



Textual Analysis of an English Dentistry Textbook and Its Persian Translation: A Schema-Based Approach

Ebrahim Khodadady (Corresponding author)

Ferdowsi University of Mashhad, Iran

Maryam Lagzian

Ferdowsi University of Mashhad, Iran

Abstract. The present study attempts to scrutinize the constituting single words or schemata comprising an English dentistry textbook and its Persian translation on the basis of microstructural approach to schema theory. To this end seventy pages constituting ten percent of both English and Persian texts were chosen randomly, parsed, codified and assigned to the three schema domains, i.e., semantic, syntactic and parasyntactic. The genera as well as species of the domains were also specified and codified. To limit the scope of the study, however, only the semantic domain schemata constituting the two texts were analyzed in terms of their types and tokens. It was hypothesized the Persian translation will be schema-based if the types and tokens of its semantic schema genera and species would not differ significantly from those of the English text. The results, however, showed that the two texts differed significantly from each other at the domain, genus and species level. The findings thus confirm schema theory as an objective criterion to evaluate the empirical validity of translated texts. The pedagogical implications of the findings within the fields of translation, foreign language teaching and testing are discussed.

Keywords: Schema theory; Translation; Types; Domain, Tokens; Genera; Species

1. INTRODUCTION

Since human beings invented writing, spread on the earth and gave birth to different nations, translation has played an important role in intercommunication and providing important texts for educational and religious purposes (Miremadi, 2008). Venuti (2000) stated that "translation is made to perform different functions, academic or religious, cultural or political, commercial or municipal" (p. 477).

There are no doubts that translation plays a necessary and useful role in learning a foreign language (FL) but like other activities if it is used inappropriately it can hinder learner's progress where it excludes the FL – based techniques (Hunt & Beglar, 2002). Translation is one of the most important strategies which are used in learning the FL. In a study, Prince (1996) found that both "advanced" and "weaker" learners use the FL Translation instead of FL context for recalling newly learned words (cited in Hunt & Beglar, 1998). Although structuralism banned translation in classrooms it has recently been used as a communication activity in language classes (Khodadady, 2003). Khodadady (2001) believed that translation is a cognitive and linguistic process which requires a sound theory to explain how it takes place. History of translation is full of different theories, or better to say, different opinions which needs to be reviewed albeit briefly.

Translation theories began basically with Cicero in the first century BC, when there was a "literal vs. free" translation debate. Then in the 1960s Eugene Nida's transformation theory shifted emphasis to receiver (Munday, 2008). Newmark in 1981 proposed two types of translation: semantic and communicative translation. In the 1970s and 1980s a functionalist and communicative approach to the analysis of translation flourished in Germany through the works of scholars like Reiss (1970) on text type. Theory of translation and action by Justa Holz-Mänttari (1984 as cited in Munday, 2008), and Vermeer's (1989) *skopos theory* did, for example, focus on the purpose of target text (TT). Then in the 1990s some scholars such as House (2001) argued that

three aspects of meaning, namely semantic, pragmatic and textual, are also important in translation. She defined translation as a "recontextualization of a text in L₁ by semantically and parametrically equivalent text in L₂" (p. 247).

A number of scholars like Baker (1992) and Hatim and Mason (1990, 1997) used some ideas of pragmatics and sociolinguistics. Baker (1992) emphasized thematic and cohesion structures of a text. Other scholars like Even-Zohar (1990) adopted a polysystem approach to translation. The approach aims "to show how translation can function within literary systems and how it can challenge or maintain a dominant poetic s or a dominant ideology" (Kuhiwczak, n.d., p. 169). Other theories like cultural and philosophical rationales were proposed by other scholars, too.

