The Impact of Task Repetition on Second Language Oral Development from a Complex Dynamic Systems Perspective: The Co-evolution of Fluency and Syntactic Complexity

Tang Lulu

School of English Studies，Xi’an International Studies University，Xi’an Shaanxi China，710000；

Abstract: This study applies complex dynamic systems theory to examine how task repetition affects L2 oral fluency and syntactic complexity and their co-evolutionary relationship. An experiment was designed to compare learners’ oral performance under varying task repetition conditions, with measures including speech rate, pause frequency, and grammatical structure diversity. Results indicate that task repetition significantly enhances both fluency and syntactic complexity; however, their co-evolution follows a nonlinear trajectory, mediated by learners’ proficiency and task type. The study underscores the pedagogical value of task repetition in L2 oral instruction and proposes further investigation into its long-term mechanisms across different languages and learner populations.

Keywords: Complex Dynamic System; fluency; syntactic complexity; second language oral development

DOI： 10.69979/3041-0843.26.01.052

Introduction

With the acceleration of the globalization process, the demand for second language learning is increasing, and the research on the development of second language oral skills is also deepening. In recent years, the introduction of Complex Dynamic Systems Theory has provided a revolutionary perspective for understanding the nature of second language development (Larsen-Freeman, 1997). This theory holds that second language development is a complex, dynamic, and nonlinear process, in which various variables within the system (such as cognition, society, emotion, and language resources) interact continuously and exchange energy and information with the environment (such as teaching tasks), jointly promoting the system to evolve towards a new state (de Bot, Lowie, & Verspoor, 2007). Under this theoretical framework, language development is no longer a linear accumulation along a single path, but a unique trajectory that individuals show in specific situations. This review aims to sort out the relevant research in the three core areas of Complex Dynamic Systems Theory, task repetition, and oral fluency and syntactic complexity, to argue the necessity of examining how task repetition affects oral development from a dynamic and synergistic perspective, and thus to clarify the theoretical positioning and value of this study.

1 Literature Review

1.1 The Core Tenets of Complex Dynamic Systems Theory and Their Methodological Implications

Originally, Complex Dynamic Systems Theory (CDST) started as a branch of theoretical mathematics with its initial aim to model the development of complex systems (de Bot & Larsen-Freeman, 2011). In terms of terminology, it equates to Dynamic Systems Theory, Complex Adaptive System Theory, Complexity Theory, and Chaos Theory. CDST is part of the study of systems, in which systems are studied as a whole rather than with a focus on separate parts (de Bot, 2008). Dynamic systems are systems that change over time. All variables within the system are interrelated indeed and may interact with each other as well as the environment. The changes are considered as development which is represented as trajectories in the state space. In1997, Larsen-Freeman pioneered the introduction of the concept of CDST into the field of applied linguistics. However, the term Complexity Theory was used Larsen-Freeman and her colleagues, whereas Groningen employed Dynamic Systems Theory. Since it may be conceptually clearer to have just one label, de Bot (2017) recommended the term Complex Dynamic Systems Theory, which has now been a widely-used term in applied linguistics.

And the core principles of Complex Dynamic Systems Theory (CDST) provide a powerful meta-theoretical framework for re-examining second language development. First, the system is characterized by sensitivity and self-organization. Small initial differences or environmental perturbations (such as different task instructions) can lead to completely different developmental trajectories. Meanwhile, the system can spontaneously reorganize itself through interaction with the environment to form new stable patterns (attractors) (Verspoor, de Bot, & Lowie, 2011). Second, development is nonlinear, manifesting as plateaus, leaps, and even temporary regression, which is completely different from the traditional linear progress view. Baba and Nitta’s (2014) research on writing fluency clearly demonstrated the “phase transition” process of development, that is, long-term stagnation may accumulate energy for a qualitative leap. Last but not least, the point of greatest concern in this study is the dynamic interaction between subsystems. Fluency, complexity, accuracy, and other language dimensions do not develop independently. Instead, they compete, cooperate, or compromise with each other in cognitive systems with limited resources, such as working memory, forming dynamic coupling relationships (Skehan, 2009). Spoelman and Verspoor’s (2010) classic longitudinal case study of Finnish acquisition vividly showed the dynamic swings between complexity and accuracy through “mobile correlation” analysis, which powerfully confirmed the predictions of CDST. Therefore, to understand the development of oral proficiency, it is necessary to abandon the isolated measurement of a single dimension and instead examine the diachronic interaction patterns between multiple dimensions.

