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Bilingual Children with Primary Language Impairment: Issues, Evidence and Implications for Clinical Actions

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Abstract

A clear understanding of how to best provide clinical services to bilingual children with suspected or confirmed primary language impairment (PLI) is predicated on understanding typical development in dual-language learners as well as the PLI profile. This article reviews general characteristics of children learning two languages, including three that challenge the diagnosis and treatment of PLI; uneven distribution of abilities in the child's two languages, cross-linguistic associations within bilingual learners, and individual variation in response to similar social circumstances. The diagnostic category of PLI (also referred to in the literature as specific language impairment or SLI) is described with attention to how language impairment, in the face of otherwise typical development, manifests in children learning two languages. Empirical evidence related to differential diagnosis of PLI in bilingual children is then reviewed and issues related to the generalization of treatment gains in dual-language learners with PLI are introduced.

Keywords

ELL; English language learners; SLI; language disorders; assessment; treatment

1. Introduction

The purpose of this article is to present general issues and empirical evidence relevant to clinical actions with bilingual children with suspected or confirmed primary language impairment. The information in this article is intended to be suggestive versus exhaustive: it serves as an introduction to the extant empirical literature as well as a prelude and complement to each of the more narrowly focused articles on assessment or treatment in this special issue. Bilingual children are operationally defined as those individuals who receive regular input in two or more languages during the most dynamic period of communication development—somewhere between birth and adolescence. This intentionally broad definition includes children who learn two languages from birth as well as those who learn a single language from birth and a second language (L2) beginning in childhood. The specific type of bilingual children included in each study reviewed is identified in context. Globally, developing bilinguals are the rule rather than the exception. In many countries, such as India and South Africa there is more than one national language. In Ontario, Canada, one in four individuals speaks a “mother tongue” other than English or French (Ontario Ministry of Finance, 2001). In the United States, previously and

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erroneously believed to be a bastion of monolingualism, more than 18% of individuals over the age of 5 speak a language other than English in the home (U.S. Bureau of the Census, 2000); by the year 2030 estimates are that 40% of U.S. children will learn English as their L2 (U.S. Department of Education & National Institutes of Child Health and Human Development, 2003).

The vast majority of children who learn two (or more) languages during childhood are “typical” learners, in the sense that with continued development and robust communicative experiences they will be skilled in the languages used consistently in their environments. The concern here is with those bilingual children who fail to make expected progress in both languages with no evident cause for the delay. Children with primary language impairment appear on clinical caseloads and in the research literature under a variety of names. These names include late talkers, specific language impairment (SLI), language impairment and language-based learning disabilities. These different names emphasize visible changes in the most obvious characteristics of the affected population across different ages and stages of development as well as some differences in theoretical perspectives.

The term primary language impairment, or PLI, is preferred here for several reasons. First, it is most consistent with the available evidence in that it encompasses the subtle nonlinguistic processing weaknesses that exist alongside the more obvious language lags, yet maintains the distinction between this diagnostic category and language impairment attributed to frank sensory, motor or neurological impairments (Kohnert, Windsor, & Ebert, 2008). Second, PLI may be applied to both younger and older children with disproportionate weaknesses in language, even though the most salient symptoms may change with development (Tomblin, Zhang, Buckwalter & O'Brien, 2003). This avoids the problematic re-labeling of the same child across development, as is often done, from “late talker” to SLI to language-based learning disabled (Kohnert, 2008; Thal & Katich, 1996). Third, as a practical matter, PLI is preferred over the more general acronym “LI” for language impairment as it avoids visual confusion with the acronym for first language (L1).

PLI is a high incidence developmental disorder presumed to be due to innate factors interacting with language-learning demands. For bilingual children with PLI, both languages are affected. Children with PLI experience difficulty in language and, consequently, are at risk for reduced academic, economic, and social outcomes. Robust, responsive intervention is seen as essential for improving language and related social and educational achievements. A critical first step in successful intervention is a full and adequate assessment. Speech-language pathologists (SLPs) have primary professional responsibility for the assessment and treatment of PLI. A clear understanding of how to best serve dual-language learners with suspected or confirmed PLI is predicated on a deep appreciation of both typical bilingualism and PLI. We begin with an introduction to these populations of interest: typically developing children learning two languages and bilingual children with PLI. We then present general assessment and intervention issues along with evidence for SLPs to consider when providing services to bilingual children with suspected or confirmed PLI.

2. Typically Developing Children Learning Two Languages

Children learning two languages do so under a wide variety of circumstances. Some children's bilingual experience begins at or shortly after birth, as when family members and care providers speak two different languages to the infant. These simultaneous bilingual learners progress through early language milestones in a timely fashion, using first words and word combinations at the same ages and for similar communicative purposes as children who learn only a single language from birth (National Research Council and Institute of Medicine, 1997; Petitto et al., 2001; Petitto & Holowka, 2002). Simultaneous bilinguals will become proficient speakers of

both languages if there is continuous input as well as multiple, meaningful opportunities to develop each linguistic system.

For many developing bilinguals there is consistent experience in only a single language (L1) from birth, with L2 learning beginning at some point later in childhood. For these early sequential bilinguals, consistent L2 experience comes with immersion in educational settings or with increased interactions with the broader community. In some cases, the L1 is considered a minority language and the L2 a majority language, as it is for children living in the U.S. whose parents speak Spanish or Somali or children in Germany or the Netherlands whose families speak Turkish as their L1. Large sections of the general population in almost every nation of the world are minority L1, majority L2 learners. The use of the term “minority language” implies that there are fewer opportunities to develop or use the L1 as compared to the majority language and less social value associated with native-speaker proficiency in these other home languages. In the incipient stages of L2 learning, sequential bilinguals are obviously more skilled in their L1. The maintenance and continued development of skills in a minority L1 corresponds to the level of support and enrichment provided in this language. Intense support for the home language during the preschool years both continues L1 development and seems to pave the way for better long-term attainment of a majority L2 (e.g., see Rolstad, Mahoney, & Glass, 2005 for meta-analysis). With the child's increasing experiences in majority language settings, studies consistently show that from early to middle childhood there is a shift to greater relative proficiency in the majority L2 (e.g., Eilers & Oller, 2003; Francis, 2005; Jia, Aaronson, & Wu, 2002; Jia, Kohnert, Collado, & Aquino-Garcia, 2006; Kan & Kohnert, 2005; Kohnert & Bates, 2002; Kohnert, Bates, & Hernandez, 1999; Yeni-Komshian, Flege, & Liu, 2000). This long-term outcome of greater ability in the L2 for minority L1 speakers reflects the rapid acquisition of the community language alongside the slowing, stabilization or regression of the L1, a consequence of different social experiences, opportunities and demands for the two languages. Note that this is not the case, however, for sequential bilinguals who learn the majority community language at home and attend immersion educational programs in a different language.

