A Comparison of Grammatical Mechanisms of Persian Scientific Language in Physics, Chemistry, Linguistics, and Politics Articles during the Past Three Decades

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Extended Abstract

1. Introduction

According to the studies, the grammatical metaphor has a special significance in the development of scientific writings, and it is one of the most important characteristics of the scientific language. The purpose of this study is to investigate the Persian language based on the systemic functional linguistics framework and it will attempt to answer the fundamental question that how many types of metaphorical processes have been used in the scientific articles in various disciplines including physics, chemistry, linguistics, and political sciences within three decades. The second goal is to compare the results of all four disciplines in different decades, in order to determine the development of these mechanisms in the scientific discourse of the Persian language at different decades.

2. Theoretical Framework

The basic roles of grammatical phenomena according to systemic functional linguistics are described through three meta-functions: ideational (consisting of empirical and logical cases), interpersonal, and textual. The whole model of systemic functional linguistics is based on the relationship and interaction between these three meta-functions. The ideational meta-function has to do with how we construe our human experience in and of reality through language. The interpersonal meta-function views language as interaction. The textual meta-function is concerned with the textual organization of the language. The ideational meta-function relates to the clause through which experience is seen as being encoded in language as processes, participants in these processes and circumstances. Each of these meta-functional representations of language can be expressed through metaphorical expressions. Halliday (2004) considers grammatical metaphor as the most important feature in describing the language of science and emphasizes that many features of the language of science are the result of grammatical metaphor.

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3. Methodology

The present study is a descriptive-comparative study whose structure consists of four sets of research papers related to the fields of physics, chemistry, linguistics, and political sciences.

60 Persian academic articles from reputable journals were chosen for analysis. Each field is divided into the groups of 15 articles and each group is divided into three groups of 5 articles devoted to 1981-2011 in three decades.

First, the number of the occurrence of metaphorical grammatical expressions in each text was determined, and congruent equivalent for each was presented. After analyzing the grammatical metaphors of selected articles in this way, the frequency of occurrence of each type of metaphors was obtained through the division of grammatical metaphors by the total words in the whole text and, accordingly, the average percentage of the use of metaphorical grammatical expressions in each text were assessed. The results of the calculations were compared using independent t-test using SPSS software. In this research, the significance level is less than 0.05.

4. Results and Discussion

Based on these findings, metaphors type (2, 10, 5, and 6) were the most frequent metaphors respectively, and type (7, 11, 4, and 12) were the least frequent ones respectively. Chemistry has the most use of metaphorical mechanisms, and physics, political science, and linguistics are ranked next. In addition, the results, on the one hand, show that the ratio of the general use of the type of grammatical metaphors contained in the experimental texts (chemistry and physics) is significantly more than the human sciences (political science and linguistics). On the other hand, the political science text (human sciences) with the average of 5/07 grammatical metaphors are not much different from the average of 5/09 physics texts (experimental science). In addition, the order of frequency occurrence of different metaphors in this field is the same as physics and chemistry. According to the results, "apparently" there is no direct connection between the scientific nature of a field and the application of metaphor.

5. Conclusion and Suggestions

The finding of present study showed the order of the occurrence of grammatical metaphors in each text was as follow: 2 > 10> 5> 6> 1> 9> 8> 3> 12> 4> 11> 7. In addition, it showed that the order of fields in using the most number of metaphorical processes is as follows: chemistry> physics> political science> linguistics. Findings of the research do not show a direct relation between the scientific nature of these disciplines and the application of grammatical metaphor. In addition there is also no significant difference in the number of grammatical metaphors diachronically.

The findings of this research can be used in determining the promotion extent of the status of Persian language among the international scientific languages, which is one of the eight major objectives in the comprehensive scientific map of the country. In addition, the findings of this research can be used in various fields including

planning, teaching and writing scientific texts to teach the Persian language to non-Persian speakers.

Keywords: Grammatical metaphor, Systemic linguistics, Ideational metaphor

References (In Persian)

1. Assi, M. (2005). دادگان زبان فارسی [*Persian language data*]. Tehran, Iran: Research Institute for Humanities and Cultural Studies.

2. Chavoshi, M. (2011). کارکرد استعاره دستور در زبان علم [*The function of the grammatical metaphor in the language of science*]. (Unpublished master's thesis). Tehran, Iran: Allameh University Tabataba'i.

3. Dehghani, M. J. (2016). خبرگزاری ایسنا [*ISNA*]. News ID: 95111208042- Tuesday 12 Bahman.

4. Imani, R. (2019). زبانشناسی مدرن [Modern linguistics]. Tehran, Iran: Afra.

5. Mehrad, J. (2012). خبرگزاری مهر [*Mehr news agency*]. News ID: 1662231 - Tuesday, August 10

6. Mokaram, M. (2004). تجزیه و تحلیل تعبیرات استعاره دستوری در چارچوب نظریه نقش گرایی هلیدی [*Analysis of grammatical metaphor interpretations within the framework of Halliday's Functionalism Theory*] (Unpublished master's thesis). Shiraz University, Shiraz. Iran.

7. Pourdad, A. (2008). استعاره دستوری در زبان علم فیزیک از دیدگاه نقش گرایی هلیدی: مطالعه موردی زبان کتاب های فیزیک ایران از ۱۳۵۶ تا ۱۳۸۶ [*A grammatical metaphor in the language of physics from Halliday's functionalism perspective: A case study of the language of the books Physics of Iran from 1356 to 1386*]. (Unpublished master's thesis). Islamic Azad University, Central Tehran Branch, Tehran, Iran.

