

Article

Crisis and Causality in Second Language Acquisition Research: Implications for Language Teaching

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Abstract

This commentary addresses several key topics that relate to the current state of second language acquisition research and its relationship to language pedagogy. I argue that similar to the research model that SLA has adopted from psychology, the field is in a state of crisis, owing to several problematic issues: the exorbitant number of theories, several of which are incompatible, the lack of a general theory that is able to unify and integrate the findings of research from each of the individual theories, failure to confront the distinction between methodology, as the way researchers cognize their object of study and method, the research techniques deployed to investigate the object of study, heavy reliance on quantitative research that is unable to uncover underlying processes that account for the relationships between variables and that concomitantly values efficient causality over material and formal causality, and finally, the segregation of theory/research from pedagogical practice. The article then lays out a contemporary interpretation of L. S. Vygotsky's theory of the human psyche, referred to as Structural-Systemic Theory (SST), as proposed by Aro Toomela. The theory argues that to explain psychological processes it is necessary to adopt a dialectical way of thinking about the object of study (i.e., L2 development), which identifies the components (material cause) that comprise the process as well as the relations between those components (formal cause). In keeping with Vygotsky's dialectical approach to psychology, SST proposes an approach to research and practice that maintains Vygotsky's instrumental method in which experimentation and practice, including schooled instruction, form a unity. An example for how SST is relevant for language instruction is provided.

Keywords

Crisis, methodology, methods, causality, praxis

1 Introduction

In this commentary, I would like to address, from the perspective of sociocultural theory, what I perceive to be a crisis in SLA research with a particular focus on the problem of causality and its implications for language instruction. To do this, I will rely on the writings of L. S. Vygotsky, in particular his manuscript

on the historical meaning of the crisis in psychology (1997a), as well as on the work of one of the most important contemporary interpreters of Vygotsky's psychological theory, Aro Toomela (e.g., Toomela, 2019). Although Vygotsky (1997a) discussed a wide spectrum of topics relating to what he saw as the crisis in psychology, I believe that what he had to say about the distinction between methodology, how a discipline cognizes its object of study, and method, as the research procedures that emanate from the discipline's cognitive orientation to that object, is especially relevant when it comes to how causality is conceptualized. I begin the discussion with an overview of the crisis in psychology that served as the motivation for Vygotsky's text. However, in the view of many psychologists, the field continues to find itself in a state of crisis to the present time. This is important to appreciate because of psychology's influence on how SLA research is conducted and on how SLA researchers conceptualize the developmental process they seek to understand and explain.

2 Crisis

In this section I will first briefly consider the state of crisis that psychology has found itself in virtually from its beginning in the 1870s, when Wilhelm Wundt established his psychology laboratory at the University of Leipzig in Germany. This is relevant because although SLA is generally assumed to have emerged from the field of applied linguistics as a consequence of two ground-breaking publications—Corder's (1967) analysis of learner errors and Selinker's (1972) proposals on interlanguage—there is little doubt that SLA research practices have been shaped by psychology's largely quantitative orientation to research as well as its understanding of explanation and causality.

2.1 Psychology in crisis

According to several scholars (e.g., Sturm & Mülberger, 2012; Bakan, 1996; Miller, 1985), among others, the crisis in psychology can be attributed to a variety of reasons, including the array of different approaches, hypotheses and theories that purport to understand and explain the human mind as well as the different research techniques employed to study the mind. Bakan (1996, p. 337), for example, characterized psychology as “a collection of ‘unrelated molecules’”, an extensive “list of interesting findings and ideas” but lacking in “coherence.” Crucially, and in alignment with Vygotsky, Bakan (p. 341) also criticized his discipline for its failure to address the “relationship between human beings and the social order.” One of the leading figures in mid 20th century psychology, who was influential in bringing Chomsky's theory into cognitive psychology, George Miller, lamented that fact that psychology lacked a standard research method, as well as a “fundamental scientific principle comparable to Newton's laws of motion or Darwin's theory of evolution” and it did not have a “universally accepted criterion of explanation” (Miller, 1985, p. 42). I address the explanation criterion later in the discussion.

For his part, Vygotsky (1997a) argued that the crisis was by and large a problem provoked by the fact that psychology was cleaved by two general theoretical approaches, one based on idealism as represented in the proposals of Freud, Dilthey, and Husserl, and another grounded in materialism as manifested in the orientation of Pavlov's reflexology in Russia and Watson's behaviorism in the United States.

Those who have written about the crisis in psychology have offered a number of different solutions to overcome this state-of-affairs. For instance, Vygotsky's contemporary, German psychologist, Karl Bühler proposed his theory of language as the model for psychology because, according to Bühler, linguistic phenomena entail experience, behavior, and objectification (Plehl, 1988). Bakan (1996, p. 339) argued that focus must shift from the study of aggregates of participants using statistical means to investigation of single individuals, a topic that I will also return to later.

2.2 Methodology – method: Not synonymous

In his response to the crisis in psychology, Vygotsky (1997a) argued that it would be necessary to build a general theory with the capacity to integrate the findings of the myriad subfields of the discipline, including, for example, cognitive psychology, developmental psychology, industrial psychology, social psychology, etc. In order to construct a general theory, however, it would be necessary to first establish the methodological orientation for such a theory. In this regard, Vygotsky made a critical distinction between methodology and methods, something that neither psychology nor SLA does as the terms are by and large used interchangeably in both fields (see Haig, 2014 as a notable exception).

