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Guest Editor's Column: Clinical Management of Communicatively-Impaired Adult Neurorehabilitation Caseloads in a Diverse Aging World

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Abstract

Steady aging in the world's population is estimated to substantially increase the prevalence of age-related neurological disabilities across the world primarily from stroke and dementia. Yet, as the numbers of neurologically impaired older adults grow, local neurorehabilitation caseloads are estimated to increasingly become more ethnically heterogeneous as diversity environments in each country are impacted by new immigrants and their descendants. Suitable numbers of appropriately trained speech-language clinicians will be necessary to meet these service demands. The articles in this issue provide a step forward to illustrate the broad multidisciplinary evidence required to meet the challenges of an intensifying global healthcare crisis: the steady growth of diverse adult neurorehabilitation caseloads in an aging world.

Steady aging in the world's population, driven by a reduction in birth rates and an increase in life expectancy, is estimated to markedly intensify the occurrence of age-related neurological disabilities worldwide primarily from stroke and dementia (National Institutes of Health [NIH], 2011; World Federation of Neurorehabilitation [WFN], 2015). Stroke and Alzheimer's disease, the most common cause of dementia, are two major leading causes of disability in the world (Johnson, Onuma, Owolabi, & Sachdev, 2016; World Health Organization [WHO], 2011, 2015, 2017). Between 2015 and 2030, the number of people aged 60 years or older is projected to grow by 56%, from 901 million to 1.4 billion worldwide (United Nations, Department of Economic and Social Affairs, Population Division, 2015). Reflecting this global population trend, by 2030, the number of stroke survivors is projected to reach 73 million and individuals with dementia near 75 million, much of the increase estimated to occur in medically-underserved, low- and middle-income countries (Feigin et al., 2014; WHO, 2017).

The steady increase in age-related neurological disabilities is a growing global healthcare crisis that has received very little attention (Johnson et al, 2016; Laslett et al., 2012; Norrving & Kissela, 2013). Local and international multidisciplinary strategies are imperatively required to ensure access to quality care that would promote physical and mental well-being in the expected larger numbers of disabled older individuals in neurorehabilitation (United Nations [UN], 2017; WFN, 2015; WHO, 2015). Among the critical targets in a strategic plan, two prominent factors warrant attention: the increasingly diverse populations expected in neurorehabilitation across the world, and the local availability of appropriate neurorehabilitation services (Centeno, 2015; UN, 2017; WHO, 2015).

Local diversity environments with multiple coexisting ethnic groups will continue to grow from new immigrants and their descendants (United Nations, Department of Economic and Social Affairs, Population Division, 2015, 2016). The number of international migrants across the world progressively has increased to reach 244 million individuals in 2015 from 173 million

in 2000 (UN, 2016). Extensive heterogeneity in linguistic profiles, including bilingualism and multilingualism, and life realities, including socioeconomic circumstances and sociocultural histories, particularly, is expected in large urban centers. To realistically serve larger multiethnic adult neurorehabilitation caseloads, a considerable number of qualified healthcare personnel, trained with suitable evidence-based and culturally-responsive clinical skills (Centeno, 2015; Lundy & Hilado, 2018), is critical, especially because diverse adult groups include some of the most vulnerable groups with disabilities. Disability disproportionately affects older people, poor people, indigenous individuals, refugees, and migrants (WHO, 2015). Relative to non-minority adults, these groups experience disparities in their healthcare services due to, among different factors, the limited evidential bases to support their clinical management (Ellis, 2009; Harris, 2011; Payne, 2014).

Using a multinational, multiethnic, and interdisciplinary approach, the articles in this special issue discuss evidence and strategies that may be useful to interpret and address the complex problem solving needed to work with adults in diverse neurorehabilitation caseloads. In the first article, using the case of indigenous adults, Penn et al. discuss a sociocultural approach to serve minority individuals with aphasia grounded in the historical, linguistic, and cultural profile of minority groups. The next two articles highlight how the research and clinical realities of each ethnic group may shape the remedial strategies to improve clinical services in underresearched, underserved communities. Specifically, Kong discusses the current scenario in clinically relevant research and clinical protocols relevant to Chinese speakers with aphasia as well as possible strategies to develop appropriate linguistically- and culturally-based clinical procedures to address the gaps in the services for this population. Fleming and Harris continue by highlighting how epidemiological and social variables in Hispanic and African American adults may require a special approach to identify and treat individuals with mild cognitive impairment, a precursor to dementia, in these two groups. In the following two articles, researchers summarize important neuroscientific research pertinent to bilingual individuals with aphasia. While Dash and Ansaldo illustrate the application of neural-based language-cognition interactions in the intervention of dual language users with aphasia, Peñaloza and Kiran discuss how neuroimaging techniques can provide valuable evidence to identify treatment-induced neurological changes in the brain of bilingual speakers with aphasia. In the final article, Altarriba and Kazanas discuss interdisciplinary psychological insights on Hispanic groups to illustrate a plausible interprofessional approach that may be useful to enhance intervention outcomes when working with non-majority individuals in neurorehabilitation.

The authors and I hope that the collection of articles in this issue may illustrate a possible dissemination strategy of clinically relevant research and local approaches that would ultimately lead to domestic and international collaborative efforts to address a global health priority: the steady growth of diverse adult neurorehabilitation caseloads in an aging world.

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Decolonizing Speech-Language Pathology Practice in Acquired Neurogenic Disorders

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Abstract

Indigenous peoples throughout the world, despite being known to suffer from increased risk of stroke and traumatic brain injury (TBI), are marginalised in terms of access to rehabilitation services and have poorer health outcomes than non-indigenous peoples. Speech-language pathology services for indigenous people with aphasia have rarely been discussed in either clinical or research fora in this field, with few guidelines available for clinicians when working

with indigenous clients, families, and communities. Exploiting the broad input gathered through the collective problem-solving of a focus group, the paper integrates the input of a group of practitioners and researchers at an international roundtable held in 2016 to generate a “declaration” of issues that need to be addressed regarding aphasia services for indigenous clients with aphasia. The paper aims to promote a transformative approach to service delivery that is driven by decolonizing attitudes and practices, and acknowledges historical, sociopolitical, linguistic, and family contexts as a framework for understanding indigenous clients with aphasia.

In March of 2016, a group of indigenous and non-indigenous researchers from four countries (Australia, South Africa, New Zealand, and Canada) held a “roundtable” to discuss issues related to aphasia in indigenous communities. What brought us together was the recognition that, in each of our countries, a great need exists for a better understanding of aphasia in context. Our countries are each characterised by a history of colonization. It should be recognized that related historical factors have contributed to tiered health systems, a neglect of linguistic and cultural origin, and health disparities (Griffiths, Cole, Lee, & Madden, 2016). In response, it is evident that our current training and clinical practice require decolonization and transformation.

Drawing on the established benefits of an expert focus group approach in adult neurology to solving problems in health care (e.g., Raymer et al., 2008):

The aims of the roundtable were as follows:

1. To merge and discuss global patterns of health and wellness and to consider models of application to those with communication disorders in marginalized and indigenous communities.
2. To initiate and disseminate research on relevant common issues and explore suitable methodologies for research as well as opportunities for collaboration.
3. To promote the issue of communication disorders in indigenous populations as an area requiring research in order to improve service delivery options and improve health outcomes.
4. To establish a network of indigenous and non-indigenous researchers and clinicians who will work together to improve health outcomes of indigenous peoples with brain impairment and their families.

This paper summarizes the findings of the roundtable in terms of a “declaration” of issues that need to be addressed in this area, and potential principles of practice. The paper is focused particularly on adult populations who have communication disorders following acquired brain injury such as stroke or TBI. The health care needs and the limitations in the health care services for indigenous people, including those with neurogenic communication disorders, have been discussed only on a limited basis in the literature (Armstrong, Hersh, Hayward, & Fraser, 2015; Katzenellenbogen et al., 2016; Penn & Watermeyer, 2012). Similarly, following a review of relevant policies (e.g., scope of practice and accreditation documents) within our own field of speech-language pathology, professional policies rarely refer specifically to indigenous clients or related culturally secure practices, although a small number in our field and in related fields do make explicit reference (e.g., Australian Association of Social Work Code of Ethics, 2010; New Zealand Speech-Language Therapists’ Association, 2016). While such policies are a step in the right direction, their application is limited by the lack of research in this field (Brewer & Andrews, 2016). We argue that those with communication disorders are already disempowered within their societies, restricted in their social participation, and at risk of decreased quality of life. When such disorders overlie populations who are already disadvantaged through a colonial history of displacement, subjugation, and loss of culture, the level of disempowerment is compounded. Speech-language pathologists (SLPs) have an ethical obligation to acknowledge this context, to actively learn about and prioritize

the cultural contexts of these clients, and to reassign their needs from a marginal to a central professional concern.

Background

Indigenous people throughout the world are known to suffer from increased risk of stroke and TBI, and yet are marginalized in terms of access to rehabilitation (Armstrong, Hersh, Hayward, & Fraser, 2015; Keightley et al., 2009; McLellan, 2013; Penn & Watermeyer, 2012) and have poorer health outcomes than non-indigenous peoples (Barnett et al., 2012; de Leeuw, Lindsay, & Greenwood, 2015). In the Australian context, stroke and TBI occur up to three times more often in Aboriginal and Torres Strait Islander populations compared to non-Aboriginal populations (Jamieson, Harrison, & Berry, 2008; Katzenellenbogen et al., 2010). Similar figures are available in regard to other indigenous people throughout the world (Blackmer & Marshall, 1999; Connor & Bryer, 2006; Ministry of Health, 2010; Rutland-Brown, Wallace, Faul, & Langlois, 2005). Given this situation, there is surprisingly little research published in this area, and few clinical initiatives addressing the issues involved.

When we use the term “indigenous,” we recognize the hugely diverse group of peoples subsumed under this label. Relevant here is the World Health Organization’s (WHO) recognition that indigenous people “remain on the margins of society; they are poorer, less educated, die at a younger age, and are generally in worse health than the rest of the population” (WHO, 2007). While this description clearly does not refer to all indigenous people, it does remind us of the need to acknowledge the long-term and often intergenerational effects of colonization, and to explore the effects of brain injury in marginalized communities. It is also important to acknowledge that colonization is “...an ongoing process that continues to impact negatively on Indigenous health outcomes” (Axelsson, Kukutai, & Kippen, 2016, p. 3). Colonization is not merely an “historical event.” The term “decolonization” hence refers to the process of challenging and reconfiguring paradigms, rules, and systems that continue to create asymmetries. In the case of health, such systems include diagnostic frameworks and services that reinforce inequities and misalignment between indigenous and non-indigenous views of health and wellness as well as access to appropriate services (see Griffiths, Coleman, Lee, & Madden, 2016 for further discussion).

While contexts widely vary across countries, there are common barriers to clinical changes and to research, and there are potentially common solutions to addressing at least some of the challenges faced in the field of indigenous health. Common issues include: differences in worldview between mainstream Western model health services and indigenous concepts of health and wellness (McLellan, McCann, Worrall, & Harwood, 2014); limited availability of and access to interpreting services (Brewer, McCann, Worrall, & Harwood, 2015; Penn & Armstrong, 2016); economic marginalization and a high rate of comorbidities in indigenous people with brain impairment; and considerably complicating rehabilitation services (Penn & Armstrong, 2016; Robson, Cormack, & Cram, 2007). In addition, other challenges include Western rehabilitation not catering for the diverse realities of indigenous health and wellness, which incorporate concepts of causality of events such as stroke and brain injury (Legg & Penn, 2013), and ongoing effects of colonization that marginalize indigenous peoples on many fronts, including health care professionals’ uncertainty about how best to address these effects in order to provide culturally secure care (Brewer et al., 2015; Hersh, Armstrong, Panak, & Coombes, 2015).

Non-indigenous SLPs who work in English-speaking countries impacted by a colonial past—for example, Australia, New Zealand, Canada, the USA, and South Africa—need to be aware of the health, social, economic, and political implications of that colonial history on indigenous populations, and be committed to decolonization in the country where they work. As experts in language and communication, which are intrinsically woven into culture, SLPs have a particular responsibility to work closely with indigenous populations in their communities, recognize when the SLP has something useful to offer, and understand how sociopolitical context contributes to health

inequities. SLPs must also recognize when their practice is, often inadvertently, perpetuating the effects of colonization.

The Roundtable Declaration

The roundtable involved presentations of relevant historical and political contexts in each country, influences of these on the development of health and other services for indigenous peoples, as well as relevant current research in each country. After much discussion, the group subsequently developed a preliminary “declaration,” outlining primary issues and perspectives that need addressing in the field of aphasiology in particular, and general principles to be taken into account when establishing or developing services with indigenous communities. We are starting the process in this regard, rather than seeing the declaration of principles as an endpoint. We take this opportunity of sharing this with the readership. We believe that the group-based principles from this researcher-practitioner collaboration may be valuable to similar groups in our countries especially to generate strategies to address the clinical needs of under-researched, underserved populations.

The aims of the “declaration” are:

1. To improve outcomes for indigenous peoples with communication disorders following brain injury consistent with the United Nations Declaration on the Rights of Indigenous Peoples (United Nations, 2007) and the WHO program of work in the area of health equity and human rights (WHO, 2015).
2. To advocate for communication as a human right.
3. To enhance systems of communication among the different health care services and providers working with indigenous peoples.
4. To raise awareness within the speech-language pathology discipline and the broader community of contextual issues, including sociopolitical and historical factors surrounding brain impairment in indigenous people that may have an impact on the delivery of post-stroke services.
5. To connect individuals working in the area (clinicians and researchers) internationally (Australia, Canada, New Zealand, South Africa, and the United States) for support and collaboration purposes.

What the Declaration Is and What It Isn't

In making this declaration, we are not speaking on behalf of indigenous peoples. We are not claiming to represent indigenous peoples. However, as indigenous and non-indigenous researchers, clinicians, and educators with collective experience working with indigenous communities in our respective countries, we are hoping to raise important principles and perspectives, and to actively create a collaborative space for conversation surrounding the possible impact of historical factors on service delivery with marginalized groups.

The declaration does not represent a toolkit or recipe for prescribing practices. Instead, it is a vehicle for acknowledging sociopolitical issues and cultural diversity in clinical populations, and promoting cultural security in clinical practice. It seeks to promote discussion, highlight current barriers and facilitators to accessible and appropriate services, and encourage services that are appropriate to an individual client's context. In addition, we hope to influence what have been described as the “hidden” barriers which exist in educational and clinical contexts. In addition, we hope to influence, by advocating for a process of self-reflection, the impact of barriers that have been described as “hidden” in educational and clinical contexts. Such barriers are those that are not currently addressed by policies, systems, and procedures but that, for indigenous communities, hamper access to, and acceptability of, our Western-based models of

assessment and intervention. These may include assumptions, stereotypes, and routines which are part of health professionals' everyday practice and require re-examination.

