Examination of Image Schemas in Scientific and Literary Texts within the Framework of Cognitive Semantics

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Citation
Shakerian Behzadi, A., & Shakerian Behzadi, A. (2023). Examination of Image Schemas in Scientific and Literary Texts Within the Framework of Cognitive Semantics. *International Journal of Language and Translation Research*, *3*(3), pp. 53-70. http://doi.org/ 10.22034/IJLTR.2023.177415

Available online

Keywords:

Cognitive Linguistics, Cognitive Semantics, Image Schema, Scientific Text, Literary Text

Abstract

The aim of this study is to examine and compare image schemas in scientific and literary texts within the framework of cognitive linguistics. Image schemas are one of the key topics in fields such as philosophy, psychology, and linguistics. According to cognitive linguists, the importance of image schemas, as a part of language and thought, is that they, in terms of rudimentary embodied concepts, systematically provide the fundamental building blocks for more complex concepts. That makes their study inevitable in many fields. In this study, I examined Johnson's basic image schemas (i.e., force, path, and containment) in scientific and literary texts, as two extremely different genres. I used qualitative, descriptive, and inferential methods in our examination. The results show that, despite their significant difference ($p<.05$), all three schemas are used in both scientific and literary genres. The most frequent schemas in scientific and literary texts were containment schemas (52%) and path schemas (56%), respectively. There also was a significant difference between schematic (9%) and non-schematic (91%) sentences ($p<.05$). I suggested that the observed difference between the two genres may be due to the fact that scientific concepts are more abstract, and the use of schemas facilitates their understanding.

بررسی طرح واره تصویری در متون علمی و متون ادبی در چارچوب معناشناسی شناختی

هدف این پژوهش بررسی طرحواره های تصویری پایه در متون علمی و ادبی و مقایسه آنها در چارچوب زبان‌شناسی شناختی است. طرحواره های تصویری یکی از مباحث اساسی رشته هایی چون فلسفه، روان‌شناسی و زبان‌شناسی است. به زعم زبان‌شناسان شناختی اهمیت طرحواره های تصوری به عنوان بخشی از سازوکار زبان و تفکر این است که آنها به عنوان مفاهیم جسمیت یافته ابتدایی و اولیه می‌توانند به شکلی نظام‌مند، ساختار مفاهیم پیچیده تر را فراهم آورند. این مهم باعث اجتناب‌ناپذیر شدن مطالعه و بررسی آنها در بسیاری از زمینه ها می‌شود. دراین پژوهش به بررسی طرحواره های تصویری حجمی، حرکتی و قدرتی جانسون به عنوان طرحواره های پایه در متون علمی و ادبی به عنوان دو گفتمان کاملا متفاوت بپردازد. روش پژوهش به لحاظ هدف، کاربردی و از نوع کیفی، توصیفی و استنباطی است. نتایج نشان می‌دهد که هر سه طرحواره در هر دو نوع گفتمان علمی و ادبی کاربرد دارند که بیشترین میزان در متون ادبی به طرحواره حرکتی (۵۲٪) و در متون علمی به طرحواره حجمی (۵۶٪) اختصاص دارد واین تفاوت بین فراوانی انواع طرحواره ها معنادار است. همچنین میزان جملات حاوی طرحواره (۹۱٪) در کل پیکره بیشتر از جملات بدون طرحواره (۹٪) است و این تفاوت بین فراوانی این دو معنا دار است. استفاده از طرحواره در متون علمی بیشتر از متون ادبی است و این میزان با توجه به معنادار بودن این تفاوت می‌تواند به دلیل انتزاعی بودن مفاهیم علمی باشد که نیاز به طرحواره برای بیان آن مفاهیم را در جهت درک فیزیکی آن تسهیل می‌بخشد.

واژگان کلیدی: معناشناسی شناختی، طرحواره تصویری، متون علمی، متون ادبی

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P-ISSN: 2750-0594
E-ISSN:2750-0608

Introduction

Influenced by cognitive linguists and cognitive scientists, cognitive semantics has a number of fundamental theoretical constructs (Clausner & Croft, 1999, p. 1). One of these basic constructs is image schemas by which cognitive semanticians study the formation of meaning in mind (Gandomkar, 2012, p. 116). Prototypes and schemas are the key concepts of categorization in cognitive semantics. They regulate our understanding of the world. In cognitive semantic research, image schemas are of great importance; because their abstract construct allows us to link physical experiences to cognitive modules. In this research, I studied schemas in scientific and literary texts. Whether conceptualization in these two genres is carried out through which schemas and in what proportion can help us to recognize the type of categorization in these texts and even how to teach them. A comparison between the extents of application of schemas can enhance our understanding and teaching methods of these two genres.

