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Reflections on the Special Issue and the Significance of Pre-Paradigm Thinking for the Field of Second Language Acquisition

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Abstract

I am pleased to have been afforded the opportunity to offer my reflections on the articles included in the special issue of *JALDA* on what I will call "pre-paradigm" research. I borrow the concept from Kuhn (2012), which I believe appropriately describes the current state of affairs in SLA. Each article compares different aspects of SCT with other frameworks and methodologies in the field. An appealing aspect of the overall project is that contributions have adopted different perspectival lenses. In what follows, I will address each article individually. In some cases, I will expand upon what the authors argue and in others I will critique their arguments to encourage the authors to think more deeply about their proposal(s) and perhaps to bring to bear additional theoretical insights. For convenience, I have organized the seven articles into what I see as a coherent grouping. The criterion used was whether an article reflected more of a theoretical, empirical, or practical orientation.

Keywords: Sociocultural Theory, pre-paradigm thinking, second language development, Complex Dynamic Systems Theory, Collective Pedagogy, English as a Lingua Franca, indigenous language instruction, language curriculum, cognitive linguistics, Aspect Hypothesis

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Introduction

I am pleased to have been afforded the opportunity to offer my reflections on the articles included in the special issue of *JALDA* on what I will call "pre-paradigm" research. I borrow the concept from Kuhn (2012), which I believe appropriately describes the current state of affairs in SLA[1]. Accordingly, the pre-paradigm period in scientific development is typical of an immature science "regularly marked by frequent and deep debates over legitimate methods, problems, and standards of solution, though these serve rather to define schools than to produce agreement" (Kuhn, 2012, pp. 48-49). I believe that SLA, even after more than fifty years of research is still in a pre-paradigm period given that there is no agreed upon theory under which researchers engage in the activities of normal science aimed at solving a fixed set of puzzles using an agreed upon collection of methodological procedures and instruments. We might even speculate that SLA has not yet reached the pre-paradigm stage of development, if this stage is indeed characterized by "frequent and deep debates" that not only involve methods, problems and standards of solution, but also debates regarding theory. While the middle of the 1990s witnessed a brief flare up of theoretical debate, triggered by the so-called "social turn" (e.g., Block, 2003; Firth & Wagner, 1997; Gass, 1998; Lantolf, 1996; Long, 1997 & 1998; van Lier, 1993), much of what transpired in the pages of the leading SLA journals at the time might qualify as the type of debate needed to move toward a unified paradigm science. Unfortunately, at times the debate degenerated into ad hominem (e.g., Gregg, 2000; Lantolf, 2002) and at other times it was construed as an attack by those espousing the social turn on those supporting the cognitive stance on SLD (e.g., Long, 1998). In the end, not much was resolved and the various approaches retreated to their respective camps where they continue to carry out research more or less in splendid isolation.

To be sure, occasional attempts continue to be made to bridge gaps in the field, such as the colloquium on SLD theory sponsored by the American Association for Applied Linguistics that resulted in a multi-authored publication by Hulstijn, et al (2014) that in reality had little if any unifying impact on the field. Some contributors to the article, such as Nick Ellis, outlined a hyper-rich set of recommendations for a division of labor in which researchers work cooperatively on the cognitive and social aspects of SLD. Ortega suggested that perhaps the way forward would be to build bridges open to bi-directional traffic whereby researchers occupying different epistemic ground share the results of their research efforts. Despite the best efforts of the colloquium participants, the editor of *SSLA*, Albert Valdman, in his concluding remarks to the jointly-authored article, noted that a member of the colloquium audience remarked that "when a gap is bridged there is still a gap" (pp. 414-415). This is the problem that the field is confronting. When there is a gap, or in the case of SLA, multiple gaps, bridging them will not result in a unified field. Vygotsky (1997) understood this very well in his proposal to formulate a unified psychology. He rejected any attempt at what could be seen as gap-bridging activity that involved cobbling together a patchwork psychology comprised of elements of materialism (Pavlov in Russia and Thorndike in the US) with features of idealism represented in the theories of Freud and Husserl, among others. I will have

more to say about Vygotsky's approach to theory building in my concluding remarks.

I applaud the contributors as well as the guest editors of the SI for taking on the comparative project. Each article compares different aspects of SCT with other frameworks and methodologies in the field. An especially appealing aspect of the overall project is that contributions have adopted different perspectival lenses. Amory and Becker use a macro-level lens to compare SCT and CDST. White and Masuda, with perhaps a somewhat narrower lens, compare the pedagogical approaches of SCT and Cognitive Linguistics (CL), while at the same time appropriately acknowledging that the former offers a much more principled model of instruction's impact on development and that the latter provides a much deeper analysis of the relationship between meaning and language structure. Kissling's study integrates SCT pedagogical principles realized through C-BLI with conceptual knowledge of language developed in CL to challenge one of the most researched topics in mainstream SLA, the Aspect Hypothesis. Grazzi and Siekmann and Webster respectively take on two long-standing practical problems— instruction in English as a lingua franca and instruction that involves dual literacy in an indigenous language and English. Rosborough and Wimmer also adopt a practical orientation in their comparison of SCT principles and concepts with those that operate in the accepted approach to language instruction reflected in most school curricula. Van Compernolle and Ballesteros Soria address the CAF approach to task-based language instruction and argue for broadening the scope of pre-task preparation to incorporate a collectivist component.

In what follows, I will address each article individually. In some cases, I will expand upon what the authors argue and in others I will critique their arguments, not with the intent of casting them in a negative light but to encourage the authors to think more deeply about their proposal(s) and perhaps to bring to bear additional theoretical insights. As will be obvious, I will have more to say about some contributions than others. Again, in so doing, I am not implying in any way those that provoked more commentary should be seen either in a more positive or more negative light. It is strictly a matter of the nature of the topic under discussion. For instance, because Amory and Becker conducted a macro-level comparison between two robust theories involving an array of concepts and principles, their work understandably calls for greater reflection and commentary. Those contributions with a narrower focus quite naturally elicited more focused and succinct reflection.

Reflections

For convenience, I have organized the seven articles into what I see as a coherent grouping, which was not an easy task. The criterion used was whether an article reflected more of a theoretical, empirical, or practical orientation. For instance, the chapters by Amory and Becker as well as by White and Matsuda clearly seemed to fit under the theory rubric. However, Kissling's contribution could have been grouped with the empirical studies. However, I opted to group it with the theoretical chapters because even though it reports the results of an empirical study,

its goal is to challenge the theoretical claims of the Aspect Hypothesis. The articles by Ballesteros Soria and van Compernolle and by Siekmann and Webster I decided to group together as empirical studies, although they both could have been discussed as practically oriented studies, given their focus on classroom practice. This leaves two practical articles, one by Grazzi on ELF and the other by Rosborough and Wimmer on L2 in the school curriculum. Readers might well disagree with my categorization of the articles, which I fully appreciate and which I believe illustrates the robustness and vitality of the theory itself. Indeed, all of the articles include consideration of various aspects of general SCT and all address its relevance for specific concepts and concrete practice in some way.

