On Language Learner Agency: A Complex Dynamic Systems Theory Perspective

DIANE LARSEN–FREEMAN

University of Michigan, 610 E. University Avenue, Ann Arbor, MI 48109 and University of Pennsylvania, Educational Linguistics, 3700 Walnut Street, Philadelphia, PA 19104   Email: dianelf@umich.edu

ABSTRACT

Agency has attracted considerable attention, especially of late. Nevertheless, perceptions of language learners as nonagentive persist. In this article the Douglas Fir Group's call for a transdisciplinary perspective is heeded in a Complex Dynamic Systems Theory's (CDST) conceptualization of agency. It is suggested that CDST maintains the structure–agency complementarity while bringing to the fore the relational and emergent nature of agency. Coordination dynamics is identified as a possible mechanism for the phylogenetic and ontogenetic emergence of agency. CDST further characterizes agency as spatially-temporally situated. It can be achieved and changed through iteration and co-adaptation. It is also multidimensional and heterarchical.

In this era of posthumanism, an issue that is also taken up is whether it is only humans who have agency. The article then discusses educational practices that could support learner agency. Finally, the article closes with a discussion of agency and ethical action.

<END OF ABSTRACT>

Keywords: agency; Complex Dynamic Systems Theory; relational; emergent; heterarchy; teaching practices; ethics

We live in tumultuous times. Many feel disempowered by policies, actions, and forces over which they have little or no say and certainly no control. With literal and virtual walls being constructed around the world to prevent the entry of thousands of people seeking refuge from

regions suffering environmental degradation, economic deprivation, violence, and war, "these days are dark" (Henry Giroux at the AERA Conference, 14 April 2018). Ortega (2017) remarked recently that "(. . .) the world is witnessing serious deterioration of solidarity and respect for human diversity" (p. 1). Indeed, with the rise of populism within the United States, some of the hard-won political and social gains of the past few decades are eroding. On a still more local level, scholarship itself is under attack, and scholars who challenge authority (e.g., climate scientists in the United States) find their work subject to attempts to delegitimize it.

It is no wonder, then, that academics from a number of disciplines have shown new interest on the topic in an attempt to reclaim their own agency. To this point, Ahearn (2001) observes that social movements in recent decades have encouraged scholarship on agency (cited in Miller, 2014), and clearly this increased interest in agency is also evident in our field in the form of monographs (Deters, 2011; Gao, 2010; Miller, 2014; Vitanova, 2010), anthologies (Benson & Cooker, 2013; Deters et al., 2015; Murray, Gao, & Lamb, 2011), numerous articles (e.g., five articles on parent and teacher agency in affecting language education and language revitalization were posted online in July/August 2018 in the open-access journal *Language, Culture and Curriculum*), and conference presentations. In some of these cases, agency has been associated, and even conflated, with free will, consciousness, identity, autonomy, and empowerment;[1] in other cases, agency is said to extend to nonliving entities.

At times, agency has been characterized as a personal feature of individuals. Given the state of the world, as I have just depicted, one can rightfully ask, when people's personal data is up for sale, how much room is there for individual agency? The answer is that individual agency can only be understood in relation to the material and social world and what it affords or denies (e.g., Goller, 2017). As Goller, paraphrasing Emirbayer and Mische

(1998), writes, "(. . .) agency can only be captured in its full complexity if it is situated within the flow of time and takes into account relational and structural aspects toward which participants can assume different orientations" (p. 447).

Thus, while I acknowledge the contextual (including social, spatial, material, cultural, temporal, relational, and structural) embeddedness of agency, I also assume that learners can adopt different "orientations" to it. This is an important point in light of a theme in the 2016 Douglas Fir Group's (hereafter DFG) article that while learners' "understandings are to a great extent shaped by larger social institutional expectations, they, as individual agents, also play a vital role in shaping them" (p. 33). One of my purposes for writing this article, then, is to expand on this DFG theme. In so doing, I adopt Evan Thompson's definition (on-line interview by Heuman, 2014): "agency is the capacity to act in the world." More specifically, following the DFG's lead, I use it here to refer to optimizing conditions for one's own learning (or not—Duff & Doherty, 2015) and choosing to deploy one's semiotic resources to position oneself as one would wish in a multilingual world (Byrnes, 2014).

While the theme of agency has been pursued in anthropology, biology, philosophy, psychology, and sociology, among other disciplines, in keeping with the DFG's call for transdisciplinary approaches, I enlist the help of Complex Dynamic Systems Theory (CDST) in investigating agency in this article. CDST qualifies as transdisciplinary in two ways. First, CDST "represents an important challenge to the disciplinary silos of the twentieth-first-century academy" (Byrne & Callaghan, 2014, p. 3). Indeed, Byrne and Callaghan, among others (see Larsen–Freeman & Freeman, 2008), assert that complexity science is central to the foundation of a post-disciplinary research program. Second, besides respecting, but moving beyond disciplinary boundaries (Morin, 2008), CDST introduces new cross-cutting, transcendent intellectual themes (Halliday & Burns, 2006; Hult, 2010a; Larsen–Freeman, 2012a), on which I draw in this article.

First, though, I address my long-standing personal concern about learner agency, which was a second motivation for my writing this article. My third purpose was to show the value of extending insights afforded by CDST from the natural world to the human one. I suggest how CDST introduces a mechanism to account for the phylogenetic and ontogenetic development of human agency. I also contend that CDST endorses several perspectives on agency that stem from different disciplines, and, as a result, it may contribute a coherence to the discussion of agency. Then, I touch upon what agency might look like in a posthumanist world. I conclude with thoughts on how this understanding plays out in education and how it demands ethical actions.

<A>CONSTRUING LEARNERS AS NONAGENTIVE

As I have written, work on agency has become more prevalent in recent times; however, I have been concerned about second language learners' construal as nonagentive for a long time (e.g., Larsen–Freeman, 1983; 2002b; 2012b; see also Lantolf & Pavlenko, 2001), especially given that learner agency is fundamental to success (McLoughlin, 2016). At least implicit claims about the nonagentive status of second language learners have been made from a number of different perspectives on second language development:[2]

1. Developmental—that there are universal acquisition orders (the result of a built-in syllabus) and developmental sequences, which all learners follow.

2. Pedagogical—that task-as-plan can be equated with learner performance on task when enacted (Coughlan & Duff, 1994); that learners need comprehensible input to be provided for them.

3. Social—that young learners can be passively socialized into the communities in which they live (Duff & Doherty, 2014).

4. Categorical—that individuals are categorizable, while disregarding their intra-category differences (and thus changing how we interact with them and how they think of themselves) (Thompson regarding Hacking's 2006 "looping effect" and "making up people").[3]

5. Statistical—that we can capture what is happening with individuals by simply aggregating data on these individuals (Molenaar, 2008; van Geert, 2011).

6. Teleological—that language is a closed teleological system (which encourages deficit thinking, e.g., Larsen–Freeman, 2006a; 2014).

7. Ideological—that the language or dialect of minoritized populations is unacceptable.

Let me make clear my position: I do believe we humans are social beings. Communion with others is essential to our survival as individuals. Also, I recognize the need to guard against an ethos of individualism and neoliberalism (e.g., Ayn Rand), and I am aware that SLA's social turn was in part a rejection of the individualism of 'mainstream' SLA theories (Benson, 2017). I do not wish to be overly agentive (Block, 2013), I am not a Cartesian dualist, pitting the social against the individual, and I do not discount collective agency. Nor do I reject the posthumanists' charge that agency is not exclusively human. Finally, I recognize that I am a product of my own noncollectivist culture, and I am aware of my privileged status within it. For instance, a "common aspirational narrative" (Condoleezza Rice, PBS special "American Creed," broadcast 27 February 2018) no doubt influences my sense of agency.[4]

I should also acknowledge that even when limiting the discussion of agency to language development, for subaltern populations,[5] the feeling of being disregarded is not new. For instance, Mick (2015) points out that there are few languages that have legitimated status within educational institutions, and raciolinguists have argued that the matter of which languages enjoy this status is based on geopolitical and economic factors. Then, too,

indigenous populations have long witnessed the assault on their languages by settler-colonists. It is equally well-known that the playing field is not level when it comes to resources that support additional language learning. For instance, power imbalances deny some easy access to speakers of the target language (Norton, 2000; Pavlenko, 2001; Zuengler & Miller, 2006), and economic and racial inequality means that members of the majority communities have more opportunities for language study than do others (Larsen–Freeman & Tedick, 2016). However, "being positioned as disempowered is not the same as having no agency" (Miller, 2014, p. 9), a point which Norton Peirce's (1995) research amply demonstrates. Individuals whom we might regard as less powerful in relation to dominant social groups are not necessarily lacking agency. Nonetheless, it is important not to lose sight of the fact that having agency and having choices is linked.

Claire Kramsch (2012) has written, "We are free to act but at the same time are not in control of the choices that are given to us" (p. 15). Judith Butler (2016) asserts "We are called names and find ourselves living in a world of categories and descriptions way before we start to sort them critically and endeavour to change or make them on our own. In this way, we are, quite in spite of ourselves, vulnerable to, and affected by, discourses that we never chose" (p. 24). It is no doubt true that our agency is more limited than we are aware of due to the asymmetries of affordances (Dufva & Aro, 2015). As agents in multiple, nested, complex systems, the decisions that we make as individuals cannot help but be influenced by our connections with all kinds of social groupings (see Hall, 2019, this issue).

However, while acknowledging this reality, we must also leave scope for individual agency and avoid masking differences in agency exercised by members of particular social groups (e.g., McKay & Wong, 1996). We must not overlook the learning paths that individuals take. Although second language development is rightly seen to be embedded in a larger sociohistorical ecological system, languaging is still performed by an agentive learner

in particular in a specific place (García & Flores, 2014) for particular reasons with particular others. We must attend to this level of granularity as well, a level of granularity that needs more attention by the DFG (Han, 2016).

