Language and Communication Disorders in Older Adults: Selected Considerations for Clinical Audiology

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Introduction

Language, speech, voice and communication change over the life course of adults (18 to 65 years) and older adults (65 years +). The large body of scientific evidence published during the past three decades documents "normal" age-related selective improvements and subtle declines in language, speech voice and communication performances. Examples of "normal" age-related positive changes in language include selected expansion of semantic memory (i.e., expressive and receptive vocabularies – fact based memories) (Schaie & Willis, 2002) and spoken and written story-telling abilities (Kemper, 1992). More obvious declines in language include wordfinding problems and changes in auditory acuity, discrimination and processing that, in concert with age-related cognitive changes, result in auditory comprehension problems. Increased loquaciousness (i.e., talkativeness) among older adults, documented in studies of offtopic verbosity, reflects the communication pattern of a minority of older adults (Arbuckle & Pushkar-Gold, 1993) Interestingly, speaking rates decline with age (Caruso & Mueller, 1997) while vocal fundamental frequency of men increases and that of women generally drops (Eadie, 2000). These normal changes in aging can be complicated by stroke, Parkinson's disease, dementia, injuries (falls with head injury), and medications affecting cognition (attention, memory), which may further affect language and communication in older adults.

Clinical audiologists are faced with unprecedented proportions of older adults comprising their caseloads as a result of the worldwide increase in the number of seniors and their associated hearing problems. The impact on the practice of clinical audiologists of "normal" age-related language and communication changes and those associated with various pathologies is now widely recognized. However, not all clinical audiologists are aware of or take into consideration in their daily practices the influences of age-related changes in language, speech, voice and communication on hearing performances in older adults. The purpose of this chapter is to provide current and relevant material on the influences of common "normal" age-related changes and of pathological conditions on language, speech production and communication performances in older adults within the context of hearing performance. Changes in voice related to aging are well-documented in the scientific literature but are outside the scope of the current theme of the chapter so will not be addressed. Each section of this chapter will highlight considerations relevant to the daily clinical practice of audiologists.

Language and Communication in Older Normal Adults

Automatic, highly over-learned language structures and processes (e.g., those used in greetings and social discourse) appear relatively unaffected by age (Shadden, 1997). Passive vocabulary (e.g., word recognition) and other basic lexical and semantic skills (e.g., retention of underlying semantic meanings) remain generally unimpaired and often improve through adulthood up to the early seventh decade (Kemper, 1992). Phonological and morphological elements and rule systems are not disrupted in normal ageing (Shadden, 1997). Moreover, basic pragmatic skills are well retained into old age including signaling and repairing misunderstandings among

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non-cognitively impaired older adults (Maxim & Bryant, 1994) and older adults with Alzheimer's disease (Orange, Lubinski & Higginbotham, 1996). As noted previously, the spoken and written narratives of older adults are well-preserved and are valued highly as a component of social communication. Their stories contain elaborate narrative structures including hierarchically elaborated episodes with beginnings describing initiating events and motivating states, details of protagonists' goals and actions, and endings summarizing outcomes of protagonists' efforts (Kemper, Rash., Kynette, & Norman, 1990; Pratt & Robbins, 1991). Perhaps older adults learn how to capture and to maintain the attention of their partners to help make their narratives that much more appealing. Interestingly, Pratt and Robbins found positive correlations between the age of the older adult storytellers and the ratings of the quality of their narratives.

It is well known that older adults use shorter sentences with fewer clauses and fewer multiple clauses (i.e., decreasing linguistic complexity) as a function of age-related decline in language. (Kemper, 1986, 1987). They also use more revisions and interjections than younger adults (Heller & Dobbs, 1993). Most studies of the syntactic complexity used by older adults show reduced complexity with advancing age across a wide variety of experimental tasks (e.g., sentence imitation, written and oral discourse production, text comprehension and imitation and life span diary studies) (Baum, 1993; Kemper, 1986, 1987, 1988; Maxim & Bryan, 1994; Shadden, 1997).

Older adults who have low levels of education and who are much older (80 yrs +) experience increasing difficulty with word retrieval and recall (vs. recognition) (Kent & Luszcz, 2002). Older adults' performance on semantic verbal fluency tasks (e.g., say or write the names of as many "animals" as you can in one minute) declines with age and is influenced heavily by low levels of formal education (Crossley, D'Arcy, & Rawson, 1997). Word class (nouns and verbs), word frequency and personal relevance all influence older adults' abilities to recall and to retrieve words (Caramazza & Hillis, 1991). That is, nouns and verbs that occur less frequently in their vocabulary (i.e., limited semantic meaning network) and which are less personally relevant (e.g., "quetzal" vs. "peacock" and "curtsying" vs. "bending") are more difficult for them to say or to write, particularly under dual-task conditions (Kemper, Schmalzried, Herman, Leedhal, & Mohankumar, 2007). Older adults often experience "tip of the tongue" (TOT) phenomenon, particularly for names of people (Burke, MacKay, Worthley, &

