

UNCHARTED TERRITORY: A COMPLEX SYSTEMS APPROACH AS AN EMERGING PARADIGM IN APPLIED LINGUISTICS

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Developing a theory of applied linguistics is a top priority for the discipline today. The emergence of a new paradigm – a complex systems approach – in applied linguistics presents us with a unique opportunity to give prominence to the development of a foundational framework for this design discipline. Far from being a mere philosophical exercise, such a framework will find application in the training and induction of new entrants into the discipline within the developing context of South Africa, as well as internationally.

A TOP PRIORITY FOR APPLIED LINGUISTICS

Complexity theory is emerging as a new paradigm of doing applied linguistics (Larsen-Freeman & Cameron, 2008; Cameron & Larsen-Freeman, 2007; De Bot, Lowie & Verspoor, 2007; Kramsch, 2008). It is, in fact, the latest in a series of six paradigm shifts that the discipline has undergone since its inception in the middle of the previous century (cf. Davies, 2008:297). When such shifts occur, an opportunity arises to ask a number of questions relating to the foundations of the discipline. Given the urgency that is often associated with applied linguistic work, there are relatively few chances to ask questions about the theoretical and philosophical basis of the field. One of the more serious of such questions, to me, is whether our discipline has sufficient maturity to distinguish between the fashionability of a new paradigm, and the real value that a new paradigm might have as a contributor of novel design principles. For each paradigm offers a slightly different set of principles according to which applied linguistic solutions to language problems are designed. It is these applied linguistic design principles that guide the development of the artefacts, the designed products of the discipline, such as language courses, language tests, and language management plans or policies.

A related foundational question concerns the measure of continuity or discontinuity of the new paradigm with what went before, with previous traditions and interpretations of the field. Can it be made clear, for example, precisely how a complex systems approach coheres with previous styles of working within the discipline, or exactly what redirection of applied linguistics its adoption will entail? All of these questions are relevant when we honour, in the current volume, the work of an applied linguist who has spent a whole lifetime working in the field. I shall attempt to answer below only some of the more salient questions that are being raised here. It should perhaps be said that it is not unusual that in such a transition between paradigms, there are more questions than answers. It is my intention, however, to follow this up in a larger, more detailed study. The current discussion should be viewed, therefore, as a

first and provisional mapping out of the larger agenda of a much more detailed subsequent analysis of complexity theory and applied linguistics.

As a starting point for the discussion, consider the following table, which sets out the successive approaches that have informed applied linguistic work since its inception (adapted from Weideman, 2007b; cf. also Weideman, 1999):

Table 1: Seven successive traditions within applied linguistics

	Paradigm/Tradition	Characterized by
(1)	Linguistic/behaviourist	'scientific' approach
(2)	Linguistic 'extended paradigm model'	language is a social phenomenon
(3)	Multi-disciplinary model	attention not only to language, but also to learning theory and pedagogy
(4)	Second language acquisition research	experimental research into how languages are learned
(5)	Constructivism	knowledge of a new language is interactively constructed
(6)	Postmodernism	political relations in teaching; multiplicity of perspectives
(7)	Complexity theory	language emergence organic and non-linear, through dynamic adaptation

Having been informed by various approaches, applied linguistics is therefore no monolithic, self-contained enterprise, nor has it ever been. This transitional time from the currently dominant approach (postmodernism) to another paradigm (a complex systems approach) presents a historically unique opportunity to reflect critically on the impact of such shifts on the design work being done in the discipline.

There is no doubt that applied linguistics now needs a foundational clarification, articulated in a philosophically informed theoretical framework. A recent symposium published in *TESOL Quarterly* (42[2], 2008) makes it clear, however, that we currently have little of substance within applied linguistics that can serve as a theoretical framework for the whole of the discipline. As McNamara (2008:303) remarks in one of the contributions to this *TESOL Quarterly* discussion, even the surveys that we do have today (such as those of Rajagopalan 2004 in Davies & Elder, 2004; Kaplan, 2002; or Hinkel, 2005) are more descriptive, synchronic or methodological than backed up by a coherent theoretical framework. We may therefore have (limited) descriptions of different traditions or styles of doing applied linguistic work (cf. also Cumming, 2008:287), but little sense of what makes applied linguistics the disciplinary endeavour that it is. Similarly, we sometimes remain uninformed or even ill-informed about what makes our discipline cohere across its different paradigms, interpretations and approaches. What guarantees the continuity of applied linguistics? What makes it endure in spite of paradigmatic shifts? And how are its discontinuities to be accounted for? How does one explain the philosophical differences between, for example, the first ('scientific' approach) and fourth traditions of doing applied linguistics on the one hand and, on the other, the fifth one, postmodernism (cf. Kumaravadivelu, 2006)?