Theoretical Frameworks

Despite it has not passed more than a few decades of its life, Cognitive linguistics has offered a platform for high quality work in a wide range of different fields of application including descriptive linguistics, cultural linguistics, language acquisition, discourse studies, sociolinguistics, visual communication, stylistics, poetry, pedagogical linguistics, computational linguistics, and sign language (Kristiansen et al., 2006, p.1). Cognitive linguistics consists of two main parts: cognitive semantics and cognitive grammar (Langacker, 2008, p.4). Influenced by the opinions of cognitive linguists and cognitive scientists, cognitive semantics achieved fundamental theoretical constructs (Clausner and Croft, 1999, p.1). One of these basic constructs is the image schema by which cognitive semanticians examine the formation of meaning in mind (Gandomkar, 2012, p. 116). The origin of the theory of image schema, in a modern sense, dates back to Frederick Bartlett's book (1932). He described a schema as an active organization of past experiences. He defined image schema as stereotypical mental scripts or scenarios of situations and events, built up from numerous experiences of similar events (Qiu and Huang, 2012, p.243). Based on such descriptions, Mark Johnson studied in details image schemas and their function in language. The result of his studies was a detailed description of image schemas, as a theory, in a book named "The Body in the Mind" published in 1987. According to his theory, image schemas

are abstract conceptual representations built up directly from our everyday interaction with the world (Johnson, 1987; Fuchs, 2007; Ibα′ñez,2008; Littlemore, 2009).

Image schemas are "imagistic" since they relate to and derive from our experiences in the world, and they are “schematic” because they are not partial concepts (Evans & Green, 2006, pp. 178-9). Skemp also believes a schema is a structured organization of knowledge which can be adapted to a person's knowledge or experience. Today, Image schemas, as a subset of cognitive linguistics, have been able to play a significant role in various fields, including education, because as part of the mechanisms of language and thought, in terms of rudimentary embodied concepts, they can systematically provide structure to more complex concepts (Evans et al., 2006, p. 10). For example, Bergsten (2011, p.127) believes that the conceptual framework of image schemas by Johnson (1987) and Lakoff (1988) has a great impact on mathematics education and such bodily based schematic structures are used in human abstract thinking by the means of metaphorical projection from the world of bodily experience into the abstract dimension. Fuchs (2007, p. 6) considers the educational use of image schemas in physics effective. Among schemas, I focused on three schemas: containment, path, and force. I briefly describe each one below.

Containment Schema

Containment schema arises from our experience of being in bounded spaces (such as a room or bed), or putting objects into containers (like cups or boxes) (Johnson 1987, pp.21-23); for example:

رفته **تو** فکر

Lit[3]: He/she is [deeply] into his/her thought.

Fig[4]: He/she is [deeply] thinking.

توی بد مخمصه‌ای افتاده

He/she is in big trouble.

سعی کن خودت رو از این گرفتاری **بیرون بکشی**

Try to get out of this trouble.

[3] literally
[4] figuratively

Path Schema

According to Johnson (1987, pp.113-117), through their own experience of movement and other moving objects, humans create schemas by which they embody abstract concepts. Thus, we encounter expressions in languages representing movements, as in the below examples:

رسیدیم به **ته** قصه.

We reached the end of the story.

برای **رسیدن** به موفقیت باید تلاش کنی.

Lit: You should try to reach success.

Fig: You should try to achieve success.

برای دستیابی به اهدافت هنوز **راه درازی** در پیش است.

There is still a long way ahead to achieve your goals.

Force Schema

According to Johnson (1987, p.47), through their life, humans have been faced with many obstacles, and they have used their force in several ways to deal with them. Through such experiences, they have developed schemas and generalized them to abstract situations. According to Johnson, there are three kinds of reaction in facing an obstacle represented in image schemas: 1. The obstacle blocks the force; 2. The force crosses or passes by the obstacle and continues its way; 3. the force removes the obstacle. Following examples represent force schemas:

گرفتار مصیبتی شدم که **نه راه پیش دارم نه راه پس**.

Lit: I've got caught up with a problem that I can't go either forward or backward.

Fig: I've got caught up with a problem that I don't know how to solve it.