For sequential as well as simultaneous bilinguals, there will likely be differences in relative levels of proficiency in the two languages, due to different social circumstances and opportunities in each. Despite these expected differences in relative skill level, both languages may play important, continuous functional roles. For example, studies with immigrant children in the U.S. indicate that adolescents who speak both home and community languages are more likely to graduate high school than their immigrant peers who speak only English and also to develop close family and cultural connections associated with social and emotional health (e.g., Feliciano, 2001; Portes & Hao, 2002; see Schmid, 2001 for review).

Three general characteristics of typically developing simultaneous and sequential bilingual learners that may challenge clinical actions are; (1) uneven ability or distributed skills within and across linguistic domains, (2) the variable presence and nature of cross-language associations, and (3) individual variation in language performance even in response to relatively similar circumstances.

2.1 Distributed Skills and Uneven Ability

Gains in the absolute level of language proficiency are emblematic of development in single language learners. That is, improved performance in all aspects of language is expected with age. For children learning two languages, absolute changes in each language system are often accompanied by relative differences in proficiency between the two languages: which language is strongest or “dominant” may fluctuate across age and learning opportunities. Also, at any given point in time a single language may not be completely “dominant” or stronger across all measures, topics, settings, or subcomponents of language proficiency. That is, if tested on the

full range of tasks that comprise language proficiency at any point during the very dynamic period of language development, bilingual children may perform better on some tasks in one language and better in the other language on different tasks (e.g., Kohnert & Bates, 2002; Ordoñez, Carlo, Snow & McLaughlin, 2003; Peña, Bedore, & Zlatic-Giunta, 2002; Snow, 1990; 1991). Uneven performance across tasks, settings, and languages may be most apparent in developing bilinguals who use their two languages with different partners (parents, teachers, siblings, peers) in different settings (home, school, internet, play ground) for different purposes (telling stories about family celebrations, explaining results of a science experiment, solving math problems, following directions that involve manipulating different colored geometric shapes or negotiating bedtimes or household chores). For example, Kohnert, Kan, and Conboy (in press) found that typically developing preschoolers learning Hmong (L1) and English (L2) used longer utterances and a greater diversity of words to retell stories in Hmong, as compared to English. However, on receptive vocabulary tests in which these same children were asked to point to pictures of named objects, English performance was comparable to that of Hmong.

Distributed (as opposed to duplicated) skills mean that the weaker language does not simply form a subset of information encoded in the stronger language. Rather, there are some linguistic skills or representations present only in the relatively weaker language; and others (presumably more) present only in the relatively dominant language. Even on a single type of measure, performance may reflect divergent experiences. Ordoñez and colleagues found differences in the quality of definitions provided in Spanish and English by bilingual fourth and fifth graders (Ordoñez et al., 2003). Peña et al. (2002) found that 68 percent of the items produced in a scripted word-generation task by 4- to 7-year-old bilingual children were unique to either Spanish or English: the remaining items were translation equivalents with lexical referents in the L1 as well as the L2. This distribution of lexical-semantic knowledge has been well-documented both in simultaneous and sequential bilinguals at various ages and stages of development (e.g., Conboy & Thal, 2006; Kan & Kohnert, 2005; Kohnert, Hernandez, & Bates, 1998; Pearson & Fernandez, 1994; Pearson, Fernández, & Oller, 1993; Umbel, Pearson, Fernández & Oller, 1992).

From a practical standpoint evidence of uneven performance across language tasks and distributed skills within linguistic domains indicate that single language scores may not adequately capture the total language ability of dual-language learners. This core characteristic of typically developing bilinguals negates the validity of direct comparisons with monolingual speakers of either language for the purpose of identifying language disorders, a point we return to in section 4.1, *Standards of Comparison for Identifying PLI: Empirical Evidence*.

2.2 Cross-language Associations within Bilingual Children

Evidence of cross-language associations within bilingual learners may be at the surface or structural level, reflecting interactions between typological features of two distinct languages, or the cognitive-linguistic interface, reflecting mediation of central conceptual and processing mechanisms. Cross-language associations may be positive, in that there is a facilitative effect of one language on performance in another, or negative, with cross-linguistic interference or competition having a deleterious affect on language performance.

Associations at the surface or structural level often come under the heading of “cross-linguistic transfer”. Although the two languages of developing bilinguals may be largely functionally independent, cross-linguistic influence or transfer effects have been observed for developing bilinguals in the areas of phonology, lexical-semantics, and morphosyntax. Gildersleeve-Neumann and colleagues (Gildersleeve-Neumann, Kester, Davis, & Peña, 2008) found that typical bilingual learners transferred Spanish phonemes such as /x/ to English. Cunningham and Graham (2000) found that English-speaking fifth and sixth graders in a Spanish-immersion educational program demonstrated a performance advantage on a receptive vocabulary task

for cross-linguistic cognates (words in two languages that share form and meaning; triángulo/triangle), relative to non-cognates (translation equivalents that do not share form; cuadrado/square). Other researchers have failed to find such an advantage with first, third and sixth grade Spanish-English bilinguals (Umbel & Oller, 1994). At the grammatical level, Methodological differences or learner characteristics may account for divergent study findings. Döpke (2000a) found that young simultaneous learners of English and German used S-V-O word order when speaking German much more than German-only speaking peers, presumably because this word order was permissible and reinforced to some degree in both of their languages (see also Genesee & Nicoladis, 2006). The language-in-contact proposal (Döpke, 2000b) posits that cross-linguistic transfer may be predicted based on structural similarities and differences between the learners' two languages. Empirical evidence, particularly in both languages of young children learning two languages sequentially, is quite preliminary.

