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Towards understanding the bilingual profile in typical and atypical language development: A tutorial

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Abstract

Purpose: The purpose of this tutorial is to inform assessment, treatment and research approaches that are uniquely tailored to bilingual children with and without developmental language disorder (DLD), a communication disorder characterised by weaknesses in language production and comprehension.

Method: A review is presented on what is known about joint language activation in adult and child bilinguals. This supports a discussion of the bilingual profile, which includes cross-language interactions and associations with broader cognitive functions. This is followed by consideration on how these bilingual phenomena may manifest in the context of relatively weak language skills, as is the case with DLD.

Result: In addition to exploring the bilingual profile, guidelines are provided for incorporating cognates—a type of translation equivalent with distinct overlap in form and meaning that enhances cross-linguistic interactions—in language assessment, therapy and research.

Conclusion: The field of speech-language pathology would benefit from more tools specifically designed for bilingual children. Already, there is interest in clinical applications of cognates, as they may support transfer and generalisation across languages. Future research is needed to better explore this potential in child bilinguals, particularly those with DLD. Such work would help establish a developmental bilingual processing model with clinical relevance.

Keywords

bilingualism; language development; developmental language disorder; language impairment; cross-language interactions; executive function

Introduction

Discerning typical and atypical language development in bilingual children is a well-known challenge in the field of speech-language pathology. Contributing factors include the relative lack of assessments developed for culturally and linguistically diverse clients; relatively

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small number of bilingual clinicians and educators; limited developmental data for many languages; wide variety of native languages represented on caseloads; and the heterogeneous profiles of language development demonstrated by child bilinguals with typical and atypical language development (see Guiberson & Atkins, 2012).

Clinically, best practice for young bilinguals involves assessing each language separately and considering performance across both (ASHA, 2017). But what we know of bilingualism in adulthood is that the two languages are not separate. Instead, they are jointly activated and interact with one another. Is it possible to use this information to discern typical and atypical bilingual language development in childhood? That is, do typically developing children acquiring two languages resemble their adult counterparts and demonstrate cross-language interactions? And might these cross-language interactions differ in bilingual children with relatively weak language skills, such as those with developmental language disorder? The goal of this tutorial is to describe a uniquely bilingual phenomenon, joint activation of both languages, and to consider its potential contribution to clinical practice for young bilinguals. In service of clinical applications and future research efforts, we also outline evidence-based considerations for incorporating cross-language interaction in bilingual language assessment and treatment.

The bilingual profile in adults

Ostensibly, bilingual speakers use one language at a time, selecting the appropriate language for a given context. If the two languages are used in the same interaction, this is called code switching, a term that subtly conveys that a bilingual speaker shifts from one language mode to another. On the contrary, it is now understood that a bilingual speaker's two languages are both consistently and jointly activated. Even when context calls for a specific language, activation of the non-target language can be detected (e.g. Kroll, Bobb, Misra, & Guo, 2008).

With both languages activated, it is possible for one to affect the other. Across comprehension and production, in spoken and written language, adult bilinguals demonstrate influence of their first language on their second and vice versa (see Kroll, Dussias, Bogulski & Valdes-Kross, 2012). This pattern of cross-language interactions, or the potential for knowledge of one language to affect performance in the other, has often been demonstrated with lexical tasks in which stimuli are manipulated with regard to their cognate status. Cognates are cross-language word pairs that are similar in both meaning and form. For example, *elephant* in English and *elefante* in Spanish are a cognate pair, as they refer to the same object and have a high degree of similarity in phonological (and orthographic) composition. In contrast, *bird* and *pájaro* are translation equivalents and share a referent but are non-cognates because there is no overlap in form. Bilingual adults respond to cognates with greater accuracy and speed on a wide array of linguistic tasks, including lexical decision, naming and translating (see Desmet & Duyck, 2007). Of particular interest to the present paper, it has also been shown that adult bilinguals learn cognates more successfully than non-cognates (Lotto & De Groot, 1998; De Groot & Keizjer, 2000). This pattern of cognate effects is consistent with the two languages being activated in tandem, with congruent information across the two resulting in facilitation. Appropriately, influential

models of bilingual language processing reflect this parallel language activation (e.g. BIA+, Dijkstra & Van Heuven, 2002; Revised Hierarchical Model, Kroll, van Hell, Tokowicz & Green, 2010; Distributed Features Model, van Hell & de Groot, 1998). In short, cross-language interactions are expected in multilingual individuals and may be considered an aspect of the bilingual profile.

An addition implication of this cross-language activation is that successful use of the target language requires the resolution of the two competing languages. Executive function (EF), a set of higher-order cognitive processes including updating, shifting and inhibitory control, is understood to be implicated in this language selection (Miyake et al., 2000; Luk, Green, Abutalebi, & Grady, 2012). Accordingly, it has been argued that bilinguals gain significant experience exercising EF skills (Green, 1998), and numerous studies have compared EF performance in bilingual and monolingual groups to test for a bilingual advantage (e.g. Barac, Bialystok, Castro & Sanchez, 2014; c.f. Hilchey & Klein, 2011). In addition, refined methodologies and analyses are now being used to recognise individual differences within bilingual speakers to better understand the complex relationship between dual language experience and EF (e.g. Kroll & Bialystok, 2013; Linck, Hoshino & Kroll, 2008). The bilingual profile may thus also include specific patterns of EF performance.

In short, joint activation of both languages in adult bilinguals has consequences for language performance and, potentially, for broader cognitive functions. Is a similar profile evident earlier in development? And might it differ as a function of language ability? How can this information be applied in clinical practice? We begin to address these questions with an overview of cross-language interactions in typically developing child bilinguals, who, unlike their adult counterparts, are in the process of developing language skills.

The bilingual profile in development

Cross-language interactions in typically developing bilingual children

Patterns of cross-language influences have been demonstrated in child bilinguals across language domains, including phonology and morphosyntax (see Kohnert, 2010). However, as in the literature on adult bilingualism, much of this research has utilised lexical tasks and manipulated cognate status.

