

On teachers, clocks and perturbations: What CDST means for the language classroom

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Abstract This paper looks at what a complex dynamic systems view of language learning means for language teaching. We argue that teachers ideally are ‘professional perturbers’ who actively shape their students’ learning processes by responding to their needs and by creating useful challenges. We also emphasize that language learning is inherently a social process. This means that teachers should make room for group work, interaction, and the socio-cultural aspects of language use. Language teaching should focus on who you can be more than what you can do. This calls for more flexible goals and assessment practices that value language, culture, and identity in addition to proficiency.

Keywords complex dynamic systems, language teaching, L2 development, language assessment

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In his viewpoint, Lowie (2026) offers a personal account of how he came to view second language acquisition and teaching from a complex dynamic systems theory (CSDT) perspective. He briefly explains what this perspective means for research and methods on language development and for language teaching. More importantly, however, the text is a testimony of Lowie’s significant influence on the field of SLA, being one of the frontrunners in applying CDST concepts and methods to the study of second language learning. In his rich and CDST-inspired career, Lowie has caused perturbations in the field of second language acquisition by advancing new views on language development and developing new techniques for studying such development. These perturbations not only affected research, but also had consequences for teaching. In this response, we would like to elaborate on what a CDST view on language development might mean for the second or foreign language classroom.

However, before doing so, we want to reflect briefly on combining learning and teaching in a metatheory, as Lowie did in his contribution. A discussion that often floats in

relation to dynamic systems approaches is: Where does the system stop? (Dijk et al., 2025; Freeborn et al., 2023). Language learning and language teaching are strongly related domains in research and in practice, but they are not evidently one system. In cognitive terms, language learning is concerned with the accumulation and growth of the language system. Language teaching is a more fuzzy concept that is difficult to capture in a clear definition. From a cognitive viewpoint, it captures processes that are quite different from language learning processes; it unfolds in the minds of teachers rather than learners. Language teaching refers to teachers' intentional behaviors and the specific materials they use and design to create optimal conditions for language learning to occur. When language development occurs in the classroom, then the language system likely responds to the teachers' behaviors. In this contribution, we will consider this interaction with a particular focus on the teacher and the classroom. The best teachers are probably those teachers that monitor and respond to the learning processes unfolding in the minds of their students. Hence, we offer thoughts on why it might be advantageous for teachers to consider language development from a dynamic perspective. What does a CDST view of language mean for language teaching?

1 Cater to individuals and groups

CDST teaches us that language development is the result of many interacting variables. The development of the language system within individuals has been shown to be variable and non-linear (e.g., Verspoor et al., 2008). A classroom may consist of a group of individuals that all have slightly different starting levels and prior knowledge, different experiences with language learning, different motivations, different responses to the teacher and their teaching materials, to fellow learners, etc. Thus, in classroom settings, teaching can easily be seen as an attempt to herd cats. Teachers indeed experience that not all students respond equally well to a particular teaching method, language activity, or specific language learning strategies, let alone that they can expect similar end-of-course scores by students who all received the same instruction. CDST confirms, as it were, these experiences: no student and no learning process is the same. This insight can be a confirmation for teachers, perhaps even a relief.

Acknowledging the individual nature of language learning is important and we agree with Lowie (2026) that student-centered teaching approaches should be prioritized over teacher-centered approaches. For this reason, some people hail the advent of generative AI in the language classroom: it may offer customized feedback, adapted materials, and more personalized learning experiences. From a CDST perspective, this may seem an ideal scenario, but it is important to acknowledge that language learning and teaching are inherently social processes and involve the acquisition of a system that allows you to interact with people in authentic communicative settings. People choose to learn a language because they want to connect with certain people or communities, for reasons

of travel or stays abroad, for career reasons, etc. The fundamentally social character of language learning implies that it is undertaken for and with others, and that it can only succeed with the help of others (Storch, 2017). In the complex classroom context, the challenge is to organize teaching in such a way that it caters to individual needs, but also does justice to its social nature. This means teaching should be many things at once and teachers should probably not make dogmatic choices. Students should work with tasks, but probably not exclusively so. Students should work independently, but also need group work and social interaction. A balanced mix in teaching activities probably works best.

