**On-line Supplementary Materials**

**Research topics contributing to CT-for-SLA (Larsen-Freeman, 2017)**

|  |  |
| --- | --- |
| 1 | L1 acquisition |
| 2 | L2 acquisition/development |
| 3 | Developmental psychology |
| 4 | Neurobiology |
| 5 | Cognitive linguistics |
| 6 | Language ecology |
| 7 | Language origins |
| 8 | Language evolution |
| 9 | Language attrition |
| 10 | Language change |
| 11 | Bilingualism/Multilingualism |
| 12 | Motivation |
| 13 | L2 anxiety |
| 14 | Willingness to communicate |
| 15 | Transfer of learning |
| 16 | Social theory |
| 17 | Usage-based/emergentist models of language |
| 18 | Language teacher cognition |
| 19 | Language awareness |
| 20 | Discourse analysis |
| 21 | L2 writing |
| 22 | Language policy and planning |
| 23 | Educational linguistics |
| 24 | CALL |
| 25 | English as a lingua franca |
| 26 | Sociolinguistics |
| 27 | L2 teaching |
| 28 | Teacher education |
| 29 | General education |
| 30 | Learner agency |
| 31 | Conversation analysis |
| 32 | World Englishes |
| 33 | Complexity-informed research methods |

**CT-inspired aphorisms for language, language learners/users, language learning, and language teaching (Larsen-Freeman, 2017)**

|  |  |
| --- | --- |
| Language | 1. Language is a complex adaptive system. |
| 1. Language as it is used is dynamic, ever changing; its lexicogrammatical patterns emerge from interaction. |
| 1. The genesis of language, its evolution, its use, its processing, and its development in learners all proceed from use. Changes over days, months, years, and moment-to-moment changes are produced by the same processes, differing only in their timescales. |
| 1. Each meaningful adaptive experience in the “here-and-now” of a specific context contributes to stable, but mutable, attractor states emerging on a longer timescale. |
| 1. Language is manifest at different levels, from neuronal activity in individual brains to discourse in communities. |
| 1. Language is fractal, self-similar at different levels of scale (e.g., Zipf’s law). |
| 1. Language in use is both stable (with a certain degree of collocational predictability) to ensure comprehensibility and transmission and, at the same time, variable. |
| Language learners/users | 1. Language learners/users interact in a particular context, and when they do, they main gain access to frequent and reliably contingent form-meaning-use constructions through a process of co-adaptation, an iterative and dialogic process, with each interlocutor adjusting to the other over and over again. |
| 1. As learners/users adapt to the context, the context changes. Successful adaptive behavior entails the ability of learners/users to convey meaning and to position themselves in the way that they intend. |
| 1. Learners/users “soft assemble” or cobble their utterances together, a kind of bricolage that involves exapting any and all “parts” of languages (including sound segments, prosody, and nonverbal behavior) that the learner has experienced or that have been primed in induced resonance in the immediacy of the interaction, which may or may not be consistent with the units described by linguists. |
| 1. Learners build on what they know, including knowledge of other languages. But rather than thinking of it as transfer, it should be thought of as transformation. Transfer is never exact; what is being “transferred” is reworked to suit a new context. |
| 1. Language use in a multilingual situation is not a matter of translation between totally discrete and distinct language systems. |
| 1. Learners’/users’ language resources are not simply a record of their past experience. Language learners/users have the capacity to create their own patterns and to expand the semiotic potential of a given language, not just to conform to a ready-made system. |
| 1. There is also considerable intra- and inter-learner variability in development. Each developmental trajectory is unique. Therefore, we can make claims at the level of the group, but we cannot assume that they apply to individuals. (It may be possible, however, to develop different learner profiles at a remove from individual learners.) |
| 1. Moreover, so-called individual differences are not stable and monolithic traits. |
| Language learning | 1. Learning is not a matter of assembling an internal model of an external reality. |
| 1. Patterns emerge through interaction are subsequently entrained by what preceded them, in a process of reciprocal causality, i.e., one that recognizes both local-to-global processes of construction and global-to-local processes of constraint. |
| 1. L2 learnings is a sociocognitive construction process, in which learners make use of heuristics such as analogy, statistical preemption, abduction (inferencing beyond the data to which they have been exposed), recombination, relexification, co-adaptation, and alignment. |
| 1. Learning is not climbing a developmental ladder; it is not unidirectional. It is nonlinear. |
| 1. Language and its learning have no endpoints. Both are unbounded. |
| 1. A person’s history of interactions with diverse interlocutors builds up collections of experiences that contribute to the language, cognitive, affective, and ideological resources that are available to be drawn on. |
| 1. These resources include physical (e.g., the use of gestures) as well as symbolic and multimodal ones. |
| 1. What is important in a complex system is the interdependent relationship of the factors that comprise it. |
| Language teaching | 1. Teaching grammar as the dynamic system it is (“grammaring”) can ameliorate the inert knowledge problem. |
| 1. From a target-language perspective, errors are evidence of learners’ creativity and are not, in any linguistic sense, readily distinguishable from the linguistic innovations of language users. |
| 1. Meaningful iteration is a more efficacious practice than repetition of forms. |
| 1. It is not the input, but the learner’s perception of the affordances in the ever-changing context that is fundamental to learning (a second order affordance is a relationship between the learner and the environment that a teacher can manage). |
| 1. Learners’ attentional resources need to be directed to the learning challenge; one way that can be accomplished is through explicit instruction. |
| 1. Learners are helped by being taught how to adapt to mold their language resources to changing situations. |
| 1. Learners benefit from seeing that they have options in how to express themselves. Every time they use language, they are making choices, and by so doing, negotiating their identities. |