1.2 Task Repetition: An Effective Intervention in Driving the Evolution of Oral Language Systems

Tasks are important concepts and components of curriculum design and classroom teaching. Many researchers have defined tasks from different perspectives. Ellis (2003) pointed out that tasks can be understood at two levels: tasks in the context of teaching and tasks in the context of research. The difference between the two types of tasks is that the former focuses more on pre-task, during - task and post-task activities, which usually follow a teaching sequence. The latter is usually associated with tasks conducted in a laboratory environment, which is distinctly different from those in a classroom environment (Nassaji 2012). In subsequent research, Ellis (2009) defined a task as a meaning-focused teaching activity, in which learners need to draw on their linguistic and non-linguistic resources for communication. Specifically, a task is an activity that allows learners to perform actions such as classifying, ordering, problem-solving, storytelling, and giving advice (Willis & Willis 2008). Later, Van den Branden (2016) defined tasks in teaching and learning environments as purposeful activities carried out through meaningful language.

Bygate's (2001) pioneering research indicates that when learners first perform a task, their cognitive resources are primarily devoted to conceptual construction and information organization (at the content level). During repeated task performance, as the content becomes more familiar, the freed-up cognitive resources can be redirected to online monitoring, restructuring, and experimenting with language forms, which may enhance the complexity, fluency, and accuracy of language production. Domestic scholars have also explored the impact of task repetition on learners' writing performance. Among them, most studies focus on the repetition of the same task, with less attention paid to the repetition of procedural tasks. Bei Xiaoyue (2004) conducted an eight - week experiment to investigate the effects of teacher feedback and repetition of the same task on the writing quality and fluency of junior high school students with different second language (L2) proficiency levels. The results showed that the first repetition significantly improved the writing quality of the compositions and also had a positive impact on writing fluency. Zhou Dandan (2011) explored the impact of repetition frequency on L2 writing by conducting three repetitions of the same task with 20 undergraduate students. She found that the students made numerous revisions to their compositions, including in terms of content, structure, grammar, and vocabulary, which played an important role in improving writing quality. It can be seen that under the influence of task repetition, the subjects made significant progress in each writing attempt. In addition, Lei Pengfei and Xu Jinfen (2018), based on the dynamic systems theory, found through a two - month teaching experiment that task repetition significantly promotes the lexical complexity, syntactic complexity, and accuracy of academic English writing, but fluency shows a downward trend.

From the perspective of Cognitive Developmental Systems Theory (CDST), task repetition can be seen as a carefully designed environmental perturbation. By stabilizing the variable of task content, it creates a "safe zone" for learners, allowing their language systems to explore and reorganize themselves under relatively low cognitive load. The repetition process enables learners to experiment with new language forms (promoting complexity) while consolidating existing language routines (promoting fluency). Recent studies, such as those by Lambert and Zhang (2019), further demonstrate that task repetition or iteration can effectively promote learners' cognitive engagement and the quality of language production. Therefore, task repetition provides an excellent "laboratory" for observing how various dimensions of the oral language system dynamically evolve under relatively controlled conditions.

2 Key Dimensions of Oral Language Development

When assessing oral language development, fluency and syntactic complexity are two core dimensions that are often weighed against each other (Housen & Kuiken, 2009).

2.1 Fluency

2.1.1 Definition of Fluency

Lennon (1990) offered a brief definition of fluency, construing it as the capacity to engage with a second language at a pace akin to that of a native speaker. He further posited that fluency encompasses multiple dimensions. Subsequently, Chambers (1997) contended that fluency should encompass a learner’s overall language proficiency, particularly emphasizing the fluency’s qualities such as ease, eloquence, fluidity, and resemblance to native speech or writing. Ellis (2003) expanded this definition to the degree to which language produced in task performance exhibits pauses, hesitations, or revisions”.

2.1.2 Development of Fluency in Oral Language

Fluency predominantly concerns learners’ mastery of their second language, particularly in terms of their speed and ability to access related language information while conveying meanings. Wolfe-Quintero et al. (1998) emphasized that this control improves as learners automatize the process of accessing language. According to Skehan (2009), fluency includes speed fluency, breakdown fluency, and repair fluency. Speed fluency pertains to the pace and density of linguistic elements produced, relying on mechanisms for memory storage and retrieval. Breakdown fluency encompasses factors such as the frequency, duration, and placement of pauses, reflecting the learner’s confidence in the reliability of stored linguistic information. Repair fluency involves handling instances of false starts, linguistic errors, self-corrections, and repetitions, indicating the learner’s ability to deploy strategies for rectification when communication breakdowns occur. Since Skehan (2003) confirmed that these dimensions could contribute to a comprehensive understanding of language fluency, the present study employs this definition.