Methodology, in Vygotsky's thinking, determines how researchers are to cognize and study what is not immediately available to direct observation (Toomela, 2014, p. 102). Given that science is about facts and how they are to be interpreted, it matters how scientists not only find a way to observe what is not directly observable to our senses, but how we think about the facts that we attempt to bring to light. As an example, consider how a phenomenon such as temperature is observed and measured. While we can tell through our bodily sensations if a room is hot or cold, we cannot determine through these sensations what the precise temperature of the room is. Consequently, scientists developed the thermometer as an instrument that allows us to indirectly observe and measure the temperature of a space or an object. To complement physical instruments such as thermometers, microscopes (to observe very small objects and phenomena) and telescopes (very distant objects and phenomena), scientists also employ mental tools, including symbols, especially as reflected in language, as well as charts, diagrams, figures, and models (Toomela, 2014, p. 103).

According to Vygotsky (1997a), linguistic symbols are particularly important for how we cognize what we observe, either directly or indirectly. For this reason, he pointed out that the words we use to name what we observe not only establish facts, but at the same time imbue the facts with theory. For example, a common term that is frequently used in current SLA research is 'input'. Although we currently use the term without acknowledging its origins or what it implies about the learning process, it is theoretically loaded. The term originated at the time when cognitive psychology viewed the mind as a computer that carried out computational operations on information fed into the computer—input. Thus, the field conceptualized linguistic evidence that learners receive from their environment as input into the mind, analogous to the information fed into a computer, which then performed various computations on the information to generate a linguistic system. Numerous articles and book-length publications (e.g., Gass, 1997) propagated the term throughout the field to the extent that most contemporary researchers take it for granted that input is what is available for learners to use in order to construct their L2 systems. However, a minority of SLA researchers rejected the term and its theoretical implications in favor of alternative ways of naming, and therefore thinking about, the same evidence available to learners. Van Lier (2004), for instance, introduced the term 'affordance' borrowed from the ecological approach to psychology proposed by Gibson (1979), which is intended to capture what an environment offers an individual to make use of. Stairs, for example, provide someone with the opportunity to climb to a higher level of a building, but for someone confined to a wheelchair stairs are an impediment. Similarly, a sophisticated explanation of verbal aspect in English, or word order in Chinese, accompanied by an abstract visual representation diagramming a user's communicative options provide university-level students with the opportunity to understand and internalize the concept. However, for a three-year-old child, such a presentation is useless and therefore is not an affordance.

2.3 SLA in crisis

I believe that SLA is in a state of crisis for reasons that parallel the situation in psychology. First, there is a plethora of SLA theories; by my count, something in the range of 10 to 15 (see Atkinson, 2026; Mitchell, Myles, & Marsden, 2019; VanPatten, Keating, & Wolf, 2020). Some of the theories, such as

Universal Grammar and Skill Acquisition Theory, are incompatible. More than three decades ago, some SLA researchers worried about this state-of-affairs and called for the formation of a unified theory, much as Vygotsky did for psychology (see [Hatch, et al., 1990](#); [Spolsky, 1988, 1989](#)). Unfortunately, little progress has been made on such a worthwhile project. In fact, in my view, the field seems to have made an unfortunate “methods turn” as a mean for creating unity. By this I mean rather than working toward a unified theory, research procedures and techniques have been brought to center stage in the hopes of providing the missing, and apparently felt need, for unity.

The number of publications that address research methods and statistical procedures both in journal articles (e.g., *Language Learning*, 65, Supplement 1, June 2015), edited volumes (e.g., [Phakiti, et al., 2018](#); [McKinley & Rose, 2023](#); [Plonsky, 2015](#)) and textbooks (e.g., [Mackey & Gass, 2022](#)), is impressive. Indeed, by my count, John Benjamins in the past year published some ten new titles on research methods and statistical procedures, including one on less frequently used research methods ([Riazi, 2025](#)), and one devoted specifically to the study of French L2 acquisition ([Howard, 2025](#)). To be sure there are texts devoted to SLA theory, such as those mentioned in the previous paragraph; however, the number of such publications pales in comparison to the research methods and statistical manuals. Moreover, with the exception of Jordan’s (2004) book that includes an informative discussion of philosophy of science, theory building and evaluation, book-length publications are limited to overview discussions of the various theories currently operating in the field with a concluding chapter that tries, rather unsuccessfully, in my view, to incorporate the findings of the research conducted under the auspices of each theory into some kind of coherent statement of what is known about SLA. Missing is in-depth discussion of philosophy of science and the relationship between theories and research methods, as Vygotsky argued for in distinguishing methodology and research methods. The impression one is left with is that the field has made available a methods tool box (see [Toomela, 2014](#) for detailed discussion) from which one can select a research method and statistical procedure that meshes with any theoretical orientation. Moreover, looking across the graduate programs currently focused on SLA and/or applied linguistics, most require one or more courses in research design and statistical analysis, with perhaps a single course that surveys SLA theories. There are, to my knowledge, no courses on the philosophy of science, which Vygotsky (1997a) and others promoted as necessary for serious theory building and that prepares the next generation of students to think theoretically about issues in our field and to hopefully engage in the project of developing a unified theory of SLA. The students are, however, very well prepared to function as research technicians or research engineers, but not as deep theoretical thinkers.

