State-of-the-Art Article

Going covert: Inner and private speech in language learning

María C. M. de Guerrero Inter American University of Puerto Rico, San Juan, Puerto Rico

mcmdeguerrero@gmail.com

Roughly 30 years ago researchers in the second language acquisition (SLA) field started to take a focused interest in the study of inner speech (IS) and private speech (PS) processes in second language (L2) learning and use. The purpose of this review is to assess the status of current research and the progress made during the last ten years on the development and experience of covertly using a language other than the first. The review begins with a critical discussion of the challenges involved in defining and conceptualizing IS and PS. To conduct the search of relevant sources, a broad understanding of IS as 'silent speech for oneself' and PS as 'externalized speech for oneself' was adopted. After a brief synopsis of past research on L2 IS and PS, recent (2005–2015) work is discussed both from a generic-language stance and an L2, bilingual, and multilingual perspective. The review then takes a critical look at the difficult methodological issue of data collection on IS and PS, highlighting strengths and limitations in recent research. Pedagogical implications derived from the research reviewed and suggestions for future studies are discussed.

1. Introduction

Acquiring a new language implies not only learning how to communicate in it with others, it also involves developing the capacity to use this language covertly for private thinking and self-communicative purposes. This article reviews research produced in the 2005–2015 decade on covert use of the L2, specifically in regards to language activity referred to as INNER SPEECH and its related phenomenon, PRIVATE SPEECH. The review focuses on studies produced since Guerrero's (2005) comprehensive monograph on L2 IS, widening the scope to include not only the internal, inaudible manifestations of verbal thinking (IS) in the L2 but also its development and various subvocalized or overtly vocalized materializations (PS).

The study of L2 IS and PS merits renewed attention for a number of reasons. First and foremost, the development of L2 IS represents attaining the capacity to think in a language other than the first (L1). It is thus important to investigate the variables and implications involved in developing a new form of verbal thinking. Specifically, the new interest in the

study of bilingualism and multilingualism as a vantage point for the systematic inquiry on the relationship between language and thought makes IS in the L2 (or any additional language, henceforth LX) an area worthy of greater research (Pavlenko 2011b). Second, as Cook pointed out as early as in 1998, the SLA field is in need of a wider perspective on linguistic competence which includes not just the external, social uses of the L2 but those internal, covert functions that are crucial in the life of an individual. Third, precisely because IS and PS are by nature 'hidden' processes that often go unnoticed by classroom teachers and learners themselves, it seems necessary to identify the learning environments and pedagogical factors that contribute to transform the L2 into a new medium for thinking. Lastly, new developments in introspective methodologies and neurolinguistic tools of research have bolstered the feasibility and desirability of studying covert language processes in SLA. The review begins by defining and conceptualizing IS and PS and continues with a synthesis of past research from an L2 perspective. Recent (2005–2015) work on IS/PS is then presented, first—briefly—from a generic or L1 perspective and second—more in depth—from an L2 point of view. Three areas are finally included: a critical evaluation of methods of data collection in the corpus analyzed, pedagogical implications derived from this corpus, and ideas for further research.

2. Defining and conceptualizing IS/PS

In the course of the last 30 years, the term IS has become a familiar one in the SLA field, frequently cropping up in SLA overviews, textbooks, and research studies. But, what exactly do researchers have in mind when they refer to IS and its related phenomenon—PS? Whereas specific definitions and conceptualizations vary, there seems to be consensus in treating IS as some form of internal, self-directed inaudible speech involved in thinking processes. IS is thus traditionally associated with, or sometimes even equated to, thinking in words, verbal thought, mental self-talk, inner voice, subvocal rehearsal, and covert language behavior. These internal forms of speech are usually distinguished from two external forms of speech: social speech (oral or written speech directed to others) and PS (audibly or subvocally articulated speech directed to oneself, sometimes referred to as egocentric speech). Though distinct from IS, these external forms have important links to IS. In the Vygotskyan sociocultural theory (SCT) approach to psycholinguistic development, in particular, social speech and PS are to the essence of IS because of their involvement in internalization and externalization processes. Through internalization, an ontogenetic process, social speech is turned inwards as, first, external PS and, then, full-fledged IS. In the externalization process, IS becomes materialized in online verbal activity (speaking and writing) as PS and social speech.

   Defining IS constitutes somewhat of a challenge for various reasons. First, although the term IS is used to refer broadly to some form of silent, self-directed speech, there are both subtle and major variations in how IS is conceived. Second, studies vary in how IS is delimited for purposes of investigation, and operational definitions change from one study to another. Delimiting the phenomenon of IS also implies understanding the relationship between IS

and other forms of covert and overt self-directed speech, boundaries being blurred at times because of the dynamic, online, and developmental connection between these forms. Third, the very nature of IS—its covertness, fluidity, and complexity—makes it difficult to pin down and define in a few words, let alone observe experimentally or experientially for purposes of investigation.

Two major theoretical conceptualizations underlie research on IS. One is the SCT view, based on Vygotsky's (1978, 1986) seminal writings; the other one is the cognitive psychology information-processing framework (IPF), in its various models of verbal working memory (VWM) (Baddeley & Lewis 1981; Baddeley 1986). Whereas the SCT view stresses the social origin and 'thinking' function of IS (i.e., IS as intentional, meaningful, verbal thought), the IPF approaches IS as a subvocal mechanism, necessary for keeping fresh and manipulating information in one's mind while performing mental operations. In the IPF, IS is typically conceived as the essential mechanism for the PHONOLOGICAL LOOP, an active and recursive memory process consisting of an articulatory rehearsal component (silently vocalizing words) and an auditory image component (hearing the sounds in one's mind). These two perspectives on IS—its equation with verbal thought and its role in VWM—are not mutually exclusive although they come from distinct theoretical approaches to cognition, and, in fact, most SCT and IPF oriented studies do acknowledge, although give relative weight to, both verbal thought and mental rehearsal as IS descriptors.

Even within SCT, however, there are divergent views of what strictly counts as IS, perhaps resulting from Vygotsky's own elusive, almost nebulous, definition of the phenomenon, characterized by 'oscillation' (Zinchenko 2007: 219) between the notion of IS as 'thought connected with words' and 'thinking in pure meanings' (Vygotsky 1986: 249). Some scholars, such as Lantolf & Thorne (2006: 206), adhere strictly to Vygotsky's representation of IS as 'thinking in pure meanings' and postulate that IS has no linguistic form, only semantic content. In the view of IS as reduced to only meanings, any other type of internal speech encoded in form is considered subvocal PS: 'Once inner speech is encoded in linguistic form, it becomes private speech' (Lantolf & Thorne 2006: 75). Other researchers (Sokolov 1972; Vocate 1994; Guerrero 2005) within SCT, leaning more towards Vygotsky's depiction of IS as 'thought connected with words' and Vygotsky's own acknowledgement of IS as having a predicative syntactic form, allow for IS to adopt, at times and for certain cognitive functions— for example, during self-talk or in preparing what to say—certain formal properties, such as abbreviated syntax (preservation of sentence elements that encode new or focal information) and word forms saturated with senses. This latter view also captures the characteristic instability and fluidity of IS, moving constantly between almost wordless thought and more expanded, elaborate, often discursive, linguistic forms. Current models of IS refer to these two poles of IS structure as 'condensed' and 'expanded' (Alderson-Day & Fernyhough 2015a) or 'abstract' and 'concrete' (Geva et al. 2011).

Inspired by these conceptualizations of IS and its types, definitions abound. Recently, IS has been defined as 'internalized, inaudible verbal thought that may or may not reach conscious awareness and may or may not be accompanied by subliminal vocal activity' (Marvel & Desmond 2012: 43) and as 'subvocal self-talk that takes place in an identifiable linguistic code and is directed primarily at the self' (Pavlenko 2014: 256). In this review, IS and PS are broadly conceived as, respectively, 'silent speech for oneself' and 'externalized

speech for oneself' to allow for inclusion of various manifestations and understandings of the phenomena in the search for relevant sources.

3. Background for the study of L2 IS/PS

This section presents a brief synopsis of the research conducted on L2 IS and PS prior to 2005, the initial year of the timespan for this review. Although interest in IS dates from ancient times (Guerrero 2005), it was not until the late nineteenth century that research on IS began in earnest, particularly among European scholars working in the philosophy and psychology of language (see Levelt 2012 for an account of psycholinguists who dealt with IS before the 1950s). This early research was conducted primarily from a tacit L1 or monolingual viewpoint. A remarkable exception to this predominantly monolingual trend in IS research was Izhac Epstein's 1915 dissertation *La pensée et la polyglossie*, which explored the way multilinguals think, in particular while engaged in IS (*langage intérieur*), mental translation, and mathematical computations.

Amid the 1960s revival of Vygotskyan theory in the former Soviet Union, some researchers began to consider IS, not just from an L1 point of view but also from an L2 stance. Sokolov (1972), for example, utilized a psychophysiological approach to investigate the nature of IS as it occurred during the reading of foreign language (FL) texts. Through laboratory experiments, Ushakova (1994) studied IS mechanisms involving the acquisition of an artificial language. Outside the Soviet Union, as Vygotskyan SCT started to make an impact on L2 research in the 1980s, researchers Lantolf & Frawley (1984; Frawley & Lantolf 1985) were the first to call attention to PS and IS processes in L2/FL learning. Two studies published in the 1990s (Guerrero 1994, 1999), also drawing support from Vygotskyan SCT, produced empirical evidence that L2 learners may experience IS in the L2.

Prior to 2005, insights into L2 IS processes were also provided by studies in the areas of verbal thought among bilinguals. John-Steiner (1985), for example, suggested that highly developed and balanced bilinguals operate based on a unified dual-language system of meaning. The issue of semantic and conceptual reorganization at the level of IS as a consequence of L2 acquisition, bilingualism, or multilingualism would also become a topic of interest in Lantolf (1999), McCafferty & Ahmed (2000), and Pavlenko & Lantolf (2000). Other notable areas of research related to IS among bi- or multilinguals were the issue of self-reconstruction and linguistic identity on the basis of a new language (Pavlenko & Lantolf 2000), the role of IS in autobiographical memory (Larsen et al. 2002), and preferences for a 'language of thought' (Cohen 1998). One last line of research that started to make inroads into L1-L2 IS processes in the late twentieth century was the burgeoning field of neuroimaging psycholinguistic studies. The new technology, such as FUNCTIONAL MAGNETIC RESONANCE IMAGING (fMRI) or POSITRON EMISSION TOMOGRAPHY (PET), was able to offer, for the first time, vivid images of brain areas and patterns of activation involved in IS activity among L2 learners and bilinguals (e.g., Kim et al. 1997; Price, Green & von Studnitz 1999; Chee, Soon & Lee 2003).

Rather than dealing specifically with L2 IS, that is, fully internalized social speech, several researchers in the late twentieth century focused on the PS of L2 learners or bilinguals, both as the externalization of IS and as an early stage in the internalization of the L2. Two early studies explored the self-regulatory function of PS among adult L2 learners (Lantolf & Frawley 1984; Frawley & Lantolf 1985), whereas Diaz, Padilla & Weathersby (1991) focused on self-regulatory PS among bilingual preschoolers. A considerable number of studies continued this line of research showing how L2 learners use PS (oral or written) to mediate their thinking processes and gain control over a task (for instance, McCafferty 1992, 1994; Appel & Lantolf 1994; DiCamilla & Lantolf 1994; Centeno-Cortés & Jiménez-Jiménez 2004). PS was also examined in its internalizing role, that is, as an overt or subvocal mechanism aiding in the internalization of the L2. Early evidence of this type of PS was provided by Saville-Troike (1988) in a study of the L2 language learning strategies of small school children. PS with an internalizing function was also explored in studies with older children in L2 classroom contexts (Broner & Tarone 2001; de Courcy 2003) and adult L2 learners (Ohta 2001; Centeno-Cortés 2003; Lantolf & Yáñez 2003). On the whole, these studies revealed that in their low-voice vocalizations learners covertly, and usually undetected by teachers, engage in processes that seem to have an essential role in the appropriation and internalization of an L2.

A later study by Guerrero (2004), based on data from learner diaries, attempted to gain further insights into the early stages of IS development by focusing on the learners' self-reported covert attempts to internalize the L2. The study yielded several concealed behaviors, such as (in descending order of frequency) inward reproduction of language being heard or read, spontaneous or deliberate recall of language heard or read previously, mental preparation of future language production, imagining conversations in the L2, and silent verbalization of private thoughts. (Further details on IS research before 2005 can be found in Guerrero's 2005 comprehensive overview.)

4. Recent findings on IS/PS (generic or L1 perspective)

4.1 IS

Most of the studies reviewed in this section approach IS from a 'generic or L1 perspective', that is, they usually do not specify the particular language(s) in which IS is carried on, indirectly assuming IS is conducted—as if by default—in one's native language. In empirical studies, this L1 is frequently not specified, nor is the participants' knowledge of other languages taken into consideration. This view thus either implicitly adheres to a monolingual perspective or disregards the participants' bi- or multilingualism as irrelevant to the study of IS. It should be mentioned, however, that some reviews of the literature do recognize variation in language experience (Alderson-Day & Fernyhough 2015a) or bilingualism (Morin 2012) as topics of interest related to IS research.