The declaration is not designed to criticize current practice, but to recognize challenges and to suggest possible directions of change through self-reflection on the culture of our discipline. In so doing, we can position ourselves for the future of our increasingly global world.

Finally, while we recognize the huge mobility that has come about globally as a consequence of refugee and migration movements, our declaration acknowledges that the concerns of indigenous peoples are not identical to refugee and migrant issues. Such issues in each country require additional and substantial attention. Additionally because language issues, such as bilingualism, have often been the focus of discussion regarding diverse populations, our declaration goes beyond language and recognizes that language problems are just one cause of social exclusion. Our discipline has a very real role to play in addressing the unique and separate complexity in the aphasia management in individuals both from indigenous populations and from other minority groups.

Core Values

In order to support and achieve the aims of the declaration, it is essential to articulate values/principles that underpin these aims. We recognize that there is a growing literature within both medical and educational groups on the issue of cultural security and indigenous understandings of health (Coffin, 2007; National Aboriginal Health Organization, 2008). However, the needs of the adult with acquired communication disorders are quite unique. Not only does a marginalized member of society have little voice in terms of political agency, the impact of an acquired communication disorder can exacerbate and compound this situation, and potentially affect both individual and community identity.

A critical feature of this declaration is to highlight the important role of context— historical, sociopolitical, and linguistic context as a framework for understanding our clients. This involves a need to expand our methods to incorporate peoples' world views, to understand the inextricable relationship between language, culture, and our services. The core values as indicated below serve to highlight key aspects which emerge from this stance/position, and potentially inform future policy and practice. We want to recognize, acknowledge, promote, and apply principles of cultural security.

These values are framed by ethical principles of autonomy and justice. Given our colonial histories, a transformative approach that is driven by decolonizing attitudes and practices is the only ethical option regardless of relative proportions of indigenous peoples in individual countries. In order to become clinicians who can offer culturally secure services to our clients, we believe that our own discipline and professional groups need to develop a culture of self-reflection and adherence to the following principles:

1. Trust and relationship building;
2. Two-way dialogue between service providers and communities;
3. Reflective practice by healthcare practitioners in regard to their assumptions and practices;
4. Acknowledgment and recognition of (ongoing) inequity;
5. Incorporation of cultural understandings relating to family, community, and local cultural protocols into routine clinical practice;
6. Recognition that indigenous peoples are best placed to work with their own communities, hence the imperative to work closely with Indigenous colleagues and grow the indigenous speech-language pathology workforce;

7. Identification of broader systems of communication among the different healthcare services and providers of interaction in health, as well as individuals as targets for attention;
8. Advocacy for indigenous peoples with communication disorders across clinical, community, and policy contexts; and
9. Recognition that the process towards understanding and applying indigenous principles in practice is ongoing, fluid, dynamic, and reciprocal.

Figure 1 contains case studies from each of the countries in which the participants in the round table work and which illustrate typical challenges.

Figure 1. Examples of Contexts of Indigenous Individuals With Acquired Communication Disorders in Australia, South Africa, New Zealand, and Canada.

Case 1: Australia

TM is a 60-year-old Aboriginal man from a remote community in Western Australia, who suffered a motor vehicle accident at age 40 and became severely aphasic and apraxic.

Following the accident, TM was flown to a teaching hospital in Perth for neurosurgery and after his management in an acute hospital, was transferred to live in an aged care facility in Perth. No one at the facility spoke his language, and after a number of years, connections with family were lost. He had no alternative communication system.

Case 2: Canada

An elderly indigenous woman with dementia moved into a long-term care facility in the community where she had lived all her life. Under a government policy of assimilation, she had been forcibly removed from her family as a child to spend several years in a residential school for indigenous children (see Truth and Reconciliation Canada, 2015). Having been punished there for speaking her indigenous language, she had spoken only English for most of her life. With the progression of her dementia, she gradually lost her ability to speak in English, and she began speaking again in her first language. Care staff (not indigenous speakers) assumed she was speaking in jargon and failed to advocate for her to have access to a speaker of her language. Fortunately, a member of her community who came to visit recognized the language and was able to arrange for one of the relatively few remaining speakers to visit with her.

(continued)

Case 3: New Zealand

A 67-year-old Māori woman developed aphasia as a result of a stroke 12 months ago. She is a community elder, highly respected for her knowledge of the Māori language and the whakapapa (genealogy) of her iwi (tribe) and hapū (subtribe). Because of her knowledge and status she is involved in the land claim that her iwi has taken to the Waitangi Tribunal. Her aphasia means that she is no longer able to pass on her knowledge of whakapapa or teach the Māori language to her grandchildren. Members of her iwi support her to continue contributing to the Waitangi Tribunal claim, but her role has greatly reduced due to the severity of her aphasia.

Case 4: South Africa

After a stroke, a 34-year-old man is admitted to a city rehabilitation unit in Johannesburg. He is from Malawi, a country in southeastern Africa and has worked for three years as a migrant miner in the city. He has minimal skills in English and in the local South African languages. After a discussion with a hospital based interpreter, we established he has no family living nearby and he believes he will not improve until he returns home. He attributes his stroke and particularly his loss of speech to displeasing his ancestors.

Conclusions

This paper opens a conversation rather than provides solutions to the challenges proposed, and serves to provoke discussion. Service delivery change in this area is potentially more about attitudes and awareness influencing culturally secure practice than additional physical treatment resources. This paper hence outlines issues and principles that clinicians and researchers can consider when attempting to explore and develop culturally secure services that are accessible to indigenous peoples through being culturally appropriate and aligned with peoples' needs and aspirations. While the nine principles above are not comprehensive, they highlight the importance of dialogue between health providers and potential indigenous consumers, and the need for explicit inclusion of the contexts of indigenous consumers (indigenous people with aphasia and their families) in discussions, research and planning of *speech pathology services*.

Limitations

The Roundtable from which this declaration emanated was limited to representatives from Australia, South Africa, Canada, and New Zealand. Representation from other countries would have broadened the discussion, however those attending represented the primary sources of

research in the area of aphasia in indigenous populations at this point in time. The Roundtable included indigenous and non-indigenous researchers all of whom have worked directly with indigenous individuals with aphasia and their communities, and related fields. However, clearly greater indigenous input is desirable in future meetings, with the establishment of broader indigenous networks in our field an area for growth.

Future Directions

As noted throughout, this paper is not intended to provide a toolkit of practices to be implemented. Rather, the declaration is seen as stimulating and informing discussion on this important global issue within our field and we invite input and commentary from the readers. As a work in progress, we also hope that such ideas in the future will become embedded into curriculum and inform policy changes in professional and clinical contexts.

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Speech-Language Services for Chinese-Speaking People With Aphasia (C-PWA): Considerations for Assessment and Intervention

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Abstract

Chinese is the world's most widely spoken language with about 1.2 billion speakers. Yet, the majority of the aphasia research to date has been focused on speakers of Indo-European languages. The goals of this paper are threefold: (a) to highlight major research findings that are specific to Chinese speakers with aphasia, (b) to provide a review of the state-of-the-art tools and resources for assessing and managing aphasia in Chinese, and (c) to discuss factors to consider for evaluating and treating Chinese aphasia.

Chinese is the most widely spoken language, with about 1.2 billion native speakers worldwide (Lewis, Simons, & Fennig, 2016). Approximately one in five people in the world speaks one (or more) of the seven major geographical dialect groups of Chinese (Fung, 2009). Chinese and its dialects are characterized linguistically as analytic, or isolating, due to its lack of inflectional and derivational morphology. Word units of Chinese do not change through markings or inflections. They heavily rely on the use of particles to indicate grammatical aspects (such as aspect markers in Cantonese 食緊 “eating” versus 食咗 “ate”) and plural forms (such as plural markers in Mandarin 我們 “we” versus 我 “I”). There are also unique syntactic elements in Chinese that have no counterparts in English, such as classifiers (such as 一張紙 “a piece of paper” versus 一盒紙 “a box of paper”) or sentence-final-particles (such as 這很有趣嗎 “Is this funny?” versus 這很有趣啊 “This is funny”). The great majority of Chinese characters corresponds to one single syllable and one morpheme in isolation. The flexibility of Chinese compound formation patterns (such as affixation, reduplication, or combination of independent morphemes) makes it easy to form new vocabulary items. There is a significant number of homophonous syllables and words in Chinese because of its limited phonological structure and phonetic inventory. However, as a tonal language, contrastive tones that employ pitch changes distinguish lexical items in Chinese. Grammatically, Chinese displays a basic syntax of subject-verb-object word order, but permits extensive ellipses through omission of subjects and objects. Sentence-hood, or clause-hood in Chinese is, therefore, not as clear as in most Indo-European languages. The orthographic system in Chinese is logographic, with strokes being the basic writing units. Specific spatial arrangements of strokes are combined to form semantic and phonetic radicals, which can then be used to make up characters. However, due to the more arbitrary correspondence between orthography and phonology in Chinese (i.e., variable degree of consistency and regularity that leads to lower predictability of form-to-sound correspondence), Chinese is considered to be an opaque language. For a more detailed discussions on the linguistic characteristics of the Chinese language, refer to Kong (2011a), Liu, Pan, Gu, and Liu (2001), and Matthews and Yip (2011).

The presence of neurogenic communication disorders, such as aphasia, can adversely affect a person's communication and quality of living life due to its consequences of reduced level

of participation in community activities (Hilari, 2011). These effects are universal but their impacts on Chinese-speaking people with aphasia (C-PWA) may be considered more significant because of the lack of culturally- and linguistically-sensitive resources for adequate clinical evaluation and subsequent long term management. The problem, in fact, is not limited to the situation in the United States or other Western countries, but applies to Mainland China, Hong Kong, and Taiwan as well as other Asian countries with Chinese speakers. In particular, much existing knowledge for managing aphasia in the English literature may not be readily applicable to C-PWA, due to the aforementioned unique linguistic properties of Chinese. The goals of this paper are threefold: (a) to outline major research findings in the literature that are specific to C-PWA, (b) to provide a review of the state-of-the-art tools and resources for assessing and managing aphasia in Chinese, and (c) to highlight factors to consider for evaluation and intervention of Chinese speakers with neurogenic communication disorders.

Research in Chinese Aphasiology and Its Implications

Given the vast linguistic differences between Chinese and Indo-European languages, interest in research in Chinese aphasiology can be traced back to the 1930s. Scientists have been attempting to gain a clearer picture of how aphasia disrupts the normal functioning of language systems among C-PWA. Based on evidence generated from psycholinguistics and behavioral research as well as neuroimaging studies using speakers of Indo-European languages as a reference, a body of research emerged in the past few decades that investigates acquired language disorders in Chinese has attracted increasing attention of more researchers and clinical practitioners. More critically, these earlier studies have formed the foundation for sophisticated linguistic models specific to Chinese and have led researchers to understand the fundamental characteristics of Chinese aphasia (e.g., Bates, Chen, Tzeng, Li, & Opie, 1991; Packard, 1993, 2000).

The most common etiology of aphasia in the Chinese population is stroke, followed by head injury, progressive neurological disease, and brain tumor (Kong, 2017). Earlier studies (e.g., Gordon & Bogen, 1974) have led to postulations of a higher degree of right hemispheric dominance for Chinese, potentially due to the need in right-sided processing of non-linguistic tonal information. In contrast, Gandour et al. (2003) reported that the right hemisphere mediates some aspects of perceptual processing of emotion (i.e., affective prosody), which are dissociable from processing of intonation (i.e., linguistic prosody). Along this line of investigation, a series of cross-sectional studies conducted in the 1990s (e.g., Gao & Benson, 1990) and 2000s (e.g., Zhang et al., 2005; Zhao, Xu, & Zhang, 2007; Zhou, Zhang, Cao, & Wang, 2006) has concluded that the clinical-anatomical correlations reported in the Indo-European aphasia literature are largely applicable to native Chinese speakers. As reported on speakers of Indo-European languages, the location and extension of impairments in the left hemispheric “language centers” was argued to be highly associated with aphasia severity in C-PWA as well.

Findings regarding unique deficits of lexical-, sentential-, to discourse-level processing specific to Chinese have been reported. In particular, at the lexical-level, a range of psycholinguistic variables, such as age-of-acquisition (the time when someone has acquired the meaning and pronunciation of a word), familiarity (the degree to which someone comes in contact with or thinks about the concept of a word), imageability (the ease to which someone forms a visual or mental representation of a word), concreteness (the degree to which a word’s referents can be perceived through the senses; e.g., the verb “to eat” is more concrete than another verb “to consider”), word length, naming and image agreement, or visual complexity, have been found to influence processing of lexicons in C-PWA (Crepaldi, Che, Su, & Luzzatti, 2012; Law, Weekes, Yeung, & Chiu, 2009). Moreover, despite the lack of formal distinction between nouns and verbs in Chinese, dissociation of accurate production of noun- and verb-morphemes in compound words (e.g., noun-verb compound 心認 heart-think “to think” vs. verb-noun compound 飲茶 drink-tea as a noun “dim-sum lunch” or verb “to have dim-sum lunch”) has been reported in C-PWA of Broca’s

and Wernicke's type (Bates et al., 1991), despite the fact that compounds are processed as single units independent of the internal structure.

Concerning deficits in sentence comprehension and production, the factor of canonicity (order of thematic roles in sentence constituents) can only partly explain the difficulties exhibited by C-PWA (e.g., see Law & Leung, 1998, 2000). Packard (1993) and Yiu and Worrall (1996a, 1996b) have also specified the clinical features of impaired sentence production by fluent versus nonfluent C-PWA. Specifically, agrammatism in nonfluent C-PWA usually manifests as the production of shorter and fragmentary sentences secondary to impairment in using closed-class elements such as pronouns, coverbs (or prepositions), classifiers, structural and modal particles, and structural suffixes (see also Chu, Peng, & Yiu, 1986; Lu, 1994; Tseng, Chen, & Huang, 1991). Speakers with fluent aphasia, on the other hand, tended to show less lexical or morphological disruptions. More recently, a series of studies have been reported to illustrate the impaired micro-linguistic (e.g., reduced variety of semantic relations or high omission of information content) and macro-linguistic components (e.g., lower degree of coherence, order accuracy, completeness, and clarity) of spoken discourse in C-PWA (Kong, 2009; Kong, Linnik, Law, & Shum, 2017).