Other indications of a crisis in SLA are highlighted in the commentary of Wardhaugh (1998) on the occasion of the 50th anniversary of the journal *Language Learning*: “Given all the thought and effort that has gone into so many years of such research, one might well wonder why this is so, why researchers still have such a poor understanding of how people learn a second language” (p. 585). According to Wardhaugh there are several reasons for this, including the lack of an agreed upon theory of language, which range from “traditional grammar, structural grammar, Hallidayan grammar, and any of the various generative grammars” (p. 586). Another reason proposed by Wardhaugh is the lack of a coherent and unified research program that focuses on specific problems for the period of time necessary to resolve the problem. Instead, studies are carried out with small groups of participants over relatively short time spans ranging from a few hours to perhaps a few weeks using the techniques borrowed from psychology that yield “a minuscule amount of information about a highly restricted activity” (p. 588) rather than a broad-based understanding and explanation of the processes involved in L2 development.

A decade after Wardhaugh, Rod Ellis (2008, p. 990) continued painting a rather bleak picture of the field of SLA in the second edition of his monumental survey of SLA research:

In the first edition of this book (1994), I queried the extent to which it was in fact possible to identify findings that were well established. It would be pleasing to report that some fifteen years later the situation has changed and that it is now possible to identify consensual findings. However, I do not believe this is the case. Indeed, if anything, there is now more disagreement

about the facts of L2 acquisition ... In short, the picture of SLA that I have painted in the [16] preceding chapters resembles a collage of contrasting and sometimes competing images rather than a sharp, well-defined photograph.

3 Causality in SLA Research

In this section I examine another problem affiliated with the crisis in SLA which has to do with how causality is conceptualized by most SLA researchers largely because of their methodological perspective—that is, how they cognize the SLA process. It seems clear from even a perfunctory reading of the literature that the dominant view of the SLA process emerges from the metaphysical assumption that reality is comprised of isolated objects and events that are given, “static and immutable” (Dafermos, 2021, p. 337). That is, things and events do not have necessary interconnections with other things and they do not normally change over time, unless provoked by their intersection. This was the perspective of the Newtonian world view in physics, which psychology adopted as its model in order to stake its claim as a legitimate natural science (Dafermos, 2021, p. 360). Consequently, psychology established “rigorous operationism and quantitative measurement” as its preferred way of conducting scientific research (p. 360). SLA, in my view, has followed suit. I point out that operationism has been another fundamental problem contributing to the crises in psychology and in SLA. This is a complicated topic, however, that requires separate treatment well beyond the scope of the present commentary.

3.1 Metaphysics and linear thinking

The Newtonian world view sustains the essential idea of an immutable ahistorical reality comprised of independent entities in which change is seen as an exception arising from the occasional interaction of these entities. Thus, psychology is construed to be an empirical science which studies observable behavior resulting from the consequences of the relationship between one thing (independent variable) and another thing (dependent variable). Over time psychologists, with a statistical proclivity, developed ever more complex and sophisticated mathematical procedures (e.g., Anova, regression analysis, factor analysis, structural equation modeling, etc.) ostensibly designed to capture the subtleties of the relationships among variables. As Louis Thurstone (1935), a leading psychometrician of the mid-twentieth century, pointed out, however, with regard to factor analysis in particular, such procedures are only capable of revealing covariation among appearances and are incapable of revealing the mechanisms that underlie behavior.

To give a simple example of how causality is viewed from a metaphysical perspective. If one heats the air in a balloon, the balloon will expand. Thus, the independent variable (or the explanans) that “causes” the balloon to expand, is the heating of the air. The dependent variable (or the explanandum) that is “caused” by the heated air is the expansion of the balloon. The relation between the two variables (explanans and explanandum) is temporal. In other words, the heating of the air precedes the expansion of the balloon in time and the expansion of the balloon follows from the heating of the air in time. Moreover, the balloon will not expand without the heating of the air; therefore, the heating of the air is considered to be the efficient cause of the balloon’s expansion. The relationship can be captured in a more abstract way as follows: X (the explanans) causes Y (the explanandum) only if it precedes Y in time, and Y will not occur if X does not precede Y in time. Thus, the relationship between X and Y is temporally linear. I will have more to say about the balloon example in due course.

Most theories of SLA are linear in their causal assumptions. Two clear exceptions are Complex Dynamic System Theory and Sociocultural Theory, both of which are systems-based theories, but each of which has a different view of causality. This is not the place to compare the two theories with respect to causality, although it is a topic that is worth pursuing in a separate study. Instead, I will focus on SCT and its perspective on causality.

SCT argues that metaphysical empiricism cannot capture the complexity and dynamism that operates in a given reality, in particular, the reality which involves psychological processes, including SLA. It argues that reality, including psychic processes, are imbued with complex internal contradictions that result in developmental dynamism. In formulating his proposals for a viable general theory of psychology, Vygotsky, adopting a dialectical approach to the study of the development of the human psyche, asserted that

the essence of things does not directly coincide with their appearance. He who judges things only from incidental appearances judges them falsely. He will inevitably make false suppositions about the realities he studies and will give false practical instructions for influencing those realities. He who groups together all coughs or all headaches will have grouped together phenomena which have nothing in common. Such a person will have created for himself a false notion of reality, and he will never figure out how to cure a cough. *The whole point is that science studies the links, the dependencies, and relationships which exist among things, and which are the basis of reality* [italics added]. (Vygotsky 1993a, p. 247)

To illustrate his point of view Vygotsky notes that before Darwin's evolutionary theory, phenotypical understanding (appearances) of reality dominated genotypical understanding (essence) in biology. Consequently, whales appeared to share more common traits with fish, living out their entire lives in water, than they did with deer and rabbits (p. 247). Following Darwin's theory, biologists understood that they needed to peer beyond the surface appearance of life forms to access their essence or genotype and when they did they came to realize that whales share very little with fish, beyond living in water: they are air-breathing, they bear their offspring and nurse them in a way that parallels deer, rabbits, and even humans; they have flippers instead of fins and propel themselves through water in a different way from fish.