Research on IS from a generic-L1 perspective has been intensively produced in recent years, including thorough reviews or syntheses of the literature (e.g., Brown 2009; Morin 2012; Perrone-Bertolotti et al. 2014; Alderson-Day & Fernyhough 2015a) as well as empirical

studies. This research has a predominantly 'adult' or 'fully developed' IS focus, insofar as studies using child populations usually fall under the realm of 'PS' or 'developmental IS' research (to be discussed below).

One area of studies centers on features of IS that had been underexplored in previous research, such as functions, contents, and varieties of IS. A study by Morin, Uttl & Hamper (2011), for example, showed that the contents of IS were predominantly self-referential; i.e., IS dealt with thoughts about the respondents' own emotions, physical appearance, relationships, and the like. In addition, the most frequently reported functions were self-regulation (planning, controlling emotions), memory (remembering, rehearsing what to say), and problem-solving. DaSilveira & Gomes (2012) uncovered an interesting relationship between the contents of IS and problem-solving: when IS was evenly distributed to address the problem and to address the self, task performance tended to be successful; however, performance was affected negatively by increased verbalizations about the self or unrelated to the task and by ruminative inner dialog (consisting of redundant or repetitive thinking). Various specific properties of IS—dialogicality, condensed or expanded form, evaluative and motivational functions, and hearing other people's voices in the head—were explored by McCarthy-Jones & Fernyhough (2011), who found the dialogical variety of IS to be much more frequent than the condensed one. Based on college-student population data, the three studies mentioned above, however, provide a very particular profile of IS. Studies to be conducted with more diverse populations may offer differential results.

Another area of interest relates to the VWM model, which views IS as a dual-natured phenomenon consisting of an articulatory (inner voice or inner speaking) and an auditory (inner ear or inner hearing) component, both part of the phonological loop system (Buchsbaum 2013). The key role of articulatory IS in VWM was confirmed in studies showing the detrimental effects of tampering with covert articulation during silent verbal tasks (Durisko 2006; Aguilar & Aguilar 2008). A study by Scott (2013) on the auditory component of IS, in turn, argued that the experience of hearing the sound of one's IS is due to a brain mechanism known as COROLLARY DISCHARGE. The involvement of auditory speech imagery in silent reading or writing is actually an area which has shown conflicting results. Filik & Barber (2011), for example, demonstrated that auditory imagery during silent reading is influenced by the reader's familiarity with features of the author's voice or, if this is unknown, by the reader's own regional accent. Perrone-Bertolotti et al.'s (2014) review, however, shows that IS during reading or writing may not always involve auditory imagery and may in fact adopt non-phonological modalities, such as inner signing, graphic imagery, and abstract linguistic representations.

In the 2005–2015 timespan, research on IS has also been actively pursued regarding special populations, that is, individuals with some type of psychological, social, or linguistic condition or disorder. Several studies have dealt with IS in the form of pathological voice hallucinations (Allen, Aleman & McGuire 2007; Simons et al. 2010). Research has focused on dysfunctional self-talk among individuals affected by test anxiety, anorexia, depression, or insomnia (Morin 2012). Investigations have also targeted populations affected by communicative problems or impairments, such as autism, deafness, and aphasia (Perrone-Bertolotti et al. 2014; Alderson-Day & Fernyhough 2015a). Because of space limitations, only one study will be mentioned to exemplify the important implications about the nature of IS that can be derived from

these specialized areas of IS research, namely, the study by Williams, Bowler & Jarrold (2012), which showed deficits in dialogic—but not monologic—IS among autistic individuals, deficits also associated to the severity of their communication impairments. The study points to the importance of early-age interpersonal interactions in the development of intrapersonal dialogic communication.

Finally, intensive work has been produced in recent years on the cerebral correlates of IS, with an abundance of studies relying on neuroimaging technology. Overall, results from studies on healthy adult individuals reveal cerebral IS activity to be extremely complex and dynamic, involving multiple neural regions and networks of activation depending on the particular language task being carried out and the processes involved (Price 2012; Alderson-Day & Fernyhough 2015a). Areas that have consistently shown to be the site of IS activity during silent verbal rehearsal or repetition are the left inferior frontal gyrus and the left supramarginal gyrus (Geva et al. 2011; Morin 2012). Studies reviewed by Perrone-Bertolotti et al. (2014) also show that, although IS and external speech share certain brain regions typically associated with language processing (such as Broca's and Wernicke's areas), other distinct areas and networks of activation have been detected for covert and overt speech. Researchers concur that IS cannot be simply described as overt speech minus the articulatory motor component; however, 'the level at which the speech production process is interrupted (abstract linguistic representation vs. articulatory representation) is still debated' (Perrone-Bertolotti et al. 2014: 227; see also Geva et al. 2011).

4.2 PS

In the period 2005–2015, research on the covert uses of language from a generic-L1 perspective has included looking into the PS phenomenon, predominantly as part of children's IS development and to a lesser extent as manifested among adults. Recent research on child PS has been able to confirm its use for a variety of functions or purposes, such as problem-solving (Damianova, Lucas & Sullivan 2012; Alarcón-Rubio, Sánchez-Medina & Prieto-García 2014; McGonigle-Chalmers, Slater & Smith 2014), planning and numeracy tasks (Lidstone, Meins & Fernyhough 2010, 2011), referential communication (San Martín, Boada & Feigenbaum 2011), free play (Davis, Meins & Fernyhough 2013), and regulating emotions (Day & Smith 2013). Lately, interest has also gathered on social aspects of PS, such as its role in social interactive discourse (San Martín et al. 2011) or the stimulating effect of potential listeners or interactants (Damianova et al. 2012; McGonigle-Chalmers et al. 2014).

Most of the current studies on PS among children provide support for Vygotsky's (1986) general hypothesis that vocalized PS emerges in early childhood, peaks right before school age, and fades off in the school years as children learn to regulate their mental processes through silent IS (Lidstone et al. 2011; San Martín et al. 2011; Damianova et al. 2012; Alarcón-Rubio et al. 2014). Lidstone et al. 2011 investigated the occurrence of PS in middle childhood (7–10 years old), an age when children are typically transitioning from fully externalized PS to inaudible IS. To measure levels of internalization, the researchers utilized the following scale, Level 5 representing the child's developing ability to mediate cognition through covert, rather than overt, speech.

Level 1: Fully overt speech
Level 2: Intelligible muttering
Level 3: Intelligible whispering OR unintelligible muttering
Level 4: Audible but unintelligible whispering
Level 5: Inaudible and barely audible verbal lip and tongue movements (Lidstone et al. 2011: 209)

The pattern of development suggested by this scale, sometimes described as an inverted U-shaped pattern of internalization, is moderated by findings showing that audible PS does not totally disappear with age but persists among older children, adolescents, and adults as a useful non-primary form of verbal self-mediation. According to Duncan & Tarulli, however, the persistence of PS after childhood does not alter the notion of childhood as a period of internalization, 'in the sense that it may be a time when children FORM THE CAPACITY FOR covert verbal thinking' (2009: 176).

4.3 Implications of generic-L1 inner/private speech research for covert use of the L2

Late research on IS/PS conducted from a generic-L1 perspective cannot but confirm the essential role that language—any language—has as an instrument of thought. This research also suggests the covert use of language fulfills a wide range of functions, mostly self-regulatory and self-referential. If IS and PS respond to the basic intellectual needs of an individual, a similar role might then be expected from L2 IS/PS. But, how specific will use of an L2 be for particular intramental functions? Are there social and affective roles for L2 PS, as in L1 PS? Whereas command in the L1 among monolinguals represents the availability of a very efficient psychological tool, to what extent can full or partial knowledge of another language or multiple languages facilitate or obstruct the intramental life of an individual? Research on generic-L1 IS suggests that the dialogic form of IS is prevalent (at least among certain populations) and that too much ruminative IS can negatively affect problem-solving. Are these findings replicated in L2 IS? Strong evidence for the role of PS as a genetic precursor for IS, its persistence in adulthood, and the definite evolution towards full covertness of speech-for-the-self suggest similar patterns will occur in L2/LX learning. It is also clear from generic-L1 IS research that covert linguistic activity involves multiple areas and complex patterns of brain activation as well as articulatory and auditory representations, the extent and manner of which are still partially understood. Going into these issues from an L2 IS perspective may yield interesting similarities and differences. Recent studies on L2 IS/PS discussed in the next section will address many of these concerns, yet the full potential of generic-L1 research in terms of its implications for L2 IS/PS remains to be explored.

5. Recent work on L2 IS/PS

The period 2005–2015 has seen a steady interest in the IS and PS processes of L2/FL, bilingual, or multilingual learners/users as the importance of covert uses of two or more

languages for self-regulation and self-communication is being recognized. Several theoretical discussions and overviews of L2 IS and PS published in this period, such as Lantolf & Thorne (2006), Ortega (2009), Pavlenko (2011a, 2011b, 2014), and Guerrero (2012a, 2012b, 2013), have helped keep track of the empirical work being produced as well as consolidated the view of L2 IS and PS as significant areas of study within the SLA field. For reasons of space, this review will concentrate on empirical (data-based) studies, first—reflecting its generally agreed developmental precedence—on L2 PS, i.e., the external self-directed use of the L2, and second on IS, i.e., the inner use of an L2 for thinking.

5.1 Empirical research on L2 private speech

In the past decade, a significant amount of empirical research has focused on the overt manifestations of self-directed speech among L2 learners and users. This line of research is of interest for two main reasons: (1) it offers evidence of the functions and the extent to which an L2 is used intramentally, and (2) it provides insights into the process of L2 internalization and development of L2 IS.

As in past research, new studies have called attention to L2 PS for self-regulation among L2 learners or users while performing challenging cognitive tasks. For example, in a study conducted with a group of 30 Spanish-English bilinguals (Spanish-dominant, English-dominant, and balanced), Jiménez-Jiménez (2015) found massive use of PS in both languages for self-regulation as the participants worked independently in solving question-like problems in Spanish. Participants who were more dominant in one of the languages, however, tended to use this language more frequently for spontaneous verbalized reasoning. The balanced bilinguals made use of L1 and L2 in their PS, with no clear pattern of preference for either language.

Whereas the above study provides evidence of PS for purposes of self-regulation in solitary conditions, several studies have revealed the occurrence and functions of self-directed talk in social and collaborative L2 scenarios (Smith 2007; Yoshida 2009; Sönmez 2011; Steinbach-Kohler & Thorne 2011; Hauser 2015). PS of this type, in addition to being a self-regulatory mechanism, appears to have an important social dimension and other-regulating functions. For example, in a study involving school children interactively playing board games especially designed to learn English (the L2), Smith (2007) found that although PS was primarily produced for intramental purposes, it was also attended to by peers as if it were social in nature. Indeed, Smith showed that the naturally occurring PS not only helped the children self-regulate their thinking in and about the L2, it also had intermental functions, such as calling peers' attention to and encouraging verbalization on certain aspects of the joint activity. In Yoshida's (2009) study, the Japanese learners' PS served important social and affective functions in that it helped learners maintain involvement in classroom interaction and express affection through covert participation. In Steinbach-Kohler & Thorne, it was also shown that the self-directed talk of three L1 Swiss German adolescents working collectively on an L2 French pedagogical task worked as a 'publicly available resource' (2011: 71), useful for the maintenance of intersubjectivity and joint problem-solving. Lastly, two other studies point out the social functions—in addition to the intramental ones—of L2 PS produced

in interactive contexts: (a) a group of non-native speakers of English (Turkish L1) socially interacting over a word game with a group of native English speakers (Sönmez 2011) and (b) a non-native speaker of English (Japanese L1) practicing English in conversation with a native English speaker (Hauser 2015).

Recent studies have shown that externalized PS functions not just as a self-regulatory mechanism aiding problem-solving but as a tool in learning and internalizing the L2. This research confirms the occurrence of previously documented PS behaviors such as repetitive and transformative imitation, rehearsal for memorization or before public speaking, vicarious response, language play and manipulation, translation into the L1, and displays of metalinguistic awareness (Guerrero 2012b, 2013). These forms of PS appear to have an internalizing role, providing learners the opportunity to experiment with and appropriate elements of the L2, obtain meaning from L2 affordances, reinforce existing knowledge, and creatively extend the L2 to possible or imaginary scenarios. In Vygotskyan SCT, overt PS, that is, speech that in form and function has lost its social-communicative nature but is still observable, as it occurs among L2 learners, is a reflection of the L2 internalization process, representing an early stage in the development of L2 IS (Guerrero 2005).