با مشکلاتم **کنار آمدم** و آنها را **پشت سر گذاشتم**.

Fig: I dealt with my problems and put them behind.

برای اینکه به هدفم برسم مشکلاتم را **کنار زدم**.

Lit: To reach my goal, I pushed aside my problems.

Fig: To achieve my goal, I solved my problems.

Literature Review

Tavakolniya (2016) studied image schemas in Qur'an and how they embody Qur'anic abstract concepts. Tarhani (2017) identified image schemas and their variants in Mustafa Rahmandoust's childish poems. Ghasemi (2015) shows that among the existing schemas, after the animate schema, path schema is the most common one. The results show that the poet considers his body as a container of sadness, and he assumes the feeling as a path that he would proceed along the course of his life. Babasalari (2015) studied Johnson's image schemas in primary school's books. She found that all three schemas are used in primary school's books, and there is a significant difference between their applications. Schemas with the highest rate of application in primary school's books were containment (58.5%), path (25.5%), and force (16%), in descending order. Shamloo Darbani (2016) studied the high-frequency prepositions in Persian and English. By comparing the meaning of preposition, their similarity, and differences, he suggested an educational method using image schemas. Gandomkar (2012) evaluated the role of image schemas in producing "contextual synonymity" at the level of verbs by examining the semantic substitution, which its trend is from abstract concepts to concrete concepts. The results show that the similarity of verbs' image schemas is the main factor in the emergence of synonymity. Afrashi and Naeimi Hashkvaei (2011) show that out of 954 extracted sentences, only 92 sentences contain image schemas. They interpreted the finding as one of the weaknesses of the children's literature in Iran.

In a cognitive ethnographic study of clock-reading in primary school children, Williams (2010) shows that there are different image schemas in reading landmark (e.g., 3 o'clock), relative (e.g., a quarter past three), and absolute times (e.g., three-fifteen). The analysis of image schemas predicts the most common errors in children's clock-reading, and also the source of errors. There are different levels of sophistication in reading "a quarter past". Comparing their image schematic structure shows how enriched image structures interrelate various aspects of clock-reading. The author believes that relating visible actions to these aspects of conceptualization will help us enhance our understanding of embodied mathematical cognition, teaching, and learning.

Bergsten (2011, p. 127) believes that the conceptual framework of image schemas by Johnson (1987) and Lakoff (1988) has a great impact on mathematics education and such bodily based schematic structures are used in human abstract thinking by the means of metaphorical projection from the world of bodily experience into the abstract dimension. Fuchs (2007, p. 6) considers the

educational use of image schemas in physics effective. He believes that human reasoning is based on a number of abstract schemas which are provided by the sensorimotor system. In his view, most of the basic schemas are universal and independent of culture; so, they are present in every aspect of human reasoning and activity, including formal sciences. He believes that today, according to modern cognitive science, there is an idea that human understanding is based on embodied thinking, therefore, the application of cognitive linguistics, as an important subcategory of cognitive science, to continuum physics and to a recent theory of the dynamics of heat reveals some pervasive imaginative structures which help conceptualize physical processes. He (ibid: 2) also believes that the aspects of quality, quantity, and force can be conceptualized through the projection of a few image schemas into different phenomena. In the meantime, there are cognitive processes that create similarities between different fields of physics and allow us to apply analogical reasoning to theories of fluids, electricity, heat, chemicals, and motions.

By examining the effects of image schemas on the improvement of listening comprehension in the second language acquisition, Qiu and Huang (2012, pp.243-244) assert that without schemas, including image schemas, nothing would be predictable; and if nothing were predictable, learning would be impossible. According to the authors, the prior knowledge structures in existing image schema interact with new information in incoming image schema. They emphasized the application of image schemes as an essential and necessary strategy for learning and development (ibid, p.252). They conclude that with the help of a dynamic image schema, learners can understand the interactive and dynamic nature of the learning system. The construct of dynamic image schema helps language learners to organize listening materials for systematic processing of information in the basic frameworks and thereby extend their ability in sorting, categorizing, predicting, organizing, and analyzing the information, and achieve to a meaningful reconfiguration of knowledge and thus improve their listening comprehension. They believe that the language system is a matrix schema consists of different subsystems which interact with each other. Such interaction brings changes in other systems and thus causes the holistic change of the overall system. They believe that dynamic image schemas help students to look at situations in a holistic way and organize information into a basic structure, and thus, realize meaningful reconstruction of information through a systematical combination of existing knowledge and incoming information.

