Involvement of the Applied Translation Procedures in Compatibility of Persian Medical Terms With International Naming Criteria

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ABSTRACT

Medical language, as many technical languages, is rich with morphologically complex words. The increasing number of foreign words and specific terms incorporated into the native language are due to the ongoing development of technology and science. Many problems appear in medical translation when the Persian translators try to employ non-Persian or imported words in medical texts, in which multiple equivalents may be created for one particular word based on the individual preferences of authors and translators in the target language. According to this study, following the analysis of the data based on the applied translation procedures and word formation processes, the compatibility of the resulted characteristics has been investigated based on Sager's naming criteria and it is concluded that the main problem is due to the translation procedures of borrowing and substitution.

KEYWORDS

Linguistics, Medical Translation, Naming, Terminology, Translation Procedures, Word Designation, Word Formation

INTRODUCTION

Today, as science and technology continue to develop as a rapid pace, language plays an increasingly important role in keeping up with these changes. Catford (1965, p. 20) defines translation as "the replacement of textual material in one language (source language) by equivalent textual material in another language (target language)." Sometimes the technical terms in medical science are accepted in general language, as the public uses them easily in their general communication; and sometimes medical doctors and other healthcare providers refuse to apply the equivalents for several reasons. This paper starts to go through this issue by investigating the compatibility of the Persian medical terms with the international naming criteria, considering the applied translation procedures.

LITERATURE REVIEW

Developments in medicine, science and technology are mounting alongside the growth of medical terminology, and The World Health Organization (WHO) has estimated that several thousand new terms are being created annually (Barkman, 1974, p. 28). Recent observations indicate the need for scientific research to combine morphemes, especially medical ones to produce new word formation in the Persian language. In order to maximize the potentialities within the complex Persian technical language, a text must be converted into a generative language, a language which is comprehensible and accessible to professionals (Mansouri, 1999, pp. 224-225). According to Mansouri combining morphemes is significant in European medical word formation and naming, so foreign dictionaries, especially medical ones, present combined morphemes as entries. He highlights it as medical terms in such languages are ever-increasing, developing neck and neck with broad developments in medicine. Most of the new terms can be formed mainly through the same combining components and settled word formation patterns. This means that medical language in European languages is generative for its professionals. He argues that the generative nature of medical language in Europe is not applicable to Persian readers or translators, so not only does the Persian language indicate null function in medicine but also something lower than base, as medical language in Persian has not shown any progress.

Mansouri (1999, pp. 224-226) explains that given those entries introducing a foreign combining morpheme (suffix or prefix), most of Persian medical dictionaries usually provide the reader with its information just by presenting the Latin combining component and providing its meaning through translation of its definition. He believes that it can never be helpful to the translator, unless he is fluent in medical terminology. The translator should analyze the term into its combining components when referring to a dictionary and should guess the meaning of the whole word regardless of anything written in front of the word in the dictionary. Mansouri explains different features for equivalents and combining morphemes. He believes that sometimes completely different equivalents have been observed for several foreign medical terms with the same combining morphemes, while there is one equivalent in Persian for several combining components. With regard to the lack of research in the area of word formation, which is based on a specific field, some suggestions are presented. However, it is left to the readers to find an intermediary and appropriate way to keep Persian active and progressive as the language of science, by paying attention to the used patterns in finding equivalents and their frequency (Naseri et al., 2011).

According to Catford's principles, the main difficulty in translation practice is finding translation equivalents in the target language. The problem arises as new ideas and new methods in sciences emerged rapidly. Finch (1969, p. 5) states that the text in the source language may conform to the existing terms, invent new terms, or use metaphors. The translator may then be required to build terminology in his own language; however, he may experience difficulties. The translator would be able to find the exact concepts for the new words or terms and use them as appropriate and accurate equivalents. Thus, the equivalents will not be only one word, but would be in many words according to the inclination or personal taste of the translators. The increasing number of foreign words and specific terms incorporated into the native language are the result of the ongoing development of technology and science; and lack of appropriate equivalences for terms or technical words highlights the magnitude of naming process. Sager (1990, p. 63) explains that naming occurs once a new concept, object, process etc. appears and a name has undergone multiple attempts and processes of word formation. Sager lists 12 naming criteria in a serious controlled condition. These criteria are outlined in Table 1.

