Studies in Second Language Learning and Teaching
Department of English Studies, Faculty of Pedagogy and Fine Arts, Adam Mickiewicz University, Kalisz
SSLLT 6 (1). 2016. 43-63
doi: 10.14746/ssllt.2016.6.1.3
http://www.ssllt.amu.edu.pl

Deconstructing the I *and* SLA *in ISLA: One curricular approach*

Ronald P. Leow
Georgetown University, Washington, DC, USA
leowr@georgetown.edu

Luis Cerezo
American University, Washington, DC, USA
luis.cerezo@american.edu

Abstract

Instructed second language acquisition (ISLA) has been referenced in the larger field of the SLA literature for over two and a half decades. Currently, there are several theoretical underpinnings accounting for processes assumed to play a role in ISLA and quite an impressive number of studies have empirically addressed some aspect(s) of ISLA. Recently, a lengthy and relatively cohesive treatise of this substrand of SLA research in relation to both theoretical, empirical, and pedagogical perspectives has been published in two books (cf. Leow, 2015a; Loewen, 2015), and a new model of the L2 learning process in ISLA has been proposed (Leow, 2015a). These publications are timely and important given that the concept of ISLA not only needs to be clearly defined but also situated contextually. To this end, this article (a) revisits current definitions of ISLA in the SLA literature with the aim of identifying specific features of ISLA that underlie such definitions, (b) deconstructs ISLA by probing deeper into what comprises the terms *instructed* and *SLA* in ISLA, (c) provides a brief summary of the cognitive processes and variables postulated by the theoretical underpinnings of ISLA and pertinent empirical research, (d) recommends that ISLA be observed from one curricular approach together with its empirical and pedagogical ramifications, and (e) provides some measure of direction future ISLA research may follow.

Keywords: cognitive processes; learning; acquisition; concurrent procedures; language curriculum; CALL

1. Introduction

The phrase *instructed second language acquisition* (ISLA) has been around for over two and a half decades and has been typically subsumed within the field of SLA, in itself a subdisciple of the general area of applied linguistics. Recently, a lengthy and relatively cohesive treatise of this substrand of SLA research in relation to both theoretical, empirical, and pedagogical perspectives has been published in two books (cf. Leow, 2015a; Loewen, 2015), and a new model of the L2 learning process in ISLA has been proposed (Leow, 2015a). In addition, while current definitions (e.g., Housen & Pierrard, 2005; Loewen, 2015) have underscored two major features of ISLA that focus on the learning mechanisms and the instructional manipulations of these mechanisms or learning conditions to promote L2 development, the concept of ISLA may also need to address the broader picture in which ISLA lies, that is, the language curriculum, and whether such scholarly inquiries have pedagogical ramifications for the formal L2 environment. To address these issues, this article takes a critical look at the current strand of ISLA research within the broader field of SLA by (a) revisiting current definitions of ISLA in the SLA literature with the aim of identifying specific features of ISLA that underlie such definitions, (b) deconstructing ISLA by probing deeper into what comprises the terms *instructed* and *SLA* in ISLA, (c) providing a brief summary of the cognitive processes and variables postulated by the theoretical underpinnings of ISLA and pertinent empirical research, (d) recommending that ISLA be observed from one curricular approach together with its empirical and pedagogical ramifications, and (e) providing some measure of direction future ISLA research may follow.

2. Definitions of ISLA

Early definitions of ISLA, viewed from a cognitive perspective, provided a fairly general scope of ISLA as "research that concentrates on *how* [emphasis added] classroom [emphasis original] second language acquisition takes place" (R. Ellis, 1990, p. vii) with the role of instruction as an intervention into the L2 learning process (e.g., R. Ellis, 2005). However, more recent definitions reflect a more purposeful role on the part of the instructor or via instructional materials (e.g., Loewen, 2013) and this includes, especially from an empirical perspective, "any systematic attempt to enable or facilitate language learning by manipulating the mechanisms of learning and/or the conditions under which these occur" (e.g., Housen & Pierrard, 2005, p. 2; see also Loewen, 2015). Indeed, Loewen (2015) points out that, overall, little effort has been expended in previous literature to define and identify the specific characteristics that embody what comprises ISLA. To this end, he encompasses previous definitions in his broader definition of ISLA as

> a theoretically and empirically based field of academic inquiry that aims to understand *how* (our italics) the systematic manipulation of the mechanisms of learning and/or the conditions under which they occur enable or facilitate the development and acquisition of a language other than one's own. (p. 2)

What appear to underscore all these definitions are (a) the focus on the "mechanisms of learning" (cognitive processes) employed in an instructed setting, that is, *how* L2 learners process L2 data in this setting, and (b) the question whether such processes can be manipulated by instructional intervention with the assumption that superior or faster L2 development will result. However, missing from all these definitions are two additional important features, namely, (a) the broader picture in which ISLA lies, that is, the language curriculum, and (b) whether such scholarly inquiries do hold pedagogical implications, ideally robust, for the formal L2 environment. To address these current issues, it is necessary to deconstruct the *I* and *SLA* in ISLA by identifying minimally three aspects that may be useful in categorizing current and future research within this strand of academic inquiry: (a) the *I* or the *where* (context), (b) the *SLA* or the *how* (theoretical perspectives on learner processes) and, based on these two aspects, (c) one curricular approach to ISLA together with its empirical and pedagogical ramifications.

3. The *I* (instructed) or the *where* (context)

ISLA is viewed as a substrand within the SLA field of research and the obvious distinction between ISLA and SLA lies primarily in whether the process of L2 learning, often conflated with that of acquisition, is instructed or uninstructed. The term *instructed* may be a misnomer given that it denotes some form of *instruction* by someone (usually an instructor or researcher) whereas ISLA also refers to *exposure* to some kind of external manipulation of the L2 data (e.g., textual enhancement, computerized feedback, etc.) or learning conditions that do not actually involve the presence of the instructor. Perhaps *exposure* is a more appropriate term to use, given that, viewed from a psycholinguistic perspective, "learners may be *exposed* to, and not necessarily *instructed* on, grammatical information with the expectation that they will somehow 'attend to,' 'notice,' 'take in,' or 'detect' targeted L2 forms or structures during exposure" (Leow, 1998, p. 63).

