Title of Project:
Effects of Task Complexity on Chinese EFL Learners' L2 Oral Performance:
A Complex Dynamic Systems Theory Perspective

Researcher:
Feifeng Liu

Masters-Degree Institution
Fudan University
18326657900@163.com

Current Institution
Shanghai High School


Feifeng Liu

Research Supervisor:
Prof. Yongyan Zheng
Fudan University

Motivation for the Research

This study will attempt to combine task-based language teaching (TBLT) with learner corpus research and natural language processing techniques (see Alexopoulou et al., 2017). The current study is theoretically different from prior research because it mainly focuses on testing hypotheses on task complexity effects from the two major models: the Trade-off Hypothesis and the Cognition Hypothesis. The current study adopts a Complex Dynamic Systems Theory (CDST) perspective. From a Complex Dynamic Systems Theory standpoint, language is a complex, adaptive system featuring complete interconnectedness, nonlinear dynamic changes, contextual sensitivity, self-organization and self-adaptation (Larsen-Freeman, 1997; Larsen-Freeman & Cameron, 2013).The purpose of the study is to examine the effects of task complexity on interactions between micro task contexts and features of linguistic complexity in L2 oral production and within L2 speaker oral lexical and syntactic sub-systems and those between the oral lexical and syntactic sub-systems with increasing task complexity. This study will demonstrate the synergy of combining methods from corpus linguistics with computational linguistic so as to facilitate the natural linguistic analysis relative to lexical and syntactic complexity features. This process is helpful for investigating the effects of task complexity on learner performance using data from a large corpus. The aim is to exemplify the effective triangulation of corpus linguistics, computational linguistics, and task-based approaches to second language research (Alexopoulou et al., 2017).

Research Questions

1. How do the L2 learners' oral lexical and syntactic measures change with increasing task complexity? What are the specific changes?
2. How do different lexical and syntactic measures interrelate with one another as task complexity increases?

3. Is there any interrelation between the L2 speakers' oral lexical sub-system and syntactic sub-system? If yes, what are the specific relations?

Research Methodology

This study draws on the spoken corpus of Test for English Majors, Band 8 (TEM-8) in the *Spoken and Written Corpus of Chinese Learners (2.0)* (Wen et al. 2008), which is comprised of learners' oral data in TEM-8 ranging from the year of 2003 to 2007. Considering that participants in the TEM-8 are English majors in the fourth university year, they can be approximately regarded as upper-intermediate learners. To achieve proper task complexity identification and balance the data scale, this study selected the oral data from the year of 2004 to 2006.

To answer the research questions and considering the multidimensionality of language performance, this study utilizes three advanced natural language analysis tools, namely the Tool for Automatic Analysis of Lexical Diversity (TAALED), Tool for Automatic Analysis of Lexical Sophistication (TAALES) (Kyle & Crossley, 2015), and Tool for Automatic Analysis of Syntactic Complexity (TAASSC) (Kyle, 2016), to investigate the lexical (by TAALED and TAALES) and syntactic (by TAASSC) features in the L2 oral corpus data.

In traditional research on second language performance, lexical complexity can often be investigated in the following three dimensions: lexical diversity, lexical density and lexical sophistication (Read, 2000). Grounded on previous literature and considering the features of L2 oral texts, this study selected both large-grained and fine-grained measures along the three lexical dimensions to observe task complexity effects on L2 speakers' interlanguage performance.

Scholars in not in agreement about a definition of syntactic complexity in L2 research. Syntactic complexity has been considered in various ways in second language acquisition research and assessed through various measures, for a variety of groups of language learners, and for varied proficiency levels and learning tasks (cf. Kuiken, Vedder, Housen, & De Clercq, 2019). The syntactic complexity measures in the existing literature often seek to quantify one or more aspects of the following four dimensions: length of production unit, amount of subordination and coordination, the range of syntactic structures, and the degree of sophistication of certain syntactic structures (Lu, 2011, pp. 36-37). The five syntactic complexity measures are selected in accordance to the typical four dimensions of syntactic complexity measures illustrated above.