In this research, I tried to answer the following questions:

RQ1. What proportion of the basic image schemas have been used in scientific and literary texts?

RQ2. Is there any significant difference between the proportions of schemas?

RQ3. What is the ratio of sentences containing the three image schemas to the sentences without schemas in each scientific and literary text?

RQ4. What is the difference between sentences with and without schemas?

Method

The current study is descriptive-analytic research. For an objective and qualitative description of scientific and literary texts, the researcher systematically studied basic schemas. She used a corpus consisted of 20 articles in biology and 20 short stories to evaluate our hypothesis. The main unit of analysis was the sentence. Overall, 11019 sentences were extracted from the corpus. Classification is the categorization of elements of a set by differentiation and then categorizing them based on similarities and predetermined criteria (Sarmad et al., 2012, p.135). The researcher classified sentences at a single level of basic image schemas. At this level, she selected three classes (containment, path, and force schemes). A counting unit is a unit that can be selected based on relevant categories. Here, the sentence was the counting unit of all types of basic image schemas. The sampling method was convenience sampling method, and the researcher used lists to collect data. After a thorough study of each scientific article and the literary story, the researcher made a list of the existing schemas and then classified them into three categories of path schemas, containment schemas, and force schemas. In the end, she had a set of lists which provided us with the data. In each category of each genre, she counted the number of sentences containing schemas. She used the relative frequency as a result of the number of sentences containing schemas divided by the overall number of sentences containing schemas in each text and all the texts of each genre. Finally, the researcher analyzed the data using inferential and descriptive statistics methods. she used Chi-square and correlation to analyze the data.

The researcher used inferential and descriptive statistics methods. She used descriptive methods to organize and summarize the collected data. Since the size of each text was varied, relative frequency was used. The researcher presented the frequency of variables in both the sentences of each text and each genre. She used T-test, Chi-square, and correlation. A t-test is used to evaluate

hypotheses in an unknown population. To evaluate some of our hypotheses, Chi-square was used. This test is one of the most reliable statistical tests by which we can examine whether there is any systematic relationship between the two variables. In fact, the Chi-square test examines the relationship between two variables and does not tell us anything about the intensity and direction of their relationship.

Results and Didcussion

As you can see in table 1, there are more schemas in scientific texts than literary texts. Since the number of sentences is different in two genres, we have used percentages to compare them. As you can see, the frequency of schemas in scientific and literary texts is 16% and 6%, respectively.

Table 1

The frequency and percentage of sentences with basic schemas

Genre	Scientific	Literary
Frequency	531	493
Relative Frequency	531	493
Percentage	16%	6%
Total	3209	7810

Table 2

The Frequency of Basic Schemas in Each Genre

Genre	Basic Schemas						Total
	Containment		Path		Force		
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Literary	108	22	255	52	130	26	100
Scientific	298	56	153	29	80	15	100
Total	406	40	408	40	210	20	100

Table 2 shows that all three schemas have been used in the corpus. Containment schema is the most commonly used schema in scientific texts with 56%, and path schema is the most commonly used schema in literary texts with 52%. Force schema with 15% and containment schema with 22% are the least commonly used schemas in scientific and literary genres, respectively. Figure 1 shows the proportion of each schema in the whole corpus: containment schema with 40%, path schema with 40%, and force schema with 20%.

Figure 1

The Percentage of Basic Schemas in the Whole Corpus

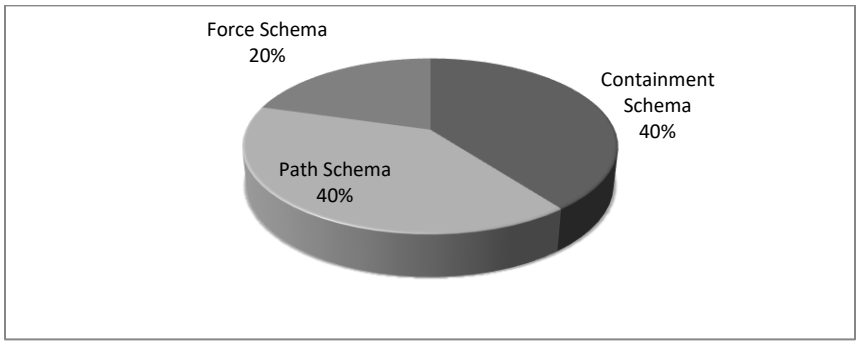
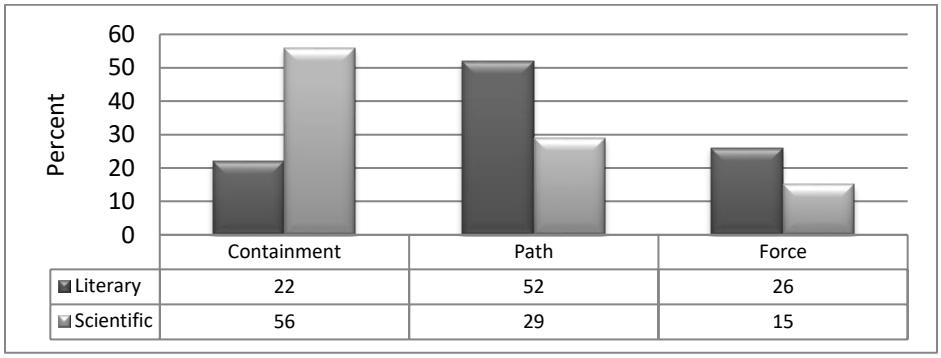