A recent study (Yi 2010) exemplifies the internalizing role of overt L2 PS and developmental progression towards IS. In Yi's study, three Korean preschoolers were observed as they learned English in a US classroom over the course of one year. The children's language learning process started with active observation of L2 use, progressed to overt self-directed vocalizations of the L2, and gradually developed into social speech as exposure to and interactions in English continued. PS verbalizations were used mainly to learn new words and self-direct during solitary play. As verbal communication increased, PS became non-observable, turning inwards as silent IS: 'The ELLs [English language learners] no longer used private speech when they internalized the learning and it became inner speech' (2010: 167).

PS for language learning has also been documented among preschoolers in English as a foreign language (EFL) classrooms. In Wang & Hyun (2009), for example, children in Taiwan, fluent in Mandarin Chinese, used PS to memorize English words, practice pronunciation, formulate sentences, rehearse for future production, and perform several language learning tasks. Sometimes, translation into the L1 was used to facilitate comprehension. In the following example, a child is shown using several PS strategies to facilitate learning of the English word *foot*, from meaning-making drawing and code-switching to repetition for memorization.

> Child: (Drawing a foot) 脚是 **foot.** 脚是 **foot . . . .** (*Jieu means foot. Jieu means foot*). (2009: 15)[1]

This type of PS is not restricted to small children. There is recent robust evidence that older children and adolescents (Smith 2007; Fallahchai 2011; Steinbach-Kohler & Thorne 2011) as well as adults (Borer 2007; Yoshida 2009; Sönmez 2011; Abadikhah & Khorshidi 2013; Stafford 2013) use self-directed talk to learn and internalize a language in classroom and social environments. Some studies have demonstrated the beneficial effects of using PS in the form of rehearsal to learn FL vocabulary (Borer 2007; Fallahchai 2011). Borer

---

[1] Transcription markings in the original texts have been slightly adapted for uniformity within this paper, as follows: *italics* = translation; **bold** = private speech; [= overlapped discourse.

found that repetition was the most frequent form of self-vocalization to retain new words; however, it was elaborative rehearsal involving deep processing, not simple repetition, that enhanced vocabulary retention. Deep processing through manipulation and generation signaled 'movement toward internalization' (2007: 278).

In Yoshida's (2009) study, spontaneous repetition was also the most common type of PS among six (English and/or Chinese L1) college learners of Japanese. Other functions of PS in Yoshida's study, in addition to repetition, were vicarious response to the teacher's questions; manipulating sounds, forms, or structures; reading aloud; commenting on new words or forms; and practicing task answers. The following excerpt from Yoshida reveals an instance in which subvocal repetition of a teacher's model turns into transformative imitation; that is, the learner softly repeats the input word *chokoreito* extending it to an utterance of her own creation.

Teacher: (writes the sentence on the board) Chokoreito [dake o kaimashita. (*I bought only chocolate*)
Learner: [**Chokoreito, chokoreito keeki, tabetai n desu yo, chokoreito keeki o tabetai n desu yo** (*Chocolate, chocolate cake, I would like to eat, I would like to eat chocolate cake*) (2009: 161)

Further evidence on the nature of L2 PS for internalizing purposes comes from Lee (2006, 2008), who focused on the PS produced by seven bilingual (Korean-L1, advanced English proficiency) students enrolled at a US university as they were preparing alone for a biology exam. Although their goal was to study for the exam, the activity also turned into a language learning task, with PS as an important mediational tool. Their PS had several main functions: establishing meanings; mental rehearsal for memorization; monitoring, planning, and self-motivation; and expressing emotions. A notable finding in Lee's research was that the PS of the participants was produced not only orally but also in the form of written notes and drawings as well as communicative and self-regulatory gestures (see also Yoshida 2009, for PS as note-taking, and Steinbach-Kohler & Thorne 2011, for private gesturing).

5.1.1 Use of L1 in L2 private speech

An interesting angle that has emerged in recent L2 PS research is the involvement of the L1. Researchers seem concerned with two questions related to L1 use: (a) to what extent does the PS of L2 learners or bilinguals rely on the L1, and (b) what role does the L1 play? On the first question, there seems to be much individual and group variation, fluctuating from total L1 absence (Clark 2005; Smith 2007) to rare or little use (Yoshida 2009; Yi 2010; Sönmez 2011) and moderate or substantial use (Wang & Hyun 2009; Steinbach-Kohler & Thorne 2011; Abadikhah & Khorshidi 2013; Stafford 2013; Jiménez-Jiménez 2015). This variation was patently observed in Lee's (2006) study of solitary exam preparation, where, out of seven highly proficient English learners, three used the L1 Korean frequently, two occasionally, and two never.

So what would be the variables accounting for the relative presence or absence of recorded L1 in externalized PS? Proficiency is an important factor. In Abadikhah & Khorshidi

(2013), both the advanced and beginning proficiency EFL learners used the L1 (Persian) when performing the L2 tasks; however, the advanced learners externalized their thinking predominantly in English and the beginning group predominantly in Persian. These findings suggest that higher proficiency in an L2 increases the probability that a learner may use it in PS (and rely less on the L1) when engaged in L2 tasks. In Jiménez-Jiménez (2015), however, proficiency in the L2 did not make a difference in the amount of L1 PS produced. Because all the bilingual participants were highly proficient in both languages, it was language dominance (degree of daily use or confidence in using a language), rather than proficiency, that appeared to determine private L1 use. Other factors that may determine the presence and extent of L1 use are the type and language of the task, context of data recording, presence or absence of interlocutors, and language background and learning trajectory of the participants. Smith, for example, attributes the complete absence of L1 in her PS data primarily to the design of the task, though other factors may have been involved: 'The activity itself (an interactive task designed to promote English language learning), the context of the UK classroom, as well as the mix of languages within groups, affected the learners' choice of language' (2007: 351). Clark (2005), in turn, ascribes the lack of L1 use in the PS of diverse home-language kindergarteners in *Aotearoa* New Zealand to the children's remarkable ability to tune into their cultural surroundings and switch their thought processes to English, the language of the school context.

When L1 is used in PS, what is its role then? Studies suggest learners resort to the L1 chiefly because it facilitates meaning-making processes, aiding comprehension, retention, concept formation, and production of the L2 (Lee 2006; Borer 2007; Lee 2008; Wang & Hyun 2009; Storch & Aldossari 2010). Learners do this by thinking about L1 equivalents; making connections between L1 and L2 concepts, sounds, and structures; paraphrasing and translating to and from the L1; and code-switching. Another important function of the L1 is in providing a self-regulatory mechanism to ease the solution of demanding verbal or cognitive tasks in the L2. In this function, L1 PS takes the form of metalinguistic or metatask comments, affect expressions, and verbalizations to guide actions (Scott & de la Fuente 2008; Stafford 2013; Jiménez-Jiménez 2015). In Scott & de la Fuente (2008), English-speaking learners of French and Spanish who were instructed to use only the L2 to conduct an L2 grammar task, nevertheless, talked to themselves in the L1 to translate the text, recall grammar rules, review the task, and plan what to say in the L2. The L1 appears then as a powerful and convenient resource to be used naturally and strategically in private for cognitive operations demanding use of the L2. For bilinguals, however, as Jiménez-Jiménez points out, both languages may act as complementary cognitive resources, and specifically in the case of early bilinguals a balanced exposure to two languages may result in 'both languages forming part of their verbal thinking processes' (2015: 277).

5.1.2 Summary of empirical research on L2 private speech

A review of empirical studies (published 2005 to 2015) corroborates the occurrence of intramental L2 use in the form of externalized PS. Vocalized, self-directed speech in the L2 has been confirmed among L2 learners/users of all ages (children, adolescents, and

adults) and diverse language backgrounds in a variety of circumstances: deliberately elicited or naturally produced, in solitary or collective discourse, inside and outside a classroom, and in various modalities—orally, gesturally, or in writing. The research indicates that PS among L2 learners or speakers, as in monolinguals, is widespread, has a variety of functions, and exhibits reliance on the L1 to varying degrees. While both L2 proficiency and language dominance appear to determine extent of L1 use in L2 PS, it is evident the L1 constitutes an effective complementary cognitive resource for learners engaged in L2 tasks.

As pointed out in the past, one of the main functions of L2 PS, whether occurring in solitary or collective conditions, is the externalization of intramental activity to achieve self-regulation and aid problem-solving. A number of recent studies, however, suggest that L2 PS, when embedded in interactive discourse, has an additional social function as a useful cognitive resource for joint problem-solving and maintaining intersubjectivity. Research has also confirmed the other key role of L2 PS, i.e., as an L2 learning mechanism, spontaneously or deliberately deployed by learners in school settings in a variety of forms: low-voice or subvocal repetition and rehearsal, transformative imitation, vicarious response, manipulation of form, and language play. It is believed these PS behaviors have an internalizing role, helping learners in their appropriation of the L2 and in the formation of an internal psychological plane mediated by the L2. Whereas most of the studies reviewed provide evidence of the internalizing role of L2 PS in its external, audible manifestations, a few have shown movement towards greater covertness in the development of L2 IS in learners' display of subvocal or silent mental activity.

5.2 Empirical research on L2 IS

Several recent data-based studies on the covert uses of an L2 to mediate verbal thinking, self-regulation, and self-communication will be reviewed in this section. Most of these studies are concerned with the question 'What language do L2 speakers, bilinguals, or multilinguals use for thinking?' This body of research throws light on whether and to what extent an LX is used in IS as well as the variables that affect its use and development.

Important information on the language of choice for IS among multilinguals has been offered by Dewaele (2015) in a series of studies based on data gathered through the Bilingualism and Emotions Questionnaire (BEQ) (Dewaele-Pavlenko 2001–2003). This web-administered questionnaire, which focused on multilinguals' expression of emotions, included two questions on the silent use of language: 'Which language(s) do you use for mental calculations/arithmetic?' and 'If you form sentences silently (inner speech), what language do you typically use?' Results of the BEQ based on responses from 1,579 multilinguals representing 77 different L1s and up to four additional languages (L2, L3, L4, and L5) showed an overall preference for using the L1 for IS (Dewaele 2015). More than a third (37.9%) of the overall BEQ respondents, however, indicated using their L2 'frequently' or 'all the time' for mental calculations and more than half (56.6%) using the L2 'frequently' or 'all the time' for IS (Dewaele 2009). L3s, L4s, and L5s were used decreasingly less for these cognitive functions.

Dewaele's (2015) research also showed that early acquirers, i.e., people who had started learning their L2 and L3 at ages 3 to 7, had higher rates of use of IS in these languages than late acquirers. Age of onset of acquisition was thus found to be a predictor of L2 and L3 use as language for IS and mental calculations. The strongest predictor of choice of language for IS, however, was frequency of use in everyday interactions. Other variables that appeared to predict whether an L2 or L3 would become the medium for IS were proficiency and socialization in the language, size of network of interactants, context of acquisition, and number of learned languages. Context of acquisition was indeed a significant predictor for the language of mental calculations, suggesting that the type of setting—whether naturalistic, instructed, or mixture of both—in which performing mental calculations is learned will have an impact on the language chosen to perform those operations in adult life. An interesting result regarding the gender variable (one that is seldom tested in IS studies) was that females reported using the L2 significantly more often than males for IS. Finally, another remarkable result was the multilinguals' choice of the L1 as the preferred language of 'emotional inner speech' (internal use of language to express deepest feelings). Moreover, Dewaele found that IS use in general was greater than emotional IS in any LX, suggesting 'that it takes a while before an LX becomes internalized to the point of becoming a multilingual's "language of the heart"' (Dewaele 2015: 15).

Some studies have replicated, at least partially, Dewaele's research on the question of multilinguals' preference of language for IS. Hammer (cited in Dewaele 2015) found that higher levels of acculturation and greater size of the L2 speaking social network were correlated with higher use of the L2 for IS among Polish L1-English L2 bilinguals residing in the UK. Ewert (2010) also explored language preferences for internal and external uses. The sample consisted of 17 Polish L1 multilinguals enrolled in a combined Russian/English degree program at a Polish university. All participants used these three languages frequently for a variety of academic and social purposes. Responses to a self-report questionnaire indicated that Polish, the L1, was the preferred language for internal functions, such as performing mental calculations, making private notes, praying, dreaming, swearing, and formulating IS sentences. The two other languages were used sometimes or rarely for these functions, except for English, which was used frequently or sometimes for IS sentences and swearing. An explanation for this phenomenon might be that swear words sound much stronger in the L1 than in the L2; perhaps participants were trying to lessen the emotional charge of these words by rendering them in the L2. Also, interestingly, private prayer was for most participants conducted exclusively in the L1. Overall, the findings reflect that preference for a particular language for internal purposes is consistent with how dominant this language is in the life of the individual. Ewert's study additionally revealed (through questions not derived from the BEQ) that mental code-switching was done sometimes or frequently for talking to oneself and taking private notes but not so much for arithmetic tasks and that mental translation, i.e., formulating thoughts in one language and expressing them in another when writing or speaking, was done rarely.