2 Teachers as ‘professional perturbers’

Lowie explains that language development requires perturbation of the learner’s language system. He also emphasizes learner autonomy and self-regulation and presents potentially a somewhat passive view of the teacher: “First, rather than “teaching” languages, the teacher’s task is to create optimal conditions for learning to develop. These conditions should allow individual learners to build on their own learning experiences and encourage them to use language freely in a safe environment.” (p. 5). Past discussions on instructed second language learning resonate here. Many pedagogical approaches have viewed teachers as facilitators and coaches in the language learning process (e.g., Ellis et al., 2020; Krashen & Terrell, 1983; Spada, 2007; Van den Branden, 2016), but this has also sometimes been criticized (e.g., Swan, 2005). In these discussions, language teaching has sometimes been interpreted narrowly as teaching the language system or as teaching grammar. It is not entirely clear how to interpret Lowie’s double quoted “teaching” in the citation above, but we would not want to emphasize the idea that a language does not have to be taught. Nor do we want to embrace the idea that teaching is ‘explaining how the system works’. We would argue that teachers are instrumental in effectuating the perturbations required for the language system to develop.

In many contexts, especially in the foreign language classroom, learners are heavily, if not fully, reliant on their teachers for their language development. We agree wholeheartedly with Lowie that learners are competent and autonomous, but this does not mean they know how to effectively organize their own learning process. As already explained, language learning is first and foremost a social process that relies on experienced users helping novice users. In classroom settings, a teacher’s professional guidance is indispensable for learners to develop into autonomous language users (Storch, 2017). Teachers fundamentally shape the cognitive activities that students engage in to acquire the language: they make decisions about what text(book)s students read, which oral input they receive, what tasks and activities they do and in which order, which formal aspects of the language require instruction, which tests they have to take, and so on. But teaching involves much more. Teachers also play

a major role in determining the social and affective context in which these activities take place (Duff, 2017), which may well be as important, if not more so, for language learning to be effective. Teachers make language learning enjoyable, safe and effective. The essence of teaching thus is to juggle many learner needs simultaneously and in doing so, teachers create the circumstances that are conducive to language development. The ultimate goal for learners will be to develop into autonomous and self-regulated language users (De Vrind et al., 2024). This requires exceptional skill and professionalism on behalf of teachers that extends far beyond knowing how the language works. In this sense, teachers are more than just facilitators. As Lowie explains in his contribution: “Perturbations can take place at a variety of levels, magnitudes, and time scales” (p. 5). We therefore advocate that teachers should rather be seen as the professional perturbers who actively shape their students’ learning processes.

3 New goals and flexible norms

CDST presents a view of language development that emphasizes its idiosyncratic nature. This may be at odds with common classroom practice, where students generally all have to meet the same end-of-course objectives and are given the same instructions and activities to work towards these objectives. For practical and social reasons, it is probably neither feasible nor desirable that teachers adapt their teaching to the specific needs of each and every individual in the classroom (as already argued above). However, even if learners are exposed to largely the same input and instruction, the uptake will be hugely variable. Learning outcomes will differ greatly and it is interesting to consider what this should mean for teaching and testing practices.

For testing purposes, we have become used to casting course goals in proficiency levels and can-do statements. These capture functions (‘can speak about familiar topics’) and qualifications of language use (being accurate, fluent, automatic, etc.). Setting norms in terms of such proficiency statements may offer goals to work towards, but ultimately, language development is a process of learning to convey meanings in a new language and acquainting yourself with new speech communities, customs, and cultures. It is to be recommended that these aspects are incorporated in our course and curriculum goals and become part of our formative and summative assessment procedures. In Dutch secondary education, reforms are due that incorporate this thinking (Fasoglio et al., this issue; Michel et al., 2026). The reforms were inspired by a vision developed by the *Meesterschapsteam* (an interest group that aims to strengthen pedagogy-oriented research into modern foreign language learning) under Lowie’s leadership (Meesterschapsteam Moderne Vreemde Talen, 2022). Most importantly, the new core curriculum standards for secondary education now go beyond setting mere proficiency goals as they additionally include knowledge of language and culture as content goals (*Examenprogramma’s*

moderne vreemde talen, n.d.; Fasoglio et al., 2025). This should lead to language teaching pedagogies that focus more on who you can be when learning a new language, rather than what you can do, and should all together lead to much more inspiring modern foreign language programmes (Fasoglio et al., this issue).

In recent years, many scholars have argued that teachers should accept and work with the variation present in the classroom and adopt flexible norms (Valdman, 2013). In addition, the native speaker model as the norm has been questioned (Andringa, 2014; Valdman, 2013). If on top of that content goals are elevated to similar levels of importance to proficiency goals in secondary education, then new testing and examination procedures are required. The Meesterschapsteam has argued that the foreign language reforms will be most successful if exams are thematically organized. This means that proficiency is assessed on the basis of language and culture topics that were studied in class (Andringa & De Jong, 2024). This objective can be reached most effectively if exams are organized around particular themes that students know in advance and can prepare for, as argued by the Meesterschapsteam.