Cognate sensitivity in child bilinguals appears to be present as early as preschool and persists into early adolescence. In child bilinguals, this understanding is largely based on evidence from studies that have repurposed standardised language assessments by categorising test items as either cognates or non-cognates (see Rosselli, Ardila, Jurado & Salvatierra, 2012, for a comparable approach in adult bilinguals). In these studies, young bilinguals and second language learners have demonstrated higher accuracy rates for words that were similar in form and meaning across their two languages (e.g. Kelley & Kohnert, 2012; Pérez, et al., 2010; Bosma, Blom, Hoekstra & Versloot, 2016). As previous studies were highly variable in methodology with respect to cognate identification, Potapova, Blumenfeld and Pruitt-Lord (2016) considered multiple criteria for identifying cognates in predetermined word lists, including subjective criteria based on speaker judgments and an objective phonological criterion. Consistent with related research, Potapova et al. (2016)

found that preschool-aged Spanish-English bilinguals with typical language development demonstrated higher comprehension for cognates than non-cognates when tested in English, provided that the cognate pairs were relatively transparent (i.e. identified via speaker judgment; see also Bosma et al., 2016).

Cognate effects have also been demonstrated with more controlled experimental paradigms. Sheng, Lam, Cruz and Fulton (2016) selected stimuli specifically to test for cognate sensitivity, controlling for the target words' phonological structure, frequency, length and age of acquisition across English and Spanish. Results indicated that 4- to 7-year-old Spanish-English bilinguals were better able to name objects with cognate than non-cognate labels in each of their languages. Importantly, neither age-matched English monolinguals nor Mandarin-English bilinguals demonstrated the same advantage, indicating that the cognate stimuli were not inherently easier or more recognisable. Instead, it appears that the young Spanish-English bilinguals benefited from cross-language associations during this task. Similarly, 8- to 9-year old German-English bilinguals named objects and translated words more quickly when the target forms shared cross-linguistic overlap (e.g. *nose/Nase* in English and German, as compared to *head/Kopf*).

This research offers parallels between child and adult bilinguals in terms of cognate sensitivity. Both child and adult bilinguals demonstrate influence from the non-target language and are sensitive to degree of overlap in cognate word pairs (Bosma et al., 2016). And across the lifespan, cognate effects may be related to individual factors, including language dominance (Rosselli et al., 2012; Pérez et al., 2010). However, there is also evidence that cross-language sensitivity develops over time. Kelley and Kohnert (2012) found that age predicted cognate effects in English language learners aged 8–13 years, and Potapova et al. (2016) found that cognate effects emerged in a smaller proportion of child than adult bilinguals. Though cognate sensitivity may be relatively attenuated early in development, typically developing child bilinguals demonstrate a clear potential for joint language activation and cross-language interactions, with knowledge of one language supporting performance in the other.

But how does this aspect of the bilingual profile manifest in the context of an impaired language system, as in the case of developmental language disorder (DLD)? Might it be the case that DLD in the context of dual language use is characterised, in part, by dampened cross-language associations? Should this prove to be the case, measures of cross-language interactions may play a useful role in bilingual language assessment. Conversely, if bilingual children with weak language skills demonstrate preserved sensitivity to cross-language similarities, such targets may prove particularly useful in language therapy, bolstering performance in both languages. Critically, future research in this area will help establish clinical tools that are tailored to multilingual speakers, addressing a recognised need in the field of speech-language pathology. In the following section, we consider evidence relevant to cross-language interactions in bilingual children who demonstrate impaired language development.

Cross-language interactions in the context of weak language skills

Evidence for cross-language sensitivity emerges from studies of healthy adults (e.g. Kroll et al., 2012); adults with impaired language skills (e.g. Kohnert, 2004); and young bilinguals with typical development (e.g. Sheng et al., 2016). Understanding this phenomenon in bilingual children with impaired language skills has the potential to support clinical decision-making for culturally and linguistically diverse children and to help extend models of adult bilingual language processing to this population. How do cross-language interactions and associations manifest within a relatively weak language system in development? To facilitate this discussion, it is helpful to briefly review relevant features of DLD (also known as specific language impairment, primary language impairment, or language impairment), a developmental disorder resulting in weak language skills in the absence of explanatory causes (e.g. hearing loss, cognitive impairment, neurological trauma, etc.). As research on DLD is most widely available for monolingual English-speaking children, we begin with a brief review of this literature.

While DLD is frequently described with reference to weaknesses in morphosyntax (e.g. Leonard, 2014), it is important for the purposes of this tutorial to consider the lexical-semantic deficits evinced by children with DLD relative to typically developing (TD) peers. Children with DLD present with delayed onset of first words and may perform below TD peers on vocabulary measures (e.g. Gray, Plante, Vance & Henrichsen, 1999; Watkins, Kelly, Harbers, & Hollis, 1995). Further, children with DLD also show difficulty with word naming, recall and categorisation (Dollaghan, 1998). Relative to TD peers, these children also make more errors when naming familiar objects (McGregor, Newman, Reilly & Capone, 2002); demonstrate difficulty inhibiting non-target competitor words during auditory word discrimination (Mainela-Arnold, Evans & Coady, 2010); and provide fewer accurate information units when defining familiar words (Mainela-Arnold et al., 2010). Novel word learning tasks have been used to better understand semantic weaknesses in children with DLD. A consistent pattern in this research is that monolingual children with DLD demonstrate relative difficulty learning new words, including needing more exposures to novel labels to demonstrate learning that is comparable to TD peers (Rice, Oetting, Bode & Pae, 1994). In a recent meta-analysis, Kan and Windsor (2010) concluded that monolingual children with DLD (4;2–12;3) demonstrate lower performance on novel word recognition, comprehension and production relative to age-matched TD peers during word learning tasks.