Of course, each of the different approaches in Table 1 above is informed by some theoretical or philosophical starting point. In this way, they may each on their own terms be internally more or less consistent, and, hence, intelligible, offering professionals working within the

field of applied linguistics different ways “to become clear about what we do; to affirm, inform or challenge what we do; ... to make sense of our experience” (Larsen-Freeman, 2008:293). Their internal consistency and intelligibility as starting points for applied linguistic work are, however, no guarantee that they could, as theoretical vantage points, robustly explain the connections that they have with the other traditions and paradigms that operate within the discipline. In fact, as different perspectives, they are quite likely to constrain, compete with and suppress the others, even while co-existing with them (McNamara, 2008:304). We must not forget that different traditions are more often than not institutionalised, and derive organisational power from the contexts in which they are embedded. Such power may well be resistant to change, or at least unwilling to offer room for alternative theories or philosophies to grow.

APPLIED LINGUISTICS CANNOT FUNCTION WITHOUT A PHILOSOPHICAL BASE

The development of a robust and systematic foundational framework for applied linguistics, a foundation that addresses and articulates the philosophical bases of the field, is important for several further reasons. First, apart from clarifying the nature of the field, such a framework is needed to evaluate the expectations one may have of the results of applied linguistic research and designs. Second, in allowing us to assess critically the research basis of applied linguistic designs, we are alerted to potential future challenges facing the discipline. These challenges mainly concern the induction of new entrants into the discipline, and specifically how they will take up and experience their professional responsibilities. Thus we need a theoretical way of accounting for new paradigms that arise within applied linguistics. This theoretical, foundational framework itself, however, will have to reach beyond applied linguistics and its disciplinary history. As McNamara (2008:304) points out:

It is important to keep alive an understanding of the theoretical perspectives that have been proposed in the past so that their enduring relevance is appreciated and we do not go on reinventing the wheel... Historical amnesia is a persistent temptation in a practically oriented intellectual field such as ours.

How this understanding must be accomplished, however, and what measure of accounting for and appreciating ‘enduring relevance’ we should have, is, of course, not a given. So the theoretically robust framework that the discipline of applied linguistics is in need of should ideally be able to clarify and explain the coherence of all of the different paradigms that have influenced the discipline. Such a framework must of necessity be one that stands beyond the parochial defence of its own theoretical starting points, and the concerns of a single disciplinary involvement.

For various reasons, work within a discipline rarely connects with the foundations of that discipline or with other fields. This is even true in the case of third generation applied linguistics (see Table 1, above), the one attempt so far in the history of our field that has actively promoted multidisciplinary work (cf. Van Els, Bongaerts, Extra, Van Os & Janssen-van Dieten, 1984). The foundational framework that applied linguistics needs is not necessarily of an interdisciplinary (which, as one reviewer has pointed out, some have claimed is impossible anyway) or multidisciplinary kind, however, but is philosophical in nature. Though related, a multidisciplinary approach is obviously not the same as a transdisciplinary one. This does not mean that work done from the former is unimportant or

irrelevant, but that what a complex systems approach has again sensitised us for is that the theoretical framework we should seek for applied linguistics may perhaps be found in a transdisciplinary or philosophical foundation. It is therefore interesting that, in a context apparently unrelated to current discussions on a complex systems approach to applied linguistics, one finds a similar kind of appeal for transdisciplinarity in recent work on the social dimensions of language testing; having situated the subfield of language testing squarely within the discipline of applied linguistics, McNamara & Roever (2006:254) call for breaking “down the walls between language testing researchers and those working within other areas of applied linguistics, social science, and the humanities generally.”