As Vitanova (2002, p. 216) observes, "to Bakhtin, discourses do not automatically position individuals; rather, individuals actively use speech genres to orient themselves in relationships and interactions. This model of agency is both dialogical and creative for it lies in particular people's creative responses to particular situations at a particular time" (cited in Deters, 2011, p. 24).

Indeed, sometimes particular people, known only by one name—Julie, Wes, Bob, Valerio—have been powerful correctives to prevailing SLA theories at the time they were studied: Ioup et al.'s (1994) Julie, an adult native speaker of British English living in Cairo, who appeared to speak Egyptian Arabic in a way virtually indistinguishable from native speakers of Arabic, presented as counter-evidence to the Critical Period Hypothesis; Schmidt's (1983) Wes, a native speaker of Japanese living in Hawai'i, who, despite having considerable comprehensible input and social proximity to English speakers, never appeared to make progress in speaking English grammatically; Liu's Bob, a Chinese speaker learning English, whose use of particular questions in specific interactional contexts overrode any putative universal sequence of acquisition (Tarone & Liu, 1995). Along these same lines, there is Eskildsen's (2012) Spanish-speaking Valerio, whose use of negative English constructions to accomplish locally contextualized interactional goals departed from established developmental sequences, thus calling them into question. And there have been others: For example, Norton's (1995) account of Eva who, by challenging her subject position, was able to reject the way she was positioned and excluded by others in her workplace.

Thus, while there may be a long-standing debate over the primacy of structure or agency in shaping human behavior (see Archer in Brock, Carrigan, & Scambler, 2017), I think it well to remember, as Carter and Sealey (2000) argue,

> [t]oo great an emphasis on structures denies actors any power and fails to account for human beings making a difference. Too great an emphasis on agency overlooks the (. . .) very real constraints acting on us in time and space. And reducing each to merely a manifestation of the other (. . .) necessarily results in a theory which is unable to capture the complex relations between them. (p. 11)

<A>COMPLEX DYNAMIC SYSTEMS THEORY AND AGENCY

Various theories have been invoked to account for agency: performativity theory (e.g., Miller, 2014), sociocultural theory (e.g., Arievitch, 2017; García, 2014), sociocognitive theory (e.g., Dufva & Aro, 2015); critical realism (e.g., Block, 2015; Boucher, 2018), and others. Each makes its contribution, and I do not wish to argue for a synthesis nor do I want to encourage a competition. As McLoughlin (2016) has observed: No one theoretical model seems able to completely capture the role of agency in second language acquisition— admittedly even the one to which I am committed. And yet, one must ask: If we are to entertain a transdisciplinary perspective, which the DFG article encourages us to do, what would that be? It is noteworthy to me that the National Academies recently convened a group of leading complexity researchers to examine nine pressing global issues. These included examining whether the biosphere is sustainable, studying the robustness of power grids and disaster relief networks, and trying to determine how to exert control on the spread of disease (The National Academies, 2009, in Yoon, Goh, & Park, 2018). I submit that this convening

and others like it are an indication of the transdisciplinary reach of CDST and its applicability to both human and nonhuman affairs.

Therefore, it will not surprise many when I say that one way to investigate the agency of language learners is through the transdisciplinarity of Complex Dynamic Systems Theory (CDST), which brings a relational, ecological systems lens to the study of agency. A relational system is "an integrated whole whose essential properties cannot be reduced to those of its parts. They arise from the interactions and relationships between the parts" (Capra & Luisi, 2014, p. 10). What is important for the terms of this discussion, then, is to understand the dynamic relationship between social structure and agency as constituting an irreducible system, structure and agency never to be reconciled through the synthetic unity of Hegelian dialectism, all while the space in which the relationship is situated and the time at which it is situated ever changes.

As the structure–agency coupled system moves through time and space, it can evolve in many directions, depending on its "initial conditions," which are always being updated. The same components in the system can have different effects, and different components can have the same effect; the latter phenomenon biologists refer to as "degeneracy" and social scientists call "epifinality."

As the components interact nonlinearly, patterns arise that could not have been anticipated from the components themselves. There is no central executive in a complex system; control is distributed. There is also no preformationism. The patterns are softly-assembled to deal with the contingencies of the moment. With iteration (but not repetition), patterns are built up at different levels of scale (Agar, 2005; Hult, 2010b). The recurring patterns self-organize into attractors, regions in state space that a dynamic system tends to move, thus achieving some dynamic stability, never stasis. Moreover, a perturbation to the

system can move it out of its attractor basin, the region in which the attractor exerts a force, to a new trajectory, although it might simply return to its original attractor state.

As the system moves through space-time, the agent and structure co-adapt, that is, the change is bi-directional and synchronous. What propels the change in humans is the reflexivity of which they are capable. "This reflexivity results in a unique feedback path between the emergent structure and the individual agents – each agent being an observer of the structure he/she contributes to producing and the process of observation contributes to what emerges" (Goldspink & Kay, 2007, p. 12). More recently, Warren (2018) has added that "humans' intentional behavior is not only self-organized, but also adaptive: Agents harness dynamics and information in the service of goal-directed behavior."

Because complex systems change on multiple timescales and operate at different interacting levels of scale, I believe that a systems view can bring a nonreductionist scientific holism to the study of agency (Heylighen, Cilliers, & Gershenson, 2007). I realize that this description of CDST is far too synoptic for a first-time reader. For an interested party, there is a growing body of literature to consult, but I hope that I have provided a description sufficient to contextualize my subsequent remarks about agency.

<B>*Agency is Relational*

First, it seems to me that what CDST can contribute by way of expanding on the DFG article is the position that agency is relational. Agency is not inhered in a person. There is no homunculus or innate internal program that is responsible for the observed behavior. Instead, agency is interpellated from the self-organizing dynamic interaction of factors internal and external to the system, persisting only through their constant interaction with each other. In this account, the sense of agency is relational. It is not something "derived from internal representations of our own action-related processes. Rather, it is essentially another

dimension of our relation with the world, and derives from the ways in which we establish, lose, and re-establish meaningful interactions between ourselves and our environment" (Buhrman & Di Paolo, 2017, p. 216).

In discussing an enactivist approach, which is related to CDST, Shaun Gallagher (2017) underscores the idea that [agency] "is not a property of one individual brain, mind, or organism, but is relational" (p. 3). Agency is always related to the affordances in the context, and thus inseparable from them, and affordances, in turn, are ecological rather than merely physical features of the world, defined in terms of the 'systems' relationship between the organism and its environment (Ellis, 2019, this issue).

<B>*Agency is Emergent*

"The question of agency and directedness in living systems has puzzled philosophers and scientists for centuries. What principles and mechanisms underlie the emergence of agency?" complexity theorist Kelso (2016, p. 490) asks. In keeping with CDST, his answer lies in his concept of coordination dynamics (Larsen–Freeman, 2017b). Agency arises when spontaneous activity is coupled to the world, forming a coordinative structure (Kelso, 2016, pp. 491–492). Kelso (2016) states:

A strong case can be made that coordinative structures (. . .) are units of selection in evolution (. . .) and intentional change (. . .) The ability of complex systems to softly assemble themselves into functional synergies or coordinative structures in a context-sensitive fashion offers significant selectional advantages. Coordinative structures are embodiments of the principle of functional equivalence (. . .): they handle the tremendous degeneracy of living things, using different combinations of elements and

recruiting new pathways 'on the fly' to produce the same outcome (. . .) (p.

492)

Kelso (2016) offers a simple example of an infant's first experience of agency. He

posits that agency emerges in humans at a very early age—say when a baby first becomes

aware that it can make things happen; for example, by kicking its legs, it can make a mobile

move or shaking its fist, a rattle sound. The coupled dynamics between the baby's

movements (kinesthetic, visual, auditory, and emotional) and the consequences they produce

constitute the first experience of agency for the infant. This may appear at first simply to be

an example of stimulus–response learning, but Kelso suggests otherwise. "What may have

been missed (. . .) is the essence of what it means to be aware of oneself as a source of

control, of doing something deliberately, and how this comes about" (p. 493). As he put it in

May 2018, "[The awareness of] making the world change is the origin of agency" (Kelso,

2018). While Kelso's example of an infant with a mobile or rattle may be culture-bound, the

point is that the perception of one's own agency depends on detecting spatiotemporal

correlations between one's actions and its effects (Haggard & Tsakiris, 2009). "[W]hen the

baby's initially spontaneous movements cause the world to change, their perceived

consequences have a sudden and sustained amplifying effect on the baby's further actions.

This autocatalytic mechanism is continuous with our understanding of how biological form

develops (. . .) and of the feedforward network motifs so ubiquitous in the design of

biological circuits (. . .)" (Kelso, 2016, p. 492).

It goes beyond the iteration of coordinative structures between a child's actions and

its physical environment, of course. "When a child's actions are treated by others as

meaningful, the child is likely to repeat them and such actions become more habitual over

time [. . .]" (Miller, 2014, p. 16); thus, "[l]earners' agentive capacity should be understood to

develop in relationship with others and with the world" (Miller, 2014, p. 142). Admittedly, it

is a stretch to go from a child kicking in its crib to the full agency of adult users of a language; nevertheless, the point should not be lost that it is in "mundane social practices" that we become someone who is assigned and claims responsibility for particular actions (Miller's discussion of Davies (1990), pp. 11–12). Bagga–Gupta (2015) puts it this way: "Conceptualizing actors separated from the affordances offered in and through the communicative practice they co-construct in different settings would therefore comprise a reductionist view of the practice" (p. 128), and certainly such a comprisal would not be in keeping with CDST. Neither would an ahistorical account because a CDST adherent would maintain that an individual is "an interactant shaping apperception (. . . in) an unfolding history of interaction with the world" (Hellerman, 2018, p. 42).