However, almost all the approaches and theories which have been proposed from the past till present time favor a macrostructural approach (Khodadady, 2001). The most important problem of these theories is that they do not provide any clear and objective criteria for evaluating the translated texts (Bassnett, 2002). They seem to fall short of explaining the process of translation on a theoretically sound basis. This can be seen in different definitions which have been proposed by scholars about translation. For example, Newmark (1988a) defined translation as "rendering the *meaning* of a text into another language in the way that the author intended the text" (p. 5). However, he does not specify how the rendering should take place! Different persons reach different meanings or intentions for that matter when they read a single text. Similarly, there will be different renderings of the same text depending on who does the translation. Somewhere else Newmark (1988b) defined translation as a craft consisting of the attempt to replace a written message and /or statement in one language by the same message or statement in another language. The two terms *meaning* and *message* are too broad to be operationally defined and employed in translation.

Newmark (1988a) falls short of providing an objective measure not only to explain but also to evaluate translation because all the methods he identified and described, i.e., word-for-word, literal, faithful, semantic, adaptation, free,

idiomatic and communicative are macrostructural and thus ambiguous in nature (Khodadady, 2001). A review of translation literature confirms Khodadady's (2011) statement that there is not any satisfactory theory of translation to explain how translation must be done. He, therefore, suggested schema as a powerful theory which can explain the process of translation in an objective manner by resorting to the microstructural approach of schema theory.

The macrostructural approach views translation as a "meaningful rendering of units larger than sentences" whereas the microstructural approach treats it as "a process of supplying the best equivalents for the author's schemata ... on the basis of their textual or discoursal content" (Khodadady, 2011, p. 140). In contrast to macrostructural approaches in which units of translation e.g., meaning, message, sentence, and ..., are subjectively defined, in microstructural approaches the single/phrasal words or schemata which form a given text of a source language and carry specific meaning not only individually but also collectively are considered as units of translation. The adoption of each schema as a single unit of translation thus provides an objective unit to explain the process and measure the outcome psychometrically. This can be achieved by assigning the constituting schemata of source and target texts into three domains: semantic, syntactic and parasyntactic (Khodadady, 2008b). To limit the scope of the present study, the translation of semantic schemata comprising a given source text will be analyzed

Semantic domain schemata are assigned to four genera, i.e., *adjectives*, *adverbs*, *nouns* and *verbs*. In contrast to syntactic schemata which are few in number and many in token or frequency, semantic schemata are many in type but few in token. They belong to open set items (Quirk, Greenbaum, Leech & Svartvik, 1985) which are joined to each other by syntactic and parasyntactic schemata to express the author's message (Khodadady, Alavi, & Khaghaninezhad, 2012). Table 1 present semantic domain and its genera and species.

Table 1

The Genera and Species Constituting Semantic Schema

Genera	Species
Adjective	Agentive, Comparative, Dative, Derivational, Nominal, Simple, Superlative
Adverbs	Comparative, Derivational, Simple, Superlative
Nouns	Adjectival, Complex, Compound, Conversion, Derivational, Gerund, Nominal, Simple
Verbs	Complex, Derivational, Phrasal, Simple, Slang

Based on the genera and species of semantic schemata comprising the English and Persian texts, this study explores whether there is any significant difference between the two texts in terms of their tokens and types. It is hypothesized that the number of Persian equivalent schemata provided by the translator as his personally acquired conventional knowledge of the source English schemata will be the same as those constituting the source text. In other words, there will be no significant difference between the domain, genus and species of semantic schemata of both source and target texts in terms of their tokens and types.

2. Method

2.1. Materials

The English textbook entitled "*Radiology: Principles and interpretation*" (White & Pharoah, 2004) and its Persian translation, *RADIOLOGY DAHAN: OSOOL WA TAFSIR* (Valizadeh, trans. 1384) were chosen to be analysed schematically and statistically. This book offers practical guidance as regards the most advanced care in the field of oral and maxillofacial radiology. The Persian text is taught as a major source for educational courses of general dentistry, entrance of radiology

specialty courses and specialty examinations of radiology in Iranian universities. Because of these distinctive characteristics it was selected for this research project.