One may disagree with one implication of McNamara and Roever’s (2006) appeal, namely that we should limit the task of “breaking down the walls” to those separating the human sciences only. If we are to adopt a more comprehensive, foundational framework for the discipline, then, in making applied linguistic and language test designs, we need to refer not only to the human or cultural dimensions of our experience – the way that our designs relate and open up to, or in the technical sense intended here are disclosed by ethical, legal, aesthetic, economic, social and lingual concerns. This disclosure of our designs by cultural considerations yields important, regulative conditions for those designs. Yet we should also articulate how our designs refer to the natural dimensions of experience: its numerical, spatial, kinematic, physical, organic and other aspects, which in their conceptual relationships with the technical mode offer to us the constitutive or necessary requirements for applied linguistic designs to be adequate. As we shall see below, in complexity theory we find references especially to the organic aspects of language development and growth. It is nonetheless exciting to note that in more than one subfield of applied linguistics there is a new realization that the discipline connects both with human and with natural sciences (Weideman, 2009).

Is a philosophical framework such as is required for applied linguistics available? The short answer is no, but one attempt at developing such an emerging theoretical framework for applied linguistics has been explored by Weideman (1999, 2003, 2006, 2007a, 2009) in various publications.

In what follows, I shall explore how this framework can be utilized, first, to deepen our understanding of the emerging new paradigm of complexity theory, and, second, to enhance our conceptualisation of applied linguistics as a discipline. The terms theoretical or foundational framework will be employed to refer to the philosophical foundations of applied linguistics. For historically important approaches to applied linguistic work, I shall mainly use the terms ‘approach’, ‘interpretation’, ‘paradigm’ or ‘tradition’, of which seven have been identified in Table 1 above. After articulating below the methodology and theoretical framework that can be employed in such enquiry, I turn subsequently to the conceptualisation and evaluation of a complex systems approach within applied linguistics.

A THEORETICAL FRAMEWORK FOR APPLIED LINGUISTICS

In this section the theoretical starting points of the argument are identified and briefly noted, as well as the research methodology. The latter has three dimensions: 1) a systematic starting point (the characterization of applied linguistics as a discipline of design); 2) a historical inquiry of how different approaches have interpreted the discipline; 3) an investigation of how these systematic and historical perspectives together can inform a foundational framework for applied linguistics. Put differently: how is applied linguistic concept-formation made

possible? And, in light of this framework, which concepts have gained prominence in the history of the discipline?

Throughout its history, applied linguistics has concerned itself with the design of solutions for language problems. In this respect, it has been compared by some (initially by Corder, 1972; but cf. too Cumming, 2008:286) to the science of engineering. One should be careful not to dismiss this, especially from a currently fashionable point of view, as merely a typically modernist or technicist definition. As Lillis's observation on what design emphasizes postmodernist approaches lack (2003:205) illustrates, or as Bell's (2003:333) comments on Kumaravadivelu's work make clear, this characterization also encompasses postmodernism in applied linguistics. Since it is a characterization that therefore brings together both modernist and postmodernist approaches in the field, it is, in my opinion, a worthwhile theoretical starting point for a foundational applied linguistic framework. What is meant by referring to applied linguistics as a 'design discipline' therefore is that *its meaning is derived from the technical or formative mode of experience* (Schuurman, 1972), *in which appropriate forms are given to human plans or designs; in this case: plans or designs that present technically conceived and theoretically based solutions for language problems.*

While historically the concerns of applied linguistics have found a major stimulus in the realm of designing solutions to language teaching problems, they are of course neither limited to that, nor to English language teaching (or TESOL) in particular. Though most of my work experience lies within the subfields of developing language teaching or designing language tests, the exciting point about the new framework for applied linguistics to be employed below is that it may have broad appeal across most, if not all, fields of applied linguistic endeavour. Nonetheless, such applications shall be for others to make: the aim here is to restrict the exposition and its initial implications and outcomes to my own primary areas of expertise.

The development of a coherent theoretical framework for applied linguistics will have to take both the systematic starting point (that it is a design discipline) and these traditional, historical emphases into account. But it would also need to take up the challenge of articulating how the discipline relates to other fields, both in the humanities and in the natural sciences.