All the three natural language analysis tools can be available freely for research and educational purposes, and support batch processing. Before being put into computation, all of the oral texts in the spoken learner corpus used in this study have been meticulously cleaned. The basic principle for cleaning the data is not to affect the effective and accurate calculation of the measures. For example, some words typical in oral expressions, like "um", "en", "ha", "er" are excluded in order to ensure the reliability of related vocabulary results. Incomplete sentences like "I think er the er and" are also not considered in order to have more accurate analysis.

For descriptive and inferential statistical analyses, the present study employed R (3.6.1 version) software for data analysis. Procedures were conducted including multivariate analysis of variance (MANOVA), given more than two measures in lexical and syntactic strands respectively are used to observe the changes of linguistic complexity, post-hoc multiple comparisons of variables, correlation tests, etc. The visualization of relevant results was also achieved through packages in the R (3.6.1) software.

Summary of Findings

In correspondence to the three research questions, some major findings are reiterated here in a succinct way. The first research question is concerned with the task complexity effects on lexical and syntactic

177 Webster St., # 220, Monterey, CA 93940 USA
Web: www.tirfonline.org / **Email:** info@tirfonline.org

measures. The findings show a linear upward tendency of MRCF values, a U-shaped curve with the changes of BNCSF and MRCM values, and an inverted U-shaped curve with the changes of MATTR, LD, BNCSR, MRCC, and MRCI values. In other words, with increasing task complexity, L2 learners' lexicon is significantly affected with regard to both overall measures and specific word information measures. Moreover, most lexical measures display significant nonlinear fluctuations. In addition to lexical measures, the first research question also deals with how L2 learners' oral syntactic measures change when task complexity increases. The findings indicate that with increasing cognitive task demands, L2 speakers display a higher value of dependents per clause and coordinate phrases per clause, yet a lower value of dependents per nominal, and some fluctuations of the use of dependent clauses per clause. However, the more general syntactic complexity measure, i.e., the mean length of clause, keeps steady with contextual changes.

The second research question is devoted to investigations on the interrelations with L2 speakers' oral lexical sub-system and syntactic sub-system. The selected correlations to be discussed above demonstrate that both lexical and syntactic measures sustain interactions with each other under changing micro task contexts. As for the interrelations between lexical measures, the major findings show an increasing negative correlation between MATTR and BNCSF, a decreasing negative correlation between BNCSF and MRCI, and nonlinear fluctuating changes of interrelations between some other general and specific measures. In contrast, the correlations between syntactic measures tend to be low and medium. The major findings suggest a decreasing negative correlation between MLC and DCC, an increasing mixed correlation between CPC and DC, and fluctuating relations between MLC and CPC, and MLC and DN.

The last research question is aimed to further examine the interrelations between the L2 speakers' oral lexical sub-system and syntactic sub-system. However, the result shows that there is no significant correlation between any lexical and syntactic measures, which may be attributed to such factors as computational differences of selected lexical and syntactic measures and the learner corpus design.

Implications

The critical contribution of natural language analysis measures and tools is the consideration on the multidimensionality of linguistic complexity and the functional differentiation of lexical and syntactic indices used for analyzing the L2 oral texts. The choice and utilization of both local-level and global-level lexical and syntactic metrics enable us to observe more complex and dynamic changes of interlanguage performance brought by increased task complexity and nuances in the complete interconnectedness, interactions, self-adaptation and self-organization of the L2 oral lexical and syntactic sub-systems and their sensitivity to contextual changes. Previous task-based research (Jackson & Suethanapornkul, 2013) has encouraged scholars to take advantage of multiple linguistic measures with different functions, the feasibility of which has been testified in the present study. It is worth noting that with the development of data-driven research and automatic natural language processing tools and metrics (Kyle et al., 2017), the computational tools and models are going to make more practical contributions to the inventory of reliable linguistic complexity measures, and task-based language teaching investigations, as other core issues in second language acquisition, can indeed obtain benefits from the inclusive use of computational linguistic measures along both lexical and syntactic dimensions.