Figure 2 shows the distribution of basic schemas in scientific and literary genres.

Figure 2

The Distribution of Basic Schemas in Scientific and Literary Genres



According to figure 2, the frequency of containment schema is 22% in literary texts and 56% in scientific texts, the frequency of path schema is 52% in literary texts and 29% in scientific texts, and the frequency of force schema is 26% in literary texts and 15% in scientific texts.

Below are some examples of each schema in both genres:

Containment Schema

۱. اساس تجزیه خوشه‌اي ژنوتیپ‌ها در سه گروه قرارگرفتند.

Cluster analysis of genotypes is placed in three groups.

۲. مطالعات گسترده‌اي برروي میان‌کنش نانوذرات با پروتئین‌ها انجام شده است.

There are extensive studies on the interaction of nanoparticles with proteins.

۳. واعظ جلیلی درتحقیقي درسال۲۰۱۱روي هزار نمونه خون اهداء شده آزمون انجام داد.

In a study in 2011, Vaez Jalili examined 1000 samples of donated blood.

٤. بنابراین افرادی تحت عنوان مثبت کاذب از چرخه اهداءخون خارج نمي‌شوند.

Therefore, people titled as a False Positive do not go out of the donor cycle.

٥. دراین مطالعه يك نمونه خون با بار مشخص ویروس تهیه شد.

In this study, a blood sample was provided with specific virus load.

٦. سر ظهر نرسیده به شهرچرخ ما دوباره پنچر شد.

At noon, near the city, we got a flat.

۷. در لای ترتر ماشین و دود آن از بین رفته بود.

It had been devastated in the middle of cars' Ter-Ter[5] sounds and their pollution.

۸. زیر آفتاب خشک و پوچ می‌نمود.

It appeared dry and hollow under the sunshine.

۹. من در اول چنان خلقم تنگ بود.

First, I was so irritated.

۱۰. اتاق در ظلمت و سکوت فرو رفته بود.

The room was deep in darkness and silence.

Human's physical experiences of containers (locations) shape concepts stored in his/her mind. Such experiences allow him to understand and perceive abstract concepts which are similar in some aspects. In examples 1-10, such experiences will help us to generalize them to abstract immeasurable concepts, such as "interaction", "study", "title", "noon", "cars' Ter-Ter sound", "sunshine", and "darkness and silence". These and other examples of Persian show that in Persian, prepositions potentially and actually play an important role in representing containment schemas and schemas cannot be represented without them.

Path schema

۱۱. تولیدات به دست‌آمده از این منابع، پاسخگوي نیازهاي ژنوتیپ روز افزون نخواهد بود.

The products of these sources will not be able to meet the increasing genotype needs.

۱۲. پایداري این آنزیم‌ها امري ضروري به‌نظر مي‌رسد.

[5] onomatopoeia for rickety cars in Persian

Stability of these enzymes appears necessary.

۱۳. حضور حلال‌هاي آلي درشكل ۳ آمده‌است.

The presence of organic solvents is given in Fig. 3.

۱٤. بعدازگذشت ۳۰ دقیقه نمونه‌ها در مجاورت سوبسترا قرار گرفتند.

After 30 minutes, samples were placed adjacent to the substrate.

۱۵. و حجم نهایی به ۱۰۰ میلی لیتر رسانده شد.

And the final volume was transmitted to 100 ml.

۱٦. و با تعقیب این فکر روبرویش ایستادم.