In the theoretical framework being developed by Weideman (2007a, 2007b) for applied linguistics, a number of preliminary distinctions are made that could provide an indication of how such inter-disciplinary relationships can be accounted for. It derives from a philosophical perspective developed initially by Dooyeweerd (1953) in which reality has a modal horizon that allows our theoretical analysis to conceptualize a multiplicity of unique, mutually irreducible, yet interconnected aspects. By viewing these modalities as irreducible but interconnected, Dooyeweerd's approach in principle avoids the reductionist pitfalls that impede theoretical concept-formation whenever one mode of reality is absolutised, and all others are subsumed under it. In this view, developed further by Schuurman (1972) for the applied sciences, among the various modalities the technical mode of design fulfils a leading or qualifying function in applied linguistic designs, and relates both in a foundational or constitutive direction with 'natural' dimensions of experience, which delimit the fields of enquiry of the natural sciences, and in a regulative sense with those aspects of experience that constitute the boundaries of the human and social sciences. In terms of this framework, there are thus connections that can be explored between the leading technical function of an applied linguistic design and the numerical, kinematic, physical, and organic aspects of experience, as well as with the lingual or symbolic, social, economic, aesthetic, and political dimensions of

reality, as in Table 2 below (adapted from Weideman, 2007a). Two of these functions stand out as terminal, critically important facets of applied linguistic designs: the leading technical function, and the foundational, analytical one. Moreover, the connections or references that lie in the foundational direction are conceptualised as “constitutive” analogies (retroicipations), and those that follow the technical are marked as “regulative” or disclosing references (anticipations). Disclosure here means an opening up of one leading or qualifying aspect by its anticipation of dimensions that occur later in the sequential order of aspects.

This framework is beginning to be applied in understanding the relations between transparency and accountability in language test design (Van der Slik & Weideman, 2005, 2009; Weideman, 2009), but its relevance and robustness need to be tested further in other applied linguistic applications. The claim is that it underlies and makes possible applied linguistic concept-formation; the various analogical technical concepts in the last column (and labelled retroicipatory and anticipatory moments there) lie at the basis of applied linguistic concept-formation.

Table 2: Constitutive and regulative moments in applied linguistic designs

Applied linguistic design	Aspect / function / dimension / mode of experience	Kind of function	Retroicipatory / anticipatory moment
is founded upon	numerical	constitutive	unity within a multiplicity of design principles/sources of evidence
	spatial		extension
	kinematic		internal consistency (technical reliability)
	physical		internal effect / power (validity)
	organic		differentiation and adaptation of design
	psychical		volition and imagination
	analytical	foundational	design rationale
is qualified by	technical	qualifying / leading function (of the design)	
is disclosed by	lingual	regulative	articulation of design in a blueprint / plan
	social		implementation / administration
	economic		technical utility, frugality
	aesthetic		harmonization of conflicts, resolving misalignment
	juridical		transparency, defensibility, fairness, legitimacy
	ethical		accountability, care, service
	belief		commitment, trust

The main advantage of the framework, derived from a number of initial philosophical distinctions refined further by Schuurman (1972; but cf. too 1977, 2005) is that it is an attempt to develop a non-reductionist perspective on our disciplinary endeavours, since it

relates every mode of experience to every other unique mode or aspect, in this way demonstrating the interdependence of these unique dimensions of our world. At the same time, the uniqueness of the leading technical function of an applied linguistic design does not make that function absolute, or promote it to be the sole explanatory principle of the phenomena that are stamped or guided by it, as is the case in reductionist (and specifically, in this case: technocratic) approaches.

The framework provides us with a provisional starting point for a foundational perspective in applied linguistics. Applied to the emerging paradigm of a complex systems approach in applied linguistics, it will have to demonstrate its ability and robustness as theoretical tool that can be used to assess the new emphases of this approach, as well as the potential pitfalls that may be associated with it. We turn first, therefore, to an exploration of the main characteristics of a complex systems approach.

A COMPLEX SYSTEMS APPROACH

Though there have been other, smaller studies, the pioneering and most ambitious work in describing the relevance of a complex systems approach for our field is to be found in the recent exposition of Larsen-Freeman and Cameron (2008).