A number of underlying deficits have been proposed to explain these findings, including an auditory perceptual deficit (Dollaghan, 1998); impairment in phonological working memory or processing (Gathercole & Baddeley, 1990); difficulty with lexical competition (Mainela-Arnold, et al., 2010); weak receptive language or vocabulary skills (McGregor et al., 2002); and a syntactic deficit (see Kan & Windsor, 2010), with conflicting evidence across studies. Multiple factors are seemingly at play, including multiple levels of representation (e.g. phonology, semantics; Gray 2005) and perception (e.g. audition; Dollaghan, 1998). Further, the relative weight of these factors may shift as different skills (e.g. comprehension vs. production) are measured (Gray 2006). Though underlying mechanisms have yet to be pinned down, the behavioral differences in lexical-semantic tasks between TD children and

peers with DLD are consistent and compelling. Altogether, children with DLD are understood to have weaker semantic representations than TD peers (Mainela-Arnold, et al., 2010; McGregor et al., 2002).

Despite these group differences, diagnosing DLD in monolingual children is not a clear-cut matter. Standardised assessments have been developed for evaluating language in monolingual English speakers, but criteria for DLD are arbitrary and inconsistent in both research and clinical practice (Spaulding, Plante & Farinella, 2000). Further, norms are not available for dynamic assessment approaches, including novel word learning tasks, because they are, by necessity, individualised to a child's needs. Measures with subjective components (e.g. evaluation of learning process; naturalistic observation) may be difficult to interpret consistently across children, settings and clinicians, further complicating the task of diagnosing DLD (Tomblin, Records & Zhang, 1996).

This challenge becomes more pressing in the case of dual language learners. Bilingual children demonstrate highly variable patterns of language development, particularly in the early stages of acquiring a second language (Paradis, 2005). As a result, clinicians must be able to discern whether a child demonstrates language differences, a language disorder, or both (Oetting, 2018). The identification of appropriate and sensitive clinical measures is needed to support clinicians so that bilingual children receive the services that match their needs.

There are notable parallels in how DLD manifests in monolingual and bilingual speakers. For example, English-speaking bilingual children with DLD also demonstrate difficulty with English tense and agreement morphemes (Gutierrez-Clellen, Simon-Cereijido & Wagner, 2008; Potapova, Kelly, Combiths & Pruitt-Lord, 2018). Similarly, bilingual children with DLD have been shown to have weaknesses in lexical-semantic tasks. For example, 4- and 5-year-old Spanish-English bilingual children with DLD demonstrated weaker comprehension for novel Spanish words than did TD age-matched bilingual peers (Kapantzoglou, Restrepo & Thompson, 2012).

Drawing from our understanding of impaired language systems in development, it is reasonable to expect differences in patterns of cross-language associations and cognate sensitivity across bilingual children with typical development and those with DLD. One possibility is that cognates will present a relative challenge for bilingual children with DLD. If children with DLD have difficulty inhibiting lexical competition (Mainela-Arnold et al., 2010), then the high degree of similarity across cognates may impede the formation of stable form-meaning associations (i.e. learning a specific label for a referent) and cause difficulty in learning these types of lexical items. Similarly, difficulty with auditory perception or phonology (e.g. Dollaghan, 1998; Gathercole & Baddeley, 1990) could impact children's ability to discern small but meaningful differences between the cross-language translation equivalents in cognate pairs. And in a relatively weak or sparse semantic network (Mainela-Arnold, et al., 2010; McGregor et al., 2002), associations across languages may not be well supported, precluding the facilitatory cognate effects demonstrated by TD peers.

Two studies provide emerging evidence that cognates will pose a challenge for children with DLD. Kohnert, Windsor and Miller (2004) tested how successfully 8- to 13-year-old English monolinguals with typical language development and monolingual peers with DLD identified Spanish words. Participants were presented with Spanish words that varied in their form overlap with English (i.e. cognate status) and selected one of two pictures to match the label. TD children outperformed peers with DLD, indicating that the children with DLD had more difficulty identifying and capitalising on cross-language similarity. However, as these were monolingual children, this is not necessarily representative of a bilingual semantic system. Second, a case study describing therapy for word-finding difficulties in a multilingual child (8;6) with DLD found that the child had difficulty retrieving cognate words prior to treatment (Kambanaros, Michaelides & Grohmann, 2016). These studies provide early indications that cognate sensitivity may informative in bilingual language assessment.

Alternately, it is possible that unlike within-language semantic associations, *cross-language* associations may be spared in bilingual children with DLD. Unlike other words similar in form (e.g. *cab* and *cap* in English)—cognate pairs *do* refer to the same object. As such, it is possible that suppressing phonological neighbors or processing highly detailed phonological information is not necessary to pair a label and referent. If this is the case, and bilingual children conflate the two highly similar translation equivalents (e.g. *tiger* in English and *tigre* in Spanish) when initially encountering novel forms, then exposure to the word in each language might constitute repeated exposures. In turn, this increased exposure to highly similar translation equivalents may support cognate learning relative to non-cognate learning (Rice et al., 1994), and we may see that bilingual children with DLD demonstrate comparable or stronger cognate effects than TD peers. The single study that has compared cognate sensitivity in bilingual children with typical and atypical language development has found this pattern (Grasso, Peña, Bedore, Hixon & Griffin, 2017): Like the TD group, Spanish-English bilingual children (5;0–9;11) with DLD were more likely to name cognates in each of their languages than non-cognates. As the authors indicate, this is evidence of preserved cross-language associations, even in the context of weak language skills. This pattern of results offers support for the use of cognates as targets in bilingual language treatment.

Emerging research motivates the use of cognates in clinical practice, but continued investigations of cross-language sensitivity are needed to support evidence-based practice. How do we best make use of current information as we continue to clarify the role of cross-language associations in bilingual language development? We outline relevant considerations and future directions in the following section.

Cross-language interactions and practical applications

Cognates have been shown to help child and adult bilinguals bootstrap information across their two languages. Accordingly, this special word class is hypothesised to support transfer, generalisation, and improvement across languages, and cognates are noted as potentially valuable treatment targets for bilinguals (e.g. Kohnert, 2010, 2004; Kambanaros et al., 2016). And yet, empirical evidence on cognate therapy is limited, particularly for young

bilinguals (cf., Kambanaros et al., 2016) and in the context of language assessment. Next, we offer considerations for utilising cognates that may be of use to researchers and clinicians alike.

