-patterns, usually the **Postulatory**, the **Argumentative** and the **Formulative** patterns. The impersonality of this type of writing can be revealed in the frequent use of passive voice constructions with which scientific experiments are generally described.

Fourth, one more observable feature of the scientific register is the use quotations, references, and foot-notes in accord with the main requirement of this register, i.e. the **logical** coherence of the ideas expressed.

Finally, science does not have its own syntax only, but also its own terminology. And we have already hinted at the importance of the familiarity with this terminology resting on a solid foundation of previously acquired knowledge on behalf of the translator. Therefore, it is not the language itself which is special, but certain words or their symbols.

Having these characteristic features of the scientific register in mind, we feel that we are in a good position to identify the areas of contrast between scientific texts and other types of texts.

**5. Scientific versus Literary Contexts**

By setting off scientific against the literary translation, their characteristics and the problems that are likely to be encountered in each, become more salient as illustrated below.

In scientific texts we have an end in view and the means necessarily remains within the general conceptual framework within which the end is defined. That is, the scientific context has a content which is concerned with the horizontal structure of the world while the literary context has a content which is concerned with the vertical structure of the world.

Thus, on the one hand, we shall have a vertical relation between height and depth while, on the other hand, we shall have a horizontal relation between width and breadth. The first relation testifies to the relative merits of artists and poets, whereas the second one signifies the merits of scientists and technologists. The product of poets is essentially a product of height and depth which has either been brought down or lifted up so as to fit into the width and breadth of life itself, that is acquiring a horizontal dimension; while the product of scientists lacks the intuitive complexity and wealth of experience characteristic of poets. This product is therefore, essentially conceived as a horizontal line corresponding to a photographic representation of the world (Blankenburg, 1982: 35-47).

Scientists speak within the familiar and concrete realities of everyday life. If they are to move, their movement is almost always towards the accomplishment of a new horizon or new perspectives that always remain within the horizontal structure of the concrete, tangible and objective reality.  
  
Another point intrudes itself here: it is important to stress that these dimensions, whether vertical or horizontal, are intrinsically dependent on the perceiving man, that is both self-relationship and world-relationship are unified through the symbolic system of identification generally known as language. However, this is not the same as saying that these dimensions can be spanned during a given culture’s or individual’s life-time. The relation of these dimensions seems as one of opponents while their unity seems as a harmony of opposites. To span them, therefore, seems impossibility that even a highly-sophisticated computer technology cannot bring off.

These demarcation lines between vertical and horizontal dimensions suggest another area of investigation and comparisons. We can now expand the previous columns (p.3) of differences between science and literature so as to include more important language details:

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| **Scientific Texts** | **Literary Texts** |
| - Logicality. | - Lack of argumentative progression. |
| - Precision. | - Vagueness. |
| - Reason. | - Emotion. |
| - Truth to particular reality. | - Truth to the ideal. |
| - Generalization. | - Concretion. |
| - Referential meaning. | - Emotive meaning. |
| - Denotation. | - Connotation. |
| - Lexical affixation. | - Grammatical affixation. |
| - Idiomatic expressions are rare. | - Idiomatic expressions are frequent. |
| - Use of abbreviation, acronym, and registers. | - Very few abbreviations, acronyms, and registers. |
| - Standard expressions. | - Almost all varieties. |
| - Use of scientific terminology, specialized items, and formulae. | - No use of scientific terminology, or formulae. |
| - No use of elements of figurative language. | - Expensive use of figurative language. |

Close examination of the items included in the literary texts column will suggest that these items are clearly descriptive by Arabic, while the items contained in the opposite column testify to the characteristics that are relevant to English usage.

Setting off these differences against more linguistic differences that exist between English and Arabic will confirm the latter’s tendency to allegory and provide guide lines for translating English scientific texts into Arabic. See below:

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| **English** | **Arabic** |
| - Words are composite. | - Words are paradigmatic. |
| - Only few grammatical items are compound. | The majority of grammatical items are compound. |
| - Rigid word order. | - Flexible word order. |
| - Very few inflections | - Highly inflectional. |
| - Uses abbreviations, acronyms, formulae, and registers. | - Rarely uses abbreviations, acronyms, formulae, and cliches. |
| - Narrow range of gender distinction. | - Wide range of gender distinction. |
| - There is clear-cut tense-aspect distinction. | - There is no clear-cut tense aspect distinction. |
| - There is no dative or dual. | - Contains dative and dual. |
| - Scientific and technical terminology covers all relevant fields. | - Shortage of scientific and technical terminology that may cover all fields. |
| - Archaic expressions are almost obsolete. | - Archaic expressions are still in use. |
| - Uses so many compound lexical structures. | - Uses few compound lexical structures. |
| - Metaphor and other forms of figurative language are reserved for poetic use of language and certain related fields. | - Metaphor and other forms of figurative language are very much frequent even in Modern Standard Arabic. |
| - Adverbs are mostly formed by the affixation of (ly) to adjectives. | - Adverbs are formed by prepositional premodification of nouns and adjectives; English prepositions such as before, after, above, over, below, under, behind, and between are adverbs in Arabic. |
| - Capitalization is sometimes used for semantic implication e.g. Mosaic, Nativity…. etc. | - Does not use any form of capitalization. |
| - Does not use vocalization. | - Vocalization has a semantic function. |
| - Punctuation has a bearing on the interpretation of texts. | - Punctuation has little bearing, if any, on the interpretation of texts. |
| - A part from such suffixes as (-ling and -ette) there is no paradigmatic diminutive in English. | - Paradigmatic diminutive exists. |
| - It has no diglossia. | - Diglossia exists. |
| - There are about twenty configurations of vowel sounds. | - Few vowel sounds used mainly in vocalization. |
| - There are no pharyngeal or glottal sounds except in the aspirated (H) and the colloquial glottal stop. | - Pharyngeal and glottal sounds are among the standard phonemes in Arabic. |

Since scientific texts rarely contain idiomatic or culture-bound expressions, the type of equivalence most common in their translation is the **formal equivalence** which focuses attention on the message content itself rather than its form. Nida (1964: 223) highlights this aspect of scientific translation as follows:

*This level of language, experientially is lifeless, is linguistically very manipulatable. For to the extent that language can be separated from the unique qualities of experience and can be made a kind of linguistic mathematics, its units can easily be arranged and re-arranged with little interference from the cultural context.*It emerges from the above-mentioned comparison between English and Arabic, which drastically lack scientific and technical terminology, suffers an irreversible process of disintegration through diglossia, and harbors scanty abbreviations, acronyms, formulae and registers. But since science and technology create situational features which involve new concepts, techniques, and processes that can be imitated and imagined, it is binding for Arab translators to coin equivalent terminology and develop corresponding programs of expression which Arabic morphology and flexible word order can provide. However, theoretical possibilities may in many cases fall short of practical application and this is very much the case with English technical translating into Modern Standard Arabic today.  
  
  
**6. Conclusions:**

- It becomes obvious from the discussion we presented so far that the act of scientific translation is sometimes guided by certain strategies. One of these strategies accounts for the systematic differences between the two languages concerned. Another depends on the type of language used in any individual text. Both these strategies are applicable in translating English scientific texts into Arabic.

- Another point is that Arabic, in its current situation, does gravely lack a frame-of-reference in the scientific and literature, and what is available of translated literature to this effect in Arabic is rather scanty and harbours gaps that are likely to multiply since initiative has not been taken by the Arabs to adopt and sustain a large-scale translating process in this particular.  
  
- In English, which expresses a highly sophisticated technological culture, both horizontal and vertical dimensions of human experience are dynamic and expanding. Whereas in Arabic, which is the expression of poetic culture, only the vertical dimension of human experience is unevenly expanding. Thus, translating English scientific texts into Arabic will inescapably involve a process of transferring dynamic and multidimensional human experience into a static and mono-dimensional one whose verbal system can hardly provide for such a transfer.  
  
- As the Arab culture is being profoundly modified and modern technology is being increasingly introduced, new technical terms are being adopted as well. But these terms are predominantly a mixture of transliterations and borrowing e.g. “banzinkhana” “petrol satation” is compounded from the English word “benzine” and the Turco-Persian word “khana” “station”. However, these terms, regardless of their readiness to catch up with Arabic paradigmatic moulds, can by no means encompass the whole body of English technical and scientific literature.

- Finally, in this situation which is rather difficult if not entirely hopeless, it seems imperative for the Arabs to start a serious and large scale process of Arabization. Yet, this process cannot be affected overnight. It necessitates an exceptionally high energy, good-will and objective thinking on the Arabs’, part to span and assimilate what the west has spanned and assimilated since the Renaissance.

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