Using an instrument of his own, Schrauf (2009) continued the investigation of L2 IS among bilingual immigrants (Larsen et al. 2002) by focusing particularly on a cohort (N = 60) of Spanish L1 Puerto Rican elders who had migrated to the US in their twenties. In this study, the participants self-rated their frequency of use of English and Spanish in social

and psychological domains, this latter domain including cognitive and affective functions of internal self-directed speech. Results showed that the immigrants with higher levels of L2 proficiency made greater use of the L2 not only in the social but also in the internal domain, for both cognitive (thinking, talking to themselves, and counting) and affective (expressing feelings, swearing, and dreaming) functions. However, no predominant shift to the L2 was found in any social or psychological domain, even among the most fluent L2 users. The study suggests that it is possible for long-time immigrants living in ethnically and linguistically concentrated communities to keep adherence to the L1 despite development of high proficiency in the L2.

An insightful and original perspective on the issue of language shift in the IS of multilinguals comes from Pavlenko's (2011a, 2014) analyses of autobiographical narratives (journals, memoirs) of individuals, many of them well-known writers and scholars, who acquired LXs as part of their migration to linguistic communities different from their native ones. Testimonies from such individuals as Mary Antin, Veronica Zhengdao Ye, Gerda Lerner, Eva Hoffman, Ariel Dorfman, Kyoko Mori, Tzvetan Todorov, and others show that being able to think in a new language involves developing new concepts and perspectives and frequently a new sense of self. Based on these testimonies, Pavlenko has identified several turning points in an individual's journey into a new mode of verbal thinking:

1. Upon arriving into a new linguistic community, the migrant continues to use the L1 as a medium of thought.
2. After some time, there is a loss of IS, as the L1 begins to fade as a functional medium of thought and the L2 has not been sufficiently developed yet. This is usually a very difficult and frustrating time as the person is 'caught between languages' and unable 'to render one's thoughts in either' (Pavlenko 2011a: 17).
3. With time and intensive involvement in the new community, the L2 is internalized, becoming the dominant vehicle for thinking, a process that shapes the individual's IS into a new way of perceiving the world and self-communicating.
4. Frequently, loss of the L1 as a meaningful mechanism for the expression of thoughts and emotions entails the inability to translate one's thoughts from one language to another.
5. Finally comes the feeling of being a different self in the new language and, for some, a sense of accomplishment in finding a new internal voice: 'It took several years before I began to think in English. It was exciting when it actually happened and it made a qualitative difference in the way I lived,' wrote Gerda Lerner, a German-English translingual (cited in Pavlenko 2014: 271).

A few empirical studies provide additional insights on language learners' preferences of language for IS. Choi & Lantolf's (2008), for example, examined the 'thinking for speaking' (Slobin 2003) patterns of four advanced Korean and English L2 learners to observe shifts from L1 to L2 in the use of hand gestures while speaking in the L2. Because gesturing when speaking reflects common underlying mental processes and semiotic systems, gestures may also offer clues about choices of language for IS. In Choi & Lantolf's study, some evidence of a shift from L1 to L2 was found in gestures indicating the 'path' of a motion event, thus corroborating earlier results by Negueruela et al. (2004) and Stam (2006); however, very little evidence of such a shift was obtained for gestures involving

'manner' of motion, a shift which possibly also involves a change in conceptual meanings. Previous results for manner of motion had been conflicting: Negueruela et al.'s and Stam's studies showing no switch, Özyürek (2002) providing positive evidence of a shift among very advanced Turkish L1-English L2 speakers. In a recent study by Gullberg (2011), however, advanced speakers of Dutch and French were able to use gestures that were linguistically appropriate to each language to indicate object placement, suggesting that a linguistic shift in thinking for speaking had taken place. It is clear that much further research is needed on gesture-speech processes that might throw light on the nature of bi- and multilinguals' language of IS, particularly as it involves the adoption of new (L2) conceptual meanings.

Another study which looked into language preference for IS was Gabryś-Barker (2006, 2015). The researcher observed how 48 trilinguals (Portuguese L1, English L2, German L3) activated the different languages in two translation tasks (from L1 to L3 and from L2 to L3). By thinking aloud (i.e., verbalizing IS through PS) while performing the tasks, the participants gave hints as to what languages were activated at the levels of conceptualization, formulation, or articulation. It was found that language processing of the tasks was greatly influenced by the language of 'input' (i.e., text to be translated). In general, both the input (L1 or L2, depending on the task) and 'output' (L3) languages were predominantly selected at all levels of activation. Specifically, however, different processing sequences called for different languages to be selected; for example, during the task itself, L2 and L3 were more frequent than L1; when a problem occurred, L1 and L3 were activated; all languages were activated at the level of articulation and evaluation. According to Gabryś-Barker, these complex results may be accounted for by individual factors, such as the participants' learning history, level of competence in L2 and L3, and approach to the task. This study shows that the IS produced by multilinguals in performing non-immediate tasks, such as translation, involves very complex patterns of language activation, subject to great individual variation and difficult to generalize.

In another study, Gabryś-Barker asked 26 multilinguals (same languages as above) to write self-reflective narratives on their preference for a language of thought. Quantitative analysis of the data indicated overall preference for the L1, frequent L2 activation among highly proficient L2 users, and little or no use of the less dominant L3 by the participants. Qualitative analysis revealed particular language choice or activation was determined by various reasons. Linguistic reasons were 'high level of language proficiency, perceived language economy, code-switching, and communication with NS [native speakers] and speakers of other languages' whereas non-linguistic reasons were 'exposure and immersion (media, music, film, studies and work), and the affective dimension (attitude to a language, confidence in one's ability, emotional states)' (Gabryś-Barker 2014: 193). The following sample from Gabryś-Barker's data demonstrates the complex variables at work for a multilingual's choice (or rejection) of a language for thought, from effect of exposure to an L2 to feelings of dislike for an L3:

> I happen to think in other languages i.e., English whenever I am exposed to it, e.g. when meeting foreigners or native speakers of English, while watching films or TV series without subtitles and when reading books in original. (...). As I am a day-dreamer, I often daydream in English. Sometimes in Spanish, too. It

depends where the story is set. I never think or dream in German, though. I just don't like the sound of it. (2014: 195)

Also related to the issue of language selection for IS among L2 users, two recent studies investigated the types of language used for thinking and their effect on the production of collocations by EFL learners, L1 Mandarin Chinese (Wang & Shih 2011) and Persian (Nejadansari & Alijanian 2012). In both studies learners were asked about the language they used for thinking as they performed an oral production task. In both studies most of the learners reported using a combination of the L2 and the L1, with significantly fewer learners using mostly L2 or mostly L1. (In Wang & Shih, although some participants were knowledgeable of other languages, none reported using any of these for thinking.) Results of these studies also demonstrated that inner use of the L2 combined with the L1 was more beneficial to the EFL learners, as it led to significantly greater accuracy in the production of collocations than use of the L2 or L1 alone. In both studies, it was speculated that, if the learners had relied mostly on their L1, this would have led to direct translation and greater L1 interference.

Two empirical studies have dealt with other aspects of L2 IS. One is Shigematsu's (2010) dissertation research on the concept of inner voice and its development among L2 learners. Shigematsu defined inner voice as the conscious 'use of the L2 for thinking as a way of helping one mediate the ways of the L2 and culture' (2010: 2). Self-reports from five L2 learners of English and Japanese revealed that an L2 inner voice tends to develop with increased proficiency and exposure to naturalistic L2 settings. The other study (Kato 2009) highlights the role of IS in reading L2 texts. Data from 64 L1 Japanese English as a second language (ESL) participants showed that, when the ability to use IS (covert articulation) was suppressed, reading comprehension was affected negatively. The effect was greater among learners with lower reading proficiency levels, suggesting that less proficient readers rely more on covert phonological activation and articulation during reading than more advanced readers who have developed the ability to derive meaning directly from visual orthographic symbols (bypassing the phonological route). Kato's research suggests that helping learners develop less dependence on covert expanded articulation and greater reliance on direct orthographic processing may contribute to increased L2 reading proficiency.

Additional light into L2 covert speech processes comes from the intensive neuroimaging research carried out in the last decade. Although most brain-imaging studies involving non-native speakers (NNSs), L2/FL learners, bi- and multilinguals do not use the term 'IS', they do have much to say about the impact of learning additional languages on brain areas of activation and covert speech processes (e.g., Kovelman, Baker & Petitto 2008; Grogan et al. 2012; Klein et al. 2014; Stein et al. 2014; Wattendorf et al. 2014). Because this area of literature is too vast to review here in depth, the two studies that are mentioned next offer glimpses of the implications that can be derived—and remain to be made—on the nature of L2 IS from neuroimaging research. In a study of lexical efficiency and brain structure correlates, for example, Grogan et al. (2012) found that native speakers of two or more languages (multilinguals) had higher gray matter density than NNSs of only one language (bilinguals), differences that may be attributed to increased covert use of lexical

processing regions among multilinguals. Another study (Kovelman et al. 2008), showed that, although both bilingual and monolingual participants displayed activity in classic language areas (such as the left inferior frontal cortex) during a silent syntactic processing task, the bilingual group had a higher activation level while processing the L2. The study suggests the possibility of a different NEURAL SIGNATURE (pattern of neural activity) among bilinguals. Much information pertinent to L2 IS can result from neuroimaging research, yet the landscape that is arising is extremely complex and numerous variables—number and type of languages known, age and context of acquisition, proficiency level, nature of task involved, to name a few—will have to be taken into account to fully understand the impact of learning and using an L2 on brain structure and activity.

5.2.1 Summary of empirical research on L2 IS

Several conclusions can be derived from recent research L2 IS, that is, covert L2 use at its most internalized stage of developmental progression. A key finding is that, although the L1 is generally the preferred language of thought for IS among proficient L2 users, bilinguals, and multilinguals, many individuals do use an L2 in their IS. LXs are also used for IS but less than an L1 or L2. The studies show that dependence on the L1 for IS, though powerful, however, is not immutable, as demonstrated in cases of long-time residents in an LX community who have lost their L1 as the language of their IS for all effective purposes. Not only across time are there linguistic shifts in IS, at any point in time covert code-switching may also occur.

Certain variables explain the relative use of different languages for IS. The strongest predictors of language of choice for IS are generally related to the immediate context of use, be it the social environment or the particular mental task the individual is performing. In the words of Pavlenko, 'context-specific activation … affects language selection for inner speech' (as cited in Grosjean 2010: 128). Other variables that stand out are frequency of language use in daily interactions, degree of acculturation to the linguistic community of the LX, proficiency, age of onset of acquisition, and context of acquisition. Having learned the language in a naturalistic or mixed (instructed-naturalistic) context of acquisition will make it more likely for that language to be used in IS, particularly in the case of mental calculations. The functions for which IS is used—whether social, cognitive, or affective—also contribute to determine language choice.

Studies indicate that thinking in another language entails not merely developing high proficiency in that language but most fundamentally conceptual restructuring, a re-interpretation of reality through new linguistic concepts and perspectives. Linguistically associated gestures sometimes indicate a measure of the conceptual changes taking place as a result of shifts in the language of thinking. Changes in cerebral structure and patterns of activation of language for thinking among non-native speakers, bi-, and multilinguals in particular language tasks also suggest that great individual variation exists and that the L1 may not remain forever or in all circumstances as the sole medium of thought. In short, results of empirical studies on L2 IS are consonant with Grosjean's (2010) 'complementarity principle,' that is, the notion that multilinguals use different languages, externally and internally, for different purposes in different contexts.

6. Collecting data on PS/IS

Conducting research on covert language processes has always been a methodological challenge. How, then, have new studies tackled the methodological hurdles of investigating phenomena that are imperceptible to outsider observation, in the case of IS, or difficult to detect and record, in the case of PS? This section focuses on methods of data collection in late PS/IS research, highlighting features that might be of help for further studies.

6.1 Collecting private speech data

Externalized PS has the advantage that it can be visibly and audibly observed and recorded although it is not always easy to capture intelligibly or distinguish from social-communicative speech. Most of the studies based on PS data reviewed here use a combination of audio and video recording and sometimes, additionally, observation notes, especially when it is impractical to utilize cameras or microphones, or simply to complement and corroborate video and audio recordings (e.g., Yi 2010). Still, a caveat in most PS studies is that there is the possibility for additional L2 PS to have occurred but not been observed or recorded.

Quality of recording and subsequent transcribing as well as description of context is crucial in establishing reliability of PS data for analysis. In particular, identifying and categorizing self-directed speech are extremely dependent on reliable data collection. Most of the observation and category systems utilized in the studies reviewed entail differentiating among a nuanced variety of self-addressed vocalizations. Usually, PS categories range in degrees of covertness between audible and visible to inaudible or in a very low voice. Establishing degrees of covertness through reliable categories is especially crucial when stages of internalization are considered (e.g., Lidstone et al. 2011). As recent studies also show (Smith 2007; San Martín et al. 2011; Steinbach-Kohler & Thorne 2011), reliable recordings and context description are essential in determining the social aspects and impact of PS verbalizations embedded in interactive discourse or in the presence of others. Identification and categorization of PS are frequently corroborated by the stimulus response (SR) technique, whereby participants view/hear recordings of their own previous verbalizations and make retrospective comments on these. SR interviews, as in Lee (2006), Borer (2007), Scott & de la Fuente (2008), and Yoshida (2009), contribute to better data interpretation. In Yoshida, for example, the learners' comments produced in the SR sessions helped the researcher more accurately identify whether an utterance was an instance of PS or addressed to someone else (2009: 140).