Traditional aphasia investigations have been conducted following paradigms of single case studies, case series, or participants in small groups. More recently, the Cantonese Aphasia Bank (2015) project, funded by the National Institutes of Health that contains publicly accessible language samples, videos, and behavioral/language test results of 149 unimpaired native speakers of Cantonese and 104 monolingual C-PWA in Hong Kong, allows systematic scientific study of Chinese aphasia. This database has been utilized for examining topics around linguistic (e.g., lexical, micro-linguistic processing, and macro-linguistic performance) and prosodic symptoms (e.g., speech duration and intonation) as well as nonverbal communication (e.g., coverbal gestures and facial expressions) in C-PWA (see summary in Kong & Law, 2016). To highlight a few examples, Law, Kong, and Lai (2017) have recently reported a list of lexical items, with the corresponding part of speech, and topics that can be used as training materials for conducting language rehabilitation for C-PWA. A preliminary model of acoustic analysis for automatic speech recognition and assessment in fluent C-PWA was also proposed by Lee et al. (2016). Concerning gesture-based intervention, iconic and metaphoric gestures have been found to have the greatest therapeutic impact among C-PWA (see details in Kong, Law, & Chak, 2017).

The above-mentioned studies contain rich information for addressing various theoretical and clinical issues in Chinese aphasiology. Future investigations with clear and strong motivations to explore theoretical issues of Chinese aphasia are also needed for subsequent improvement of clinical services for C-PWA.

Assessment

As compared to the quantity of research-based evidence and protocols for evaluating aphasia in Indo-European languages, there is a paucity of resources reported for C-PWA. Given the significant linguistic differences between Chinese and Indo-European languages summarized earlier, translating an existing English test to be applied to C-PWA is far from straightforward. Adaptation of assessment materials to Chinese requires careful selection and modification of stimuli in relation to cultural appropriateness and linguistic characteristics. For example, test items containing references to objects or words unfamiliar to C-PWA or posing a different meaning in their culture should be avoided. Table 1 summarizes the available tools, which are predominantly developed in the two most common Chinese dialect groups—Mandarin and Cantonese. Note that most of these instruments have limited circulation because they have not been formally published and lack linguistically-specific scoring criteria (thus preventing us from evaluating their validity and reliability).

Table 1. Standardized and Nonstandardized Assessment Tools With a Language Component for C-PWA.

Tool	Target Dialect (with geographically-specific norms)	Author(s)	Year of Publication
<i>Full Battery</i>			
Aphasia Battery in Chinese	Mandarin (China)	Gao et al.	1992
Boston Diagnostic Aphasia Examination (Mandarin version)	Mandarin (China)	Naeser & Chan	1980
	Mandarin (Taiwan)	Tseng	1993
Chinese Dyslexia/Dysgraphia Screening Test	Cantonese (Hong Kong)	Law	1990
Concise Chinese Aphasia Test	Mandarin (Taiwan)	Chung, Li, & Chang	2003
Hakka-S-Xian Tone Aphasia Battery	Hakka-S-Xian Tone (Taiwan)	Hsu	2009
National University Health System Aphasia Screening Test	Mandarin (Singapore)	Guo, Rickard-Liow, Lai, et al.	2010
Northwestern Assessment of Verbs and Sentences (Chinese version)	Mandarin (China)	Wang & Thompson	2016
Singapore Aphasia Test	Mandarin (Singapore)	Lim	2014
Western Aphasia Battery (Cantonese version)	Cantonese (Hong Kong)	Yiu	1992
<i>Word-Level Assessment</i>			
Boston Naming Test	Cantonese (Hong Kong)	Tsang	2000
<i>Sentence- to Discourse-Level Assessment</i>			
Linguistic Communication Measure	Cantonese (Hong Kong)	Kong & Law	2004
	Mandarin (Taiwan)	Yeh & Kong	2015
Main Concept Analysis ¹	Cantonese (Hong Kong)	Kong	2016b
	Mandarin (Taiwan)	Kong & Yeh	2015
	Mandarin (China)	Gao, Kong, & Lau	2016
Quantitative Production Analysis	Cantonese (Hong Kong)	Law	2001

(continued)

<i>Cognitive Assessment</i>			
Abbreviated Mental Test (Hong Kong version)	Cantonese (Hong Kong)	Chu, Pei, Ho, & Chan	1995
Birmingham Cognitive Screen (Cantonese version)	Cantonese (China)	Pan et al.	2015
	Cantonese (Hong Kong)	Kong et al.	2017
Mini-Mental State Examination (Cantonese version)	Cantonese (Hong Kong)	Chiu, Lee, Chung, & Kwong	1994
Montreal Cognitive Assessment (Hong Kong version) ²	Cantonese (Hong Kong)	Wong et al.	2009
Oxford Cognitive Screen (Hong Kong version) ³	Cantonese (Hong Kong)	Kong et al.	2016

Note. ¹http://www.cp1897.com.hk/product_info.php?BookId=9789620704123&cl=english; ²<http://www.mocatest.org>; ³http://www.ocs-test.org/?page_id=188

The primary language spoken at home and culture of C-PWA can impact how they perform on evaluations, how they share knowledge, and how they respond during a testing situation (Goral & Conner, 2013; Goral, Rosas, Conner, Maul, & Obler, 2012; Lanza & Svendsen, 2007). An important key to ensure validity and reliability in measuring C-PAW's language proficiency is the employment of normative data based on native speakers of the target dialect. Reviewing the description pertaining to psychometric properties of the original test and the adaptation procedures of the corresponding translated version is encouraged.

Testing should ideally be conducted by trained and knowledgeable clinical professionals in the client's native Chinese dialect. However, the lack of corresponding dialectal norms for a particular assessment battery may limit this feasibility (Kong & Weekes, 2011). It is suggested that, similar to the practice in Western countries, adequate evaluation of multiple factors in C-PWA (including cognitive, behavioral, psychosocial, neuropsychological, and pragmatic aspects of functioning) is not only encouraged but expected. In cases where the needed materials to cover multiple areas are not readily available, one should incorporate other culturally and linguistically appropriate (informal) strategies or performance-based measures to identify clinical information that is relevant for determining C-PWA's communication strength, weaknesses, and needs (Kong, 2016a; Spreen & Risser, 2003). The involvement of qualified and competent interpreters during clinical assessment should be considered (American Speech-Language-Hearing Association, 1989).

Intervention

When providing language therapy to C-PWA, clinical professionals face a major challenge. The current literature contains extremely limited intervention studies that were conducted in the Chinese context. As a result, speech-language pathologists nationwide and worldwide are constantly struggling to find evidence-based treatment protocols and materials to support their daily practice.

Among the few reports are three earlier studies in the 2000s that examined naming therapies for C-PWA in Hong Kong. Law, Wong, Sung, and Hon (2006) introduced an approach of combining semantic feature analysis and semantic priming, in which tasks focusing on semantic processing were involved. The results provided the necessary foundation of applying semantically-based anomia treatment in Chinese. Despite the lack of directly mapping between sub-character components and phonemes in Chinese, Law, Yeung, and Chiu (2008) further reported an ortho-phonological intervention for Chinese anomia that relied on phonological cues generated by

C-PWA through the association between target objects and their letters representing the initial consonants of the names. A follow-up study (Yeung, Law, & Yau, 2009) also highlighted the important role of executive functions and inhibitory control played in facilitating the outcomes of Chinese anomia therapy. The findings of these two investigations further demonstrated that word-finding difficulties in a subset of C-PWA can be addressed using a phonological approach of training. Unfortunately, other standardized aphasia intervention programs targeting post-lexical production in C-PWA are currently lacking.

The concept of technology-based management for C-PWA is not foreign to clinical professionals, but its implementation has largely been restricted to research personnel. A major hurdle for clinical application of technology-based aphasia training in Chinese has been because of the fact that most novel protocols or translated/adapted versions of existing protocols are not easily accessible through published international refereed journals. While several apps in English are available for aphasia therapy, such as Tactus Therapy Solutions¹ or Constant Therapy², none of them sufficiently support speakers and readers of Chinese. It is not until recently that the first report of Cantonese Apps for Speech Therapy-Adult (CASTA; Kong et al., 2016) became available. The CASTA project³ aims to (a) develop apps-based therapy for clinicians to conduct training of language comprehension and production, apraxia, and dysarthria, and (b) set up a databank of culturally specific training materials that clinicians can assign to C-PWA apps users for self-practice. Preliminary results of a multiple-case study that examined the effectiveness of blended learning using CASTA for anomia rehabilitation suggested that C-PWA with a moderate degree of language impairment (as reflected by the Cantonese version of the Western Aphasia Battery; Yiu, 1992), who had intensive self-practice (at least 60 minutes per day; Kong, 2011b; Kong et al., 2016), benefited the most from the CASTA treatment and showed the best improvement in oral naming and discourse production. Younger age and shorter post-onset time seemed to facilitate overall treatment outcome (Kong et al., 2016).

Additional factors must be considered for appropriate intervention with C-PWA. When planning and delivering rehabilitation services for C-PWA and their families in the United States (and other non-Chinese speaking countries), cultural and linguistic diversity is a crucial factor to be addressed (Hallowell, 2017; Tian, 2015). For example, clinicians should identify the correct form of addressing their C-PWA clientele. The name for Chinese is usually in the order of family name, maiden name, and given name. Correctly identifying the birth place of a C-PWA (e.g., Mainland China versus other Southeast Asian countries) can assist in determining their cultural background and the subsequent planning of culturally appropriate aphasia services. Determining religious affiliation and degree of acculturation of each C-PWA can provide the clinician with a more detailed picture of the interactions of cultural identity, customs perception of health and illness, communication styles, and language use (Awad, 2010). Finally, knowing the dialect that the C-PWA and their caregivers feel more confident (and prefer) to communicate will be helpful. In case an interpreter is necessary, it is recommended the same interpreter is used over different sessions (instead of having a randomly selected one each time). This act will enhance the interpreter's familiarity with intervention procedures, rapport with the client and clinician, and, in turn, result in a more collaborative and efficient translation process (National Aphasia Association, 2007).

Conclusion and Final Remarks

A review by Beveridge and Bak (2011) revealed that articles related to aphasia literature published in the 2000s were predominant by English-speaking participants. There is a clear paucity of research studies investigating assessment and intervention for C-PWA. Thus, a need for continued research pertaining to the fundamental understanding of Chinese aphasia and its

¹Tactus Therapy, 2017

²Constant Therapy, 2017

³e2care, 2017

management should be advocated. Continuous development and publication of best practices evaluating and managing Chinese aphasia is warranted to ensure that C-PWA receive services that meet their communication needs, functional skills, and social well-being in the community.

It is recommended that a more robust international research paradigm be set up. Proper dissemination of research findings, information, and resources is also encouraged. This effort will lead to (a) a more explicit understanding of the unique linguistic deficits associated with Chinese aphasia that can expand our current knowledge base about the disorder, (b) an extension of the range of existing pool of resources that can make the diagnostic process of Chinese aphasia more theoretically-informed, and (c) an expansion of language intervention approaches and options that will be evidence-based for clinicians to deliver across multiple clinical settings. Given the increasing number of qualified researchers worldwide who are interested in examining issues around and exploring topics of Chinese aphasia, the preceding goals can hopefully be achieved in the near future.

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Toward Identifying Mild Cognitive Impairment in Hispanic and African American Adults

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Abstract

Across the breadth of acquired neurogenic communication disorders, mild cognitive impairment (MCI) may go undetected, underreported, and untreated. In addition to stigma and distrust of healthcare systems, other barriers contribute to decreased identification, healthcare access, and service utilization for Hispanic and African American adults with MCI. Speech-language pathologists (SLPs) have significant roles in prevention, education, management, and support of older adults, the population most susceptible to MCI.

Across the breadth of acquired neurogenic communication disorders, mild cognitive impairment (MCI) may go undetected, underreported, and untreated. Relative to other cognitive disorders, MCI remains virtually hidden in plain sight—the proverbial elephant in the room. There are several reasons for this oversight. Cognitive decline in MCI is subtle. Cognitive decrements may be passed off as effects of normal aging because mild cognitive decline is unlikely to affect individuals' normal activities. Further, because of MCI's recognized association with Alzheimer's disease (AD) and other dementias (Alzheimer's Association, 2016b), failure to recognize MCI may prevent early intervention that is designed to delay disease progression. Early intervention, which may include both pharmacological and behavioral management, is most effective during earlier stages of the disease (Casey, Antimisiaris, & O'Brien, 2010). Early identification of MCI may also provide the best opportunity for effective long-term support—planning that ideally involves patients and their care partners. Finally, despite MCI's negligible disruption of daily activities, detailed examination and consideration of MCI's cognitive-linguistic characteristics is consistent with a cardinal communication sciences and disorders tenet, namely that any source of deviant communication compels empirical diligence with the goal of generating an evidential basis for clinical interventions. As codified in the American Speech-Language-Hearing Association's (ASHA; Dublinske & Lemke, 2008) vision statement, "...effective communication is a human right, accessible and achievable for all."

Now is the time to emphasize MCI's significance in the overall landscape of prevention, diagnosis, and treatment of acquired cognitive-linguistic disorders. Assessment and management of cognitive-communication disorders, including AD and other dementias, are well-established clinical domains within the purview of speech-language pathology (Bayles & Tomoeda, 2013). The relatively recent recognition of MCI as a distinctive cognitive-linguistic category demands intensified research inquiry. Communication sciences and disorders professionals are uniquely positioned to conduct needed research, generate public awareness, promote early identification, and recommend

appropriate medical and rehabilitative follow up. The opportunity and charge exists for speech-language pathologists (SLPs) to assert their expertise in the behavioral management of all cognitive-linguistic disorders. Hesitation on the part of SLPs to declare their unique expertise in MCI may result in others trying to fill the intervention-void without fully understanding MCI's place in the context of more fully understood cognitive-linguistic disorders.

Outreach to certain populations may require more urgency, as it is expected that MCI, a frequent precursor of AD, disproportionately affects Hispanic and African Americans, populations with the highest prevalence of dementia (Alzheimer's Association, 2016a; Gao et al., 2014). Hispanic Americans are 1.5 times more likely than Whites to develop AD (Alzheimer's Association, 2016a). African Americans are twice as likely as Whites to develop late-onset AD. Significant cardiovascular risk factors, including diabetes and hypertension, account for higher dementia prevalence among Hispanic and African Americans. Importantly, both groups are also less likely to receive early diagnosis and treatment, resulting in poorer clinical outcomes (Alzheimer's Association, 2002, 2004).

This call to action is an effort to heighten professional and public awareness of MCI as an important clinical marker for dementia management, particularly in high-risk Hispanic and African American populations. Early identification of MCI has implications for prevention and effective dementia management. This paper will provide a more in-depth description of MCI, demographic profiles of the target populations, barriers to identification and diagnosis of MCI, and will conclude with action steps to effect MCI diagnosis and management.