What is undeniable is that the typical context in which ISLA research is perceived to be situated is the formal L2 environment (classroom) taught by an instructor, be it face-to-face (FTF), hybrid or online (via the Internet). This may explain R. Ellis's (1990) bolding of the word *classroom* in his early definition in an effort to differentiate this context as opposed to, for example, immersion, study abroad, or naturalistic settings. However, the use of technology over the

last decade has made huge inroads into the way instruction or exposure is provided in language curricula (e.g., computer-assisted language learning or CALL). This is clearly evident in the increasing number of students in hybrid/blended courses (Allen, Seaman, & Garrett, 2007) and online learning courses (Allen & Seaman, 2014). Given this broader scope of contexts for language instruction or exposure, Loewen (2015) suggests that instead of viewing ISLA as situated in the classroom setting, it should be contextually linked to two prerequisites or conditions, namely, instruction and acquisition, or what he calls "attempted acquisition." More specifically, this suggestion replaces any emphasis on the location of instruction and places it more on the manipulation of the L2 learning process and/or the conditions under which such learning takes place (cf. also Housen & Pierrard, 2005). To this end, ISLA research may incorporate learners who, according to Loewen (2015), "are participating in study abroad programs or are using textbooks or computer-assisted language learning materials for self-selected, individual study program" (p. 4). However, it may be necessary to take a closer look at these and other nonclassroom environments in relation to the criteria of purposeful external manipulation of the L2 data, learning conditions and/or focus on the cognitive processes employed by L2 learners as they process the instructed L2.

One nonclassroom context that easily fits within definitional ISLA research in relation to how L2 learners process the L2 and external material manipulation by the researcher or teacher is the use of technology to promote L2 learning or development, be it via CALL tasks or activities or manipulated synchronous computer-mediated communication (SCMC) in which some target form or structure underlies the practice or communication being promoted. Both strands of technology-based contexts are premised on the construct of minimal attention paid to target or manipulated data in the L2 that are designed to promote L2 development (see for example, Baralt, 2013 for SCMC and Cerezo, Caras, and Leow, in press for CALL) and, especially in the case of several CALL tasks, to also elicit information on the role of learner cognitive processes employed during exposure (e.g., Bowles, 2008; Calderón, 2013; Cerezo et al., in press; Hsieh, Moreno & Leow, 2015; Leow, 2001; Rosa & Leow, 2004; Rosa & O'Neill, 1999).

On the other hand, there has been an explosion of studies addressing the use of various technology-based tasks or activities that include 3D gaming environments in which students enter the virtual world as avatars to interact in the L2 (e.g., Liou, 2012; Peterson, 2012) or play games (e.g., Thorne, Black, & Sykes, 2009) and autonomous tele-collaboration in which students have technology-based access to L2 speakers (e.g., via Skype or Zoom) inside or outside the formal classroom setting (e.g., Teletandem; Telles, 2015). The theoretical underpinning of many of these studies appears to be noncognitive and socially oriented. For example, these studies typically situated themselves within the sociocultural

theory (Lantoff & Thorne, 2007) that views language as a socially mediated construct embedded in communication. However, given the open-endedness of these tasks, games, and interaction, there is no controlled instruction, exposure, or manipulated L2 input, and L2 development is, for the most part, anecdotally discussed based on selective participant samples but rarely addressed empirically. In other words, these studies do not report tangible evidence of whether such exposure to or interaction with the L2 or L1 speaker led to some beneficial gain in L2 development, and the autonomy and potential learning process do not fall under any aspect of the ISLA definitions. To this end, it is quite challenging to include these studies within the ISLA field of inquiry, as currently defined.[1]

In addition to the classroom setting, other contexts that may potentially fall within the research strand of ISLA have been proposed, namely, immersion and study abroad programs (Collentine & Freed, 2004; Loewen, 2015). However, like the gaming and tele-collaboration contexts, whether ISLA research may be conducted within these settings will depend heavily on the degree of purposeful manipulation of specific target L2 items or learning conditions or even the learning process. The findings would contribute to a better understanding of robust learning within these contexts.

As discussed above, simply allowing L2 learners to be exposed to the L2 without empirically manipulating the L2 data or learning condition in relation to L2 development or addressing learners' cognitive processes employed during the learning process may not qualify for membership in the ISLA strand of research. To this end, the experimental designs to be employed in ISLA research need to include minimally methodological procedures to address the effects of intervention on L2 development and/or learners' internal processes and their effects on or relationships with such development.

4. The *SLA* in ISLA or the *how*: Learning vs. acquisition

If we are to view the formal L2 environment (FTF, hybrid/blended, or online) as the context for ISLA research, whether L2 learners *acquire* or *learn* the L2 needs to be seriously discussed. Given that these two terms (and processes) have been conflated or used synonymously in the (I)SLA literature, which may potentially shape one's perception of the kind of processing that takes place in the ISLA context, it may be useful to revisit the period when these two terms became

[1] One reviewer suggested that such exposure to the L2 can serve as a fluency building component of a given curriculum, a point well taken when viewed from a curricular perspective. From an ISLA research perspective, however, like study abroad and immersion programs, some purposeful manipulation of this kind of exposure and documentation of its promotion of L2 fluency is required given the open-endedness of these exposures or interactions.