And by following this thought, I stood in front of him/her.

۱۷. بعد از گذشتن روزها و ساعاتی که در آن حال من و او دیگر وجود نداشتیم.

After the days and hours in which I and he/she didn't exist any longer.

۱۸. به نظر رسید آنچه مرا رنج می‌دهد از او جداست.

It seems what is bothering me is separated from him/her.

۱۹. اما به نظر می‌رسید از پشت شیشه‌ها افتاب به درون اتاق نفوذ می‌کند.

But it seemed that the sunshine behind the glasses is encroaching into the room.

۲۰. در همین حال باد ناله‌ای از عرشه آورد.

Meanwhile, the wind brought a wail from the deck.

Human is able to understand and perceive non-physical movements through his/her own experience of physical movements. This has led to expressions, such as به دست آمده [lit: came on hand; fig: achieved], به‌نظر رسیدن [lit: arrive in sight; fig: seem], در شکل آمده [lit: came in figure; fig: shown in figure], گذشتن ۳۰ دقیقه [lit: passing 30 minutes; fig: after 30 minutes], رسیدن به حجم [lit: arrive to the volume of; fig: transmitted to the volume of], تعقیب کردن فکر [fig: following the thought], گذشتن زمان [fig: passing time], and آوردن ناله [brought a wail] in above examples, which there is not any sign of physical movement in them.

Research shows that in Persian, the combination of a noun phrase with verbs like کشیدن [to draw/to pull], رسیدن [to arrive], بردن [to bear], آمدن [to come], and گشتن [to become] in subject, object, and complement place, forms path schema.

Force schema

۲۱-مکانیسم‌ها و نیروهاي مختلف درگیرند.

Various mechanisms and forces are involved.

۲۲- زیرا این آنزیم‌ها سوبسترای سلولزی را به طور تصادفی از داخل مورد هدف قرار می‌دهند.

Because these enzymes randomly target the cellulosic substrate from inside.

۲۳- همچنین ناکارایی سی‌آتی‌دو مقاومت به نور زیاد را در گیاهان کاهش می‌دهد.

The inefficiency of CAT2 reduces the resistance of plants to high light.

۲٤-آنها گزارش کردند که X در تنظیم بیان WRKY درگیر است.

They reported X is involved in the regulation of WRKY.

۲۵- باعث پایداری آنزیم در مقابل حلال می‌گردد.

It leads to stability of enzyme against solvent.

۲٦- ترسیدم در چشم‌های او با سنگی روبرو شوم.

I feared to face with a stone in his eyes.

۲۷-با تکرار کلمه شما چرا می‌کوشد بین من و خودش دیوار بکشد.

By saying "you" why does he/she try to build a wall between us?

۲۸- در ان لحظه اماده بودم چون دریای دیوانه در مقابل او طغیان کنم.

At that moment, I was ready to revolt against him/her like a mad sea.

۲۹- بغض گلویم را فشرد.

The lump squeezed my throat.

۳۰-میخواستم فریاد بزنم.

I wanted to scream.

The formation of force schema in the human mind is the result of his physical experience in applying forces. In the 21-30 examples, we perceive abstract concepts through such experiences. Regarding the formation of force schema in Persian, the findings show that this phenomenon usually emerges in compound verbs. These compound verbs are appeared in forms of "noun + زدن [to hit]" as in فریاد زدن [to scream], لبخند زدن [to smile], and بانگ زدن [to scream].

Differences in Schemas in Literary and Scientific genre

To answer this question, I examined the data using t-test in SPSS. Using t-test requires normality test. To ensure that my data was normally distributed, I used the Shapiro–Wilk test and Kolmogorov–Smirnov test. The important issue in the inferential statistics section of research is finding a relationship between variables of samples and generalizing that to population. Knowing whether a variable is normally distributed helps us choose relevant correlation and coefficient correlation in our statistical analysis. I used 0.05 as the level of significance to evaluate the null

hypothesis, which assumes that the data is normally distributed. So, if P-value is greater than 0.05, the data is normal (Chou et al., 1998).

Table 3

The Kolmogorov–Smirnov Test

Basic Schemas	Hypothesis	Mean	SD	P-value	Decision
Containment Schema	H_0: P-value $\geq \alpha$ H_1: P-value $\leq \alpha$	10.42	6.9	0.666	Confirmed
Path Schema	H_0: P-value $\geq \alpha$ H_1: P-value $\leq \alpha$	10.058	6.59	0.306	Confirmed
Force Schema	H_0: P-value $\geq \alpha$ H_1: P-value $\leq \alpha$	5.259	5.259	0.124	Confirmed

As you can see in Table 3, the P-value of all three schemas is more than 0.05. Therefore, the distribution is normal, and we could use the t-test to evaluate our hypotheses.