In addition to surface level interactions, there may be cross-language correspondences within developing bilinguals not related to the similarities or differences in structural features of the two languages. The presence of such associations may be attributed to general conceptual or processing mechanisms used in the service of both languages. Common underpinnings that support the acquisition of language may, at least from general cognitive interactive theoretical frameworks, account for cross-language associations on some cognitive mediated tasks (e.g., see discussion in Kohnert, in press and Kohnert & Medina, 2009). These associations are also consistent with the bilingual advantage documented on some basic cognitive processing tasks (e.g., Bialystok, 2007) as well as the finding of weakness in both languages of bilingual children with PLI (described in section 3 *Primary Language Impairment [PLI] and Children Learning Two Languages*).

As evidence of cognitive mediation on language outcomes, several studies have found a positive relationship between spoken language proficiency in the L1 and early reading in the L2 for sequential bilingual children, even though the structure of these units is different (Dickinson, McCabe, Clark-Chiarelli & Wolf, 2004; López & Greenfield, 2004; Miller et al., 2006). Kan and Kohnert (2008) found a significant positive cross-linguistic relationship between receptive vocabulary in the L1 and expressive vocabulary in the L2 for Hmong-English preschoolers, indicating that children who understood more Hmong words were likely to name more pictures in English. On the other hand, for these same participants the ability to “fast map” (quickly learn and produce a novel word for an unfamiliar object) in English was negatively correlated with Hmong vocabulary knowledge. That is, stronger vocabulary skills in Hmong were associated with poorer ability in making an initial representation of novel English forms, suggesting perhaps some type of temporary cross-linguistic interference under the most demanding cognitive processing conditions (cf. Kohnert et al., 1999). The negative cross-linguistic relationship of language knowledge and fast mapping is consistent with theories that posit highly interdependent language and cognitive systems within developing sequential bilinguals (Kohnert, 2008; MacWhinney, 2005). Importantly, the strength and direction of cross-language relationships would be expected to change across development, language experience and proficiency.

Kohnert et al. (in press) found a positive cross-language association in 3-to 5-year old sequential bilinguals in the number of different words produced in Hmong (L1) and English (L2) while retelling stories in each language. Conboy and Thal (2006) found a positive cross-language association in vocabulary for younger simultaneous Spanish-English bilinguals as measured by parental report, indicating some type of common underpinnings for language learning or the pooling of resources linked to cognitive development. However, Tabors, Pérez, and López (2003) reported a cross-language association in productive vocabulary in the opposite direction for a group of Spanish-English preschool children, as measured using standardized vocabulary tests. Again, discrepancies across studies may be attributed to the very

different types of measures employed (parent report and story retells versus identification of a predetermined set of items) or the social circumstances in which study participants were learning their two languages. Windsor and colleagues administered Spanish and English nonword repetition tasks to bilingual and English-only speaking 6-to-10 year old children (Windsor, Kohnert, Lobitz, & Pham, 2009). Performance was consistently better in English for monolingual participants and in Spanish for bilingual participants. At the same time, nonword repetition performance was significantly and positively correlated across languages within each group. Taken together, results demonstrate that nonword repetition performance relies on the dual influences of the child's underlying processing ability and prior language experience.

Overall, two languages within the developing child seem to be both functionally independent and, to some degree, interdependent at different developmental stages. Future studies investigating both languages of typically developing dual-language learners are needed to more precisely determine the presence, nature and meaning of cross-language associations. To date, evidence suggests that cross-language associations are affected by the child's age, developmental stage, skill in each language, exposure to each language, task demands, linguistic level investigated as well as typological features of the languages being learned (e.g., Conboy & Thal, 2006; Gildersleeve-Neumann et al., 2008; Kohnert et al., in press; Yip & Matthews, 2000). Current interactive cognitive theories of language clearly support the idea of cognitive mediation for cross-language associations in developing bilinguals. The hypothesized cognitive mediators include very basic speed of information processing, attention, perception, memory mechanisms and learning algorithm (as opposed to more global measures of nonverbal IQ). Although theoretically plausible, to date there are few studies that directly investigate these hypothesized connections in typically developing bilinguals. The integrity of the underlying language-learning system also likely influences the presence and nature of cross-language associations, a point we return to in the section on *Primary Language Impairment and Children Learning Two Languages*.

2.3 Individual Variation

Although experimental studies often emphasize group data, it is now axiomatic that there is considerable variation in language ability, at all developmental stages, within any well-defined group of bilingual learners. As noted previously, age and context of acquisition along with the social value and related opportunities to develop each language affect absolute as well as relative levels of proficiency in each of the bilingual child's languages. These "bilingual factors" interact with the many factors found to affect language ability in monolingual children, including socioeconomic circumstances, parent education and home literacy, as well as individual differences in styles, preferences and cognitive abilities or aptitude (see Marchman & Thal, 2005 for review of factors affecting individual variation in monolingual learners).

The results of these complex interactions between child-endogenous and exogenous factors produce impressive variability within any group of bilingual learners as well as between groups of bilingual learners. Significant individual variation in performance within relatively homogenous groups of bilingual children has been documented on traditional phonological, lexical-semantic, morphosyntactic and narrative tasks (e.g., Gildersleeve-Neumann et al., 2008; Kan & Kohnert, 2005; Kohnert et al., in press). This significant variation also extends to performance on a variety of basic language processing tasks, including novel morpheme learning, nonword repetition, lexical decision, and sentence interpretation (e.g., Kohnert & Danahy, 2007; Kohnert, Windsor, & Yim, 2006; Pham & Kohnert, in press; Windsor & Kohnert, 2004; Windsor et al., 2009).

For example, Pham and Kohnert (in press) examined the use of animacy and word order cues on a classic sentence interpretation task in both languages of typically developing 6-to 8-year

old children who learned Vietnamese as their L1 and English as their L2. All bilingual study participants attended the same educational program, had similar cultural and language experiences and were drawn from the same socioeconomic group. Children were to choose the agent or 'doer' of actions in a series of simple sentences (e.g., *The chair kicked the boy*). A reliance on animacy (living noun) as a cue to meaning is consistent with high-context languages that have flexible word order, including Vietnamese. In contrast, monolingual English-speakers consistently rely on word order as their preferred cue to meaning, ignoring animacy and choosing the first noun as the agent or doer of an action in simple sentences. As expected, the group analysis revealed significant differences between bilingual participants and their monolingual English-speaking peers when processing sentences in English. The English-only children relied almost exclusively on word order as their cue to meaning, consistently selecting the first noun (chair) as the agent. In contrast, the bilingual group used an amalgamation or mixture of animacy and word order cues to interpret sentence meaning. For present purposes, important findings were the striking differences in choice responses *within* the bilingual group on even this very basic sentence processing task, in both Vietnamese (L1) and English (L2). Although the blending of Vietnamese and English strategies was the most common pattern for the bilingual group, this was by no means a one-size-fits-all response pattern. Some bilingual participants relied heavily on animacy (a cue more consistent to Vietnamese) to process English, some used word order, a cue consistent with English, to process Vietnamese, some used separate cues for each language and others used a blending of cues for both language (Pham & Kohnert, in press).

