Prologue

CDST: Everything Dynamic Goes?

Kees de Bot

As in all research areas, theories in applied linguistics (AL) have their own life cycle. Ever since Kuhn's (1962) groundbreaking *The Structure of Scientific Revolutions*, we know that theory development in science is not a gradual or linear process. According to Kuhn, science develops in three distinct stages. The start is 'prescience' in which there is no central paradigm, but rather a wild and incoherent set of ideas brought together. This is followed by 'normal science', when scientists attempt to enlarge the central paradigm by 'puzzle-solving'. The third stage is 'revolutionary science' in which a new paradigm emerges that can deal with both old data that didn't fit with the existing paradigm and with new data that can only be explained within the new paradigm.

New theories have to prove their worth. Journals, editors and reviewers will be critically evaluating the publications based on a new framework, and while getting publications into leading journals continues to be problematic, gradually more and more leaders in the field are starting to endorse the new paradigm. At this point, a theory may reach a critical state where it may either show a breakthrough or start a gradual demise because in the end the theory did not meet the expectations, or the resistance is too strong.

Does this also apply to Complex Dynamic Systems Theory (CDST)? With respect to the impact of CDST in developmental psychology. Van Geert (2011) sketches three scenarios:

- The pessimistic stance is that such a paradigm shift [to CDST thinking] will not occur, primarily because the forces that act against paradigm shifts in developmental psychology – if not in all scientific disciplines – are now too strong to allow for paradigm shifts.
- The less pessimistic prediction is that DST will not diffuse into developmental psychology as a whole as I would hope, but will survive as yet another subdivision in developmental psychology.
- The optimistic prediction is that in line with DST itself, the growing number of currently rather isolated islands of DST applications in

the world will finally form a critical mass, leading to a tipping point phenomenon... Or a velvet evolution. (Van Geert, 2011: 277)

More or less the same holds for CDST and AL, and it is not clear what direction CDST will take. When CDST was introduced to AL by Larsen-Freeman in 1997, her article on this topic did not catch on immediately; it took the field almost a decade to see the potential of her contribution as several other research groups around the world joined in in what has been called 'the dynamic turn' (de Bot, 2015). While there is a substantial core group of researchers working on CDST at this point, only time will tell whether the seeds that were planted by the older generation will bear fruit in the years to come.

Theories go through different stages and cycles. They do not emerge out of the blue, but result from earlier thinking and empirical work. There is always a current paradigm, even if that paradigm is not systematically defined. Paradigm shifts follow from dissatisfaction with current and old paradigms. There may be new data, or new types of data (such as neuroimaging techniques in cognitive science) that are incompatible with the existing paradigm. There may also be conflicts at the personal level leading to groups splitting off (and becoming the fiercest opponents of the 'old' paradigm).

To what extent and how quickly new theories are accepted by a given research community depend on the state of the field and the forces that hinder or support it. 'Research data only really become information when they attract advocates for the messages they contain. Thus endorsement of data as "evidence" reflects judgments that are socially and politically situated' (Nutley *et al.*, 2013: 24). So, the next phase of the cycle is the spreading of the word through publications and presentations at conferences, books and special issues of journals, and training a younger generation in the new framework. Researchers working within the new paradigm will try to convince others to consider the new theory as an alternative.

Resistance or acceptance will differ between those who belong to the orthodox followers of the old paradigm and those who are eclectic in their use of theories. New theories may be seen as a threat by researchers working exclusively in an existing theoretical framework. They may have built their career on that framework and are known for it, get invited as plenary speakers, acquire subsidies and are promoted to full professor. A new theory always calls for substantial investment and openness to something new and may put all of that in peril.