6.2 Collecting IS data

Because of its inherently covert nature, silent IS, unlike audible and/or visible PS, has traditionally relied on indirect methods of data collection. Vygotsky's GENETIC METHOD, i.e.,

the study of IS through its overt developmental precursor, PS, is an indirect approach that continues to be used in studies anchored in the internalization hypothesis. It is essential in these studies to be able to document not only the gradual evolution in time towards covertness through levels (as mentioned above) but also to identify IS activity through reliable 'observable' indicators. In some longitudinal and cross-sectional studies in L1 (e.g., San Martín et al. 2011; Alarcón-Rubio et al. 2014) and L2 (Yi 2010), IS is presumed to take place when silence takes over and no audible and visible signs are produced during cognitive activity. In addition, San Martín et al. have listed some 'rigorous' criteria to help infer IS from silence: (a) silence or pause persists for two seconds or longer, (b) silence is accompanied by inaudible mutterings or lip movements, (c) facial expression indicates concentration in task, and (d) there are no communicative gestures aimed at interlocutor (2011: 222). Although these criteria seem reasonable, further research would be desirable to test their usefulness and purported rigorousness.

For the most part, recent studies on IS (L1 and L2) rely on self-report methodologies—questionnaires (or question prompts), interviews, autobiographical narratives, thought sampling, and think-aloud—to collect data. Some of the questionnaires used in late IS research are instruments that had previously been created to measure various aspects of inner life and mental states (DaSilveira & Gomes 2012; Zimmerman & Brugger 2013). A questionnaire which was especially designed to assess the experience of IS from a generic-L1 perspective is the Varieties of Inner Speech Questionnaire (VISQ) (McCarthy-Jones & Fernyhough 2011). In addition, several question-based instruments have specifically explored IS among L2 learners, bilinguals, and multilinguals. Worth mentioning are the BEQ (Dewaele-Pavlenko 2001–2003), which included two questions on the silent use of language and contributed to gather massive data on multilinguals' IS, and Ewert's (2010) adaptation of the BEQ to be used with multilinguals on a smaller scale. Also within the questionnaire modality are Schrauf's (2009) Language Background Questionnaire probing bilinguals on language usage in various domains, including internal speech, and Wang & Shih's (2011) questionnaire (adapted from Guerrero 1994) exploring EFL learners' choice of language for thought during an oral production task. A few other studies have used question-like prompts to find out L2 learners' use of language for thinking (Nejadansari & Alijanian 2012) and an L2 inner voice (Shigematsu 2010). Questionnaire-type instruments have proved useful in providing insights on certain aspects of IS use, such as language choice, contents, and functions, and have generally yielded high statistical reliability; however, they have been criticized for lack of convergent validity, i.e., high correlations among them (Uttl, Morin & Hamper 2011); lack of phenomenological fidelity, i.e., faithfully representing the phenomenon of inner speaking as a subjective experience (Hurlburt, Heavey & Kelsey 2013); and respondents' inability to retrospect accurately on formal features of IS, such as condensed or expanded structure (McCarthy-Jones & Fernyhough 2011).

Interviewing participants is another methodology that has been lately employed to collect data on IS. Usually, interviews are used in the SR modality, that is, as stimulus for participants to comment on, corroborate, or expand the information gathered through other instruments. DaSilveira & Gomes (2012), for example, interviewed subjects after they had answered an IS questionnaire and performed a think-aloud task in order to find out about their experience in responding to these instruments and in having an inner dialog. Shigematsu (2010), in a

study of L2 inner voice development, conducted in-depth interviews so that subjects could elaborate on responses previously obtained through online prompts.

A very productive means of gathering data in IS research is the examination of autobiographical narratives in search for first-person accounts of IS experiences. Pavlenko (2011a, 2014) has applied this methodology to the analysis of memoirs of bi- and multilingual users, predominantly famous writers. Recognizing the limited use of autobiographical narratives in the study of linguistic development and self-reconstruction in the past, Pavlenko recommends expanding future research to include self-reports from various types of 'bilingual speakers, including simultaneous bilinguals, multilinguals, and language attriters' (2014: 251). Gabryś-Barker's (2014) study, based on the analysis of texts written in response to the prompt 'Language(s) of our thoughts', applied the self-narrative technique to multilingual L2 learners/users. No recent study, however, has deliberately exploited the diary form of the self-report narrative technique (such as in Guerrero 2004) to collect longitudinal data on L2 learners' personal experiences in developing L2 IS.

The thought sampling technique, which literally aims at obtaining samples of people's thoughts in response to a prompt, has been the method of preference for some researchers in recent studies on IS. In Morin et al. (2011), the technique was used as 'thought-listing', i.e., asking a large group of college students to list, retrospectively, what they usually said to themselves when engaged in IS. As Morin & Uttl (2013) point out, this method can cause recall errors: 'There is the possibility that participants may forget some actual IS occurrences or may "recall" instances that never occurred' (2013: 6–7). Rather than using this retrospective and reconstructive procedure, the researchers employed cell phones to send a prompt to participants asking them to respond immediately by text message on the contents of their current IS (Morin & Uttl 2013). Thought sampling by text-messaging is a modernized version of DESCRIPTIVE EXPERIENCE SAMPLING, a procedure in which participants carry a beeper and, at the sound of a random beep, jot down notes on whatever inner experience they are having (Hurlburt et al. 2013).

Introspective techniques, unlike the retrospective ones mentioned so far, elicit verbalization of thought processes as they are taking place (or immediately after) and are thus less likely to suffer from memory limitations. Thinking aloud is an introspective procedure that has also been used lately in gathering IS data (Gabryś-Barker 2006; DaSilveira & Gomes 2012; Gabryś-Barker 2015). For the technique to be successful, training is usually necessary so that subjects learn to say out loud whatever is on their minds while performing an action. Think-alouds, however, should not be taken as exact, direct verbalizations of silent thinking. Think-alouds are close records of IS, but they are 'externalizations' of IS, i.e., internal speech that has most likely suffered structural changes in its transition to overt speech (Guerrero 2005: 102–103).

A review of the self-report methodologies adopted in late studies on IS reveals strengths and weaknesses, some of which had already been pointed out in the past (Guerrero 2005: 104–108). To summarize these in brief, self-reports are valuable sources of insights and information on people's perceptions of their own IS, particularly as it pertains to its contents and functions (though not so much on its structural features), and useful in making generalizations when large samples are used. Self-reports, however, are limited in providing direct and precise records of actual IS activity, a phenomenon which is non-observable to outsiders and often

inaccessible to self-control and attention. The more retrospective a personal account of IS, i.e., the further removed in time from the actual verbalizing event, the more likely it may not be remembered well or may be reconstructed and misreported. Even immediate introspective verbalizations of IS are prone, as was pointed out above, to modifications of the actual verbal thinking phenomenon. It is very important for researchers to be aware of these shortcomings and to not only follow guidelines that may safeguard against distorted or unwarranted conclusions but also clearly report and explain step-by-step procedures so that readers may assess on their own the relative merits and usefulness of the research. Triangulation—i.e., using multiple approaches in gathering data—of self-report methodologies is recommended in the study of IS, as for example in DaSilveira & Gomes (2012). McCarthy-Jones & Fernyhough (2011) point out that one of the limitations of the instrument they developed, VISQ, is that participants may be unable to accurately retrospect on the subjective qualities of IS; thus, the authors recommend supplementing results of the VISQ with more ecologically valid methodologies, such as descriptive experience sampling (see study employing this joint methodology: Alderson-Day & Fernyhough 2015b).

Aside from self-reporting, a few other methodological strategies have been used lately in PS/IS research. One of these is the measurement of covert verbal responses through speech interference (frequently including comparisons between silent, subvocal, and overt speech). Techniques such as having the tongue clamped between the teeth, concurrent finger or foot tapping, and concurrent word repetition, which might interfere with normal verbal production while performing a silent task, have contributed to throw light on the role and extent of phonological articulation in covert speech production (Durisko 2006; Aguilar & Aguilar 2008; Kato 2009). Other psycholinguistic methodologies include eye-tracking assessment to obtain information on the pronunciation features of IS during reading (Filik & Barber 2011) and experimenting with speech imagery to collect data on the brain mechanism responsible for an inner voice (Scott 2013).

Lastly, brain scanning techniques, most prominently neuroimaging (as in fMRI or PET), have been intensively exploited in the past decade in the study of brain areas and processes associated with IS activity. (See Girbau 2007 for a detailed overview of the evolution of these techniques in IS research.) To their advantage, brain scanning and imaging techniques provide, to date, the most 'direct' method of observation within IS research. The images produced through these technologies make it is possible to 'see' brain structures and pathways of activation implicated in verbal thinking. In the case of research involving speakers of more than one language, in particular, brain scanning techniques offer invaluable information about anatomical and procedural differences related to language processing. Data-gathering through these technologies, however, is not without weaknesses. One of these is lack of ecological validity—neuroimaging experiments can only be conducted in highly controlled laboratory conditions. As Morin points out, brain-imaging studies are restricted to dealing with artificially elicited IS, mostly of the mental recitation type: 'Naturally occurring inner speech, with its condensed and dialogic qualities, has never been imaged' (2012: 440). Another drawback is the danger of reduced internal validity—it is difficult to establish with complete certainty that the person whose brain is being scanned is mentally engaged in the IS task as instructed. (For further discussion of neuroimaging strengths and shortcomings in the study of IS, see Alderson-Day & Fernyhough 2015a.)

Finally, one crucial limitation affecting many PS/IS studies is failure in collecting detailed information on the language background of the participants. Except for studies specifically involving L2, bi-, or multilinguals (which generally do include information about multiple languages learned or spoken), most studies do not go beyond reporting the native language category of the participants. As a rule, the language(s) known by the inner speaker, the language(s) used in the IS under observation, or the language(s) spoken or scripted in the external context are not issues to be taken into consideration or variables to be included in the research design. It is an important gap because assuming (often incorrectly!) monolingualism or disregarding people's knowledge of more than one language leads to failure in investigating how multiple-language knowledge may affect people's thinking processes. This is a problem particularly blatant in self-reports, where participants are frequently not asked what language they use for covert self-verbalizations. In Morin et al. (2011), 380 college students were asked to list, retrospectively, what they usually said to themselves when engaged in IS. The authors do mention that 89% of the participants were English-L1 speakers, but not whether they knew other languages. Nor was it probed what language the English-L1 and English-L2 (11%) participants used in their IS verbalizations, and therefore it remains unknown whether another language was used by participants in their thinking or to what extent L2 IS was used or for what purposes. (See also Dewaele 2015 on this issue.)

7. Pedagogical implications

A review of recent studies (2005–2015) reveals several pedagogical approaches and strategies that might be useful in the development and effective use of L2 IS. Four sets of pedagogical implications will be discussed below.

7.1 Providing learners with opportunities for social engagement with the L2

As Guerrero put it, 'inner speech is derived from external speech and cannot happen in the absence of exposure to and participation in the particular discursive practices of a social group' (2005: 191). The importance of creating socially stimulating conditions in classrooms and providing learners with plenty of opportunities for social interaction in the L2—for external-to-internal movement to occur—is confirmed by studies indicating socially related variables (frequency of L2 use in daily interactions, size of social networks, naturalistic contexts of acquisition) as the strongest predictors of L2 (or LX) IS use among bi- and multilinguals (Shigematsu 2010; Pavlenko 2014; Dewaele 2015). Socially interactive settings (classrooms, playground) and activities approximating conditions of naturalistic L2 use, including learner–learner and teacher–learner interactions, may also foster self-directed use of the L2 (Smith 2007; Steinbach-Kohler & Thorne 2011). Use of the L2 in social interactions may prove particularly essential in the development of the dialogic (i.e., conversation-like) form of IS as suggested by studies on the effects of social speech impairment in L1 (Williams et al. 2012; Alderson-Day & Fernyhough 2015a) and on the evolution of an internal L2 voice

(Shigematsu 2010), just as the social presence of interacting or non-interacting others may have a 'stimulating' effect on PS occurrence (San Martín 2011; Damianova et al. 2012; McGonigle-Chalmers et al. 2014).