MCI

MCI is often conceptualized as a transitional phase between normal cognitive aging and early dementia (Petersen et al., 2014). It is that loosely delineated area where one departs from aging normally to a subtle, but detectable, decline in cognitive skills. Changes are negligible and activities of daily living may not be affected. The general criteria for diagnosis of MCI include: (a) a change in or concern about cognition (preferably corroborated by an informant); (b) impairment in one or more cognitive domains for age and education level; (c) absence of dementia, but not normal cognition; and (d) intact activities of daily living (Albert et al., 2011). Cognitive domains that can be impaired in MCI include memory, executive function, attention, language, and visuospatial skills (see Table 1). MCI can be classified into subtypes according to clinical symptoms. *Amnestic MCI* (aMCI) refers to those individuals who have memory impairment and *nonamnestic MCI* (naMCI) applies to those individuals with unimpaired memory (Albert et al., 2011).

Table 1. Cognitive Processes That May Be Impacted by MCI (Davis, 2012; Petersen et al., 2014).

Process	Definition
Memory	Process by which information is retained (encoded & stored) for later use (retrieved)
Executive Function	Processes for cognitive control includes: attentional control, inhibitory control, initiation, working memory, cognitive flexibility, reasoning, problem solving, and planning
Attention	Process for selectively concentrating on specific external or internal stimuli
Language	A ruled governed, socially shared system of arbitrary symbols used to represent ideas and meaning
Visuospatial	Process by which one processes and interprets visual information about where objects are in space

Some researchers estimate that about half of the individuals who develop MCI go on to develop dementia (Gauthier et al., 2006). More recent longitudinal research involving cohorts of older adult African Americans studied the transition from normal cognition to MCI, and MCI's conversion to dementia or reversion to normal cognition (Gao et al., 2014). These researchers observed an annual MCI incidence rate of 5.6%, with an annual evolution rate of MCI to dementia of 5.9%. Interestingly, the rate of reversion from MCI to normal cognition was 18.6%, with younger age participants more likely to revert to normal cognition and older participants more likely to convert from MCI to dementia. Clearly, the variable characteristics of MCI warrant further investigation.

Older Hispanic Americans

Of the total 46.2 million Americans aged 65 years and older in 2014, 3.6 million or 8% of the total were Hispanic. The number of older Hispanics is expected to increase to 21.5 million, almost a quarter of the total older adult population, by 2060 (Administration of Community Living, 2017). Like most aging individuals, older Hispanics have chronic health conditions. In 2011–2013, the most pertinent conditions were hypertension (75%), cardiac disease (25%), and diabetes (27%). The same source indicated that between 2011–2013, older Hispanic adults were almost twice as unlikely (7%) to have a usual source of healthcare compared to all older Americans (4%). The poverty rate in 2013 for Hispanics age 65 and over was 20.4%, double the rate for all older Americans (10.2%). The health conditions cited above are highly associated with and predictive of AD and other dementias (Alzheimer's Association, 2016b).

Older African Americans

Of the 46.2 million Americans aged 65 years and older in 2014, African Americans made up 8% of that population, totaling some 4 million individuals (Administration of Community Living, 2017). By 2060, as the general older adult population is expected to more than double, African Americans will account for 12 million of the anticipated population surge. The significantly large population of aged African Americans looms even larger when chronic health conditions are tallied. Between 2009 and 2012, hypertension, cardiovascular disease, and diabetes were present in 85%, 27%, and 39%, respectively, in African Americans 65 years and older. The high prevalence of chronic conditions occurred in the context of inadequate or absent reliable sources of healthcare. For example, between 2011–2013, 4% of older African Americans had no healthcare source, compared to 4% of all older Americans. The poverty rate in 2013 for African Americans age 65 and older was 18.7%, higher than the rate for all older Americans (10.2%). The most prevalent chronic health conditions cited above are reliable predictors of AD and other dementias (Alzheimer's Association, 2016b).

Barriers to Identifying MCI

In Hispanic and African American communities, pervasive cultural stigma about mental illness (Holmes, 2016; National Alliance on Mental Illness, 2016a, 2016b) may prevent identification and disclosure of mild memory impairments and other kinds of cognitive decline. For example, individuals, as well as those close to them, are likely to ignore, or sardonically dismiss memory lapses as an expected and mildly annoying sign of aging—a senior moment. Even worse, individuals may hide memory and cognitive impairments, mistakenly believing them to be harbingers of mental illness. An unwillingness to talk about declining cognitive functions precludes the engagement of first-line professionals who can activate supportive interventions. Increasing public knowledge of cognitive health characteristics, particularly in high-risk populations, will contribute to stigma reduction (Batsch & Mittelman, 2012) and pave the way for early identification of MCI and appropriate supportive management.

Distrust of healthcare systems also hinders some minority individuals from seeking health services, including care for memory and other cognitive problems (Shoff & Yang, 2012). Distrust is deep-rooted and complex, involving both hurtful personal experiences and those resulting from societal patterns of abuse, discrimination, and disrespect, based solely on one's

membership in a racial-ethnic minority group (Shoff & Yang, 2012). Such distrust challenges providers to dismantle this substantial health barrier that effectively delays help-seeking among those needing early management of cognitive symptoms that may convert to AD or other dementias (Cambridge Cognition, 2015).

In addition to stigma and distrust of healthcare systems, other barriers also contribute to decreased identification of MCI and reduced access to and utilization of healthcare for older Hispanic and African American adults. Language differences, lack of knowledge, and poor health literacy are just a few of the additional barriers that continue to persist and add to the health disparities experienced by both groups (Correa-de-Araujo, 2017). While determining the underlying causes of health disparities is a complex and daunting undertaking, there are some concrete steps that can be taken to reduce gaps in early identification, thereby improving clinical outcomes for older adults, including Hispanic and African American with prevalent risk factors for cognitive impairment.

Action Steps

Despite their greater risk for cognitive impairment, Hispanic and African Americans are less likely to seek medical help (Fiscella, Franks, Gold, & Clancy, 2000) for mild or nuanced cognitive changes (Mukadam, Cooper, & Livingston, 2013). However, both groups are likely to participate in community-based health fairs and other initiatives to promote prevention, self-care, and early identification of emergent health conditions. In community-based settings, allied health professionals, especially SLPs, are in a unique position to educate MCI-prone older adults and their caregivers. SLPs can serve dual roles as both practitioner and advocate. The requisite knowledge and expertise allow SLPs to navigate easily between the worlds of healthcare and broader communities. As such, SLPs have significant roles in prevention, education, management, and support of older adults at risk for developing MCI.

The first priority is the quest to serve individuals who are at risk for developing MCI should be in the general areas of prevention and education (Mukadam, Cooper, & Livingston, 2013). This two-pronged approach includes informing targeted communities about what makes certain individuals at higher risk for developing MCI as well as educating individuals about what can be done to decrease their risk for AD and other dementias. First and foremost, this entails heightening the awareness of MCI among all interested stakeholders, not only older adults who may be at risk, but also potential caregivers, primary care physicians, nurse practitioners, physician's assistants, long-term care personnel, program planners, or other healthcare professionals that may interact with at risk older adults. Strategically placed, persistent public service announcements have heightened public awareness of the signs and symptoms of heart attack and stroke. A similar public service campaign may be expected to alert the public to the signs and symptoms of MCI or dementia.

To fill the existing information void, we urge the public to look for our *Caution Signs of MCI: **M**emory, **C**ommunication, and **I**ndividual **T**raits* (see Figure 1). Memory refers to memory declines, whether self- or informant-reported. Any observed memory decline warrants follow-up with a physician or specialist. Communication refers to changes in how one usually conveys or understands messages, such as difficulty following a conversation, staying on topic, finding the right words, or using more empty speech or "fillers" (e.g., pauses, repetitions, or words such as "uh," "umm," "thing," and "stuff"). Memory and communication decline validate a tentative diagnosis of MCI. Individual traits including: changes in personality or behavior; increased agitation; social withdrawal; irritability; or changes in sleep patterns or appetite are also important. While these signs may signal MCI, they may also indicate psychosocial/emotional or physical problems that need psychotherapeutic or medical follow-up. While the intent is not to diagnose any of the aforementioned disorders, knowing the "signs" will help heighten public awareness of MCI and improve education and prevention efforts in Hispanic and African American communities.

Figure 1. The Caution Signs of MCI.



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As a part of prevention and education, SLPs can provide information to communities regarding evidence-based ways to decrease the risk of MCI. Several strategies have been identified, such as diet modification, exercise, and cognitive engagement (Rogalski & Quintana, 2013) to decrease the risk of MCI or dementia. In addition, providing education regarding normal aging versus pathological aging (Fleming, 2013) may encourage earlier help-seeking. Earlier identification helps individuals to seek medical consultation and to use ancillary resources, such as supportive management by SLPs.

Since the early 1980s, SLPs have had a clear role and direction in the management of clients with dementia (Bayles & Tomoeda, 2013). To date, similar clarity for SLP's MCI management has not evolved. Because individuals with MCI do not present with frank signs of dementia or readily detectable changes in communicative ability, the need for traditional speech-language intervention is likely contraindicated. Nevertheless, individuals with MCI need education, counseling, advocacy, and case management. Although less traditional, these roles are fully within the practice realm of SLPs in the management of cognitive-linguistic disorders (ASHA, 2005). Each of these roles can significantly contribute to improving the quality of life of individuals with MCI and their families by providing support for them in this new uncharted territory. Further, using nontraditional methods in fulfilling these roles may also be necessary. Rather than working one-on-one with a particular client, a group-oriented approach may be considered. This approach may involve working with multiple individuals with MCI or including caregivers and other stakeholders. Telepractice may be an alternative to face-to-face intervention for individuals in remote locations without access to SLP services. Approaches to service delivery will have to be as creative and unique as the populations being served.

Conclusion

Now more than ever is the time for SLPs to assertively and proactively proceed on behalf of all adults with MCI. In an uncertain healthcare climate, prevention and early identification become significant elements of service delivery to better serve individuals at highest risk for MCI and AD. Barriers to identifying MCI will have to be addressed and dismantled. How best to resolve the myriad issues of SLP intervention in MCI, particularly in high-risk Hispanic and African American communities? Like eating the proverbial elephant—one bite at a time—we must proceed with haste toward implementing the action steps of prevention, education/public awareness, management, and support, as outlined in this paper. The complexity of MCI requires that SLPs and other stakeholders work collaboratively to ensure that MCI is accorded greater importance as a potential precursor of AD or other dementias that require appropriate follow-up and long-term

management. Identification of MCI in Hispanic and African Americans requires even greater diligence because of the prevalence of AD and other dementias in these populations.

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Clinical Implications of Neurocognitive Control Deficits in Bilingual Adults With Aphasia

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Abstract

The purpose of the paper is to review the literature on the neurocognitive control in bilingual aphasia and extrapolate research findings into clinical guidelines. Neurocognitive control, as well as bilingualism, are multifaceted phenomena whose complex interaction is disrupted by stroke. Bilingualism is an added factor of complexity to aphasia assessment and rehabilitation. Rehabilitation specialists are more aware of the need to understand language and nonverbal cognitive abilities, for a better treatment outcome (Ansaldo, Saidi, Ruiz, 2010; Green, 2005; Helm-Estabrooks, 2002). Consequently, assessment and management of neurocognitive skills in bilingual aphasia are gradually gaining momentum. Applying principles from language-cognitive control interactions to the rehabilitation of bilingual populations with aphasia appears to be a valuable intervention strategy for this population.

Bilingual Aphasia: Journey So Far

In the last two decades, there has been an increase in studies on the neurocognitive control and bilingualism (Abutalebi & Green, 2008; Abutalebi, Della Rosa, Tettamanti, Green, & Cappa, 2009; Bialystok, Abutalebi, Bak, Burke, & Kroll, 2016), in healthy as well as bilingual adults with aphasia (BAA). Bilingual aphasia research has focused on single case and group studies, addressing a wide variety of issues. These include the clinical characteristics of bilingual aphasia (Paradis 2001), crosslinguistic effects of interventions (Ansaldo & Saidi, 2014), recovery patterns of language and cognitive skills (Marangolo, Rizzi, Peran, Piras, & Sabatini, 2009), the validation of assessment and management strategies (Ansaldo, Saidi, & Ruiz, 2010; Kohnert, 2004), and the identification of the pre-requisite skills to achieve efficient bilingual rehabilitation in BAA (Gray & Kiran, 2013, 2016).

Researchers have addressed a series of questions and the answers have evolved overtime with the advent of new knowledge in the field. Among these questions: Are neurocognitive control deficits present in all cases of bilingual aphasia? How can clinicians assess neurocognitive control deficits? Which tools are available to assess these deficits? How do neurocognitive deficits affect the bilingual aphasia profile? What clinical signs characterize neurocognitive control deficits in BAA? What is an efficient way of approaching these deficits in therapy? How can speech-language pathologists (SLPs) take into account these deficits while choosing the stimuli and therapy approach to treat BAA? These questions are of great interest and clinical relevance in the field of speech-language pathology since it has become very clear that the understanding of bilingual aphasia

cannot be achieved by the mere extrapolation of data from monolingual aphasia. Until recently, most of the studies on bilingual aphasia focused on the impact of brain damage on language representation and function, with a less direct focus on bilingual aphasia rehabilitation. In particular, the issue of the clinical implications of neurocognitive control deficits in bilingual aphasia still remains “terra incognita”.

Hence, given that bilingualism is a global phenomenon characterized by a constant increase in the number of bi/multilingual individuals around the world (de Bot, 1992), there is as well an increase in bilingual clinical populations with speech and language disorders, such as BAA. There is a great need to develop adapted assessment and intervention tools for these populations; tools and interventions that tap on the disrupted processes, and provide valid solutions for the management of BAA. Most of the literature has focused on common and distinct features between monolingual and bilingual aphasia, in terms of clinical signs, and recovery patterns. Conversely, there is little research on the status of other cognitive functions than language, and limited information about neurocognitive deficits in bilingual adults with aphasia, and their appraisal. The purpose of this paper is to discuss the clinical implications of neurocognitive control deficits observed in bilingual aphasia, and how this understanding can substantiate the bilingual assessment and rehabilitation methods in this widely increasing clinical population.

The Concept of Neurocognitive Control and Its Implications in Bilingual Aphasia

The concept of neurocognitive control refers to the neural and cognitive mechanisms that sustain the ability to adapt and flexibly change behavior to novel conditions. Neurocognitive control consists of an array of cognitive processes, including attentional control, cognitive flexibility, abstraction, reasoning, concept formation, the use of strategies, problem solving, initiation, sequencing, monitoring, inhibition, impulse control, goal setting, and planning (Cahana-Amitay & Albert, 2015). It is also referred to as “executive function,” “executive control,” “central executive,” or “cognitive control”. In the context of this paper, we will use the term neurocognitive control to refer to the definition above.