METHODOLOGY

The selected area for this study was the area of medicine which involved diseases or disorders and procedures or surgical operations. The scope of 'the musculoskeletal system and connective tissues'

Table 1. Sager's 12 naming criteria

Sager's Criteria	1. The term must relate directly to the concept. It must express the concept clearly. A logical construction is advisable (C1).
	2. The term must be lexically systematic. It must follow an existing lexical pattern and if the words are of foreign origin, a uniform transcription must be preserved (C2).
	3. The term must conform to the general rules of word formation of the language which will also dictate the word order in compounds and phrases (C3).
	4. Term should be capable of providing derivatives (C4).
	5. Terms should not be pleonastic (i.e. no redundant repetition, e.g. combining a foreign word with a native word having the same meaning) (C5).
	6. Without sacrificing precision, terms should be concise and not contain unnecessary information (C6).
	7. There should be no synonyms whether absolute, relative or apparent (C7).
	8. Terms should not have morphological variants (C8).
	9. Terms should not have homonyms (C9).
	10. Terms should be monosemic (C10).
	11. The content of the terms should be precise and not overlap in meaning with other terms (C11).
	12. The meaning of the terms should be independent of context (C12).

in ICD-9-CM was used as the source texts while "راهنمای کـدگـذاری بیماری‌ها" (Guide to ICD-9-CM in Persian) was used as the target text. The collected data included a population of 339 Persian medical terms from the target text with regard to their pairs from the source text. This study attempted to investigate selected English medical terms whose equivalent pairs are available in the target source. The analysis focused on the characteristics of the Persian terms with regard to the naming criteria suggested by Sager and the morphosematic factors for naming, considering the applied translation procedures. Figure 1 illustrates the discussion procedure of the study.

As a theoretical framework, the work of this study is based on the criteria and rules for naming terms according to Sager (1990). The medical term data in this research was studied with respect to the word formation based on Katamba (1994) and Yule (1988). The translation procedures adopted by Newmark (1988) and Vinay and Darbelnet (1995) were applied for the translation of English medical terms into Persian. The most highly applied translation procedures for the medical terms under this study are as follows:

- 'Naturalization,' is a procedure in which the SL word is transferred to the TL, first by the normal pronunciation, then by the normal morphology (word forms);
- 'Through-Translation' (calque or loan translation), is the literal translation of common collocations, the names of organizations and the components of compounds;
- 'Shift', is a process in which the grammar is changed from the SL to the TL, e.g. singular to;
- 'Reduction & expansion', occurs where there is at least one shift, particularly in poorly written texts;
- 'Couplets': couplets, triplets and quadruplets combine two, three or four of the above-mentioned procedures respectively for dealing with a single problem. They are common for cultural words and quadruplets are only used for metalingual words.

FINDINGS AND DISCUSSION

Following analysis of the medical terms and their equivalents through the applied translation procedures and the word formation processes, the data have undergone to a categorization accordingly; and the findings of the equivalents have been divided or classified into two groups based on the naming criteria: compatible and incompatible equivalents. The compatible terms are the ones which follow all of the Sager's criteria. These terms or words are compatible with all the requirements for naming. In other words, the compatible terms automatically present those features of translation procedures