Before moving on with the discussion, I want to stress that while it might appear that the SI is making the case that SCT-L2 should become the dominant theory of SLD and as such serve as the paradigm umbrella for normal L2 research, that is not the intent. The point, and I believe that the authors and guest-editors would concur, is to illustrate a possible way to proceed to build a unified theory. That is, instead of surveying the various theories interested in SLD and then somehow synthesizing research conducted under the auspices of the theories (see Mitchell, Myles, & Marsden, 2019; Douglas Fir Group, 2016), the proposal here is to illustrate the value of cross-theory comparison. If more and more of this kind of work is carried out, it might eventually result in a unified theory, or at least stimulate the kinds of conversations necessary to move in this direction.

Theoretical Articles

Amory and Becker: SCT and CDST

Even though the authors focus on the concept of motivation in SCT and CDST, they in fact present a broader-based comparative exegesis of the theories themselves, explicating the central tenets of each theory demonstrating points of (in)commensurability. We have to acknowledge that those who work in CDST might not fully concur with their interpretation of the CDST literature. Surely, they have not read all that has been written on CDST, even within the limited domain of L2 research. Nevertheless, I still believe that their project has value. In my view, they exhibit a deeper understanding, even if not fully accurate, of the theory than for example has occurred when others have undertaken a comparative analysis. For example, de Bot, et al (2013) incorporated a brief comparison of SCT and CDST in their general discussion of dynamic systems theory. Unfortunately, a significant problem is their characterization of SCT, as others have also done, as a social theory (p. 203), which it most definitely is not, certainly not in any way that would group it with sociolinguistic and language socialization theories. SCT is a psychological theory concerned with the development of the human psyche—the evolutionary adaptation that empowers humans to cope with unanticipated objects and events (Arievitch, 2017). What perhaps misleads some into conceiving the theory as social is the fact that the core of the theory is the dialectical connection between human biology and human culture. However, Vygotsky (1994, p. 349) insists that the relevant role of the environment as far as the theory is concerned is not to socialize individuals into a community's system of social behavior (linguistic or otherwise),

but to serve "as the *source* [italics added] of [psychological] development and not its setting." Thus, the social world is not the context in which development happens, but it is the origin, the mechanism that provokes the formation higher mental activity. Without robust access to the social world, the internal psychological plane would either be degraded, as can happen to children raised exclusively in some orphanages (Vygotsky, 1994, p. 350), or absent altogether as attested in the case of feral children. I return to the matter of socialization later.

While there are numerous issues that I would very much like to react to in Amory and Becker's article, not the least of which is the matter of importing a theory from one domain, the natural sciences, into another domain, the social sciences, I will limit myself to one—unit of analysis.[2] They do a good job explicating how this concept is interpreted in SCT, although I believe their discussion can be sharpened a bit, as I will attempt to do below. Unfortunately, they do not have much to say regarding the unit of analysis in CDST. Instead, they assume that CDST adopts a different orientation with regard to the whole of a system and its component parts, which, I think is ambiguous, as I will try to explain below. I am also somewhat surprised by their claim that CDST does not have an adequate research methodology, given that they reference Hiver and Al-Hoorie's (2020) book on CDST research methods, and they also discuss Dörnyei's proposal on retrodiction.

In their book on CDST research methods, Hiver and Al-Hoorie (2020, p. 21) propose that the appropriate unit of analysis for CDST research is a "phenomenologically real" contextualized complex system. An additional unit of analysis—the individual—is offered by Al-Hoorie, et al (2023) in their discussion of replication research in CDST. As far as I can tell, in neither publication do they relate the two units, despite the fact that they are quite different in scope. I will address each unit separately but will leave it to CDST researchers to either link them up or explain why they are not to be linked.

Claiming that the proper unit of analysis for the study of complex systems is a complex system, such as motivation, would mean that the unit of analysis to study motivation would be motivation itself. This is problematic as it defeats the purpose of units of analysis. For one thing, it requires the entire system to be analyzed as a whole. Vygotsky (1987, p. 46) cautioned that such a move would make it very difficult if not impossible to carry out a proper analysis, especially in the social sciences, given the complex nature of human systems, including above all, our psyche, the proper subject matter of psychology. Consequently, a simpler, more manageable unit is required—a unit that contributes to the full system and at the same time "possesses *all the basic characteristics of the whole*" (Vygotsky, 1987, p. 46, italics in original). Additionally, whenever Vygotsky focused on the various components of consciousness (memory, attention, perception, imagination, emotion), he realized that they could not be studied without eventually linking them back up to the other components and to the entire system of which it is a part (see Vygotsky, 1997a). Finding his inspiration in Marx's analysis of capitalism through commodity as his basic unit of analysis, Vygotsky (1987) originally proposed word meaning as the appropriate unit for the study of the formation and functioning of our

higher mental system. In word meaning, he saw the crucial dialectical connection between thinking (meaning) and speaking (symbolic activity).

Not all SCT researchers agree with Vygotsky in this regard, because they believe the unit to be too narrow and therefore failing to capture the process of higher mental activity and its development. Basing his proposal on activity theory, Wertsch (1985, p. 208) has suggested "tool-mediated, goal-directed action" as a more viable unit, because it "applies to the interpsychological as well as the intrapsychological plane, and it provides an appropriate framework for mediation." It is important to remember, again following Marx, that word meaning for Vygotsky is not understood as a static object (a noun) that one looks up in a dictionary but a doing (a verb) that mediates an individual's goal-directed activity.

In keeping with his propensity to criticize his own theoretical statements in his unrelenting quest to improve and sharpen the theory, toward the last years of his life, Vygotsky proposed a new unit of analysis that incorporated what he considered to be the motive for all thinking—emotion. He captured the new unit with the Russian term, *perezhivanie*, as mentioned by Amory and Becker. The term in ordinary Russian references the living through of an emotional experience. In keeping with his general dialectical orientation, Vygotsky interpreted *perezhivanie* as a theoretically relevant unit comprised of emotion and intellect (in contemporary parlance, cognition). He characterized the unit as a prism through which the social world is not reflected, but refracted by the individual (Vygotsky, 1994, p. 340), and therefore better explains the unity formed between the individual and the environment that results in development than did the earlier more cognitively aligned unit (Veresov, 2016).