This variation is fundamental to clinical activities as SLPs are charged with making decisions for individual children, with reference to group data or developmental norms. Measurement tools emphasize the "universals" of language ability at different developmental stages in an effort to separate typical versus atypical language ability. However, significant within-group heterogeneity among typically developing bilinguals challenges the development of normative data, even when the pairs of languages as well as age and context of language experiences are controlled. For this reason, best practices in assessing language in developing bilinguals requires the use of multiple measures, in both languages, at different points in time (e.g., American Speech-Language-Hearing Association, 2004; see Caesar & Kohler, 2007, Kohnert, 2008 and Langdon, 2008 for additional discussion and recommendation). Next, we turn our attention to children who have significant delays in language development, in the face of otherwise typical development.

3. Primary Language Impairment (PLI) and Children Learning Two Languages

There are no epidemiological studies of PLI in children learning two languages. In the absence of direct evidence, PLI is generally believed to affect monolingual and bilingual children in similar numbers. If this is the case, we can anticipate that approximately 7% of dual-language learners will have PLI, as has been documented for English-only speaking school-age children in the U.S. (Tomblin et al., 1997). It seems that a bilingual environment does not, in and of itself, put children with an underlying PLI at either an additional advantage or disadvantage relative to monolingual children with a similar disorder, when all other factors known to affect language outcomes are equal. Paradis, Crago, Genesee, and Rice (2003) found no difference in nature or severity of morpho-syntactic features produced in spontaneous language samples by 7-year old simultaneous French-English bilingual children with PLI as compared to monolingual peers with PLI. Windsor and colleagues found no difference in severity between 6- to 10-year old monolingual and sequential Spanish-English bilingual participants with PLI when the standard of comparison for each PLI group was typically developing children matched for age and language backgrounds (Windsor et al., 2009). Of course, given the considerable heterogeneity within PLI and bilingual populations, the complexity of fully capturing language ability at any point in time, as well as the inherent challenges in measuring

skills in dual-language learners, all cross-group comparisons of disorder severity should be interpreted with great caution. Additional risk factors present for some bilingual children may be insufficient support for both languages and limited clinical competencies of service providers to adequately assess or treat bilingual PLI. Limited understanding of developing bilingualism and PLI by a speech-language pathologist may result in delays in identification, identification of only the more severe cases, or insufficient support for the child's dual-language system.

PLI is identified solely on the basis of behavioral data, although there is now robust evidence of both genetic and neurological correlates (e.g., see Schwartz, 2009 for review). In monolingual children with PLI, several areas of language may be affected including vocabulary (e.g., Gray, 2004; Rescorla, 2005), morphosyntax (e.g., Bedore & Leonard, 2001; Cleave & Rice, 1997), discourse (e.g., Scott & Windsor, 2000), written language (e.g., Mackie & Dockrell, 2004), and social language (e.g., Fujiki, Brinton, Morgan, & Hart, 1999). Children with PLI also process language more slowly and less efficiently than unaffected peers (e.g., Graf Estes, Evans, & Else-Quest, 2007; Kohnert, Windsor, & Miller, 2004; Lahey & Edwards, 1996). Within-child variations over time in the most observable PLI symptoms are, in part, because of shifting environmental demands and developmental changes in typical children who constitute the normative referent for determining PLI (see Kohnert, 2008 and Thal & Katich, 1996 for reviews). Presenting symptoms interact with the child's internal and external resources to determine the impact the language impairment will have on his or her academic and social-emotional development.

For bilingual children with PLI, the underlying impairment manifests in both languages. Children with PLI learn both their languages at a much slower pace than their typically developing bilingual peers (Hakansson et al., 2003). Just as the degree of relative proficiency or ability in each language may vary within typically developing bilingual children, both with development and spheres of use, we can anticipate differences in relative L1 and L2 abilities for dual-language learners with PLI. There is also evidence to show that young minority L1 learners with impaired language systems are even more vulnerable than unaffected bilingual peers to loss or early plateaus in the home language if it is not supported (Hakansson, Salameh, & Nettelbladt, 2003; Restrepo & Kruth, 2001; Salameh, Hakansson, & Nettelbladt, 2004).

Although poor performance on language tasks, in the face of otherwise typical development, is considered the critical marker of PLI, subtle processing inefficiencies extend beyond language to the general cognitive domain. Main areas of cognitive processing weakness in children with PLI are in working memory (e.g., Hanson & Montgomery, 2002; Montgomery, 2002), sustained/selective attention (e.g., Noterdaeme, Amorosa, Mildenerger, Sitter, & Minow, 2001; Spaulding, Plante, & Vance, 2008) and speed of information processing (e.g., Kohnert & Miller, 2004; Miller, Kail, Leonard, & Tomblin, 2001; Windsor & Kohnert, 2009). The relationship between these well-documented, albeit sub-clinical, cognitive processing weaknesses and the more obvious language deficits in children with PLI is not yet clear. One theoretical perspective consistent with general interactive cognitive accounts is that quantitative differences found in general information processing abilities are exacerbated under the high demands of language learning and use (cf., Hayiou-Thomas, Bishop, & Plunkett, 2004; Leonard et al., 2007; Viding et al., 2003). Bilingual children with PLI demonstrate the same cognitive processing weaknesses as their monolingual counterparts (Kohnert, Windsor, & Pham, 2009). Research investigating the potential role of these weaknesses in nonlinguistic processing for differential diagnosis of linguistically diverse learners is underway but has not yet been translated into clinical practice (Kohnert et al., 2009).