Individual factors.—Current research in child and adult speakers indicates that cognate effects are not uniform across bilinguals. Sensitivity to cross-language similarity may increase with age (Kelley & Kohnert, 2012; Potapova et al., 2016), and differences in performance on cognate and non-cognate targets may be more robust in unbalanced bilingual speakers (Pérez et al., 2010; Rosselli et al., 2012). To illustrate, we may expect greater cognate effects in a school-aged bilingual tested in her non-dominant language than a preschool-aged bilingual with similar skills in both languages. And, as outlined above, there may be reason to expect differences in ability to bootstrap information across languages between children with typical and atypical language development.

Importantly, individual factors relevant to cross-language interaction continue to be discovered as research in this area progresses. For example, recent work has linked individual differences in executive function with individual patterns of cross-language interactions (Crivello et al., 2016; Linck et al. 2008). Continued efforts are needed to fully capture the nature of cross-language sensitivity in development. Future work on cross-language interactions should continue to monitor factors known to be relevant, such as language dominance, but also explore the contribution of less understood factors, including language status (typical language development vs. DLD).

Cognate status.—Just as cognate effects may differ across individual speakers, the magnitude of this effect also differs as a function of the word pairs selected (Bosma et al., 2016; Potapova et al., 2016). That is, cognate status may be a spectrum as opposed to a clear categorical distinction. Some word pairs demonstrate near total overlap in phonology and orthography (e.g. *accident/accidente* in English/Spanish) and would be identified as cognates by nearly any criterion, including speaker judgments or objective overlap measures. Other pairs are clearly non-cognates, demonstrating no substantial overlap (e.g. *feather/pluma*). Still others fall somewhere in between, with meaningful—but less transparent—overlap (e.g. *surprised/sorprendido*). Indeed, Potapova et al. (2016) found that different methods of determining cognate status resulted in different sets of cognates and non-cognates within the same predetermined word list. While some translation equivalents were unequivocally identified as cognates across the approaches, others were identified by some criteria, but not others, indicating that different pairs of translation equivalents may differ in their degree of cognate status. Similarly, the Crosslinguistic Overlap Scale for Phonology (Kohnert, Windsor, & Miller, 2004) objectively ranks similarity between translation equivalents on a scale of 0 to 10, reflecting a continuum of overlap.

Cross-language facilitation and cognate effects appear to be more readily found when maximising the degree of overlap between the two translation equivalents (e.g. Bosma et al., 2016). As a result, highly transparent cognate targets may be most useful for training cognate awareness and other cognate-based tasks in therapy. Selecting such cognates may be particularly important when exploring cross-language interactions in speakers whose sensitivity may be more fragile, such as younger children. Future work may explore the

potential benefits of cognates with less obvious overlap. For example, in the context of language treatment, do such cognate pairs add a meaningful challenge or complexity that stimulates greater generalisation following therapy? And, in the context of assessment, might such cognates better distinguish between strong and weak language skills in bilingual children?

Extensions of cognate-based therapy and teaching.—Cognates may serve as bridges across languages and the contexts in which those languages are used (e.g. Cummins, 2005). Imagine a typical scenario in the United States—a bilingual child receives intervention from a speech-language pathologist that does not share her native language. By selecting cognate treatment targets, the clinician can utilise English in sessions while providing an avenue for the family to support the child in their native language at home. Sample tasks in therapy could include structured translation activities or cognate searches using academic texts (Kohnert 2010), or the use of pre-programmed materials including cognates in both languages (Pham, Kohnert & Mann, 2011). Families may then reinforce the same cognate pairs using the home language. Importantly, such an approach fosters family involvement, places value in each of the child's languages, and supports the child's language development more holistically (e.g. Verdon, Wong & McLeod, 2015), consistent with best practice for culturally and linguistically diverse children.

Research also indicates that training in cognate awareness may improve academic performance, including reading comprehension (Nagy, Garcia, Durgunoğlu & Hancin-Bhatt, 1993). Bilingual students may reap particular benefits when the cognate word pairs differ in frequency or difficulty across the two languages, as is often the case. As Nagy et al. (1993) describe, numerous technical or academic words in English are cognates with relatively common Spanish words (e.g. *infirm/enfermo* in English/Spanish). Cognates thus offer an opportunity to support bilingual children in academic contexts in a manner that aligns with the home language.

Task presentation and demands.—Cognates and non-cognates may be presented via numerous language tasks—such as categorisation, translation and word learning—in either written or spoken form. Such flexibility is useful in clinical settings, as tasks may be selected to meet a child's needs and stage of development. While cognate effects have been detected in preliterate children, tasks with reading and writing may illustrate cognates' orthographic similarity and be appropriate for school-age children (e.g. Nagy et al., 1993). Depending on the method of presentation, cognates may be selected for greater phonological or orthographic overlap. To illustrate, translation equivalents *helicopter* and *helicóptero* in English and Spanish show clear orthographic overlap, but, phonologically, may be considered non-cognates due to differences in pronunciation across the two languages (Kohnert et al., 2004). Increasing variability in task presentation and demands is also important in research settings. At present, we see more varied language tasks in research on adult bilinguals. To better understand the nature of cross-language scaffolding, we would be served by investigations of cognate effects in child bilinguals with additional language tasks, as well as stimuli that were specifically designed to investigate cognate sensitivity.

Further expanding presentation options, cognates may be presented in either language or in both. We know that it is important to support each of the child's two languages, and future work may offer guidance on how to optimally include both languages in therapy and teaching. At present, language of presentation is important in that cognate effects have been shown to be stronger in the speaker's non-dominant language, with the bilingual speaker utilising knowledge of their stronger language to support their performance (Rosselli et al., 2012; Pérez et al., 2010). As such, cognates may be valuable for supporting second language acquisition and development while maintaining a foundation in the native language.