Among the recommendations for how CDST might approach the matter of replication, a hot topic in SLD research, Al-Hoorie, et al (2023, p. 285) propose the individual across time as an appropriate unit of analysis. To appreciate what this entails, I will need to briefly consider the basis of their argument on replication and its connection to prediction, a thorny issue for CDST. The matter of prediction is potentially problematic for CDST, because of its claims that factors such as initial conditions, context-dependence, interconnectedness, soft-assembly, and emergence can result in different developmental outcomes (p. 282).[3] Al-Hoorie, et al (2023) seem to recognize the problem and therefore acknowledge that all actions cannot be narrowly "idiographic," but must, to some extent, manifest aspects of the original action. When it comes to science, this means that replication has clear and unambiguous value, but only when a theory has achieved maturity (p. 280). A mature theory should be able to explicitly indicate prior to a replication attempt which aspects of the replication are relevant and which are not. In the case of direct replication, some variations from the conditions for the initial study may be irrelevant; thus, as long as the relevant conditions are met, the study is considered to have positive value. In conceptual replications, if the claims of the theory hold even when relevant conditions vary from the original study, the findings strengthen the value of the theory, and if the theoretical statements do not hold up under the new conditions, the value of the theory is weakened (p. 280). The situation changes in the case of studies conducted under the auspices of an immature theory, because such a

theory cannot "elaborate on the necessary conditions to produce a particular outcome" (p. 281). While positive findings could imply support for the theory, negative findings could be at best ambiguous, because one could not know with certainty their value for the theory, given that the theory would be unable to specify with clarity the possible outcomes of a study under different conditions (p. 281).

In order to address the prediction issue in the absence of mature theories, the authors propose a reinterpretation of replication, which they describe under the rubric of "substantiation" (p. 280)—a procedure that mitigates the need for a theory of some phenomenon of reality (e.g., SLD) prior to exploring, observing and experimenting with that phenomenon (p. 283). Under substantiation, researchers "intervene in and influence the complex dynamic realities of the phenomena under investigation" with the goal of "generating positive change that is complex, situated, iterative, and time-scaled in nature" (p. 282), without necessarily fully and explicitly understanding the object of interest (p. 283).

One of the three directions for substantiation research envisioned by Al-Hoorie, et al (2023) entails the previously mentioned analysis of performances across individuals whereby one individual is focused on as the initial study with the performance of additional individuals counted as subsequent replications.[4] In such an approach the expectation is that the effect from one study to the next would not be uniform, but the result would yield a "cumulatively richer picture" that would reveal the pattern and extent of replicability across the participants (p. 285).

In essence what Al-Hoorie, et al (2023) propose is a break from what they call "theory fetish", which "devalues exploratory and pre-theoretical observation and experimentation" (p. 283). Accordingly, Al-Hoorie, et al (2023) argue that a viable alternative is "to instead focus on intervention" (p. 283). This entails the previously mentioned use of machine learning with big data to make predictions as well as acting intentionally to "influence the complex dynamic realities" and generate "positive change that is complex, situated, iterative, and time-scaled in nature" as well as "practical in use in applied settings" (p. 282). Thus, they want to flip the relationship between theory, basic research and its eventual application, something the field has worried about since its inception nearly five decades ago (e.g., Tarone, Swain & Fathman, 1976).[5]

Underlying Al-Hoorie, et al's (2023) position is a dualistic assumption—that theory and practice are separate and independent activities, regardless if one moves from theory to practice or from practice to theory. However, there is a third, dialectical option, which calls for the unity of theory and practice. Al-Hoorie, et al (2023, p. 280) assume that as research "attempts to approximate the complexities of real life, the more unwieldy theories inevitably become" until the findings of research become irrelevant. I agree with their argument when it comes to the traditional way of conceptualizing the theory / basic research vs. practice gap that no doubt underlies Jakobovtis and Gordon's forceful comment in note 5.

Vygotsky rejected the traditional approach to scientific theorizing and its application to practice whereby practice takes place only after theory has been formulated and basic scientific research completed (1997a, p. 305). On this view,

should the application of a theory confirmed by basic research fail in its application to practical activity, "it had practically no effect on the fate of the theory" (p. 305). He insisted that in the new historical dialectical psychology that he was seeking to establish practice must pervade "the deepest foundations of the scientific operation" and must "reform it from beginning to end"; moreover, practice must become "the supreme judge of theory, as its truth criterion" and determine "how to construct the concepts and how to formulate the laws" (p. 305).

This does not mean that Vygotsky eschewed laboratory research. He and his colleagues regularly conducted laboratory experiments through what he variously called the experimental-developmental method or the method of double stimulation, in which the object of research was not to observe the behavior of participants, but to intervene in the process of interest through offering the participants various mediational tools to carry out the experimental tasks (Vygotsky, 1978). However, he understood that it was necessary to transfer the results of experimentation to real life, as revealed in the following quotation:

> If the experiment discloses for us a sequence of patterns or any specific type, we can never be limited by this and must ask ourselves how the process being studied occurs under conditions of actual real life, what replaces the hand of the experimenter who deliberately evoked the process in the laboratory. One of the most important supports in transferring the experimental outline into reality are the data obtained nonexperimentally. We have already indicated that we see in these data a valid confirmation of the correctness of our outline. (Vygotsky, 1997b, p. 94)

What all of this means is that even though in dialectical relationships there is a necessary interaction between the contrasting poles of a relationship, one of the poles takes precedence over the other (see Marx, 1973 on production and consumption). Thus, for Vygotsky if theory and experimental research fail to make a difference in real life practice, the theory is faulty and must be revised or abandoned altogether. One of the ways in which the theory was in fact tested in practical activity was to focus on schooling, because the fundamental tenet of the theory is that higher psychological processes are social in origin (Vygotsky, 1986). Schooling is a social process that is markedly different from the social processes that transpire in everyday life. Vygotsky (1997a, p. 88) described education as the "artificial development of the child", which "restructures all functions of behavior in a most essential manner." It does this through the systematically created, organized and sequenced signs "designed by an external agent", such as teachers, textbooks, curriculum, syllabus, etc. (Wertsch, 2007, p. 185). If schooling does not promote development, the theory must be considered suspect, and either revised or abandoned (see van der Veer, 1985 for a fuller discussion of this important topic).

One of the earliest tests of the theory in real-life was carried out by Luria (1976), who investigated the impact of schooling in general on the thinking of rural agricultural communities in the Uzbekistan and Kurghizia during the 1930s government collectivization efforts of these communities. His research team uncovered clear evidence that even a few years of schooling significantly changed

the manner of thinking, not only of children, but of adults. These studies were later replicated among indigenous populations in Canada (Schubert, 1983) as well as among the rural populations of the Taymyr peninsula of Russia and in Kurghizia (Tulviste, 1991).

This brings me to the article by Kissling in which a real-world educational study conducted in accordance with SCT principles of instructional development challenged the predictions of the Aspect Hypothesis, one of the most robustly researched hypotheses in SLA.

