

# The Development of Vocabulary and Syntax through Translation

Liu Jing and Wang Lin

**Abstract**—Dynamic System Theory (DST) can be applied in second language acquisition. This paper, from the perspective of DST, examines the development of vocabulary and syntax through translation. The analysis of three postgraduate students' performances in College English Test Band 6 (CET 6) translation shows that the lexical and syntactic performances are variable, unpredictable and non-linear. In order to increase the validity of the result, three English major postgraduate students in Qingdao University of Science and Technology were invited to be raters. And the result shows that the growth of translation performance is variable, unpredictable and non-linear, which is corresponding to the result assessed by [www.pigai.org](http://www.pigai.org).

**Index Terms**—Dynamic system theory, translation, vocabulary and syntax development

## I. INTRODUCTION

Since 1980s, complexity, accuracy and fluency have become one of the hot spots in second language acquisition (SLA). Most of the researchers investigated learners' second language knowledge and level through complexity, and the relationship between complexity and other two variables. Complexity is often investigated from the perspective of vocabulary and syntax, in which the study of lexical complexity is more in-depth and has reached a certain consensus, while the study of syntactic complexity is more chaotic [1].

DST is about the change of systems over time. Systems change through interaction with their environment and internal reorganization [2]. It is a new perspective to apply in second language acquisition. The significance of dynamic system theory is to regard language as a complex and open dynamic system [3]. It provides a brand-new method and perspective for us to observe and study the essence of language development at the theoretical and methodological level. It regards variability as the research focus and looks at language development more comprehensively, which enriches our understanding of language development [3].

Although the research of dynamic system is very important in the field of second language acquisition today, most of its main results come from western countries such as America. With the gradual development of relevant research in recent years, a number of theoretical and empirical researches on applying dynamic system theory to the specific practice of

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Liu Jing and Wang Lin are with the School of Foreign Languages, Qingdao University of Science and Technology, Qingdao, CO 266061 China (e-mail: rogerliu99@126.com, 498399349@qq.com).

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second language acquisition have been developed, and some in-depth and valuable results have been obtained.

## II. LITERATURE REVIEW

According to the theoretical and empirical researches on translation and DST, with the help of CiteSpace.v. 5.3. R4, 372 papers were selected and analyzed.

CiteSpace, which was created by Chaomei Chen, a professor of Informatics at Drexel University, Philadelphia, can help the researcher better understand the scientific literature of a certain topic. It saves time and lets the researcher concentrate on the most important and critical information. The important feature of CiteSpace is that the researcher can directly see the hot spots of science study change over time, incrementally or drastically. The development of science research can be extracted from published literature through tracks.

The research condition “subject=翻译中的词汇 (vocabulary in translation) or subject=翻译中的句法 (syntax in translation) or subject=翻译中的词汇句法 (vocabulary and syntax in translation), source categories=CSSCI & 核心期刊(Core Journals)” was input in CNKI and searched on August 21st, 2019. As a result, the number of literature data that are relative to our study totals 182 records from 1993 to 2019. Fig. 1(a) shows the analysis of keywords in the data. It shows that there is a heated discussion around translation, machine translation, translation strategy and statistical machine translation.



Fig. 1(a). The map of translation literature.

Hai Fang (2003) described the lexical strategy in translation from Chinese to English in Test for English Major Band 8 (TEM 8). It analyzed the reason and characteristics of the strategy, examining translation process and the

enlightenment to English teaching [4]. Luo Jimei and Li Mei (2012) described typical forms of error in the machine translation of words, syntax, symbols, etc [5]. Wang Yue and Zhang Jijia (2017) observed the process of cross-language recognition of different types of ambiguous words by Chinese English learners, investigated through psycholinguistic experiments. And it showed complexity and flexibility of lexical acquisition process in second language learning [6]. Yang Zhiting (2019) compared impersonal constructions used both in English and Chinese languages and gave birth to a significant enlightenment for scientific translation [7]. From these literature and the map of translation, we can see that it is from the perspective of DST that few researchers observe lexical and syntactic growth in translation.



Fig. 1(b). The map of dynamic system theory literature.

And then, the research condition “subject=动态系统理论 (DST), source categories=全部来源 (All Journals)” was input in CiteSpace and searched. After selecting, the number of literature data which are relative to our study totals 190 records. Fig. 1(b) is about keywords in this field. It can be seen that dynamic system theory, second language acquisition, language attrition and foreign language teaching are hot spots in this field.