7.2 Fostering internalization and externalization of the L2

Although the capacity to think through a new language owes much to factors associated with naturalistic conditions of acquisition, pedagogical intervention can also greatly contribute to foster internalization and externalization of the L2. Actually, in Dewaele (2015), it was 'mixed context' of acquisition (i.e., a combination of naturalistic learning and formal instruction) which accounted for highest L2 use in IS. Several instructional methods and learner strategies seem to encourage internalization and externalization of the L2. First and foremost is learners' use of PS in academic settings. The literature on PS among L2 learners/users shows quite convincingly that it is widespread as a learning mechanism or as a self-regulating tool in solving problems in the L2. Researchers recommend that teachers pay close attention to learners' production of PS, acknowledge it, and certainly not inhibit it (Lee 2006; Smith 2007; Yoshida 2009; Day & Smith 2013; Clark 2005). Yoshida derived the following implication from her PS study among college learners of Japanese:

> Teachers should regard the learners' private speech not as distracting or disturbing, but as an opportunity for the learners to practise the language, test hypotheses or express themselves by taking their 'private turns' without affecting the flow of classroom teaching, even though the private speech is not directly related to target grammatical items or task questions. (2009: 230)

What can teachers do to deliberately stimulate internalization and development of IS in the L2? Recent studies suggest certain instructional methods and strategies may be particularly favorable. One of these is the integration of subvocal repetition or rehearsal in pedagogical activities. Borer (2007), for example, implemented learners' use of self-vocalization in the learning of L2 vocabulary, finding positive effects of deep-processing rehearsal on word retention, both in solitary or collaborative conditions. Specifically, Borer recommends exposing learners to new words alone (rather than in peer groups) so they can have better control over their private rehearsal process. In Borer's study, 'by selectively rehearsing linguistic features such as phonology, spelling, or meaning for future use, learners began the transformation from external to inner speech' (2007: 287). Fallahchai (2011) similarly found that training learners in phonological awareness and performing vocal and subvocal rehearsal contributed to successful learning of FL words. Positive effects on vocabulary learning may be attributed, according to Fallahchai, to the learners' efforts at vocal and subvocal articulation of new words and their increased ability to hear and modify their own vocal production through PS and IS.

Shadowing and summarizing are two other classroom techniques that rely on repetition and rehearsal and have great potential for enhancing IS processes, such as inward auditory reproduction, subvocal phonological articulation, retention in memory, semantic condensation, and verbal restructuring. Guerrero & Commander (2013) integrated shadowing and summarizing into a technique labeled 'shadow-reading', which required

learners working in pairs to read aloud and shadow parts of a story to each other, then orally summarize the story, and finally produce a written retelling. The shadowing, which consisted of repeating segments of a text in three modes—out loud, low voice, and silent (subvocal)—provided repeated opportunities for internalization during the stages of self-directed low-voice and silent repetition. Summarizing and retelling, in turn, provided affordances for meaningful imitation, internalization, transformation, and externalization of L2 models.

Dialog journal writing is another technique recommended by Mahn (2008) to foster the IS process among L2 learners. As Mahn proposes, learners write freely in their journals without worrying about making mistakes; rather, the emphasis is on meaning-making when writing in the L2. Dialog journals encourage learners to draw from their 'systems of meaning' (Vygotsky's notion of the internalized conceptual system on which IS relies): 'When students focus on meaning and are relieved of the pressure of producing error-free writing, they increasingly rely on inner speech and verbal thinking' (2008: 122). The technique, the author claims, improves learners' fluency in writing, stimulates efforts to develop mastery over the structure of language, and encourages use of IS to express thoughts in meaningful ways.

7.3 Developing a conceptual foundation in the L2

The capacity to engage in L2 IS entails changing the L1 conceptual foundation to accommodate new concepts expressed linguistically in the L2. Negueruela (2008; Negueruela-Azarola, García & Buescher 2015), who conceives L2 development as a conceptual process, argues that instruction should aim at promoting the internalization of new conceptual categories through properly organized, meaningful, and awareness-raising pedagogical tasks. Instructional applications of this concept-based approach have mostly focused on the teaching of new categories in areas related to grammar (e.g., verbal aspect, modality, voice), writing genres, and academic discourse (see studies in Lantolf & Poehner 2008). Negueruela & Lantolf (2006), for example, found that Spanish learners showed greater coherence and accuracy in using preterit and imperfect forms after engaging in conscious reflection and private verbalization on the concept of verbal aspect. Similarly, Escandón & Sanz (2011) obtained favorable results when utilizing a 'bottom-up move' (based on Galperin's external-to-internal methodological approach to concept formation) to teach learners the notions of Spanish gender and number agreement. In general, however, this review reveals that the potential for the application of a deliberate and systematic conceptually-based approach to L2 instruction remains largely untapped.

7.4 Creating awareness about inner and private speech

The final implication derived from the studies reviewed is the need to raise awareness about IS and PS among educators and learners. Several researchers advocate for pedagogical approaches that include the explicit and deliberate stimulation of PS and IS development in the L2 (Clark 2005; Smith 2007; Yoshida 2009; Little 2010; Wang & Shih 2011). Little,

for example, argues that 'developing the learner's capacity for L2 inner speech should be an explicit goal of L2 pedagogy' (2010: 28). It is necessary, however, to first become aware of the occurrence and importance of PS and IS in L2 education.

Research indicates that PS often goes unnoticed (Clark 2005) or is discouraged (Manfra & Winsler 2006) in classrooms. Paying attention to covert speech processes, however, can be highly revelatory to teachers. Clark believes there is little understanding of the significance of L2 PS in early childhood education and claims for a pedagogy that recognizes that 'private speech is meaningful, . . . can be revealing about the child's use of language, . . . can provide insight into their thinking and their needs, and . . . can provide clues about the effects of the environment on their learning' (2005: 217). Smith observed: 'The private speech produced during a learning activity may reveal what pupils have already learned, and how they are using language as a tool in the process of learning' (2007: 254). Day & Smith (2013) also point out that PS has an important emotion-regulating function and that, by paying attention to children's PS, teachers may help learners who express negative emotions cope better when performing cognitively frustrating or difficult tasks. Importantly, research (Clark 2005; Pavlenko 2014) suggests that in the case of translingual learners who become immersed in a new L2 community, by paying attention to their PS, teachers may help learners cope with the problems they undergo in the process of attriting from an L1 inner voice and acquiring a new one mediated by the L2.

Research also proposes that learners be made aware of their own PS and IS processes in learning the L2 and of the role and benefits of PS and IS in conducting cognitive-verbal tasks in the L2 (reading, writing, mathematical operations, problem-solving, retaining in memory, planning, etc.). Although many covert speech processes take place at an unconscious level, learners can take an active role in those phases of IS that are within their control: rehearsal and repetition, switching from one language to another, deliberately engaging in L2 self-talk, and the like. Even though awareness of intrapersonal speech is considered to be a rather late higher-level cognitive development among children, Manfra & Winsler found that even very young children (preschoolers) understand that self-talk can be a useful tool in learning (2006: 547). Wang & Shih (2011) believe learners can be offered metacognitive training into using L1 and L2 for language support in IS. The implication from research is thus that learners' awareness and deliberate covert use of the L2 through PS and IS may have positive effects on internalization and externalization of the L2.

8. Conclusion

8.1 Further research

Several suggestions for further research on PS and IS arise from a review of the literature produced during the 2005–2015 period. The first one is actually a plea for future research to abandon the predominant monolingual perspective that characterizes studies on IS outside the exclusive realm of SLA. Not only should there be more research conducted with bilingual and multilingual populations, but research on IS as a common human phenomenon should

acknowledge the fact that many individuals know and use more than one language, affecting the nature and processes of IS. Information about the number, level of competence, and degree of daily use of languages known should be included and built into study designs so that commonalities and differences between L1 IS and IS in other languages can be observed.

Studies on the properties of silent (L1 and L2) IS related to form, contents, or functions should be carried out with more diverse populations than has been the case up to now. Little is known, for example, on the IS of non-literate and non-college educated individuals. Pavlenko points out that most studies on IS and PS 'have been conducted in Western contexts and we do not know whether their findings are applicable to non-Western contexts and non-industrialized societies' (2014: 259). Studies specifically focusing on L2 IS could also begin looking at special populations (e.g., hearing-impaired, autistic, females vs. males). The question is whether and how covert forms of speech fluctuate across a wider range of social and individual variables than have been investigated so far.

A great gap exists in the area of L2 IS development over the lifespan, particularly in the form of longitudinal research. Apart from one study that could be considered short-term longitudinal (Yi's 2010 investigation of preschoolers' speech internalization over the course of one year), most research on developmental L2 PS and IS is cross-sectional, that is, based on separate studies targeting specific age groups. Rather than making inferences on the course of L2 speech internalization levels and stages from cross-sectional data, researchers could set up longitudinal studies following up individuals (in single case, small group, or large group design) for a considerable length of time, particularly covering critical periods in their lives regarding L2 language learning. Longitudinal studies could focus, for example, on individuals who start learning the language in infancy or early childhood, alongside an L1, and reach age maturity as L2 or bilingual speakers, or on people who at an adult age migrate and establish long-time residence in a new linguistic community. This type of longitudinal study could provide insights into the ontogenesis of L2 verbal thinking, noting levels of internalization as they occur over time, from social speech to PS, to fully internalized IS in the L2. At any rate, longitudinally or cross-sectionally, differences in frequency, functions, levels of covertness, and other aspects of L2 PS and IS across different age groups should be further investigated.

In particular, although a fairly substantial number of studies have focused on L2 externalized PS among children, very little is known of the early stages of silent L2 IS in this age group. Does children's incipient IS adopt the same modalities as those found among adults (Guerrero 2004)? How does early IS development in the L2 compare with that of monolingual learners of the same age? Studying the L2 silent IS processes of school age children would have great impact in understanding how L2 literacy and performance in academic verbal tasks is affected by L2 IS development.

As pointed out earlier, much more research should focus on conceptual development and restructuring as a result of L2 internalization. Research on conceptually based approaches to L2 instruction should continue its exploration on how the learning of new conceptual (lexical and grammatical) categories, as instantiated in an L2, can have an impact on L2 internalization and the capacity to effectively think through an L2. Two areas that should also be further explored as part of L2 IS development and conceptual restructuring are the

gestural-thinking connection and the configuration of a new self and/or identity on the basis of an L2.

The auditory and articulatory features of IS, as conceived in the VWM model, could be studied more intensively from an L2 perspective. For example, the auditory mechanism known as corollary discharge (Scott 2013) has not been yet investigated in relation to L2 IS. Corollary discharge could be explored to find answers on the experience of hearing an L2 in the mind and the mismatch often reported between L2 phonological representations in the mind and the actual sounds produced. Another aspect to be further investigated is the role of covert articulation and phonological activation in silent L2 reading. This area of research has been addressed theoretically in Ehrich (2006), but little empirical work (Kato 2009; Askildson 2011) has been conducted in L2, FL, or multilingual scenarios since Sokolov's (1972) early psychophysiological studies on the role of IS in reading FL texts.

Future research should intensify the use of tested methodological approaches through not only triangulation of specific procedures but also the combination of different theoretical perspectives (such as SCT and IPF), which can throw light on different aspects of the L2 PS and IS phenomena. Some novel or under-used methods of data collection in L2 research, such as thought sampling and personal narratives (including learner diaries and autobiographical testimonies), could yield much interesting evidence on the covert processes of L2 learning and development. Additionally, brain-imaging technology, as it keeps growing and improving, should continue to be used to gain insights into brain areas and functions of not only artificially elicited but also naturally occurring IS among bilinguals and multilinguals.

Lastly, research is needed on the effects of pedagogical intervention and specific instructional methodologies on the development of L2 IS and the effective use of the L2 for thinking.

8.2 Final assessment

In this review, a retrospective look has been cast over the body of work produced on IS and PS in the timespan 2005–2015 to gain insights into recent findings on the process of 'going covert' in learning and using a new language. Overall, the research reviewed, both from a generic-L1 and an L2/LX point of view, overwhelmingly confirms the notion of IS/PS as essential instruments of thought and self-communication and as vital processes in language learning and use. From an L2 stance, the empirical work produced is strong and vibrant enough not only to solidify the status of L2 IS and PS as legitimately relevant and revelatory topics of SLA research but also warrant continued research. In particular, research from an L2 perspective has been strengthened by the investigation of IS/PS as it occurs among advanced bi- and multilinguals in natural settings, extending the focus beyond that of L2 classroom learners and yielding extremely rich and interesting data on what it means to be a multiple-language IS/PS user. From a generic-L1 perspective, the research on IS/PS is likewise productive and informative but has been found to be generally oblivious to the notion of human beings as potential intramental multiple-language users. It is hoped researchers,

educators, and learners alike become increasingly more sensitive and appreciative of the wondrous, though not extraordinary, ability to think and talk to oneself in a language other than the L1.

Questions arising

1. Development and use of PS and IS are tightly related to literacy development and academic performance. How do L2 PS and IS develop in instructed academic scenarios, and how does this development affect literacy and academic success in an L2? Is there a two-way influence between PS/IS development and literacy/academic instruction?

2. How does L2 IS develop over a lifespan? This question has not been sufficiently explored by longitudinal studies. What critical periods or stages characterize the ontogenesis of L2 IS in the life of an individual? Possible interesting scenarios where long-term research could be conducted are infants who begin acquiring an L2 simultaneously with an L1, learners who achieve high competence in an L2 in instructed settings, or adult migrants who become bilingual or multilingual after immersion in a new linguistic environment.