<B>*Agency is Spatially and Temporally Situated*

Agency, therefore, is not only about spatial "settings" (Kramsch, 2018); agency is temporally situated as well. In keeping with this, Emirbayer and Mische (1998) propose that agency is influenced by the past, engagement with the present, and orientation to the future. Agency is thus temporally situated and "both reproduces and transforms those structures in interactive response to the problems posed by changing historical situations" (p. 970). This accords with Scollon's (2001) nexus of practice position in which social actions carry history with them and what Pavlenko and Lantolf (2000) refer to as "history in the present."

Just as a complex system can achieve relative stability, as evidenced by its self-organizing attractor landscapes, agentive acts can achieve some stability, too, through the interplay between structure and agency. Emirbayer and Mische (1998) attribute the stability to "the selective reactivation by actors of past patterns of thought and action, routinely incorporated in practical activity, thereby giving stability and order to social universes and helping to sustain identities, interactions, and institutions over time" (p. 971). Biesta and

Tedder (2007) add a qualification: "[p]articularly under the rapidly changing 'external' circumstances of high or late modern societies, a substantial amount of effort may be needed to keep a situation relatively stable over time, and this requires agency as well, both in terms of orientation and action" (p. 136).

Moreover, it is not only effortful reactivation that is responsible for the stabilizing and changing dynamic between agency and structure. It also lies in the "the imaginative generation by actors of possible future trajectories of action, in which received structures of thought and action may be creatively reconfigured in relation to actors' hopes, fears, and desires for the future" (Emirbayer & Mische, 1998, p. 971). Nevertheless, although agency is involved with the past and the future, it can only ever be "acted out" in the present, as Biesta and Tedder observe.

Writing about language learner agency from a CDST perspective, Mercer (2012) states: "Viewing agency holistically also implies considering it as temporally situated connecting together the dynamics of a person's ongoing life history including their past and present experiences as well as their future goals, expectations and imaginations" (p. 57). As a result, when we attribute agency to a learner, we understand that any relationship between and among the factors "has to be understood as temporally situated, as creative with respect to antecedents and driven by local contingency" (Giorgi, 2012, p. 15).

<B> *Agency Can be Achieved*

Biesta and Tedder (2007) contribute an ecological perspective to their discussion of agency. They posit that agency is not a power that one has (see also, Miller, 2016), but rather is something one *achieves by means of* an environment, not simply *in* an environment (Biesta & Tedder, 2007, p. 137). The distinction between *by means of* and *in* is important because it reinforces the theme that agency is not something independent from structure. It further

allows not only for the fluctuation of agency over time, but also that the agent has recourse to change its agentive status, a point to which I shall return later in this article. However, as Biesta and Tedder (2007) caution,

> [t]o think of agency as achievement rather than as a 'power' also helps to acknowledge that the achievement of agency depends on the availability of economic, cultural and social resources within a particular ecology. In this sense we can say that the achievement of agency will always result from the interplay of individual efforts, available resources and contextual and structural 'factors' as they come together in particular and, in a sense, always unique situations. Methodologically an ecological approach to understanding agency thus focuses the attention on the unique configurations of such 'factors.' (p. 137)

<B>*Agency Changes Through Iteration and Co-Adaptation*

CDST is essentially a theory of change. There are two mechanisms in accounting for change in complex systems: iteration and co-adaptation. Some years ago (Larsen–Freeman, 2012c), I wrote about the former with regards to language change. Adopting a CDST perspective, I claimed that iteration produces the recurrent sequences found in language at the same time that it introduces change into a system. In a complex system, what results from one iteration is used as the starting point for the next iteration. Thus, the starting point or initial condition is always different, and the consequence is the system's mutability. As I noted earlier, however, iteration also provides some stability to the developing system due to the selective reactivation of certain past patterns (Emirbayer & Mische, 1998). I suggested that iteration was a better term than repetition, arguing along with many others, that what we say

is never an exact repetition of what we or someone else has said (e.g., Derrida, 1976).

Furthermore, I mused on why iteration was significant (Larsen–Freeman, 2012c):

> What would be the evolutionary advantage to someone of not repeating the same sound or word the same way twice? Well, first of all, not repeating the same word the same way creates options in our language resources that give us choices for how we want to make meaning, how we want to position ourselves, and how we want to express our identity or identities. In other words, iteration introduces heterogeneity. It opens up spaces. Iteration does not preserve the fidelity of the original, but only approximates it. In so doing, it includes in itself alterity (Deleuze, 2004). (p. 203)

It seems to me that this same dynamic could account for change in agency (cf. Miller, 2014). For Butler (1999) (whose work on iteration was brought to my attention by Tim McNamara [p.c., 2018]), "the iterability of performativity is a theory of agency" (p. xxiv). And in his new book, McNamara (2019) makes a cogent argument along these same lines with regards to gender identity. It is in the slight difference that gender is enacted from one time to another, which makes transformation possible.

In sum, according to CDST, iterative processes are responsible for two outcomes. First, stability comes from iterative processes, "recurrent evolving responses to given situations," yet second, these processes at the same time allow for "emergence and situational contingency" (De Fina & Georgakopoulou, 2008, p. 383).

The other mechanism of change in complex systems is co-adaptation. For instance, co-adaptation takes place in first language development between an infant and an "other," early on its caregiver. As a child and its caregiver interact, the language resources of each are dynamically altered, as each adapts to the other. CDS theorists refer to this as the "coupling" of or co-adaptation between one complex system to another. Co-adaptation is an iterative

process, with each partner adjusting to the other over and over again. Pertinent to the present discussion, such adaptations lead to reciprocity between agency and structure. The dimensions of the structure constrain the actions that can be performed, and the actions that can be performed produce changes in the structure (Gibson, 1993).

<B>*Agency is Multidimensional*

Agency is not only about behavior. As Lantolf and Thorne (2006) have written, agency also "entails the ability to assign relevance and significance to things and events" (p. 143; also cited in Deters et al., 2015). In discussing the outcome of a football game, Sullivan and McCarthy (2004) refer to Rosaldo's (1986) example:

Describing how the game is structured, its genesis in history, and how it functions in society might be extremely informative and interesting but would convey very little about what the game means for those involved. Football fans, for example, "love" and are "loyal" to their team and may even "hate" the opposition. For them, this is a key part of what makes the game meaningful and what makes victory "sweet" and defeat "bitter." We miss this kind of personal meaning unless we place feelings, emotions and values at the centre of our understanding. (p. 291)

(cf. the joyous celebration that erupted after the Philadelphia Eagles' Super Bowl win in 2018!)

We see the multidimensionality of agency in Joana's (Mercer's 2012 research participant) agency, which is seen to be interlinked with a range of intrapersonal factors such as her emotions, beliefs about language learning, self-beliefs, personality, and motivation. Clearly, these all impact agency. Keysar (2018) has recently pointed to his research

concerning the emotional connection with one's language, and how such a connection affects the decisions that multilinguals make in how they deploy their available language resources.

<B>*Agency is Heterarchical*

Witherington and Lickliter (2016) observe "dynamic systems proponents take as their ontological starting point systems of relations (. . .) with components necessarily defined in terms of relations with other components and the system as a whole (. . .)" (p. 214). Importantly, in a relational system, the components of the system do not form a hierarchy (cf. Figure 1 in the DFG article), and each component in a complex system can have a different spatial and temporal reach (Walby, 2007). In the place of a hierarchy, then, we might think in terms of a heterarchy, where due to homologous dynamics, influence extends in both/many directions among the components of a complex system, rather than top-down or bottom-up[6] and is always changing over time. This decentralized and multidimensional view of causality means that change is not caused by a single component, directly and linearly affecting another component, but can emerge from changes in relations within the system (Mercer, 2018).

Furthermore, the heterarchy is fractal, in that each feature of any one component applies to the other components of the system, in holographic fashion. Here, I am thinking of the features that I have highlighted in this article, namely, their relational, emergent, dynamic, etc. character. Finally, any depiction, such as Figure 1 in the DFG article, needs to capture the dynamism that exists among the components of the heterarchy.[7]

<A>DO NONHUMAN SYSTEMS HAVE AGENCY?

Some readers might object to my attempt at providing coherence to the study of agency by appealing to CDST as simply an exercise in renaming. While my intention was to

challenge the way that learners have been positioned nonagentively and to suggest a metadiscourse for discussing agency, I am sensitive to the fact that I may simply be analogizing. I have found some satisfaction, though, in discovering some convergence between CDST and previous research on agency, to which I have not been a contributor. I also know that CDST has afforded me a way of thinking about complex phenomena in our field (Larsen–Freeman, 2017b), and it is to illustrate this point that I turn next before concluding.

<B>*Agency in the Era of Posthumanism*

A question that has arisen is whether CDST, a theory that has originated in the physical sciences, can account for human agency.[8] Brügge (1993), for example, insists that similarities between social processes and physical processes are misleading, rather than helpful. Then, too, some scholars in our field have rejected the notion that the laws of the physical world apply to humans. On the other hand, leading Dynamic Systems researchers Thelen and Smith (2006) comment that "self-organization, nonlinearity, openness, stability, and change—all qualities of complex dynamic systems—are not confined to biological systems. They are also found in complex physical systems such as chemical reactions, global weather changes, mountain streams, clouds, dripping faucets— wherever many components form a coherent pattern and change over time" (pp. 267−268), and many of us use these images when we attempt to explain CDST concepts.