Li Fangfang and Guan Lijuan (2009) examined that language attrition is the typical representation of dynamic system theory and language transformation and language interference are generated from the perspective of dynamic system theory [8]. Zheng Yongyan (2011) proposed the new directions of the development of second language acquisition from the perspective of dynamic system theory with the empirical study of the development of the second language vocabulary. Fang Hong and Wang Kefei (2014) studied translation teaching models based on translation competence development with the DST [9]. Jiang Weishan and Wang Tongshun (2015) examined the dynamic development of syntactic representation in second language writing. Ning Jiangeng and Cai Jinting (2019) designed a case study of directional flow from the perspective of dynamic system. The result indicates that the DMC (Directed Motivational Currents) construct captures a unique form of motivation worthy of investigation on the individual and group levels [10]. From these literature and the map of DST, we can see that it is in translation that few researchers observe lexical and syntactic growth from the perspective of DST.

Dynamic system theory fits the dynamic characteristics of the development of translation competence, and has a

practical explanatory power for the composition and development of translation competence. It has a broad research space and prospect in the field of translation ability research, and is of great significance to translation studies and translation teaching practice [11].

### III. THEORETICAL UNDERPINNINGS

Theories which applied in this paper includes DST and lexical and syntactic complexity.

#### A. DST

Dynamic Systems Theory (DST), originally used to describe the behavior of complex dynamical systems in applied mathematics, has been applied to several disciplines such as physics, biology and more recently to social sciences. In 1997 Larsen-Freeman published her oft-cited and pioneer work entitled *Chaos/Complexity Science and Second Language Acquisition* which made her the first researcher to study second language acquisition from a DST perspective. Larsen-Freeman (1997) characterized dynamic systems as “dynamic, complex, nonlinear, chaotic, unpredictable, sensitive to initial conditions, open, self-organizing, feedback sensitive, and adaptive”.

The main characteristics of dynamic systems and their application in the study of second language development (SLD) have been discussed extensively in various publications (de Bot, Lowie & Verspoor 2007; Dornyei 2009; Larsen-Freeman & Cameron 2008; Verspoor, de Bot & Lowie 2011; Daniel J. Olson 2019). It may be useful to briefly mention the main characteristics of dynamic systems as far as relevant for SLD [12].

#### B. Vocabulary and Syntax Complexity

In addition to DST, vocabulary and syntax complexity have been developed by researchers these years.

In recent years, the scholars have done a large number of empirical studies on the multi-dimensional vocabulary knowledge, and the non-linear path of the development of the vocabulary is confirmed from each side. At the macro level, the receptive vocabulary and the output vocabulary development are not synchronized (Laufer 1998; Liu Shaolong 2001). The productive vocabulary is at a certain stage, which is subject to a stagnant vocabulary plateau (Laufer & Paribaht 1998; Cui Yanqing & Wang Tongshun 2006; Tan Xiaochen 2006; Wen Qiufang 2006); at the micro level, the development of various dimension knowledge of the word (including word meaning, synonyms, collocation, etc.) development is not synchronized (Schmitt 1998; Wu Xudong & Chen Xiaoqing 2000; Liu Shaolong 2001), and will experience a number of semi-stable states (Churchill 2008), while the development of the aggregate and combined semantic relations in the second language psychological lexicon is unbalanced and not symmetrical (Wolter 2001; Zhang Shanshan 2006; Zhang Ping 2010), the path of which presents a certain U-shape (Zhang Shujing 2008; Fu Yuping 2009; Liu Zhifang, Zhang Zhijun, Yang Guifang 2016). The rich research results show that the development of vocabulary is not a constant linear process [13].

In the field of syntax, most studies on writing development have utilized quantitative measurements such as average

length of structural units or the extent of clausal subordination. Researchers assumed that longer units and more subordination reflect greater complexity. A large percentage of these studies has relied on the construct of T-unit: “one main clause with all subordinate clauses attached to it” (Hunt, 1965, p. 20). The two most frequently used measures have been the mean length of T-unit (MLTU) (e.g., Larsen-Freeman, 1978, 1983; Ishikawa, 1995, Henry, 1996), which is the average across all T-units in a text, and clauses per T-unit (C/TU) (e.g., Flahive & Snow, 1980; Bardovi-Harlig & Bofman, 1989; Hirano, 1991; Bao Gui 2010; Wu Xue & Lei Lei 2018; Hou Junxia & Chen Zuanzuan 2019), which is the number of dependent clauses per T-unit [14].