For example, the resistance against a CDST approach was clearly voiced by Kevin Gregg in his 2010 review of Larsen-Freeman and Cameron's (2008) book on CDST. Gregg is not known for the subtlety of his evaluation of anything outside strict universal grammar (UG) thinking. His main point is that language is not a dynamic system:

> If we take 'language' in a narrower sense to refer to the linguistic
> competence(s) of an individual – the standard view in theoretical
> linguistics – all normal humans reach a steady state fairly early in life,
> which is to say that language in this sense is not dynamical, hence by
> definition not a complex system. When I say steady state, I mean steady:
> I have been using English for more years than I am going to let on, and
> since puberty at least, pretty much nothing has happened to my phono-
> logical, semantic, or syntactic knowledge. (Gregg, 2010: 553)

Apart from the fact that there is substantial evidence for language attri-
tion through non-use and crosslinguistic influence (Schmid, 2011), it is
hardly conceivable that Gregg's language system was completely unaf-
fected by his move to a Japanese university. Also, it is questionable if the
linguistic 'competence' of an idealised individual is currently the standard
definition of 'language' in linguistics.

In the past decades, the impact of UG-based approaches to second
language development (SLD) has clearly declined (Hulstijn, 2019). After
having seen golden years in which UG seemed the only acceptable theory
of language, with a massive presence at conferences and easy access to
leading international journals and subsidies for researchers working
within UG, in recent years the role of UG as the leading paradigm is
beginning to be taken over by Usage-Based approaches which are com-
patible with CDST thinking.

Another typical phenomenon in theory building is that early adopters
become defenders of the original version of the new paradigm which they
tend to see as the 'true' theory. However, if a new theory catches on, its
reach will automatically broaden. The zealots will resist any adaptation
and aim at defining the essential characteristics as much and as narrowly
as possible. If a theory causes a breakthrough, more and more researchers
will pick it up and either adapt their work to make it fit with the new kid
in town, or they try to stretch the theory to make their research fall under
the new paradigm and belong to the work by the frontrunners to which
they aspire. With growing popularity, the more technical/mathematical
parts and labels of the theory become mainstream, and with that these
labels lose their specific meaning. A good example in the present context
is the term 'dynamic'. While in CDST this refers to the changing interac-
tion of variables over time, in the mainstream this specific meaning gets
lost. Now, numerous articles mention the term 'dynamic' even though a
CDST interpretation is not intended.

So what is required for research to be labelled 'dynamic' in a CDST
sense? According to most researchers in CDST, the essence of CDST is
the dynamic interaction of variables, so an interaction that changes over
time. This means that there should always be something that changes.
Measuring language development over time requires data on different
time scales, and thus dense longitudinal studies are needed. This brings

about a practical problem when conducting research in a CDST framework: Since longitudinal research implies repeated data collection over a longer period of time, finding funding is a major challenge and once secured, for PhD students a problem might be that longitudinal studies hardly fit in the typical three to four-year PhD contracts. But as several of the papers in this volume show, it can be done.

In his influential book *Against the Current. Essays in the History of Ideas*, Isaia Berling (1979) discusses the development of ideas with an emphasis on almost forgotten thinkers whose work was not appreciated or valued in their own lifetime, only to re-emerge much later. As is evident from his discussion of theories in different fields, not all ideas come to fruition and most theories are short-lived. In his highly interesting *A Directory of Discarded Ideas*, Grant (1981) discusses a large number of ideas that were ultimately untenable, but that created the foundation for more durable ideas. While we can ridicule these discarded ideas on the basis of current knowledge, a proper analysis shows that much of the knowledge at any point comes from research at earlier moments in time, and our current ideas may be ridiculed when their time comes.

So if old theories are superseded by newer theories, how exactly is it that theories fail? There may be various reasons, some of them scientific, others more sociological. It may be that there is no empirical support for the theory or that, over time, the scientific landscape changes in such a way that the original empirical foundation no longer meets contemporary standards. Another reason is the so-called 'decline effect'. In 2010, Lehrer wrote an article for the *New Yorker* on this effect which may occur when scientific claims receive decreasing support over time. Lehrer discusses a number of examples, mainly from medicine, and concludes that decline may be caused by the need to have a new niche, by a publication bias, but also by satiation. Other factors are the retirement/death of the main figures who were instrumental in the development of the theory, and the theory being overtaken by a new theory.