Containment Schema

To examine containment schemas and compare them in literary and scientific genres, I used T-test. We examined our hypotheses at 95% confidence level. The result shows that there is a significant difference between two literary (M=5.4, SD=3/7) and scientific (M=15.5, SD=5/4) genres in using containment schema (t (4.78) = -6.861, p<.05).

Path Schema

I also used the t-test to examine path schemas used in scientific and literary genres at 95% confidence level. The result shows that there is a significant difference between two literary (M=12.4, SD=7/8) and scientific (M=7.6, SD=3/9) genres in using path schemas (t (4.31) = 2.443, p<.05).

Force Schema

I used the t-test to examine force schemas used in scientific and literary genres at 95% confidence level. The result shows that there is no significant difference between two literary (M=6.5, SD=5/3) and scientific (M=4, SD=3/5) genres in using force schemas (t (1.09) = 1.731, p>.05).

The ratio between sentences with and without schema

The corpus contained 20 scientific articles and 20 short stories, and overall, I extracted 11019 sentences. Since the unit of counting was the sentence, and there were an unbalanced number of sentences, I used relative frequency and percentage. The distribution of sentences is shown in Table 4.

Table 4

The Distribution of Sentences with and without Schemas

Genres	Sentences				Total
	Sentences with schema		Sentences without schema		
	Frequency	Percent	Frequency	Percent	
Scientific	531	16	2678	84	100
Literary	493	6	7317	94	100
Total	1024	9	9995	91	100

Figure 3

The Distribution of Sentences with and without Schemas

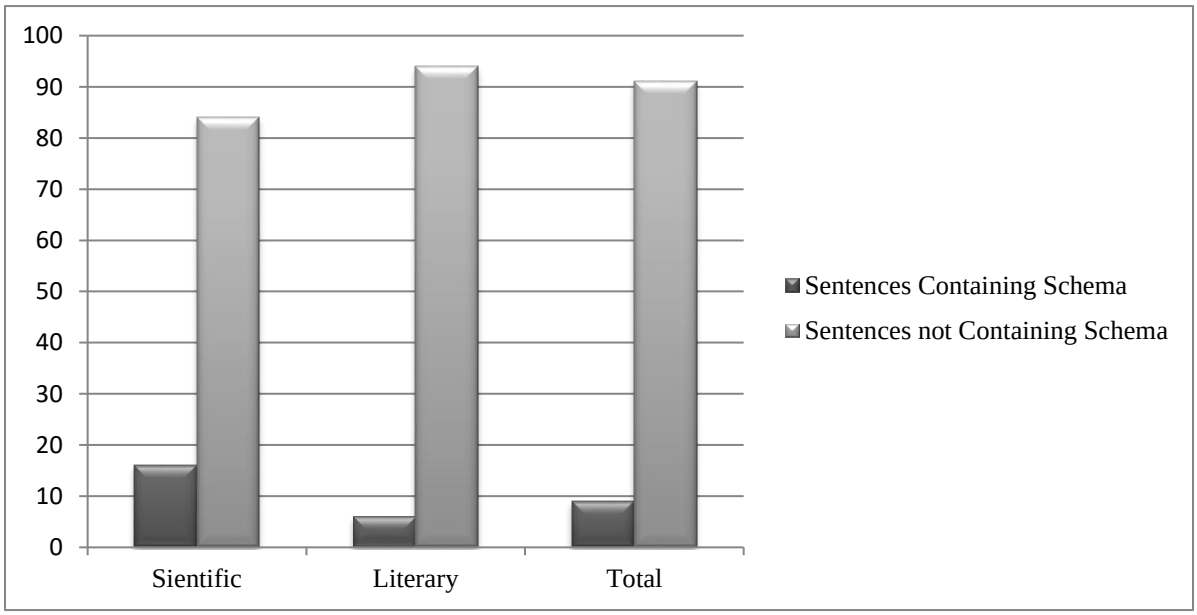
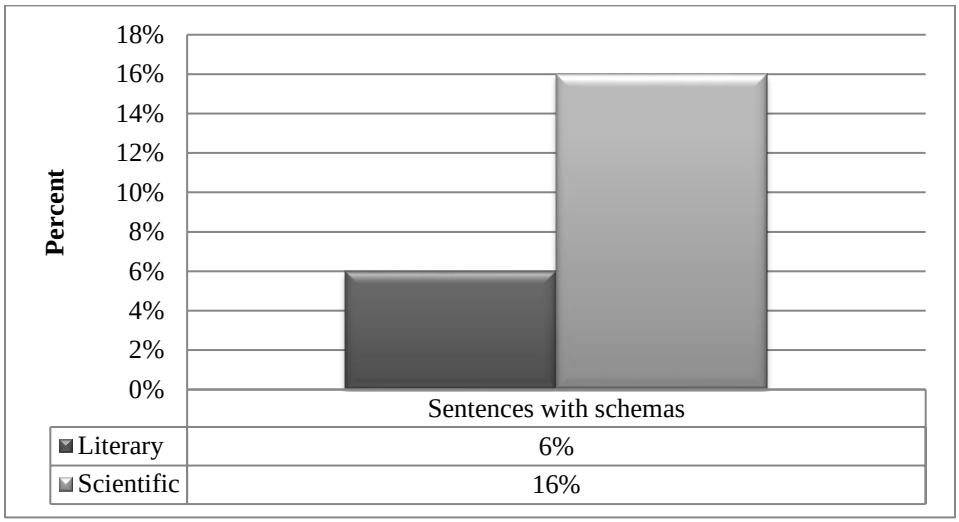