2.2. Procedure

Ten percent, i.e., 70 pages, of the textbook *Radiology: Principles and interpretation* (White & Pharoah, 2004), i.e., 16, 25, 41, 47, 59, 63, 79, 90, 108, 116, 125, 131, 136, 137, 150, 154, 155, 156, 166, 177, 182, 193, 218, 233, 237, 241, 245, 250, 258, 295, 296, 321, 324, 325, 332, 335, 339, 374, 397, 406, 410, 436, 441, 443, 259, 476, 487, 498, 505, 519, 520, 522, 524, 544, 545, 549, 550, 570, 587, 604, 616, 622, 636, 641, 661, 668, 675, 681, 687, and 689) and their corresponding Persian translations in *RADIOLOGY DAHAN: OSOOL WA TAFSIR* (Valizadeh, trans. 1384), i.e., 38, 46, 63, 67, 79, 83, 98, 409, 125, 136, 145, 153, 158, 159, 172, 176, 177, 178, 188, 199, 205, 217, 241, 258, 264, 267, 272, 275, 285, 320, 321, 349, 351, 352, 358, 362, 366, 401, 423, 434, 437, 464, 469, 470, 486, 503, 512, 524, 530, 544, 546, 547, 549, 568, 569, 574, 575, 595, 611, 627, 638, 643, 659, 662, 682, 689, 696, 701, 709, and 711, were selected randomly by employing the table of random number.

The content of the seventy English and Persian pages were typed and broken into their single word and phrasal schemata. Following Khodadady (2008b), parsed schemata were assigned to three domains, i.e., semantic, syntactic and parasyntactic. The genera and species of these domains were then specified and codified in Microsoft office excel (2007). The codification of the data in terms of their species has already resulted in the establishment of 123 species so far. It is hypothesized that this level of elaboration will provide researchers with a comprehensive and objective measure to evaluate the empirical validity of the text translated into any language. (Interested readers can obtain the codes from the correspondence author.)

After codifying the English schemata their Persian equivalents were analysed syntactically, semantically and discursively by employing the same

codes. In the process, the different inflected forms of a single schema were treated as its tokens. For example, the English schemata, *teeth* and *tooth* were counted as the tokens of the noun schema *tooth*. The determination of type of a single schema was based on its meaning and syntactic role within the sequences in which it appeared in the text. For example, the two word schema *account for*, and its translation in Persian TASHKIL MIDAHAAD which contain a space in between were considered as a single verb schema because they could not be parsed without losing their meaning.

The schemata connected by a hyphen were also considered as a single schema type. Each of the schemata *film-holding* and *bisecting-angle* were, for example counted as one single adjective. Similarly, their Persian equivalences NEGAHDARANDEYE FILM and NIMSAZE ZAVIYE were considered as single schemata. Since there is no hyphen in Persian, the Persian equivalents of most English schemata connected by a hyphen were also considered as single schema types in Persian. The same codes were used for both Persian and English schemata. The Persian schema COLIMASION, for example, was considered as a derivational noun based on its English equivalent *collimation*.

3.2.2. Data Analysis

In order to find out whether the semantic domain of English and Persian texts differed significantly from each other or not Chi-Square test was employed. Since the genera and species of semantic domain consisted of four and forty eight categories, respectively, Crosstabulation statistics was also employed. IBM SPSS Statistics 20 was utilized to run the statistical analyses and test the following hypotheses:

H1: There is no significant difference between semantic domain tokens used in the source text and the target text?

H2: There is no significant difference between semantic genera tokens used in the source text and the target text?

H3. There is no significant difference between semantic species tokens used in the source text and the target text?

H4. There is no significant difference between semantic domain types used in the source text and the target text?

H5. There is no significant difference between semantic genera types used in the source text and the target text?

H6. There is no significant difference between semantic species types used in the source text and the target text?