prominently salient in the SLA literature. Krashen (1982) proposed his monitor model that was premised on child L1 *acquisition* and was the first theoretical underpinning in SLA to raise the issue of the role played by the construct of consciousness (or awareness) in the L2 learning process. Among his hypotheses was his acquisition-learning distinction in which he distinguished between *acquiring* (without consciousness) resulting in acquired/implicit knowledge and *learning* (with consciousness) resulting in learned/explicit knowledge. Viewed from a processing perspective, acquisition is effortless or, as Krashen (1982) put it, like "picking up" a language (p. 10) and occurs in an L1 environment in which exposure to and interaction with the L1 is prominent. Krashen also argued that there was no interface (connection) between implicit (acquired) and explicit (learned) knowledge, which led to a discussion of whether there exists in ISLA a weak interface (e.g., N. Ellis, 2005), a strong interface (e.g., DeKeyser, 2007), or support for Krashen's noninterface position (Paradis, 2009). Dörnyei (2009), on the other hand, proposed moving away from whether Krashen was right or wrong in making this distinction and focusing more on the mechanisms and processes that underlie learning. However, the key distinctions between acquisition and learning lie precisely in *how* L1 and L2 learners process the L1 and L2 data (e.g., depth of processing, level of awareness, cognitive effort) and *where* exposure to the L1 and L2 occurs, together with the amount of time (and, as an extension, the amount of target features) learners are exposed to and interacting with the L1 or L2. Viewed from this processing perspective and the context in which L2 learners are typically exposed to and interact with the L2, two major distinctions between acquisition and learning are clearly based on type of processing (explicit vs. implicit) and type of context (naturalistic vs. formal environment). It appears to be more appropriate to employ the term *learning* when referring to the formal environment and *acquisition* for conditions in which the language is usually acquired such as naturalist settings and the more formal immersion and extended study abroad settings. More specifically, the typical formal setting situated within a language curriculum is designed to promote more explicit and intentional learning than implicit and incidental learning and acquisition. This does not negate any instance(s) of implicit or incidental learning taking place in the formal instructed setting but, as Leow (2015a) cautions,

> this kind of processing depends heavily on many factors that include the provision of large amounts of exemplars in meaningful contexts and quite a long period of time to process, internalize the exemplars, and have the knowledge available for subsequent usage. (p. 244)

Based on the discussion above, it may be observed that instructed language learning (ILL) provides a more precise description of what comprises ISLA.

To view the L2 learning process globally, let us now discuss a theoretical framework for the L2 learning process in ISLA followed by a summary of the cognitive processes and variables postulated by several theoretical underpinnings to account for this formal learning process.

5. A theoretical framework of the L2 learning process in ISLA

A theoretical framework of the L2 learning process postulated for ISLA may be represented by both stages of processes and resultant products as exemplified in Figure 1 (Leow, 2015b, p. 49). In this framework, several stages are postulated to occur along the learning process that begins with exposure to the L2 (input), some of which is attended to and taken in by the learner (intake). A subset of this intake may be further processed and integrated as L2 knowledge into the internal system. Such knowledge then becomes available for output production, which in itself is assumed to be representative of the L2 knowledge learned implicitly or explicitly. Leow differentiates between learning as a *process*, which occurs internally at Stages 1 (input processing), 3 (intake processing), and 5 (L2 knowledge/output processing), and learning as a *product* (what is learned), which is presented internally at Stage 4 (L2 knowledge), and externally (output) as representative L2 knowledge, which may or may not reflect what is actually stored in learners' developing L2 grammar. Stage 2 represents intake as an initial product kept in working memory but has yet to be further processed and internalized or learned and may disappear from working memory if not further processed (cf. Leow, 2012 for further elaboration on the concept of intake).

INPUT	{ >	INTAKE	>	INTERNAL SYSTEM	> }	OUTPUT
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	
(product)	(process)	(product)	(process)	(product)	(process)	(product)
(*input*)	(*input*)	(*intake*)	(*intake*)	(*L2 knowledge*)	(*L2 knowledge/ output*)	(*representative L2 knowledge*)

Figure 1 Stages of the learning process in SLA: Of processes and products

6. Theoretical underpinnings in ISLA

The SLA literature is littered with several theoretical underpinnings postulated to address the learning process (as in stages) or product (as in knowledge) from different perspectives (e.g., generative Chomskyan linguistic, see Carroll's autonomous induction theory; social, see Lantolf and Thorne's Vygotskian sociocultural theory; cognitive neuroscience-based, see Ullman's declarative/procedural model of memory; psychology-based, see Ellis's associative-cognitive CREED framework, Pienemann's processability theory, Truscott and Sharwood's

MOGUL (modular online growth and use of language), and Tomlin and Villa's cognitive science-based model of input processing). At the same time, there are several underpinnings that are more pedagogically based and are (a) premised on the role of cognitive processes (e.g., attention and/or awareness) such as Gass's (1997) model of SLA, Leow's (2015a) model of the L2 learning process in ISLA, McLaughlin's (1987) cognitive theory, Robinson's (1995) model of the relationship between attention and memory, Schmidt's (1990 and elsewhere) noticing hypothesis, Swain's (2005) output hypothesis, and VanPatten's (2007) input processing theory or (b) associated with some form of instruction or exposure designed to promote the L2 development of procedural knowledge such as DeKeyser's (2007) skill acquisition theory. Unlike the other theoretical underpinnings, skill acquisition theory skips the early stages of the learning process (input and intake processing) and targets the role of instruction in converting one type of knowledge (explicit or declarative) into another type of knowledge (implicit or procedural) through practice. This position, reflective of the strong interface position, is strongly rooted in cognitive psychology models of skill acquisition and in theories of controlled and automatic processing (e.g., Shiffrin & Schneider, 1977) and is best represented by Anderson's adaptive control of thought (ACT) model (updated in Anderson, Bothell, Byrne, Douglass, Lebiere, & Qin, 2004).

A concise synopsis of the cognitive processes and variables postulated by these theoretical underpinnings to play important roles in the L2 learning process (from input to intake to output), based on Leow (2015a), is presented in Figure 2. If we look carefully at all these theoretical postulations concerning the stages of the learning process, it is evident that there is no shared perspective to account for the L2 learning process. However, we can easily identify the principal cognitive processes and variables shared by over half of the different theoretical underpinnings to account for the preliminary exposure to L2 input and learners' eventual output. As can be seen, we have working memory, attention, awareness, depth or levels of processing, and prior knowledge.