Kissling: SCT and the Aspect Hypothesis

Recent SCT-L2 research has begun to compare the effects of specifically designed instruction on L2 development and in particular testing the claims of other theories on the effects of schooled instruction on L2 development. Zhang (2014) was the first such study to test the predictions of a specific SLA theory, Pienemann's (1989) teachability hypothesis, when instruction on topicalization in L2 Chinese is designed according to SCT principles. Similar to Andersen's Aspect Hypothesis, as well as most theories of SLA, Pienemann's (1998) general processability theory claims that L2 development is governed by learner internal mechanisms that are not subject to modification by contextual factors, including those that are typical of language classrooms. Recall that the mechanisms that shape higher psychological development are situated in the social world not in our biological endowment.

One of the problems with previous research that has investigated both hypotheses in classrooms is that they have not paid sufficient attention to the quality of classroom instruction and have assumed that any variation in instructional design will not impact the mechanisms responsible for SLD. Salaberry (2008, p. 13), however, found that beginning L2 learners do not exhibit effects of the AH until they improve their proficiency in the new language. As such, he proposed the default past-tense hypothesis which states that in the very early stages of development learners will tend to rely on perfective morphology (in the case of Spanish, preterite forms) to mark past distinctions and only later will they reflect the predictions of the AH. A possible source of learner predilection for perfective morphology in early SLD is the fact that traditionally instruction on Spanish past-tense morphology has relied on rules-of-thumb that isolate instruction on each of the two forms (preterite and imperfect) with the preterite given precedence (Bardovi-Harlig & Colomé, 2020, p. 1146). This segregationist approach undermines the very concept of aspect, given that the concept itself depends on a contrast between the two temporal perspectives. Moreover, as Kissling also points out, teacher talk tends to exhibit a higher frequency of prototypical than nonprototypical use of past morphology. This raises the question of whether or not Kissling also produced more incidents of prototypical use in the 85 hours of classroom talk that preceded instruction on aspect. If she followed the general trend reported in the research literature, this should lend even stronger support to her finding that her students were able to use aspect in nonprototypical ways: imperfect with achievement predicates and preterite with stative predicates, something that normally does not

usually emerge until learners have reached more advanced levels of proficiency (see Yáñez-Prieto, 2014).

Kissling argues that future research should incorporate direct comparisons of C-BLI with other pedagogical approaches. While I agree with this recommendation, I also think that comparing the performance of her students with a learner corpus is legitimate, especially since the learner corpus is based on the same task used in her study, although this might not come across so clearly in her presentation. A question that also arises with respect to Kissling's study is even though her students seem to control viewpoint aspect in ways that are similar to more advanced learners and to some extent even L1 speakers, do they have the ability to use lexical aspect appropriately in personal narrative tasks where lexical aspect typically appears? This is an important question to answer given that the study by Palacio Alegre cited in her article found that learners avoided its use preferring instead non-target-like use motivated by the rules they were taught. I also encourage more C-BLI comparative research on other agreed-upon features supposedly typical of SLD, including English question formation and negation, German word order and negation, and Spanish mood, among others.

White and Masuda: SCT and CL

The final article in the theory group is White and Masuda's comparative analysis of SCT and cognitive linguistics. In my view, the most important contribution of their article is raising the issue of the dialectical interaction between grammar as conceptual knowledge and grammar as usage. The fact that those working in CL, such as Achard, who apparently is agnostic with respect to whether instruction should be implicit or explicit, fail to appreciate the significance of this type of interconnectedness whereby each component depends upon and, at the same time, pushes the other must be noted. Vygotsky cogently develops the argument in support of the relevant dialectical relationship between both capacities in chapter 6 of *Thinking and Speech* (Vygotsky, 1987), whereby the weakness of conceptual knowledge that is not sufficiently saturated with concrete practical relevance results in "verbalism", while at the same time its strength resides in a students' capacity to deploy it to carry out practical actions (p. 165). In the absence of a connection with practical action, students do not learn concepts, but words that imitate concepts or what Ilyenkov (2007, p. 75) characterizes as the "*illusion* of knowledge" (italics in original). Hence, again echoing Marx's thinking[6], true concepts for Vygotsky are not static nouns, but are instead imbued with action and therefore function as verbs; without this, they are petrified relics of the educational process. In other words, as White and Masuda stress, SCT pedagogy is designed to breathe life into the conceptual knowledge uncovered by CL research.

The other side of the dialectical coin is just as important. In other words, doing without understanding stifles any performance. This is what I believe results from implicit exposure to any kind of knowledge, including linguistic knowledge whether inside or outside of a classroom. The danger is that exposure only, even if to a large number of tokens, constrains learner creativity as it forces them to blindly mimic native speaker performance, who, with the exception of literary figures and a

few others, are constrained in their use of language by virtue of its invisibility. Scientific concepts change the structure of spontaneous concepts that are internalized implicitly outside of schooling (Vygotsky, 1987, p. 174), a process that is essential for creativity and imagination to flourish. In this regard, however, we need to appreciate how Vygotsky interprets creativity and imaginative activity. He is not referring to the accomplishments of exceptional figures of history, such as Tolstoy, Edison, but in the activity of ordinary individuals "whenever a person imagines, combines, alters and creates something new, no matter how small a drop in the bucket this new thing appears compared to the works of geniuses" (Vygotsky, 2007, pp. 10-11). It is the task of education to cultivate the development of every student's imagination and creativity (p. 88), and this must be an intentional explicit feature of the educational process. Hence, the importance of making language visible through presentation of its conceptual organization linked to practical communicative activity. An example is evidenced in Kissling's article as well as in Yáñez-Prieto's (2014) study involving nonprototypical use of verbal aspect in Spanish.

In addition to the general significance of White and Masuda's article, I would like to point out a few matters that should strengthen their line of argument. The authors state that "the foundation of SCT lies in developmental psychology", which can be misinterpreted to support the position expressed by many scholars that Vygotsky is a developmental psychologist and as such that the theory is essentially a theory of child development. This interpretation loses sight of the fact that Vygotsky proposed a historical materialist theory of the adult psyche and as such his research methodology is historical. John-Steiner and Souberman (1978, p. 128), in their afterward to *Mind in Society* (Vygotsky, 1978), make this key point abundantly clear:

> Though Vygotsky focused much of his research energies on the study of children, to view this great Russian psychologist as primarily a student of child development would be an error; he emphasized the study of development because he believed it to be the primary theoretical and methodological means necessary to unravel complex human processes, a view of human psychology that distinguishes him from his and our contemporaries. There was, for him, no real distinction between developmental psychology and basic psychological inquiry.