3.2 Systems thinking and dialectics

Counter to the metaphysical perspective, Vygotsky's dialectical orientation to psychological theory and concomitant research, seeks to uncover the internal links, dependencies and relationships which exist between components of objects and phenomena, and which, importantly, are contradictory. Here, Vygotsky's favorite example is the relationship between oxygen and hydrogen that results in the formation of water. Considered separately, the relation between oxygen and hydrogen seems to be problematic when it comes to explaining the properties of water. This is because hydrogen is combustible and oxygen supports combustion, but in the right combination represented in the formula H_2O they interact to form water, which has the property of extinguishing fire.

Recently, Toomela (2014, 2019) has expanded upon and sharpened Vygotsky's proposal regarding a dialectical view of causality and the distinction between and genotype and phenotype. Toomela refers to the updated theory as Structural-Systemic Theory (SST). Accordingly, to be fully explanatory a theory must go beyond efficient causality, which is limited to establishing linear relationships between variables, in order to uncover the deeper processes that underlie behavior and that are not directly observable. One salient reason for this, as Vygotsky pointed out in the above quote from *The crisis*, is that the same surface behavior (phenotype) can emerge from very different underlying (genotype) processes. Consider the well-known distinction Krashen (1981) made between learning and acquisition. The former, he claimed, is conscious, largely rule-based, explicit knowledge, resulting from instruction, while the latter is unconscious implicit knowledge that results from so-called meaningful exposure to language similar to what occurs when children acquire their native language(s) through immersion experiences. Acquired implicit knowledge, according to Krashen, is the source of spontaneous communicative performance, while conscious explicit learning can only be deployed to monitor and perhaps edit performance

provided there is sufficient time to do so. McLaughlin (1987), however, made a convincing argument that it is impossible to distinguish whether performance arises from learned or acquired knowledge.

More recently, Paradis (2009), basing his position on neuroscience evidence, asserted that the majority of late L2 learners (those who begin learning a new language as young adults and beyond) are much more likely to rely on the declarative memory system of the brain that supports explicit knowledge than they are to deploy the procedural memory system that underlies implicit knowledge, because as we age, the declarative system strengthens while the procedural system declines in its capacity. He goes on to claim (p. 87) that when using a language spontaneously, late learners are able to access their explicit knowledge through the declarative system with sufficient speed to be able to effectively sustain linguistic activity during even oral communication. Furthermore, only in exceptional cases are some late learners able to access implicit knowledge through procedural memory. If Paradis and McLaughlin are correct, it is indeed difficult to determine for any given late learner the underlying source of their spontaneous communicative behavior. Could the performance arise from rapidly accessed explicit knowledge supported by declarative memory, or could it indeed result from underlying implicit knowledge supported by procedural memory that has yet to decline? Indeed, Rod Ellis, who, on the basis of his (2005) study, claimed that it was possible to establish tests to distinguish implicit from explicit knowledge and performance later acknowledged (Ellis & Rover, 2021) that most tests are in fact unable to make such a distinction based solely on external behavior. In other words, test performance distinguished on the basis of quantitative procedures such as factor analysis (see Ellis, 2005), as Thurstone (1935) warned, cannot distinguish phenotype from genotype.

Toomela (2010, p. 2) argued that “mathematical procedures of any kind cannot answer questions about the structure of mind.” What is required is something akin to the experimental approach that Vygotsky (1978) pioneered in order to study the human psychological processes. Toomela (2010, p. 9) characterized Vygotsky’s approach as “qualitative”. Unlike traditional approaches to qualitative research, which, similar to quantitative methods, are limited to the study of surface-level appearances, Vygotsky’s approach is historical as it entails observations that identify the components comprising a structure, their relationships and tracks the changes in the structure over time. The observations can take place in everyday life, such as documented in Roth’s (2016) study of the sociogenesis of psychological functions that arise as people interact in social life and they can also entail qualitative experiments that intentionally construct the structure of interest in artificial settings, including laboratories, clinics as well as in school. It is important to appreciate that by artificial Vygotsky did not mean fake. Rather, it is the term he used to differentiate the natural organic world (for example, the biologically determined mental capacities illustrated in Figure 1 below) from cultural reality intentionally constructed by humans over the course of their history. Thus, experiments are artificial because they are intentionally designed and implemented by humans and are designed to replicate what happens in sociogenesis. Luria (1973) reported on several artificial experiments in which he undertook to repair, or reconstruct, through alternative forms of mediation, the mental functions of individuals disturbed by damage to their brains. Similarly, education is artificial because it is intentionally designed and implemented by humans with the aim of promoting psychological development of other humans.

A potential qualitative experiment to answer the question regarding whether L2 learners rely on procedural or declarative memory during spontaneous communication could entail exclusively exposing some individuals to explicit instruction, such as called for in Concept-based language instruction (C-BLI), while exposing other individuals to meaning-based immersion instruction, such as Input Processing, for an equal period of time. Tracking their development over time and then comparing their performance on a series of spontaneous communicative tasks. If Paradis’s claim regarding procedural and declarative memory is accurate, we would expect those individuals experiencing explicit instruction to do better than those students receiving meaning-based immersion instruction, who are assumed to rely on implicit knowledge supported by procedure memory. If Paradis is wrong, then we would expect implicit instruction to result in enhanced performance. The experiment would have to be long-term and involve

languages to which learners would not have any exposure to outside of the experimental setting. As the learners carried out the relevant tasks their neurological activity could be assessed using ERP procedures to determine which memory system was active during task completion. Importantly, and in line with qualitative experimentation, the performance of each individual would be assessed separately and the result would not be aggregated into a cohort in order to measure the average performance of the group.