As these authors make clear quite early on (2008:x,5), complex systems thinking finds its roots in biology. It is not surprising, then, that key concepts revolve around the adaptability (2008: 33) and potential of systems, especially the ability to self-organise (2008:62), and “the organic nature of change” within those systems (2008:1,17). In the same way, the focus of the new approach on constant, dynamic, ongoing change is one that is related in the first instance not to a physical, but to a biotic understanding of things: “... an organism’s ongoing activity continuously changes its neural states, just as growth changes the physical dimensions of the body”, the authors remark (2008:17; cf. too 29,32,72). In a complex systems approach, the emphasis is on dynamics, which requires “us to look for change and for processes that lead to change, rather than for static, unchanging entities” (2008:16; also 26). We should note, however, that the emphasis is not as much on analogical physical concepts, such as dynamic effect or power, as on analogical biotic conceptualisations of phenomena. Phrased differently: the flux that is the focus of the approach interprets it in an organically dynamic way.

This brings us to a second important and related tenet of the new approach: the non-linearity of the processes of change that it focuses on. If one defines a complex system as one whose behaviour is not predictable in terms of a single dimension, or set of dimensions, but rather emerges from the interactions of its components (2008:2), then it follows that the behaviour of a system cannot be predicted in a linear fashion (2008:72), and that causal explanations, so typical of modernist explanations of phenomena, are no longer sufficient. Rather, since all the various components of a complex system (including what previously was sometimes inappropriately sidelined as ‘context’) are in continuous interaction, there is ‘reciprocal causality’ (2008:7,60). The processes of change can therefore be described as a “movement in a trajectory across a ‘state space’ or ‘phase space’” (2008:20,43). The change process, if drawn towards a sufficiently powerful ‘attractor’ (2008:20; Chapter 3), can come to a provisional stability. An example of this is when certain emergent patterns of language use become temporarily stable around the strong attractor of the notion of a standard language (2008:81).

It is clear that a complex systems approach therefore wrestles with the age-old question of how to explain the sometimes remarkable stability of a continuously changing system; to explain, to put it another way, the systematicity or orderliness of a system:

If we are seeking an explanation of how ‘order’ ... comes to be in complex adaptive systems, then we may find it in thinking of a complex system that is flexible enough to maintain its stability through continuous adaptation (Larsen-Freeman & Cameron, 2008:56; cf. too 36).

It should be noted, however, that the emergent patterns that a complex systems approach finds are relative stabilities. Complexity theory acknowledges that no system is wholly free of change, since the many interacting components of systems each bring their own measure of instability and thus unpredictability with them. So even small changes that are introduced into a system can have dramatic effects, spreading “through the system, diluting the determinism and rendering the outcome of system activity unpredictable” (2008:75).

COMPLEXITY THEORY, LANGUAGE AND LEARNING

Applied linguists are directly concerned, of course, with the identification and discovery of regular patterns, both in language and in learning. The grammatical subsystem of a language is just one such recurrently regular pattern (2008:84). Language develops, from a complex systems perspective, in a process of co-adaptation, that gives rise to an alignment of patterns between, for example, learner and interlocutor (2008:127). Again, the biotic terminology is evident: even the relationship between accelerated lexical growth and grammatical development is described in organic concepts, as two subsystems that are connected growers (2008:149). So, too, learning a language is seen as language development rather than as acquisition, as a process of dynamic adaptation (2008:157) rather than as something that, once learned, is ‘possessed’ for all time. In the same way, discourse and discourse types are multiply interconnected complex systems, and the language-using patterns that each discourse type yields are a resource or language potential that is actualised in each instance of talk or text creation within such a system (2008:174). So, for instance, the expectations that derive from previous experiences of co-creating and aligning oneself with the latent meaning potential of others through discourse, as these have been identified, for example, by conversation analysis, become ‘attractors’, or locations of relative stability for language use in such contexts (2008:179; cf. too 193). In the same fashion, written texts can be viewed as co-constructed, yet asynchronous, collaborative compositions, in which writers imaginatively engage with, and thus interact with, prospective readers (2008:188).