Nowotny (2005) argues for the importance of transdisciplinary interfaces in which analyses of complex evolving systems are not to be left to scientists alone, since they increasingly turn out simultaneously to involve human agents *and* things, science *and* society, in novel configurations. Indeed, researchers who study physical systems and those who study human systems search for patterns in their respective phenomena. The fact that

there are fractals in language and in the natural world is such an example (Ellis & Larsen–Freeman, 2006; Larsen–Freeman, 2017a).[9]

But posthumanism has implications for applied linguists that exceed the search for common patterns. While it is easier to reject human exceptionalism when it comes to the agency of living nonhumans (Cook, 2015), it might make some uneasy to extend agency to nonliving material systems. Perhaps the strongest stance regarding agency and the intertwining of the physical and human systems comes from Hofkirchner (2012):

> I would like to paraphrase Jesper [Hoffmeyer] by saying that "(. . .) the universe is perfused with all kinds of agents–all of which are capable of generating and using signs according to the stage they happened to reach so far in the course of evolution. Such agents might be material systems that organize themselves, or living material systems, or human living systems." (p. 119)

<B>*Agency and the New Materialism*

Bruno Latour (2005) has challenged modernity's fundamental distinctions, such as the one between human and nonhuman. Certainly, the way that we speak in English alludes to agency in nonhuman, material objects (de Bot, 2018, p.c.). In a well-known case in Chicago, it has been said that Jane Byrne was elected mayor due to a snowstorm. "While we may be allowed to take for granted that the snow storm did not anticipate this result or have any intentions to bring it about it; nevertheless, it did leave its track in the web of American history" (Hoffmeyer, 1998, p. 36).

If it seems far-fetched to consider a snowstorm agentive, there are applied linguists who are thinking along the lines of the posthumanism and the new materialism in the scholarship of Barad (2007). For example, Canagarajah (2018) and Hawkins (2018) both de-

center human agency, and suggest that objects and other semiotic resources have agency in shaping messages, meanings, and understandings. In particular, Canagarajah discusses the representational power of objects in STEM fields and theorizes that objects in the environment have agency to shape human actors.

The conveniences of the modern world allow us to witness and benefit from the fact that "[t]hings mediate, actively shape, and constitute our ways of being in the world and of making sense of the world" (Malafouris, 2013, p. 44, cited in Clowes, 2018). Nowhere is this truer than with technology (also foregrounded in the DFG's article)—and our increasing reliance on it. At the very least, "[h]uman beings use material culture to bring new aspects of themselves into being" (Clowes, 2018).

However, saying things mediate human activity is different from saying that things have agency in human worlds. Deacon (2012) makes the point that "the apparent agency of the computer is effectively just the displaced agency of some human designer" (p. 101). Pennycook (2018) usefully observes "It is worth recalling that a posthumanist position does not aim to efface humanity but to rethink the relation between humans and that deemed nonhuman" (p. 457). So, here is where thinking inspired by CDST may be helpful. CDST encourages us to interrogate dichotomies such as that between human and nonhuman. Furthermore, I have written long ago about the challenge of drawing boundaries in a complex system. Since everything is interconnected, one might legitimately inquire as to where one system begins and another ends. One of the original systems thinkers, Gregory Bateson, asks us to consider where the boundary between the end of the blind man's cane and the world can be drawn. Bateson (1972) suggests that "[t]he way to delineate the system is to draw the limiting line in such a way that you do not cut any of these pathways in ways which leave things inexplicable" (p. 465).

Certainly, the level of granularity at which one is contemplating an object will make a difference. At one level, I see a desk as a static object, on which I can lay my books and papers. At another level, we know from physics that my desk is composed of atoms in motion. At this level, my desk is certainly not inert. Yet, applying this advice to a spatial system may be easier to conceive of than one constituted in time. Still, complex systems are constituted both in space and time, and therefore, the same question of boundary-drawing pertains. For instance, unless one is a creationist, one understands that we all began in a primordial soup. Then, chemical interactions in the primordial soup began to self-replicate. From these interactions followed single-cell organisms which began to compete with one another for resources and have evolved into various life forms ever since. How should we account in this chain for the transition between sub-human and a personal subjective account of agency? We have seen that the reflexivity of humans and their intentional adaptability are thought to be distinguishing features when it comes to human agency. We can add to these the matter of having a choice. Humans can choose whether to conform to social norms or not; molecules cannot choose whether or not they should interact (Capra & Luisi, 2014, p. 307). Still, claiming that agency rests solely with humans remains an open issue. For instance, we need to consider the entanglement of quantum physics in which sub-atomic particles behave differently depending on whether they are observed or not. While I am not claiming that particles have the subjectivity of humans, their behavior suggests that simple dualisms between human and sub-human are not helpful in a complex world where all things are interconnected.

Of course, de-centered causal pluralism is a characteristic of complex systems, and because of the interconnection of all things, objects can influence human behavior. If this is what is meant by the agency of objects, it is easier to accept. Moreover, I certainly acknowledge the mess that we humans have perpetrated on the rest of the globe in the

Anthropocene era. My reluctance to accept the agency of objects stems in part from what I observed earlier. We humans are meaning-making beings who interpret and attach personal meaning to events in our lives.

Mercer (2018) writes:

(. . .) humans exercise their agency to differing degrees in how they subjectively make meaning out of their experiences and their contexts, while in turn influencing and being influenced by them. This implies a need to move away from thinking of contexts and cultures as being monolithic external objective variables affecting an internal inner world. Instead, contexts and cultures are subjectively interpreted in terms of the meaning for individuals. Individuals are seen as being connected across time and space to multiple contexts, past, present and future. (p. 8)

It may all come down, then, to how one defines agency. Is it about the capacity to act in the world, the definition I have been using? Is it about influencing human behavior? Or, is it something entirely different? What I can be unequivocal about is that my use of CDST has been helpful in my thinking, and, in particular, my "thinking about the human world and its intersections with the natural world as involving dynamic open systems with emergent properties that have the potential for qualitative transformation" (Byrne, 2005, p. 98).

<A>EDUCATION IN SUPPORT OF LEARNER AGENCY

I turn next to considering how education can support learner agency. I begin by taking up the seven perspectives that I have alleged render learners as nonagentive.[11] First of all, there may be good reason to want to generalize across groups of learners. Patterns can be perceived at various levels of scale in a complex system. However, in light of the

characteristics of complex dynamic systems and the research it has informed, it is not difficult to see the fact that complex systems following unique paths takes issue with the claim of language acquisition orders that all learners adhere to. Operating from a CDST perspective, Lowie and Verspoor (2015) put it thusly:

> If we are interested in grand sweep effects that may be generalizable to large populations of learners, we will have to carry out group studies with representative samples that can be analyzed using Gaussian statistics based on the normal distribution. But if we are interested in how an individual learner progresses over time as a result of changing variables in a changing context, we will have to conduct longitudinal studies and use nonlinear methods of analysis. (p. 63)

Indeed, while allowing generalizations at the level of the group, sample-based research does not tell us about individuals. Van Geert (2011) warns:

> (. . .) models based on aggregated data from individuals have no logical bearing on models of individual processes. Molenaar (2008) calls this the ergodicity principle. He and his collaborators have shown that the implicit step, so common in the behavioral sciences, from sample-based research to individual process statements is often demonstrably incorrect. (p. 275)

Furthermore, entertaining a complexity theory perspective, educational researchers Moss and Haertel, 2016) state that

> [t]he same outcome may be generated in more than one way, so any theory needs to account not just for complex causes, but also for multiple complex causes. Further, similar mechanisms may lead to different outcomes as they interact with different features of the context (p. 208).

Thus, the nonlinearity and multicausality of the process argues against pedagogical treatments inevitably leading to particular learning outcomes for all learners (Larsen–Freeman, 2006b). In addition, the distributed control of a complex systems calls into question any characterization of learners as passively yielding to an authority or outside force, even one such as socialization.

Moss and Haertel (2016) continue as follows:

Central to these contextual features are the understandings, choices, actions and interactions of the people involved. "Human agency informed by meaning is absolutely part of the causal nexus" (Byrne, 2013, p. 221). These are shaped by their past histories and relationships within and across contexts as well as the social structures and institutions within which they live and work. (p. 208)

Given the complicated histories that individuals bring with them to learning and using a language, it is not hard to understand how by placing them in categories, we miss out on all the intra-category differences that make them unique.

As far as the teleological view of language is concerned, CDST posits that language is a complex adaptive system without end (Ellis & Larsen–Freeman, 2009). And, it also dismisses native speaker privilege because language as a complex adaptive system is realized in, and affected by, different contexts. Thus, there can be no one usage that is universally privileged, independent of purpose and audience (Larsen–Freeman, 2018a).

Much more could be said about these seven perspectives, but let me move on to the implications for educators which are implicit in these challenges. For after all, as the DFG asserts, the teacher's influence on learners is considerable. Given the definition of language learner agency with which I began this article ("optimizing conditions for one's own learning

and choosing to deploy one's semiotic resources to position oneself as one would wish in a multilingual world"), I ask now what our responsibility as educators is.

<B>*Teaching Practices: Optimizing Conditions for Language Learning*

Elsewhere, I have recommended language teaching practices, which have been influenced by my CDST thinking —such as teaching iteratively, not repetitively, and teaching students to adapt their language resources to changing situations (Larsen–Freeman, 2014). Regardless of which practices are adopted, it is right to ask how a particular practice fits with who we are and who our students are. Given the complexity of the changing spatial–temporal context with different actors and different sociohistorical backgrounds and orientations to agency, 'best practices' need to be carefully vetted; instead, practices that are maximally adaptable find favor in CDST (Larsen–Freeman & Freeman, 2008).