Opportunities for inclusivity.—As cognates are readily found across many language pairings (e.g. Cummins, 2005), cognate-based clinical approaches, teaching methods and/or research can smoothly be extended to and repurposed for speakers with different language backgrounds. One example task might be identifying cognates in an academic text (Kohnert, 2010); as many academic words are cognates (Nagy et al., 1993), the same English text or audio may be used to test or to practice cognate awareness in children with different native languages. Importantly, pre-existing cognate lists for multiple languages are readily available in research articles (e.g. Poarch & Van Hell, 2012; Nagy et al., 1993), cognate dictionaries, and online searches; moreover, new cognate lists tailored to individual clients may be created using native speaker judgments (Friel & Kennison, 2001). Unlike assessments or treatment approaches that, by necessity, reflect language-specific structures, cognates offer the opportunity to create tasks that are more easily inclusive of dual language learners with varied language backgrounds.

Future research directions and measures of cross-language interactions.—Continued efforts to understand cross-language interactions in bilingual language development will further clarify the recommendations made above. At present, cognates appear to be a practical means of supporting both languages for clinicians who do not share their client's native language. Such work also has theoretical implications, including helping establish a developmental bilingual processing model with clinical relevance. Cognate effects have already helped shape models of adult bilingual language processing. The enhanced performance for cognates relative to non-cognates has been interpreted as evidence for parallel or non-selective language activation, as in the BIA+ (Dijkstra & Van Heuven, 2002) and Revised Hierarchical Model (, Kroll, van Hell, Tokowicz & Green, 2010) or for shared representations across languages, as in the Distributed Feature Model (van Hell & de Groot, 1998). Though these models were not developed to capture cross-language interactions across the lifespan, it stands to reason that similar mechanisms may be in place for TD bilingual children; the cognate effects identified in young bilinguals are inconsistent with two languages functioning independently. However, these models have yet to reflect atypical language development, including weaknesses in semantic representations associated with DLD. Considering cognate effects in bilinguals with DLD would help determine whether cross-language associations are weakened, akin to the sparse within-language semantic networks, or whether they remain relatively intact.

Moving forward, improved methods of studying cross-language sensitivity in bilinguals—specifically in development—are needed. Initial efforts to understand this pattern adapted

monolingual language assessments to test for cognate sensitivity (Bosma et al., 2016; Potapova et al., 2016; Simpson-Baird et al., 2016; Kelley & Kohnert, 2012; Pérez, et al., 2010). Though these works provided an important foundation, the use of existing receptive and expressive vocabulary tasks is limiting for many reasons. These predetermined word lists feature targets designed for testing performance in one language, without intention of capturing cross-language interactions. In addition, performance on vocabulary measures is known to be impacted by prior experience (e.g. Bialystok, Luk, Peets & Yang, 2010). As a result, cross-language sensitivity has largely been observed in a somewhat opaque manner, without knowledge of the children's prior exposure to the cognates in either language—it is not yet clear whether cross-language interactions occur from the first moments of exposure to novel stimuli in each language in bilingual children with typical and atypical language development.

Novel word learning tasks are at a valuable intersection of research on DLD and on bilingualism and may serve as an important future measure of cognate sensitivity in young bilinguals. Recall that including cognate and non-cognate stimuli in word learning tasks has allowed for investigations of cross-language associations in adult bilinguals. These studies revealed that cross-language interactions are at play specifically as new lexical representations are being acquired (Lotto & De Groot, 1998; De Groot & Keijzer, 2000). The same method has been used to probe for differences in semantic networks in young children with typical and atypical development (Rice et al., 1994), revealing that children with weak language skills demonstrate difficulty forming within-language semantic associations. This approach also lends itself to instruction and dynamic assessment that may be appropriate in clinical settings (Kapantzoglou et al., 2012). Methodologically, novel word learning tasks also offer the benefit of mitigating the effect of prior experience, as exposure to the targets is experimentally controlled; these tasks are also appropriate across languages and can be tailored to bilinguals. Indeed, at least two studies have taught bilingual children novel words in both languages simultaneously, but cross-language form similarity was not manipulated, and participants included only TD bilingual children (Kan & Kohnert, 2012; Kan & Kohnert, 2008). Altogether, this approach is appropriate for capturing variation in both cross-language interactions and language ability in bilingual children, allowing us to ask: Is it the case that DLD in the context of bilingualism is characterised, in part, by dampened cross-language associations? Once a cognate word learning protocol has been established, it would be possible to adjust key stimuli such that the task would be appropriate for children from other language backgrounds. Our understanding of how two languages interact in a developing system would be strengthened as we extend the type of linguistic tasks that test this phenomenon in young bilinguals and as we include children from more varied language backgrounds.

Improvement in outcome measures may also improve our understanding of cognate sensitivity in young bilinguals. Prior emphasis on accuracy for cognates and non-cognates (e.g. Potapova et al., 2016; Kelley & Kohnert, 2012; Pérez et al., 2010) offers a somewhat narrow demonstration of cognate sensitivity and cross-language interactions. One example of a rewarding, but relatively uncommon, approach in research for young bilinguals is to include measures of reaction time (Schelleter, 2002; Poarch & van Hell, 2012). Future work would benefit from continued and expanded use of sensitive measures. Ultimately, the set of

studies and methods used to study cognate sensitivity in child bilinguals is limited relative to the work in their adult counterparts; borrowing from the established literature will help make clear how the bilingual profile manifests in the context of typical and atypical language development, informing clinical practice and theoretical frameworks.

Executive function skills in young bilinguals

Recall that consequences of parallel language activation include not only cross-language associations, but also associations with broader cognitive functions. The joint activation of both languages can be thought of as competition, and it has been argued that bilinguals select the appropriate language target by recruiting and exercising executive function (EF) skills, including inhibition, selective attention, monitoring, task-switching and working memory (Green, 1998). To test this possibility, numerous studies have compared EF skills in bilinguals and monolinguals, often finding that, across the lifespan, bilinguals outperform monolingual counterparts (see Barac et al., 2014; c.f. Hilchey & Klein, 2011). These observed strengths in EF have been explained to be a result of dual language experience. In this section, we briefly review how research in this area may further support our understanding of the bilingual profile in development.