INPUT → OUTPUT	WM	attention	awareness	levels of awareness	levels of processing	prior knowledge
McLaughlin (1987)	no	yes	no	n/a	yes	*(yes)
Schmidt (1990)	no	yes	yes	yes	(yes)	no
Robinson (1995)	yes	yes	yes	yes	yes	yes
Gass (1997)	(yes)	yes	yes	(no)	yes	yes
Swain (2005)	n/a	yes	yes	no	(yes)	yes
VanPatten (2007)	yes	yes	yes	no	yes	(yes)
DeKeyser (2007)	n/a	n/a	n/a	n/a	n/a	yes
Leow (2015)	yes	yes	yes	yes	yes	yes

* = not clear

Figure 2 Theory-based cognitive processes and variables important in the L2 learning process

Leow's (2015a) recent model of the L2 learning process in ISLA incorporates all of these processes and variables and provides a more fine-tuned perspective of the several stages postulated to occur throughout the entire L2 learning process. More importantly, while the model is theoretically derived from cognitive psychology, it is based on previous empirical studies that have explored L2 learners' cognitive processes employed while exposed to or interacting with the L2. Like VanPatten's and Gass's models, Leow posits three major processing stages, namely, the input processing stage, the intake processing stage, and the knowledge processing stage. The first stage (input processing) is largely dependent upon the level of attention (peripheral, selective, or focal) paid to some information by the learner, which may be accompanied by depth of processing, cognitive registration, and level of awareness.[2]

Dependent upon these variables, intake may be categorized as either being attended intake (peripheral), detected intake (selective), or noticed intake (focal). According to Leow, while both detected and noticed intake, and to a substantially lesser extent, attended intake, may be lodged in working memory and made available for subsequent *recognition* by L2 learners, they can all be discarded if not minimally processed further.

The intake processing stage of his model underscores *how* L2 learners further process the preliminary intake and how such processing depends on depth of processing, potential levels of awareness, and activation of old or new prior knowledge. On the one hand, linguistic data may be processed with a low level of cognitive effort (e.g., data-driven processing, cf. Robinson, 1995), which allows the data to be entered into learners' L2 developing system encoded as non-systemized chunks of language (cf. Gass, 1997). Subsequent exemplars not accompanied by higher levels of processing may follow this path forming a collection of encoded discrete data or entities lodged in learners' L2 developing system. A low level of processing may potentially lead, if necessary, to implicit restructuring of subsequent L2 information and implicit systemized knowledge. On the other hand, with a higher depth of processing, such as consciously encoding and decoding the linguistic information and conceptually-driven processing (e.g., activation of prior knowledge), learning may be accompanied by

[2] Depth of processing is defined as "the relative amount of cognitive effort, level of analysis, elaboration of intake together with the usage of prior knowledge, hypothesis testing and rule formation employed in decoding and encoding some grammatical or lexical item in the input" (Leow, 2015a, p. 204). Cognitive registration is the detection of some stimuli in the input. "Detection is the process that selects, or engages, a particular or specific bit of information" (Tomlin & Villa, 1994, p. 192). Awareness is "a particular state of mind in which an individual has undergone a specific subjective experience of some cognitive content or external stimulus" (Tomlin & Villa, 1994, p. 193).

higher levels of awareness thus facilitating the potential entry and incorporation of intake into the learner's systemized grammatical system. The combination of prior knowledge activation, depth of processing, and potentially higher levels of awareness allows the linguistic data to be explicitly restructured if necessary and stored as explicit systemized knowledge.

What is stored in the L2 developing system, then, are two kinds of product (stored linguistic knowledge) of what has been processed up to this point in the learning process, namely, unsystemized (discrete linguistic data) and systemized (internalized or learned) data. This separation of internalized data in the system is reminiscent of Gass's (1997) postulation and accounts for item versus system learning. Accuracy of the product is not of importance at this point given that one's knowledge may be accurate or inaccurate.

The third and final process occurs at Stage 5 between the L2 developing system and what is produced by the learner (*knowledge processing* such as assigning syntactic and morpho-phonological features to the L2 in oral production, monitoring production in relation to learned grammar, etc.). Depth of processing and potential level of awareness may also play a role at this stage together with the ability to activate (appropriate) knowledge. Unlike Gass, Leow views this stage as a part of the learning process given that at this stage learners monitor their own output or use potential feedback based on what they have just produced as confirmation or disconfirmation of their L2 output.[3] Dependent upon depth of processing or level of awareness, they may reinforce their current knowledge or restructure their current interlanguage. Leow (2015a), who situates ISLA within the L2 language curriculum, suggests that "SLA research that seeks to probe into learner cognition, then, needs to focus on the identification and explanation of the cognitive processes employed by L2 learners as they learn the L2 in these two settings" (p. 2).[4]

7. Empirical research on L2 cognitive processes

Many studies have addressed L2 learners' cognitive processes as they interacted with L2 data but have used research designs that only permit assumptions or

[3] One reviewer questioned whether practice to promote L2 development forms part of this model at the knowledge processing stage. The answer is affirmative given the active role of the learner and the potential for proceduralization of declarative or explicit knowledge through practice.

[4] The two settings refer to either one in which the L2 is either viewed as a foreign language (as in English speakers taking the foreign language requirement in an L1 environment) or as a second language (as in Japanese speakers taking English classes in an L2 environment, for example, in the USA).

interpretations of offline data to address how learners actually processed said data (e.g., N. Ellis & Sagarra, 2010; Morgan-Short & Bowden, 2006). Other studies have created experimental tasks or conditions in which learner cognitive processes are directly addressed by employing concurrent data elicitation procedures such as concurrent verbal reports or think aloud protocols (TAs), eye-tracking, and response times in an effort to glean information on these internal mechanisms in L2 processing (cf. Leow, Grey, Marijuan, & Moorman, 2014 for a critical report of these procedures). Concurrent data are gathered to provide an improved understanding of the mechanisms that contribute to more robust learning, that is, the roles these cognitive processes play do make a substantial difference in mostly explicit learning outcomes. These procedures have provided a tremendous amount of insights into L2 learners' processing (e.g., where, when and for how long attention is paid via eye-tracking) and the use of specific processes (e.g., awareness, activation of prior knowledge via TAs) while interacting with the L2 data. For example, studies employing eye-tracking (e.g., Godfroid, Housen, & Boers, 2013) and concurrent verbal reports (e.g., Leow, 2001) have reported that mere attention to or even noticing information in the L2 input may not lead to this information being internalized into students' learning system without further processing. This information has led some researchers to ensure that learners are indeed cognitively engaged in attending to *and* processing the L2 information during instructional exposure by carefully designing learning activities or tasks that promote students' usage of identified beneficial cognitive processes such as hypothesis testing, rule formulation, level of awareness, and activation of prior knowledge, together with feedback (e.g., Bowles, 2008; Cerezo et al., in press; Hsieh, Moreno, & Leow, 2015; Leow, 2001; Rosa & Leow, 2004; Rosa & O'Neill, 1999).