The literature of task-based research has already shown that TBLT research traditionally adopting standard experimental research design usually with relatively small data size can be usefully complemented by large-scale learner corpus research (Alexopoulou et al., 2017). The present study continues along this line by using Chinese L2 oral test corpus and attempting to identify task complexity in a post hoc way and further demonstrates that the interaction between L2 oral production and micro task contexts is less straightforward and more nuanced. Differing from a manipulative experimental

177 Webster St., # 220, Monterey, CA 93940 USA
Web: www.tirfonline.org / **Email:** info@tirfonline.org

design in TBLT research and adopting a more exploratory data-driven corpus design, this study examined findings of L2 production along the continuum of task complexity across three tasks of the same task type, and find out how the oral lexical and syntactic sub-systems adapt to the micro contextual changes through the self-adaptation mechanism. To situate the multidimensionality of linguistic complexity possibly affected by task complexity in this study, I have chosen lexical and syntactic measures at different levels, which are instrumental in furthering the understanding of task complexity effects on learner language production. All these methodological considerations show that the data-driven synergy of large learner corpora, task-based language teaching research, and natural language analysis tools can provide feasible and practical methodological advice on investigating interlanguage performance especially within the TBLT paradigm.

From a theoretical perspective, findings in this study may greatly complement previous studies on testing the predictions from the Cognition Hypothesis. The Cognition Hypothesis claims that pedagogical tasks should be sequenced in an order of increasing task complexity (Robinson, 2005), and that in particular, when cognitive task demands are increased along the resource-directing dimension, learners' increasing effort in conceptualization promotes more structurally and lexically complex and accurate oral language production (Robinson, Cadierno, & Shirai, 2009). The nonlinearity and disproportionate development of trajectories of lexical and syntactic measures under changing contextual situations further underscore the necessity of adopting a complex and dynamic viewpoint towards the effects of task complexity on L2 learners' interlanguage performance. Instead of merely testing the task-based predictions from the cognitive-psycholinguistic models, it is important to research the mechanism beneath the changes of interlanguage performance under different task contexts, and the new theoretical perspective of Complex Dynamic Systems Theory (CDST) may indeed play an important complementary role in furthering previous research (Michel, 2013). Furthermore, the interactions whether between lexical measures or between syntactic measures have also demonstrated the complex, dynamic property of the interlanguage system, and the dynamic and disproportionate interconnectedness of the multiple components within the interlanguage system revealed from the oral texts. In this sense, the CDST perspective adopted in the present study has the potential to complement task-based research traditionally situated in a cognitive-psycholinguistic paradigm.

This corpus-based study also has some pedagogical implications especially for oral task-based language teaching. The manipulations of task complexity are important factors in task sequencing and syllabus design in oral curriculum. Through the data analyses on changes of oral lexical and syntactic measures and their within-and- between interrelations along with dynamic micro-contextual changes, it may be figured out that the design and manipulation of oral tasks should be closely connected to the changing trajectories of different dimensions of learners' oral performance. In other words, the oral tasks should not be made based on the one-size-fits-all principle; rather, teachers may design oral tasks in consideration of different types of students' oral features so as to help learners promote their oral performance more effectively. As in longitudinal development, learners' linguistic performance under different tasks may show nonlinear trajectories, which may need more specific adjustments of task designs based on curricular goals. In this sense, a complex, dynamic and adaptive perspective should also be taken in the designing and sequencing of pedagogical oral tasks, as argued by Robinson (2010), so as to make better adaptations to the changing learners' oral linguistic features in their interlanguage performance and development. Additionally, in terms of assessing L2 learners' task-based oral interlanguage production, the complex and dynamic features in their performance should be fully considered. Even though the micro task contexts can be changing and diverse, the developmental trajectories of learners' oral linguistic features may be recorded to help their future oral development. To be more specific, assessing learners' oral performance should include different linguistic measures under different tasks, make comparisons between different task contexts in terms of their

177 Webster St., # 220, Monterey, CA 93940 USA
Web: www.tirfonline.org / **Email:** info@tirfonline.org

multidimensional oral performance, and then provide more targeted feedbacks for learners to improve their own oral performance.

References

Ahmadian, M. J., & Tavakoli, M. (2010). The effects of simultaneous use of careful online planning and task repetition on accuracy, compleixty, and fluency in EFL learners' oral production. *Language Teaching Research, 15*(1), 35-59.

Ai, H., & Lu, X. (2013). A corpus-based comparison of syntactic complexity in NNS and NS university students' writing. In A. Díaz-Negrillo, N. Ballier, & P. Thompson (Eds.), Automatic Treatment and Analysis of Learner Corpus Data (pp. 249-264). Amsterdam/ Philadelphia: John Benjamins.