Recent research in EF performance has shifted from comparisons between monolingual and bilingual groups and reflects the understanding that bilingualism is a continuous, not categorical, variable (Luk & Bialystok, 2013), with numerous relevant facets (Barac et al., 2014). To illustrate, White and Greenfield (2017) found that bilingual children with comparable Spanish and English language skills outperformed monolingual peers on EF measures, but that emerging bilingual children with unbalanced Spanish and English skills earned EF scores that fell between the two other groups without being significantly different from either.

Importantly, changes in EF are argued to result specifically from practice with resolving cross-language competition. If navigating cross-language competition, whether through inhibition, attention shifting, or any other mechanism, is an important trigger for changes in bilingual speakers' cognitive performance, then direct investigations of contexts that enhance cross-language interactions are critical. In child bilinguals, this need has been best met with a study that measured EF alongside knowledge of translation equivalents across languages. Crivello et al. (2016) tested whether EF performance increased in bilingual toddlers as they acquired an increasing number of translation equivalents across French and English. Consistent with expectations, bilingual toddlers who acquired more translation equivalents—and thus, likely experienced more language coactivation and competition—were also found to earn higher scores in EF tasks that required inhibitory control. This focus on individual differences is more readily available in the adult literature. For example, adult bilinguals with stronger EF skills, as measured by a Simon task, were found be to be less likely to demonstrate a cognate advantage (Linck, et al., 2008). That is, bilinguals who were better able to navigate irrelevant stimulus dimensions were also better able to suppress cross-language competitors (see also Gollan, Sandoval & Salmon, 2011).

Measurement of EF performance, with attention to individual differences and cross-language associations, may thus shed light on the bilingual profile—but much remains to be learned.

Might it be the case that bilingual children, whose vocabulary and other language skills are in development, experience and resolve cross-language competition differently than their adult counterparts? Further, might these differences be more pronounced for bilingual children with DLD, who have relatively weak language skills? In a relatively weak semantic network, the possibility for cross-language competition may be reduced. Consequently, the need for inhibition or related cognitive processes is lessened, in which case bilingual children with DLD would experience reduced "training" in EF skills. Future work that investigates differences in EF across adult and child bilinguals, as well as across child bilinguals with typical and atypical language development, would help characterise the relationship between dual language experience and broader cognitive functions. In turn, this would contribute to a more complete understanding of bilingualism across development.

Such work would also be of clinical interest. Because bilingual children's language performance may be highly variable—even in typical development—insight into processing is valuable and offers advantages over static measures of knowledge (Campbell, Dollaghan, Needlman & Janosky, 1997). EF tasks have an additional advantage in that they may be non-verbal and less biased against culturally and linguistically diverse children (Kohnert & Windsor, 2004). Because EF performance has been shown to vary with individual profiles in cross-language interactions, and cross-language interactions may differ across bilingual children with typical and atypical language development, there is reason to expect these group differences. Moreover, monolingual children with DLD have been shown to have weaker EF performance than TD monolingual peers (Kapa, Plante & Doubleday, 2017; Vugs, Hendriks, Cuperus & Verhoeven, 2014), indicating that there may be EF weaknesses associated with DLD independent of relatively limited practice in resolving cross-language competition. In fact, the relationship between cross-language competition and EF may be complex and/or bidirectional. That is, just as bilingual children with DLD and weak semantic networks might recruit EF skills less extensively or efficiently than TD peers, bilingual children with weak EF skills might have relative difficulty selecting between lexical competitors across languages. As the picture of EF skills and bilingualism continues to sharpen, we may see practical applications in clinical settings, including opportunities for interprofessional practice, with EF performance considered as part of a holistic assessment (for an example of EF in speech-language therapy, see Jacques, 2017).

Conclusion

Dual language development is characterised by variability. Relatively low performance on language assessments may be caused by an underlying disorder or, just as easily, by a variety of non-clinical factors, including limited exposure to that language. Further, it is possible that there is an overlap of clinical and non-clinical factors (Oetting, 2018). Not surprisingly, clinicians report difficulties in working with children from culturally and linguistically diverse backgrounds (Guiberson & Atkins, 2012), and there is concern regarding misdiagnosis of DLD in bilingual children (Paradis, 2005).

Fortunately, the field of speech-language pathology has made strides in improving bilingual language assessment, embracing numerous non-standardised approaches. Alternative forms of assessment, including parent reports, dynamic assessment and spontaneous language

analysis, are receiving greater attention in research and clinical settings. Further, assessment of both languages is recognised as best practice (ASHA, 2017). For example, clinicians may determine a total conceptual vocabulary by combining vocabulary performance across both languages or analyse spontaneous language samples in each language. These developments are significant, supplying clinicians with tools when previously, there were effectively none. And yet, these approaches effectively adapt or combine two monolingual approaches for the purpose of bilingual language assessment.

Moving forward, these advances in bilingual language assessment may be complemented with approaches that focus on processes that are unique to bilingual children. Mounting research indicates that, even early in development, a bilingual speaker's two languages are not separate or independent of one another. Considering how a bilingual child's languages interact with one another and how cross-language competition is resolved may provide a valuable perspective on language development. Attention to cross-language interactions may also serve to bolster therapy techniques as we grow to understand how to better support both languages. Critically, such approaches would be tailored to bilinguals and their unique linguistic experiences.

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References

Barac R, Bialystok E, Castro DC, & Sanchez M (2014). The cognitive development of young dual language learners: A critical review. Early Childhood Research Quarterly, 29(4), 699–714. [PubMed: 25284958]

Bialystok E, Luk G, Peets KF, & Yang S (2010). Receptive vocabulary differences in monolingual and bilingual children. Bilingualism: Language and Cognition, 13(4), 525–531.