Interestingly, even though processes such as attention and awareness have been investigated since the mid-90s (e.g., Alanen, 1995; Leow, 1997, 1998) via TAs, there has been (and perhaps still exists) some mistrust of its use. Major critiques of this concurrent procedure include its intrusiveness and the potential for reactivity, that is, "whether thinking aloud could have affected participants' primary cognitive processes while engaging with the L2 or even add an additional processing load or secondary task on participants, which would not reflect a pure measure of their thoughts" (Leow, 2015a, p. 142). Rosa and O'Neill (1999) also noted that TAs may be affected by individual differences while Leow et al. (2014) pointed out that the level of intrusiveness may depend on type of protocol employed (nonmetacognitive vs. metacognitive) and type of experimental task employed (e.g., problem-solving vs. reading). Other variables may include working memory, language of report, and proficiency level.

The reactivity strand of research grew exponentially after Leow and Morgan-Short's (2004) first reported failure to find a reactive effect on L2 participants'

performances after a reading exposure when compared to a control group. Several studies (e.g., Bowles, 2008; Bowles & Leow, 2005; Morgan-Short, Heil, Botero-Moriarty, & Ebert, 2012; Rossomondo, 2007; Sanz, Lin, Lado, Bowden, & Stafford, 2009; Yanguas & Lado, 2012; Yoshida, 2008) subsequently addressed the issue of reactivity in relation to various variables while a recent meta-analysis (Bowles, 2010) reported an effect size value that "is not significantly different from zero" (p. 138), that is, it is not a reliable effect. Many current TA studies follow Leow and Morgan-Short's (2004) suggestion that "studies employing concurrent data-elicitation procedures include a control group that does not perform verbal reports as one way of addressing this issue" (p. 50).

The introduction of the eye-tracking procedure (e.g., Godfroid, Housen, & Boers, 2010; Smith, 2010) to the field of SLA to methodologically address the process of attention was typically accompanied by a critique of the validity of TAs as proponents of this procedure sought to present the eye-tracking procedure as a valid replacement of these concurrent verbal protocols. It is only recently that researchers (e.g., Leow, 2013; Leow et al., 2014; Winke, 2013) appear to agree that the use of these procedures is differential and they are both crucial for a better understanding of, for example, how L2 learners process the L2 data (TAs), and what, where, and for how long they pay attention to such data (eye-tracking) (cf. Leow et al., 2014 for further elaboration of the strengths and limitations of these procedures). From a psycholinguistic perspective, it is clear that a solid understanding of the cognitive processes L2 learners employ during the learning process is required before appropriate intervention to impact the mechanisms of learning or learning conditions in ISLA can take place.

8. ISLA: One curricular approach

If it is accepted that ISLA research is situated within an instructed environment, then there is an obvious need to seriously consider this context not only in relation to a noninstructional setting but also within the larger language curriculum. First of all, the different types of affordances offered by type of context (e.g., extended study abroad vs. formal environment) in relation to the number of hours of exposure to and type of interaction with the L2, amount of practice, and so on are undoubtedly substantial. Secondly, a typical curriculum provides information that may include, for example, specific learning outcomes for some or all four skills, kinds of evaluation to take place, and there is inevitably a syllabus that provides some kind of guideline for each class session. Homework and a prescribed textbook are two staples, and activities and tasks associated with the curriculum are performed both inside and outside the formal instructed setting. Different language programs vary in the amount of time spent in this formal

setting (e.g., 1 hour either daily for intensive classes or three or four times a week for nonintensive classes with lesser times allocated per session). Curricula may involve different levels (e.g., 2 years, 3 years, etc.) that may range from 150-200 formal hours in a two year program and so on. Ideally, informal activities or tasks such as technology-based contexts are logically linked to the overall curriculum with regard to its objectives or learning outcomes, its classroom activities, and its evaluation component (cf. Leow, 1994 for a model of coherent language curriculum development). This link, in turn, would allow researchers to address whether their findings hold potential for pedagogical extrapolation to the formal instructed environment in relation to its curricular components or whether further research is needed before such extrapolation can be made.

Acknowledging the *where* (formal instructed environment) and *how* (explicit learning) of ISLA, a curricular perspective of ISLA research requires that we consider very closely the potential pedagogical ramification of ISLA studies, that is, whether the findings can be extrapolated to this instructed setting with some confidence of *robust* L2 development taking place. This perspective places a premium on ISLA studies to demonstrate such robust L2 development after the experimental learning condition, instruction, or exposure or after some methodological manipulation of learner cognitive processes during the L2 treatment. However, as observed by Leow (2015a), while the SLA (and ISLA) field is now several decades old, it is categorically challenging to state that we know the best way, based on research, to teach the L2 or promote L2 learning in the L2 classroom:

> There is no question that SLA research has come a very long way in illuminating and increasing our understanding of many aspects of the L2 learning process yet there still appears to be a disconnect between what we researchers report and publish and what we teachers find relevant to our classrooms. Perhaps we teachers are not entirely sure what the research is all about given the many variables that contribute to both language learning and teaching. In other words, SLA research, divided into its many strands, may only address one partial aspect of what really takes place in the formal classroom setting given all the variables involved in this context. (p. 271)

Seeking robust L2 development from a curricular approach necessitates a critical focus not only on statistical differences between experimental groups in previously published or future studies but also whether the gain scores obtained from the pretests to posttests are indeed substantial. For example, a study investigating the effects of type of instruction reports that two experimental instructional conditions (A and B) improved statistically better when compared to a control group (C) that did not receive any exposure to the target structure in the input. However, the gain scores are minimal and the highest score after instruction was 44/100. While improvement is statistical, overall gain scores are relatively low

in relation to what is rated as satisfactory performance in a typical instructed language classroom. Consequently, it may be better to fine-tune the design or probe deeper into how the L2 learners processed the L2 data, especially those who performed well above average, before any pedagogical extrapolation can be made.