Wade, 1991). However, sound cues can help sometimes with word retrieval more so than semantic word cues (e.g., "/kw _ _ /" vs. "It's a colourful bird found in the Central American rainforest"). Overall, language use and language-related activities also may influence naming abilities (Baressi, Obler, Au & Albert, 1999). This means that those older adults who use language frequently as an integral part of their lives (e.g., crosswords, public speaking) and who value it highly are likely to have fewer naming problems. In concert with overall slowing of cognitive processes, which is reflected in longer response times and increased length of pauses, older adults take longer to say or to write words during naming tasks, sometimes producing errors across word classes (i.e., verb instead of a noun; pronoun instead of a noun) (Baum, 1993; Cooper, 1990; Heller & Dobbs, 1993, Obler, Au, & Albert, 1995). Older adults often will show circumlocution when experiencing word finding problems. That is, they say or write words related in meaning (rather than sounding similar) to their intended word(s) ("daughter" for "son" rather than "mat" for "cat") (Shadden, 1997).

Notwithstanding concomitantly occurring age-associated hearing problems (e.g., one or more types of presbycusis or a noise induced loss), older adults experience difficulty understanding spoken and written sentences in which a relative clause occurs at the beginning of the utterance or sentence (i.e., L-branching sentences - "The little girl who sang to the teacher smiled at the boy.") (Kemper, 1986). Reduced auditory comprehension is exacerbated by declines in age-related verbal working memory especially on dual tasks (Hancock, LaPointe, Stierwalt, Bourgeois, & Zwann, 2007). Worrall and Hickson (2003) noted that declines in the comprehension of spoken or written discourse among older adults become evident when tasks place stress simultaneously on cognitive and linguistic systems by increasing cognitive demands or removing/reducing linguistic information. Schneider, Daneman and Pichora-Fuller (2002) showed that older adults (regardless of hearing ability) have more trouble understanding speech in everyday communicative contexts. They found that older adults do not remember as much detail as younger adults and that older adults experience more difficulty answering integrative questions. When their participants listened to passages read in quiet or multi-talker babble noise, presented at the same SPL to all participants (younger vs. older adults), the older adults recalled less detail in quiet and in noise. When tested under equivalent levels of perceptual stress, there were no significant age differences.

These findings prompted them to hypothesize that cognitive processes (generalized slowing, declines in verbal working memory deficits in inhibitory processes, and attention) and/or sensory and perceptual processes (auditory declines in older adults) underscore discourse comprehension problems.

So how do these and related findings inform the practices of clinical audiologists? Firstly, older adults, particularly those under that age of 75 to 80 years, have a wealth of linguistic resources to offset age-associated hearing loss. Aural rehabilitation options should include the supportive elements of relatively preserved context processing, elaborative story-telling and intact pragmatic skills. Secondly, instructions for auditory assessments must be free of complex syntactic structures. Avoid placing background information or relative clauses at the beginning of sentences. Thirdly, provide additional responses times and be vigilant for related word errors on word discrimination and word repetition tasks. Older adults are predisposed to slow response times and to give words related in meaning to the target word (i.e., semantic paraphasia) during word repetition tasks. Overall, the retained language and communication abilities can be capitalized on by clinical audiologists for case history taking, during word and sentence discrimination tasks, and for targeting linguistic and pragmatic supports in aural rehabilitation programs.

Aphasia

Aphasia is a syndrome (i.e., collection of behavioural and neurological features) of language problems that result from focal damage, usually of rapid onset, to cortical and/or subcortical regions involved in the language dominant cerebral hemisphere (McNeil, 1982). All modalities of language are impaired to varying degrees in those with aphasia including spoken language, writing, reading, auditory comprehension and the use and understanding of nonverbal language (e.g., gestures, facial expressions, etc.). Aphasia is caused most frequently by cerebral vascular accidents (CVAs) or "brain attacks" but can occur as a result of traumatic brain injury (e.g., motor vehicle accident), tumors or other focal brain pathologies, among other aetiologies. The risk of aphasia rises significantly with age (Dickey Kagan, Lindsay, Fang, Rowland, & Black, 2010). The link between increasing age and prevalence of aphasia is especially important for clinical audiologists given the current and projected demographics showing increasing numbers of older adults internationally for the next three to four decades.

Slightly over one-third of all individuals who suffer a stroke and who are admitted to hospital suffer aphasia (Dobkin, 1997). The prevalence of aphasia drops to less than 20% of all strokes at discharge from acute care and rehabilitation units (Pedersen, Jorgensen, Nakayama, Raaschou, Olsen, 1995). However, a recent epidemiological study in the province of Ontario in Canada showed 35% of adults admitted with a diagnosis of CVA suffered aphasia at discharge (Dickey et al., 2010).