#### IV. METHODOLOGY

After analyzing the literature and theories, this part is an introduction to methodology of the paper. This longitudinal case study investigated three postgraduate students’ translation development---specifically the development of lexical and syntactic devices---by adopting the dynamic systems theory.

##### A. Research Questions

This study answered the following two research questions.

1. Did the translators’ performance evolve in terms of lexical complexity over a month period?
2. Did the translators’ performance evolve in terms of syntactic complexity over a month period?

##### B. Participants

Three postgraduate students who are studying at different universities are non-English majors. They were invited and volunteered to this study. They are in the same age group, in different universities, in different genders and all passed CET 4 (College English Test Band 4). The participants have to pass CET 6 in order to graduate.

The participants took part in one-hour lesson twice a week from 15<sup>th</sup> July to 9<sup>th</sup> August, totally four weeks. The objective of the course is to develop students’ four basic language skills, i.e. writing, speaking, listening and reading skills, and translation skill. It is important to note that none of the skills was emphasized more than the others during the course.

The first participant in the study, Amy (a pseudonym) is 25. She passed CET 4 in 2010. Amy started her postgraduate studies in 2017 at a university in Hebei Province. She has been learning English about 15 years. According to her, she has difficulty with vocabulary because she often forgets the meaning of the new or difficult words.

The second participant in the study, Alex (a pseudonym) is 27. He passed CET 4 with only 425 in 2012. He has been studying English for 17 years. He pointed out that his spoken English and listening are worse than his grammar and syntax.

The third participant in the study, Sara (a pseudonym) is 26. She passed CET 4 in 2010. Sara started her postgraduate studies in 2017 at a university in Beijing. She has been learning English for around 15 years.

Table I shows a summary of the participants’ profile.

##### C. Instruments

The data for the study were participants’ translation from

Chinese to English which were collected at 8 points (T1, T2, T3, T4, T5, T6, T7 and T8) over the one-month period. Eight CET 6 translations that were selected from the CET 6 past exams were used to collect data.

TABEL I: PARTICIPANTS’ PROFILE

	Amy	Alex	Sara
Gender	Female	Male	Female
Age	25	27	26
L1 background	Chinese	Chinese	Chinese
Length of learning English	15	17	15
Level of English language proficiency	CET 4	CET 4	CET 4

##### D. Data Collection

Each participant translated 2 paragraphs per week after every class. The requirement is to translate as close as possible to the original text. The participants could use dictionaries to help their translation but they had to mark the words they looked up in the dictionary.

TABEL II: THE TIME FRAME OF TRANSLATION

T1	16th, July	Translation 1
T2	19th, July	Translation 2
T3	23th, July	Translation 3
T4	26th, July	Translation 4
T5	30th, July	Translation 5
T6	2nd, Aug.	Translation 6
T7	6th, Aug.	Translation 7
T8	9th, Aug.	Translation 8

##### E. Analysis

The analysis were dealt with from both macro- and micro-level perspectives. At the macro-level, quantitative measures were used to explore how the system changes and organizes over time. At the micro-level, the participants’ performances were examined qualitatively.

www. pigai. org is a website to evaluate the quality of writing. It is an online service based on cloud computing for automatic correction of English composition. By calculating the distance between students’ composition and standard corpus, the score of students’ composition and the results of language and content analysis are generated immediately. And it can also be used to evaluate translation results. It was chosen to analyze the syntactic and lexical features of Chinese to English translation.

##### F. Evaluation by Raters

In order to ensure the validity, three translation raters, Annie, Jimmy and Lillian, who are English major postgraduates in Qingdao University of Science and Technology were invited. They have passed TEM 8 and they were willing to be raters. During 30th August to 31st August, the three raters were required to evaluate the same sample translation according to CET 6 translation assessment standards (See Appendix) which involve the evaluation of lexical and syntactic performances and came to an agreement on the rating standards through discussion. Then they gave 24 translation scores during 1st September to 5th September.

V. RESULTS AND DISCUSSION

This part mainly presents and analyzes the research results.

A. Lexical Development

The different trajectories in Fig. 2 clearly reflect the inter-individual variability. These three subjects' performances show stability and the scores are often very high.