AN ILLUSTRATION AND EXAMPLES

As regards learning language in the classroom, a complex systems approach furthermore emphasises that even small interventions can make a big difference (2008:200). Some of the clearest indications of how a complex systems approach can contribute new design principles for language teaching can be found in the chapter of Larsen-Freeman and Cameron’s (2008) book that deals with the language classroom.

In one excellent illustration of a complexity perspective on a how a classroom task was accomplished, they describe (2008:204ff.) how to interpret the variation on a language task,

both in terms of language use and the potential to grow the potential resources at the disposal of learners. The task in the example required of Norwegian learners to nominate and then discuss an arctic animal in English. By making use of the concept of an interaction differential, they measure the difference between the demand from the teacher (from open requests, the most demanding, to closed questions, the least demanding) and the responses from the learners, that range from minimal (the least desirable) to more expansive (the most desirable) offerings.

The interactive talk between the teacher and individual learners is then carefully plotted, turn by turn, in terms of this differential. The analysis shows that the trajectory of the interaction goes from a high (and therefore pedagogically meaningful) differential towards the powerful, but pedagogically less helpful attractor of a low differential, as especially the teacher leads a process of co-adaptation that will ensure at least some measure of success on this language task. In one significant case, however, the trajectory does not slide into this less desirable stable condition. This is where a learner chooses an animal of which he indeed has some knowledge, and on his own initiative increases the interaction differential.

This interpretation is significant for the design of language tasks. It is evident that, in tasks like these, if the teacher beforehand ensures an increase in the prior content knowledge of the learners about the topic of the discussion, the interaction differential may increase, and so stretch the potential latent language resources of the learners. As the authors remark (Larsen-Freeman & Cameron, 2008:212), activities in the language class would enhance the potential of learning and growth of learners' language if they can be designed "to challenge learners to exploit the meaning potential of their developing systems in new ways."

Complexity theory also enables new interpretations to be given to previous observations on the fossilization of language. A learner's stage of acquisition of an additional language has long been seen as an interlanguage (Selinker, 1972), a kind of waystage on the path to the desirable end of (almost) native-like competence in the target language. Rather than taking a cross-sectional view as this, a complex systems approach can plot the path of individual growth and variation across a time-scale (Larsen-Freeman & Cameron, 2008:245). And since "every organism is changing and determining what is important in its world-creating and remaking the world in which it lives" (2008:143), the explanations for fossilization must yield, in a complex systems perspective, to an acknowledgement of the 'boundless' potential to grow one's language resources, and not stop at the powerful attractor that is "the neural commitment of the first language, and the ensuing entrenchment, [that] may lead to a deep valley or well" (2008:142), which may constitute a trough in the trajectory of learning an additional language.

In this kind of view, teachers and language course designers can also find an explanation not only for individual variation, but also of apparent lapses in language learning. In two telling further examples, Larsen-Freeman and Cameron (2008: 135ff.) show how individual growth may vary in terms of fluency, vocabulary complexity and grammatical complexity for a number of language learners, and how, in a single learner, there may be both growth and lapses. Since these learners are seen as organisms that are free to explore new behaviours (2008:148), and since language growth does not follow a linear path, a complexity theory explanation can readily provide an interpretation for a phenomenon that many teachers will attest to. How is it, one often hears language teachers ask, that learners sometimes 'unlearn' or simply fail to learn elements of the target language that they should, by linear expectations, already have possessed or acquired?

In a complex systems perspective the many interacting subsystems of language, and the abilities of learners in terms of components of this whole, such as discourse practices and structure, grammatical patterns, vocabulary resources, as well as the various other interacting dimensions, like interventions and language demands in specific contexts, provide an explanation for non-linear growth in learners' language, since variation in any one or more parts of these interacting systems may change the state of development of a language learner.

From a design angle, this means that a complex systems approach would make us more sensitive, as applied linguists, to the varying demands and levels of learning that can sometimes be found in a single classroom. As these authors put it (2008:226):

... language resources of individuals exist only as latent potential to engage in appropriate patterns of interaction until realized in specific discourse environments... The challenge is for interaction, tasks and tests to be designed, planned, and managed so as to push and stretch an individual's language resources to the edge of their current potential.