The language problems of aphasia are not related to sensory or perceptual disturbances but can coincide with selected cognitive problems (e.g., attention system and processes), sensory impairments (e.g., unrelated hearing loss(es), associated visual fields cuts) and muscle movement and muscle coordination disorders (e.g., dysarthria or apraxia). The multimodal language problems of aphasia represent disruptions to the processing of language (i.e., access to and retrieval of symbols) rather than a loss of language per se. Individuals with aphasia show improvements in language competence and performance over time as a result of spontaneous recovery (typically within the first eight to sixteen weeks post-onset, sometimes much longer) and from active involvement in individual group language therapy led by speech-language pathologists or trained volunteers (Robey, 1998). In addition, intact or aided hearing can serve to enhance auditory comprehension skills and to maximize aphasia therapy.

There are several types of aphasia that are most frequently categorized for research and clinical purposes based on the Boston Classification System; a nomenclature developed at the Boston Aphasia Centre in the early 1960s and 70s by a group of expert aphasiologists (e.g., Norman Geschwind, Harold Goodglass, Edith Kaplan, among others). While all types of aphasia create challenges for clinical audiologists, older adults with aphasias that predominantly involve auditory comprehension (i.e., Wernicke's, global, anomic and transcortical aphasia) pose the greatest difficulty. Table 1 summarizes the language skills of those with the most common types of aphasia.

Clinical audiologists must be cognizant that age-related hearing loss often can accompany older adults who have aphasia. This means added vigilance during testing to ensure that those individuals with aphasia who have significant listening comprehension problems understand the instructions and to minimize any over-estimate by clinicians of the nature of a perceived hearing loss. Moreover, clinical audiologists might be asked to assess older adults who have suffered small single or repeated

Nonfluent				Fluent			
Broca's				Wernicke's			
Global				Anomic			
Isolation syndrome				Conduction			
Transcortical motor				Transcortical sensory			
Poor Comprehension		**Fair Comprehension**		**Poor Comprehension**		**Fair Comprehension**	
Global		Broca's		Wernicke's		Conduction	
Isolation syndrome		Transcortical motor		Transcortical sensory		Anomic	
Poor Repetition	**Fair Repetition**	**Poor Repetition**	**Fair Repetition**	**Poor Repetition**	**Fair Repetition**	**Poor Repetition**	**Fair Repetition**
Global	Isolation Syndrome	Broca's	Transcortical motor	Wernicke's	Trans-cortial sensory	Conduction	Anomic

Table 1. Summary of language features in commonly occurring types of aphasia*

strokes that result in spoken or receptive language errors and where there may be confusion between hearing problems vs. central language processing errors. Collaboration with a consulting speech-language pathologist can yield useful information about language strengths and weaknesses, and of supportive language strategies such as writing out hearing assessment protocols using aphasia friendly symbols and materials. The Aphasia Institute (http://www.aphasia.ca/) offers a wealth of suggestions on how best to create aphasia-friendly reading materials and supportive communication strategies. For example, clinical audiologists may need to sit in the sound booth beside the older adult with aphasia to ensure accuracy and compliance with pure-tone audiometry and speech discrimination testing. Alternatively, persons trained in Supportive Conversation (Kagan, Black, Duchan, Simmons-Mackie, & Square, 2001) can assist older adults with aphasia during testing to ensure that the clients understand the instructions, the task and the requisite response options.

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* Adapted from Brookshire 2007

Motor Speech Disorders with Language and Cognition Considerations

Motor speech disorders include the conditions of dysarthria and apraxia. Dysarthria refers to speech movement disorders caused by damage to the central and/or peripheral nervous systems (Darley, Aronson & Brown, 1975). Dysarthria often occurs in older adults as a result of acquired progressive and degenerative neurological conditions such as Parkinson's disease (PD) or amyotrophic lateral sclerosis (ALS). Speech movements in those with dysarthria are impaired in the speed, the force, the range, the direction, or the timing of movements (Duffy, 2005). There also can be involuntary movements or alterations in muscle tone (Darley, Aronson, & Brown 1975).

The term apraxia refers to a neurogenic disorder in which there are impairments in one's, abilities to select, to program and to coordinate muscle movements for specific volitional tasks. The disruptions in coordinated muscle movements are unrelated to auditory comprehension problems, to cognitive impairments, to disruptions in reflexes, or to impaired muscle strength or tone (Square, 1998). There are several types of apraxia. Those most relevant to speech-language pathologists in-

clude verbal apraxia or apraxia of speech, and nonverbal apraxia, sometimes referred to as oral or as buccofacial apraxia. The apraxias are of less relevance to the clinical practice of audiologists. Consequently, the focus of this section of the chapter will be on dysarthria because of its greater prevalence among older adults and because language, cognitive and hearing problems can coexist with various types of dysarthria.