From calculating variance, it can be seen that Amy's lexical performance is the most stable among the three's. Through marked words, Amy's lexical performance shows that it is difficult for her to remember or know the words which are long, ambiguous or at low frequency. Alex's performance in vocabulary fluctuates obviously and the variance score is the highest. His lexical performance shows that although his vocabulary is large, the usage of words is difficult for him to grasp, for example, "pay" instead of "pay for". Sara's variance score is in the middle. The number of her marked words is fewer than Amy's and more than Alex's. She is good at using words appropriately. In a word, Sara's lexical performance is solid from the perspective of vocabulary and word usage.

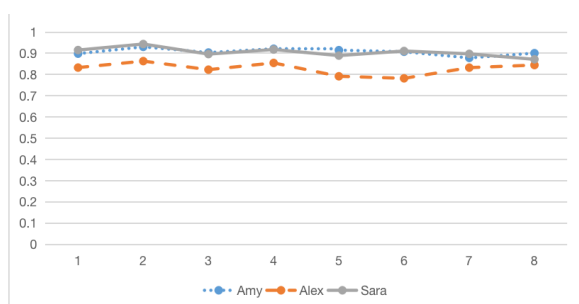


Fig. 2. Individual growth in vocabulary.

B. Syntactic Development

The different trajectories in Fig. 3 clearly reflect the inter-individual variability. Some individual performances show regression, progress, and others remain unchanged over time.

From calculating means, Alex's syntactic score is higher than Amy's and Sara's. He is good at using subordinate clauses, for example, attributive clause and causal clause. But at the beginning, he always neglected the usage of punctuation and many sentences appeared more than one predicates so that the researcher could not understand the meaning quickly sometimes. With correcting and reminding, he had subconsciousness about the usage of punctuation and improved it in T4, T5, T6 and T7. Amy's syntax performance is simple and sentences are often short. She is not good at using subordinate clauses. After T2, she paid attention to this and did better in T4, T5 and T6, for example, "Compared with the airplane, the outstanding advantage of the CRH train is punctuality, because it is basically not affected by weather or traffic control." in T5. Sara's mean of syntactic score is the lowest one. Although she sometimes used inverted sentences, her sentences were always characterized by Chinese word order. From the perspective of variance (TABLE III), Amy is the best, that is, Amy's syntactic performance is stable and Sara's syntactic performance stability is the worst.

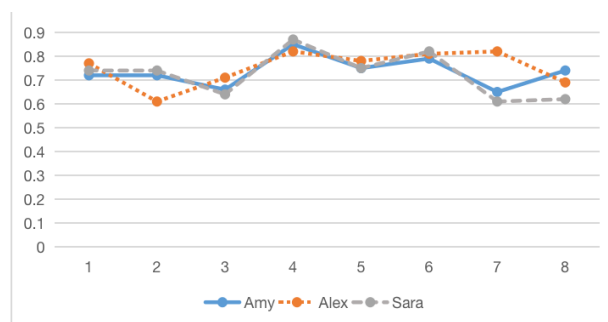


Fig. 3. Individual growth in syntax.

TABLE III: INDIVIDUAL VARIANCE

	Amy	Alex	Sara
Variance	0.004	0.005	0.008

The above Table III and Fig. 3 show that the performance is unpredictable and nonlinear: scores in syntactic are not always very high or low and at the second time, scores are not always the same with or higher than the scores at the first time; progress and decline coexist at the same time, that is, scores do not always rise linearly and decline linearly.

C. Comparison in Individual

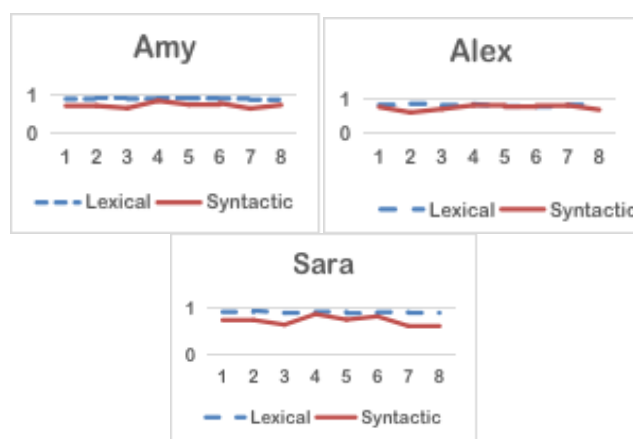


Fig. 4. Lexical and syntactic performance among individuals.