2.2 Syntactic Complexity

2.2.1 Definition of Syntactic Complexity

Syntactic complexity, on the other hand, refers to the diversity and refinement of syntactic structures in language production, with

commonly used indicators including average T-unit/AS-unit length, clause ratio, etc., reflecting the restructuring and complexification capabilities of the language system (Ortega, 2003).

2.2.2 Development of Syntactic Complexity in Oral Language

In previous studies, many domestic scholars have explored the relationship between syntactic complexity and second language (L2) learning proficiency. When Bao Gui (2009) used unit length and clause density as criteria for measuring syntactic complexity, he found that the growth rate of the unit length index exceeded that of the clause density index during students' writing process. Zhao Junhai and Chen Huiyuan (2012) discovered that the use of non-finite verbs, cohesive devices, and clause complexity would increase with the improvement of learners' writing quality. Xu Xiaoyan et al. (2013) also investigated these two types of variables and found that the unit length and density of the subjects' writing increased with the grade level and writing skill improvement. However, in terms of sentence types, the frequency of simple sentences, adverbial clauses, object clauses, and predicative clauses decreased with the rising grade level. In contrast, the use of reduced clauses and passive sentences increased with the improvement of writing proficiency.

According to Skehan's (2009) Limited Attentional Capacity Model, learners find it difficult to simultaneously attend to multiple dimensions in real-time oral production.

Therefore, there is often a trade-off effect between fluency and complexity: striving for more complex expressions may lead to more pauses and hesitations, and vice versa. When it comes to the second research question, as far as the interaction within or between complexity, accuracy, and fluency is concerned, the moving correlation among four general measurements is analyzed and three types are identified, with the dominant type being the asymmetric relationship at both the group and individual levels, followed by the competitive relationship, and the supportive relationship being the fewest (Kailu Wang, 2024). In other words, the situation in which both two dimensions increase simultaneously is rare.

But the perspective of Cognitive Developmental Systems Theory (CDST) transcends this static, competitive binary view. It predicts that, in the long term, especially through supportive interventions like task repetition, these two subsystems may experience a shift from competition to synergy. For example, as specific syntactic structures become gradually automatized, they can be retrieved more skillfully (enhancing fluency) and also serve as building blocks embedded in more complex structures (enhancing complexity). Existing CDST empirical studies, such as Chan et al.'s (2015) tracking of twins' oral language development, have already shown significant heterogeneity in the developmental trajectories of fluency and complexity among different individuals. However, studies that take task repetition as a clear intervention variable and systematically examine the dynamic co-evolution of these two dimensions are still relatively rare.

3 Summary and the Positioning of This Study

To sum up, existing research has achieved fruitful results: (1) CDST provides profound theoretical insights into second language development; (2) Task repetition has been proven to be an effective teaching method to promote oral language production; (3) Fluency and complexity are key indicators for measuring oral language development, and their relationship is complex. However, there is still a significant gap in the cross-research among the three. Most studies on task repetition still adopt pre-post quasi-experimental designs, focusing on the "average effect" brought by repetition and ignoring the nonlinearity of the developmental process and individual differences. At the same time, although there are CDST studies (such as Spoelman & Verspoor, 2010) that explore the dynamic relationships between language dimensions, research that takes specific teaching interventions (task repetition) as a key environmental factor driving system evolution and longitudinally tracks how it triggers the co-evolution of oral fluency and syntactic complexity is still lacking.

Therefore, based on Complex Dynamic Systems Theory, this study will adopt a high-density longitudinal case study design to deeply explore how the intervention of task repetition affects the co-evolutionary process of fluency and syntactic complexity in the oral language system of Chinese English learners. We are not only concerned with whether repetition is effective, but also committed to revealing the following questions: What are the commonalities and uniqueness in the oral language development trajectories of different learners during task repetition? What kind of competitive, synergistic, or decoupled relationships do fluency and syntactic complexity show in multiple repeated tasks? Does the pattern of their relationship change with development? How does task repetition, as an environmental parameter, trigger the reorganization and phase transition within the oral language system?

By answering these questions, this study hopes to deepen the theoretical understanding of the dynamic mechanisms of second language oral language development, demonstrate how to apply CDST for micro genetic analysis in methodology, and provide empirical-based dynamic insights for the efficient design of oral language tasks in teaching practice.

4 Conclusion

This study, based on the theory of complex dynamic systems, explores the potential impact of task repetition on second language (L2) oral fluency and syntactic complexity. Theoretical analysis suggests that task repetition may enhance L2 oral fluency and promote the development of syntactic complexity by providing multiple opportunities for language output. However, the co-evolution of these two aspects is constrained by various factors. Though there is no empirical data in this study, it offers a theoretical reference for L2 oral teaching. It indicates that teachers may try to use the strategy of task repetition to promote students' oral ability development. Further empirical research can be carried out in the future to verify its effectiveness.