Alexopoulou, T., Michel, M., Murakami, A., & Meurers, D. (2017). Task effects on linguistic complexity and accuracy: A large-scale learner corpus analysis employing natural language processing techniques. *Language Learning, 67*(S1), 180-208.

Allaw, E., & McDonough, K. (2019). The effect of task sequencing on second language written lexical complexity, accuracy, and fluency. *System, 85*. doi:10.1016/j.system.2019.06.008

BNC Consortium. (2007). British National Corpus, version 3 (BNC XML ed.). Retrieved from http://www.natcorp.ox.ac.uk.

Brysbaert, M., Warriner, A. B., & Kuperman, V. (2013). Concreteness ratings for 40 thousand generally known English word lemmas. *Behavior Research Methods, 46*(3), 904-911.

Bulté, B., & Housen, A. (2012). Defining and operationalising L2 complexity. In A. Housen, F. Kuiken, & I. Vedder (Eds.), Dimensions of L2 performance and proficiency: Complexity, accuracy and fluency in SLA (pp. 21-46). Philadelphia/Amsterdam: John Benjamins.

Bygate, M., Skehan, P., & Swain, M. (eds.). (2001). *Researching pedagogic tasks: Second language learning, teaching, and testing*. London: Longman.

Cadierno, T., & Robinson, P. (2009). Language typology, task complexity and the development of L2 lexicalization patterns for describing motion events. *Annual Review of Cognitive Linguistics, 7*, 245-276.

Coltheart, M. (1981). The MRC psycholinguistic database. *Quarterly Journal of Experimental Psychology Section A, 33*, 497-505.

Covington, M. A., & McFall, J. D. (2010). Cutting the Gordian Knot: The moving-average type-token ratio (MATTR). *Journal of Quantitative Linguistics, 17*(2), 94–100.

Crossley, S., & McNamara, D. (2009). Computational assessment of lexical differences in L1 and L2 writing. *Journal of Second Language Writing, 18*, 119-135.

Crossley, S., Salsbury, T., & McNamara, D. (2010). Predicting lexical proficiency in language learner texts using computational indices. *Language Testing, 28*(4), 561-580.

Crossley, S., Salsbury, T., McNamara, D., & Jarvis, S. (2011). What is lexical proficiency? Some answers from computational models of speech data. *TESOL Quarterly, 45*(1), 182-193.

Crossley, S., Subtirelu, N., & Salsbury, T. (2013). Frequency effects or context effects in second language word learning: What predicts early lexical production? *Studies in Second Language Acquisition, 35*, 725-755.

de Bot, K. (2008). Introduction: Second language development as a dynamic process. *The Modern Language Journal, 92*, 166-178.

de Bot, K., & Larsen-Freeman, D. (2011). Researching second language development from a dynamic systems theory perspective. In M. H. Verspoor, K. de Bot, & W. Lowie (eds.), A dynamic approach to second language development: methods and techniques (pp. 5-23). Amsterdam: John Benjamins.

de Bot, K., Lowie, W., Thorne, S., & Verspoor, M. H. (2013). Dynamic Systems Theory as a comprehensive theory of second language development. In M. D. P. G. Mayo, M. J. G. Mangado, & M. M. Adrián (Eds.), Contemporary approaches to second language acquisition (pp. 199-220). Philadelphia/ Amsterdam: John Benjamins.

Douglas Fir Group. (2016). A transdisciplinary framework for SLA in a multilingual world. *The Modern Language Journal, 100*(S1), 19-47. doi:10.1111/modl.12301

Ellis, R. (2000). Task-based research and language pedagogy. *Language Teaching Research, 4*(3), 193-220.

Ellis, R. (2003). *Task-Based Language Teaching and Learning*. Oxford: Oxford University Press.

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*(4), 36.

Evans, J. J. (2007). The emergence of language: A dynamic systems account. In E. Hoff & M. Shatz (eds.), *Blackwell handbook of language development* (pp. 128-147). Oxford: Blackwell.

Foster, P., & Skehan, P. (1996). The influence of planning and task type on second language performance. *SSLA, 18*, 299-323.

Foster, P., & Tavakoli, P. (2009). native speakers and task performance: Comparing effects on complexity, fluency, and lexical diversity. *Language Learning, 59*(4), 866-896.