9. Where does ISLA research go from here?

The insights that concurrent data provide cannot be understated and probing deeper into learner cognitive processing and processes, as underscored in recent definitions of ISLA, not only clearly warrants future research but also explicates other ISLA studies that have not employed concurrent data elicitation procedures. For example, one popular strand of ISLA research (exposure) addresses the relative benefits of enhancing textual L2 input, premised on drawing learner attention to target items in the L2 data. To date, it may be argued that the results appear to be inconclusive (cf. Leow, 2009 for one plausible explanation based on type of experimental design employed), but a deeper probe into this strand of research that employed TAs and eye-tracking reveals that it may not be the actual textual enhancement that differentiates performances but *how* L2 readers process the L2 text. Leow (2001) and Bowles (2003) gathered concurrent verbal reports during text processing and both reported nonsignificant differences in performance between their respective enhanced and unenhanced groups on a comprehension, a recognition and a written production assessment task. A review of their concurrent data revealed that while the majority of participants reported a low level of processing or awareness of the target items in the text, a few outliers in both experimental groups scored very high on the assessment tasks. Given that their protocols clearly revealed a higher depth of processing and level of awareness of the target items when compared to the rest of the participant population, Leow and Bowles postulated that while enhancement does not appear to contribute to superior performances when compared to an unenhanced condition, concurrent data may contribute to understanding *how* such enhancement is processed. Winke (2013) employed the eye-tracking procedure to address the effect of textual enhancement and reported that while the enhanced group did demonstrate a statistically greater amount of attention paid to the target items (based on amount of eye gazes), her findings supported similar nonsignificant results reported in previous studies between the two experimental groups. It still remains to be empirically addressed whether depth of processing accounts for the nonsignificant performances between enhanced and unenhanced texts before pedagogical extrapolations can be made.

Another example is the popular processing instruction (PI) strand of ISLA research, in which the typical research design is the classic pretest-instruction-

posttest format in which researchers assume that some kind of altering or restructuring of an L1 strategy took place in the PI condition during the experimental instructional phase of the study. It is also assumed that this kind of processing did not occur in the traditional output condition. Results from almost two dozen studies in this strand provide relatively similar statistical performances between these two experimental groups, leading to the question of how specifically or differentially the L2 data were processed in the two groups? Theoretically, PI targets the early stages of the L2 learning process while traditional instruction targets the output stage of this process. Once again, ISLA research needs to address whether type of processing was differential between these two experimental groups (e.g., did awareness of the incorrect strategy play a role in only one or both groups?) before pedagogical implications can be made.

The role of technology in the L2 instructed setting also needs to be seriously considered in future ISLA research given that this role is becoming increasingly important in language curricula and its use in this context needs to be theoretically-driven and empirically supported. Indeed, it is suggested that ISLA research guide the successful migration of content from the instructed setting to the computer setting (Cerezo et al., in press). Concurrent data gathered from CALL studies (e.g., Bowles, 2008; Hsieh, Moreno, & Leow, 2015; Leow, 2001; Rosa & Leow, 2004; Rosa & O'Neill, 1999; Sachs & Suh, 2007) have revealed consistent use of high depth of processing, potential levels of awareness that include hypothesis and rule formulations, and activation of prior knowledge, which all appear to play important roles in learning targeted difficult L2 structures (e.g., English back-shifting of verbs in the past tense to the past perfect tense, Spanish *gustar* with its five substructures, Spanish past subjunctive). These processes align with those of explicit learning of new information postulated in the intake processing stage of Leow's (2015a) model of the L2 learning process in ISLA. As pointed out by Leow et al. (in press), well-designed CALL materials hold the potential to (a) promote the use of such cognitive processes by ensuring that learners are cognitively engaged in attending to and processing the L2 information, (b) maximize practice opportunities by unit of available time, (c) manipulate the amount of examples in the input to be processed, and (d) provide timely feedback and prompts to promote deeper processing. To maximize the role of technology in the instructed setting, several researchers have suggested shifting the formal teacher-centered instruction of several difficult grammatical points to an online component (e.g., Bowles, 2008; Hsieh, 2008; Leow, 2007, 2015a), thereby creating a hybrid curriculum. Such CALL materials hold the potential to free up important time in the classroom spent on formally teaching these difficult grammatical points and will ultimately maximize students' exposure to and interaction with the L2 in the formal instructed setting.

10. Conclusion

This paper has taken a critical look at the current strand of ISLA research within the broader field of SLA in an attempt to provide some measure of direction future ISLA research may follow. It is relatively strongly accepted that some empirical manipulation of both instructional conditions and learner internal mechanisms need to underscore the focus of ISLA research in an effort to promote robust L2 development in the formal instructed setting. In addition, it is recommended that we seriously acknowledge the kinds of affordances or lack thereof inherent in a typical and formal L2 environment for L2 development and view ISLA from one curricular approach. In turn, this curricular approach to ISLA research places a premium on researchers to seriously consider (a) the context under which ISLA research occurs, (b) the type of processing, namely, explicit learning, that predominates in this context, and (c) whether the findings can be extrapolated to this formal environment with a high level of confidence in relation to robust L2 development. Additionally, there is no doubt that the more we understand about cognitive processes the more we can as both researchers and teachers manipulate the L2 data and learning conditions to promote more robust learning on the part of our students within the limited confines of the formal L2 environment. The research on learners' internal mechanisms and the empirical investigations of their manipulated use during L2 processing, especially within the CALL strand of research, appear to hold much promise toward not only achieving this better understanding of L2 processes but also their potential contribution to more robust learning in the L2 classroom. Probing deeper into how L2 learners process L2 data should be one of the premium areas of future ISLA research.