8. Rafiee, A, & Sahraee, R. M. (2013). زبان فارسی زبان علم [Persian *as the language of science*]. Tehran, Iran: National Research Center.

9. Rezapur, E. (2015). تحلیل انتقادی استعاره در گفتمان سیاسی روزنامه های داخلی [A critical analysis of metaphor in the political discourse of domestic newspapers]. *Journal of Linguistics Research*, *7*(1), 12, 49-64.

10. Sana'ati, M. (2007). مفهوم شناسی در واژه سازی زبان فارسی [Conceptualization *in Persian's word formation]* (Unpublished doctoral dissertation). Allameh Tabatabaei University, Tehran, Iran.

11. Sayfouri, N., Rezaei, A. A., & Hosseini, F. (2015). استعاره دستوری در مقالات پژوهشی پزشکی: بررسی مقایسه ای مجلات ایرانی به زبان انگلیسی و مجلات انگلیسی / ایرانی [Grammatical metaphor in medical research articles: A comparison of Iranian journals in English and English/Persian journals]. *Journal of Alzahra University*, *8*(19), 103-122.

12.Shariatzadeh, M. (2009). بررسـی نحوگونه های گفتاری و نوشـتاری زبان علم فارسـی بر مبنای [فرانقش اندیشـگانی هلیدی *The study of spoken and written syntaxes of the language of Persian science based on Halliday's ideational metafunction*] (Unpublished master's thesis). Al-Zahra University, Tehran, Iran.

References (In English)

1. Banks, D. (2008). *The development of scientific writing: Linguistic features and historical context*. London, England: Equinox.
2. Baratta, A. M. (2010). Nominalization development across an undergraduate academic degree program. *Journal of Pragmatic*s, 42, 1017-1036.
3. Biber, D, & Victoria, C. (2002). Historical shifts in modification patterns with complex noun phrase structures: How long can you go without a verb? In T. Fanego, M. J. López-Couso, & J. Pérez-Guerra (Eds.), *English historical syntax and morphology* (pp. 43-66). Amsterdam, Netherlands: John Benjamins.
4. Biber, D. & Gray, B. (2010). Challenging stereotypes about academic writing: complexity, elaboration, explicitness. *Journal of English for Academic Purposes (9),* 2-20.
5. Biber, D. (2009). Are there linguistic consequences of literacy? Comparing the potentials of language use in speech and writing. In D. Olson, & N. Torrance (Eds.), *Cambridge handbook of literacy* (pp. 75-91). Cambridge, England: Cambridge University Press.
6. Biber, D., & Bethany, G. (2011). Grammatical change in the noun phrase: The influence of written language use. *English Language & Linguistics, 15(2),* 223-259.
7. Dian, Y. (2011). Enhancing texts written language characteristics through grammatical metaphor in research articles. *E proceeding of International Online Language Conference. Vol. 2*. P. 258- 265.
8. Farahani, A. A., & Hadidi, Y. (2008). Semogenesis under scrutiny: Grammatical metaphor in science and modern prose fiction. *Iranian Journal of Applied Linguistics, 11*(2), 51-82.
9. Hadidi, Y. & Raghami, A. (2012). A comparative study of ideational grammatical metaphor in business and political texts. *International Journal of Linguistics,* *4*(2), 348- 365.
10. Halliday, M. A. K., & Martin, J. R. (1993). *Writing science: Literacy and discursive power*. London, England: The Falmer Press.
11. Halliday, M. A. K., & Matthiessen, C. (2004). *An introduction to functional grammar* (3rd Ed.). London, England: Arnold.
12. Halliday, M. A. K., & Matthiessen, C. M. I. M. (2006). *Construing Experience through Meaning*. A Language-based Approach to Cognition. London, New York: Continuum
13. Halliday, M.A.K. (2004). *The language of science*. London, England: Continuum.
14. Holtz, M. (2009). Nominalisation in scientific discourse: A corpus- based study of abstracts and research articles. Lancaster University Centre, Department of

Linguistic and Literary Studies, English Linguistics,Technische Universität Darmstadt. Available at holtz@linglit.tu-darmstadt.de.

15. Kazemian, B. (2013). Ideational grammatical metaphor in scientific texts: A Hallidayan perspective. *International Journal of Linguistics, 5*(4), 146-168.

16. Mahbudi, A., Mahbudi, E., & Amalsaleh, A. (2014). A Comparison between the Use of Nominalization in medical papers by English and Iranian writers. *International Journal of Applied Linguistics & English Literature*.Vol. 3 No. 6, 1. *6.*

17. Martin, J. R., & Rose, D. (2007). *Working with Discourse: Meaning beyond the Clause*. London, England: Continuum.

18. Susinskiene, S. (2009). Textual functions of nominalizations in English scientific discourse. *Žmogus ir žodis*, *11*(3), 58-64.

19. Taverniers, M. (2006). Grammatical metaphor and lexical metaphor: Different perspectives on semantic variation. Retrieved from http:// users. ugent. be/ ~mtaverni/ publications.html

20. Ventola, E. (1996). Packing and unpacking of information in academic texts. In E. Ventola & A. Mauranen (Eds.), *Academic Writing. Intercultural and Textual Issues*, *Pragmatics & Beyond* (pp. 153-194). Amsterdam: John Benjamins Publishing.

21. Wenyan, G. (2012). "Nominalization in medical papers: A comparative study". *Studies in Literature and Language*, *4*(1), 86-93.writing: Complexity, elaboration, explicitness. *Journal of English for Academic Purposes.*