Applied to [language] education, Biesta (2007) observes:

(. . .) the question for teachers is not simply 'what is effective' but rather 'what is appropriate for these [students] under these circumstances.' This means, he argues, 'that inquiry and research can only tell us what is possible—or, to be even more precise, they can only show us what *has been* possible. [They] can tell us *what worked* but cannot tell us *what works.'* (p. 16*)*

In addition, it is commonly recognized these days that there is a changing reality in education:

The reality is that people of all ages, and especially the mobile young, are managing to communicate across cultures and languages because they want to and need to, making use of prior knowledge, language acquired on-line or through the media and electronic translation tools" (King, 2017, p. 34).

Learner agency hardly needs to be encouraged according to this scenario. Learners are already optimizing conditions for their own learning (Larsen–Freeman, 2018b).

Even within the classroom, conditions for language learning can be enhanced through technology. For instance, Italian Studies at the University of Pennsylvania is reinvigorating their curriculum through language learning technologies, OER (Open Educational Resources), and individual performance assessment (Veneziano Broccia, 2018). Others have suggested using the Second Life virtual world with students to afford students an opportunity to take on a new identity and voice.

In a "porous classroom," the teacher and students investigate the language together. Framed in this way, "[t]he language classroom ceases to be the place where knowledge of language is made available by teacher and materials for learners and becomes the place *from* which knowledge of language and its use is sought by teacher and learners together; the classroom walls become its windows" (Breen, 1999, p. 55). An application of this approach can be found in the SKILLS (School Kids Investigating Language in Life and Society) (http://www.skills.ucsb.edu/) program (Bucholtz, 2013) in California public schools. This program encourages students to metapragmatically reflect on the relationship between language and identity (e.g., how are Ebonics speakers positioned compared with those who speak Standard English?).

<B>*Teaching Practices: Helping Students to Enact and Enhance Their Agency*

There is another angle to take on the question of teaching practices for optimal learning, and that is the question of how teachers can help their students to enact and enhance their agency. One way is by implementing learner-driven feedback, where learners "drive" the feedback dialogue by asking for specific feedback. The feedback is given by the teacher, but learners decide how and on what they receive feedback. For example, students can choose

"between various modes of feedback: in-text corrections, correction symbols, handwritten feedback, email, audio recording, or face-to-face consultation" (Maas, 2017, p. 129).

Drawing on Archer's (2003) influential theory of agency, Gao (2013) makes a case for enabling language learners' agency through reflexive/reflective thinking and sees learners' narratives as supporting this thinking when teachers dialogue with learners about what the learners have written. Biesta and Tedder (2007) also suggest the use of narratives, but with a somewhat different purpose—for learners to become aware of their agentic orientations and how they play out in the achievement of agency.

Again, we encounter the idea that agency is to be achieved. If this is so, then one must ask which practices will help learners to achieve greater agency. It would seem that teacher–student relationships are critical in terms of cultivating learner agency. Teachers normally have the power to "determine the types of activities and resources to which learners will be given access and the opportunities they will have to engage in the activities and it is usually teachers who do the assessing" (DFG, 2016, p. 33). However, learner agency may be more sustained when teachers ask themselves, "Who gets to ask questions?" "Who gets to remain silent, and in which ways do some learners in my class choose to use silence?" (see, for example, Bao, 2014). It has been observed that well-intentioned teachers can teach in a culturally sensitive manner and still enable racism (Gholson & Wilkes, 2017). How can implicit bias be eliminated? Deborah Ball, in her Presidential Address to the American Educational Research Association (2018), asserts that

> Teaching is dense with discretionary moments (. . .) We usually draw on our experience; however, we have the power of teaching to disrupt racism and promote justice (. . .) by developing a repertoire of practices and ways that counter normalized practice (n.p.).

And, in terms of assessment, rather than asking if learners transfer what they have been taught, teachers could be asking what connections learners are making for themselves (Larsen−Freeman, 2013).

Teaching practices that can lead to learning of language and practices that contribute to learners' achieving greater agency can only succeed if there is an openness to transformation on the part of both teachers and learners. Complexity theorist Ricca (2012) makes this very clear:

> All [interactions] involve mutual influence. It has been said that teachers must know their students, but usually what is meant is not that the teacher is to be transformed, but rather that the teacher can, by knowing her or his students, more efficiently move the students to a desired understanding. However, a complexity approach suggests not only that attempts such as efficiency are misplaced, but also requires that teachers must be transformed by their students as a result of the mutual influence of teachers and students. (p. 43)

Without a commitment to mutual transformation, learning on both sides of the desk will be less optimal.

<B>*Teaching Practices: Supporting Learners in Choosing to Deploy Their Semiotic Resources to Position Themselves as They Would Wish in a Multilingual World*

A much-discussed practice these days to address this goal is the use of translanguaging in the classroom, or at least creating a place where students are not silenced because they cannot draw on all their language resources in the classroom. Obviously, learner agency is not fully appreciated when learners are seen to be mere hosts of another language (Kroskrity, 2004). Instead, it is essential to appreciate that learners have the capacity to create their own patterns with meanings and uses (morphogenesis) and to expand the meaning

potential of a given language, not just to internalize a ready-made system (Larsen–Freeman, 2012b). In truth, learners actively transform their linguistic world; they do not merely transfer previous patterns and conform to it (Larsen−Freeman, 2013). However, learners have to see that they have options from which to choose (e.g., Larsen−Freeman, 2002a).

Of course, teachers may need to enforce normative practices, depending on the goals for learning. As Sealey and Carter (2004) point out, "one of the properties of languages is that they enable mutual intelligibility among their speakers, which means that innovation is always constrained by the need to be understood" (p. 273). Teachers do need to make learners aware of the consequences of the linguistic choices learners make. However, language is not a closed system (see Ortega, 2019, this issue), and there is, in fact, no linguistic basis for distinguishing a linguistic innovation from an error (Larsen–Freeman, 2016) because both are contingent upon the speakers' perception of, and acting on, the affordances in the context to create meaning and to position oneself in a manner one wishes, engaging in the agentive process of audience design by tailoring their messages to interlocutors and other audiences (LaScotte & Tarone, 2019, this issue; Larsen–Freeman, 2019). Knowing this may make it possible to "disrupt understandings" of what constitutes an error, and become more accepting of what is essentially a creative process (Bouchard, 2018; Elder–Vass, 2014).

ETHICAL CONSIDERATIONS BEYOND THE CLASSROOM

Considerations of learner agency do not end in the classroom. The year 2018 marked the 50th anniversary of the publication of Paulo Freire's (1970) *Pedagogy of the Oppressed*, and its central message is that there can be no individual emancipation without social emancipation (Biesta & Tedder, 2007, p. 133). The DFG article also reminds us of a need to make an ethical commitment (Ortega, 2005) of the sort that Ortega (2019, this issue) writes

about concerning grassroots multilingualism and the multilingualism of marginalized and minoritized communities. But what kind of ethics is required? Kramsch and Zhang (2018) identify two types, based on a distinction by Ricoeur: an ethics of conviction (norms and duties) and an ethics of responsibility. While, of course, teachers must abide by the norms of the institutions in which they work, CDST asks educators to take seriously an ethics of responsibility.

> [A] complexity perspective does not diminish the need for people to take responsibility for their actions; if anything, it increases the urgency of accepting that responsibility (. . . S)elf-organization and the emergence of order in complex systems are ethically-neutral processes; it is people who must impose and apply ethics to these processes, recognizing how a decision in one part of a system can affect other parts and ripple outwards to other connected systems" (Larsen–Freeman & Cameron, 2008, p. 77).

In summarizing existing research on agency, van Lier (2008) claimed that there are three central characteristics when it comes to agency in language classrooms: the learner's ability to self-regulate, the socially mediated nature of sociocultural context, and an awareness of one's responsibility for one's own acts.

Sullivan and McCarthy (2004) expressed a similar sentiment in their appeal to Bakhtinian dialogism:

> Perhaps the most significant feature of agency in the context of experience is the reflexive awareness of our own agency (. . .) It is this reflexivity that brings with it a sense of morals in our dialogues with the other. That is, we have some choice in how we author the value of another. As such, we have a sense of making the right choices, of making ethically particular choices that

will enrich the other. This points us towards an aesthetic account of agency
that puts potentiality and responsibility at the centre of inquiry. (p. 307)

With regard to valuing others and relating to them, it is perhaps naïve but a hopeful
thought nevertheless, to imagine, in an era of neonationalism and neoliberalism in which a
larger segment of the population is experiencing what it is like to feel their sense of agency
compromised, that this era will ultimately be transformative, at least in engendering empathy
with those who have long experienced their agency similarly.

<A>CONCLUSION

It is not surprising, given the exigencies of the modern world, that "agency" has
attracted a great deal of scholarly attention. I have been especially concerned for a long time
that the agency of language learners has not always been respected in SLA theories. Second
language learners are not mere processors of input, nor are they mere products of
socialization. Further, teaching does not cause learning. It is fairly common practice with
studies of individual differences, such as those having to do with motivation or attitude, to
treat all members of a group so designated as if they were homogeneous, and thus overlook
their particularity. Then, too, ideologies can lead to deficit views of learning and can demean
language users. In addition to challenging these portrayals, I sought to expand upon the
treatment of agency in the DFG article, and to suggest that the individual interacting with the
environment is an appropriate level of granularity—indeed, a necessary one—if
understanding the uniqueness of learning trajectories is the goal. I also hoped to better
understand where research on learner agency and research on second language development
intersect and perhaps to encourage the adoption of a discourse that would allow the
conversation between the two groups of researchers to be facilitated.