Through comparing lexical and syntactic performances in individuals, Fig. 4 shows that these three subjects' lexical performances are often better than syntactic performances. But for Alex, in T5 and T6, syntactic performance is nearly the same with, even better than lexical performance. Syntax growth and vocabulary growth are not synchronous, that is, when lexical performance is improved, syntactic performance does not always change with lexical performance at the same time and when syntactic performance is declined, lexical performance does not always change with syntactic performance at the same time. For example, for Sara, lexical performance is stable and in T4, and syntactic performance is better than T3 but lexical performance is nearly the same with syntactic performance.

D. Evaluated by Raters

Fig. 5 shows scores given by three raters. It shows that the growth of scores is variable, unpredictable and non-linear. Amy, Alex and Sara's performances of growth shows no

obvious regularity. They sometimes got a lower score and sometimes got a higher one. But the fluctuation is within limits and does not have too much ups and downs. It is not sure that they will always make progress or fall behind.



Fig. 5. Raters' evaluation among individuals

TABLE IV: CORRELATION COEFFICIENTS AND ALPHA OF SCORES AMONG RATERS

	Annie/Jimmy	Annie/Lillian	Jimmy/Lillian	Alpha among raters
Amy	0.827*	0.926**	0.873**	0.947
Alex	0.882**	0.864*	0.972**	0.959
Sara	0.816*	0.843**	0.885**	0.926

\*\*Correlation is significant at the .01 level (2-tailed)

\*Correlation is significant at the .05 level (2-tailed)

In TABLE IV, the correlation coefficients of scores among three raters are all over 0.80 and are statistically significant. And internal consistency among raters is very well in that Alpha are all over 0.9.

## VI. CONCLUSIONS AND LIMITATIONS

The research shows that the subjects' lexical and syntactic performances change over a period of time. However, the change is variable, unpredictable and non-linear. That is, lexical and syntactic performances can be improved and can also be declined and whether improved or declined is not predictable. In a word, the growth is often a kind of curve whose camber is large or small sometimes. For each subject, his or her lexical and syntactic performances is also variable, unpredictable and non-linear. That is, the relationship between lexical performance and syntactic performance is not positive correlation relation and not reverse relation. This result confirms the dynamic system theory and makes the theory more explanatory.

The results of dynamic system theory in the field of translation reveal the development of vocabulary and syntax, which has important implications for and influences on the study of translation ability development. The dynamic system theory fits into the dynamic characteristics of the development of translation ability, and has a practical explanatory power for the development of translation ability. It has a broad research space and prospect for the study of translation ability, and is of great significance to the second language learners and the practice of translation teaching.

In addition, this research also has limitations. On the one hand, www. pigai. org is better for writing assessment, and

for evaluating translation, it doesn't reflect the accurate degree between the original Chinese and English translated version. On the other hand, the duration of this study is only one month. It may be, to some extent, incomplete.

## APPENDIX

### CET 6 Translation Standards

Levels	Evaluation Standards
13-15	The translation accurately expresses the meaning of the original text. The words are appropriate, the writing is fluent, and there are basically no language errors, only a few minor mistakes.
10-12	The translation basically expresses the meaning of the original text. The text is smooth, coherent, and there are no major language errors.
7-9	The translation barely expressed the meaning of the original text. The words are not accurate and there are a lot of language mistakes, some of which are serious language errors.
4-6	The translation expresses only a small part of the meaning of the original text. The use of words is inaccurate and there are quite a lot of serious language errors.
1-3	The translation is fragmented. Except for individual words or sentences, most of the text does not express the original meaning.
0	There are only a few isolated words, or the translation has nothing to do with the original text.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## AUTHOR CONTRIBUTIONS

Wang Lin collected the data and Liu Jing wrote the paper ; all authors had approved the final version.

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**Liu Jing** was born in Qingdao, China in 1974. He received his M. A. degree in foreign linguistics and applied linguistics from Ocean University of China, in 2006.

He is currently a professor at the School of Foreign Languages, Qingdao University of Science and Technology, Qingdao, China. His recent works include *The Studies on the Development of Learners' Multi-competence in Multimodal Foreign Language Classrooms*, Shandong University Press, Jinan, China, 2018. etc. His research interests are applied linguistics, multimodal discourse analysis and translation.

Professor Liu is currently a member of College Foreign Language Education Committee in Shandong Province, China.

**Wang Lin** was born in Shanxi province, China in 1994. She is a postgraduate student from the School of Foreign Languages, Qingdao University of Science and Technology.

Her recent work was *The New Trend of Textbook-Review of The Palgrave Handbook of Textbook Studies*.