Whether in a bilingual or unilingual mode of communication, the two languages of the bilingual person are in constant competition. This competition is managed by the cognitive control system, which selects or inhibits either language, depending on the constraints of the communicative situation. Hence, at the lexical, morphosyntactic, or discourse levels, and at the comprehension or production levels of oral and written language, neurocognitive control abilities play a key role in the achievement of efficient communication (Cahana-Amitay & Albert, 2015).

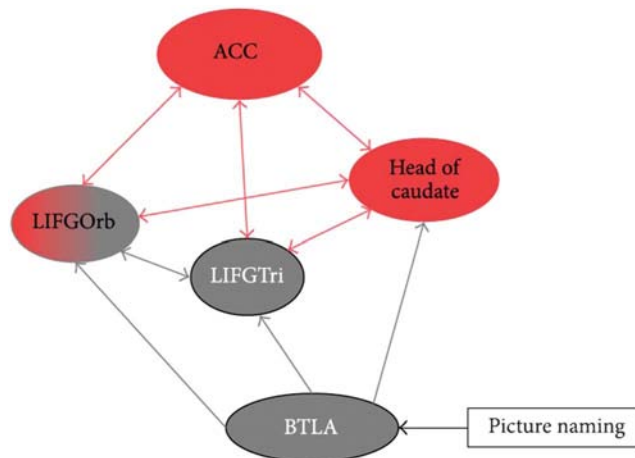
Deficits in neurocognitive control following stroke have been largely reported in persons with aphasia, and they have been related to a wide variety of aphasia signs and symptoms, including paraphasia (Ardila, Bernal, & Rosselli, 2016), anomia (Ansaldi et al., 2010), discourse comprehension (Novick, Trueswell, & Thompson-Schill, 2005), language production (Biegler, Crowther, & Martin, 2008), apraxia of speech (Ardila et al., 2016), and conversational discourse (Penn, Frankel, Watermeyer, & Russell, 2010). More specific to BAA, some neurocognitive advantages in bilinguals, as compared to monolinguals, have been reported (Penn et al., 2010). A thorough understanding of neurocognitive control abilities and deficits in the context of bilingual aphasia, will contribute to designing intervention approaches adapted to this population. To do so, it is important that SLPs are sensitized to the links between language and cognitive control, mechanisms, and how these two can be affected in the context of stroke (Abutalebi & Green, 2008; Radman et al., 2016).

A Model-Based Approach to Understand Neurocognitive Control-Language Interactions

Abutalebi’s neurocognitive model of bilingual language switching provides a framework for the understanding of neurocognitive control deficits in bilingual aphasia (Abutalebi & Green,

2008; Abutalebi et al., 2009) while providing a neuroscience perspective that may guide clinical assessment. Thus, highlighting the importance of assessing cognitive skills in addition to language skills as well as their interaction in BAA. According to this model (Abutalebi et al., 2009) lexical selection is supported both by control (neurocognitive control; in red) and language (naming; in grey) processing networks, as shown in Figure 1.

Figure 1. Model of Language-Control Network (Proposed by Abutalebi et al. [2009], from Radman et al. [2016]).



Note. ACC = anterior cingulate cortex, BAs 24, 32, 33; BTLA = basal temporal language area, BAs 19 and 37; LIFGOrb = left inferior frontal gyrus pars orbitalis, BA47; LIFGTri, left inferior frontal gyrus pars triangularis, BA45.

The language network comprises semantic decoding areas (Brodmann Areas [BAs] 19, 37), a lexical production area (BA 45) and a lexical retrieval area (BA 47). As for the control network, it comprises the left inferior frontal pars orbitalis (LIFGOrb; BA 47), the head of the caudate, and the anterior cingulate cortex (ACC; BAs 24, 32, 33), all of which support conflict monitoring, and managing interference from the nontarget language. Damage to any of areas or their interconnection may result in typical clinical signs in aphasia. For example, damage to semantic decoding areas may result in semantic paraphasia, which occurs when the correspondence between the conceptual and lexical representation is disrupted. As a result, the person with aphasia produces words that are semantically related to the target within or across languages (i.e., saying “chair” instead of “sofa”) or uses a semantic alternative across the two spoken languages. The person could also select an inappropriate phonological representation, which results in a phonemic paraphasia (i.e., saying “spot” instead of “pot”). In addition, damage to these areas (BAs 37, 19, 45) may similarly lead to verbal fluency deficits with the BAA being unable to name items in a specific category. Damage to the control network results in an array of clinical signs, including pathological code-switching/-mixing, a common symptom in bilingual aphasia, and blending. While pathological code-switching consists of switching between the languages, in a single conversational context. Blending involves uncontrollable mixing of the two languages at any language level while attempting to speak in only one language. Brain damage may lead to selective language control deficits, namely impairments at the language level only, or nonlinguistic control deficits, affecting nonverbal auditory or visual stimuli processing or both linguistic and nonlinguistic control deficits, as reported in single case studies of bilingual aphasia (Dash & Kar, 2014; Green et al., 2010; Verreyt, De Letter, Hemelsoet, Santens, & Duyck, 2013).

A question of clinical interest concerns whether neurocognitive control deficits are present in all types of bilingual aphasia. What we know is that neurocognitive control deficits in BAA may show variable manifestations, ranging from very evident behavioral manifestations- such as pathological code-switching to subtle deficits at lexical, phonetic, or prosodic levels (Gray & Kiran, 2016; Green et al., 2010). The study of neurocognitive control deficits in BAA is limited and hampered by the caveats of a number of individual factors, including the age of L2 acquisition, mode of L2 acquisition, extent of use of either language, as well as language proficiency. All the previously named factors influence neurocognitive control and language deficits in the context of the assessment of bilingual aphasia. Thus, assessment of BAA can be compromised by the lack of consideration of the bilingual language experience, and neurocognitive control ability (including attention and working memory) in the interpretation of language test results. In this regard, it is to be noted that research provides important clues to be considered when working with this population. The next sections focus on a number of clinical questions, while adopting an evidence-based perspective. The reader is encouraged to keep in mind that our answers are incomplete, requiring further research to improve our understanding of these issues.

Neurocognitive Control Deficits and Bilingual Aphasia: Some Clinical Signs

Neurocognitive control deficits may be observed both in the acute and chronic stages of aphasia. The behavioral manifestations include lack of flexibility in moving from one language to the other, switching between communicative situation and difficulties in inhibiting the nontarget language, which are reflected by intrusions, blending, or mixing that are typical of pathological language switching. Specifically, it has been shown that repeated failure to inhibit the nontarget language becomes a source of verbal disfluencies, aborted sentences, and disorganized discourse (see Penn et al., 2010 for more examples). Also, slow and laborious speech may suggest neurocognitive control deficits due to slowness in execution of the goal-directed behavior in language production.

Assessing Neurocognitive Control Deficits

In addition to standard language assessment strategies, assessment of neurocognitive control abilities in BAA will contribute to develop a broad diagnosis and prognosis profile of the patient. Knowledge of the patient's neurocognitive abilities will provide important information for the assessment process, including the analyses and interpretation of the BAA's interaction with the bilingual environment, the potential for recovery and cross-language transfer of language therapy effects, as well as the overall communication impairment. Language processing in bilinguals taxes the cognitive control mechanism in unique way, as bilinguals have to select the target language, inhibit the nontarget one, and be ready to switch from one to the other, depending on the requirements of the communicative situation. This calls for the assessment of neurocognitive deficits in bilinguals with aphasia. Although assessing neurocognitive control for monolingual speakers with aphasia is the best practice, it is especially important for the bilingual speakers.

In order to avoid subjective bias in neurocognitive assessment, it is necessary to adapt the testing environment by selecting tests that have a minimal load on linguistic skills. Also, choosing the language better understood by the PWA or caregiver in the context of assessment. It is also important to gather information about the premorbid language experience of the BAA (Centeno, 2005), to distinguish between premorbid proficiency and aphasia consequences. A bilingual language processing framework (Gray & Kiran, 2013) shows that the impact of pre-morbid language proficiency, language use, and history are fundamental elements for the diagnosis of bilingual aphasia. Specifically, the authors (Gray & Kiran, 2013) argue that pre-stroke language use patterns can predict lexical and semantic deficits as measured by standardized language tests. However interesting, the authors also provide caution while interpreting these results, as only a limited number of participants were examined.

Traditionally, assessment of neurocognitive control abilities relies upon neuropsychological tests, such as the Wisconsin Card Sorting Test (Heaton, Chelune, Talley, Kay, & Curtis, 1993), the Tower of Hanoi Test (Humes, Welsh, Retzlaff, & Cookson, 1997), the Tower of London Test (Shallice, 1982), and the Trail Making Test (Reitan & Wolfson, 1985), that are now sparsely used in clinical practice. However, because these tests were not developed to assess BAA, and are highly loaded on comprehension of instructions; thus, which limits their diagnostic validity and level of reliability for this population (Cahana-Amitay & Albert, 2015). However, although testing tools with high comprehension demands are not always suited to assess neurocognitive control deficits in BAA, these demands can be decreased by lifting time constraints, simplifying instructions, using gestures, and providing practice trials (Cahana-Amitay & Albert, 2015). In other words, if the clinician has experience with these tests and with bilingual aphasia, a parsimonious use of these assessment tools may provide important information about the neurocognitive profile of person with bilingual aphasia.

Two valuable tools for the assessment of cognitive-linguistic abilities in BAA are the Cognitive-Linguistic Quick Test-Plus (CLQT-Plus; Helm-Estabrooks, 2017) and the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph, 1998). Originally developed for monolingual populations with stroke, head injury and dementia, this tools can provide a general cognitive profile of the persons with aphasia. Further, neurocognitive control skills in daily life situations, such as cooking, driving, etc., can be tested with the Activity of Daily Living Profile (Dutil, Bottari, Vanier, & Gaudreault, 2005) or the Communication Effectiveness Index (Lomas et al., 1989). Finally, validated neuropsychological tests, used to assess attention-based cognitive control, maybe useful, as well. Examples of those tests include the Stroop task (MacLeod, 1991; Stroop, 1935), the Flanker task (Eriksen & Eriksen, 1974), and the negative priming task (Tipper, 1985). These tests generate important information about neurocognitive control abilities at the executive function level. However, as none of these instruments has been standardized with bilingual populations, the results should be considered with caution.

Neurocognitive Control Deficits in Bilingual Adults With Aphasia: Current and Future Directions

Bilingual aphasia rehabilitation encompasses therapeutic options, ranging from traditional symptomatic approaches focusing on the rebuilding of language skills, to compensatory approaches, focusing on an alternative modes of communication (Hallowell & Chapey, 2008; Hux, Weissling, & Wallace, 2008). More specifically to bilingual aphasia, intervention studies usually focus on language choice for therapy, cross-language transfer of therapy effects, and factors influencing recovery in the chronic phase. Furthermore, some authors have supported the idea of addressing impaired cognitive skills (i.e., attention, working memory, etc.) in addition to the language impairment. As for the clinical management of neurocognitive control deficits in bilingual aphasia, intervention traditionally aimed at selecting one of the two languages for therapy to enhance the chances of recovery (Green, 2005; Paradis, 2001). A key reason driving this approach is that, secondary to brain damage, the amount of available cognitive resources decreases. Thus, the rationale behind this approach is that limiting intervention to one language will minimize the load on neurocognitive abilities, and pathological mixing or switching (Green, 2005; Paradis, 2001). Given that brain damage causes the amount of available resources to decrease, limiting intervention to one language is expected to decrease the load on neurocognitive abilities, thus favoring recovery (Green, 2005; Paradis, 2001).

However, there is evidence that integrating code-switching in the therapy process may be beneficial to improve communication in BAA. In particular, Switch Back through Translation Therapy (SBTT) has been shown to be an efficient way to bypass anomia, access the target language, and maintain fluid communication, while preventing communication breaks (Ansaldo & Saidi, 2014). SBTT uses translation as a means of overcoming pathological code-switching. More precisely, when the person switches to the nontarget language, instead of trying to prevent the switch, the

SLP uses a cue to guide the person to translate the items from the nontarget to the target language (it can be a short cue sentence in the target language or a gesture). As translation restricts the choice in vocabulary selection, it makes it easier to access the word in the target language, while avoiding communication breakdown due to the pressure of producing a word in a specific language. Hence, SBT provides top-down control by increasing awareness of the use of translation equivalents in the nontarget language, and by providing BAA with a strategy to overcome the impairment, by using the word that first comes to their minds, and if needed, translate that word to the target language (Ansaldo & Saidi, 2014).

Another perspective promotes combining interventions targeting general cognitive control abilities, in addition to speech-language therapy (SLT; Green et al., 2010). In this regard, the evidence suggests that therapy for nonlinguistic neurocognitive control abilities, including attention, working memory and inhibitory control, may contribute to better language recovery in BAA (Dash & Kar, 2014; Verreyt et al., 2013). Specifically, in a single-case study on a bilingual participant with severe aphasia, Kohnert (2004) applied a cognitive treatment, consisting of visual scanning, categorization, and simple arithmetic tasks. The participants showed therapy gains in both the languages. In addition, Gray and Kiran (2016) speculate that the training of nonverbal control skills, rather than language control skills should help improving language in BAA. However, this argument warrants further investigation.

A recent meta-analysis of the literature on bilingual aphasia therapy points to the importance of considering the potential for cross-language therapy effects (CLTE) by looking at similarities and differences between two languages used by the bilinguals (L1-L2; Ansaldo & Saidi; 2014). Specifically, cognates (i.e., words that share phonology and semantics across languages) show a higher potential for CLTE than noncognates (i.e., words that share semantics but not phonology across L1-L2). For cognates, a lack of inhibitory control is less harmful than when processing noncognates. The competition involved in processing noncognates requires a strong inhibition of the nontarget item. As a whole, the research reviewed suggests that the post-stroke functional status of the language-control network (Abutalebi et al., 2009, please refer to Figure 1) will have a strong impact on the recovery profile of the BAA. A description of the different recovery profiles in bilingual persons with aphasia is beyond the scope of the present paper (see Lorenzen & Murray, 2008; Paradis, 2001). However, when assessing either language of the BAA, it should be noted that neurocognitive control deficits may jeopardize observations regarding pure language or cognitive deficits, due to the difficulty in selecting or inhibiting the pertinent information at a given time.