A major problem with aggregated analysis is twofold. First, it is quite possible that no single individual in a cohort performs in accordance with the mean-based analysis of the cohort (see Freunberger, et al, 2022 for an excellent example of this problem in SLA neuroscience research). Second, and related to the first, since the time of World War II mainstream psychology (and current SLA practice), largely under the influence of the Anglo-American proclivity for cohort-based quantitative research, have accepted statistically significant mean performance of a group as somehow representative of how most members of the population sampled behave. However, prior to World War II, psychologists working in Continental Europe, especially in Germany and Austria, did not accept group performance as typical of a population and therefore did not explain the process of interest. Instead, they believed that a particular psychological phenomenon could not be explained until each member of a cohort, and especially those whose performance deviated from the group norm, was investigated in detail. Their goal was to gain insight into psychological processes and not simply to confirm or disconfirm predictions. According to Watson (1934, p. 765), American psychologists mistakenly assumed a psychological symmetry between individuals producing the same score on a psychometric test and therefore assigned the individuals to the same group. The European psychologists, in line with Vygotsky's thinking, made no such assumption and instead conducted an in-depth probe of each individual to determine how a given score was produced.

What all of this means for SLA and the search for causality seems clear. To understand and explain SLA development it is vitally important to look beyond the normal distribution and group means. The questions that must be answered in any quantitative study are, does the mean represent a fiction, as pointed out in Freunberger, et al's (2022) study, how and why do some individuals deviate from the group norm, and do individuals producing the same performance on experimental tasks do so on the basis of the same psychological process.

4 Structural-System Theory (SST)

In this section I present the updated version of Vygotsky's theory as proposed by Aro Toomela in his writings over the past several decades. The most important feature of Toomela's work is the fact that it effectively defines the theory that Vygotsky was moving toward before his early death, especially with respect to causality.

SST asserts that causal explanation must uncover the elements or components of a process, the relationships among the components as well as the relationships between the components and the whole that emerges from the componential interactions. Returning to the balloon example, recall that if we heat the air inside the balloon, it expands, which is an efficient causal account of the behavior of the balloon. However, what cannot be explained by this description is why heated air should cause a balloon to expand in the first place. To account for this, it is necessary to dig deeper into the process, where we discover that according to the kinetic theory of gases, any gas is composed of numerous molecules (the components of gas) that are constantly in motion. Sometimes these molecules collide with each other and with the interior surface of a container, in the present case, the balloon. When they are heated, the molecules move at a faster rate, which invokes an increased number of collisions thus increasing the pressure inside of the balloon, and this forces the expansion of the balloon (see Jordan, 2004). According to SST, the elements involved in the process are represented by the molecules of air, which are the material cause of the process and the relationship among the molecules, the formal cause of the process, changes as a consequence of the heat applied to the inside of the balloon.

Vygotsky's way of conceptualizing the formation of the uniquely human mind is represented in Figures 1 and 2 below.

Figure 1

Natural Human Instincts determined by Our Biological Endowment

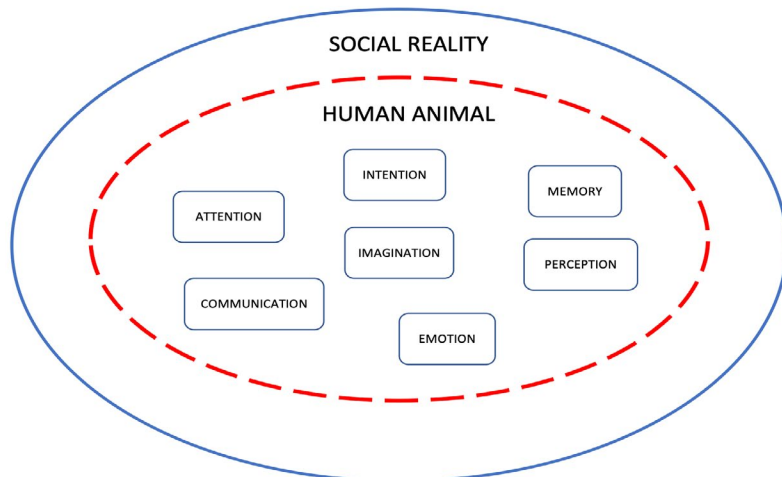
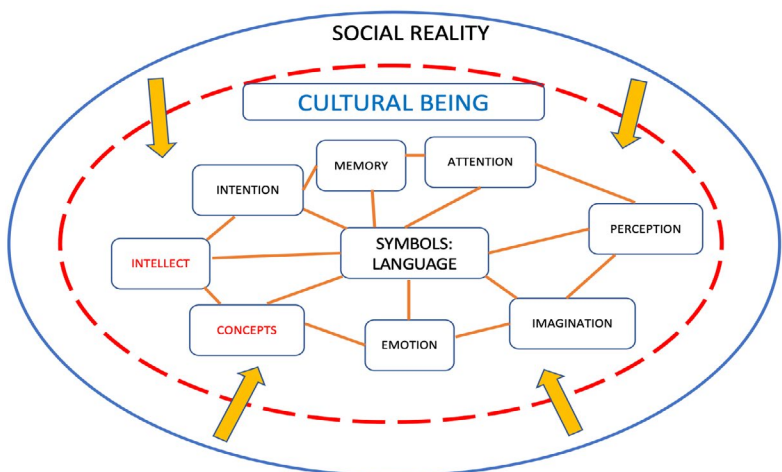