White and Matsuda recommend use of stimulated recall in order to gain access to how learners use specific concepts in their L2 performances and as a means of enabling teachers to more appropriately guide learner development. The study reported in Yáñez-Prieto (2014) does this, although with regard to written rather than spoken performance. In keeping with principles of C-BLI, she interviewed her students to discover how they decided to manipulate Spanish aspect in their written narratives. The procedure revealed that the students intentionally made use of nonprotypical aspect marking in order to create a different impression on the reader than would have been transmitted through typical use of aspect in Spanish discourse, especially with regard to foreground and background information.

I would like to underscore the authors' recommendation that longer term studies are needed than has been the case in SCT-L2 research so far, and as is unfortunately, also typical of much SLA research. In this regard, I believe it would have been extremely informative to discover how the students who participated in Negueruela's (2003) and Yáñez-Prieto's (2014) semester-long projects performed when we they once again returned to more traditional pedagogical experiences in subsequent courses. Would there have been resistance to their re-encounter with rule-of-thumb explanations or would they have succumbed to what was required in traditional instruction?

With respect to question that a reviewer asked if intermediate and advanced level learners can be considered at "the beginning of their conceptual understanding", it would have been instructive if White and Matsuda had presented excerpts from Negueruela's and Yáñez-Prieto's respective studies in which when asked to explain the new concept of aspect the students struggled to reconcile the conflicting old and the new information and then eventually began to change their understanding toward the new concept over time. The struggle might have highlighted the relevance of conflict and dissonance in giving impetus to development, a central feature of Vygotsky's theorizing (Vygotsky, 1987).

The authors recommend including L2 instructors as participants in future research, something that I encourage as well. The work of Olga Esteve and her colleagues in the Barcelona Formative Model cannot be overlooked in this regard (see Esteve & Alsina, 2024). The program they have implemented has had a profound impact on language instruction in the schools in the Barcelona region of Spain. It uses C-BLI to prepare teachers and teacher-educators to deliver C-BLI instruction in an array of L2s and it also inspires and prepares teachers and teacher-educators to carry out and publish research focused on their experiences, not as action research but as research that assesses the value of the theory to make a difference in real-world settings, as Vygotsky proposed.

In Table 2 on extensions of recent studies, White and Masuda offer two important recommendations, one on the use of gesture as a means of visualizing conceptual knowledge and the other having to do with perhaps the most important aspect of development—the ability of learners to generalize a concept to new circumstances. As for gesture, recall that in her study on aspect, Kissling used gesture to depict [±boundedness]. The value of gesture is that it can be taken up by learners as a significant step toward internalization as it helps them break from full reliance on a SCOBA and because it is inherently part of embodied cognition. To paraphrase McNeil (1992), the hand is part of the mind even if it is not part of the brain. Lantolf and Zhang (2017) provide evidence for this claim from an L2 learner of Chinese who used her hand movements to successfully compensate for her low working memory capacity. As for generalization, a study by Lee (2012) using C-BLI principles reported that learners instructed in the conceptual relationship between literal and metaphorical meaning of English particle verbs such as "take out", "spread out", "fish out" etc. were able to correctly generalize their knowledge to new particle verbs formed with "down" and "in". In terms of Dynamic Assessment this would comprise a near transfer because focus would still be on particle verbs.

However, as suggested by White and Masuda, boundedness is a broader concept in that it not only accounts for verbal aspect, but it also underlies nouns, adjectives and articles. Hence, an interesting assessment of learner ability to generalize would be to determine if they can extend the concept in a far transfer task that would include any or all of the other applicable categories.

Empirical Studies

Siekmann and Parker Webster: Activity Theory

The model proposed by the authors based on what is known as third generation activity theory adopts a somewhat different set of principles from those that underly C-BLI. The reason is that activity theory emerged from a different set of assumptions about what constitutes the mediating artifact and the explanatory principle that account for higher mental processes. This is not the place to enter into the historical and political details of the divergent viewpoints between Vygotsky and Leontiev (see van der Veer & Valsiner, 1991; Wertsch, 1985). Suffice it to say that the two psychologists disagreed on what constituted the foundation on which the higher mental system is built. For Vygotsky it is semiotic mediation during goal-directed activity, largely, though not exclusively, provided by language and for Leontiev it is concrete practical activity itself that mediates the formation of the higher system. Vygotsky recognized the importance of practical activity, but for such activity to occur requires a symbolically organized mental plan. He explained the inherent connection between mental and material activity through Marx's notion of "doubled experience" in which humans, unlike other animals, first symbolically construct a plan of action in their imagination before actualizing the plan in the material world (Vygotsky, 1997a, p. 68). This doubled experience is a form of adaptation that is unique to humans, because, as Arievitch (2017) argues, we are able to adapt the environment to ourselves rather than to adapt to environmental change. This notion is key to appreciating the significance of activity for human development, because changing the environment also changes us. However, the difference between Leontiev and Vygotsky in this regard is that at least in Leontiev's early formulation of activity theory there is no role for doubled experience and with it, symbolic activity. Leontiev's second generation activity theory, according to Siekmann and Parker Webster, featured collective activity, which seems to have come at the expense of individual activity. As far as I can determine, doubled experience does not play a role in Engeström's third generation activity theory either. If it does, I stand corrected.

The above matter aside, I find the on-going efforts of Siekmann and her colleagues with regard to indigenous language education very impressive. One issue that I would like to bring to the forefront of their efforts, however, is the appropriateness of the concept of participatory teacher action research. In light of my earlier discussion of the dialectical interaction between theoretically informed practical research and practically informed theory (i.e., praxis), I strongly encourage Siekmann and her colleagues to jettison the modifier "action" and instead refer to what is carried out in classrooms as research as the ultimate test of the theoretical validity. I believe that this is one of the significant contributions of Esteve's

Barcelona Formative Model, in which research carried out by teachers is as highly valued, if not more so, than basic research. Indeed, the authors make the extremely important point in their comment that theorizing in the absence of "practical implications, calls into question the applicability to practitioners, thereby inhibiting the potential for transformative action or praxis." This is precisely the significance of Vygotsky's insistence that theory has to be ineluctably connected to practice. I also wonder why the community node in their activity system is limited to Indigenous and non-Indigenous teachers and students as well as non-Indigenous university faculty but no mention is made of Indigenous and non-Indigenous families? In the BFM, families are very involved in understanding and supporting the changes in the language curriculum and program of instruction.

The authors' final commentary on diffractive methodology is intriguing and should be looked at more carefully with regard to how it might or might not interface with SCT. My curiosity was sufficiently piqued by the remark to have grappled with Barad's (2007) book. In a nutshell, diffraction is a physical process in which a wave of light, water, or sound, bends and expands when it encounters an obstacle.[7] Thus, in classical physics, when an ocean wave encounters a natural or human-made barrier, the wave diffracts resulting in a series of small waves or ripples. When sound waves strike a barrier such as a wall, they bend around it, which is why someone can hear the sound even though they may not be standing in a direct line with the waves. Without going into the details, the study of diffraction is the study of "patterns of difference that make a difference" (Barad, 2007, p. 72). Researchers can then determine something about the nature of the object that diffracts (e.g., waves or particles), or the object that causes the diffraction (e.g., the barrier). Barad brings this notion into social science with regard to the "differences our knowledge-making practices make and the effects they have on the world" (p. 72).