3. RESULTS AND DISCUSSIONS

Table 2 presents the descriptive statistics and binomial test of semantic domain tokens of two English and Persian texts. As can also be seen, 47% of English domain tokens are semantic while this percentage for Persian tokens increases to 53%. The Chi-Square test showed that the tokens of the two texts differ significantly from each other ($X^2 = 112.073$, $df=1$, $p<.001$) and thus the first hypothesis that *there is no significant difference between ST and TT in their semantic domain tokens is disconfirmed.*

Table 2

Descriptive Statistics and Binomial Test of Semantic Domain Tokens

Category	N	Expected N	Residual	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
English	15553	16515.0	-962.0	.47	.50	.000
Persian	17477	16515.0	962.0	.53		
Total	33030			1.00		

The Persian domain tokens are more than English because one English semantic schema has been replaced by more than one Persian semantic schema. For example the schema *improves* has been replaced by three schemata

ERTEGHAYE, BAES and MISHAVAD in Persian. As can be seen in Example 1, one single verb schema has been translated into one complex verb and one noun schema. Moreover, schema *improves* has been inappropriately translated as BAESMISHAVAD whose back translation will be *cause*. The translation would be schematic if the schema ERTEGHAMIDAHAD was used instead of BAESE ERTEGHAYE MISHAVAD

Example 1

English:	Use of collimation also improves image quality (p. 15).
Persian	HAMCHENIN ESTEFADE AZ COLIMASION BAESE
Translation:	ERTEGHAYE KEIFIATE TASVIR MISHAVAD.
Back translation:	Use of collimation also <u>causes improvement of</u> image quality.
Suggested translation:	HAMCHENIN ESTEFADE AZ COLIMASION KEIFIATE TASVIR RA ERTEGHAMIDAHAD.

Table 3 presents the semantic genus tokens comprising the English and Persian texts. As can be seen, the number of adverbs and verbs in English is more than that of Persian. Also adjectives and nouns in Persian i.e., 4050, 10410, prove to be more than English i.e., 3967 and 8291, respectively. Since the Chi-Square test showed the difference in the number of semantic genera tokens of the English and Persian texts is significantly different, i.e., $X^2=137.727$, $df= 3$, $p<.001$, it *disconfirmed* the second hypothesis, i.e., *there is no significant difference between ST and TT in their semantic genera tokens.*

Table 3

Language by Semantic Genus Tokens Crosstabulation

Language	Genus				Total
	Adjectives	Adverbs	Nouns	Verbs	
English	3967	448	8291	2824	15530

Persian	4050	390	10410	2627	17477
Total	8017	838	18701	5451	33007

The number of adverbs and verbs in English is more than Persian. However, the Persian adjectives and nouns are more than those comprising the English text, indicating that some significant changes have occurred in the process of translation. As Example 2 shows, for the translation of *excised* four Persian schemata of which three, i.e., KHAREJSHODE, RAVESH, EXISION, are semantic and one preposition, i.e., BE, have been used. This translation would be schema-based if the Persian schemata BARDASHTE SHODEHAND or BORIDE SHODEHAND which consists of one present perfect auxiliary and a past participle verb were used.

Example 2

English:	Solitary central lesions that have been <i>excised</i> seldom recur (p. 441)
Persian	ZAYEATE MARKAZIYE MONFARED KE BE RAVESHE
Translation:	EXISION KHAREJSHODEAND BENODRAT OVDMINAMAYAND.
Back translation:	Solitary central lesions that have been <i>excised</i> <u>by excision method</u> seldom recur.
Suggested translation:	ZAYEATE MARKAZIYE MONFARED KE BARDASHTE SHODEHAND BENODRAT OOD MINAMAYAND.

The use of additional Persian semantic genera can be seen in the translation of adjective schema *native* given in Example 3. It has been translated as KE AZ EBTEDA VOJUDDASHTEAND, indicating that one English semantic schema has been replaced by four semantic and syntactic Persian schemata. The adjective schema AVVALIYE will be the most suitable equivalent of *native* in

Persian. Moreover, the schema TASAVIR has been used two times in translation while there is only one schema, i.e., *images*, in the English text.