To address these aims, I appealed to the transdisciplinary CDST, a relational ecological systems theory, which maintains that one cannot fully understand one part of a complex system, if one does not look at its relationship with another or others—internal to the system and external to it. Using CDST, I endorsed the interdependence of structure and agency, all the while characterizing agency as relational, emergent, spatially, and temporally-situated. In addition, I proposed that agency is not something possessed, but achieved by an individual, orienting to the different affordances of the social and material worlds. Agency changes through iteration and adaptation. It is multidimensional and heterarchical. These qualities were then used to challenge the perception of second language learners as nonagentive.

I also have also taken up the issue, increasingly being discussed in today's posthumanist intellectual climate, of whether it is only humans and other sentient life forms that have agency. While certainly my intuition would suggest that objects do not, given the reflexivity, intentionality, adaptability, ability to choose, and subjectivity of humans, I nevertheless think that the case is not an open and shut one, particularly when the temporal dimension is considered, and I expect to hear more from the new materialists in the future. Moving on, I pointed to how education can support learner agency, as long as educators are discerning when it comes to adopting and adapting "best practices." Nevertheless, I did make teaching suggestions in three categories: those that optimize language learning by recognizing learner agency, those that seek to enhance learner agency, and those that support learners in deploying their semiotic resources as they wish. Finally, I called for embracing an ethics of responsibility, so that we become aware of our own agency, and we can make choices about how we value and relate to others.

One final thought, stimulated by my reading of Sullivan & McCarthy (2004) as they draw on Bakhtin's dialogical approach, is that

acknowledging our own uniqueness and responsibility brings us beyond the traditional categories that inform analysis of agency (. . .) the poor, the wealthy, the educated, the alienated and so on to focus on agency as it is experienced by particular people in the dialogical moment in which self meets other" (p. 297).

It is in precisely that moment that the ethics of responsibility is imperative. CDST, in connecting the different levels of a complex system, keeps active what is specific about individuals and their actions. Our ethics must be recruited and committed to better understanding these (Larsen–Freeman & Cameron, 2008, p. 226).

ACKNOWLEDGMENT

NOTES

[1]. Deters (2011) helpfully distinguishes identity and agency, and Gao (2013) does the same for autonomy and agency. For instance, Gao cites Benson (2007) as positing agency as "a point of origin for the development of autonomy" (Gao, 2013, p. 227).

[2]. I, myself, have contributed to some of these.

[3]. When we categorize people, we lose sight of their humanity. At the 2018 Silfen Forum, University of Pennsylvania President Amy Gutmann said, "At its core, immigration is about the fate of millions of individual people—refugees, DACA recipients, etc. yes—but individuals with lives, families (. . .)"

4. I will not here go into the question of whether we are conscious of agentive moves or not. Interested readers can consult Larsen–Freeman & Cameron (2008) and Al-Hoorie (2015) for discussion.

5. A designation, which Kumaravadivelu (2016), frustrated by the inequity in native-speaker/nonnative speaker discourse, has extended to the entire nonnative speaking community.

6. Juarrero (2000) uses the term "heterarchy," differently from the way I am using it. She states that "students of complex dynamical systems have coined the neologism 'heterarchy' to allow inter-level causal relations to flow in both directions, part to whole (bottom up) and whole to part (top down)."

7. I know from previous experience how difficult it is to portray a complex dynamic system through a static medium. See Larsen−Freeman & Cameron's (2008, p. 168) attempt to show interacting timescales and levels of organization.

8. A complication is that Complexity Theory is associated with "agent-based modeling," a computational approach to the study of complex systems; however, this association with agency stems from "restricted complexity" (Morin, 2007), not the "general complexity" that I am discussing here (see Morin, 2007, for the distinction).

9. "[I]n 1996 the Gulbenkian Commission on the Restructuring of the Social Sciences, (which included nonlinear scientist Prigogine) reported and advocated breaking down the division between 'natural' and 'social' science through seeing both characterized by 'complexity'" (Urry, 2005).

10. A diminished view of individual agency is limited still further by the idea that agency springs from reflection on action rather than from action itself. Although the findings have been challenged, in a well-cited study by Wegner and Wheatley (1999), people were asked to move their limbs but also had their brains stimulated to induce involuntary movements; they

were equally likely to believe the stimulated, involuntary movements to be the result of conscious decisions as the voluntary movements. As Gibbs (2006, pp. 22–23) says, "[R]esults such as these call into question the simple idea that the conscious self is always the author of one's bodily action."

11. In the interest of brevity, I will rely on quotations from colleagues, which I have used before in various publications, most recently in 2017b.

REFERENCES

Agar, M. (2004). We have met the other and we're all nonlinear: Ethnography as a nonlinear dynamic system. Complexity, *10*, 16−24.

Ahearn, L. M. (2001). Language and agency. *Annual Review of Anthropology, 30*, 109−137.

Al-Hoorie, A. H. (2015). Human agency: Does the beach ball have free will? In Z. Dörnyei, P. D. MacIntyre, & A. Henry (Eds.), *Motivational dynamics in language learning* (pp. 55–72). Bristol, UK: Multilingual Matters.

Archer, M. (2003). *Structure, agency and the internal conversation*. Cambridge: Cambridge University Press.

Arievitch, I. M. (2017). *Beyond the brain: An agentive activity perspective on mind, development, and learning*. Rotterdam/Boston: Sense Publishers.

Bagga–Gupta, S. (2015). Performing and accounting language and identity: Agency as actors-in-(inter)action-with-tools. In P. Deters, X. Gao, E. R. Miller, & G. Vitanova (Eds.), *Theorizing and analyzing agency in second language learning* (pp. 113−132). Bristol, UK: Multilingual Matters.

Bao, D. (2014). *Understanding silence and reticence: Ways of participating in second language acquisition.* London*:* Bloomsbury.

Barad, K. (2007). *Meeting the universe halfway*. Durham, NC: Duke University Press.

Bateson, G. (1972). *Steps to an ecology of mind.* Chicago: University of Chicago Press.

Benson, P. (2007). Autonomy in language teaching and learning. *Language Teaching, 40*, 21−40.

Benson, P. (2017). Ways of seeing: The individual and the social in applied linguistics research methodologies. *Language Teaching,* 1−11; https://doi:10.1017/S0261444817000234

Benson, P., & Cooker, L. (Eds.). (2013). *The applied linguistic individual: Sociocultural approaches to identity, agency and autonomy*. Sheffield, UK: Equinox.

Biesta, G., & Tedder, M. (2007). Agency and learning in the lifecourse: Towards an ecological perspective. *Studies in the Education of Adults, 39,* 132−149.

Block, D. (2013). The structure–agency dilemma. In identity or intercultural communication research. *Language and Intercultural Communication, 13*, 126−147.

Block, D. (2015). Structure, agency, individualization and the critical realist challenge. In P. Deters, X. Gao, E. R. Miller, & G. Vitanova, (Eds.), *Theorizing and analyzing agency in second language learning* (pp. 17−36). Bristol, UK: Multilingual Matters.

Bouchard, J. (2018). On language, culture, and controversies. *Asian Englishes*. Early view, 25 March 2018.

Breen, M. P. (1999). Teaching language in the postmodern classroom. *Bells: Barcelona English Language and Literature Studies*, *10*, 47–64.

Brock, T., Carrigan, M., & Scambler, G. (Eds.) (2017). *Structure, culture, and agency: Selected papers from Margaret Archer.* New York: Routledge/Taylor & Francis

Brügge, P. (1993). Mythos aus dem Computer. [Myth from the computer]. *Der Spiegel, 39,* 153−164.

Bucholtz, M. (2013). Teaching students the SKILLS of linguistics research. In A. H. C. Hudley & C. Mallinson (Eds.), *We do language: Understanding English language variation in the secondary English classroom* (pp. 113−115). New York: Teachers College Press.

Buhrman, T., & Di Paolo, E. (2017). The sense of agency–a phenomenological consequence of enacting sensorimotor schemes. *Phenomenological Cognitive Science*, *16*, 207–236.

Butler, J. (1999). *Subjects of desire: Hegelian reflections in twentieth-century France.* New York: Columbia University Press.

Butler, J. (2016). Rethinking vulnerability and resistance. In J. Butler, Z. Gambetti, & L. Sabsay (Eds.), *Vulnerability in resistance* (pp. 12−27). Durham, NC: Duke University Press.

Byrne, D. (2005). Complexity, configuration and cases. *Theory, Culture & Society*, *22*, 95–111.

Byrne, D. (2013). Evaluating complex social interventions in a complex world. *Evaluation*, *19*, 217−228.

Byrne, D., & Callaghan, G. (2014). *Complexity theory and the social sciences. The state of the art.* Oxon, UK: Routledge.

Byrnes, H. (2014). Theorizing language development at the intersection of 'task' and L2 writing:

Reconsidering complexity. In H. Byrnes & R. M. Manchón (Eds.), *Task-based language learning: Insights from and for L2 writing* (pp. 79–103). Amsterdam: John Benjamins.

Canagarajah, S. (2018). Materializing 'competence': Perspectives from international STEM scholars. *Modern Language Journal*, *102*, 268–291.

Capra, F., & Luisi, P. L. (2014). *The systems view of life.* Cambridge: Cambridge University Press.

Carter, B., & Sealey, A. (2000). Language, structure and agency: What can realist social theory offer to sociolinguistics*? Journal of Sociolinguistics, 4*, 3–20.

Clowes, R. W. (2018). Immaterial engagement: Human agency and the cognitive ecology of the internet. *Phenomenology and the Cognitive Sciences.* Early view 7 February 2018, 1–21; https://doi.org/10.1007/s11097-018-9560-4

Cook, G. (2015). 'A pig is a person' or 'You can love a fox and hunt it': Innovation and tradition in the discursive representation of animals. *Discourse and Society, 26*, 587–607.