Finally, it is also reported that neurocognitive control skills are a prerequisite for successful use of compensatory strategies (i.e., using gestures, or writing or self-corrections in wrong language). These compensatory strategies may help in facilitating overall communication. In cases of neurocognitive control deficits, therapy goals can be reframed based on research findings from the past. It should be noted that promoting a bilingual mode of communication may improve performance, and reduce stress related to the inability to inhibit a language and communication breakdown (Lorenzen & Murray, 2008).

Summary and Recommendations

There is no general rule for the assessment and intervention of neurocognitive control deficits in BAA. However, it is greatly acknowledged that the neurocognitive control-language interactions are particularly complex in a bilingual context. Thus, brain damage can have a serious impact on the delicate balance between the two of them. There is a great need for more research, to disentangle the behavioral signs and symptoms of neurocognitive control deficits in BAA. And find, the best practice in the context of speech-language clinical assessment and

interventions can be identified. There are pros and cons to the actual situation, and these can be summarized as follows:

(a) Caveats regarding the available evidence:

- Current literature is heavily influenced by the single case studies. Thus, a word of caution is needed while interpreting the information.
- Not all BAA will demonstrate similar cognitive-linguistic profile. Neurocognitive control deficits may vary as a function of individual factors regarding the type of pre-morbid bilingual language profile in a given person.
- Use of monolingual assessment tools with BAA is inappropriate, and may jeopardize neurocognitive deficits, and lead to poorly designed interventions.

(b) Recommendations for future research:

- More group studies comparing neurocognitive control and language patterns across bilinguals and monolinguals with aphasia, and by reference to healthy populations will increase the external validity of clinical entities described.
- Randomized control trials to study intervention impact in large cohorts of BAA would then follow.

(c) Recommendations for clinical assessment:

- Collecting a thorough case history on language background of the BAA is essential to determine premorbid proficiency and language use, to avoid over or underestimating the impact of aphasia.
- Assessing neurocognitive deficits in BAA should include both nonverbal and verbal tools, so that domain specific vs. domain general neurocognitive deficits can be disentangled, and considered when planning therapy.
- Recommendations for treatment:
- Take into consideration the pre-morbid and post-morbid language proficiency as well as the language-use patterns in both the languages (Gray & Kiran, 2016) for efficient choice of language of treatment according to premorbid competence.
- Target specific cognitive processes together with language intervention, for example by using cognitive treatment (Kohnert, 2004).
- Include SBTT (Ansaldi, Saidi, & Ruiz, 2010) when switching between languages can ease the communication instead of restricting the BAA to the use of one language.
- Favor a multimodal/multi-language approach, by combining speaking, writing, and reading in both languages to ease communication (Gil & Goral, 2004).

To sum up, the high neurocognitive demands that characterize bilingualism may be particularly hampered in the context of aphasia. This topic has been particularly neglected in the bilingual aphasia rehabilitation literature and research. Further research is required to better characterize these deficits. This will contribute to developing assessment and intervention procedures adapted to BAA. Until this happens, and given the exponential growth of bilingual population, clinicians need to be aware of at least two main things: first of all, it is important to acknowledge the possibility of neurocognitive control deficits in the context of BAA. Secondly, assessing this possibility in an adequate manner will provide key information to substantiate rehabilitation approaches and tools that can enhance the chances of recovery of BAA.

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Neuroimaging Evidence in the Treatment of Bilingual/Multilingual Adults With Aphasia

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Abstract

Recovery in bilingual adults with aphasia (BAA) following treatment is a dynamic process that is accompanied by changes in the functional organization of language in the brain. Lesion data and functional imaging methods can improve our understanding of language deficit and recovery in BAA. This review article aims to inform clinicians about the neuroimaging methods employed to examine the neural correlates of language treatment in BAA and the evidence of the functional changes that occur within and across the language processing and the language control systems as a function of language treatment.

Bilingualism and Aphasia in Bilingual Speakers

Bilinguals¹ can be broadly defined as individuals who use two or more languages in their everyday life activities (Grosjean, 1994) even when proficiency differs across languages as they may be used in different contexts and for different purposes (Lorenzen & Murray, 2008). Bilingualism is constantly increasing in the modern world as a result of globalization and immigration (Abutalebi & Weekes, 2014). Just in the United States, over 60 million people five years and older speak a language other than English at home and 58.2% also report speaking English very well (Ryan, 2013). Because of the increasing incidence of stroke in the general population reaching 795,000 cases in the United States per year (Mozaffarian et al., 2016), a growing prevalence of aphasia in bilingual speakers is also expected, with an estimated annual increase of 45,000 new cases (Paradis, 2001).

Aphasia in bilingual speakers is an acquired language disorder that follows brain damage and affects two or more languages with not always equivalent recovery (Ansaldo & Saidi, 2014). The intrinsic complexity of bilingualism poses great challenge to research of aphasia in bilingual speakers. Large sources of individual variability (i.e., differences in age of acquisition and pre-stroke proficiency) and differences in the phonological structure of each language make the interpretation of impairment and treatment outcome rather difficult (Kiran & Roberts, 2012). Nevertheless, causal accounts of language recovery in bilingual adults with aphasia (BAA) are clearly needed, and their identification requires a better understanding of the neural mechanisms associated with abnormal and recovered bilingual language processing after brain damage (Green & Price, 2001). Structural magnetic resonance imaging (MRI) and functional magnetic

¹In the present article, the term bilingual/bilingualism also refers to multilingual/multilingualism and indicates the use of two or more languages.

resonance imaging (fMRI) methods allow examining the integrity of brain areas involved in language processing and the interaction between lesion and function to identify regions associated with language recovery (Crinion, Holland, Copland, Thompson, & Hillis, 2013).

Recovery of Aphasia in Bilingual Speakers

A highly variable range of recovery patterns has been described for BAA. According to Paradis (2004), these patterns include parallel, selective, differential, antagonistic, alternate antagonistic, successive, and blended recovery (see Table 1). Parallel recovery is the most frequently observed pattern of recovery in BAA (Fabbro, 1999).

Table 1. Patterns of Recovery in BAA.

Recovery pattern	Language profile
Parallel	Similar recovery across languages that parallels premorbid relative ability.
Selective	One language recovers while the other remains impaired.
Differential	One language recovers better than the other relative to premorbid abilities.
Antagonistic	One language recovers first but the recovery of the other language leads to the gradual loss of the first.
Alternate antagonistic	Language availability alternates across languages within days or months.
Successive	The recovery of one language precedes that of the other language.
Blended	Pathological involuntary switching between two or more languages during the production of the intended language.

In contrast to the well-defined characterization of the behavioral patterns of recovery of BAA, the neural mechanisms underlying such patterns of bilingual recovery have not been specifically addressed. However, functional imaging methods have revealed important findings regarding the time course of language recovery in monolinguals. Based on the longitudinal fMRI findings of the spontaneous language recovery of 14 people with aphasia, Saur and colleagues (2006) proposed a model of recovery that involves three stages from acute to chronic stroke. In this model, the acute phase is characterized by a global breakdown of the entire language network with only minimal activation in non-infarcted language regions. The subacute phase involves an upregulation of the language network where improvement of language is associated with increased bilateral activation in spared language regions of the left hemisphere and homologue areas in the right hemisphere. Finally, the chronic phase involves a reshift of activation towards the left hemisphere, an indication of normalized activation associated with further language improvement.

The restoration of functional brain activity and language recovery across these three phases relies on distinct mechanisms. In the acute phase, the resolution of language dysfunction is mainly dependent on the successful reperfusion of the infarcted tissue (Hillis & Heidler, 2002). In the subacute phase, language improvement is associated with the resolution of diaschisis (Saur et al., 2006), that is, the dysfunction of a spared region anatomically remote but functionally connected to the lesioned region caused by the disruption of a pathway connecting both regions. In the chronic phase, language recovery is supported by mechanisms of neural reorganization and brain plasticity where spared areas and perilesional tissue in the left hemisphere and homologue areas in the right hemisphere take over the function of damaged language regions (for a review, see Crinion & Leff, 2007; Turkeltaub, Messing, Norise, & Hamilton, 2011). Right hemisphere recruitment is particularly common after extensive lesions in the left hemisphere (Sims et al., 2016).

As we understand more about the neurophysiological basis of recovery mechanisms in the brain (Hope et al., 2015; Kiran, 2012; Seghier et al., 2016), it seems logical to assume that the mechanisms sustaining language recovery in monolinguals are likely to be the same as those supporting recovery in bilinguals. More research needs to examine similarities and differences between the neurophysiological characteristics of monolingual and bilingual aphasia impairment.

Neuroimaging and Treatment of Aphasia in Bilingual Speakers

Two crucial aspects that aphasia therapy needs to consider with regards to bilingualism are the simultaneous activation of two or more languages in the brain (language coactivation) and the effects of treatment of the target language on the non-target language (i.e., cross-language generalization and cross-language interference). At the neural level, these two aspects are closely related to bilingual language representation, and the integrity and functionality of the language processing and language control networks (Abutalebi, 2008). The studies reviewed here provide evidence that structural lesion data as well as functional neuroimaging can inform aphasia rehabilitation with regards to lesion-deficit associations and changes in brain activation and connectivity in the language processing and control networks.

Structural Neuroimaging in Bilingual Treatment Studies

One study that exemplifies how structural imaging and lesion data can inform treatment is the one conducted by Keane and Kiran (2015). This study examined the within- and cross-language generalization of semantic treatment in a trilingual Amharic native speaker with aphasia for whom naming therapy was first delivered in L2 (English) and in L3 (French) at a later time. She reported an early acquisition for L2 and a late acquisition for L3, and a high pre-stroke proficiency for all three languages. Albeit this BAA showed significant improvement on trained items, no within- or cross-language generalization occurred after treatment. Moreover, her pattern of naming errors (i.e., cross-language intrusions) showed an increased interference from the target language to the non-treated language in both treatments. Structural MRI further revealed damage to the left frontal cortex and basal ganglia. These findings indicate that the integrity of key regions within the control network involving the prefrontal cortex, the anterior cingulate, and the basal ganglia (Abutalebi & Green, 2007) is crucial for the effective selection of competing items in the target language and the simultaneous inhibition of items in the non-target language (Costa, 2005). In fact, cognitive control deficits may account for the increased cross-language interference and the absence of generalization in BAA (Abutalebi, Della Rosa, Tettamanti, Green, & Cappa, 2009).

Functional Neuroimaging in Bilingual Treatment Studies

An important question that may improve our understanding of the recovery of BAA after treatment is whether L1 and L2 processing are supported by similar or different regions in the brain and the characteristics of language that modulate this functional representation. Sebastian and colleagues (2012) addressed this question in an fMRI study that examined the influence of language use/proficiency on the neural representation of language in three BAA. The BAA and three healthy controls were compared in their performance on a receptive semantic judgment task conducted in L1 (Spanish) and L2 (English) and in their associated patterns of brain activation. All participants were early bilinguals² with stronger proficiency for L2 relative to L1. The authors found that semantic judgment performance was faster and more accurate in the dominant L2 than in the nondominant L1 for all participants. Similar to the healthy individuals, the BAA showed increased and more distributed bilateral activation in the frontal cortex and the cingulate gyrus for semantic processing in L1 relative to L2. These findings suggest that neural activation for

²Early bilinguals typically acquire their L2 before age six while late bilinguals acquire their L2 after age six.

semantic processing can be different when two languages diverge in use/proficiency possibly reflecting a compensatory effort to achieve effective processing in the less dominant language.

Only a few neuroimaging studies have examined functional changes in the language processing network after treatment in BAA. In an early study, Meinzer and colleagues (2007) examined the fMRI patterns of brain activation associated with naming ability in an early German-French BAA with a high premorbid proficiency for both languages. The BAA, who showed selective recovery in German compared to French after initial treatment, received additional short-term intensive language training in German and underwent fMRI before and after training. Prior to training, improved naming in German compared to French was associated with increased functional activation in lesion-homologue areas in the right temporal cortex. After training, improvement in German naming was associated with increased perilesional and contralesional activation in frontotemporal areas. However, no generalization was observed in the nontreated language after training and its brain activation pattern in non-temporal regions remained unchanged. This study demonstrates that the differential recovery of two languages clearly reflects differential patterns of regional recruitment within the language network and that language improvement in bilinguals can also involve perilesional recruitment as observed in monolinguals (Saur et al., 2006).

Neuroimaging treatment studies have also highlighted the importance of the control network in the language recovery of BAA. Abutalebi and colleagues (2009) combined fMRI and dynamic causal modeling (DCM) to examine the effects of naming treatment in language representation and control during recovery in a late BAA with a subcortical stroke. The BAA whose pre-stroke proficiency was equally good for L1 (Spanish) and L2 (Italian), received naming treatment for L2 and underwent fMRI at pre- and post-training. fMRI revealed similar bilateral activation patterns comprising several regions in the frontal, parietal, and occipital cortices for naming in both languages before treatment. However, in contrast to L1 naming, improved L2 naming was associated with a more distributed pattern of activation in roughly the same regions of the language processing network and the right temporal cortex, and in both the prefrontal and the anterior cingulate cortex in the language control network after treatment. The DCM approach allows identifying changes in the connectivity of brain regions engaged in a particular cognitive function of interest as evidenced through fMRI activations. In the present study, DCM allowed examining changes in functional connectivity within the language processing network and between language processing and language control regions during recovery. These analyses revealed increased connection strength in regions within the naming network and between the naming and the language control networks in the left hemisphere for the treated language. On the contrary, worsened L1 naming was associated with decreased global connection strength by the end of the therapy, signaling an antagonistic recovery.

The association between increased connectivity in the language and control networks and the improvement of language function has been further supported by a more recent multiple case study. Radman and colleagues (2016) conducted an fMRI study on L1 and L2 naming at one and four months post-stroke in five BAA, three of whom underwent language therapy. Three BAA spoke French (L1) and English (L2) while two spoke Italian (L1) and French (L2). All participants were late bilinguals with good pre-stroke proficiency for both languages. Changes in connectivity between language processing and control regions during language recovery were examined using the DCM approach. Behaviorally, while three BAA showed parallel recovery and two showed selective recovery for L1 and L2 respectively, only two BAA (one with parallel and one with selective recovery) also presented improvements in language control function. DCM revealed that better recovery of language production was associated with increased connectivity between language processing regions (i.e., left inferior frontal region) and control regions (i.e., anterior cingulate) during naming in the recovered language. Importantly, all three BAA with parallel recovery had similar degrees of connectivity strength between language processing and control areas during L1 and L2 naming. It should be noted that the changes in connectivity associated with recovery were not consistently related to a specific type of treatment and took place within four months after stroke when spontaneous recovery was still ongoing. Altogether, these studies demonstrate that

language treatment gains are associated with changes in the recruitment and coupling of regions within and beyond the language system, and signal the influence of the control system on the functional recovery of the bilingual language network.