Siekmann and Parker Webster, if I understand them correctly, see something methodologically attractive about diffraction. While diffraction as a physical process might be a useful analogy to explain the relationship between individuals and the social environment (i.e., the social situation of development), I do not believe it adds much to Vygotsky's use of refraction to illustrate the same process. The issue that needs to be investigated, however, is its value as a methodological procedure, which is what Barad is primarily interested in. In other words, does the way in which physicists utilize the diffraction process to investigate the properties and behavior of waves, particles as well as the barriers enhance in any way the genetic methodology already deployed in SCT research? This matters because of Vygotsky's reluctance to introduce into psychology research methodologies developed in other sciences to study their phenomena of interest.

Ballesteros Soria and van Compernolle: The Collective and TBLT

Without question, one of the most powerful modes of socially organized forms of goal-directed activity is a collective. Since the time of Donato's early work on collective activity in L2 classrooms, cited in Ballesteros Soria and van Compernolle's article, there has been a dearth of research on this important topic.

For this reason alone, the present work is significant. The project investigates the process of pre-task planning carried out collectively instead of individually, as is typical in task-based instruction. According to the authors, the students creating the DSISs are assumed to function collectively because they are "working toward a common objective." However, this requirement alone does not constitute a collective, according to Petrovsky (1985). Collectives are also characterized by a clear division of labor in which the members of the group carry out socially significant tasks (e.g., development of L2 interactional competence) by relying on the specific contribution of each member of the group. In other words, an "inherent feature" of a collective is one of dependence whereby the "success or failure of one [member] conditions the success or failure of all" (Petrovsky, 1985, p. 99). Harré (2002, p. 148) differentiates between a "structured collective" and a "taxonomic collective". Structured collectives are held together by "real relations" such as occurs in families, and social institutions (e.g., government, factories, farms, etc.), and in Petrovsky's view, properly organized academic environments. In each of these cases, there is a mutual dependency created by a clear division of labor. In taxonomic collectives, coherence results from the members sharing common properties rather than real relations. It seems to me that the collective featured in Ballesteros Soria and van Compernolle's work is closer to a taxonomic category than it is to a structured collective, of the type addressed in Petrovsky (1985).

As an example of a structured collective, I point to the work of Urbanski (2023), which reports on a C-BLI study of L2 French students learning collectively whereby each of the subcomponents of the reading process (grammar / discourse knowledge, lexical knowledge, prediction, main idea) is assigned to individual students as together they work their way through narrative texts. In the absence of, or problem with, any subcomponent, the reading task would break down. The consequence of this approach gives rise to what Petrovsky (1985, p. 99) calls the "group effect" through which the activity of the collective contributes to the development of its members, something that is documented in Urbanski's study. Ballesteros Soria and van Compernolle might consider following a similar division-of-labor approach to teaching French conversational interaction, assuming that the process is comprised of subcomponents—eye-gaze, haptics, proxemics, pausing, intonation, and the like.

It seems to me that academic collective pedagogy is a promising approach to instruction that should be explored in more depth in real classrooms. As far as I am aware, research on task-based learning does not intentionally organize groups as collectives in order to complete tasks. I believe it might be an excellent way to organize students grouped according to their ZPD, as proposed by Vygotsky (2011, see below). A teacher would need to be sensitive to the quality and complexity of tasks given to any collective depending on the size of their ZPD. Also, the quality of mediation offered to a given collective would be expected to vary again depending on the size of the ZPD of the group members.

Practical Studies

Grazzi: English as a Lingua Franca

Grazzi tasks on a rather daunting task of bringing principles of SCT pedagogy into contact with the perplexing problem of ELF. The conundrum that teachers face, as described by Grazzi, is an excellent example of the tyranny of irrelevant expertise. On the one hand, teachers are told, and indeed are generally sympathetic to the priority of communicative effectiveness and fluency over accuracy in following presumed NS norms; on the other hand, they have not been given much guidance on how to assess and evaluate learner performance other than to suggest that if it is important for students to pass a test, teachers should instruct students in what are and are not acceptable NS norms, despite a commitment to ELF. Thus, while EFL researchers fulfill their academic desire to investigate the behavior of NNS English speakers in an array of different contexts attempting to fulfill a variety of communicative needs in various geographic regions of the world, teachers remain "lost and confused". The task that Grazzi has set for himself is to try to ameliorate the situation through engaging with the principles of SCT, especially with regard to language pedagogy (C-BLI) and assessment (Dynamic Assessment). Again, this endeavor represents a prime illustration of the importance of the dialectical unity of theory and practice that is praxis. Given that C-BLI brings conceptual meanings, as developed primarily by Cognitive Linguistics, to center stage in language pedagogy, and because it seeks to promote reasoned creativity in communicative activity rather than normative and rule-following behavior, nonprototypical performance is valued rather than to be avoided. This includes in language assessment practice as well. The primary difficulty that learners face, as pointed out by Grazzi, is flawed or incomplete conceptual knowledge of language features that empower them to generate and express meaning through their own version of English.

It might be useful for Grazzi to consider Harré's (2002) distinction among different ways of construing the concept of "norm" based on Wittgenstein's interpretation of grammar as well as what he calls the Taxonomic Priority Principle and the Task / Tool Principle (p. 137). Because Harré's work draws on Vygotskyian theory, especially with regard to tool-based mediation, I believe it has something to offer for refining the argument that Grazzi makes with regard to teachers, learners, and ELF.

Rosborough and Wimmer: The Language Curriculum

Rosborough and Wimmer engage in a more expansive encounter with educational practice than Grazzi. Nevertheless, the concerns they raise are not unlike those that are more narrowly in focus in Grazzi's analysis of the EFL situation. The crucial argument the authors make, in agreement with researchers such as Gredler (2012), is that extracting specific concepts out of the general framework of the theory simplifies, weakens, and, in my view, distorts the significance and impact of the concept. Without question, the most violated concept, again as Rosborough and Wimmer note, is the Zone of Proximal Development. Once isolated from the theory, it loses its intended function, which I believe explains the most pervasive

misinterpretation of the concept—"scaffolding". For one thing, as the authors rightly highlight, the principle that learning leads development is lost. In fact, in most work that I am aware of on scaffolding, the concept of development evaporates, as the goal is to guide leaners toward task mastery rather to promote developmental processes that result in different ways of thinking and behaving (see Xi & Lantolf, 2021).