Figure 1. Methodology
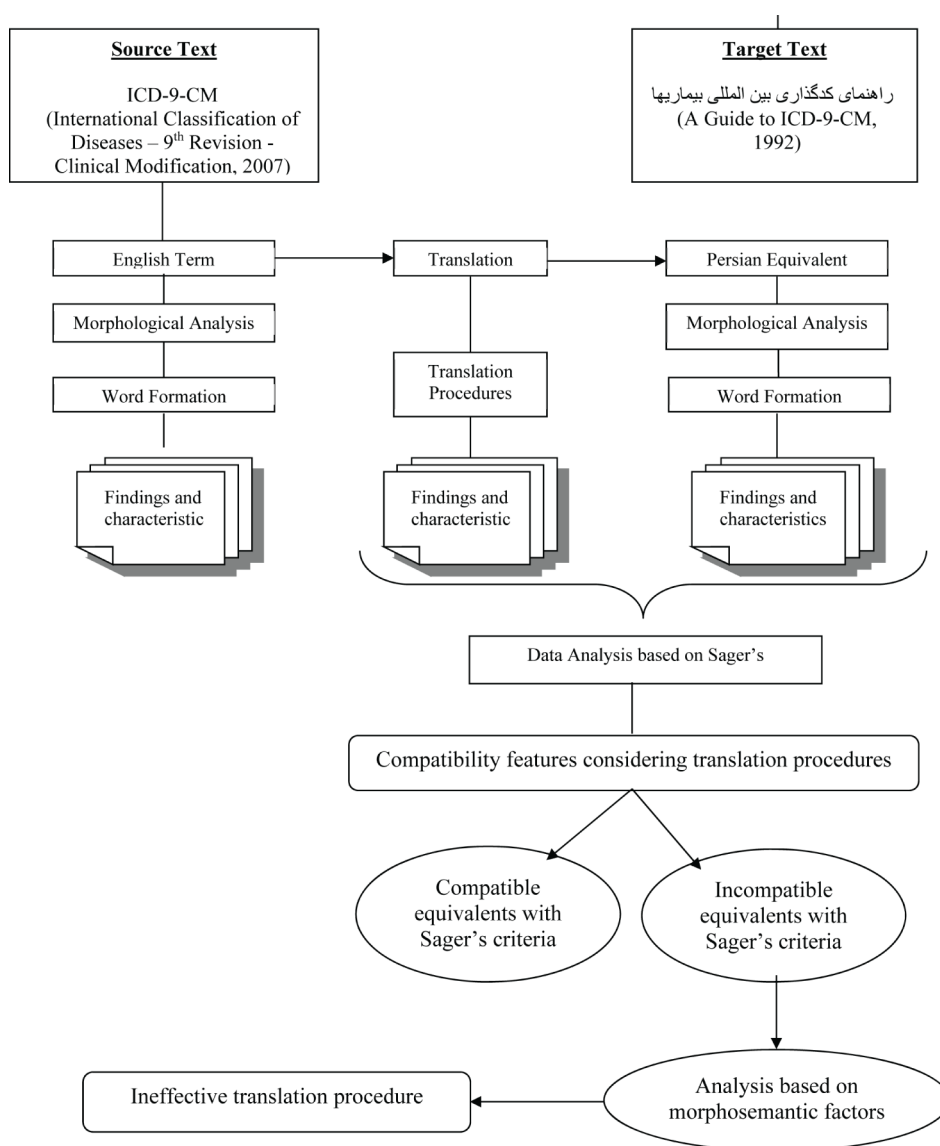
which are effective for naming the Persian medical terms. The incompatible terms are the ones which do not follow one or more naming criteria suggested by Sager. Such terms or words are incompatible with all or some of the naming requirements for naming. In other words, the incompatible terms automatically present those features of translation procedures which are ineffective for naming the Persian medical terms. Table 2, shown as below, indicates the frequency of distribution for these two groups of equivalents under this study.

According to Table 2, about 67% of the equivalents under this study have been grouped as incompatible words while about 33% of them have been compatible terms. From the analysis, it has been found that all the equivalents which were the products of shift procedure have been categorized as incompatible terms. An example of the incompatible terms from the analysis is "برش استخوان" /boreš-e ?ostoxān/ for 'Osteotomy' (See Table 3).

Table 2. Frequency and percentage of the compatible and incompatible equivalents

Equivalents	Frequency	Percent
Compatibles	112	33.04
Incompatibles	227	66.96
Total	339	100

Figure 2. Distribution of the compatible and incompatible equivalents
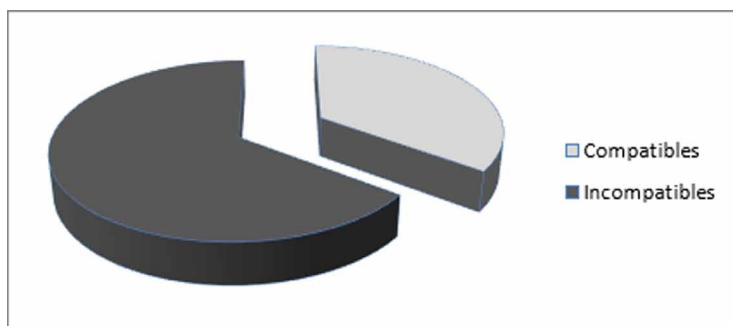
Table 3. Example for incompatible terms - Osteotomy: برش استخوان