Bilingual Service Delivery. (2017). Asha.org.

Bosma E, Blom E, Hoekstra E, & Versloot A (2016). A longitudinal study on the gradual cognate facilitation effect in bilingual children's Frisian receptive vocabulary. International Journal of Bilingual Education and Bilingualism, 1–15.

Campbell T, Dollaghan C, Needleman H, & Janosky J (1997). Reducing bias in language assessment: Processing-dependent measures. Journal of Speech, Language, and Hearing Research, 40(3), 519–525.

Crivello C, Kuzyk O, Rodrigues M, Friend M, Zesiger P, & Poulin-Dubois D (2016). The effects of bilingual growth on toddlers' executive function. Journal of Experimental Child Psychology, 141, 121–132. [PubMed: 26402219]

Cummins J (2005). A proposal for action: Strategies for recognizing heritage language competence as a learning resource within the mainstream classroom. Modern Language Journal, 585–592.

De Groot A, & Keijzer R (2000). What is hard to learn is easy to forget: The roles of word concreteness, cognate status, and word frequency in foreign-language vocabulary learning and forgetting. Language Learning, 50(1), 1–56.

Desmet T, & Duyck W (2007). Bilingual language processing. Language and linguistics compass, 1(3), 168–194.

Diamond A (2013). Executive functions. Annual Review of Psychology, 64, 135–168.

Dijkstra T, & Van Heuven WJ (2002). The architecture of the bilingual word recognition system: From identification to decision. Bilingualism: Language and cognition, 5(03), 175–197.

Dollaghan C (1998). Spoken word recognition in children with and without specific language impairment. Applied Psycholinguistics, 19(02), 193–207.

Gathercole SE, & Baddeley AD (1990). Phonological memory deficits in language disordered children: Is there a causal connection? Journal of memory and language, 29(3), 336–360.

Gollan TH, Sandoval T, & Salmon DP (2011). Cross-language intrusion errors in aging bilinguals reveal the link between executive control and language selection. Psychological Science, 22(9), 1155–1164. [PubMed: 21775653]

Grasso SM, Peña ED, Bedore LM, Hixon JG, & Griffin ZM (2018). Cross-Linguistic Cognate Production in Spanish–English Bilingual Children With and Without Specific Language Impairment. Journal of Speech, Language, and Hearing Research, 61(3), 619–633.

Gray S (2005). Word Learning by Preschoolers With Specific Language Impairment: Effect of Phonological or Semantic Cues. Journal of Speech, Language, and Hearing Research, 48(6), 1452–1467.

Gray S, Plante E, Vance R, & Henrichsen M (1999). The diagnostic accuracy of four vocabulary tests administered to preschool-age children. Language, Speech, and Hearing Services in Schools, 30(2), 196–206.

Green DW (1998). Mental control of the bilingual lexico-semantic system. Bilingualism: Language and Cognition, 1(02), 67–81.

Guiberson M, & Atkins J (2012). Speech-language pathologists' preparation, practices, and perspectives on serving culturally and linguistically diverse children. Communication Disorders Quarterly, 33(3), 169–180.

Gutiérrez-Clellen VF, Simon-Cereijido G, & Wagner C (2008). Bilingual children with language impairment: A comparison with monolinguals and second language learners. Applied psycholinguistics, 29(1), 3–19. [PubMed: 22685359]

Hilchey MD, & Klein RM (2011). Are there bilingual advantages on nonlinguistic interference tasks? Implications for the plasticity of executive control processes. Psychonomic bulletin & review, 18(4), 625–658. [PubMed: 21674283]

Jacques J (2017). "Adding Self-Regulation & Executive Functioning into Everyday Speech Therapy Activities" Presentation. Pasadena, CA.

Kambanaros M, Michaelides M, & Grohmann KK (2016). Cross-linguistic transfer effects after phonologically based cognate therapy in a case of multilingual specific language impairment (SLI). International Journal of Language & Communication Disorders.

Kan PF, & Kohnert K (2012). A growth curve analysis of novel word learning by sequential bilingual preschool children. Bilingualism: Language and Cognition, 15(03), 452–469.

Kan PF, & Kohnert K (2008). Fast mapping by bilingual preschool children. Journal of child language, 35(03), 495–514. [PubMed: 18588712]

Kan PF, & Windsor J (2010). Word learning in children with primary language impairment: A meta-analysis. Journal of Speech, Language, and Hearing Research, 53(3), 739–756.

Kapa LL, Plante E, & Doubleday K (2017). Applying an integrative framework of executive function to preschoolers with specific language impairment. Journal of Speech, Language, and Hearing Research, 60(8), 2170–2184.

Kapantzoglou M, Restrepo MA, & Thompson MS (2012). Dynamic assessment of word learning skills: Identifying language impairment in bilingual children. Language, Speech, and Hearing Services in Schools, 43(1), 81–96.

Kelley A, & Kohnert K (2012). Is there a cognate advantage for typically developing Spanish-speaking English-language learners?. Language, Speech, and Hearing Services in Schools, 43(2), 191–204.

Kohnert K (2010). Bilingual children with primary language impairment: Issues, evidence and implications for clinical actions. Journal of Communication Disorders, 43(6), 456–473. doi:10.1016/j.jcomdis.2010.02.002 [PubMed: 20371080]

Kohnert K (2004). Cognitive and cognate-based treatments for bilingual aphasia: A case study. Brain and language, 91(3), 294–302. [PubMed: 15533555]

Kohnert K, Windsor J, & Miller R (2004). Crossing borders: Recognition of Spanish words by English-speaking children with and without language impairment. Applied Psycholinguistics, 25(4), 543.

Kroll JF, & Bialystok E (2013). Understanding the consequences of bilingualism for language processing and cognition. Journal of Cognitive Psychology, 25(5), 497–514.