Parkinson's Disease

Parkinson's disease (PD) is a progressive degenerative neurological disorder that results from disruptions to the substantia nigra and its dopaminergic neurotransmitter system (Forno, 1996). Parkinson's disease affects nearly 100,000 people in Canada (http://www.parkinson.ca/) and nearly 2 million people in the United States (Tanner & Goldman, 1996). In North America, the estimated prevalence rate is 100 to 300/100,000 with an incidence rate of 10 to 20.5/100,000 per year (Rajput & Birdi, 1997). An estimated prevalence rate for Europe ranges from 65.6 to 12,500/100,000 with an estimated annual incidence from 5 to 346/100,000 (von Campenhausen, Bornschein, Wick, Bötzel, Sampaio, Poewe, Oertel, Siebert, Berger & Dodel, 2005). Eighty-five percent of those diagnosed with PD are over 65 years of age which means an oncoming wave of older adults with PD in the coming decades (Parkinson Society of Canada, 2003).

Individuals with Parkinson's disease (PD) are well known to exhibit problems with movement and motor control. They also often suffer from both cognitive and motor problems, both of which emerge early in the disease (Cooper, Sagar, Jordan Harvey & Sullivan, 1991). The prevalence of mild cognitive impairment (MCI) individuals with PD ranges from 21% to 62% given various cut-offs between 1 and 2 SD below age norms on cognitive testing (Caviness et al., 2007; Williams-gray et al., 2007). The prevalence of dementia in PD is 42.3% overall and is 68.7% in individuals over 80 years of age (Mayeux, Denaro, Hemeneglido, Marder, Tang, Cote, & Stern, 1998). Cognitive changes are reported as a disease symptom in 5.5% of individuals with PD prior to the onset of motor symptoms (O'Sullivan, Williams, Gallagher, et al., 2008). Cognitive changes in PD include impaired use of memory stores, decreased working memory stores, disrupted attention systems and processes, dysexecutive problems and visuospatial dysfunction (Dubois & Pillon, 1997; Janvin Aarsland, Larsen, & Hugdahl, 2003; Whitehead & Brown, 2009; Berg, Bjornram, Hartelius, Laakso, & Johnels, 2003; Bertella, Albani,

Greco, Priano, Mauro, Marchi, Bulla, & Semenza, 2002; Caballol, et al., 2007; Cohen, 1998; Cummings, Darkins, Mendez, Hill, & Benson, 1988; Grossman, 1999).

Speech and language problems also are common features of PD. The hypokinetic dysarthria associated with PD include the predominant speech features of monopitch, reduced speech sound stress, monloudness, imprecise consonants, inappropriate silences and short rushes of speech with rapid speech rate, and reduced speech intensity (hypophonia) (Darley, Aronson, & Brown, 1975). The language problems of individuals with PD include difficulty understanding spoken and written sentences, particularly those that are reversible ("The girls play with the boys."), trouble comprehending figurative language and problems processing facial expressions (Murray, 2000; Murray & Lenz, 2001; Henry & Crawford, 2004; Brown et al., 2003; Troyer et al., 1998; Berg et al., 2003). Expressive language problems include complex syntax production (i.e., use simplified syntax and less diversified grammar) (Colman et al. 2009) verbal fluency problems for verbs and semantic word classes (Cotelli et al., 2007; Llebaria et al., 2008; Pignatti et al., 2006; Piatt et al., 1999; Peran et al., 2009; Rodríguez-Ferreiro et al., 2009) reduced informational content and disrupted pragmatics (McNamara & Durso, 2003). The disrupted language and communication in individuals with PD, in concert with impaired cognition and speech production problems results in maladaptive coping patterns such as withdrawing from conversations, increased social isolation, and difficulty with relationships (Bayles & Tomoeda, 2007).

Amyotrophic Lateral Sclerosis

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disorder linked to cell death of lower motor neurons of the brainstem and spinal cord, and of upper motor neurons of the cerebral cortex. It is the third most common adult-onset neurodegenerative disease (Brockington, Ince & Shaw, 2006). The incidence of ALS is uniform across Caucasian populations particularly in Western Europe and North America (Canada and USA) (Cronin, Hardiman & Traynor, 2007). The incidence rate is estimated to be 2/100,000 people per year (Brockington, Ince & Shaw, 2006). ALS normally affects individuals in their fifth and sixth decades (Strong, 2003). The disease has a peak incidence between 50 and 70 years of age, with men more commonly affected than women at a ratio of about 1.6/1.0 (Mitchell & Borasio, 2007). ALS is a fatal disease and 80% of people with ALS

die within two to five years of diagnosis (Shoesmith & Strong, 2006). The cause of death in ALS is usually due to progressive respiratory failure or broncho-pneumonia (Brockington, Ince, & Shaw, 2006). However, 20% of individuals with ALS survive longer than 5 years and 10% of those affected may live 10 years or longer (Shoesmith & Strong, 2006).