English Term	Osteotomy	
Equivalent in Persian	برش استخوان (boreš-e + ?ostoxān)	
Gloss	cutting-Ø + bone	
Back Translation	bone cutting	
Parts of Speech	noun phrase	
Morphological Analysis	boreš[cutting]	?ostoxān[bone]
	root	root
	free	free
Tabatabaee's Persian Structure	Gerund + Noun	
Morphosyntactic Structure	Gerund$_{nuc}$ + Noun$_{mod}$	
Word Formation	compounding	
Translation Procedure	Shift	
Sager's Criteria	-C4	

This term defines "incision or transaction of a bone" in medicine morphologically, it constitutes two morphemes: "oste-" (bone) as a root and "tomy" (incision) as a suffix. The result of its translation into Persian is a noun phrase formed by two words "برش" [boreš] (cutting) and "استخوان" [ostoxān] (bone) as the Persian language could not make a single word for "osteotomy. Thus, "boreš-e ostoxān" is a compound phrase. Derivative feature of the equivalent is not discussable as it is a noun phrase and not a single word. From the medical dictionary, another cognate word has been found for "osteotomy," which is "osteotome" and it has been left without any equivalent; while "osteotomy"

has been translated through "shift." The equivalent does not match with C4, although it is clear that a noun phrase is not a word to be discussed in derivational aspect. Hence, the derivative feature is a basic problem for this equivalent. It seems that for this term, the equivalent should be converted to another probable equivalent [ostxānbori] "استخوان بری". This equivalent can be considered as an 'illustrate' equivalent in order to construct derivative forms. It can be used for the formation of [ostoxānbor] for "osteotome."

It indicates that the shift procedure has been assigned as a translation procedure with negative application, since most of the equivalents from this procedure have not followed even one of Sager's criteria. Several combined features of translation procedures have been observed among the incompatible equivalents. Table 4 and Figure 3 present the frequency distribution of the incompatible equivalents based on the applied translation procedures.

Figure 3 illustrates a big portion of the incompatible equivalents, which occurred due to the combined procedure of substitution + shift + through translation (SuST). It indicates that most of the incompatible equivalents were the ones which required to be translated by employing a combination of three translation procedures mentioned above (33%). A relevant example is "داخل جمجمه" /dāxel-e jomjome/ for 'Intracranial' (See Table 5).

Table 4. Frequency and percentage of the incompatible equivalents based on the applied translation procedures

Translation Procedures	Abbreviated	Frequency	Percent
Shift	S	25	11.01
Substitution	Su	16	7.05
Substitution+Shift	SuS	59	25.99
Substitution+Through Translation	SuT	19	8.37
Shift+Through Translation	ST	18	7.93
Naturalizatin+Through Translation	NT	2	0.88
Shift+Naturalization	SN	4	1.76
Shift+Eponym	SE	1	0.44
Substitution+Shift+Through Translation	SuST	75	33.04
Shift+Through Translation+Naturalization	STN	8	3.52
Total	Total	227	100.00

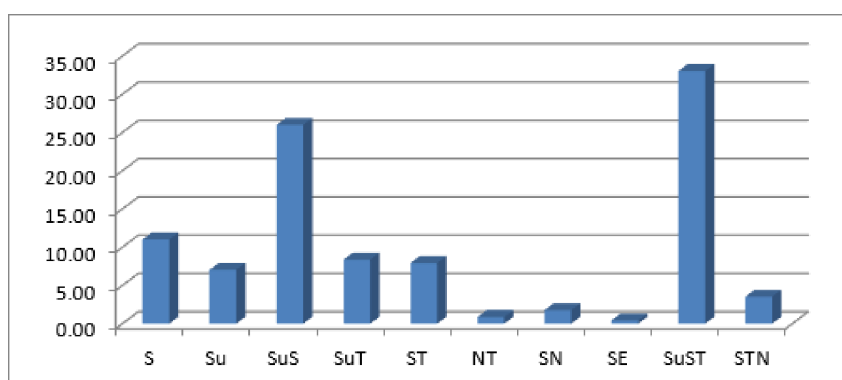**Figure 3. Distribution of the incompatible equivalents based on the applied translation procedures**