Conclusion

Despite the small number of single-/multiple case neuroimaging studies conducted on the treatment-induced recovery of BAA, the research reviewed here suggests that the functional interplay between regions in the left language processing network and the control system plays a crucial role in the recovery of language dysfunction in BAA. Treatment-based effects in bilinguals may specifically rely on (a) lesion extent and localization affecting crucial components of the language and the control networks after stroke; (b) the availability of perilesional regions and contralesional language homologue regions for active recruitment during treatment-induced recovery; (c) the residual capacity of the language and control systems for functional coupling in the left hemisphere; and (d) the integrity of the control system to sustain its modulatory activity on the language system to select the appropriate lexical semantic representations in the intended language and to resolve competition and avoid interference of the unintended language through inhibitory mechanisms. Because the treatment effects of these studies were mostly language-specific, future neuroimaging studies focused on BAA who clearly display generalized effects to the nontreated language may inform aphasia rehabilitation about the dynamic neural changes that support cross-language generalization. Likewise, more research is needed to examine the functional brain changes associated with treatment-induced recovery in BAA while considering specific aspects of bilingualism (e.g., language use and proficiency), language ability (e.g., speech production, comprehension), modality (e.g., receptive, expressive), and time point along the acute/chronic recovery continuum.

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Neurorehabilitation With Hispanic/Latino Populations: Psychological Perspectives on Interprofessional Communication

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Abstract

Recent research at the intersection between multicultural psychology and rehabilitation psychology has acknowledged the linguistic and cultural factors affecting therapeutic outcomes. For Hispanic patients, their growing population, limited access to adequate healthcare, and numerous risk factors present unique challenges to their therapists. Hispanic patients may require the use of a translator, whose ability to directly translate emotional meanings can be limited by their own experience with the patient's cultural background and specific dialect. Moreover, functional and cognitive assessments may be limited by their generalizability to a variety of Hispanic subpopulations. Religious considerations must also be met, as a patient's adherence to treatment may depend on their understanding and belief in the value of the therapeutic process. As a result of these cultural considerations, Hispanic patients often experience poor outcomes relative to non-Hispanic patients, including limited functional independence, fewer opportunities for on-the-job support, and a higher risk for related illnesses and conditions. Family support, an integral component of a Hispanic patient's neurorehabilitation team, may suffer similar negative outcomes, the result of a familial obligation to preserve the family unit. Therapists are encouraged to consider these linguistic and cultural factors of treatment in order to promote better outcomes for patients and their families.

An evolving concern in mental health counseling and rehabilitation that has recently stimulated an abundance of research is the aspect of multiculturalism. This concern most likely stems from the increasingly diverse demographic trends in modern societies worldwide. Globally, our diverse societies not only contain several distinct cultures, but through their interactions, they have given birth to new cultures where individuals adopt certain traits from more than one culture. In other words, culture is largely heterogeneous. Each individual views the world through his/her own cultural lens, and each individual is viewed likewise by others (Constantine, 2002). Acknowledging the ways in which our cultures affect us, positively or negatively, may be an important factor in maintaining desirable mental and physical health.

As suggested by Smith and Trimble (2016), research that is evidenced-based in the realm of multicultural psychology can better inform diagnosis and treatment options when working with individuals from diverse backgrounds. The authors suggest that studies on multicultural competencies are somewhat lacking in the extant literature; however, they also indicate that

great strides have been made to publish work that investigates the role of ethnic identity in promoting therapeutic situations that can lead to positive outcomes and improve overall health and well-being for individuals. Moreover, Hispanics in the United States have engaged more and more in healthcare systems, particularly those that involve mental health and wellness, as compared to their utilization in the past (Kim et al., 2011). The Hispanic population makes up a significant proportion of foreign-born individuals in the United States, as in 2014, 52 percent of foreign-born people in this country were from Latin America (Camarota & Zeigler, 2016). Thirty-seven percent of post-2010 immigrants were from Latin America (Camarota & Zeigler, 2016).

Recent Census data indicate that close to 20% of the U.S. population reported speaking a language other than English at home, though about half of the U.S. immigrant population indicated that their English-speaking abilities were less than “very well”, thus, characterized as limited English proficiency (U.S. Census Bureau, 2005). Among Spanish speakers, more recent Census data suggest that the percentage who speak English less than “very well” has decreased, though they are still less likely to speak English “very well” than are other, non-Spanish speakers (Ryan, 2013). Therefore, there are language as well as cultural barriers that might make it challenging for these populations to seek treatment on a variety of levels.

Despite their growing population and unique experiences and needs, Hispanics are still largely underserved in the healthcare system: They are less likely than other minorities to have health insurance, multiple healthcare providers, and regular care (CDC, 2004). After reviewing the medical literature, Arango-Lasprilla et al. (2007a) found that Hispanics present a disproportionately high incidence rate of serious medical illnesses, including diabetes, cancer, and asthma, as well as those conditions that rely on neurorehabilitation services: stroke, spinal cord injury, and traumatic brain injury. Additional risk factors associated with these diseases and conditions include restricted employment and educational opportunities, dangerous home environments, and physically demanding jobs (sometimes “off the books”). These factors increase the incidence rate of traumatic brain injury among Hispanic individuals more than any other group (Arango-Lasprilla et al., 2007a). The reduced access to adequate healthcare, coupled with a multitude of environmental risk factors, make the issue of neurorehabilitation particularly relevant to this population. The current review will extend this discussion by presenting research related to the linguistic, cultural, and assessment factors affecting Hispanic patients in neurorehabilitation settings. These considerations and factors summarize important cross-disciplinary and interprofessional psychological principles for speech-language pathologists (SLPs) and other neurorehabilitation professionals working with Hispanic individuals in these settings.

Factors Affecting Communication and Patient Outcomes

The following discussion will consider the ways in which (a) language barriers affect communication with a patient’s rehabilitation team, (b) cultural factors affect the acceptance and initiation of treatment, and (c) assessment quality affects their utility for these patients.

Language Barriers

Linguistic factors affecting therapy are numerous. In the simplest of cases, language preference must be considered, and may necessitate the use of interpreters to transmit important information (for detailed sets of ethical guidelines see APA, 2017; ASHA, n.d.). When possible, permitting a bilingual mode of therapy can enhance the therapeutic alliance between doctors and their patients, by promoting an environment that allows for language flexibility and switching (Olivares & Altarriba, 2009). For example, a Spanish-speaking client might use the word *cariño* when describing a combination of like and affection for an individual, given that no single English word captures the semantic/conceptual features of this particular word (Altarriba, 2003). This bilingual mode—offering language flexibility to a client—can enhance accurate communication and better capture patients’ needs and concerns. Language switching can also help therapists establish trust, as they bond with their patients on an interpersonal, linguistic level (Santiago-Rivera & Altarriba, 2002; Santiago-Rivera, Altarriba, Poll, Gonzalez-Miller, & Cragun, 2009).

Encouraging language flexibility and switching is particularly important in emotional settings, as emotion word processing differs across a Spanish-English bilingual's languages (Kazanas & Altarriba, 2016; see also Harris, Gleason, & Ayçiçeği, 2006; Pavlenko, 2008). Moreover, words may differ in terms of dialects within a given language. For example, the word *carro* is a typical word used in Spanish for the word "car" for Cubans; however, in other parts of the world, the more common Spanish translation might be *auto*. Misunderstandings can also occur with nonverbal communication, as is the case with emotional gestures. Lequerica and Krch (2014) astutely noted the broad differences in displays of anguish and struggle across cultures, notably, the exclamations to God and beating one's chest that accompany grief processing. Thus, expertise with a patient's preferred language and their emotional meanings, akin to an ethnic matching, will likely promote better communication and long-term outcomes (Olivares & Altarriba, 2009).

When interpreters *are* needed, rehabilitation therapists often express frustration with their experiences. In a study exploring these difficulties, Taylor and Jones (2014) interviewed a number of therapists working across a language barrier with stroke patients. They reported fewer sessions with their patients (a result of needing to arrange sessions with patients and interpreters), delays in assessment and treatments, and less efficient sessions. In addition, their interactions lacked informal conversation, because of difficulties in communicating these subtle messages. One of the doctors noted, "You miss that, sort of, interaction with the patient when you use an interpreter... you don't necessarily have that banter or that common sort of chatting in between that you would with someone who spoke English" (p. 2130). To promote that missing rapport, some therapists will invite a patient's family members to participate in their sessions. However, utilizing family members for translation purposes can introduce new problems: Some will answer for the patient, have difficulties providing objective responses, or lack the education needed to understand their role in the session. Because Hispanics value family support over social support from strangers, many will prefer to rely on their family for these interpreter services (Olivares & Altarriba, 2009). A doctor from Taylor and Jones' (2014) study also remarked, "Family members tend to answer for the client a bit more, in that you don't get that direct translation, because they obviously have a relationship with the person they feel that they know what they're trying to say" (p. 2130). The authors concluded that overcoming a language barrier affects all aspects of the therapeutic process, as frustrations were exhibited by occupational therapists, doctors, SLPs, and counselors. Occupational therapists expressed difficulties interpreting body language, psychiatrists indicated obstacles in assessing mood, and so on.

Cultural Factors

Additional considerations must be made for cultural factors affecting rehabilitation. In a recent review, Castillo and Caver (2009) recommended assessing patient acculturation, to determine whether patients have maintained their heritage culture or have begun to adopt behavioral, cognitive, and emotional aspects of their new culture. Examining these dimensions of acculturation can help a therapist understand their patient's cultural norms and unique needs, as they customize treatment plans (Altarriba & Santiago-Rivera, 1994; for recent examples of such acculturation scales, see Mills, Malcarne, Fox, & Sadler, 2014; Zea, Asner-Self, Birman, & Buki, 2003). A patient's values and customs may also depend on how much they have incorporated new cultural beliefs into their life; as a result, therapists may need to consider when new beliefs conflict with heritage beliefs (Hanson & Kerkhoff, 2007). Using a culturally appropriate approach to therapy will increase respect and rapport, as well as the likelihood that patients will engage in all aspects of their rehabilitation; as a result, patients often experience better outcomes under these conditions and can overcome a variety of health disparities (Lequerica & Krch, 2014; Lequerica & Panyavin, 2015).

For those patients who have maintained their cultural beliefs, several of these beliefs are relevant to the current discussion. For example, Olivares and Altarriba (2009) have outlined *familismo*, *respeto*, and *simpatía* as central to Hispanic culture. *Familismo*, the value and prioritization of family, is observed among families caring for their disabled relative, often forsaking their individual needs. *Familismo* must also be considered when working with a patient whose family

members wish to be more involved in their therapy. *Respeto*, or respect, should be considered when establishing and maintaining rapport with patients and their families. Respect between therapists and patients can also promote compromise, as needed when striking the balance between patient's established values and their rehabilitation goals; therapists should adopt a respectful approach with their patient before addressing their problems and goals (Olivares & Altarriba, 2009). Finally, *simpatía* speaks to a need to avoid conflict. Hispanic patients are more likely to continue their rehabilitation with therapists who respect this need and limit straightforward interactions (e.g., those interactions that limit the time spent building rapport). Patients also feel more connected with therapists they can trust (the value of *confianza*), as well as those who make them feel comfortable during their interactions (*personalismo*). Each of these values must be understood, for therapists to maintain a relationship with their Hispanic patients.

A Hispanic patient's religious and spiritual background must also be considered during therapy (Galanti, 2015; Lequerica & Krch, 2014; Lomay & Johnstone, 2016). Following an injury or illness, a patient may question the underlying cause of their new life circumstances. Some patients may view their injury as a punishment for sin and feel too defeated to participate in therapy; others may rely on prayer and believe that participation in therapy would be viewed as lacking belief in God's healing power. For these patients, additional counseling may be needed to address these fundamental beliefs. Attending church following an injury, a form of community reintegration, may also be helpful for devout patients. Concerning these values, therapists should make a considerable attempt to understand their patient's perspective and offer the culture-appropriate services to ensure continued engagement in the therapeutic process.

Assessment Quality

Several recent reviews detail another important factor affecting therapy outcomes for Hispanic patients: the paucity of translated and validated assessments (e.g., Benuto & Leany, 2013; Leany, Benuto, & Thaler, 2013; Salinas, Edgar, & Puente, 2016). These issues speak to the necessity for fair evaluations, increased normative data, and a degree of flexibility regarding a patient's preferred testing language. In many cases, simply translating and administering assessments in a patient's first language will not provide a valid assessment of their abilities. Regarding language preference in testing, Salinas et al. (2016) have recently recommended considering country of origin, language exposure, and language spoken at home, school, and work, or simply asking a patient for their personal preference (though preferences may also be situation-specific).

In addition, while some assessments have been translated for a Spanish-speaking population, ethnic and cultural differences among Spanish speakers can sometimes limit their general utility (Benuto & Leany, 2013); a seemingly culture-fair test may not be fair across regional dialects and microcultures. Thus, an assessment's overall quality relies on two related factors: (a) appropriate language and (b) generalizability across a variety of Hispanic populations (i.e., Mexican patients, as well as Puerto Rican, Cuban, and so on). For example, a complete neuropsychological test battery, comprised of 16 tests assessing attention, executive functioning, learning, and memory has been validated for use with Spanish speakers from the Mexican Border region, as well as from Spain (Artiola i Fortuny, Heaton, & Hermsillo, 1998). This validation represents a useful "first step" in considering overall assessment quality. Unfortunately, this multicultural validation method is not often used; many assessment validation samples are small and region-specific, greatly limiting their generalizability for all Hispanic patients (Leany et al., 2013). Moreover, therapists may wish to consider whether their nonverbal assessments (such as those measuring cognitive abilities, which do not always require translations) are also culture-fair. Related to the current discussion, both literacy and education levels should also be considered in the assessment of these populations, as they have been shown to influence performance on neuropsychological measures (e.g., Manly, Tourajdi, Tang, & Stern, 2003; Rosselli & Ardila, 2003).

Outcomes for Patients and Their Caregivers

Linguistic, cultural, and assessment factors largely affect patient outcomes and these outcomes can be particularly disparaging for minority patients (Arango-Lasprilla & Kreutzer, 2010). In one recent study, Arango-Lasprilla et al. (2007b) compared functional outcomes across ethnicity groups one year following traumatic brain injury. Their measures included those pertaining to self-care, locomotion, communication, social cognition, and several others. At their discharge and one-year follow-up appointments, minority group data reflected greater physical impairments as compared to white patients, as well as poorer cognitive ability and functional independence, even when controlling for age, cause and severity of injury, employment, and marital status. Unfortunately, these outcomes may be the result of fewer therapy services, limited financial resources for other services, related illnesses, and other factors affecting their rehabilitation. In this particular study, the first of its kind, minority groups did not differ across functional outcomes.