FOUNDATIONAL QUESTIONS CALLED UP BY THE NEW PARADIGM

However familiar the above may sound to practising teachers, there is no doubt that complexity theory makes a new contribution to our understanding of how to design language tasks. The main reason for its ability to do so, however, derives from giving us another way of looking at language. One would be justified in feeling, therefore, that a complex systems approach does not in the first instance give us an alternative design for our teaching, but rather a novel view of language. It is the effects of taking this perspective seriously that might have an impact on designing language teaching.

The focus on language may of course be a potential weak point of the approach, since applied linguistics designs bring together more than merely linguistic considerations, and have done so at least since what was characterised in Table 1 above as third generation work in the field. A complex systems approach would therefore need to demonstrate that it can also contribute to designs from the angle of learning and teaching. As one reviewer has pointed out, it clearly has the potential, through the emergentist view of language learning that it takes, to do so, and it is this possibility that needs to be realised in designs.

By taking a transdisciplinary approach, the approach stretches across the boundaries of cognitive psychology and sociolinguistics. By borrowing methods and concepts from studies as diverse as those of finger movements (2008:208), or by reinforcing and giving fresh interpretations to, or devising new uses for some of the more conventional current approaches such as conversation analysis, discourse studies, ethnographic description (2008:242) and action research (2008:244), the complex systems view described by Larsen-Freeman and Cameron gives a clear indication of how it will realise its full potential to influence new designs.

Furthermore, it exposes, though now from another perspective than the conventional objections that have been raised, some of the shortcomings of language course designs that assume linear growth in the learners' language using potential. At the same time, it sets itself apart from postmodernism, whose response to over-simplification of the world through a focus on entities is to fragment and disperse, to deny wholeness by making it multiple, hybrid, and difficult to grasp. Complexity theory, in contrast, embraces complexity,

interconnectedness, and dynamism, and makes change central to theory and method (Larsen-Freeman & Cameron, 2008:1).

In an earlier study (Weideman, 1987), I had characterised approaches to applied linguistics as lying on a continuum between technocratic and revolutionary perspectives on design. If one wishes to do the same kind of plotting for a complex systems approach, one would have to look closely at which historically important ways of doing applied linguistics (ways that were summarised in Table 1 above) it is most closely related to, and most distant from. The current authors downplay the natural scientific bases of complexity theory, probably because those kinds of connections have in the past, especially in modernist conceptions of applied linguistics, tended towards the technocratic side of the scale, and are currently unfashionable. Be that as it may, since a complex systems perspective, possibly because it has not yet had enough time to influence applied linguistic conceptualisation, seems to be more or less neutral with regard to technocratic versus revolutionary leanings, a more useful relationship to distinguish with previous traditions of doing applied linguistics may be to draw attention to its closeness to views that place language at the centre of applied linguistic designs. In this way, it is certainly related to first (Larsen-Freeman & Cameron, 2008:79), second, and fourth generation applied linguistics. A further indication of this is the use of terms like (meaning) potential, language resources, genre, discourse, and so forth, that derive from the extended linguistic paradigm characteristic of second generation applied linguistics.

In addition, by allying itself with Vygotskian views on development, a complex systems approach has affinities with fifth generation work in applied linguistics, which was for the greater part inspired by constructivist starting points. In rehabilitating ethnographic study, and pointing to the uses of action research, the approach also lifts out its connections with components of postmodernism that have been overshadowed by the overt and prominent political agenda of the other parts of the latter (cf. Weideman, 2003). In all, then, in the new insights, or at least fresh interpretations of conventional data that it brings, a complex systems approach displays both continuity with what went before and discontinuity with it.

The measure of discontinuity that it brings, and which is captured summarily in Table 2 above, is that it brings a distinctly new perspective, and, I believe, a timely one, that places applied linguistic work in principle beyond postmodernism. While the continuity of our design work will mean that the concerns raised by the latter will not go away, at the same time we have in principle moved on to new challenges, which were obscured before by overemphasis of certain privileged (though admittedly important) dimensions of our designs.