Table 5. Example for incompatible terms - Intracranial: داخل جمجمه

English Term	Intracranial	
Equivalent in Persian	داخل جمجمه dāxel-e + jomjome	
Gloss	inside-Ø + skull	
Back Translation	pertaining to inside the skull	
Parts of Speech	noun phrase	
Morphological Analysis	dāxel[inside]	jomjome[skull]
	root	root
	free	free
Tabatabaee's Persian Structure	Adv. + Noun	
Morphosyntactic Structure	Adv. + Noun	
Word Formation	borrowing, compounding	
Translation Procedure	shift, substitution, through translation	
Sager's Criteria	-C1, -C2, -C3, -C4	

This term has been translated into Persian in the form of a noun phrase which is "داخل جمجمه" [dāxel-e jomjome]. The equivalent consists of two words ("dāxel" (inside) and "jomjome" (skull)). Therefore, for translating the word in the source language (SL), the translator attempts to translate each element of the compound word ([dāxel] for "intra", and [jomjome] for "crani-"). The translated string of words indicates a phrase that is the result of conversion from the noun in the SL into a noun phrase in the TL (target language). It should be noted that [dāxel-e jomjome] can be considered as an equivalent for "intracranium," but cannot be used for "intracranial" without any derivational features. Although this equivalent can be applied for "intracranial" inside a text, it needs to be derived independently of the context. Therefore, this equivalent is not compatible with C2 and C4. [dāxel-e jomjome] does not follow C1 too, as it is not a logical construction. The equivalent, in primary term, is not an adjective, but it is a noun phrase. Accordingly, it does not follow C3, as it does not follow the word formation rules of the Persian language for adjectives.

A negative application has been found in this feature for translating the English medical terms into Persian. Shift procedure plays the critical role in this feature, by which the term requires to be translated into another grammatical structure in Persian. The second rank belongs to the feature that shows the combination of substitution and shift procedures. About 27% of the incompatible equivalents were the ones which have been translated by employing the shift procedure whereby the grammatical structure of the source language term is changed into the target language and by using substitution procedure for naming a component by borrowing it from another language. It indicates that this combination of procedures is ineffective for translating the English medical terms into Persian, since the equivalents do not follow some of Sager's criteria. The third rank is due to the shift procedure with 11% frequency. Reviewing the equivalents produced by employing this procedure, it was found that all of the equivalents translated exclusively by shift were incompatible, like "درد گردن" /dard-e garden/ for 'Cervicalgia', which indicated that this procedure is definitely not effective in naming the medical equivalents (See Table 6).

Morphologically, this Greco-Latin term (Dorland's Medical Dictionary, 2005) is a noun and it has been constructed using two morphemes: "cervic-" (neck) and "-algia" (pain). Its equivalent in Persian is [dard-e gardan] "درد گردن". [dard-e gardan] is a noun phrase made up of two nouns of [dard] (pain) and [gardan] (neck). Therefore, grammatically, the single noun in the SL is converted

Table 6. Example for incompatible terms - Cervicalgia: درد گـردن

English Term	**Cervicalgia**	
Equivalent in Persian	درد گـردن (dard-e + gardan)	
Gloss	pain-Ø + neck	
Back Translation	pain in neck	
Parts of Speech	noun phrase	
Morphological Analysis	dard[pain]	gardan[neck]
	root	root
	free	free
Tabatabaee's Persian Structure	Noun+ Noun	
Morphosyntactic Structure	$Noun_{nuc} + Noun_{mod}$	
Word Formation	compounding	
Translation Procedure	Shift	
Sager's Criteria	-C7, -C8	

into a noun phrase in the TL. Accordingly, it is not necessary to apply C4 as no derivative has been found for "cervicalgia" in the SL too. The equivalent is incompatible with C7 and C8, as [gardandard] is another synonym for [darde gardan] which is considered to be one word. Therefore, the English term can be preferably translated into [gardandard] as one word. The constructed equivalent is not matched with C7 and C8.