Example 3

English:	... the display and calibration of imported and <i>native</i> images will be the same (p. 241).
Persian	NAMAYESH VA CALIBRASIONE TASAVIRE
Translation:	VAREDSHODE VA TASAVIRI <u>KE AZ EBTEDA VOJUDDASHTEAND</u> YEKSAN KHAHAD BUD
Back translation:	... the display and calibration of images <u>which have existed from the first</u> , will be the same
Suggested translation:	NAMAYESH VA CALIBRASIONE TASAVIRE
translation:	VAREDSHODE VA <u>AVVALIYE</u> YEKSAN KHAHAD BUD.

The Chi-Square test of semantic species tokens comprising the English and Persian texts showed that they are significantly different from each other, i.e., $\chi^2=2499.914$, $df = 50$, $p < .001$. (Their descriptive statistics is given in Appendix for the ease of presentation.) The number of both *simple* and *complex derivational adjectives* in Persian is, for example, more than that of English. The detailed examination of the two texts showed that in many cases schema species such as simple nouns, e.g., mouth, have been translated as adjectives, e.g., DAHANI (of mouth). These results thus *disconfirm* the third hypothesis that *there is no significant difference between ST and TT in their semantic species tokens*.

As another example, the results show that the Persian superlative adjectives are more frequent, i.e., 48, than English ones, i.e., 17. This difference mostly has occurred because other types of English schemata have been replaced by a Persian superlative adjective. As Example 4 shows the simple adjective *early* has been translated into a Persian superlative adjective AVVALIN. The simple adjective AVVALIYE is a more appropriate equivalent for *early*. Moreover, the

English determiner "an" has been translated as the unspecified pronoun YEKI yet requiring adding the preposition AZ as its formulaic component.

Example 4

English: An *early* method for aligning the x-ray beam and film with the teeth and jaws was the bisecting – angle technique ... (p. 90).

Persian YEKI AZ AVVALIN RAVESHHAYE TANZIME PARTOVE

Translation: ASHAEYE X VA FILM BA DANDANHA VA FAKEIN
TEKNIKE NIMSAZEZAVIYE BUD ... (p.109).

Back One of the first method of aligning the x-ray beam and film
translation: with the teeth and jaws was the bisecting – angle technique ...
(p. 90)

Suggested YEK RAVESHE AVVALIYE BARAYE TANZIME PARTOVE
translation: ASHAEYE X VA FILM BA DANDANHA VA FAKEIN
TEKNIKE NIMSAZEZAVIYE BUD ... (p.109).

Further difference in the English and Persian texts lies in the number of *dative adjectives*. Results indicate that English dative adjectives are more frequent, i.e., 281, than Persian ones, i.e., 114. A close examination of equivalents provided in Persians shows that most of English dative adjectives have not been replaced by Persian dative adjectives. For example, none of the English dative adjectives given in Table 4 have been translated the same though the same grammaticalization process exists in Persian.

Table 4

English Dative Adjectives and Their Persian Translations

English	Persian translation	Suggested Schema-based translation:
<u>Scattered</u> radiation	TASHASHOE <u>MONTASHER</u>	TASHASHOE <u>PARAKANDE</u>

<u>Given point</u>	NOQTEYE <u>MOAYAN</u>	NOQTEYE <u>TAYEENSHODE</u>
<u>Absorbed</u> dose	DOZE <u>JAZBI</u>	DOZE <u>JAZBSHODE</u>
Fully <u>rectified</u>	TAMAM <u>ESLAHSHAVANDE</u>	TAMAM <u>ESLAHSHODE</u>
<u>Reduced</u> levels of radiation	SOTUHE TASHASHOE <u>PAEENTAR</u>	SOTUHE <u>KAHESHYAFTEYE</u> TASHASHO
<u>Perceived</u> contrast	KONTRASTE <u>QABELE</u> <u>ROYAT</u>	KONTRASTE <u>ROYATSHODE</u>

Moreover, the translator has mostly added schemata such as AZLAHAZE, BESURATE and BETORE in translating derivational adverbs and thus has made them complex in structure. While the number of derivational adverbs in English, i.e., 371, is more than that of Persian, i.e., 250, Persian complex derivational adverbs have become more frequent than English ones i.e., 90 and 0, respectively. In Example 5, the English derivational adverb, *completely*, has been, for example, translated as BETOREKAMEL which is a complex derivational adverb. Moreover, in the passive verb *closed* has been replaced by an active verb, BEBANDAD, along with the extra schemata of TA, ZAMANI, and KHOD for which there is no English counterparts.