From a philosophical point of view, the main contribution of a complex systems approach lies in its attempt to offer a non-reductionist perspective to applied linguistics (Larsen-Freeman & Cameron, 2008:231; also 16,40ff.,72). In such a perspective the absolutisation of a single dimension is, in principle, avoidable. The critical question that adherents of the new approach would have to answer, however, is whether one might not perhaps call the emergentism, that seems to lie at the bottom of its conceptual offering, itself a reduction. Phrased differently: is the strong emphasis on organic analogies, though novel, not itself another (over)simplification of things lingual?

In defence of its anti-reductionist stance, proponents of a complex systems view may point to its attention to other than biotic analogies. So for example, its analogical physical conceptualisations of language dynamics, or analogical psychical identification of lingual volition (Larsen-Freeman & Cameron, 2008:157), together with its emphasis on the numerical

analogy of a multiplicity of systems, certainly all add additional, non-biotic, dimensions to its perspective. Similarly, in its identification of how the subjective, normative ability or potential that humans have for creating language (2008:104,226), which are notions related to the formative analogy within the lingual dimension of our experience, correlates with the factual resources that are at the disposal of language-using agents, it touches on yet another set of analogical lingual concepts. Indeed, the approach is in my estimation a genuine attempt at investigating and analysing what in any foundational framework would be categorised as 'complex' (in distinction from merely complicated) concepts, which are notions that view phenomena such as language growth and loss, lingual subject and object, and lingual norm and lingual fact from a multiplicity of analogical conceptual angles.

Is it a sufficient perspective on complex concepts? Perhaps not, as these authors graciously acknowledge; complexity theory, according to them, needs to be complemented by other theories (2008:14). What does concern me still, though there is no space to discuss this fully here, is that the authors are hesitant to acknowledge that the predominantly organic analogies of complexity theory are more than merely metaphorical (2008:11ff.). I find this unnecessary, especially in view of their treatment of all the other analogical concepts, such as dynamism, openness, self-organisation, adaptation, emergence and system as apparently non-metaphorical and unproblematic. A lingual system, for example, if defined as a unity within a multiplicity of lingual norms or patterns that correlate with a vast variety of factual lingual phenomena, is no metaphor, but a conceptual, analogical link between the lingual and numerical dimensions of experience.

The opposition of complexity theory to rationalist conceptions of human lingual ability gives the impression that its focus is more strongly on empirical, factual data of language use (cf. Larsen-Freeman & Cameron, 2008:219, for example), an impression that is enhanced for me by its meticulous analyses of actual language events.

Several potential contributions of the new approach to applied linguistic designs have already been pointed out above. To these should be added its insight into the technical differentiation of designed interventions (Larsen-Freeman & Cameron, 2008:67), caught up as these are in new and emerging webs of interacting social, administrative, and political systems. As these interacting systems co-adapt in response to social and other pressures, new designed solutions in offering language instruction also emerge.

CONCLUSION

Will a complex systems approach help us to achieve more easily some of the emancipatory purposes to empower disadvantaged groups that Cumming (2008:289) foresees as a goal of applied linguistic endeavour? The discipline of applied linguistics has been extra-ordinarily relevant in South and Southern Africa, as well as in the rest of Africa, in helping to address the numerous language problems that are thrown up for language use, growth, acquisition, status and loss in developing countries (Young 2005).

In my view, if benefits will accrue from the further exploration here of a complex systems approach, such work should first attempt to make the designs and plans to be implemented more intelligible, interpretable to all concerned, and transparent to the public. Applied linguists have a dual accountability (Bygate 2004), both to their professional peers and to the public. The social or public accountability for our designs can best be promoted by theorists if

the theoretical defensibility of the plans becomes analytically coherent. For those working within the field, this is a first and necessary step to making our designs transparent (by releasing as much generally accessible information about them as possible), and subsequently becoming socially accountable for them. Too often, Africa has been at the mercy of language solutions dumped on it by powerful publishing and political interests. Whether the approaching fashionability of a complex systems approach will have the same effect as previous traditions in this regard remains to be seen.

The prospective influence of the new approach also has relevance for the training of applied linguists not only in South Africa, but also elsewhere. In this regard, the development of a theory of applied linguistics may enable us to achieve a better understanding locally and internationally of how paradigm shifts affect our discipline, and to begin to develop a conceptual framework for interpreting their relative merits. This contribution has been a preliminary, initial contribution to that.

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