Reviewing the applied translation procedures for incompatible equivalents, it was important to know which translation procedures play a significant negative role in the translation processes of the English medical terms into Persian or in other words, the incompatibility of the equivalents was due to which type of translation procedures. The study attempted to find out the distribution frequency of the applied translation procedures regardless of any combination with other procedures. The frequency of the incompatible equivalents based on the applied translation procedures have been summarized in Table 7.

Table 7 shows that considering the population of incompatible equivalents, the shift procedure has been observed with 182 frequencies, either independently or it was combined with other translation procedures. There is 169 for substitution procedure, i.e. substitution has been observed in the population of incompatible terms 169 times, either independently or it was combined with other procedures. Through translation also has been observed with 122 frequencies. It has been found that the shift procedure plays a significant negative role in translating or naming the medical terms into Persian

Table 7. Frequency of the incompatible equivalents based on the applied translation procedures in general

Translation Procedures	**Frequency**
Shift	182
Substitution	169
Through Translation	122
Naturalization	14
Expansion	1

whenever this procedure is involved in the translation process, the equivalent is incompatible. In other words, this procedure absolutely cannot support the translation or naming process or it can be said it is an ineffective procedure. It is also true for the substitution procedure. Therefore, the analysis shows that substitution is considered as an ineffective procedure most of the time.

Table 8 illustrates the finding of the analysis of Sager's Criteria and the frequency distribution of the incompatible occurrences. The first column of the table provides the criteria suggested by Sager, abbreviated by "C," followed by a digit indicating the number of the criterion. The second column reveals the frequency of occurrences of the terms that were incompatible with Sager's criteria. The third column illustrates the frequency in percentage considering the total sample of 339 equivalents or terms. There are also the occurrences of double entries for criteria in some data, for example one of the terms fulfil C1 + C7 of the criteria. Therefore, the total frequency is higher than the number of the data (more than 339) and total amount of percentage (it exceeds 100%).

As illustrated, among the criteria least fulfilled by the terms are C1, C4 and C7. Criterion 1 (C1) indicates that about 16% of the studied terms have other equivalents or synonyms for the related English medical terms. A standardization plan for such terms in Persian is necessary. The morphological and the word formation characteristics of the source language terms have been incorrectly translated. Lack of accuracy in translating such terms necessitates investigations of the applied translation procedures, applied word formation rules, and naming of the source language terms. C4 has the highest frequencies and indicates that about 52% of the studied terms were not or cannot be derivational. It is apparent for several reasons. Some were borrowed from other languages without any change in their word formation in order to be compatible with the lexical patterns in Persian. Therefore, it is impossible to produce derivational features from these terms. Some have been translated into a phrase which cannot be considered as a single word. Thus, the derivation cannot be discussed. Some of them also had derivational features in their primary language. Therefore, the basic word has been borrowed together with its derived forms based on foreign language grammar. Thus, more than half of the studied terms were not compatible with criterion 4 of Sager's. C7 is a criterion which has dedicated 32% of the portion of the studied terms which had more than one synonym in application. Such terms also need a standardization process, which will make them uniform.

Figure 4 illustrates a summary of the frequency distribution of the Persian medical terms that do not fulfilled or incompatible with Sager's universal criteria.

A detailed analysis will be presented in this section by examining incompatible medical terms in Persian with Sager's criteria based on the applied translation procedures. It is clear that by finding the relationship, the characteristics of the words or terms incompatible with Sager's criteria will be apparent. The following table shows the relationship between Sager's criteria and the applied translation procedures in those Persian medical equivalents that do not match Sager's criteria.