ALS was considered to be largely restricted to motor neurons while cognition was thought to be intact. More recently however, ALS has been recognized as a multisystem disorder (Strong, 1999). Cognitive impairment (CI) (35% to 55%) but not dementia has been demonstrated in a substantial proportion of individuals with ALS who also show deficits on tests of executive function (Abrahams, Leigh & Goldstein, 2005). Typical cognitive impairments include disruptions to attention systems and processes, to executive functions, to multiple memory systems, and to visuospatial skills. In particular, studies revealed deficits in verbal and non-verbal fluency tasks (Ludolph et al., 1992; Rakowicz & Hodges, 1998), working memory (Portet, Cadillac, Touchon & Camu, 2001), cognitive flexibility (Strong et al., 1999), and sustained attention (Abe et al., 1997). Deficits also are found in recognition memory for words and faces, visual perception, reasoning, word generation, word fluency (Abrahams et al., 2000; Strong et al., 1999) and executive functions such as planning, organizing, and self-monitoring (Talbot et al., 1995).

The specific association between ALS and frontal lobe impairment has been postulated with symptoms including emotional changes, memory, language and general intellectual problems, prominent bulbar features, and bilateral frontal and/or temporal lobar atrophy suggestive of fronto-temporal lobar degeneration (FTLD) (Neary et al., 1990; Abrahams et al., 1996; Talbot et al., 1995; Massman et al., 1996). FTLD is the neuropathological correlate of the majority of individuals with frontotemporal dementia (FTD). The FTD clinical spectrum includes three clinically recognized variants; (1) the behavioural variant FTD (FTD-bv), (2) progressive nonfluent aphasia (PNFA) and (3) semantic dementia (SD). The key question of whether individuals with ALS develop neuropsychological evidence of FTLD prior to or subsequent to progression of the disease is still unclear. ALS-frontotemporal dementia (ALS-FTD) is estimated to occur in 3% of the sporadic cases and 15% of the familial type (Bak & Hodges, 2001; Lomen-Hoerth, Murphy, Langmore, Kramer, Olney & Miller, 2003). The 5 to 15% of individuals with ALS and dementia generally evolve to the FTD-ALS behavioural variant (Strong et al., 2008). The

non-fluent primary progressive aphasia is sometimes the primary clinical diagnoses in individuals who eventually develop ALS-FTD (Hillis, Oh & Ken, 2004)

Speech problems are a prominent feature of individuals with ALS. The mixed spastic-flaccid dysarthria associated with ALS resulting from involvement of multiple motor systems includes the predominant speech features of imprecise consonants, hypernasality, harsh voice quality, slow speaking rate, monopitch and short phrases (Darley, Aronson & Brown, 1975). The progression of their mixed dysarthria leading to anarthria (complete speechlessness) contributes to their overall communication problems.

Language processing in individuals with ALS without cognitive impairment or dementia has not been studied in depth but rather as one part of general cognitive testing (Cobble, 1998). Recent literature has shown subtle but consistent language deficits in individuals with ALS (Abrahams et al., 2005; Cobble, 1998). The most commonly reported language deficit in individuals with ALS without CI or dementia is word retrieval problems (Abrahams et al., 2000, 2005; Cooper et al., 2008; Mantovan et al., 2003; Rakowicz & Hodges, 1998; Strong et al., 1999). Other language deficits include reduced single-word vocabulary comprehension (Strong et al., 1999), moderate auditory comprehension impairment (Mantovan et al., 2003), and verbal and semantic paraphasias on confrontation and generative noun naming (Cooper et al., 2008; Strong et al., 1998). Cooper et al. (2008) found a subgroup of their ALS participants who made significantly more semantic errors than controls on a generative verbal fluency naming task. Cobble found auditory comprehension problems of linguistically complex stimuli, spelling errors and word finding difficulties in individuals with ALS but no CI or dementia.

Discourse analysis of spoken and written outputs of individuals with ALS using samples from a topic-directed interview (TDI) and the Cookie Theft picture description task (Goodglass & Kaplan, 1983) at baseline and then again at 6-months revealed that individuals with ALS produced significantly fewer self-corrected utterances compared to controls (Strong et al., 1999). Bak and Hodges (1997) showed that individuals with ALS without CI or dementia exhibit significant verb naming deficits. Narasimha (2009) showed using discourse tasks that individuals with ALS without CI or dementia produced more obligatory 1 and 2 place arguments (simplified verb structures) vs. controls who produced more Obligatory 3 place, Optional 2 place and Optional 3 place arguments (i.e., more complex verb structures).

In addition, his ALS participants produced significantly more verbs in the TDI vs. the picture description task. Moreover, the ALS participants produced more parenthetical remarks vs. control participants on both the picture description and the TDI tasks. Parenthetical remarks generally are considered non-propositional language structures adding limited semantic content to the primary information being conveyed. Increased use of parenthetical remarks denotes possible lexical access and linguistic difficulties. The high use of parenthetical remarks also can indicate underlying word-finding and memory difficulties which get masked through the use of parenthetical remarks. Despite these collective findings, it remains uncertain whether language deficits are a common but under recognized feature of individuals with ALS without CI or dementia (Bak & Hodges, 2004).