Example 5

English: Hold the film in place until the patient's mouth is *completely* closed (p. 150).

Persian FILM RA TA ZAMANI KE BIMAR DAHANASH RA

Translation: BETOREKAMEL BEBANDAD, DAR MAHALE KHOD
NEGAHDARID.

Back translation: Hold the film in its place to the time when the patient
completely closehis mouth (p. 150).

Suggested FILM RA DAR MAHAL NEGAH DAROD TA

translation: DAJAMEBIMARKAMELAN BASTE SHAHAD.

Table 5 presents the descriptive statistics and binomial test of domain types constituting the English and Persian texts. As can be seen, in English 48% of domain types are semantic while this percentage for Persian types increases to 52%. The Chi-Square test showed that the difference in the domain types of two text is significantly different ($X^2 = 7.492$, $df=1$, $p<.05$). The results thus *disconfirm* the fourth hypothesis that *there is no significant difference between ST and TT in their semantic domain types*.

Table 5

Descriptive Statistics and Binomial Test of Semantic Domain Type

Category	N	Expected N	Residual	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
English	3599	3717.0	-118.0	.48	.50	.006
Persian	3835	3717.0	118.0	.52		
Total	7434			1.00		

Table 6 presents the semantic genus types in English and Persian texts. As can be seen, the number of adverb and verb types in English is more than that of Persian. However, adjective and noun types in Persian i.e., 1198, 1797 prove to be more than English, i.e., 1065 and 1527, respectively. The Chi-Square test showed that the difference between semantic genera types of the English and Persian texts is significant ($X^2=137.727$, $df= 3$, $p<.001$). These results *disconfirm* the fifth hypothesis that, *there is no significant difference between ST and TT in their semantic genera types*.

Table 6

Language by Semantic Genus Types Crosstabulation

Languages	Genus Types	Total
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	Adjectives	Adverbs	Nouns	Verbs	
English	1065	179	1527	826	3597
Persian	1198	156	1797	684	3835
Total	2263	335	3324	1510	7432

Similar to genera types, the semantic species types employed in English and Persian texts differ in Number. (The descriptive statistics is given in Appendix 2). The Chi-Square test of the of the numbers indicated that the semantic species types comprising the English and Persian texts are significantly different from each other, i.e., $\chi^2=1191.820$, $df = 49$, $p < .001$, and thus *disconfirmed* the sixth hypothesis that *there is no significant difference between ST and TT in their semantic species types*.

The token and type based analysis of semantic domain and its subcategories indicated a significant difference between the English and Persian texts, showing that the translator has employed more Persian semantic schemata to explain the English schemata as well as he could. The translation of syntactic and parasyntactic domain schemata into semantic schemata also explains the difference between the two texts in terms of their schema tokens and types. Future research must show whether similar results will be obtained if the translation of non-technical texts are evaluated on the basis of schema theory.

In microstructuralist approach of schema theory translation is viewed as a process of "supplying the best equivalents for the author's schemata on the basis of translator's experience with the schemata in the source language and its equivalents in the target language" (Khodadady, 2001, p. 107). So providing the best equivalent for open set items (Quirk, Greenbaum, Leech & Svartvik, 1985) or semantic schemata will be more problematic and cause more differences than the translation of closed set items because of the open nature of experiences represented by semantic schemata. The complexity increases when it is accepted that semantic schemata are subject to continuous change and do increase in

number while syntactic schemata remain almost constant over a relatively long period of time in a language (Yule, 1996).