In Table 9, the left column illustrates the translation procedures. The entries in the table are the frequency of the incompatible words with Sager's criteria respectively but based on individual applied translation procedure features. For example, number 22.12 represents the percentage of frequency occurrences of the Persian equivalents in this study which did not follow criterion 4 of Sager's, while "SuST" has been applied to these terms. In other words, about 22% of the incompatible words with C4 occurred in words with SuST. The highest frequency of incompatible words considering Sager's criteria belongs to C4 with a 52% frequency. From the number, it provides us with some frequency

Table 8. Frequency and percentage of the equivalents incompatible with Sager's criteria

Sager's Criteria	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Frequency	55	36	25	176	21	19	111	18	6	0	0	0
Percent	16.22	10.62	7.37	51.92	6.19	5.60	32.74	5.31	1.77	0	0	0

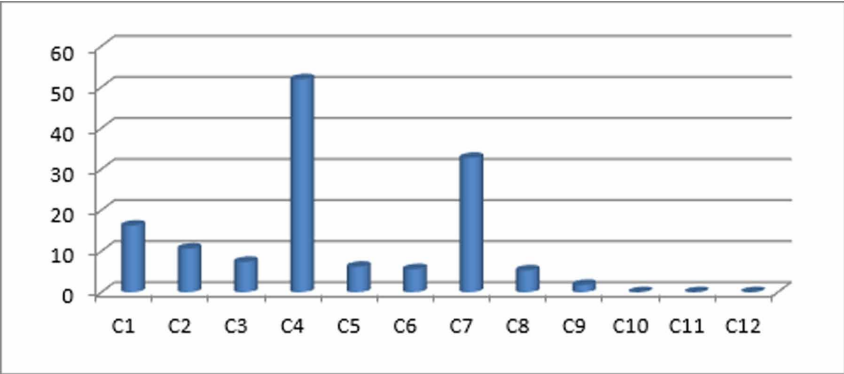**Figure 4. Frequency and percentage of the equivalents incompatible with Sager's criteria**

Table 9. Incompatible equivalents, Sager's criteria and translation procedures (frequency in percentage)

Translation Procedure	C1	C2	C3	C4	C5	C6	C7	C8	C9
T									
S				4.72			2.655	2.655	
Su				2.655					
SuS				11.8					
SuT	5.605				5.605	5.605	5.605		
ST	2.655	2.655		5.31			5.31	2.655	
TN				0.59			0.59		0.59
SN				1.18			1.18		1.18
SE							0.295		
SuST	7.375	7.375	7.375	22.12			14.75		
STN	0.59	0.59		2.36			2.36		

distributed among the applied translation procedures, and the highest one is related to SuST. The next significant high frequency of incompatibility belongs to SuS with a value of 12%, and the other one is dedicated to the source text with 5%. It can be said that among the high frequencies of translation procedures applied in the word formation is shift followed by substitution. According to Vinay & Darbelnet (1995: 88), shift is a translation procedure in which the grammatical structure is converted to another structure in the target language equivalent. This translation procedure cannot fulfill the needs of Persian in the translation of the medical terms from English into Persian. The remaining question is whether or not this holds true for all terms with shift translation procedure. Table 9 demonstrates that the highest incompatibility occurred when shift locates next to substitution and through translation. Substitution is a translation procedure in which the equivalent in the target language is substituted by borrowing from another language; and in through translation as a translation procedure, the word in the source language is translated into the target language, based on the word component. It is clear that finding an equivalent by translating the components or by borrowing from another language or forming the terms in phrase structure does not actually fulfill criterion 4.

From Figure 5, it can be concluded that only those equivalents which have been created through SuT, ST, SUST and STN do not match with criterion 1 (C1). 16% of the equivalents studied were incompatible with C1, or in other words, 16% of the Persian terms did not show any logical construction. This type of construction occurred mostly due to application of substitution + shift + through translation (7%), whilst about 5% of the illogical construction is due to the Persian terms produced through substitution and through translation. It seems that there would be some weakness in the combination of substitution and through translation procedures when translating the medical terms. Around 33% of the terms studied are not compatible with criterion 7 (C7). About 15% of the words with synonyms are the words which have been translated by SuST, 6% has been translated by SuT and 5% by ST procedure.