Individuals with ALS with dementia exhibit impairments in language functions (Haley & Raymer, 2000). The most frequently noted language problem in individuals with ALS with dementia is reduced verbal output, often leading to complete mutism (Bak & Hodges, 2001; Cooper, 2008; Neary et al., 1990). Other language disturbances reported more recently include word retrieval deficits on confrontation naming, category naming and letter fluency problems, impaired comprehension for both complex sentences and single word semantic processing tasks, and reading and writing difficulties (Caselli et al., 1993; Cobble, 1998; Doran et al., 1995; Haley & Ramer, 2000; Rakowicz and Hodges, 1998). Doran, Xuereb, and Hodges (1995) found that individuals with ALS with dementia showed significant auditory comprehension problems.

Anomia, impaired language comprehension, semantic paraphasias, and spelling errors also have been reported in individuals with ALS-FTD (Bak & Hodges, 1997, 2004; Cavelleri & DeRenzi, 1994; Deymeer, Smith, DeGirolami & Drachman, 1989; Ferrer, Roig, Espino, Piero & Guiu, 1991; Gentileschi, Sperber & Spinnler, 1999; Neary et al., 1990; Rakowicz & Hodges, 1998). On tests of verbal repetition, individuals with ALS-FTLD ranged from normal, mildly impaired to echolalic (Cavelleri & DeRenzi, 1994; Neary et al., 1990). Although naming and comprehension are impaired for both nouns and verbs, a consistently larger impairment was noticed in verbs on both naming and comprehension task (Bak & Hodges, 2001, 2004; Hillis et al., 2004). Neuroimaging studies have confirmed the involvement of language areas like Broadman areas 44 and 45 in individuals with ALS-FTLD (Bak & Hodges, 2004). Bak and Hodges (2004) found that language deficits can be an early and a prominent feature of individuals with ALS

with dementia. They also stated that language deficits could be unrelated to a dementia and that the language impairment could be more pronounced than what is expected on cognitive tests.

So how do the findings on language and cognitive issues in PD and in ALS affect the practice of clinical audiologists? Auditory comprehension and auditory processing are disrupted in individuals with PD and ALS. Moreover, for a moderately sized proportion of those with PD and ALS, cognitive impairments and dementia are common. For individuals with PD, processing complex syntactic structures is of particular concern while verb use problems and naming nouns are a paramount challenge in those with PD and ALS, with or without CI or dementia. Clinical audiologists must reduce the syntactic auditory load during instructions for assessment and should provide specific guidance to clients and family members that memory and other cognitive problems may exacerbate auditory processing, thereby limiting auditory comprehension. Clinical audiologists need to educate and to train caregivers during aural rehabilitation programming to reduce the amount and syntactic and semantic complexity of their messages, in concert with using supportive memory and attention stimulation strategies such as using writing, reducing sensory distractions and optimizing sustained attention techniques.

Mild Cognitive Impairment

Mild cognitive impairment (MCI) is considered a transitional state between normal, age-related cognitive problems and dementia (Pedersen, 2003). The idea of MCI evolved from earlier concepts of cognitive decline in aging without dementia including age-associated memory impairment (Crook, Bartus, Ferris, Whitehouse, Cohen & Gershon, 1986), age-associated cognitive decline (Levy, 1994), cognitively impaired not demented (CSHA, 1994) or cognitively impaired not demented yet (CINDY) (CSHA, 1994), among other terms.

CI is defined operationally by Pedersen, Smith, Warring, Ivnik, Tangalos & Kokmen (1999) using the following criteria:
1. complaint, preferably corroborated by informant
2. Objective memory impairment corrected for age and education (i.e., scores 1.5 SDs ? mean for normals)
3. Largely intact general cognitive function
4. Essentially preserved activities of daily living (ADL)
5. Not demented
6. No specific medical, neurological or psychiatric causes for memory difficulty

Despite the recent emergence of the term MCI, clinicians and researchers are wise to consider myriad other causes of subtle changes in the cognition of older adults rather than to conclude that MCI is the sole contributor. These other causes can include depression, delirium, infections, hypotension, medications to treat hypertension and cardiac dysfunction, vitamin B12 deficiencies, among other potentially treatable conditions.