Frear, M. W., & Bitchener, J. (2015). The effects of cognitive task complexity on writing complexity. *Journal of Second Language Writing, 30*, 45-57.

Fukuta, J., & Yamashita, J. (2015). Effects of cognitive demands on attention orientation in L2 oral production. *System, 53*, 12.

Gilabert, R. (2007a). Effects of manipulating task compleixty on self-repairs during L2 oral production. *IRAL, 45*, 26.

Gilabert, R. (2007b). The simultaneous manipulation of task complexity along planning and +/− Here-and-Now: Effects on L2 oral production. In M. D. P. G. Mayo (Ed.), Investigating Tasks in Formal Language Learning (pp. 44-68). Clevedon: Multilingual Matters.

Gilabert, R., Barón, J., & Levkina, M. (2011). Manipulating task complexity across task types and modes. In P. Robinson (Ed.), Second language task complexity: Researching the cognition hypothesis of language learning and performance (pp. 105-138). Philadelphia/ Amsterdam: John Benjamins.

Gilabert, R., Barón, J., & Llanes, à. (2009). Manipulating cognitive complexity across task types and its impacts on learners' interaction during oral performance. *IRAL, 47*, 367-395.

Gries, S. T. (2008). Dispersions and adjusted frequencies in corpora. *International Journal of Corpus Linguistics, 13*, 403-437.

Hiver, P., & Al-Hoorie, A. (2016). A dynamic ensemble for second language research: putting complexity theory into practice. *The Modern Language Journal, 4*, 742-757.

Housen, A., De Clercq, B., Kuiken, F., & Vedder, I. (2019). Multiple approaches to complexity in second language research. *Second Language Research, 35*(I), 3-21.

Hsu, H.-C. (2017). The effect of task planning on L2 performance and L2 development in text-based synchronous computer-mediated communication. *Applied Linguistics, 38*(3), 359-385.

Ishikawa, T. (2008). The effect of task demands of intentional reasoning on L2 speech performance. *The Journal of Asia TEFL, 5*(1), 29-63.

Ishikawa, T. (2011). Examining the influence of intentional reasoning demands on learner perceptions of task difficulty and L2 monologic speech. In P. Robinson (Ed.), Second language task complexity: Researching the Cognition Hypothesis of language learning and performance. Amsterdam/ Philadelphia: John Benjamins.

Ismail, L., & Samad, A. A. (2017). Effects of task complexity variables on complexity, accuracy and fluency of second language production: A critical review. *International Journal of Linguistics, 9*(4), 94-105.

Iwashita, N., McNamara, T., & Elder, C. (2001). Can we predict task difficulty in an oral proficiency test? Exploring the potential of an information-processing approach to task design. *Language Learning, 51*(3), 401-436.

Jackson, D. O., & Suethanapornkul, S. (2013). The Cognition Hypothesis: A synthesis and meta-analysis of research on second language task complexity. *Language Learning, 63*(2), 330-367.

Jiang, J., Bi, P., & Liu, H. (2019). Syntactic complexity development in the writings of EFL learners: Insights from a dependency syntactically-annotated corpus. *Journal of Second Language Writing, 46*, 1-13.

Johnson, M. D. (2017). Cognitive task complexity and L2 written syntactic complexity, accuracy, lexical complexity, and fluency: A research synthesis and meta-analysis. *Journal of Second Language Writing, 37*, 13-38.

Kim, M., Crossley, S., & Kyle, K. (2018). Lexical sophistication as a multidimensional phenomenon: Relations to second language lexical proficiency, development, and writing quality. *The Modern Language Journal, 102*(1), 120-141.

Kormos, J. (2011). Task complexity and linguistic and discourse features of narrative writing performance. *Journal of Second Language Writing, 20*, 148–161.

Kubát, M. (2014). Moving window type-token ratio and text length. In A. G, Č. R, & J. Mačutek (Eds.), *Empirical Approaches to Text and Language Analysis* (pp. 105–113). Lüdenscheid: RAM.

Kuiken, F., Mos, M., & Vedder, I. (2005). Cognitive task complexity and second language writing performance. In S. Foster-Cohen, M. D. P. G. Mayo, & J. Cenoz (Eds.), Eurosla Yearbook (Vol. 5, pp. 195–222). Amsterdam: John Benjamins.