Figure 1 depicts the biologically endowed instincts that every human being with a normal brain possesses at birth. It represents the elements/components of mental capacity that we share with other animals, in particular higher primates, and that arose over the course of evolution. Notice that the elements do not yet interact with each other. Thus, infants and young children have the capacity to attend to objects and events that occur around them. They are able to react to movement, sounds, and touch. They are able to perceive other humans, especially their care givers. However, they do not know what the objects and events are nor who the care givers are (i.e., mother, father, and the like), and there is no connection between components such as perception and memory. At some point, generally around the end of the first year and beginning of the second year of life, culture enters the picture in a profound way, primarily, though not exclusively, through language (other symbolic behaviors, including gestures, facial expressions, non-linguistic sounds, etc. also influence development). At this point, the dialectic between biology and culture takes shape, which establishes the relationships among the biological components, as depicted in Figure 2.

Figure 2

The Dialectical Formation of a Human Mind



The interconnections among the components are more complex than illustrated in Figure 2. For illustrative purposes, the figure depicts only some of the interconnections. For instance, imagination is not only connected to perception and emotion, it is also connected to memory and intellect. Thus, the human mind arises through an enculturation process in which symbols, largely linguistic in nature, establish relationships among the original isolated components and among the individual components and the whole system that is the human mind, as called for in SST. As with hydrogen and oxygen, biology and culture appear to be contrasting components, but they are each necessary for the formation of the new structure that is the human mind. Notice that in the process, biology provides the component parts of the mind and culture, through its symbol-making capacity, alters the relationship among those components. This process is referred to by Vygotsky with a German term borrowed from Hegel's conceptualization of dialectical development, *Aufhebung*, which means that something is maintained and at the same time changed. For example, perception, an original biological capacity, is maintained in the culturally organized mind, but at the same time it changes in relation to the entire system. Biologically infants and young children can perceive objects, including color, size, shape, dimensions, and the like, but under the impact of cultural symbols, they perceive objects through a semantic lens; that is, objects that are referred to in a language such as English as books, glasses, rocks, trees, dogs, cats, and events such as running, walking, jumping. In other words, they perceive conceptually and as a result they think through concepts (for details of how this process unfolds, see [Vygotsky, 1987](#), chapter 6).

Similarly, through sociogenesis emotions become semanticized. Very young children experience emotions through their bodily reactions to particular circumstances. Babies cry when they are hungry or when they suffer pain. They also have positive experiences when cuddled by care givers. However, when language enters the picture specific meanings are attached to particular emotions, including joy, sadness, anger, anxiety, and the like (see [Holodynski, 2013](#)). This enables humans to understand, contemplate and talk about emotional experiences. However, cultures do not necessarily share the same emotions, and even if they do, they may not share the same emotional reactions to the same events ([Ratner, 1990](#)).

As the higher psychological system emerges, emotions form a dialectical unity with intellect, which Vygotsky (1998) theorized with the Russian term *perezhivanie*, in which emotion provides the motive for thinking and acting and intellect interprets and manages emotion. As he explained in his defectology work ([Vygotsky, 1993](#)), if emotion dominates the result can be pathological as in the case of schizophrenia or autism. The lack of emotion can also result in problematic, if not pathological, behavior where an individual lacks any sense of experience and a motive for action.

4.1 SST and causal explanation

According to SST, then the explanation for the formation of the human mind is comprised of a material and a formal cause, with the former provided by biology and the latter by culture. In this regard it is important to appreciate that for the theory, biology and culture are not equal partners, which is often a mistaken assumption of those who confront Vygotsky's work. If this were the case, it would result in a dualism, something that Vygotsky's dialectical perspective rejects. Culture is clearly the dominant factor in that it is what shapes and reshapes what biology provides. Without it there could be no human mind, as is evidenced in the tragic cases of feral children raised by animals or as Vygotsky (1993) documented in his work on defectology, children abandoned and living on the streets of Russian cities following the Russian revolution, who could not function as fully formed humans.

Vygotsky's colleague and founder of the field of neuropsychology, A. R. Luria also documented the salient role of symbolic culture in his extensive study of twins ([Luria & Yudovich, 1971](#)) originally carried out in the 1950s. Briefly, a pair of identical twins formed an unusually close bond with each other to the extent that they failed to participate in normal social activities and even developed their own unique language system. Luria and his team documented the lack of cognitive development of the twins that accompanied their self-imposed social isolation. When they attended school, they were unable to

take part in the full array of academic and social activities typical of school. Consequently, their cognitive growth was significantly impeded. At some point, Luria separated the twins, assigning each to a different student cohort, with the expectation that their language development would improve and with it their cognitive capacity. In addition, the research team provided one of the twins with explicit instruction in Russian. After a period of approximately six months, it was found that each twin's language ability improved as did their cognitive abilities. Moreover, the twin who received explicit instruction in the language improved to a greater degree in both domains than did his brother whose language exposure was through immersion only.