3. IS and PS are unquestionably among the most efficient psychological tools humans possess. It has been noted in L1-based research, however, that when people engage too much in certain forms of IS, the ruminative kind, for example, concurrent problem-solving is affected. Does this phenomenon similarly occur when a person is using the L2 to mediate his/her IS and PS? What forms and functions of L2 IS and PS might be particularly helpful or detrimental to cognitive operations?

4. Covert articulatory rehearsal and internal auditory images are important components of IS activity. Although reports from L2 learners and users clearly show these internal phenomena to occur during L2 processing and learning, questions remain on the exact nature of L2 subvocal rehearsal and auditory imagery. What internal mechanisms are involved in the experience of hearing an L2 voice in the mind and covertly articulating the L2? More specifically, what is the role and nature of auditory and articulatory IS processes during silent verbal reception and production tasks such as listening, reading, and writing in an L2?

5. Autobiographical accounts from notable writers and scholars who have been able to develop IS in a new language suggest profound changes may occur in a person's view of the world and of the self. What kind of conceptual, intellectual, and emotional shifts do L2/FL learners undergo as they acquire a new language to mediate the mind? Is the experience of consciousness, introspection, and self-awareness when mediated by the L2 different from that of the L1? Does a new self emerge when talking to oneself in another language?

6. What is the role of 'attitude' towards particular languages in a multilingual person's preference for a language of thought? To what extent does the attitude of like or dislike towards a certain language determinant of its being used as a tool for thinking? What psychological, affective, or cultural factors may account for a person's reluctance to use an L2/FL intramentally or even refrain from or obstruct its full development as a language of the mind and of the heart?

References

Given space limitations, titles are given in the original language(s) only. Readers interested in their English translations should contact the author.

Abadikhah, S. & A. Khorshidi (2013). An investigation of the private speech phenomenon in the collaborative interaction of Iranian adult EFL learners. *The Southeast Asian Journal of English Language Studies* 19.3, 71–85.

Aguilar, A. & E. M. Aguilar (2008). Valoración del componente articulatorio del bucle fonológico del habla interior mediante una técnica conductual. *Análisis y modificación de conducta* 34.150–151, 233–257.

Alarcón-Rubio, D., J. A. Sánchez-Medina & J. R. Prieto-García (2014). Executive function and verbal self-regulation in childhood: Developmental linkages between partially internalized private speech and cognitive flexibility. *Early Childhood Research Quarterly* 29, 95–105.

Alderson-Day, B. & C. Fernyhough (2015a). Inner speech: Development, cognitive functions, phenomenology, and neurobiology. *Psychological Bulletin* 141.5, 931–965.

Alderson-Day, B. & C. Fernyhough (2015b). Relations among questionnaire and experience sampling measures of inner speech: A smartphone app study. *Frontiers in Psychology* 6.517. http://dx.doi.org/10.3389/fpsyg.2015.00517.

Allen, P., A. Aleman & P. K. McGuire (2007). Inner speech models of auditory verbal hallucinations: Evidence from behavioural and neuroimaging studies. *International Review of Psychiatry* 19.4, 409–417.

Appel, G. & J. P. Lantolf (1994). Speaking as mediation: A study of L1 and L2 text recall tasks. *The Modern Language Journal* 78.4, 437–452.

Askildson, L. R. (2011). Theory and pedagogy of reading while listening: Phonological recoding for L2 reading development. *Journal of Linguistics and Language Teaching* 2.2, 267–285.

Baddeley, A. D. (1986). *Working memory*. Oxford: Oxford University Press.

Baddeley, A. & V. Lewis (1981). Inner active processes in reading: The inner voice, the inner ear, and the inner eye. In A. M. Lesgold & C. A. Perfetti (eds.), *Interactive processes in reading*. Hillsdale, NJ: Erlbaum, 107–129.

Borer, L. (2007). Depth of processing in private and social speech: Its role in the retention of word knowledge by adult EAP learners. *Canadian Modern Language Review* 64.2, 269–295.

Broner, M. & E. Tarone (2001). Is it fun? Language play in a fifth-grade Spanish immersion classroom. *The Modern Language Journal* 85.3, 363–379.

Brown, J. W. (2009). Inner speech: Microgenetic concepts. *Aphasiology* 23.5, 531–543.

Buchsbaum, B. R. (2013). The role of consciousness in the phonological loop: Hidden in plain sight. *Frontiers in Psychology* 4.496.

Centeno-Cortés, B. (2003). Private speech in the second language classroom: Its role in internalization and its link to social production. Ph.D. dissertation, Pennsylvania State University.

Centeno-Cortés, B. & A. Jiménez-Jiménez (2004). Problem-solving tasks in a foreign language: The importance of the L1 in private verbal thinking. *International Journal of Applied Linguistics* 14.1, 7–35.

Chapelle, C. (ed.) (2012). *The encyclopedia of applied linguistics*. Wiley-Blackwell.

Chee, M. W. L., C. S. Soon & H. L. Lee (2003). Common and segregated neuronal networks for different languages revealed using functional magnetic resonance adaptation. *Journal of Cognitive Neuroscience* 15.1, 85–97.

Choi, S. & J. P. Lantolf (2008). Representation and embodiment of meaning in L2 communication. *Studies in Second Language Acquisition* 30.2, 191–224.

Clark, B. (2005). Private speech: A window into the self-talk of kindergarten children from diverse language backgrounds. Ph.D. dissertation, The University of Auckland.

Cohen, A. D. (1998). Strategies in learning and using a second language. New York: Longman.

Cook, V. J. (1998). Internal and external uses of a second language. *Essex Research Reports in Linguistics*, 100–110. http://homepage.ntlworld.com/vivian.c/Writings/Papers/InternalUses.htm.

Damianova, M. K., M. Lucas & G. B. Sullivan (2012). Verbal mediation of problem solving in pre-primary and junior primary school children. *South African Journal of Psychology* 42.3, 445–455.

DaSilveira, A. C. & W. B. Gomes (2012). Experiential perspective of inner speech in a problem-solving context. *Paidéia* 22.51, 43–52.

Davis, P. E., E. Meins & C. Fernyhough (2013). Individual differences in children's private speech: The role of imaginary companions. *Journal of Experimental Child Psychology* 116, 561–571.

Day, K. L. & C. L. Smith (2013). Understanding the role of private speech in children's emotion regulation. *Early Childhood Research Quarterly* 28, 405–414.

de Courcy, M. (2003). French takes over your mind: Private speech and making sense in immersion programs. *Journal of Educational Thought* 37.3, 349–367.

Dewaele, J.-M. (2009). Age effects on self-perceived communicative competence and language of choice among adult multilinguals. *EUROSLA Yearbook* 9.1, 245–268.

Dewaele, J.-M. (2015). From obscure echo to language of the heart: Multilinguals' language choices for (emotional) inner speech. *Journal of Pragmatics* 87, 1–7.

Dewaele, J.-M. & A. Pavlenko (2001–2003). Webquestionnaire *Bilingualism and emotions*. University of London.

Diaz, R. M., K. A. Padilla & E. K. Weathersby (1991). The effects of bilingualism on preschoolers' private speech. *Early Childhood Research Quarterly* 6.3, 377–393.

DiCamilla, F. & J. P. Lantolf (1994). The linguistic analysis of private writing. *Language Sciences* 16.3/4, 347–369.

Duncan, R. & D. Tarulli (2009). On the persistence of private speech: Empirical and theoretical considerations. In A. Winsler, C. Fernyhough & I. Montero (eds.), *Private speech, executive functioning, and the development of verbal self-regulation*. New York: Cambridge University Press, 176–187.

Durisko, C. (2006). Exploring the inner speech process in verbal working memory. Master's thesis. University of Pittsburgh.

Ehrich, J. F. (2006). Vygotskyan inner speech and the reading process. *Australian Journal of Educational and Developmental Psychology* 6, 12–25.

Epstein, I. (1915). *La pensée et la polyglossie*. Paris: Payot.

Escandón, A. & M. Sanz (2011). The bottom-up move within Vygotsky's zone of proximal development: A pedagogical application for teaching agreement in Spanish as a foreign language. *RELC Journal* 42.3, 345–361.

Ewert, A. (2010). An educational language community: External and internal language use by multilingual students. In J. Arabski & A. Wojtaszek (eds.), *Neurolinguistic and psycholinguistic perspectives on SLA*. Bristol: Multilingual Matters, 159–174.

Fallahchai, R. (2011). The effects of use of learning strategies training on students' foreign language vocabulary learning. *International Journal of Scientific Research in Education* 4.3/4, 181–189.

Filik, R. & E. Barber (2011). Inner speech during silent reading reflects the reader's regional accent. *PLoS ONE* 6.10, e25782. DOI:10.1371/journal.pone.0025782.

Frawley, W. & J. P. Lantolf (1985). Second language discourse: A Vygotskyan perspective. *Applied Linguistics* 6.1, 19–44.

Gabryś-Barker, D. (2006). Language activation in the thinking processes of a multilingual language user. *International Journal of Multilingualism* 3.2, 105–124.

Gabryś-Barker, D. (2014). Face to face with one's thoughts: On thinking multilingually. In M. Pawlak & L. Aronin (eds.), *Essential topics in applied linguistics and multilingualism*, New York: Springer, 185–204.

Gabryś-Barker, D. (2015). Communicating with oneself: On the phenomenon of private/inner speech. In L. Piasecka, M. Adams-Tukiendorf & P. Wilk (eds.), *New media and perennial problems in foreign language learning and teaching*. New York: Springer, 115–130.

Girbau, D. (2007). A neurocognitive approach to the study of private speech. *The Spanish Journal of Psychology* 10.1, 41–51.

Geva, S., P. S. Jones, J. T. Crinion, C. J. Price, J.-C. Baron & E. A. Warburton (2011). The neural correlates of inner speech defined by voxel-based lesion–symptom mapping. *Brain* 134, 3071–3082.

Grogan, A., Ō. Parker Jones, N. Ali, J. Crinion, S. Orabona, M. L. Mechias, S. Ramsden, D. W. Green & C. J. Price (2012). Structural correlates for lexical efficiency and number of languages in non-native speakers of English. *Neuropsychologia* 50.7, 1347–1352.

Grosjean, F. (2010). *Bilingual: Life and reality*. Cambridge, MA: Harvard University.

Guerrero, M. C. M. de (1994). Form and functions of inner speech in adult second language learning. In Lantolf & Appel (eds.), 83–115.

Guerrero, M. C. M. de (1999). Inner speech as mental rehearsal: The case of advanced L2 learners. *Issues in Applied Linguistics* 10.1, 27–55.

Guerrero, M. C. M. de (2004). Early stages of L2 inner speech development: What verbal reports suggest. *International Journal of Applied Linguistics* 14.1, 90–112.

Guerrero, M. C. M. de (2005). *Inner speech – L2: Thinking words in a second language*. New York: Springer.

Guerrero, M. C. M. de (2012a). Inner speech in second language acquisition. In C. Chapelle (ed.), *The encyclopedia of applied linguistics*. Wiley-Blackwell. DOI:10.1002/9781405198431.wbeal0539.

Guerrero, M. C. M. de (2012b). Private speech in second language acquisition. In C. Chapelle (ed.), *The encyclopedia of applied linguistics*. Wiley-Blackwell.

Guerrero, M. C. M. de (2013). Private speech. In P. Robinson (ed.), *The Routledge encyclopedia of second language acquisition*. New York: Routledge, 508–509. DOI:10.1002/9781405198431.wbeal0955.

Guerrero, M. C. M. de & M. Commander (2013). Shadow-reading: Affordances for imitation in the language classroom. *Language Teaching Research* 17.4, 433–453.

Gullberg, M. (2011). Language-specific encoding of placement events in gestures. In J. Bohnemeyer & E. Pederson (eds.), *Event representation in language and cognition*. New York: Cambridge University Press, 166–188.

Hauser, E. (2015). Private speech as social action. *Language and Sociocultural Theory* 2.2, 119–138.

Hurlburt, R. T., C. L. Heavey, & J. M. Kelsey (2013). Toward a phenomenology of inner speaking. *Consciousness and Cognition* 22.4, 1477–1494.

Jiménez-Jiménez, A. (2015). Problem-solving activities in bilingual speakers. *International Journal of Bilingualism* 19.3, 259–281.

John-Steiner, V. (1985). The road to competence in an alien land. In J. V. Wertsch (ed.), *Culture, communication, and cognition: Vygotskian perspectives*. New York: Cambridge University Press, 348–371.

Kato, S. (2009). Suppressing inner speech in ESL reading: Implications for developmental changes in second language word recognition processes. *The Modern Language Journal* 93.4, 471–488.

Kim, K. H. S., N. R. Relkin, K. Lee & J. Hirsch (1997). Distinct cortical areas associated with native and second languages. *Nature* 388, 171–174.

Klein, D., K. Mok, J. Chen & K. E. Watkins (2014). Age of language learning shapes brain structure: A cortical thickness study of bilingual and monolingual individuals. *Brain & Language* 131, 20–24.