Coughlan, P., & Duff, P. (1994). Same task, different activities: Analysis of SLA task from an activity theory perspective. In J. P. Lantolf & G. Appel (Eds.), *Vygotskian approaches to second language research* (173–193). Norwood, NJ: Ablex.

Deacon, T. W. (2012). *Incomplete nature. How mind emerged from matter*. New York and London: W.W. Norton & Company.

De Fina, A., & Georgakopoulou, A. (2008). Analysing narratives as practices. *Qualitative Research, 8*, 379−387.

Derrida, J. (1976). *Of grammatology*. Baltimore, MD: Johns Hopkins University Press.

Deters, P. (2011). *Identity, agency and the acquisition of professional language and culture*. London: Continuum.

Deters, P., Gao, X., Miller, E. R., & Vitanova, G. (Eds.). (2015). *Theorizing and analyzing agency in second language learning*. Bristol, UK: Multilingual Matters.

Douglas Fir Group. (2016). A transdisciplinary framework for SLA in a multilingual world. *Modern Language Journal*, *100* (Supplement 2016), 19–47.

Duff, P., & Doherty, L. (2015). Examining agency in (second) language socialization research. In P. Deters, X. Gao, E. R. Miller, & G. Vitanova, (Eds.), *Theorizing and analyzing agency in second language learning* (pp. 54−72). Bristol, UK: Multilingual Matters.

Dufva, H., & Aro, M. (2015). Dialogical view on language learners' agency: Connecting intrapersonal and interpersonal. In P. Deters, X. Gao, E. R. Miller, & G. Vitanova, (Eds.), *Theorizing and analyzing agency in second language learning* (pp. 37−53). Bristol, UK: Multilingual Matters.

Elder–Vass, D. J. (2014). Debate: Seven ways to be a realist about language. *Journal for the Theory of Social Behaviour*, *44*, 249–267.

Ellis, N. C. (2019). Essentials of a theory of language cognition. *Modern Language Journal, 103* (Supplement 2019), xx-xx.

Ellis, N. C., & Larsen–Freeman, D. (2006). Language emergence: Implications for applied linguistics. Introduction to the special issue. *Applied Linguistics*, *27*, 558–589.

Ellis, N. C., & Larsen–Freeman, D. (Eds.) (2009). *Language as a complex adaptive system*. Malden, MA: Wiley–Blackwell.

Emirbayer, M., & Mische, A. (1998). What is agency? *American Journal of Sociology*, *103*, 962–1023.

Eskildsen, S. (2012). L2 negation constructions at work. *Language Learning*, *62*, 335–372.

Freire, P. (1970). *Pedagogy of the oppressed*. London: Penguin.

Gallagher, S. (2017). *Enactivist interventions: Rethinking the mind*. Oxford: Oxford University Press.

Gao, X. (2010). *Strategic language learning: The roles of agency and context*. Bristol, UK: Multilingual Matters.

Gao, X. (2013). Reflexive and reflective thinking: a crucial link between agency and autonomy. *Innovation in Language Learning and Teaching*, *7,* 226−237.

García, O., & Flores, N. (2014). Multilingualism and common core state standards in the United States. In S. May (Ed.), *The multilingual turn* (pp. 147−166). New York: Routledge/Taylor & Francis.

García, P. (2014). Verbalizing in the second language classroom: Exploring the role of agency in the internalization of grammatical categories. In P. Deters, X. Gao, E. R. Miller, & G. Vitanova (Eds.), *Theorizing and analyzing agency in second language learning* (pp. 213−231). Bristol, UK: Multilingual Matters.

Gholson, M., & Wilkes, C. (2017). (Mis)Taken identities: Reclaiming identities of the collective Black in mathematics and science education research. *Review of Research in Education, 41*, 228–252.

Gibbs, Jr., R. W. (2006). *Embodiment and cognitive science.* New York: Cambridge University Press.

Gibson, E. J. (1993) Ontogenesis of the perceived self. In U. Neisser (Ed.), *The perceived self* (pp. 25–42). Cambridge: Cambridge University Press.

Giorgi, F. (2012). Agency. In D. Favareau, P. Cobley, & K. Kull (Eds.), *A more developed sign* (pp. 13−16). Tartu, Estonia: Tartu University Press.

Goldspink, C., & Kay, R. (2007). Emergence in organizations: The reflexive turn. *Incept Labs*

White Paper Series 09(1).

Goller, M. (2017). *Human agency at work: An active approach towards expertise development*. Wiesbaden, Germany: Springer VS.

Haggard, P., & Tsakiris, M. (2009). The experience of agency. *Current Directions in Psychological Science, 18*, 242–246.

Hall, J. K. (2019). The contributions of conversation analysis and interactional linguistics to a usage-based understanding of language: Expanding the transdisciplinary framework. *Modern Language Journal, 103* (Supplement 2019), xx-xx.

Halliday, M. A. K., & Burns, A. (2006). Applied linguistics: Thematic pursuits or disciplinary moorings? *Journal of Applied Linguistics*, *3*, 113–128.

Han, Z.−H. (2016). A "reimagined SLA" or an expanded SLA?: A rejoinder to the Douglas Fir Group. *Modern Language Journal, 100*, 736−740.

Hawkins, M. R. (2018). Transmodalities and transnational encounters: Fostering critical cosmopolitan relations. *Applied Linguistics*, *39*, 55–77.

Hellermann, J. (2018) Languaging as competencing: Considering language learning as enactment. *Classroom Discourse, 9*, 40−56.

Heuman, L. (2014) The embodied mind: An interview with philosopher Evan Thompson. Accessed 27 December 2017 at https://tricycle.org/magazine/embodied-mind/ *Tricycle,* Fall issue.

Heylighen, F., Cilliers, P., & Gershenson, C. (2007). Complexity and philosophy. In J. Bogg & R. Geyer (Eds.), *Complexity, science and society* (pp. 117−134). Oxford, UK: Radcliffe Publishing.

Hofkirchner, W. (2012). Empathy. In D. Favareau, P. Cobley, & K. Kull (Eds.), *A more developed sign* (pp. 119−122). Tartu, Estonia: Tartu University Press.

Hoffmeyer, J. (1998). Surfaces inside surfaces on the origin of agency and life. *Cybernetics and Human Knowing, 5, 33–42.*

Hult, F. M. (2010a). The complexity turn in educational linguistics. *Language, Culture and Curriculum*, *23*, 173–177.

Hult, F. M. (2010b). Analysis of language policy discourses across the scales of space and time. *International Journal of the Sociology of Language*, *202*, 7–24.

Ioup, G., Boustagui, E., el Tigi, M., & Moselle, M. (1994). Reexamining the critical period hypothesis. A case study of successful SLA in a naturalistic environment. *Studies in Second Language Acquisition, 16,* 73–98.

Juarrero, A. (2000). Dynamics in action: Intentional behavior as a complex system. *Emergence, 2*, 24−57.

Kelso, J. S. (2016). On the self-organizing origins of agency. *Trends in Cognitive Science, 20*, 490−499.

Kelso, J. S. (2018, May). Matter, movement, and mind. B. F. Skinner Lecture at the Association for Behavioral Analysis International Conference, San Diego, CA.

Keysar, B. (2018, April). Living in a native tongue. Paper presented at the Center for Human Growth & Development, University of Michigan, Ann Arbor, MI.

King, L. (2017). *The impact of multilingualism on global education and language learning*. Cambridge, UK: Cambridge English Language Assessment.

Kramsch, C. (2012). Why is everybody so excited about complexity theory in applied linguistics? *Mélanges CRAPEL* n° 33 (numero special: Didactique des langues et complexité: En hommage à Richard Duda).

Kramsch, C. (2018). Trans-spatial utopia. *Applied Linguistics*, *39*, 108–115.

Kramsch, C., & Zhang, L. (2018). *The multilingual instructor.* Oxford: Oxford University Press.

Kroskrity, P. V. (2004). Language ideologies. In A. Duranti (Ed.), *A companion to linguistic anthropology* (pp. 496–517). Malden, MA: Blackwell.

Kumaravadivelu, B. (2016). The decolonial option in English teaching: Can the subaltern act? *TESOL Quarterly*, *50*, 66−85.

Lantolf, J. P., & Pavlenko, A. (2001). (S)econd (L)anguage (A)ctivity theory: Understanding second language learners as people. In M. Breen (Ed.), *Learner contributions to language learning: New directions in research* (pp. 141−158). London: Pearson.

Lantolf, J. P., & Thorne, S. (2006). *Sociocultural theory and the genesis of second language development.* Oxford: Oxford University Press.

Larsen–Freeman, D. (1983). The importance of input in second language acquisition. In R. W. Anderson (Ed.), *Pidginization and creolization as language acquisition* (pp. 87−93). Rowley, MA: Newbury House Publishers.

Larsen−Freeman, D. (2002a). The grammar of choice. In E. Hinkel & S. Fotos (Eds.), *New perspectives on grammar teaching* (pp. 103−118). Mahwah, NJ: Lawrence Erlbaum.

Larsen–Freeman, D. (2002b). Making sense of frequency. *Studies in Second Language Acquisition, 24,* 275−285.

Larsen–Freeman, D. (2006a). Second language acquisition and the issue of fossilization: There is no end, and there is no state. In Z.–H. Han & T. Odlin (Eds.), *Studies of fossilization in second language acquisition* (pp. 189–200). Clevedon, UK: Multilingual Matters.

Larsen–Freeman, D. (2006b). The emergence of complexity, fluency, and accuracy in the oral and written production of five Chinese learners of English. *Applied Linguistics*, *27*, 590–619.

Larsen–Freeman, D. (2012a). Complex, dynamic systems: A new transdisciplinary theme for applied linguistics? *Language Teaching*, *45*, 202–214.

Larsen–Freeman (2012b). The emancipation of the language learner. *Studies in Second Language Learning and Teaching, 2*, 297–309.