Kuiken, F., & Vedder, I. (2007a). Cognitive task complexity and linguistic performance in French L2 writing. In M. D. P. G. Mayo (Ed.), Investigating tasks in formal language learning (pp. 117–135). Clevedon: Multilingual Matters.

Kuiken, F., & Vedder, I. (2007b). Task complexity and measures of linguistic performance in L2 writing. *International Review of Applied Linguistics, 45*(3), 261–284.

Kuiken, F., & Vedder, I. (2008). Cognitive task complexity and written output in Italian and French as a foreign language. *Journal of Second Language Writing, 17*(1), 48-60.

Kuiken, F., & Vedder, I. (2011). Task complexity and linguistic performance in L2 writing and speaking: The effect of mode. In P. Robinson (Ed.), Second language task complexity: Researching the cognition hypothesis of language learning and performance (pp. 91-104). Philadelphia/ Amsterdam: John Benjamins.

Kuiken, F., Vedder, I., Housen, A., & De Clercq, B. (2019). Variation in syntactic complexity: Introduction. *International Journal of Applied Linguistics*, 1-10. doi:10.1111/ijal.12255

Kyle, K. (2016). *Measuring syntactic development in L2 writing: fine grained indices of syntactic*

complexity and usage-based indices of syntactic sophistication. Unpublished Doctoral Dissertation. Georgia State University.

Kyle, K., & Crossley, S. (2015). Automatically assessing lexical sophistication: indices, tools, findings, and application. *TESOL Quarterly, 49*(4), 757-786.

Kyle, K., & Crossley, S. (2016). The relationship between lexical sophistictaion and independent and source-based writing. *Journal of Second Language Writing, 34*, 12-24.

Kyle, K., Crossley, S., & Berger, C. (2017). The tool for the automatic analysis of lexical sophistication (TAALES): Version 2.0. *Behavior Research Methods, 1*(Pt.2), 1-17.

Larsen-Freeman, D. (1997). Chaos/ complexity science and second language acquisition. *Applied Linguistics, 18*(2), 141-165.

Larsen-Freeman, D. (2006). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics, 4*, 590-619.

Larsen-Freeman, D. (2015). Ten 'lessons' from Complex Dynamic Systems Theory: What is on offer. In Z. Dörnyei, P. D. MacIntyre, & A. Henry (Eds.), *Motivational dynamics in language learning* (pp. 11-19). Bristol: Short Run Press.

Larsen-Freeman, D. (2017). Complexity theory: The lessons continue. In L. Ortega & Z. Han (Eds.), *Complexity Theory and Language Development* (pp. 11-50). Amsterdam/ Philadelphia: John Benjamins.

Larsen-Freeman, D., & Cameron, L. (2013). *Complex systems and applied linguistics*. Shanghai: Shanghai Foreign Language Education Press.

Laufer, B., & Nation, P. (1995). Vocabulary size and use: Lexical richness in L2 written production. *Applied Linguistics, 16*(3), 307-322.

Lei, L., & Wen, J. (2019). Is dependency distance experiencing a process of minimization? A diachronic study based on the State of the Union addresses. *Lingua*. doi:https://doi.org/10.1016/j.lingua.2019.102762

Liu, H., Xu, C., & Liang, J. (2017). Dependency distance: A new perspective on syntactic patterns in natural languages. *Physics of Life Reviews, 21*, 171-193.

Long, M. H. (1985). A role for instruction in second language development. In K. Hyltenstam & M. Pienemann (Eds.), Modelling and assessing second language acquisition (pp. 77-99). Clevedon: Multilingual Matters

Long, M. H. (2015). *Second language acquisition and task-based language teaching*. Malden, MA: Wily.

Lu, X. (2010). Automatic analysis of syntactic complexity in second language writing. *International Journal of Corpus Linguistics, 15*(4), 474-496.

Lu, X. (2011). A corpus-based evaluation of syntactic complexity measures as indices of college-level ESL writers' language development. *TESOL Quarterly, 45*(1), 36-62.

Lu, X. (2017). Automated measurement of syntactic complexity in corpus-based L2 writing research and implications for writing assessment. *Language Testing, 34*(4), 493-511.