There are few studies describing the language or hearing profiles of individuals with MCI. Most studies include language assessments within screening measures or as part of larger test batteries of cognition. What studies have shown is that individuals with MCI exhibit decreasing verbal fluency scores (letter and semantic categories), poor picture confrontation naming scores on nouns and that they do not benefit from semantic cues (Ostberg, Fernaeus, Hellstrom, Bogdanovic & Wahlund, 2005)

The best approach for clinical audiologists when they suspect a client has MCI is to write down assessment instructions, providing them, if indicated, prior to and during the assessment. In addition, aural rehabilitation programming must include written documentation for clients and their family or professional caregivers to review during and at a later date following aural rehab sessions. A thorough review of aural rehabilitation strategies must be undertaken simultaneously with clients with MCI, their family members or with other professional caregivers to ensure that the approaches and techniques are well understood, remembered and invoked. In addition, clinical audiologists must refer clients suspected of having MCI to their attending physician(s), if this has not already been undertaken, for detailed follow-up on the suspected cognitive impairment. Interprofessional referrals to and support from clinical psychologists, family physicians or specialists in neurology, geriatric medicine or psychiatry, along with input from speech-language pathologists, occupational therapists and social workers is crucial to help uncover the nature of the suspected cognitive impairment and to optimize overall hearing and health care.

Dementia

Dementia is an acquired progressive degenerative syndrome that affects multiple cognitive systems and processes (Mendez & Cummings, 2003). Individuals with dementia exhibit deficits of gradual onset and continual decline including the core feature of memory impairments and one or more of the following:

1. Language problems
2. Movement programming problems (apraxia)
3. Perceptions stripped of meaning (agnosia)
4. Disturbance in executive functioning (e.g., planning, organizing, sequencing ideas, etc.) (American Psychiatric Association, 2000).

It is estimated that there are over 35 million people world-wide who suffer dementia with 4.6 million new cases added each year (Alzheimer Disease International, 2009). The estimated distributions of those with dementia include 46% in Asia, 30% in Europe and 12% in North America (Alzheimer Disease International, 2009). Predictions are that there will be a doubling every 20 years such that by 2030 there will be 65.7 million people on earth with dementia. The majority (57.7%) live in low and middle income countries with estimated increases over the next twenty years of 40% in Europe, 63% in North America, 77% to 146% in Latin America, 89% to 117% in Pacific, East and South Asia regions and 125% in North Africa and the Middle East. The annual world-wide cost of providing dementia care was estimated at $315 billion (2005 US $) (Ferri, Prince, Brayne et al., 2005; Wimo, Winblad, Agüero-Torres, von Strauss, 2003; Wimo, Winblad & Jonnson, 2007). Dementia is and will continue to be for the next foreseeable decades a tremendously huge demand on health care professionals including clinical audiology.

There are multiple forms of dementia including Alzheimer's disease (AD) (the most frequently occurring form), vascular dementia, mixed dementia (AD + vascular dementia), frontotemporal lobe dementia (FTD) and it variants, dementia associated with progressive degenerative conditions such as Parkinson's disease, Huntington's chorea, and ALS, as well as the AIDS-dementia complex, and Creutzfeld-Jacob disease, among many others (Mendez & Cummings, 2003). The remaining segment of this section will address the language features of those with AD since it is the most frequently occurring type of dementia.

Researchers have arbitrarily divided the time course of AD into three somewhat distinct but overlapping clinical stages (Bayles & Tomoeda, 2007). The language features of those with AD have been described within the early/mild, middle/moderate, and late/severe clinical stages (Kempler, 1991).

Individuals in the early/mild clinical stage usually are aware of their language and communication difficulties (Bayles et al., 1992). The most prominent problem is word finding difficulties for names of people, places,

objects and actions (Appell, Kertesz & Fisman, 1982). They often use clichés and stereotyped phrases as a result of their deteriorating semantic memory system and processes but generally, their expressive language is sufficient for most social situations (Bayles & Tomoeda, 2007). The auditory and reading comprehension of individuals with AD, notwithstanding age-related hearing and vision problems, generally is good for "everyday" communication situations and materials (newspapers, magazines) although they may shift away from complex listening contexts (multiple partners in noise) and complex semantics (e.g., metaphors, proverbs, analogies, sarcasm-based humour, and abstract expressions) and grammar and syntax structures (e.g., passive voice and open ended "wh" questions) (Kempler, 1991; Kempler Van Lacker & Read, 1988).

Individuals in the middle/moderate clinical stage generally are less aware of their language and communication problems (Bayles et al., 1992; Bayles & Tomoeda, 2007). They exhibit pronounced word finding problems including circumlocution, and semantically empty and irrelevant utterances (e.g., words such as "thing", "this", and "that" often used in place of substantive nouns) (Appell et al., 1982; Bayles et al., 1992). They frequently repeat words, utterances, and ideas as a result of deteriorating working memory and meta-linguistic skills (Bayles et al., 1992). Some may become disinhibited, making inappropriate personal comments, generally being insensitive to contexts and partner factors in what to and what not to say or write (Bayles & Tomoeda, 2007). From discourse perspectives, those in the middle clinical stage digress and ramble yielding poor topic maintenance (Garcia & Joanette, 1997; Mentis, 1995). Those in the middle/moderate clinical stage can and do signal that they do not understand what is said to them (Orange, Lubinski & Higginbotham, 1996; Orange, van Gennep, Johnson & Miller, 1998; Guendouzi & Müller, 2002) and even repair or correct successfully misunderstandings. The instances of communication breakdown often occur closely with the introduction of a new topic of conversation or the re-introduction of a previously discussed topic (Williams, Abdi, French & Orange, 2010). Listening comprehension during the middle clinical stage of AD is sufficiently problematic that individuals experience great difficulty following simple commands (Bayles & Tomoeda, 2007) and can become "lost" in multi-partner conversations (Alberoni, Baddeley, Della Salla, Logie & Spinnler, 1992).