While all humans share a common biological inheritance, we do not share a common cultural history (Luria & Vygotsky, 1998). Each culture has developed over the course of its history specific forms of symbolic meaning reflected in the artifacts of the culture. Here we include not only language and gestures, already mentioned, but also representational devices such as art, music, mathematical systems, diagrams, maps, graphs, etc. (see Kozulin, 2024 for detailed discussion). The implication of this position is that because the symbolic elements (material cause) created by a culture along with their particular interrelationships (formal cause) differ, the higher forms of human thinking differ. Luria (1976) documented this principle in his study of the rural communities of Uzbekistan in which those members who had not been schooled tended to think in a functional way and had a difficult time dealing with categorial taxonomic forms of thought compared to those who had attended school. For example, schooled individuals had no problem responding to deductive syllogisms such as the following: Cotton grows where it is warm and humid; it is warm and humid in region X; can cotton grow in region X? while the unschooled community members refused to respond to the problem on the grounds that they, nor anyone they knew, had firsthand experience of region X.

5 Implications for Language Instruction

To appreciate the implications of SST for language instruction, I first remind the reader of Vygotsky's argument that human mental development is in large part an artificial process; that is, it is intentionally created by human sociocultural activity. On this view, qualitative experimentation, as described above, involves the artificial creation of the process a researcher seeks to understand and explain. Along these lines, Vygotsky strongly implied that activities such as teaching also qualify as artificial qualitative experiments to the extent that teaching, when properly designed and implemented, creates the same process that researchers create in laboratories. I offer the following quotation from Vygotsky in support of this contention:

The instrumental method studies the child not only as a developing, but also as an educable being ... Education may be defined as the artificial development of the child. Education is the artificial mastery of natural processes. Education not only influences certain processes of development, but restructures all functions of behavior in a most essential manner...The instrumental method studies the process of natural development [see Figures 1 and 2 above] and education as a unified alloy and aims to reveal how all the natural functions of the given child are restructured at the given level of education. (Vygotsky, 1997b, p. 88)

Clearly, Vygotsky argued for a close connection between experimental research and pedagogical practice. In fact, he went so far as to propose that while laboratory research is important in revealing hidden processes and in testing the claims of a theory, the ultimate test of a theory is what it can reveal about those processes when it comes to the everyday world. In other words, he insisted on the dialectical unity of theory and practice (i.e., praxis) as indicated in the following remark

practice pervades the deepest foundations of the scientific operation and reforms it from beginning to end. Practice sets the tasks and serves as the supreme judge of theory, as its truth criterion. It

dictates how to construct the concepts and how to formulate the laws. (Vygotsky, 1997a, pp. 305-306)

In reacting to the argument regarding the unity of theory and practice, Rod Ellis (2008, p. 951, note 11) commented that “it is difficult to accept that there is not a distinction to be made between what SLA researchers do and what teachers do and also in the ‘discourses’ they typically engage in.” The dualistic relationship between theory/research and practice may accurately characterize the situation in the West, but the relationship does not have to be as it is described by Ellis. McLaughlin (1986, p. 49) describes the relationship between the two poles in Russian pedagogical practice that clearly reflects Vygotsky’s position: “There is a close bond between Soviet psycholinguistic research and second-language pedagogy. Theory is closely related to practice much more so than in the West where theory tends to be *ad hoc* and much research and practice is carried out in a theoretical vacuum.”

Keeping in mind the concept of praxis and the claims of SST, I will consider the findings of a pedagogical study carried out by Piotr Gal’perin, a follower of Vygotsky’s theory, as reported in Talyzina (1981). Recall that according to SST, the causal explanation for human psychological development, including language, is determined by relevant components and their relationship. Gal’perin’s pedagogical approach, referred to as Systemic Theoretical Instruction (STI) (see, Haenen, 1996), is designed to promote schooled development through the internalization of scientific (also, referred to as theoretical) concepts provided by the various subjects included in an educational curriculum, including language. STI modified for language instruction that integrates language concepts uncovered in current meaning-based theories of language such as Cognitive Linguistics (e.g., Langacker, 2008) or Systemic Functional Linguistics (e.g., Halliday & Matthiessen, 2004) is referred to as Concept-based Language Instruction (C-BLI). Nevertheless, C-BLI maintains the phases of STI proposed by Gal’perin. Two of the key phases, or components, of STI are the material representation of a language concept, such as verbal aspect, mood, word order, phrasal verbs, metaphor, etc. and languaging (Swain, 2006)—verbalization with a psychological rather than a social function (i.e., private speech).

Materialization, referred to by Gal’perin as the Schema for the Orienting Basis of Action, or SCOPA (Haenen, 1996, p. 133), is specifically designed to guide learners as they carry out a particular activity, such as spoken or written communication. The reason SCOPAs are important is because they are holistic, easier to recall, and they avoid the tendency of students to memorize verbally presented explanations of language features without full understanding. Materialization can take different forms. For adult learners SCOPAs can entail visualizations such as diagrams, abstract drawings, graphs, and the like. For younger learners, and even for adults, SCOPAs can represent language features through animations, videos, or haptically through use of Cuisenaire rods (see Zhang, 2014; Kissling & Muthusamy, 2022)

Languaging is private speech that Vygotsky demonstrated to be a necessary component of the internalization process through which individuals, in a real sense, talk themselves into gaining control of some feature of their social environment (Vocate, 1994). As Vocate proposed, rather than a conversation between I and You, typical of social communication, private speech is a conversation between I and Me, in which the self plays both the role of subject and object of communication. In the absence of private speech, internalization is unlikely to take place.