**Sample of Empirical Studies**

Baba, K., & Nitta, R. (2014). Phase transitions in development of writing fluency from a complex dynamic systems perspective. *Language Learning, 64*(1), 1–35.<https://doi.org/10.1111/lang.12033>

Bulté, B., & Housen, A. (2018). Syntactic complexity in L2 writing: Individual pathways and emerging group trends. *International Journal of Applied Linguistics, 28*(1), 147-164.<https://doi.org/10.1111/ijal.12196>

Castro, E. (2018). Complex adaptive systems, language advising, and motivation: A longitudinal case study with a Brazilian student of English. *System, 74*, 138-148.<https://doi.org/10.1016/j.system.2018.03.004>

Chan, H., Verspoor, M., & Vahtrick, L. (2015). Dynamic development in speaking versus writing in identical twins. *Language Learning, 65*(2), 298–325.<https://doi.org/10.1111/lang.12107>

Dong, J. (2016). A dynamic systems theory approach to development of listening strategy use and listening performance. *System, 63*, 149-165.<https://doi.org/10.1016/j.system.2016.10.004>

Duan, S., & Shi, Z. (2021). A longitudinal study of formulaic sequence use in second language writing: Complex dynamic systems perspective. *Language Teaching Research.* Advance online publication.<https://doi.org/10.1177/13621688211002942>

Ellis, N., & Larsen‐Freeman, D. (2009). Constructing a second language: Analyses and computational simulations of the emergence of linguistic constructions from usage. *Language Learning, 59*(s1), 90–125.<https://doi.org/10.1111/j.1467-9922.2009.00537.x>

Feryok, A. (2010). Language teacher cognitions: Complex dynamic systems? *System, 38*(2), 272–279.<https://doi.org/10.1016/j.system.2010.02.001>

Fogal, G. G. (2019). Tracking microgenetic changes in authorial voice development from a complexity theory perspective. *Applied Linguistics, 40*(3), 432-455.<https://doi.org/10.1093/applin/amx031>

Fogal, G. G. (2020). Investigating variability in L2 development: Extending a complexity theory perspective on L2 writing studies and authorial voice. *Applied Linguistics, 41*(4), 575–600.<https://doi.org/10.1093/applin/amz005>

Gánem-Gutiérrez, G. A., & Gilmore, A. (2018). Tracking the real-time evolution of a writing event: Second language writers at different proficiency levels. *Language Learning, 68*(2), 469–506.<https://doi.org/10.1111/lang.12280>