In her discussion of CDST, Larsen-Freeman (p.c. 5/6/2017) raised the issue of what constitutes a theory. Do CDST, or UG, or Usage Based (UB) actually qualify as 'theories'? What exactly is a theory is a matter of debate. An influential definition is the one by the American Academy of Science:

> In science, the term 'theory' refers to a well-substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment. (National Academy of Sciences, 1999: 2)

What 'some aspect of the natural world' is for AL depends on one's definition of AL. De Bot (2015) asked some 100 researchers in the field of AL how they would define the field. Roughly speaking, there were three perspectives:

- Everything linguistic apart from theoretical/descriptive linguistics.
- The application of linguistic knowledge and tools to solve real-world problems, and more specifically language learning and teaching.
- The study of SLD.

In our discussion of the life cycle of theories, we will limit our scope to the last perspective; thus, theories on SLD as 'some aspect of the natural world'. These theories range from UG and sociocultural theory to usage-based approaches and CDST. It is not always clear what these theories are actually theories of. No theory can claim to cover the complete process of language in use, and there is no single overarching theory for all aspects of SLD. Most theories focus on linguistic or grammatical aspects (Processability Theory/UB/Input Processing), others take language functions as a starting point (Systemics, Sociocultural Theory [SCT]). Some are general theories of development and change (SCT/Connectionism, CDST) that may or may not have specific subtheories dealing with SLD. Since the various theories deal with different dimensions on SLD, their development may vary in direction and pace. The issue focused on here is whether they go or have gone through similar stages over time. Theories are typically dynamic and changing due to new findings, changes in Zeitgeist or the emergence of competing theories.

It is proposed here that theories go through two types of cycles. The first cycle is one in which a theory emerges and becomes established, the second is one in which satiation takes place and new theories challenge the current one. These cycles are similar to Kuhn's normal and revolutionary science. The adherents to a specific theory are not necessarily in the same stage of adoption. Some of the forerunners may no longer experience the novelty of the theory, while for others it is the new thing for which they have been looking. This holds for CDST too. In addition, while many researchers have taken it on as a useful mid-level theory and use its metaphorical means to get a better insight into the processes of development, others point to the weaknesses or the overlying mathematical nature of the theory.

As mentioned earlier, theory choice by an individual researcher is often assumed to be a completely rational process, but this is probably not true. Larsen-Freeman and Cameron argue:

> The theory that we choose to work with, explicitly as researchers and perhaps implicitly as teachers, will dictate how we describe and investigate the world. It controls how we select, out of all that is possible, what to investigate or explain, what types of questions we ask, how data are collected, and what kinds of explanations of the data are considered valid. (Larsen-Freeman & Cameron, 2008: 160)

All of the above is relevant when we talk about Marjolijn Verspoor. With her colleagues, she importantly contributed to turning CDST and

its development into a prominent new perspective. But to get there, she had to follow a long and winding road. After attending a traditional, grammar-focused teacher trainer programme, she moved to the United States where she worked as a language teacher, including German, for which she was hardly trained. In those 20 years, she managed to write several handbooks, and worked with Winitz on autonomous language learning programmes. She completed her PhD in Leiden. It was around this time that she abandoned UG for various reasons. The main reason was that the educational effects of this linguistic theory were too limited and that alternative linguistic theories such as Cognitive Linguistics (CL) provided a much stronger starting point. Around that time, in the 1970s and 1980s, UG was by far the most dominant theory in most linguistic departments. So this was not an easy time for an aspiring researcher to find a research position that was not UG oriented. Despite that, she opted for Groningen where the UG researchers formed a strong and self-conscious group that was not particularly open to newcomers from another church. Marjolijn Verspoor realised that for her, becoming the umpteenth generative grammar linguist in such a competitive environment was not the most attractive option. This is not to say that the choice she made for Cognitive Grammar (CG) and its theories on development made her path unwinding and short. CG in those days was not taken seriously as she found out, and there was basically no room for more and deviant researchers, so she went on to take a job as an English language teacher, which has continued to be an important interest and source of inspiration, and data, in particular on L2 writing development. In 2007, the widely cited Bilingualism: Language and Cognition article on the relevance of DST for second language learning was published, which was inspired by earlier work from Diane Larsen-Freeman and Paul van Geert (de Bot *et al.*, 2007). Marjolijn then developed a line of research with several PhDs on CDST and its application, the dynamicity of which was a regular point of discussion at staff research meetings. She heralded the implementation of a more lenient CDST school that liberally applied notions from CDST. As all CDST adepts, she, often with a colleague or PhD student, submitted various articles to leading AL journals with mixed success (though most of these early writings have been published in adapted form in the meantime).