In summary, monolingual children with PLI are challenged in learning/using one language: bilingual children with PLI are challenged in learning or using two languages. The cause of

the breach in the cognitive-linguistic processing system may have genetic and neurological origins, but is diagnosed using behavioral methods. Although subtle weaknesses in general information processing are part of the PLI profile, language is the most obvious and characteristic area of weakness, with the most salient symptoms changing with age/developmental stage, environmental demands, including ambient languages and communicative abilities in normative referent groups. Children with PLI can and routinely do learn two languages, yet will obviously do so less efficiently than their unaffected bilingual peers. The underlying impairment will manifest in both languages. As with typical bilingual learners, the relative level of proficiency in each of the languages of the bilingual child with PLI will vary with opportunities and experiences. Experience with, and environmental need for, two different languages are fundamental considerations in assessment and intervention planning. In the following section we address basic clinical issues and evidence at the intersection of PLI and children learning two languages.

4. Assessment with Bilingual Children

Assessment is the process of gathering and interpreting relevant data to make informed decisions about a course of clinical action. For pediatric SLPs, the process has three general aims: (1) to determine if the referred child's language abilities are substantially below the performance range expected for typically developing peers, (2) to determine the nature of an identified language disorder (e.g., differentiating PLI from low language associated with more global developmental delays), and (3) to plan a course of action that will maximize the child's long-term language, learning and social outcomes. The most basic assessment goal and the one that has garnered the most attention in the literature at the intersection of language impairment and bilingualism relates to identification, that is the “ruling in” or “ruling out” of PLI.

Performance on a battery of standardized norm-referenced language tests is often used to identify PLI in monolingual English speakers. Given the extraordinary heterogeneity in experiences and resulting proficiency among typically developing bilingual children, there are a host of formidable challenges for the development of standardized, norm-referenced measures for any particular group of dual-language learners. As such, there are currently no published tests that can be used to independently identify PLI in any group of bilingual learners. A few tests report normative data in a minority L1 (e.g., Spanish versions of the Preschool Language Scales-4, Zimmerman, Steiner, & Pond, 2002 and the Clinical Evaluation of Language Fundamentals-4, Wiig, Secord, & Semel, 2006). None report normative data on comparable measures in both languages of developing bilinguals. There are also no standardized language measures in lower incidence home languages (e.g., Chinese, Vietnamese, Somali). There is, however, a solid and growing empirical base that provides insight into the practical issue of “difference or disordered” (see Kohnert & Medina, 2009 for systematic review).

4.1 Identifying PLI: Empirical Evidence and Standards of Comparison

Researchers have employed three different standards of comparison and a variety of experimental language tasks to investigate potential ways to separate differences from disorders among bilingual learners. One way is to consider the bilingual child's performance on selected tasks as compared to those of monolingual peers. A second way is to compare language performance between bilingual children with unexplained low language or suspected PLI to performance by typically developing bilingual peers who have similar cultural and language-learning experiences. A third way is to use within-speaker comparisons, documenting the rate and direction of change in performance on a particular language task over time and, in some cases, instructional support. Each of these standards of comparison serves different purposes and each has some limitations.

4.1.1 Monolingual Comparisons—A number of studies have compared language skills by typically developing L2 learners to monolingual children with PLI. In general, results from studies employing traditional knowledge-based measures of language show striking similarities between these two groups, negating the use of monolingual comparisons for the identification of PLI in bilingual speakers. For example, although in many languages grammatical weaknesses are noted as a hallmark of PLI in children between the ages of 4 and 7 (see reviews in Leonard, 1998; 2009), there is significant overlap in both the number and types of grammatical errors produced by typically developing L2 learners and monolingual children with PLI (e.g., Restrepo & Gutierrez-Clellen, 2001; Paradis, 2005). As such, comparing grammatical skills in the L2 of developing bilinguals to monolingual grammatical norms is not clinically useful as it would falsely identify typical L2 learners as impaired. Similarly, scores on single language vocabulary measures may also be comparable for typically developing bilinguals and monolingual children with PLI, due to diverse experiences and distributed lexical-semantic knowledge for dual-language learners, again negating the clinical utility of such comparisons (e.g., Peña, Iglesias, & Lidz, 2001; Umbel et al., 1992; Windsor & Kohnert, 2004).

Language-based processing measures are designed to reduce the role of prior language-specific experience and, as such, have been proposed as viable alternatives to more traditional knowledge-based measures for identifying PLI among diverse learners (e.g., Laing & Kahmi, 2003). However, it seems that performance similarity between typical L2 learners and monolingual children with PLI also extends to processing measures that rely on linguistic stimuli. Perhaps one of the most studied language processing tasks is nonword repetition. Although by definition the stimuli in nonword repetition tasks have no semantic value, they do adhere to the phonotactic properties of the test language (e.g. English). Kohnert et al. (2006) found that typically developing 8-to 13-year old Spanish-English bilinguals performed more poorly on the repetition of nonwords in English as compared to typical English-only age peers, but somewhat better than English-only speakers with PLI. In this case, nonword repetition performance was informative in ruling out PLI, as it represented a very conservative estimate of the language processing system. At the same time, the monolingual performance standard on English nonword repetition could not be the criterion for identifying PLI in bilingual learners. Overall, studies show that language-based processing measures may reduce measurement bias but they do not eliminate it. Performance on these tasks remains, to some degree, influenced by previous experience in the test language (e.g., Kohnert et al., 2006; Windsor et al., 2010).

In summary, there appears to be significant overlap between typical bilingual learners and monolingual children with PLI on a variety of language knowledge and processing measures. In some cases, it may be possible to rule out bilingual PLI by using monolingual comparisons, but not enough to make a diagnosis of PLI. For example, if abilities in the L2 of a minority L1 learner are clearly within the normal range across language tasks using a very conservative monolingual standard, then PLI may be safely ruled out. However, lower performance by this same child as compared to monolingual standards does not provide evidence of PLI as differences in language-learning experiences may explain the monolingual-bilingual performance discrepancy.