A particularly thorny matter regarding the ZPD, according to Veresov (2017) is the inadequate, and frequently quoted, English rendering of Vygotsky's original Russian description of the ZPD that appears in Vygotsky (1978). For Veresov (2017, p. 27), the problem is the term "determined" which appears in the 1978 English definition: " . . . the level of potential development as *determined* [italics added] through problem solving under adult guidance . . ." (Vygotsky, 1978, p. 86). The term is problematic because it leaves the inappropriate impression that the child is a passive participant who is heavily dependent on the adult (Veresov, 2017, p. 27). A later translation appearing in Vygotsky (2011, p. 204) replaces "determined" with "defined"—a term that may be closer to the meaning intended in the original Russian: " . . . the level of possible development, *defined* [italics added] with the help of tasks solved by the child under the guidance of adults . . . ." Veresov (2017, p. 27) suggests that an even better rendering of Vygotsky's intended meaning would be "identified", so that the ZPD is then understood as a cooperative process between adult and child that "creates conditions for the development of those functions that are at the very beginning of their developmental cycle." Indeed, as I have mentioned with regard to collectives, Vygotsky (2011, p. 205) suggests that instruction would be much more effective if learners were grouped, not according to their independent performance on diagnostic tests, but according to their ZPD identified according to their performance in cooperation with adults.

I am in complete agreement with Rosborough and Wimmer's analysis of the community of practice perspective as far as the support they seek in Vygotskian theory (see Duff & Talmy, 2011). For one thing, a community of practice, such as occurs in the apprenticeship model of education, harkens back to a proposal that Egan (2002) attributes to Spencer, Dewey, and Piaget to the effect that formal education will be successful if the features of everyday learning are imported into schools. Although Egan's focus is on the learning process exhibited by children in out-of-school settings, the learning that transpires in apprenticeships shares an important feature with everyday learning in that apprentices are not expected to have deep generalizable knowledge of the tasks they are trained to perform (see Lave & Wenger, 1991). As with children, learning is highly empirical rather than conceptual. Moreover, Rosborough and Wimmer are on the mark when they state that Vygotsky is concerned with "consciousness and development as dialectically positioned" in contrast to the CoP approach, which has shown little interest in the formation and study of higher mental functions.

This leads me to the final point of incommensurability I want to make with regard to CoP and social constructivist perspectives, inspired by Rosborough and Wimmer's challenge to popular school curricula—the meaning of "socialization" for Vygotsky and for social constructivists and those interested in L2 socialization. Duff

and Talmy describe language socialization as a "branch of linguistic anthropology" that is concerned with "understanding the development of linguistic, cultural, and communicative competence through interaction with others who are more knowledgeable or proficient" as well as with "*the other forms of knowledge* [italics in original] that are learned in and through language", including social knowledge, ideologies, epistemologies, identities, affect and the like (Duff & Talmy, 2011, pp. 95-96). These authors assert that "language socialization has much in common with neo-Vygotskian sociocultural theory" in that it recognizes the role of "more proficient interlocutors, peers, caregivers, or teachers in helping novices/newcomers reach their potential by means of scaffolding or guided assistance" (Duff & Talmy, 2011, p. 110).

Vygotsky (1986, p. 61) views ontogenesis not as a process that moves toward socialization, but toward individualization of social functions; that is the transformation of social functions into psychological functions. Instead of asking how do children come to behave in a collective, Vygotsky asks how collectives generate higher functions in children (p. 61). Nowhere is Vygotsky's interpretation of socialization more distinct from how it is described by Duff and Talmy than in the contrast he draws between his perspective and Piaget's on the fate of egocentric speech. Egocentric speech for Piaget is indicative of the insufficient socialization of speech that eventually disappears has children master / socialized into the language of their community. For Vygotsky speech is from the beginning social and egocentric speech is social speech that does not disappear but instead transforms into psychological speech—inner speech—thus, socialization for Vygotsky is an individualization process that creates our higher mental system (Vygotsky, 1987, *Thinking and Speech*, chapter 7).

Concluding Remarks

Some very important lessons can be learned from Vygotsky's approach to building a unified theory of psychology. One is that a menu-based approach will not work. By this, I mean cobbling together features from theories A, B, C, D . . . is not going to yield anything other than a list, which is not a theory. Yet, such an approach is evidenced in SLA, whether in the various colloquia on theories with subsequent jointly authored publications (e.g., Hulstijn, et al., 2014), in the Douglas Fir Group (2016) in which a set of individuals representing different theories met for several hours to hammer out a transdisciplinary document, rather than a unified theory of SLD. Some such as Mitchell, Myles, and Marsden (2019) attempt to explicate, evaluate, and synthesize various SLD theories. Others such as VanPatten, Keating, and Wulff's (2020) edited volume compile a collection of chapters authored by representatives of particular theories in which they present the major features of the theory and then explain how the theory accounts for particular facts of SLD. A problem with this approach is that facts are not theory independent (see Harré, 2020). For instance, Chomskyan theory considers ungrammaticalities to be crucial facts in supporting theoretical arguments, but neither Systemic Functional Theory, nor Cognitive Linguistic Theory do. Yet other approaches invite contributors to edited volumes to in some way "briefly" compare their theory to other theories (e.g., Atkinson, 2011).

A newly published edited volume by McManus (2024) includes a final chapter, typical of the various compilations that have appeared in the literature, in that it includes a final chapter that undertakes the unenviable task of synthesizing the various contributions of invited authors. In this case, theories focused on usage-based SLA. After summarizing each contribution and drawing out useful insights from each theory and associated research, McManus (p. 188) writes the following: "An additional insight gained from this review is that not all approaches weigh the same factors or ways of studying usage in identical ways, which is one reason why future research should blend insights from multiple approaches." This sentence gets at the heart of the matter regarding a unified theory: different approaches establish different facts using different research methods and the different facts somehow need to be blended. If facts are to some degree theory dependent, will representatives of different approaches agree on the facts, which seems to be a crucial step if the facts are to be blended?

This is where I believe the second lesson from Vygotsky comes into play and that is his remarkable ability to engage with a wide array of theoretical perspectives and empirical output of other research traditions. Anyone who reads the six volumes of the *Collected Works* as well as his notebooks (see Zavershneva & van der Veer, 2018) will recognize that Vygotsky did not develop his theory in splendid isolation from other contemporary theories. He constantly brought his thinking into profound contact with different ways of conceptualizing and researching human psychology. In effect, he read his theory through other theories, and he read other theories through his theory. In some cases, such as egocentric speech, he rejected Piaget's interpretation and provided support for his own perspective. In other cases, he accepted what others had written about concepts such as mediation, internalization, imagination, the ZPD, activity, semiotics, etc. and blended this information into his theoretical thinking. It may be somewhat of a pipedream to assume that SLA researchers would be able to follow Vygotsky's approach but there may be other ways of achieving a similar outcome. The articles included in the special issue produced by a team of researchers rather than a single individual represent a beginning. By comparing aspects of different theories and approaches at a macro and / or micro level agreement might eventually emerge regarding the blending of insights. It will take time and effort but the payoff might be worth it. For instance, it would be informative to know how those working in CDST would respond to the discussion of unit of analysis and the theory-practice dualism.