Kovelman, I., S. A. Baker & L. Petitto (2008). Bilingual and monolingual brains compared: A functional magnetic resonance imaging investigation of syntactic processing and a possible 'neural signature' of bilingualism. *Journal of Cognitive Neuroscience* 20.1, 153–169.

Lantolf, J. P. (1999). Second culture acquisition. Cognitive considerations. In E. Hinkel (ed.), *Culture in second language teaching and learning*. Cambridge: Cambridge University Press, 28–46.

Lantolf, J. P. (ed.) (2000). *Sociocultural theory and second language learning*. New York: Oxford University Press.

Lantolf, J. P. & G. Appel (eds.) (1994). *Vygotskian approaches to second language research*. Norwood, NJ: Ablex.

Lantolf, J. P. & W. Frawley (1984). Second language performance and Vygotskyan psycholinguistics: Implications for L2 instruction. In A. Manning, P. Martin & K. McCalla (eds.), *The tenth LACUS Forum*. Columbia, SC: Hornbeam Press, 425–440.

Lantolf, J. P. & M. E. Poehner (eds.) (2008). *Sociocultural theory and the teaching of second languages*. London: Equinox.

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

Lantolf, J. P. & M. C. Yáñez (2003). Talking yourself into Spanish: Private speech and second language learning. *Hispania* 86.1, 97–109.

Larsen, S. F., R. W. Schrauf, P. Fromholt & D. C. Rubin (2002). Inner speech and bilingual autobiographical memory: A Polish-Danish cross-cultural study. *Memory* 10.1, 45–54.

Lee, J. (2006). Talking to the self: A study of the private speech of adult bilinguals. Ph.D. dissertation, University of Wisconsin-Madison.

Lee, J. (2008). Gesture and private speech in second language acquisition. *Studies in Second Language Acquisition* 30.2, 169–190.

Levelt, W. (2012). *A history of psycholinguistics. The pre-Chomskyan era*. Oxford: Oxford University Press.

Lidstone, J., E. Meins & C. Fernyhough (2010). The roles of private speech and inner speech in planning during middle childhood: Evidence from a dual task paradigm. *Journal of Experimental Child Psychology* 107.4, 438–451.

Lidstone, J., E. Meins & C. Fernyhough (2011). Individual differences in children's private speech: Consistency across tasks, timepoints, and contexts. *Cognitive Development* 26, 203–213.

Little, D. (2010). Learner autonomy, inner speech and the European Language Portfolio. *Advances in Research on Language Teaching: Selected Papers*, GALA 2010, 27–38.

Mahn, H. (2008). A dialogic approach to teaching L2 writing. In Lantolf & Poehner (eds.), 115–138.

Manfra, L. & A. Winsler (2006). Preschool children's awareness of private speech. *International Journal of Behavioral Development* 30.6, 537–549.

Marvel, C. L. & J. E. Desmond (2012). From storage to manipulation: How the neural correlates of verbal working memory reflect varying demands on inner speech. *Brain & Language* 120, 42–51.

McCafferty, S. G. (1992). The use of private speech by adult second language learners: A cross-cultural study. *The Modern Language Journal* 76.2, 179–189.

McCafferty, S. G. (1994). The use of private speech by adult ESL learners at different levels of proficiency. In Lantolf & Appel (eds.), 117–134.

McCafferty, S. G. & M. K. Ahmed (2000). The appropriation of gestures of the abstract by L2 learners. In Lantolf (ed.), 199–218.

McCarthy-Jones, S. & C. Fernyhough (2011). The varieties of inner speech: Links between quality of inner speech and psychopathological variables in a sample of young adults. *Consciousness & Cognition* 20, 1586–1593.

McGonigle-Chalmers, M., H. Slater & A. Smith (2014). Rethinking private speech in preschoolers: The effects of social presence. *Developmental Psychology* 50.3, 829–836.

Morin, A. (2012). Inner speech. In V. S. Ramachandran (ed.), *Encyclopedia of human behavior* (2nd edn.). San Diego, CA: Academic Press, 436–443.

Morin, A. & B. Uttl (2013). Inner speech: A window into consciousness. www.neuropsychotherapist.com/inner-speech.

Morin, A., B. Uttl & B. Hamper (2011). Self-reported frequency, content, and functions of inner speech. *Procedia-Social and Behavioral Sciences* 30, 1714–1718.

Negueruela, E. (2008). Revolutionary pedagogies: Learning that leads development in the second language classroom. In Lantolf & Poehner (eds.), 189–227.

Negueruela, E. & J. P. Lantolf (2006). Concept-based pedagogy and the acquisition of L2 Spanish. In R. M. Salaberry & B. A. Lafford (eds.), *The art of teaching Spanish: Second language acquisition from research to praxis*. Washington, DC: Georgetown University Press, 79–102.

Negueruela-Azarola, E., P. N. García & K. Buescher (2015). From interaction to intra-action. In N. Markee (ed.), *The handbook of classroom discourse and interaction*. Hoboken, NJ: Wiley, 233–249.

Negueruela, E., J. P. Lantolf, S. R. Jordan & J. Gelabert (2004). The private function of gesture in second language speaking activity: A study of motion verbs and gesturing in English and Spanish. *International Journal of Applied Linguistics* 14.1, 113–147.

Nejadansari, D. & E. Alijanian (2012). The effect of planning on the Iranian EFL learners' performance of grammatical collocations in speech. *World Journal of English Language* 2.2, 2–9.

Ohta, A. S. (2001). *Second language acquisition processes in the classroom. Learning Japanese*. Mahwah, NJ: Erlbaum.

Ortega, L. (2009). *Understanding second language acquisition*. London: Hodder Education.

Özyürek, A. (2002). Speech-gesture relationship across languages and in second language learners: Implications for spatial thinking and speaking. In B. Skarabela, S. Fish & A. H. J. Do (eds.), *Proceedings of the 26th annual Boston University Conference on Language Development*. Somerville, MA: Cascadilla Press, 500–509.

Pavlenko, A. (2011a). Bilingualism and thought in the 20th century. In A. Pavlenko (ed.), 12–42.

Pavlenko, A. (2011b). Thinking and speaking in two languages: Overview of the field. In A. Pavlenko (ed.), 226–245.

Pavlenko, A. (ed.) (2011). *Thinking and speaking in two languages*. Bristol: Multilingual Matters.

Pavlenko, A. (2014). *The bilingual mind*. Cambridge: Cambridge University Press.

Pavlenko, A. & J. P. Lantolf (2000). Second language learning as participation and the (re)construction of selves. In Lantolf (ed.), 155–177.

Perrone-Bertolotti, M., L. Rapin, J.-P. Lachaux, M. Baciu & H. Loevenbruck (2014). What is that little voice inside my head? Inner speech phenomenology, its role in cognitive performance, and its relation to self-monitoring. *Behavioural Brain Research* 261, 220–239.

Price, C. J. (2012). A review and synthesis of the first 20 years of PET and fMRI studies of heard speech. *NeuroImage* 62, 816–847.

Price, C. J., D. W. Green & R. von Studnitz (1999). A functional imaging study of translation and language switching. *Brain* 122, 2221–2235.

San Martín, C., H. Boada & P. Feigenbaum (2011). Private and inner speech and the regulation of social speech communication. *Cognitive Development* 26.3, 214–229.

Saville-Troike, M. (1988). Private speech: Evidence for second language learning strategies during the 'silent' period. *Journal of Child Language* 15.3, 567–590.

Schrauf, R. W. (2009). English use among older bilingual immigrants in linguistically concentrated neighborhoods: Social proficiency and internal speech as intracultural variation. *Journal of Cross-Cultural Gerontology* 24.2, 157–179.

Scott, M. (2013). Corollary discharge provides the sensory content of inner speech. *Psychological Science* 24.9, 1824–1830.

Scott, V. M. & M. J. de La Fuente (2008). What's the problem? L2 learners' use of the L1 during consciousness-raising, form-focused tasks. *The Modern Language Journal* 92.1, 100–113.

Shigematsu, B. K. (2010). Second language inner voice and identity. Ph.D. dissertation, University of Nevada, Las Vegas.

Simons, C. J. P., D. K. Tracy, K. K. Sanghera, O. O'Daly, J. Gilleen, M. Dominguez, L. Krabbendam & S. S. Shergill (2010). Functional magnetic resonance imaging of inner speech in schizophrenia. *Biological Psychiatry* 67, 232–237.

Slobin, D. (2003). Language and thought online: Cognitive consequences of linguistic relativity. In D. Gentner & S. Goldin-Meadow (eds.), *Language in mind: Advances in the study of language and thought*. Cambridge, MA: MIT Press, 157–192.

Smith, H. J. (2007). The social and private worlds of speech: Speech for inter- and intramental activity. *The Modern Language Journal* 91.3, 341–356.

Sokolov, A. N. (1972). *Inner speech and thought*. New York: Plenum.

Sönmez, S. S. (2011). A study of private speech and cognitive regulation in native-nonnative speaker interactions. Ph.D. dissertation, The Florida State University.

Stafford, C. A. (2013). What's on your mind? How private speech mediates cognition during initial non-primary language learning. *Applied Linguistics* 34.2, 151–172.

Stam, G. (2006). Thinking for speaking about motion: L1 and L2 speech and gesture. *International Review of Applied Linguistics* 44, 143–169.

Stein, M., C. Winkler, A. Kaiser & T. Dierks (2014). Structural brain changes related to bilingualism: Does immersion make a difference? *Frontiers in Psychology* 5.1116.

Steinbach-Kohler, F. & S. L. Thorne (2011). The social life of self-directed talk: A sequential phenomenon? In J. Hall, J. Hellermann, S. P. Doehler & D. Olsher (eds.), *L2 interactional competence and development*. Bristol: Multilingual Matters, 66–92.

Storch, N. & A. Aldosari (2010). Learners' use of first language (Arabic) in pair work in an EFL class. *Language Teaching Research* 14.4, 355–375.

Ushakova, T. (1994). Inner speech and second language acquisition: An experimental-theoretical approach. In Lantolf & Appel (eds.), 135–156.

Uttl, B., A. Morin & B. Hamper (2011). Are inner speech self-report questionnaires reliable and valid? *Procedia-Social and Behavioral Sciences* 30, 1719–1723.

Vocate, D. R. (1994). Self-talk and inner speech: Understanding the uniquely human aspects of intrapersonal communication. In D. R. Vocate (ed.), *Intrapersonal communication: Different voices, different minds*. Hillsdale, NJ: Lawrence Erlbaum, 3–31.

Vygotsky, L. S. (1978). *Mind in society. The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Vygotsky, L. S. (1986). *Thought and language*. Cambridge, MA: The MIT Press.

Wang, L. & E. Hyun (2009). A study of sociolinguistic characteristics of Taiwan children's peer-talk in a Mandarin-English-speaking preschool. *Journal of Early Childhood Research* 7.1, 3–26.

Wang, H. & S. Shih (2011). The role of language for thinking and task selection in EFL learners' oral collocational production. *Foreign Language Annals* 44.2, 399–416.

Wattendorf, E., J. Festman, B. Westermann, U. Keil, D. Zappatore, R. Franceschini, G. Luedi, E. Radue, T. F. Münte, G. Rager & C. Nitsch (2014). Early bilingualism influences early and subsequently later acquired languages in cortical regions representing control functions. *International Journal of Bilingualism* 18.1, 48–66.

Williams, D. M., D. M. Bowler & C. Jarrold (2012). Inner speech is used to mediate short-term memory, but not planning, among intellectually high-functioning adults with autism spectrum disorder. *Development and Psychopathology* 24, 225–239.

Yi, S. (2010). Three young Korean children's English language learning in two American preschool classrooms. Ph.D. dissertation. University of Maryland.

Yoshida, R. (2009). *Learners in Japanese language classrooms. Overt and covert participation*. London: Continuum.

Zimmerman, K. & P. Brugger (2013). Signed soliloquy: Visible private speech. *Journal of Deaf Studies and Deaf Education* 18.2, 261–270. DOI: 10.1093/deafed/ens072.

Zinchenko, V. P. (2007). Thought and word: The approaches of L. S. Vygotsky and G. G. Shpet. In H. Daniels, M. Cole & J. V. Wertsch (eds.), *The Cambridge companion to Vygotsky*. New York: Cambridge University Press, 212–245.

María C. M. de Guerrero is a retired professor from Inter American University of Puerto Rico, Metropolitan Campus, where she taught ESL and TESL (Teaching English as a second language) courses for over 30 years. Dr Guerrero has done research on L2 learning and teaching, focusing on topics such as inner and private speech, peer mediation in writing, shadowing as imitation, and metaphorical conceptualizations. She has published in journals such as *Applied Linguistics*, *Language Teaching Research*, *The Modern Language Journal*, and *Issues in Applied Linguistics*. She has also written the book *Inner speech – L2: Thinking words in a second language* (Springer) and has contributed chapters in the volumes *Vygotskian approaches to second language research* (Ablex), *Language development over the lifespan* (Routledge), *Feedback in second language writing* (Cambridge University Press), and *Elicited metaphor analysis in educational discourse* (John Benjamins).