Larsen–Freeman, D. (2012c). On the roles of repetition in language teaching and learning. *Applied Linguistics Review*, *3*, 195–210.

Larsen–Freeman, D. (2013). Transfer of learning transformed. *Language Learning*, *63*(Supplement 1), 107–129.

Larsen–Freeman, D. (2014). Another step to be taken – Rethinking the end point of the interlanguage continuum. In Z.–H. Han & E. Tarone (Eds.), *Interlanguage. Forty years later* (pp. 203–220). Amsterdam: John Benjamins.

Larsen–Freeman, D. (2016). Complexity and ELF: A matter of nonteleology. In M.–L. Pitzl & R. Osimk–Teasdale (Eds.), *English as a Lingua Franca: Perspectives and prospects. Contributions in honour of Barbara Seidlhofer* (pp. 139−146). Berlin: de Gruyter Mouton.

Larsen–Freeman, D. (2017a). The fractal shape of language. A presentation at the 18th World Congress of Applied Linguistics (AILA). Rio de Janeiro. July 27.

Larsen–Freeman, D. (2017b). Complexity theory: The lessons continue. In L. Ortega & Z.–H. Han (Eds.), *Complexity theory and language development: In celebration of Diane Larsen–Freeman* (pp. 11−50). Amsterdam: John Benjamins.

Larsen–Freeman, D. (2018a). Complexity and ELF. In J. Jenkins, W. Baker, & M. Dewey (Eds.), *The Routledge handbook of English as a lingua franca* (pp. 51−60). New York: Routledge/Taylor & Francis.

Larsen–Freeman, D. (2018b). Looking ahead: Future directions in, and future research into, second language acquisition. *Foreign Language Annals, 51*, 55−72.

Larsen–Freeman, D. (2019). Relational systems in interaction and interlocutor differences in second language development. In L. Gurzynski−Weiss (Ed.), *Cross-theoretical explorations of interlocutors and their individual differences*. Amsterdam: John Benjamins.

Larsen–Freeman, D. & Cameron, L. (2008). *Complex systems and applied linguistics*. Oxford: Oxford University Press.

Larsen–Freeman, D., & Freeman, D. (2008). Language moves: The place of "foreign" language-in classroom teaching and learning. *Review of Research in Education, 32*, 147–186. Washington, DC: American Educational Research Association.

Larsen–Freeman, D., & Tedick, D. J. (2016). Teaching world languages: Thinking differently. In D. Gitomer & C. Bell (Eds.), *Handbook of research on teaching* (5th ed., pp. 1335–1388). Washington, DC: American Educational Research Association.

LaScotte, D., & Tarone, E. (2019). Heteroglossia and constructed dialogue in SLA. *Modern Language Journal, 103* (Supplement 2019), xx-xx.

Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford: Oxford University Press.

Lowie, W., & Verspoor, M. (2015). Variability and variation in second language acquisition orders. A dynamic reevaluation. *Language Learning, 65*, 63–88.

Maas, C. (2017). Receptivity to learner-driven feedback in EAP. *ELT Journal, 71,* 127–140.

Malafouris, L. (2013). *How things shape the mind*. Cambridge, MA: The MIT Press.

McKay, S., & Wong, S.−L. (1996). Multiple identities: Investment and agency in second-language learning among Chinese adolescent immigrant students. *Harvard Educational Review, 66*, 577–608.

McLoughlin, D. (2016). Review of *Theorizing and analyzing agency in second language learning: Interdisciplinary approaches,* by P. Deters, X. (A.) Gao, E. R. Miller, & G. Vitanova (Eds). *Applied Linguistics*, *37*, 442–445.

McNamara, T. (2019). *Language and subjectivity*. Cambridge: Cambridge University Press.

Mercer, S. (2012). The complexity of learner agency. *Apples – Journal of Applied Language Studies*, *6*, 41–59.

Mercer, S. (2018). Psychology for language learning: Spare a thought for the teacher. *Language Teaching, 51*, 504–525.

Mick, C. (2015). Sociological approaches to second language learning and agency. In P. Deters, X. Gao, E. R. Miller, & G. Vitanova (Eds.), *Theorizing and analyzing agency in second language learning* (pp. 91−109). Bristol, UK: Multilingual Matters.

Miller, E. R. (2014). *The language of adult immigrants: Agency in the making*. Bristol, UK: Multilingual Matters.

Miller, E. R. (2016). The ideology of learner agency and the neoliberal self. *International Journal of Applied Linguistics, 26*, 348−365.

Molenaar, P. (2008). On the implications of the classical ergodic theorems: Analysis of developmental processes has to focus on intra-individual variation. *Developmental Psychobiology, 50*, 60–69.

Morin, E. (2007). Restricted complexity, general complexity. In C. Gershenson, D. Aerts, & B. Edmonds (Eds.), *Worldviews, science and us: Philosophy and complexity* (pp. 5−29). Singapore: World Scientific.

Morin, E. (2008). *On complexity*. Cresskill, NJ: Hampton Press.

Moss, P., & Haertel, E. (2016). Engaging methodological pluralism. In D. Gitomer & C. Bell (Eds.), *Handbook of research on teaching* (5th ed., pp. 127–248). Washington DC: American Educational Research Association.

Murray, G., Gao, X., & Lamb, T. (Eds.) (2011). *Identity, motivation and autonomy in language learning.* Bristol, UK: Multilingual Matters.

Norton Peirce, B. (1995). Social identity, investment, and language learning. *TESOL Quarterly, 29*, 9−31.

Norton, B. (2000). *Identity and language learning.* Harlow, UK: Pearson Education Limited.

Nowotny, H. (2005, March). Society in science. Keynote address delivered at the Science in Society Forum. Brussels.

Ortega, L. (2005). For what and for whom is our research? The ethical as transformative lens in instructed SLA. *Modern Language Journal*, *89*, 427–443.

Ortega, L. (2017). SLA in uncertain times: Disciplinary constraints, transdisciplinary hopes. *Working Papers in Educational Linguistics, 33,* 1–30.

Ortega, L. (2019). SLA and the study of equitable multilingualism. *Modern Language Journal, 103* (Supplement 2019), xx-xx.

Pavlenko, A. (2001). Bilingualism, gender, and ideology. *International Journal of Bilingualism*, 5, 117−151.

Pavlenko, A., & Lantolf, J. (2000). Second language learning as participation and the (re)construction of selves. In J. Lantolf (Ed.), *Sociocultural theory and second language learning: Recent advances* (pp.155–177). Oxford: Oxford University Press.

Pennycook, A. (2018). Posthumanist applied linguistics. *Applied Linguistics*, *39,* 445–461.

Ricca, B. (2012). Beyond teaching methods: A complexity approach. *Complicity: An International Journal of Complexity and Education*, *9,* 31–51.

Rosaldo, R. (1986). Ilongot hunting as story and experience. In E. M. Bruner & B. W. Turner (Eds.), *The anthropology of experience* (pp. 97−138*).* Chicago: University of Illinois Press.

Sealey, A., & Carter, B. (2004). *Applied linguistics as social science*. London: Continuum.

Scollon, R. (2001). *Mediating discourse: The nexus of practice*. London and New York: Routledge.

Sullivan, P., & McCarthy, J. (2004). Toward a dialogical perspective on agency. *Journal for the Theory of Social Behaviour, 34*, 291−309.

Tarone, E., & Liu, G. (1995). Situational context, variation, and second language acquisition theory. In G. Cook & B. Seidlhofer (Eds.), *Principle and practice in applied linguistics: Studies in honour of H. G. Widdowson* (pp. 107–124). Oxford: Oxford University Press.

Thelen, E., & L. Smith. (2006). Dynamic systems theories. In R. Lerner (Ed.), *Handbook of child psychology* (6th ed., pp. 258−312). Hoboken, NJ: John Wiley & Son.

Urry, J. (2005). The complexity turn. *Theory, Culture & Society*, *22*, 1–14.

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

van Lier, L. (2008). Agency in the classroom. In J. P. Lantolf & M. E. Poehner (Eds.), *Sociocultural theory and the teaching of languages* (pp. 163−186). London: Equinox.

Veneziano Broccia, L. (2018). Intermediate Italian as a bridge to many bridges. *Teaching Italian Language and Culture Annual,* Special Issue, 80–107.

Vitanova, G. (2002). *Gender and agency practices in a second language.* (Unpublished doctoral dissertation). University of Cincinnati, Cincinnati, OH. Accessed 2 September 2018 at https://etd.ohiolink.edu/pg_10?0::NO:10:P10_ACCESSION_NUM:ucin1029525438

Vitanova, G. 2010. *Authoring the dialogical self: Gender, agency, and language practices*. Amsterdam: John Benjamins.

Walby, S. (2007). Complexity theory, systems theory and multiple intersecting social

    inequalities. *Philosophy of the Social Sciences*, *37*, 449–470.

Warren, W. (2018, August). Behavioral dynamics and human agency. Keynote address

    delivered at the 28th International Conference of the Society for Chaos Theory in the

    Natural and Life Sciences. North Carolina State University, Raleigh, NC, August 2–4.

Witherington, D., & Lickliter, R. (2016). Integrating development and evolution in

    psychological science: Evolutionary developmental psychology, developmental

    systems, and explanatory pluralism. *Human Development*, 59, 200–234.

Yoon, S., Goh, S., & Park, M. (2018). Teaching and learning about complex systems in K–12

    science education: A review of empirical studies 1995–2015. *Review of Educational*

    Research, 88, 285−325.

Zuengler, J., & Miller, E. R. (2006). Cognitive and sociocultural perspectives: Two parallel

    SLA worlds. *TESOL Quarterly, 40*, 35−58.