Researchers have also directly examined these outcomes for Hispanic patients. In one of these studies, Arango-Lasprilla et al. (2007a) compared one-year follow-up data across a larger sample of white and Hispanic patients. Again, controlling for age, injury severity, and other sociodemographic and injury-related variables, Hispanic patients were more likely to score in the lowest quartile on functional outcome measures. However, in this study, white and Hispanic patients did not differ in their functioning during admission or discharge. Thus, any observed differences in functional outcomes are likely the result of disparities in treatment and services, or other opportunities for patients (Arango-Lasprilla et al., 2007a).

One additional study addressed the effect of treatment disparity among rehabilitation patients. Analyzing a large set of rehabilitation archival data, da Silva and colleagues (2007) compared white and Hispanic patients who had participated in vocational rehabilitation: a program designed to assist patients in returning to work following traumatic brain injury. Though Hispanic patients were more likely to receive vocational training, transportation services during rehabilitation, and financial support, they were less likely to receive on-the-job support services than were white patients. As this latter variable is the strongest predictor of successful employment, Hispanics were less likely to obtain competitive employment following vocational rehabilitation. It appears that Hispanic patients *do* receive many important services but not the one most critical to their functional independence. Moreover, when the authors could account for demographic factors including age, gender, education, and prior employment, as well as injury severity, many global differences across Hispanic and white patients were nonsignificant. Additional research, particularly research related to employment opportunities and training interventions, is needed to further examine work placement difficulties for Hispanics. Findings from these studies highlight an important trend—Hispanics may be at a greater risk for conditions requiring rehabilitation services *and* suffer worse physical, functional, and employment outcomes. Critical resources and training are needed to provide better care and more promising outcomes for these patients.

Often overlooked, caregivers for individuals with traumatic brain injury face some similar mental and physical outcomes. Spouses and close family members are often consulted for family history and language preferences, but also relied upon for rehabilitation involvement and participation (Centeno, 2015). Some of their negative outcomes stem from a sense of burden, caused by a feeling that a caregivers' work exceeds what is personally or culturally appropriate. However, what is "culturally appropriate" can widely vary. For example, accepting responsibilities is related to familial obligation and duty among black and Hispanic caregivers, despite this being connected to greater emotional distress than observed among white caregivers (Sander et al., 2007). Thus, a degree of flexibility in caregiving responsibilities may promote more positive outcomes.

In the Hispanic culture, there is an assumption that care will be provided by a close family member, though the family may not be prepared or experienced enough to understand the responsibilities associated with caring for an individual with long-term or permanent disabilities

(for a review, see Arango-Lasprilla, 2012). One recent study conducted by Friedemann, Buckwalter, Newman, and Mauro (2013) examined patterns of caregiving across a variety of ethnic groups living in South Florida. Interviews with Cubans, other Hispanics, Caribbean blacks, and non-Hispanic whites provided data related to their health, cultural values and perceptions, family functioning, and workload. In many ways, these ethnic groups did not differ in that caregivers had a similar feeling of obligation and affection for the patient (i.e., their family member) and were equally able to cope with their new roles, though they indicated a high level of responsibility and workload. The authors did note several important cultural differences. For example, Cuban caregivers worked longer hours, but felt the least amount of burden associated with their workload. Cubans also reported the highest levels of family stability. Together, these findings suggest that a caregiver may put aside feelings of personal sacrifice, for the sake of their *familismo* as they seek to preserve their strong family dynamic. Future research may want to engage a larger number of minority groups, to specify cultural variations among their “other Hispanic” participants.

In a related study conducted with Colombian caregiver-patient pairs, Stevens et al. (2012) examined the relationship between caregiver burden and depression. Importantly, the strongest predictor of caregiver burden and depression (i.e., the variable explaining the largest amount of unique variance) was *their perception of the patient’s depression*, and not their personal sense of burden, relationship with the patient, gender, or other predictor variables. Again, the strong prioritization of family needs, relative to personal needs, appears to underlie these findings. Stevens et al. (2012) recommend a series of interventions to reduce the incidence of depression among Hispanic caregivers, including improving their coping skills and adaptive thoughts (e.g., redirecting their thoughts from a patient’s overall hardships to their daily successes).

Unfortunately for caregivers, their health-related quality of life can also suffer. Caregivers often experience extreme fatigue and loss of energy. Gulin et al. (2014) recently examined these health outcomes in Mexican caregivers. They found a strong relationship between caregiver’s mental and physical health—increases in physical health were largely met with increases in mental health, and vice versa. Maintaining social interaction and vitality (i.e., higher energy levels) were also related to lower levels of depression. Thus, any interventions for caregivers combatting burden-related depression should emphasize the importance of both physical and mental health. Perhaps the benefits of social functioning, via community engagement, and active lifestyles can act as a buffer to the psychological strain associated with long-term caregiving (Gulin et al., 2014).

Caregiving can also promote positive outcomes, particularly among those providing long-term support. Recent studies utilizing the Positive Aspects of Caregiving Scale (PACS; Tarlow et al., 2004) have found that caregivers often ascribe value to their role; for many caregivers, the strength and confidence they bestow and promote can improve their own life satisfaction (Las Hayas, López de Arroyabe, & Calvete, 2014). Caregivers who have retired may then experience a renewed sense of satisfaction that comes with work. These factors are also associated with positive personal growth and a decreased sense of burden, as noted by PACS items including, but not limited to, *It has enabled you to value life more* and *It has enabled you to develop a more positive attitude toward life*. Importantly, the PACS has been adapted and evaluated to be administered in Spanish and may be useful when assessing caregivers’ emotional well-being (Las Hayas et al., 2014).

Concluding Remarks: Training Recommendations for Neurorehabilitation Services

Together, these studies highlight the importance of unique psychological, cultural, and linguistic considerations when caring for Hispanic patients. Recently, the American Psychological Association (APA, 2002) adopted a series of multicultural guidelines to meet these needs, but additional training is needed across the entire spectrum of neurorehabilitation services. Additional considerations, specifically pertaining to the need for enhanced communication across the

rehabilitation team, have been recommended by the Interprofessional Education Collaborative (2016). The Collaborative's values and core competencies demonstrate the importance of a team approach and dynamic to delivering population-centered care and improving patient health outcomes.

Given the growing Hispanic population and the outlined cultural and linguistic considerations, Centeno (2015) recently investigated the current state of neurorehabilitation services, specific to bilingual adults. An overwhelming majority of SLPs noted that they had no to minimal preparation for working with these patients, indicating a significant lack of academic and clinical education. Moreover, the SLPs felt limited by their assessments, given the lack of culturally appropriate and validated materials for their patients. As a result, many were unsatisfied with the state of bilingual services, but indicated a motivation to participate in continuing education opportunities and enroll in academic, clinical, and professional training. The training programs highest in demand included those pertaining to cultural awareness, working with additional bilingual patients, using interpreters, and completing a bilingual certification program (Centeno, 2015). Clearly, there is a dire need to train more culturally competent rehabilitation professionals, and this need is driven by the patients, their caregivers, and the entire rehabilitation team (Arango-Lasprilla, 2012; for additional recommendations regarding improving cultural competency, see Perumparaichallai & Klonoff, 2015).

Some recent findings from the related medical literature have promising results regarding communication training. In one of these studies, Michimata, Suzukamo, and Izumi (2013) developed a coaching intervention for clinicians working with stroke patients. In this training method, clinicians motivate patients and their families to improve their rehabilitation efforts. In their study, the clinicians participated in a two-day series of lectures and role-playing exercises, followed by three months of weekly tips and biweekly reports with the experimenters. Data were collected from both clinicians and their patients. Importantly, though the clinicians had not perceived any change in their communication ability, their patients' outcomes indicated a more promising set of results. Patients reported significantly higher satisfaction with their therapist and their communication, as well as with their goal-setting, a particularly important outcome for stroke patients. Patients also reported improvements in their general health and social functioning, indicating a wide array of benefits associated with this intervention. Though their study was not designed to promote better outcomes among bilingual patients, per se, their results suggest that improvements in communication quality and their associated benefits, are an attainable goal for clinicians.

The extant literature on the multicultural aspects of psychology and healthcare delivery indicate that linguistic and cultural awareness, competency, and experience promote positive outcomes and improved mental health and wellness. Given the changing demographics of the United States in particular, training and skill-development in these approaches should be incorporated into educational environments early on, before students enter graduate training, and early, direct experience in the field is warranted so that students know how to aptly use these approaches in settings in which diverse populations are being treated. Future research should focus on the plethora of cultural groups across the United States and the ways in which culture, language, and beliefs interact in healthcare settings and can be incorporated into treatment plans to further beneficial outcomes for clients and patients in all healthcare settings. While we argue that being bilingual per se is not a requirement for effective healthcare treatment, a working knowledge of some of the linguistic and cultural aspects of any particular population that is engaged in treatment can help to produce a closer bond, more disclosure, and a sense of trust between provider and patient. This additional knowledge and training can again only augment the positive outcomes that one would expect in a setting that is focused on treatment and long-lasting, positive effects for clients across healthcare settings.

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Multicultural Neurogenics: A Call and Response to Embrace Global Issues in Neurogenics

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Abstract

This epilogue outlines the call to address the clinical needs of adults from culturally and linguistically diverse backgrounds with neurogenic communication disorders, and the training needs of speech-language pathologists (SLPs) who provide those services. A response to those needs is provided in terms of advances that have been made over time, and limited areas that require future attention. Brief summaries are provided for articles in this issue, with reference to how each article contributes to advances in service delivery to culturally and linguistically diverse adults with neurogenic communication disorders around the world.

The Call

In a landmark position statement written 32 years ago, the American Speech-Language Hearing Association (ASHA) provided a strong impetus that highlighted the need to address diversity issues in communication sciences and disorders. In this document, members of the ASHA Committee on the Status of Racial Minorities discussed present and future service needs for general clinical populations from culturally and linguistically diverse communities (ASHA, 1985). The authors expressed a desire for enhanced language proficiency and knowledge about diverse cultures within the clinical and scientific community, in preparation for service delivery to burgeoning culturally and linguistically diverse populations within the United States and abroad. They cited findings from a 1982 ASHA Self Study Survey, where 77% of certified speech-language pathologists (SLPs) expressed a need for greater knowledge and skills to better serve diverse cases (ASHA, 1982). These SLPs were concerned about preparedness to serve bilingual/bicultural cases (ASHA, 1985). The paper included recommendations about the need for assessment measures, evidence-based treatment interventions, resources, and increases in the number of SLPs who are competent to serve diverse cases (ASHA, 1985).

Five years later, Wallace and Bridges Freeman (1991) conducted the first neurogenics survey to explore services for adults from diverse communities with neurologically-based communication and swallowing disorders (an area later referred to as “multicultural neurogenics;” Wallace, 1997). One of the most interesting findings was that all cases spoke English (including bilingual cases). This highlighted the need to expand marketing in underserved communities, including to non-English speaking persons. Centeno (2015) conducted a survey among clinicians working with culturally

and linguistically diverse cases who had neurologically-based impairments. He found that many SLPs reported having minimal to no training to serve bilingual cases.

Stockman, Boulton, and Robinson (2008) conducted the first general diversity survey of Speech-Language Pathology programs to obtain information about multicultural/multilingual instruction. They found that students were only moderately prepared in areas relating to diversity, and that respondents reported a lack of pertinent pedagogy models and resources.

More recently at the international level, Rose, Ferguson, Power, Togher, and Worrall, (2014) conducted a survey of aphasia rehabilitation practices in Australia. Fifty percent of their SLP respondents rated their knowledge and confidence when working with culturally and linguistically diverse populations as less than favorable. Hersh, Armstrong, Panak, and Coombes (2014) conducted a survey to investigate practices of SLPs providing services to cases with acquired communication disorders. Sixty-seven percent of their respondents did not feel as confident working with indigenous as non-indigenous Australian cases. Collectively, these reports confirm that diversity preparedness is an issue of international concern to those providing services to people with acquired communication disorders.

There is a *call* to meet the needs of a growing diverse international neurogenics population, including:

1. an increase in the number of SLPs qualified to serve,
2. marketing outreach to underserved populations, and
3. clinical guidance and resources.

There is also a need to recruit and support minority neurogenic leaders as students, clinicians, professors, administrators, researchers, and as colleagues within professional organization networks. Finally, there is a need for more doctoral level neurogenics specialists. As articulated by Dr. Orlando Taylor, “PhDs are the gatekeepers who write the textbooks and the tests and set professional standards. If you have a dearth of people of color at that level, you don’t have a natural way to infuse diversity on the intellectual side” (Moore, 2009).

The Response

Articles in this issue provide insight about how far along speech-language practitioners and researchers worldwide have advanced in *responding* to the call. Penn et al. introduce sensitive questions to consider during self-assessment of intercultural communication for individuals providing services to indigenous people who acquired neurogenic communication disorders. Kong’s insights into the complexities of Chinese dialects, the manner in which he has built a bridge to the development of Chinese assessment instruments, and the Cantonese Aphasia Bank can be used as a model for other populations. Fleming and Harris’ discussion of mild cognitive impairment demonstrates keen attention to community outreach, and interprofessional collaboration that should exist because of the health risk factors associated with neurogenic communication disorders within racial/ethnic communities. Dash and Ansaldo present information about neurocognitive system control and its potential influence on the clinical management of bilingual speakers with aphasia. Peñaloza and Kiran present evidence that translational neuroscientific research may guide best language of treatment to help achieve recovery and generalization for bilingual cases with aphasia. Altarriba and Kazanas provide valuable cross-discipline information for practitioners providing services to bilingual populations in neurorehabilitation, including insightful tips to minimize language barriers and maximize the use of interpreters.

Closing Thoughts

Personally relevant variables, such as culture and language, are critical to achieving full life participation based on the World Health Organization’s International Classification of

Functioning, Disability and Health (WHO ICF, 2001) case-centered perspective for all cases (Wallace, 2010). Issues raised by the articles in this special issue and other literature suggest that speech-language practitioners across the world should pay attention to a broad foundational base, including sociocultural, neuroscientific, and psychological factors, to create realistic evidence-based services for communicatively-impaired adults on diverse neurorehabilitation caseloads (Centeno, 2017; Code, 2001; Siyambalapitiya & Davidson, 2015; Wallace, 1996, 1997, 2017; Wright-Harp & Payne, 2016). International attention to these issues is critical if we are to provide the best care for *all* cases in neurorehabilitation, including people from culturally and linguistically diverse communities. In the coming years, when thinking about *multicultural neurogenics* and the call, what will your response be?

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