Table 4 shows that the frequency of sentences containing schemas (9%) is less than the frequency of sentences without schemas (91%). In scientific texts, the frequency of sentences containing schema (16%) is more than the ones in literary texts (6%).

Figure 4

The Distribution of Sentences with Schemas in Literary and Scientific Genre



The examination of the difference between sentences with and without schemas.

In the following, I examine whether there is a significant difference between sentences with and without schemas in the whole corpus and in each genre. To evaluate this question, we used Chi-square test.

H_0: There is no significant difference between observed and expected distribution.

H_1: There is a significant difference between observed and expected distribution.

The result shows that there is a significant difference between sentences with and without schemas, $X^2(1, N = 11019) = 7303.643$, $P<.05$. The value of the difference is 0.1, according to the correlation test.

The examination of sentences with and without schema in scientific genre

In this section, I will examine whether there is a significant difference between the sentences with and without schemas in the scientific genre?

H_0: There is no significant difference between observed and expected distribution.

H_1: There is a significant difference between observed and expected distribution.

The result shows that there is a significant difference between sentences with and without schemas in scientific texts, $X^2(1, N=3209) = 1436.463$, $P<.05$. The value of the difference is 0.1, according to the correlation test.

The examination of sentences with and without schema in literary genre

In this section, I will examine whether there is a significant difference between the sentences with and without schemas in the literary genre?

H_0: There is no significant difference between observed and expected distribution.

H_1: There is a significant difference between observed and expected distribution.

The result shows that there is a significant difference between sentences with and without schemas in literary texts, $X^2(1, N=7810) =5962.481$, $P<.05$. The value of the difference is 0.1, according to the correlation test.

Conclusion

In this study, the researcher faced with limited Iranian and foreign sources on cognitive linguistics analysis of scientific and literary texts, especially image schemas. In spite of the limitation, the researcher was able to answer the questions as much as possible. In the first question, the results show that all three basic schemas, despite significant differences between their applications, have been used in literary and scientific texts. The highest frequency belongs to containment and path schema (40%) and the least frequency belongs to force schema (20%). The frequency of basic schemas in literary texts is path schema by 52% of use, force schema by 26% of use, and containment schema by 22% of use.

The results are consistent with those of Veysi (2015) in which there was a significant difference between the rate of image schemas in scientific and literary texts. Image schemas are the basic level of cognitive construction that allows us to link our physical experiences with more complex cognitive domains. Schemas make it possible to understand abstract concepts such as containment, path, and force. In scientific texts, especially the biology texts that I studied, due to many abstract concepts which are difficult to grasp, physical experiences are used to express the abstract concepts. It seems due to many abstract concepts in scientific texts and the difficulty in understanding them, the rate of schemas relatively is higher in these texts than in literary texts.

In respect of the second question, the results show that there is a significant difference between the rate of sentences with (6%) and without schemas (94%). The results are consistent with those of Afrashi, and Naeimi Hashkvaei (2011) and Babasalari (2015).

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