4.1.2. Bilingual Comparisons—Investigators have also begun to directly compare language ability in bilingual learners with and without PLI. Across a wide range of linguistic levels and tasks, these bilingual-to-bilingual comparisons reveal clear consistent differences between children with PLI and their unaffected age peers who share similar social and linguistic circumstances. Typically developing 4-to 7-year old Spanish-English bilinguals outperformed bilingual peers with PLI on a variety of grammatical measures (e.g., Gutierrez-Clellen & Simon-Cerejido, 2007; Restrepo & Gutierrez-Clellen, 2001). For young predominantly

Spanish-speaking children in the U.S. with limited English experience, measures of utterance length and errors in Spanish combined with parental report of speech and language development effectively separated typical learners from those with PLI (Restrepo, 1998). Older Spanish-English learners with PLI performed differently from their bilingual peers on an elicited morphological inflection task in English, indicating a persisting weakness in the use of specific grammatical forms for children with PLI (Jacobson & Schwartz, 2005). Bilingual children with PLI also performed more poorly on nonword repetition tasks in their L1 as compared to age peers with similar bilingual backgrounds (Girbau & Schwartz, 2008; Windsor et al., 2009). Damico, Oller, & Storey (1983) found significant differences between 6- to 8-year old Spanish-English bilinguals with and without language delays in the pragmatic devices used in both the L1 and L2.

Taken together, study results underscore the diagnostic importance of peer-based comparisons as the standard of performance for key clinical questions. Even when using bilingual peers as the standard of comparison, however, both languages need to be measured and considered as a composite for an accurate diagnosis. This is because of the significant variation found within any group of typically developing bilingual children previously discussed. Also, although it may be possible to develop normative comparisons for some high-density bilingual groups (e.g., Spanish L1 speakers learning English as their L2 in the U.S. beginning with preschool attendance or simultaneous French-English bilinguals in Canada), it is much less viable for other groups. An additional challenge is the limited number of language-matched SLPs to administer and interpret the results of bilingual measures, should they exist. Perhaps even more importantly, static measures of current language ability may not be well-suited for detecting PLI in developing bilinguals, given that shifts in both absolute and relative levels of language proficiency are a defining characteristic of typically developing children. Documenting the rate and direction of performance change within a referred child, as is done in dynamic assessment and other “learnability” measures may provide additional diagnostic evidence. These methods are discussed in the following section.

4.1.3. Within-Child Comparisons—Investigators have used two main types of tasks to investigate within-child change; limited training tasks and dynamic assessment tasks. In limited training or fast mapping tasks, children are taught new information, such as novel words or invented grammatical rules, through modeling and imitation in a structured context. After a period of familiarization and training on the target task, children are tested to determine if they can produce or identify new forms or generalize trained forms to novel items. The efficiency of the child's language-learning under these conditions, that is, the amount of gain from pre-training to post-training, is the response variable of interest. Hwa-Froelich & Matsuo (2005) found that typically developing Vietnamese-English preschool children were able to fast map a novel grammatical rule in English. Roseberry and Connell (1991) found that, at the group level, Spanish-speaking preschool children with PLI performed more poorly on an expressive novel morpheme learning task in English (L2) as compared to their typically developing mostly Spanish-speaking peers. However, Kohnert and Danahy (2007) found that some typically developing bilingual Spanish-English preschoolers had difficulty with this same limited training task, suggesting that there may be a wide range of normal variation in children's responses (see also Hwa-Froelich & Matsuo, 2005; Kan & Kohnert, 2008).

Within-child performance change is also the key response variable of interest in dynamic assessment. A key difference between dynamic assessment measures and limited training tasks is the critical inclusion of mediation- some guided support for learning provided by the SLP or task administrator. In dynamic assessment tasks, this mediation may include explanations as to the purpose of the task or elaborated feedback regarding performance accuracy (e.g., Peña, 1996; Peña et al., 2001; see Gutiérrez-Clellen & Peña, 2001 for tutorial). The goal is to identify the child's potential for change when provided with graded levels of support. Peña

(2000) found that children's modifiability in response to a mediated learning experience in their preferred language (Spanish or English) separated participants with low language ability from typically developing peers. Dynamic assessment procedures designed to measure change or learning on a particular task can be adapted to almost any language level; including the identification of single words, the learning of grammatical morphemes, the sequencing of story elements or the use of particular pragmatic devices. These measures can be administered in either or both of the child's languages.

Within-child comparisons provide essential assessment information and are a cornerstone of the recent "response to intervention" or RTI mandate for service delivery in U.S. schools (for RTI overview, see Graner, Faggella-Luby, & Fritschmann, 2005). At the same time, for diagnostic purposes, an external referent is needed. To better understand a referred child's responses to language-learning measures it may be helpful to test one or two typically developing culturally and linguistically-matched peers or siblings using the same methods to provide this additional perspective. An additional challenge is that quantifying a child's response to mediation requires significant experience in instructional techniques as well as knowledge of response patterns for typical and atypical linguistically diverse learners.

These studies represent a critical starting point in our understanding of PLI in the context of bilingualism. Although there is as yet no definitive empirically-based method to separate differences from disorders or to satisfy all three general assessment aims, this growing empirical literature provides important direction for differential diagnosis. To satisfy professional mandates, SLPs complete valid assessments with linguistically diverse learners by using a combination of methods.

4.2 From Research to Practice: Implications for Gathering and Interpreting Clinical Data

A valid assessment can be achieved by using a combination of methods and triangulating data outcomes from multiple sources to evaluate developmental history, current levels of achievement in both languages as well as to assess the integrity of the child's more general ability to learn or use language (e.g., Caesar & Kohler, 2004). To form the basis for valid, non-biased clinical actions, gathered child-specific data is interpreted with respect to the literatures on typical bilingual development and PLI, the child's age, cultural and language history, peers with similar experiences, family, cultural, community and academic team expectations as well as the child's communicative needs (Kohnert, 2008). Bias in assessment, essentially the misrepresentation of the child's communicative abilities, may result in the failure to identify a child who needs language services, the inappropriate identification of a typical language learner as impaired, or in the development of a flawed plan of action that will not serve the child's best interests. Bias in data gathering occurs when methods are not consistent with the child's language, cultural or educational experiences or when insufficient data is collected (see Laing & Kahmi, 2003 and Westby, 2000 for discussions of different types of bias). Bias in the interpretation of collected data can occur when results from a single measure are used as the basis for clinical decisions or when values or standards not consistent with the child's experiences are used to evaluate his or her performance. Focusing on the validity of the entire assessment process as opposed to the validity of a single language measure allows the professional more freedom, insures the integrity of the process and is consistent with best professional SLP practices (Kohnert, 2008).