References

Alanen, R. (1995). Input enhancement and rule presentation in second language acquisition. In R. W. Schmidt (Ed.), *Attention and awareness in foreign language learning* (pp. 259-302). Honolulu, HI: University of Hawai'i, Second Language Teaching and Curriculum Center.

Allen, I. E., & Seaman, J. (2014). Grade change: Tracking online education in the United States, 2013. *Babson Survey Research Group and Quahog Research Group, LLC, 3*(5), 2014.

Allen, I. E., Seaman, J., & Garrett, R. (2007). *Blending in: The extent and promise of blended education in the United States*. Needham, MA: Sloan Consortium.

Anderson, J. R., Bothell, D., Byrne, M. D., Douglass, S., Lebiere, C., & Qin, Y. (2004). An integrated theory of the mind. *Psychological Review*, *111*, 1036-1060.

Baralt, M. (2013). The impact of cognitive complexity on feedback efficacy during online versus face-to-face interactive tasks. *Studies in Second Language Acquisition*, *35*, 689-725.

Bowles, M. (2003). The effects of textual enhancement on language learning: An online/offline study of fourth-semester students. In P. Kempchinsky & C. E. Piñeros (Eds.), *Theory, practice, and acquisition: Papers from the 6th Hispanic Linguistics Symposium and the 5th Conference on the Acquisition of Spanish & Portuguese* (pp. 395-411). Summerville, MA: Cascadilla.

Bowles, M. A. (2008). Task type and reactivity of verbal reports in SLA: A first look at an L2 task other than reading. *Studies in Second Language Acquisition, 30*, 359-387.

Bowles, M. A. (2010). *The think-aloud controversy in second language research*. New York: Routledge.

Bowles, M., & Leow, R. P. (2005). Reactivity and type of verbal report in SLA research methodology: Expanding the scope of investigation. *Studies in Second Language Acquisition, 27*, 415-440.

Calderón, A. M. (2013). The effects of L2 learner proficiency on depth of processing, levels of awareness, and intake. In J. M. Bergsleithner, S. N. Frota, & J. K. Yoshioka (Eds.), *Noticing and second language acquisition: Studies in honor in Richard Schmidt* (pp. 103-121). Honolulu, HI: University of Hawai'i, National Foreign Language Resource Center.

Cerezo, L., Caras, A., & Leow, R. P. (in press). Effectiveness of guided induction versus deductive instruction on the development of complex Spanish "gustar" structures: An analysis of learning outcomes and processes. *Studies in Second Language Acquisition.*

Collentine, J., & Freed, B. (2004). Learning contexts and its effects on second language acquisition: Introduction. *Studies in Second Language Acquisition, 26*, 153-171.

DeKeyser, R. (2007). Skill acquisition theory. In B. VanPatten & J. Williams (Eds.), *Theories in second language acquisition* (pp. 97-113). Mahwah, NJ: Lawrence Erlbaum.

Dörnyei, Z. (2009). *The psychology of second language acquisition*. Oxford: Oxford University Press.

Ellis, N. C. (2005). At the interface: Dynamic interactions of explicit and implicit language knowledge. *Studies in Second Language Acquisition, 27*, 305-352.

Ellis, N. C., & Sagarra, N. (2010). The bounds of adult language acquisition. *Studies in Second Language Acquisition*, *32*, 553-580.

Ellis, R. (1990). *Instructed second language acquisition*. Cambridge, MA: Blackwell.

Ellis, R. (2005). *Instructed second language acquisition: A literature review*. Wellington: Ministry of Education, New Zealand.

Gass, S. M. (1997). *Input, interaction, and the second language learner*. Mahwah, NJ: Lawrence Erlbaum.

Godfroid, A., Housen, A., & Boers, F. (2010). A procedure for testing the noticing hypothesis in the context of vocabulary acquisition. In M. Pütz & L. Sicola (Eds.), *Inside the learner's mind: Cognitive processing and second language acquisition* (pp. 169-197). Amsterdam: John Benjamins.

Godfroid, A., Boers, F., & Housen, A. (2013). An eye for words: Gauging the role of attention in L2 vocabulary acquisition by means of eye tracking. *Studies in Second Language Acquisition*, *35*, 483-517.

Housen, A., & Pierrard, M. (2005). *Investigations in instructed second language acquisition*. Berlin: Mouton de Gruyter.

Hsieh, H. C. (2008). The effects of type of exposure and type of post-exposure task on L2 development. *Journal of Foreign Language Instruction, 2*, 117-138.

Hsieh, H-C., Moreno, N., & Leow, R. P. (2015). Awareness, type of medium, and L2 development: Revisiting Hsieh (2008). In R. P. Leow, L. Cerezo, & M. Baralt (Eds.), *A psycholinguistic approach to technology and language learning* (pp. 131-150). Berlin: De Gruyter Mouton.

Krashen, S. (1982). *Principles and practice in second language acquisition*. Oxford: Pergammon.

Lantolf, J. P., & Thorne, S. L. (2007). Sociocultural theory and second language learning. In B. VanPatten & J. Williams (Eds.), *Theories in second language acquisition* (pp. 201-224). Mahwah, NJ: Lawrence Erlbaum.

Leow, R. P. (1994). Teacher education and coherent curriculum development: The crucial link. In J. E. Alatis (Ed.), *Educational linguistics, crosscultural communication, and global interdependence* (pp. 337-346). Washington, DC: Georgetown University Press.

Leow, R. P. (1997). Attention, awareness, and foreign language behavior. *Language Learning, 47*, 467-506.

Leow, R. P. (1998). The effects of amount and type of exposure on adult learners' L2 development in SLA. *Modern Language Journal*, *82*, 49-68.

Leow, R. P. (2001). Do learners notice enhanced forms while interacting with the L2?: An online and offline study of the role of written input enhancement in L2 reading. *Hispania*, *84*, 496-509.