An idea that we did not push but worth considering, would be to let go of the notion that learners must obtain specific proficiency levels. Setting clear and high goals in education generally leads to better learning outcomes. However, if this leads to an exclusive focus on proficiency and form, and goes at the expense of meaningful, language- and culture-focused activities, then relaxing proficiency standards might actually be a good thing. This is also supported by research showing that students who receive feedback relative to their own current performance, rather than in comparison to others, attribute their scores to their own effort, hold higher expectations for themselves for future assessments, are more motivated, and perform better (Martin & Elliot, 2016; McColsky & Leary, 1985).

4 Many clocks

Adopting a CDST view means that development unfolds on many time scales (Hiver, 2022, p. 478). This is also a teacher's reality. They set short- and long-term goals, think about where they can go faster or instead have to go slower, they create opportunities for repetition (and hence automatisisation) of previously encountered language structures, and in doing so, they work with multiple clocks. They may plan curricula over a time span of several years, but when they listen closely to check whether a student manages to produce an inverted word order in a question they formulate, they may work on very specific goals and operate on a time scale that may span just a few seconds. To capture this, Lowie argues that research on L2 development should be guided by a holistic, longitudinal, ecological and usage-based approach that embraces the complexity of language learning. He has led by example (e.g., Lowie et al., 2017; Smit et al., 2022, 2023; Yu & Lowie, 2020). Task-based language teaching research is a case in point, where scholars have

long examined how measures of complexity, accuracy and fluency interact. For instance, Skehan's Trade off Hypothesis (2009) and Robinson's Cognition Hypothesis (2001) offer different predictions, but both focus on how aspects of complexity, accuracy and fluency (CAF) co-occur. From a complex dynamic systems perspective, Lowie and colleagues have pursued similar questions (e.g., Yu & Lowie, 2020) by calculating CAF measures per task in a longitudinal week-by-week approach. Taking a complex dynamic systems approach seriously, however, may require also looking into a much finer temporal detail, as advocated in De Jong (2023), because dynamics of language apply across all time scales, even down to the millisecond. For example, producing a syntactically complex and accurate sentence may temporarily reduce fluency. Likewise, when learners repeatedly use the same complex structure during a task, especially when receiving feedback on its accurate use, teachers expect that learners' use of this structure becomes more accurate and more fluent over the course of the task.

From a pedagogical perspective, it is important to realize for both teachers and learners that performance is variable on many time scales. For speaking tasks, for instance, it will be helpful to understand that a steady and fast speech rate is not necessarily the main goal. In fact, well timed pauses, such as at major syntactic boundaries (Coulange & De Jong, 2026) can be indicators of L2 development. Teachers seeking to give meaningful feedback may already take such local interactions into account naturally. In addition, being aware of such small time-scale dynamics will help guide both teachers and learners in their expectations, especially when teaching speaking and interaction.

5 Conclusion

Adopting a CDST view on language development has implications for the language classroom, as Lowie has convincingly argued for himself. Our contribution aimed at highlighting the merits of this multifaceted view, while introducing a more nuanced stance in places. The language classroom is a microcosm that shapes foreign language learning for students all over the world. Teachers play an important role in shaping such microcosms. We have argued that teachers are more than facilitators: they are professional perturbers who actively shape the conditions for language learning. This entails catering to both individual and group needs, working with flexible norms that go beyond proficiency goals alone, and being aware that language development unfolds across different time scales (e.g., Lowie & Verspoor, 2015). Wander Lowie's research has made a powerful contribution to our view of language learning as a process in which multiple dimensions and aspects constantly interact, also clearly underscoring that if we truly want to understand the process, we should not allow our perspective to become too narrow. We are confident that Wander Lowie's ideas will continue to inspire both language researchers and teachers to embrace the complexity of language learning and teaching.

Personal note

It is unfortunate – for him and for us – that Wander is retiring already when, in his own words, “he is only just warming up”. But such is the Dutch system, and on the bright side: It will allow him to enjoy more time skating and cycling. As (former) members of the Meesterschapsteam MVT, we will miss his wisdom and his good-humoured and effective leadership. During our meetings, Wander also never failed to emphasize that high quality work cannot come without a good lunch, apple pie or brownies – good advice that we should not forget in times that are often too busy. We are proud of the team’s achievements and immensely grateful for the collaboration that we thoroughly enjoyed. Thank you, Wander!

Author contributions

Sible Andringa: conceptualization, writing original draft, writing – review and editing; Janine Berns: writing – review and editing; Nivja H. de Jong: writing original draft, writing – review and editing; Bert Le Bruyn: writing – review and editing; Maaïke Koffeman: writing – review and editing; Marjon Tammenga-Helmantel: writing original draft.

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Supporting information

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