4. CONCLUSION

In this study the semantic schemata of ten percent of an English book and its Persian translation were analyzed contextually and statistically. To be as objective as possible, the semantic domain and its genera and species of the two texts were compared based on their types and tokens. It was hypothesized the Persian translation of English semantic schemata would be schema-based if the types and tokens of both texts show no significant difference. The token-based results, however, showed that the difference between the two texts was significant. Also, type-based analysis indicated a significant difference between the two texts, indicating that what the translator had conveyed in his translation was significantly different in content.

The findings of this study provide further evidence to confirm Khodadady's (2001, 2008a, 2011) suggestion that the application of schema theory renders translation objective. They showed that the schema-based analysis of both source and targets texts can be employed empirically to evaluate translation. Although only semantic schemata were analysed in this study, the analysis can be extended to the translation of syntactic and parasyntactic schemata to decrease the subjectivity of translation to a very large extent. In addition to empirical advantage, schema theory approaches translation at various levels, i.e., domains, genera and species. It paves the way to claim that the most appropriate and accurate translation is the one that happens at all levels and reveals no significant difference in the number of semantic, syntactic and parasyntactic schemata comprising the source and target texts.

The findings of this study will be highly invaluable for those involved in foreign language teaching and testing. Teachers can consider schemata as the basic units of language whose interaction with each other brings about sentences and thus make their learning and instructions feasible. They also provide

teachers with an objective measure of analyzing student's proficiency. Instead of employing traditional approaches such as translation-based instruction (TBI), the schema-based instruction (SBI) is, therefore, offered to be adopted. This is in line with the findings of studies establishing the superiority of SBI over TBI (e.g., Khodadady, Alavi, & Khaghaninezhad, 2011; Khodadady, et al., 2012; Khodadady, Alavi, Pishghadam, & Khaghaninezhad, 2012; Khodadady & Elahi, 2012).

The findings are, moreover, of value for translation courses of EFL students, and for teachers and students who study translation as a major. These results pave the way for an objective evaluation of translated texts and provide empirically validated basic units for teachers to highlight the importance of student's competence related to the different levels of schemata of a text and consequently providing them with a clear description of how translation occurs. Being familiar with various levels of schemata, the students can translate them from one language into another in a more systematic and objective way. Also adopting schemata as the building blocks of texts provides EFL teachers with objective tests to measure translation objectively (e.g., Seif & Khodadady, 2003).

In addition to providing an indirect measure of translation, the findings of this study necessitate the familiarity of professional translators with schema as a unit of translation. They show that the very process and product of translating the schemata of a given source text depends first and foremost on its translator's ability to provide their readers with the same target schemata the authors have employed to compose their source texts. According to Khodadady and Elahi (2012), perfect comprehension will occur when the readers, and in the case of the present study, the translators, understand all the schemata comprising the text and establish semantic, syntactic and parasyntactic relationships among them as the author of the English text did and translate them on that basis. Translators, therefore, need to be aware of these internal and dynamic relationships among the schemata constituting the source text (ST) and the target text (TT).

Due to space limitations, the semantic domain, genus and species schemata constituting the ST and TT were analyzed and compared with each other in this study. Future research may focus on syntactic and parasyntactic schema domains as well to reveal the effect of syntactic knowledge on translation. Along with three schema domains, shorter texts can be analysed schematically to explore whether the length of texts plays any role in translation when it is rendered by the same translators. The horizon can further be pushed back by applying the schema-based translation to texts composed in the fields of arts, humanities and sciences.