Using a two-step procedure, which reflects the principles of SST (see Toomela, 2012, p. 1004), Gal’perin carried out a study in the Moscow schools in order to determine the contribution of the various components of his pedagogical model. Although Gal’perin’s studies focused on geometry rather than language, I believe that the findings are equally relevant for language development. First, he observed the developmental outcome of instruction when all of the phases of STI were maintained (for a full description of the procedures, see Poehner & Lantolf, 2024). The result was that the students were able to internalize the relevant concepts and use them independently to solve various tasks they were given. He then proceeded to remove, or knock out, different phases and observed the effects this had on the developmental process. In particular he was interested in the impact of the absence of languaging and

materialization on the internalization process. He predicted that if either process were removed, it would have a deleterious effect on student development. Indeed, he found that in the absence of languaging learners found it extremely difficult to analyze and complete problems independently and correctly. When materialization was knocked out, students could accurately list relevant attributes of a problem, however, they failed to use them when trying to solve problems. In fact, when students were in the process of struggling with the problems, the instructor had to continually remind them of the attributes and to insist that they be applied in solving the problems. When both materialization and languaging were omitted, students were not only unable to complete tasks independently, they had no understanding of the relevant concepts (Talyzina, 1981, p. 121).

C-BLI, as a modified version of STI, is a different approach to explicit instruction because, unlike what most researchers and teachers assume explicit instruction entails—formal pedagogical rules—it adheres to Vygotsky's position that to be effective school-based development in any subject-matter domain, must be based on scientific or theoretical concepts. The challenge for C-BLI is to identify viable concepts for language and then formulate the material means (i.e., SCOBAs) to represent this knowledge to learners in a way that is understandable and functional. As I've already mentioned, a particularly useful source of theoretical concepts is provided by work in cognitive, and systemic functional, linguistic theory. As a word of caution, the explanations of language features formulated in theoretical linguistics cannot be directly transferred to educational settings. The knowledge needs to be converted into an explanation that learners can grasp and make use of. Several publications in the journal *Language and Sociocultural Theory* address this issue, especially with regard to explanation, SCOA design and implementation (e.g., White, et al 2021; Masuda & Ohta, 2021)

6 Concluding Comments

In this article I have argued that SLA is in a state of crisis for several reasons: the number of theories that populate the field, the concomitant lack of a general theory that has the capacity to unify the findings of the various theories, the fact that researchers have not addressed the methodology/method distinction, especially with regard the cognitive orientation of researchers when it comes to thinking about their object of study, and related to this, how causality is conceptualized. I also suggested that even though applied linguistics has traditionally been considered to be the progenitor of SLA, as a research enterprise, SLA is more closely aligned with psychology when it comes to research methods and its use of inferential statistical analysis. As in mainstream psychology, SLA has adopted a metaphysical stance on causality, which it conceives of as the linear relationship between separate variables, certain of which are cast as independent and others as dependent variables. Whether the relationships are analyzed quantitatively through use of inferential statistics or qualitatively through interpretive/hermeneutic analysis the processes that underly the relationships remain hidden. The approach to causality proposed by Vygotsky, and refined by Toomela as structural-systemic theory, seeks to design research methods that uncover the underlying processes that explain the observable behavior of variables. The goal of SCT has always been to gain access to the structure of developmental processes that change over time. To achieve this goal, SST has proposed a method—qualitative observation and experimentation—that reveals the components that comprise a structure as well as the relationship among the components, how these change over time and how these are impacted by the system functioning as a whole.

The theory, as laid down by Vygotsky does not separate research from practice; rather, it conceives these are forming a unity whereby the process of change can be created through artificial (intentional sociocultural activity) means in laboratory as well as in educational settings. As Vygotsky argued, the true test of any psychological theory is to be observed in everyday practice, which includes clinical work of the kind pioneered by Luria, and educational work as instantiated by Gal'perin in STI and more recently as C-BLI for language instruction. The laboratory, the clinic and the classroom have the responsibility

to create change. In my view, this means that lab researchers, clinicians, and educators cannot restrict themselves to work carried out in their own domain, but must instead pay attention and learn from the work produced across domains.

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二语习得研究中的危机与因果关系：对语言教学的启示

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摘要

本文评述了与二语言习得 (SLA) 研究现状及其与语言教学法关系相关的几个关键议题。我认为，与 SLA 所借鉴的心理学研究模式相似，该领域正处于危机状态，这归因于几个问题：理论数量过多，其中一些互不相容；缺乏一个能够统一和整合各理论研究成果的通用理论；未能正视方法论（即研究者认知其研究对象的方式）与方法（即用于调查研究对象的研究技术）之间的区别；严重依赖定量研究，这种方法无法揭示解释变量之间关系的内在过程，并且同时重视效力因果而忽视质料因果（物质因）和形式因果（形式因）；最后，理论 / 研究与教学实践相分离。本文随后阐述了 L. S. 维果茨基关于人类心理理论的当代诠释，即由阿罗·托梅拉 (Aro Toomela) 提出的“结构 - 系统理论”。该理论认为，要解释心理过程，必须采用辩证的思维方式来思考研究对象（即第二语言发展），这种思维方式既要识别构成该过程的组成部分（质料因），也要识别这些组成部分之间的关系（形式因）。秉承维果茨基的辩证心理学方法，结构 - 系统理论提出了一种研究与实践相结合的方法，该方法坚持维果茨基的工具性方法，其中实验与实践（包括学校教育）形成一个统一体。本文提供了一个关于结构 - 系统理论如何与语言教学相关的实例。

关键词

危机，方法论，方法，因果关系，实践性

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