A combination of direct and indirect language measures are needed to complete a valid assessment. Sources of information important to the assessment process may include; interviews with family members, teachers and in some cases, the child; developmental, social, educational, immigration and medical histories; systematic observations of the child's communicative interactions in various settings and with different partners; work samples or portfolios from school-age children, as well as direct measures of language. The most

informative combination of methods will change with the child's age, developmental stage and social circumstances. For example, when assessing a 30 month old child referred for “not talking” the most informative methods may include parent report of words understood or produced, child language experience, social and developmental history, observation of the child in natural settings interacting with siblings or parent, and supplemented with a mediated learning measure (as when a child is taught to make signs for ‘more’ to request the examiner to blow additional bubbles). The most informative combination of methods for a school age child who uses one language at home and another at school may include an evaluation of work samples collected over time, systematic observations in structured classroom settings as well as when interacting with peers, direct measures of both the L1 and L2 on language comprehension and production tasks at a variety of levels (lexical-semantic, grammatical and narrative tasks) using criterion-referenced and learnability measures with peer-based comparisons when available, teacher as well as parent report and child interview.

Direct language measurement procedures are used to determine the child's current functional level in the L1 and the L2 (such as language or narrative sample analysis, parent report of vocabulary or standardized tests of language comprehension) or efficiency in learning or using different types of information in response to instruction (such as SLP developed dynamic assessment or RTI tasks). Data regarding the child's understanding as well as expression of both languages is needed. Task responses are analyzed in various ways, with an end toward understanding the child's range of language abilities- strengths and weaknesses in the L1 and the L2 relative to his or her experience or opportunities in each language. Partners in the data collection and interpretive process may include bilingual professionals or paraprofessionals, interpreters/translators, parents, older siblings or other family members or foreign/second language teachers.

Once a diagnosis of PLI is confirmed and a valid assessment completed, language intervention is initiated. Planning a course of action requires consideration of the child's history with the L1 and the L2 as well as the anticipation of future needs and opportunities for each language across communicative contexts.

5. Intervention Considerations in Bilingual PLI

Intervention is essentially planned action intended to help the child with PLI reach his or her potential as a communicator. These planned actions may be direct, with systematic training on certain forms and functions implemented by the SLP, as well as indirect, with parents, teachers, paraprofessionals, peers or other community partners guided to be primary agents of change. Although PLI is not caused by deficits in the environment, when inefficiencies in language exist due to some breach in the integrity of the child's internal language system as it interacts with the available input, a core tenet in the language treatment literature is that the environment can play an important facilitative role. SLPs may work to improve children's skill in communication by manipulating input (such as reducing rate of input, highlighting certain sounds, words, grammatical structures or social functions) within carefully constructed environments intended to either strip away or replicate influential factors found in natural contexts. Parents and early childhood educators may also be trained to interact with their child in specific ways to increase the availability of meaningful language (e.g., Girolametto & Weitzman, 2006). For English-only speaking school-age children with PLI, a variety of interventions have been shown to be effective, including those that rely on computer interface or peer interactions (see Cirrin & Gillam, 2008 for systematic review).

Over the past decade bilingual clinical researchers have advocated replacing the question; “Which language should we support in intervention with bilingual children?” with “How can we best support both languages needed by bilingual children with PLI?” (e.g., Gutierrez-

Ciellen, 1999; Kohnert, 2008; Kohnert & Derr, 2004; Kohnert & Medina, 2009; Restrepo, 2005). Despite recommendations to the contrary in the clinical literature, systematic support for only one language remains conventional for most bilingual children with PLI (e.g., Jordaan & Yelland, 2003; Zehler et al., 2003). There are at least three reasons for the prevalence of treatment plans that consider only one language for bilingual children with PLI. First, there is a critical shortage of bilingual SLPs, resulting in a frequent mismatch between child and provider languages. A myth related to this very real shortage of bilingual SLPs is that only bilingual language-matched clinicians can support dual-language development. Second, exclusive training in the majority language is often believed to be the best way to improve educational outcomes for bilingual children with PLI. Third, this practice has not been empirically vetted so SLPs have little evidence on which to base alternative clinical recommendations. That is, although there are now a number of resources that describe procedures for supporting dual-language intervention plans for bilingual children with PLI, even in cases where the clinician does not speak both of the child's languages (e.g., Kohnert, 2008; Kohnert & Derr, 2004; Kohnert, Yim, Nett, Kan, & Duran, 2005; Peña & Bedore, 2009; Restrepo, 2005), there is a dearth of studies investigating the effectiveness of these recommended procedures (Kohnert & Medina, 2009). Two main considerations in both planning and investigating effective, efficient intervention in bilingual PLI are the generalization of treatment gains and the approaches to structuring systematic support for target languages.

5.1 Generalization in Bilingual PLI Treatment

Generalization, the extension of language gains on targeted stimuli and tasks to untrained stimuli and communicative interactions in real-life settings, is the single most important marker of a successful intervention plan. For bilingual children with PLI, an additional issue to consider is generalization or transfer across languages, from a treated to an untreated language. Evidence of generalized improvement in an untreated language as well as the primary treated language would present an effective and efficient method for facilitating language in bilingual children with PLI. The clinical issue of potential cross-language generalization following treatment in bilingual PLI is a direct correlate to the issue of cross-language associations typically developing bilingual learners introduced in section 2.2, *Cross-language Associations within Bilingual Children*.

A significant clinical question related to generalization for bilingual children with PLI is whether treatment in only one language produces greater gains than intervention plans which systematically consider both of the child's languages. To date, such direct evidence is extraordinarily limited and generally restricted to single subject studies (Perozzi, 1985; Restrepo & Kruth, 2001; Thordardottir, Ellis Weismer, & Smith, 1997). In the only available group comparison study, Perozzi and Sanchez (1992) divided 38 bilingual first graders in the U.S. with low oral language scores into two treatment groups. One group received vocabulary training in Spanish (L1) until criterion was reached and then English (L2) training was initiated. The other treatment group received vocabulary training only in English. The bilingual treatment group obtained criterion-level performance on target vocabulary items in both Spanish and English faster than the English-only group learned English vocabulary. These results indicate unidirectional cross-language generalization, in that treatment in the L2 did not benefit the L1, yet treatment in the L2 was associated with vocabulary gains in both the L1 and L2. These results, reflecting associations at the general conceptual or processing levels (versus structural-level interactions) are consistent with findings in the more general bilingual education literature which shows that building on an existing L1 foundation may pave the way to greater subsequent gains in the L2 (e.g., Rolstad et al., 2005). Although the Perozzi and Sanchez (1992) study is considered part of the language impairment literature, it may be that participants were typically developing L2 learners: all were from the same classroom and

conventional criteria to identify PLI was not employed. The presence and nature of cross-language associations in children with PLI remains open.