Leow, R. P. (2007). Input in the L2 classroom: An attentional perspective on receptive practice. In R. DeKeyser (Ed.), *Practice in second language learning: Perspectives from applied linguistics and cognitive psychology* (pp. 21-50). Cambridge: Cambridge University Press.

Leow, R. P. (2009). Input enhancement and L2 grammatical development: What the research reveals. In J. Watzinger-Tharp & S. L. Katz (Eds.), *Conceptions of L2 grammar: Theoretical approaches and their application in the L2 classroom* (pp. 16-34). Boston, MA: Heinle.

Leow, R. P. (2013). Schmidt's noticing hypothesis: More than two decades after. In J. M. Bergsleithner, S. N. Frota, & J. K. Yoshioka (Eds.), *Noticing and second language acquisition: Studies in honor in Richard Schmidt* (pp. 23-35). Honolulu, HI: University of Hawai'i, National Foreign Language Resource Center.

Leow, R. P. (2015a). *Explicit learning in the L2 classroom: A student-centered approach*. New York: Routledge.

Leow, R. P. (2015b). Implicit learning in SLA: Of processes and products. In P. Rebuschat (Ed.), *Implicit and explicit learning of languages* (pp. 47-65). Amsterdam: John Benjamins.

Leow, R. P., & Morgan-Short, K. (2004). To think aloud or not to think aloud: The issue of reactivity in SLA research methodology. *Studies in Second Language Acquisition, 26*, 35-57.

Leow, R. P., Grey, S., Marijuan, S., & Moorman, C. (2014). Concurrent data elicitation procedures, processes, and the early stages of L2 learning: A critical overview. *Second Language Research*, *30*(2), 111-127.

Liou, H.-C. (2012). The roles of second life in a college computer-assisted language learning (CALL) course in Taiwan, ROC. *Computer Assisted Language Learning, 25*(4), 365-382.

Loewen, S. (2013). Instructed second language acquisition. In C. Chapelle (Ed.), *The encyclopedia of applied linguistics* (pp. 2716-2718). Malden, MA: Blackwell.

Loewen, S. (2015). *Introduction to instructed second language acquisition*. New York: Routledge.

McLaughlin, B. (1987). *Theories of second language learning*. London: Edward Arnold.

Morgan-Short, K., & Bowden, H. W. (2006). Processing instruction and meaningful output-based instruction: Effects on second language development. *Studies in Second Language Acquisition*, *28*, 31-65.

Morgan-Short, K., Heil, J., Botero-Moriarty, A., & Ebert, S. (2012). Allocation of attention to second language form and meaning: Issues of think alouds and depth of processing. *Studies in Second Language Acquisition*, *34*, 659-685.

Paradis, M. (2009). *Declarative and procedural determinants of second languages*. Amsterdam: John Benjamins.

Peterson, M. (2012). EFL learner collaborative interaction in second life. *ReCALL, 24*(1), 20-39.

Robinson, P. (1995). Attention, memory and the "noticing" hypothesis. *Language Learning*, *45*, 283-331.

Rosa, E., & Leow, R. P. (2004). Awareness, different learning conditions, and second language development. *Applied Psycholinguistics*, *25*, 269-292.

Rosa, E., & O'Neill, M. (1999). Explicitness, intake and the issue of awareness. *Studies in Second Language Acquisition*, *21*, 511-556.

Rossomondo, A. E. (2007). The role of lexical temporal indicators and text interaction format in the incidental acquisition of the Spanish future tense. *Studies in Second Language Acquisition, 29*, 39-66.

Sachs, R., & Suh, B-R. (2007). Textually enhanced recasts, learner awareness, and L2 outcomes in synchronous computer-mediated interaction, In A. Mackey (Ed.), *Conversational interaction in second language acquisition: A series of empirical studies* (pp. 197-227). Oxford: Oxford University Press.

Sanz, C., Lin, H-J., Lado, B., Bowden, H., & Stafford, C. A. (2009). Concurrent verbalizations, pedagogical conditions, and reactivity. Two CALL studies. *Language Learning*, *59*, 33-71.

Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics, 11*, 129-158.

Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing: Perceptual learning, automatic attending, and a general theory. *Psychological Review*, *84*, 127-190.

Smith, B. (2010). Employing eye-tracking technology in researching the effectiveness of recasts in CMC. In F. M. Hult (Ed.), *Directions and prospects for educational linguistics* (pp. 79-97). Dordrecht: Springer.

Swain, M. (2005). The output hypothesis: Theory and research. In E. Hinkel (Ed.), *Handbook of research in second language teaching and learning* (pp. 471-483). Mahwah, NJ: Lawrence Erlbaum.

Telles, J. A. (2015). Teletandem and performativity. *Revista Brasileira de Linguística Aplicada, 15*(1), 1-30.

Thorne, S. L., Black, R. W., & Sykes, J. (2009). Second language use, socialization, and learning in internet interest communities and online games. *Modern Language Journal*, *93*, 802-821.

Tomlin, R. S., & Villa, V. (1994). Attention in cognitive science and second language acquisition. *Studies in Second Language Acquisition*, *16*, 183-203.

VanPatten, B. (2007). Input processing in adult second language acquisition. In B. VanPatten & J. Williams (Eds), *Theories in second language acquisition* (pp. 115-135). Mahwah, NJ: Lawrence Erlbaum.

Winke, P. M. (2013). The effects of input enhancement on grammar learning and comprehension. *Studies in Second Language Acquisition*, *35*, 323-352.

Yanguas, I., & Lado, B. (2012). Is thinking aloud reactive when writing in the heritage language? *Foreign Language Annals*, *45*(3), 380-399.

Yoshida, M. (2008). Think-aloud protocols and type of reading task: The issue of reactivity in L2 reading research. In M. Bowles, R. Foote, S. Perpiñán, & R. Bhatt (Eds.), *Selected proceedings of the 2007 Second Language Research Forum* (pp. 109-209). Somerville, MA: Cascadilla.