Lu, X., & Ai, H. (2015). Syntactic complexity in college-level English writing: Differences among writers with diverse L1 backgrounds. *Journal of Second Language Writing, 29*, 16-27.

McCarthy, P., & Jarvis, S. (2007). VOCD: A theoretical and empirical evaluation. *Language Testing, 24*, 459-488.

McNamara, D., Graesser, A., McCarthy, P., & Cai, Z. (2014). *Automated evaluation of text and discourse with Coh-Metrix*. Cambridge: Cambridge University Press.

Meurers, D., & Dickinson, M. (2017). Evidence and interpretation in language learning research: Opportunities for collaboration with computational linguistics. *Language Learning, 67*(S1), 66-95.

Michel, M. C. (2011). Effects of task complexity and interaction on L2 performance. In P. Robinson (Ed.), *Second language task complexity: Researching the cognition hypothesis of language learning and performance* (pp. 141-173). Philadelphia/ Amsterdam: John Benjamins.

Michel, M. C. (2013). The use of conjunctions in cognitively simple versus complex oral L2 tasks *The Modern Language Journal, 97*(1).

Michel, M. C., Kuiken, F., & Vedder, I. (2007). The influence of complexity in monologic versus dialogic tasks in Dutch L2. *IRAL, 45*(3), 241-259.

Norris, J., & Ortega, L. (2009). Towards an organic approach to investigating CAF in instructed SLA: The case of complexity. *Applied Linguistics, 30*, 555-578.

O'Loughlin, K. (1995). Lexical density in candidate output on direct and semi-direct versions of an oral proficiency test. *Language Testing, 12*(2), 217-237.

Ong, J., & Zhang, J. L. (2010). Effects of task complexity on the fluency and lexical complexity in EFL students' argumentative writing. *Journal of Second Language Writing, 19*, 218-233.

Plonsky, L., & Kim, Y. (2016). Task-based learner production: A substantive and methodological review. *Annual Review of Applied Linguistics, 36*, 73-97. doi:10.1017/S0267190516000015

Rahimi, M. (2018). Effects of increasing the degree of reasoning and the number of elements on L2 argumentative writing. *Language Teaching Research, 22*. doi:.org/10.1177/1362168818761465

Read, J. (2000). *Assessing vocabulary*. Cambridge: Cambridge University Press.

Révész, A., Kourtali, N., & Mazgutova, D. (2017). Effects of task complexity on L2 writing behaviors and linguistic complexity. *Language Learning, 67*, 208-241.

Révész, A., Michel, M., & Gilabert, R. (2016). Measuring cognitive task demands using dual-task methodology, subjective self-ratings, and expert judgments: A validation study. *Studies in Second Language Acquisition, 38*, 703-737.

Robinson, P. (1995). Task complexity and second language narrative discourse. *Language Learning, 45*(1), 99-140.

Robinson, P. (2001a). Task complexity, cognitive resources, and syllabus design: a tradic framework for examining task influences on SLA. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 287-318). Cambridge: Cambridge University Press.

Robinson, P. (2001b). Task complexity, task difficulty, and task production: exploring interactions in a componential framework. *Applied Linguistics, 22*, 27-57.

Robinson, P. (2003). The cognition hypothesis, task design, and adult task-based language learning. *Second Language Studies, 21*, 45-105.

Robinson, P. (2005). Cognitive complexity and task sequencing: Studies in a componential framework for second language task design. *International Review of Applied Linguistics in Language Teaching, 43*, 1-32.

Robinson, P. (2007a). Criteria for classifying and sequencing pedagogic tasks. In M. D. P. G. Mayo (Ed.), *Investigating tasks in formal language learning* (pp. 7-26). Clevedon: Multilingual Matters.

Robinson, P. (2007b). Task complexity, theory of mind, and intentional reasoning: Effects on L2 speech production, interaction, uptake and perceptions of task difficulty. *International Review of Applied Linguistics, 45*, 193-213.

Robinson, P. (2010). Situating and distributing cognition across task demands: The SSARC model of pedagogic task sequencing. In M. Püta & L. Sicola (Eds.), *Cognitive processing in second language acquisition* (pp. 243-268). Amsterdam/ Philadelphia: John Benjamins.