As with typically developing bilingual children, cross-language associations may be the result of interactions between surface characteristics of the two languages or due to shared conceptual or processing mechanisms. Both learner and language characteristics may affect the presence and nature of any relationships. The particular type of training employed could also potentially facilitate or constrain generalization within as well as across languages and settings. Additional research in this area is essential as it lies at the heart of educational and clinical treatment issues. It is possible that the generalization of treatment gains from one language to the other, or the promotion of positive cross-language associations, could be facilitated by careful consideration of how the languages are combined in the intervention plan. The clinical question then becomes; *how could we structure the language of intervention in clinical planning to best promote gains in both languages in the bilingual child with PLI?*

5.2 Bilingual and Cross-linguistic Approaches to Treatment

Holistic interactive views of bilingual PLI indicate both languages are considered in the intervention plan. Precisely how this plan is implemented will vary with each child. Kohnert and Derr (2004) introduced two general approaches to structuring language during the intervention process; a Bilingual Approach (with skills common to both languages receiving attention) or a Cross-linguistic Approach (with attention directed at specific linguistic features or social uses of each language separately). These approaches are complementary, not mutually exclusive, and are meant only as a heuristic method for thinking about how different languages may be incorporated into clinical action plans. Although the Bilingual and Cross-linguistic Approaches can also be applied to indirect components of an action plan they are presented here within in the context of direct systematic treatment delivered by an SLP.

In the *Bilingual Approach* to intervention, attention is simultaneously directed at improving communicative competency in both of the child's languages, within treatment sessions, activities or socially mediated interactions. According to Kohnert and Derr (2004), this direct dual-language focus may be achieved in the following ways: (1) by focusing on cognitive or processing mediated skills common to all languages and an area of weakness in PLI (such as the efficiency in processing information or the ability to attend to slight changes in signal form); (2) by directly training those structural aspects of language content, form or use that are shared by the two languages (such as cross-linguistic cognates or other surface similarities between the child's two languages); and (3) by invoking conceptual and metalinguistic processing to compare and contrast the two languages, using contrastive analysis, translation or cross-linguistic scaffolding. It may be that bilingual treatment, using both languages within a single session, will promote within- and across-language generalization by encouraging children to pool cognitive, linguistic and social resources. An SLP who does not speak both of the child's languages can implement many procedures consistent with the bilingual approach, including the use of software or commercially available games that promote efficiency in general information processing (Ebert & Kohnert, 2009), structured translation activities using on-line dictionaries, cognate search and define strategies with academic texts or mediated interactions with parents as partners in an SLP-directed language group (e.g., Kohnert, 2008; Kohnert et al., 2005). With respect to generalization, the goal here is to promote positive cross-language associations, simultaneously promoting development in each of the child's languages.

The *Cross-linguistic Approach* provides special training in each language, separately targeting those linguistic features or communicative functions unique to the child's L1 and L2 (Kohnert & Derr, 2004). Non-overlapping features of the child's two languages may be at the sound, meaning, structural, discourse or pragmatic levels. Also, some communicative functions or modalities may be very important in one language but less so in the other. Here the goal is to

target key forms and functions as they are needed in the child's different settings. A Cross-linguistic Approach may focus on both languages, concurrently in separate treatment sessions, or sequentially with systematic treatment of target structures or concepts in one language immediately followed by training in the other language (e.g., Perrozi & Sanchez, 1992). In some cases, particularly with younger minority L1 children with PLI, an intervention plan may focus for several months exclusively on developing the L1 to pave the way for more rapid subsequent learning in the L2. Once foundational L1 skills are reinforced, the L2 may be incorporated into treatment, using direct (SLP-implemented) or indirect (partner-implemented) procedures (Kohnert et al., 2005). As in all interventions plans, procedures may be implemented by the SLP or in collaboration with parents, paraprofessionals, teachers, peers, siblings, or other community partners. Note that both cross-linguistic and bilingual approaches to intervention have as their ultimate goal facilitating communicative gains in both languages of bilingual children with PLI.

In summary, SLPs strive to promote learning and generalization, both within and across languages, in bilingual children with PLI. There are different ways to consider structuring direct as well as direct components of the treatment plan. At the same time, direct evidence investigating treatment outcomes under various conditions is needed to advance both the science and clinical practice of intervention in bilingual PLI.

6. Summary and Conclusion

In this article, general issues and empirical evidence relevant to clinical actions with bilingual children with suspected or confirmed developmental language impairment is presented. There is a solid and growing literature documenting language and cognitive abilities in the L1 and L2 in typically developing bilingual children. This normative data base provides a critical reference point when we consider children at risk for persistent PLI. Three key characteristics of typically developing bilinguals identified are; an uneven distribution of abilities in the child's two languages, positive as well as cross-linguistic associations within bilingual learners at either structural or conceptual/processing levels, and individual variation in response to similar social circumstances. These characteristics are fundamental considerations in assessment as well as intervention in PLI. Although our understanding of distributed skills and individual variation has increased exponentially over the past decade, our understanding of cross-language associations in developing bilinguals lags behind. Further investigation in this area would substantially improve our understanding of educational and clinical interventions with bilingual learners.

To differentially diagnosis PLI in dual- (as well as single-) language learners, a variety of data gathering methods is recommended, with results compared to the culturally and linguistically matched peers, the normative literature and the child's environment. Studies which have relied on bilingual peer-based comparisons have shown that a variety of language tasks reliably separate those affected by PLI. In contrast, language-based comparisons with monolingual peers do not. There is some indication that the subtle weaknesses in general cognitive processing that are part of the PLI profile can be exploited for the identification of PLI in linguistically diverse learners. Further research in this area is needed to translate this basic research finding to clinical practice.

One of the most critical areas of research need at the intersection of PLI and developing bilingualism is in the area of intervention. In this article two potential strategies for structuring intervention to improve outcomes in both of the child's languages are introduced (Bilingual and Cross-linguistic). Direct evidence investigating the relative and absolute effectiveness of a variety of treatment strategies is needed. To improve treatment efficacy with bilingual

children with PLI, it is essential to understand factors that promote or constrain generalization within and across languages.

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