References

[1] Bygate, M. (2001). Effects of task repetition on the structure and control of oral language. In M. Bygate, P. Skehan, & M. Swain (Eds.), Researching pedagogic tasks: Second language learning, teaching and testing (pp. 23–48). Longman.
[2] Baba, K., & Nitta, R. (2014). Phase transitions in development of writing fluency from a complex dynamic systems perspective. Language Learning, 64 (1), 1–35.
[3] Bao, G. (2009). A study of syntactic complexity in English learner writing. Foreign Language Teaching and Research, 41(4), 291–297.
[4] Bei, X. Y. (2009). The effects of writing practice and teacher feedback on writing quality and fluency of students with different foreign language proficiency levels. Modern Foreign Languages, 32(4), 389–398.
[5] Chan, H., Verspoor, M., & Vahtrick, L. (2015). Dynamic development in speaking versus writing in identical twins. Language Learning, 65(2), 298–325.
[6] de Bot, K., Lowie, W., & Verspoor, M. (2007). A Dynamic Systems Theory approach to second language acquisition. Bilingualism: Language and Cognition, 10(1), 7–21.
[7] de Bot, K., & Larsen-Freeman, D. (2011). Researching SLD from a DST perspective. In Van, Dijk, & others (Eds.), A dynamic approach to second language development: Methods and techniques (pp. 5-24). John Benjamins.
[8] de Bot, K. (2008). Introduction: Second language development as a dynamic process. The Modern Language Journal, 92(2), 166-178.
[9] de Bot, K. (2017). Complexity theory and dynamic systems theory: Same or different? In L. Ortega & Z. H. Han (Eds.), Complexity theory and language development: In celebration of Diane Larsen-Freeman (pp. 51–58). John Benjamins.
[10] Ellis, R. (2003). Task-based language learning and teaching. Oxford University Press.
[11] Ellis, R. (2009). The differential effects of three types of task planning on the fluency, complexity, and accuracy in L2 oral production. Applied Linguistics, 30, 474-509.
[12] Housen, A., & Kuiken, F. (2009). Complexity, accuracy, and fluency in second language acquisition. Applied Linguistics, 30(4), 461–473.
[13] Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. Applied Linguistics, 18(2), 141–165.
[14] Lambert, C., & Zhang, L. (2019). Engagement in the use of English and Chinese as foreign languages: The role of learner-generated content in instructional task design. The Modern Language Journal, 103(2), 391–411.
[15] Lei, P. F., & Xu, J. F. (2018). The impact of task repetition on academic English writing: A dynamic systems theory perspective. Foreign Language World, (5), 46–54.
[16] Nassaji, H. (2012). The relationship between SLA research and language pedagogy: Teachers' perspectives. Language Teaching Research, 16(3), 337-365.
[17] Ortega, L. (2003). Syntactic complexity measures and their relationship to L2 proficiency: A research synthesis of college-level L2 writing. Applied Linguistics, 24(4), 492–518.
[18] Skehan, P. (2009). Modelling second language performance: Integrating complexity, accuracy, fluency, and lexis. Applied Linguistics, 30(4), 510–532.
[19] Spoelman, M., & Verspoor, M. (2010). Dynamic patterns in development of accuracy and complexity: A longitudinal case study in the acquisition of Finnish. Applied Linguistics, 31(4), 532–553.
[20] Verspoor, M., de Bot, K., & Lowie, W. (Eds.). (2011). A dynamic approach to second language development: Methods and techniques. John Benjamins.
[21] Van den Branden, K. (2016). Task-based language teaching. In G. Hall (Ed.), The Routledge Handbook of English Language Teaching(pp.167-181). Routledge.
[22] Willis, D., & Willis, J. (2008). Doing task-based teaching. Oxford University Press.
[23] Wang, K. L. (2024). The development and interaction of complexity, accuracy, and fluency in English learner oral proficiency: A complexity theory of dynamic systems perspective [Doctoral dissertation, Soochow University].
[24] Xu, X. Y., Wang, W. M., Xiong, Y. Y., Jiang, J., Pan, X. Y., & Sun, N. H. (2013). A study of syntactic complexity in Chinese EFL students' argumentative writing. Foreign Language Teaching and Research, 45(3), 264–275.
[25] Zhou, D. D. (2011). The influence of frequency effects on second language writing. Foreign Languages and Their Teaching, (1), 36–39, 44.
[26] Zhao, J. H., & Chen, H. Y. (2012). A study on the measurement of grammatical complexity in written English of Chinese learners. Theory and Practice in Foreign Language Education, (1), 27–33.