Coming back to the life cycle of theories, it is obvious that CDST is now in the second cycle. There is some satiation in the research groups working on CDST, but many researchers have met their limits in terms of statistical and mathematical knowledge. In the AL community, CDST has made its mark and many researchers have taken over relevant aspects for their own research, but the Gregg-adapts will beyond doubt attack this theory whenever they can. As mentioned, Paul van Geert's scenarios for the impact of CDST in developmental psychology are equally

relevant for AL. As a useful and easily understandable metaphor, CDST will hang on for quite some time, and there we need young and engaging researchers to carry this further.

Over the years, Marjolijn Verspoor developed from a more or less traditional linguist, as evidenced by her early work on articles, to a cognitive linguist. Her work had not attracted much attention in a time when Chomsky and his followers dominated theoretical linguistics. In several of her publications, Marjolijn Verspoor has argued against the UG approach and in support of the UB one. She moved from a CL approach to an AL one. Her definition of CL and its scope are broad which makes CL suitable for many, if not all, aspects of language.

The present volume brings it all together, from her link with CL through Ron Langacker's contribution, to her dynamic usage-based approach through the contributions of her PhDs. Working with her colleagues in Groningen, she developed an interest in the development of second language writing which led to a substantial number of publications, mostly in cooperation with one of her PhDs. Her work has been well-received as evidenced by articles in the leading AL journals such as *Applied Linguistics*, *Second Language Writing*, *Language Learning* and *The Modern Language Journal*.

Her interest in the application of CDST in education led to the development of the Dynamic Usage-Based approach (DUB) which is discussed in detail in several chapters in this volume. DUB made her what might be called a full applied linguist, someone who bridges the gap between research and application in education though it took some years for this approach to settle. This confirms that a late start may still lead to an admirable academic career.

References

Berling, I. (1979) *Against the Current*: *Essays in the History of Science*. Chicago, IL: Chicago University Press.

De Bot, K. (2015) *A History of Applied Linguistics 1980–2010*. New York: Routledge.

De Bot, K., Lowie, W.M. and Verspoor, M.H. (2007) A dynamic systems theory approach to second language acquisition. *Bilingualism: Language and Cognition* 10 (1), 7–21.

Grant, J. (1981) *A Directory of Discarded Ideas*. London: Ashgrove Press.

Gregg, K. (2010) Shallow draughts: Larsen-Freeman and Cameron on complexity. *Second Language Research* 26, 549–560.

Hulstijn, J.H. (2019) An individual-differences framework for comparing nonnative with native speakers: Perspectives from BLC theory. *Language Learning* 69, 157–183.

Kuhn, T. (1962) *The Structure of Scientific Revolutions*. Washington: American Association of Science.

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

Larsen-Freeman, D. and Cameron, L. (2008) Research methodology on language development from a complex theory perspective. *The Modern Language Journal* 92 (4), 200–213.

Lehrer, J. (2010) The truth wears off. *The New Yorker* 13.52, 229.

National Academy of Sciences (1999) *Science and Creationism: A View from the National Academy of Sciences* (2nd edn). Washington, DC: The National Academies Press.

Nutley, S.M., Powell, A.E. and Davies, H.T.O. (2013) *What Counts as Good Evidence*. London: Alliance for Useful Evidence.

Schmid, M.S. (2011) *Language Attrition*. Cambridge: Cambridge University Press.

van Geert, P. (2011) The contribution of complex dynamic systems to development. *Child Development Perspectives* 5 (4), 273–278.