Robinson, P. (2011a). Second language task complexity: the cognition hypothesis, language learning and performance. In P. Robinson (Ed.), *Second language task complexity: Researching the cognition hypothesis of language learning and performance* (pp. 3-38). Philadelphia/ Amsterdam: John Benjamins.

Robinson, P. (2011b). Task-based language learning: A review of issues. *Language Learning, 61*(Suppl. 1), 1-36.

Robinson, P., Cadierno, T., & Shirai, Y. (2009). Time and motion: Measuring the effects of the conceptual demands of tasks on second language speech production. *Applied Linguistics, 30*(4), 533-554.

Robinson, P., & Gilabert, R. (2007). Task complexity, the Cognitive Hypothesis and second language learning and performance. *International Review of Applied Linguistics in Langauge Teaching*. doi:10.1515/IRAL.2007.007

Salimi, A. (2015). The effects of focus on form and task complexity on L2 learners' oral task performance. *Advances in Language and Literary Studies, 6*(6), 9.

Santos, S. (2018). Effects of task complexity on the oral production of Chinese learners of Portuguese as a foreign language. *Journal of the European Second Language Association, 2*(1), 49-62. doi:https://doi.org/10.22599/jesla.40

Sasayama, S. (2016). Is a 'complex' task really complex? Validating the assumption of cognitive task complexity. *The Modern Language Journal, 100*(1), 24.

Skehan, P. (1996). A framework for the implementation of task-based instruction. *Applied Linguistics, 17*, 38–62.

Skehan, P. (1998). *A cognitive approach to language learning*. Oxford: Oxford University Press.

Skehan, P. (2001). Tasks and language performance assessment. In M. Bygate, P. Skehan, & M. Swain (Eds.), *Researching pedagogic tasks: Second language learning, teaching, and testing* (pp. 167–185). London: Longman.

Skehan, P. (2014). Limited attentional capacity, second language performance, and task-based pedagogy. In P. Skehan (Ed.), Processing perspectives on task performance (task-based language teaching) (pp. 211–260). Amsterdam: John Benjamins.

Skehan, P., & Foster, P. (1999). The influence of task structure and processing conditions on narrative retellings. *Language Learning, 49*, 93–120.

Skehan, P., & Foster, P. (2001). Cognition and tasks. In P. Robinson (Ed.), *Cognition and Second Language Instruction* (pp. 183-205). Cambridge: Cambridge University Press.

Spoelman, M., & Verspoor, M. H. (2010). Dynamic patterns in development of accuracy and complexity: A longitudinal case study in the acquisition of Finnish. *Applied Linguistics, 4*, 532-553.

Thelen, E., & Smith, L. (1994). *A dynamic systems approach to the development of cognition and action*. Cambridge: MIT Press.

Toglia, M. P., & Batting, W. R. (1978). *Handbook of semantic word norms*. New York, NY: Lawrence Erlbaum.

Van Patten, B. (1990). Attending to content and form in the input: An experiment in consciousness. *Studies in Second Language Acquisition, 12*, 287-301.

Vasylets, O., Gilabert, R., & Manchón, R. M. (2017). The effects of mode and task complexity on second language production. *Language Learning, 67*(2), 394-430.

Verspoor, M. H., Lowie, W., & van Dijk, M. (2008). Variability in second language development from a dynamic systems perspective. *Modern Language Journal, 92*, 214-231.

Verspoor, M. H., Schmid, M. S., & Xu, X. (2012). A dynamic usage based perspective on L2 writing. *Journal of Second Language Writing, 21*, 239-263.

Wang, Y., & Liu, H. (2018). Is Trump always rambling like a fourth-grade student? An analysis of stylistic features of Donald Trump's political discourse during the 2016 election. *Discourse & Society, 29*(3), 299-323.

Wen, Q., Liang, M., & Yan, X. (2008). *Spoken and written English corpus of Chinese learners*. Beijing: Foreign Language Teaching and Research Press.

Yu, G. (2009). Lexical diversity in writing and speaking task performances. *Applied Linguistics, 31*(2), 236-259.

Zheng, Y. (2016). The complex, dynamic development of L2 lexical use: A longitudinal study on Chinese learners of English. *System, 56*, 40-53.

Zheng, Y. (2018). The multidimensional development of advanced learners' linguistic complexity. *Foreign language teaching and research, 50*(2), 218-229.