Kroll JF, Bobb SC, Misra M, & Guo T (2008). Language selection in bilingual speech: Evidence for inhibitory processes. Acta psychologica, 128(3), 416–430. [PubMed: 18358449]

Kroll JF, Dussias PE, Bogulski CA, & Valdes-Kroff J (2012). Juggling two languages in one mind: What bilinguals tell us about language processing and its consequences for cognition In Ross B (Ed.), The Psychology of Learning and Motivation, Volume 56 (pp. 229–262). San Diego: Academic Press.

Kroll JF, Van Hell JG, Tokowicz N, & Green DW (2010). The Revised Hierarchical Model: A critical review and assessment. Bilingualism (Cambridge, England), 13(3), 373.

Leonard LB (2014). Specific language impairment across languages. Child development perspectives, 8(1), 1–5. [PubMed: 24765105]

Linck JA, Hoshino N, & Kroll JF (2008). Cross-language lexical processes and inhibitory control. The mental lexicon, 3(3), 349–374. [PubMed: 19907674]

Lotto L, & De Groot A (1998). Effects of learning method and word type on acquiring vocabulary in an unfamiliar language. Language learning, 48(1), 31–69.

Luk G, & Bialystok E (2013). Bilingualism is not a categorical variable: Interaction between language proficiency and usage. Journal of Cognitive Psychology, 25(5), 605–621. [PubMed: 24073327]

Luk G, Green DW, Abutalebi J, & Grady C (2012). Cognitive control for language switching in bilinguals: A quantitative meta-analysis of functional neuroimaging studies. Language and cognitive processes, 27(10), 1479–1488.

Mainela-Arnold E, Evans JL, & Coady JA (2010). Explaining lexical–semantic deficits in specific language impairment: The role of phonological similarity, phonological working memory, and lexical competition. Journal of Speech, Language, and Hearing Research, 53(6), 1742–1756.

McGregor KK, Newman RM, Reilly RM, & Capone NC (2002). Semantic representation and naming in children with specific language impairment. Journal of Speech, Language, and Hearing Research, 45(5), 998–1014.

Miyake A, Friedman NP, Emerson MJ, Witzki AH, Howerter A, & Wagner T (2000). The unity and diversity of executive functions and their contributions to complex “Frontal Lobe” tasks: a latent variable analysis. Cognitive Psychology 41(1), 49–100. [PubMed: 10945922]

Nagy WE, García GE, Durgunoğlu AY, & Hancin-Bhatt B (1993). Spanish-English bilingual students’ use of cognates in English reading. Journal of Reading Behavior, 25(3), 241–259.

Oetting JB (2018). Prologue: Toward Accurate Identification of Developmental Language Disorder Within Linguistically Diverse Schools. Language, speech, and hearing services in schools, 49(2), 213–217.

Paradis J (2005). Grammatical morphology in children learning English as a second language: Implications of similarities with specific language impairment. Language, Speech, and Hearing Services in Schools, 36(3), 172–187.

Pérez AM, Peña ED, & Bedore LM (2010). Cognates facilitate word recognition in young Spanish-English bilinguals’ test performance. Early Childhood Services (San Diego, Calif.), 4(1), 55.

Pham G, Kohnert K, & Mann D (2011). Addressing clinician–client mismatch: A preliminary intervention study with a bilingual Vietnamese–English preschooler. Language, Speech, and Hearing Services in Schools, 42(4), 408–422.

Poarch GJ, & Van Hell JG (2012). Cross-language activation in children’s speech production: Evidence from second language learners, bilinguals, and trilinguals. Journal of experimental child psychology, 111(3), 419–438. [PubMed: 22138311]

Potapova I, Kelly S, Combiths PN, & Pruitt-Lord SL (2018). Evaluating English morpheme accuracy, diversity, and productivity measures in language samples of developing bilinguals. Language, Speech, and Hearing Services in Schools, 49(2), 260–276.

Potapova I, Blumenfeld HK, & Pruitt-Lord S (2016). Cognate identification methods: Impacts on the cognate advantage in adult and child Spanish-English bilinguals. International Journal of Bilingualism, 20(6), 714–731.

Rice ML, Oetting JB, Marquis J, Bode J, & Pae S (1994). Frequency of input effects on word comprehension of children with specific language impairment. Journal of Speech, Language, and Hearing Research, 37(1), 106–122.

Rosselli M, Ardila A, Jurado MB, & Salvatierra JL (2012). Cognate facilitation effect in balanced and non-balanced Spanish–English bilinguals using the Boston Naming Test. International Journal of Bilingualism, 18(6), 649–662.

Schelletter C (2002). The effect of form similarity on bilingual children's lexical development. Bilingualism: Language and Cognition, 5(02), 93–107.

Sheng L, Lam BPW, Cruz D, & Fulton A (2016). A robust demonstration of the cognate facilitation effect in first-language and second-language naming. Journal of experimental child psychology, 141, 229–238. [PubMed: 26463463]

Spaulding TJ, Plante E, & Farinella KA (2006). Eligibility Criteria for Language Impairment: Is the Low End of Normal Always Appropriate? Language, Speech, and Hearing Services in Schools, 37(1), 61–72.

Tomblin JB, Records NL, & Zhang X (1996). A system for the diagnosis of specific language impairment in kindergarten children. Journal of Speech, Language, and Hearing Research, 39(6), 1284–1294.

Van Hell JG, & De Groot AM (1998). Conceptual representation in bilingual memory: Effects of concreteness and cognate status in word association. Bilingualism: Language and cognition, 1(03), 193–211.

Verdon S, McLeod S, & Wong S (2015). Reconceptualizing practice with multilingual children with speech sound disorders: people, practicalities and policy. International journal of language & communication disorders, 50(1), 48–62. [PubMed: 24919842]

Watkins RV, Kelly DJ, Harbers HM, & Hollis W (1995). Measuring children's lexical diversity: Differentiating typical and impaired language learners. Journal of Speech, Language, and Hearing Research, 38(6), 1349–1355.

White LJ, & Greenfield DB (2017). Executive functioning in Spanish-and English-speaking Head Start preschoolers. Developmental Science, 20(1).