In 2015, I participated in a symposium on individual differences and L2 interlocutors at Indiana University that brought together researchers from four different theoretical orientations: cognitive-interactionist, variationist, CDST, and SCT. Each presentation and the edited volume that followed included a theoretical statement and an empirical study illustrating the theory. Similar to other edited compilations, the symposium organizer Gurzynski-Weiss (2020) made the effort to synthesize the theoretical and empirical presentations accompanied by an agenda for future research. Unfortunately, what is missing from the published version of the symposium is documentation of the fruitful exchanges that occurred among the

participants outside of the formal proceedings where similarities and differences among the theories were explored.

In 2017, I had the opportunity to take part, along with a representative of CDST, in a six-hour pre-conference workshop sponsored by AAAL. Each presenter first explained the major principles, concepts, and research methodology of their respective theory. They then engaged with each other and with the audience in an extended discussion comparing the theories and their relevance for SLD. The event involved direct interactions of individuals deeply involved and knowledgeable of the respective theories. As interesting and as stimulating as the workshop was, as far as I can determine, nothing much came of the event in the sense that there was neither a follow-up event, nor was there an effort to produce a collaborative publication that might have stimulated additional and more in-depth discussions along the lines one encounters in Vygotsky's writings.

With this in mind, my recommendation is that in the future researchers from different theoretical perspectives collaborate on theoretical as well as empirical projects from beginning to end and using an array of concepts and principles to address topics of interest to the field; for example the study of motivation from two different theoretical perspectives as Amory and Becker did, or investigation of developmental sequences in empirical projects carried out under the auspices of different theories, as Kissling did. It would also be informative to engage in projects comparing theories at a more macro level as illustrated in White and Masuda's article. This is not to leave out more focused projects along the lines of Ballesteros Soria and van Compernolle's approach to task-based instruction. Grazzi's project is particularly provocative because it makes a speculative argument about integrating C-BLI and DA into ELF teaching. I do firmly believe that the leading journals in the field need to open up space for publication and discussion of theoretical manuscripts. Even though most journals avow a commitment to theory in their instructions to would-be authors, they clearly show a strong preference for publication of empirically rather than theoretically oriented manuscripts. Perhaps the current trend toward open access journals where authors and reviewers engage in open, and hopefully constructive, conversations over theoretical manuscripts would be at least one venue conducive to bringing theories into contact. Be that as it may, the effort to do something has to be worth the effort!

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Notes

1 While I believe that SLD (D is for Development), in agreement with those working in CDST, is a more appropriate means of referring to the process than is SLA (A is for Acquisition), the abbreviation SLA has become the accepted way to refer to research field that investigates the process. I will make this distinction throughout the article: SLD is the process and SLA is the field of study.

2. Vygotsky (1997a) cautioned against the tendency of psychology at his time to import theories and research methodologies from the natural sciences into psychology. In Lantolf (2016), I raised this issue with regard to CDST. Hiver and Al-Hoorie (2020) briefly responded to my observation, commenting that researchers in the social sciences have realized "that the human and social domains, at their

core, reflect and are characterized by the very principles that make up complexity" and furthermore there are "many instances when the human and social sciences have taken their inspiration from developments in the physical sciences" (p. 18). This may be all well and good, but it does not mean that the findings of such research appropriately reflect what is going on when it comes to human mental development and it very well could overlook aspects of the developmental process itself, for instance, how do the biological and cultural factors necessary for human mental development come together to form our higher unified psychological system? (see Vygotsky, 1994, 1997a). As for inspiration from the physical sciences, according to Dafermos (2018, p. 21), physics envy "became a hallmark of twentieth century psychology" resulting in the "reproduction of the natural-social dualism" that continues to plague the discipline. As an example of what can happen when concepts from physics are imported into psychology see Brown, Sokal, and Friedman's (2013) scathing critique of Fredrickson and Losada's (2005) misguided attempt to predict whether an individual would emotionally flourish or languish based their "positivity ratio", a mathematical model derived from nonlinear fluid dynamics.

3. According to Morrison (2008, p. 29), "if the same behavior does not produce the same results twice" and "if its outcomes are unknowable," "the nature of responsibility" and rationality are seriously called into question.

4. The other two involve machine learning using big data that apparently has been successful at making predictions in the absence of a human generated theory, and mini-theory thinking as a type of preregistered statement of what would count as evidence for or against the thinking underlying the study.

5. It could well be that basic research, especially when it entails controlled experiments, can never be relevant for applied purposes. Jakobovits and Gordon (1974, p. 85) pleaded for teachers to free themselves from what they characterized as "the tyranny of irrelevant expertise". In their view, application of the findings of basic academic research, even when "focused on educationally relevant issues" must not be confused with "applied educational research" (pp. 86-87). A major problem with basic research in the social sciences, is that in laboratory circumstances, human participants cease behaving in "typically human ways" and instead are converted into "organisms", thus erasing "the boundaries between animal and human psychology" (Newman & Holzman, 1996, p. 81). Behaving as organisms (e.g., rats) alienates humans from their appropriate life form (p. 81).

6. In *Grundrisse*, Marx (1973, p. 91) states that "a garment becomes a real garment only in the act of being worn; a house where no one lives is in fact not a real house."

7. Not to be confused with refraction, the image used by Vygotsky to illustrate what occurs in SSD, which is the pending of light when it passes from one medium (e.g., air) to another medium (e.g., water). Waves are not in themselves objects, but are rather perturbations in matter, whereas things like electrons, atoms, etc. are particles of matter. The weird thing, at least for non-physicists, is that in the quantum world, electrons, and other particles, behave as if they were both waves and particles.

Author's Biography

James P. Lantolf, Greer Professor in Applied Linguistics, Emeritus, Pennsylvania State University & Distinguished Professor, Beijing Language & Culture University. President—American Association of Applied Linguistics (2005), received its Distinguished Scholarship & Service Award (2016). Co-editor—*Applied Linguistics* (1993-1998); founding editor, *Language and Sociocultural Theory* (2013-2023). Co-authored *Sociocultural Theory and the Genesis of Second Language Development* (2006); *Sociocultural Theory and the Pedagogical Imperative in L2 Education* (2014)—awarded the Mildenberger Prize of the Modern Language Association of America. Co-editor—*Routledge Handbook of Sociocultural Theory and Second Language Development* (2018). Published 144 articles and book chapters.