Guerrettaz, A. M., & Johnston, B. (2013). Materials in the classroom ecology. *The* *Modern Language Journal, 97*(3), 279–296.<https://doi.org/10.1111/j.1540-4781.2013.12027.x>

Jiang, A. L., & Zhang, L. J. (2021). Teacher learning as identity change: The case of EFL teachers in the context of curriculum reform. *TESOL Quarterly, 55*(1), 271–284.<https://doi.org/10.1002/tesq.3017>

Kliesch, M., & Pfenninger, S. E. (2021). Cognitive and socioaffective predictors of L2 microdevelopment in late adulthood: A longitudinal intervention study. *The Modern Language Journal, 105*(1), 237–266.<https://doi.org/10.1111/modl.12696>

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, 27*(4), 590-619.<https://doi.org/10.1093/applin/aml029>

MacIntyre, P., & Legatto, J. (2011). A dynamic system approach to willingness to communicate: Developing an idiodynamic method to capture rapidly changing affect. *Applied Linguistics, 32*(2), 149–171.<https://doi.org/10.1093/applin/amq037>

Meara, P. (2004). Modeling vocabulary loss. *Applied Linguistics, 25*(2), 137–155.<https://doi.org/10.1093/applin/25.2.137>

Meara, P. (2006). Emergent properties of multilingual lexicons. *Applied Linguistics, 27*(4), 620–644.<https://doi.org/10.1093/applin/aml030>

Nagle, C., Trofimovich, P., & Bergeron, A. (2019). Toward a dynamic view of second language comprehensibility. *Studies in Second Language Acquisition, 41*(4), 647–672.<https://doi.org/10.1017/S0272263119000044>

Pfenninger, S. E. (2021). Emergent bilinguals in a digital world: A dynamic analysis of long-term L2 development in (pre) primary school children. *International Review of Applied Linguistics in Language Teaching*. Advance online publication.<https://doi.org/10.1515/iral-2021-0025>

Smit, N., van Dijk, M., de Bot, K., & Lowie, W. (2021). The complex dynamics of adaptive teaching: observing teacher-student interaction in the language classroom. *International Review of Applied Linguistics in Language Teaching*. Advance online publication. <https://doi.org/10.1515/iral-2021-0023>

Smith, L., & King, J. (2017). A dynamic systems approach to wait time in the second language classroom. *System, 68*, 1-14.<https://doi.org/10.1016/j.system.2017.05.005>

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), 532–53.<https://doi.org/10.1093/applin/amq001>

van Geert, P., & van Dijk, M. (2002). Focus on variability: New tools to study intra-individual variability in developmental data. *Infant Behavior and Development, 25*(4), 340–374.<https://doi.org/10.1016/S0163-6383(02)00140-6>

Verspoor, M., Lowie, W., & van Dijk, M. (2008). Variability in second language development from a dynamic systems perspective. *The Modern Language Journal, 92*(2), 214- 231.<https://doi.org/10.1111/j.1540-4781.2008.00715.x>

Verspoor, M., Schmid, M., & Xu, X. (2012). A dynamic usage based perspective on L2 writing. *Journal of Second Language Writing, 21*(3), 239-263.<https://doi.org/10.1016/j.jslw.2012.03.007>

Vyatkina, N., Hirschmann, H., & Golcher, F. (2015). Syntactic modification at early stages of L2 German writing development: A longitudinal learner corpus study. *Journal of Second Language Writing, 29*, 28–50.<https://doi.org/10.1016/j.jslw.2015.06.006>

Yu, H., & Lowie, W. (2020). Dynamic paths of complexity and accuracy in second language speech: a longitudinal case study of Chinese learners. *Applied Linguistics, 41*(6), 855-877.<https://doi.org/10.1093/applin/amz040>

Zheng, Y. (2016). The complex, dynamic development of L2 lexical use: A longitudinal study on Chinese learners of English. *System, 56*, 40-53.<https://doi.org/10.1016/j.system.2015.11.007>

Zheng, Y., Lu, X., & Ren, W. (2020). Tracking the evolution of Chinese learners’ multilingual motivation through a longitudinal Q methodology. *The Modern Language Journal, 104*(4), 781–803.<https://doi.org/10.1111/modl.12672>