On the other hand, morphological analysis is a study that investigates the base components of the word. When the analysis is complemented by semantic interpretation, the process is called morphosemantic analysis. *Only by keeping track of morphology and semantics at the same time does a systematic connection emerge between certain conceptualizations in lexical semantics and certain morphological properties that do not reduce to contextual inflection* (Acquaviva, 2008: 2). There are four terminological factors which contribute to the acceptance of a term in a society. Conciseness, absence of competing terms, derivative form capability and compliance with the rules of the language are the naming factors presented by Meyer and Bowker (2006: 117) which, here, are considered as morphosemantic factors in the term formation.

The analysis done in Sager's criteria showed that these factors can be matched with some of the naming guidelines. The finding of this analysis can be summarized as below:

F1. "Conciseness" C6
F2. "No competing terms" C7
F3. "Derivative form capability" C4
F4. "Compliance with rules of the language" C3

Figure 5. Distribution of the incompatible equivalents based on Sager's compatibilities and translation procedures
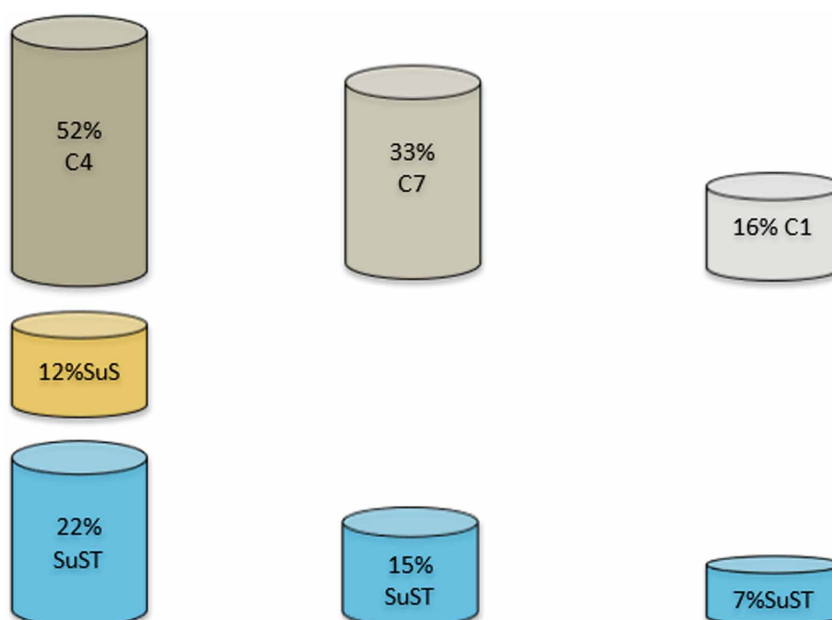
Table 10. Frequency and percentage of the incompatible equivalents based on lexical knowledge

Lexical Knowledge	Morphosemantic Factors	Frequency	Percentage
Semantics	F1 and F2	130	38.34
Lexicology	F3 and F4	201	59.29
Out of morphosemantic factors		8	2.37

From the listing above, the first factor (conciseness) refers to the same idea as suggested by Sager in criterion 6. The second factor (No competing terms) refers to C7. The third one (Derivative form capability) speaks of the derivational capability of the term which is discussed in C4; and the last factor (Compliance with rules of the language) refers to the similarity in C3.

Based on the frequencies provided in the following table, the lexical knowledge area of the most incompatible frequencies will be clarified. Table 10 shows the following frequencies.

The table indicates that the most significant problem with the translation process of the English medical terms into Persian belongs to lexicology area which covers F3 and F4, compared to the semantic area which is included by F1 and F2. In other words, the Persian language should focus on lexicology in the secondary term formation of the English medical terms rather than semantics; while the latter area needs also a special concern in itself. This is due to the secondary term (word) formation as we are speaking about the equivalents and naming process in translation. According to Sager (1990: 80-83), the terms which belong to scientific and technological innovations (primary term formation) basically differ from the terms accompanying the transfer of scientific and technological knowledge from one linguistic society to another (secondary term formation): while the former is spontaneous, the latter can be designed and engineered. As a result of knowledge transferred to another linguistic community, secondary term formation occurs when a new term is created for a recognized concept.

CONCLUSION

According to the findings discussed above, the main problem of incompatibility of Persian medical terms with Sager's criteria is due to borrowing and substitution procedures. Therefore, naming through word formation should be done carefully with respect to the compatibility with basal guidelines.

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