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APPENDIX 1

Semantic Species Tokens by Language Crosstabulation

Species	Language		Total
	English	Persian	
Agentive Adjective	173	144	317
Agentive Complex Adjective	39	42	81
Comparative Adjective	105	147	252
Complex Adjective	247	324	571
Dative Adjective	281	114	395
Complex Dative Adjective	72	110	182
Derivational Adjective	1364	1404	2768
Derivational Complex Adjective	252	335	587
Nominal Adjective	5	2	7
Simple Adjective	1442	1350	2792
Superlative Adjective	17	48	65
Comparative Adverb	36	16	52
Complex Adverb	4	5	9

Derivational Adverb	341	250	621
Derivational complex Adverb	0	90	90
Simple Adverb	32	29	61
Superlative Adverb	3	2	5
Adjectival Noun	214	352	566
Complex Noun	496	647	1143
Compound Noun	119	141	260
Compound Complex Noun	21	19	40
Conversion Noun	4	4	8
Derivational Noun (Simple)	1170	1002	2172
Derivational Complex Noun	107	237	344
Gerund Noun	239	38	277
Gerund Noun (Complex)	7	154	161
Nominal Noun	0	1	1
Simple Noun	5884	7845	13729
Complex Verb (Base)	32	275	307
Complex Verb (Third Person)	12	425	437
Complex Verb (Past participle)	36	105	141
Complex Verb (Present participle)	8	23	31
Complex Verb (Simple Past)	0	6	6
Derivational Verb (Base)	17	1	18
Derivational Verb (Third Person)	15	1	16
Derivational Verb (Past Participle)	34	1	35
Derivational Verb (Present participle)	7	0	7
Derivational Verb (Simple Past)	0	1	1
Phrasal Verb (Base)	22	5	27
Phrasal Verb (Third Person)	23	7	30
Phrasal Verb (Past Participle)	9	2	11
Phrasal Verb (Present Participle)	21	0	21

Phrasal Verb (Simple Past)	1	0	1
Simple Verb (Base)	1018	469	1487
Simple Verb (Third Person)	636	1009	1645
Simple Verb (Past Participle)	707	244	951
Simple Verb (Present participle)	203	19	222
Simple Verb (Simple Past)	23	34	57
Total	15530	17477	33007

APPENDIX 2

Semantic Species Types by Language Crosstabulation

Types	Language		Total
	English	Persian	
Agentive Adjective	70	50	120
Agentive Complex Adjective	23	15	38
Comparative Adjective	24	62	86
Complex Adjective	104	174	278
Dative Adjective	129	43	172
Complex Dative Adjective	49	65	114
Derivational Adjective	293	344	637
Derivational Complex Adjective	69	116	185
Nominal Adjective	4	2	6
Simple Adjective	290	307	597
Superlative Adjective	10	20	30
Comparative Adverb	4	2	6
Complex Adverb	2	4	6
Derivational Adverb	160	66	226
Derivational Complex Adverb	0	67	67

Simple Adverb	11	17	28
Superlative Adverb	1	0	1
Adjectival Noun	59	78	137
Complex Noun	140	165	305
Compound Noun	59	63	122
Compound Complex Noun	6	6	12
Conversion Noun	2	3	5
Derivational Noun (Simple)	280	171	451
Derivational Complex Noun	14	70	84
Gerund Noun	115	26	141
Gerund Noun (Complex)	3	80	83
Nominal Noun	0	1	1
Simple Noun	849	1134	1983
Complex Verb (Base)	15	161	176
Complex Verb (Third Person)	9	216	225
Complex Verb (Past participle)	17	59	76
Complex Verb (Present participle)	8	2	10
Complex Verb (Simple Past)	0	18	18
Derivational Verb (Base)	13	0	13
Derivational Verb (Third Person)	12	1	13
Derivational Verb (Past Participle)	19	1	20
Derivational Verb (Present participle)	2	0	2
Derivational Verb (Simple Past)	0	1	1
Phrasal Verb (Base)	8	1	9
Phrasal Verb (Third Person)	6	3	9
Phrasal Verb (Past Participle)	5	2	7
Phrasal Verb (Present Participle)	6	0	6
Simple Verb (Base)	245	93	338
Simple Verb (Third Person)	138	67	205

Simple Verb (Past Participle)	221	36	257
Simple Verb (Present participle)	95	9	104
Simple Verb (Simple Past)	7	14	21
Total	3597	3835	7432