By the late stage of AD, individuals possess a restricted range of language skills but do retain fundamental elements of communication such as turn-taking, eye-contact and responsiveness to spoken questions and commands (Kim & Bayles, 2007). They now begin to demonstrate a breakdown in the fundamental aspects of grammar and syntax and show disruptions in their speech with misarticulations. They repeat themselves and what others say (Bayles & Tomoeda, 2007). They have limited reading comprehension skills (Cummings, Houlihan & Read, 1985). Their auditory comprehension is best preserved for frequently occurring and personally relevant words (Bayles, Tomoeda, Cruz & Mahendra, 2000; Causino Lamar, Obler, Knoefel & Albert, 19944; Kim & Bayles, 2007. They will respond to and understand not so much the semantic content of what is said but rather to the prosodic features including rate of speech, its pitch contours and to pause, loudness and personal-familiarity cues (Kempler, 1991).

So, given these language and communication features of individuals with AD across the three clinical stages, what can clinical audiologists do to optimize their provision of health care? Firstly, audiologist must recognize that individuals with AD can learn to use assistive listening devices successfully. There is emerging evidence that individuals with AD can learn and retain new information via specific interventions such as spaced retrieval (Hopper, Mahendra, Kim, Azuma, Bayles, Cleary, et al. 2005). Fitting for devices must include a comprehensive gathering of relevant communication contexts and partners in which the device will be used and who of the potentially multiple caregivers (e.g., family, neighbours, formal professional) can provide support in the use of and in troubleshooting any problems with the device. Secondly, audiologists will need to adjust the manner in which assessment instructions are provided to clients and the way in which assessment protocols are completed. For example, written instructions of the assessment tasks in semantically and syntactically simple sentences (e.g., one idea per sentence) using large sans-serif upper and lower case font (e.g., Arial or Helvetica, 24 point or larger) in black ink on a white background, in concert with spoken reminders during the task, serve to ensure compliance and optimize accuracy of results from the audiometric assessment for those in the early and middle stages of AD. Family caregivers can be briefed a priori of the assessment tasks and sit in with their relative during the testing, helping to remind their relative of the required responses. Finally, clinical audiologists need to consider mechanistically simple assistive devices for use (e.g., no remote adjustments but pre-set settings) and what electronic feature can be used to help

the person with AD or her/his caregiver to locate the device should it be misplaced.

Communication Predicament and Enhancement – Personhood and Self

The final and possibly most important language and communication consideration for clinical audiologists in their hearing care of older adults is the concept of personhood and self. Much has been published over the last three decades about how family members, health care providers, and strangers communicate with older adults and how they reinforce or undermine the personhood and self of seniors (see Ryan this volume for a more detailed discussion of this concept).

Based on speech accommodation theory (Coupland, Coupland, Giles & Henwood, 1988) individuals adjust their speech, language and communication based on real and perceived features and needs of their partners. With respect to accommodated communication with older adults, Caporael (1981, 1983, 1986) was among the first researchers to gather field data based on interactions between older adult residents of long-term care facilities and health care staff. She documented the over-accommodated speech and language styles of the care provides, noting its similar qualities and features to those used by parents with their children. Caporael's early published works on elderspeak, secondary baby-talk and patronizing talk to older adults led to a series of studies that have since formed a large and expanding foundation of published works and knowledge on over-accommodated communication with older adults.

Ryan and colleagues have, over the past two decades, investigated systematically the prosodic, linguistic and behavioural features of elderspeak, leading to the development of the model of the Communication Predicament of Aging (Ryan et al., 1986) and to the Communication Enhancement Model of Aging (Ryan et al., 1995) with application to those with AD (Kemper, 1997; Orange et al., 1995). The fundamental tenet of the Communication Predicament Model is that people adopt linguistically simple and demeaning forms of speech and language (e.g., exaggerated inflectional patterns, increased loudness, terms of endearment like "Sweetie" and "Dearie", etc.), based on myths and stereotypes of older adults perceived abilities and needs, that undermine the personhood and communicative and social independence of older adults. Older adults are perceived, rather incorrectly, as needing nurturing, which becomes manifest in speech and language features de-signed to help with interactions but rather lead to fewer communicative interactions, loss of control and self-esteem, and a downward spiral of reinforcing age-related stereotyped behaviours (Ryan et al., 1986).

So how might clinical audiologists avoid using over-accommodated speech and language with older adults and work to maintain the personhood, self and dignity of older adult clients? The work of the late Tom Kitwood (1997) frames nicely his five personhood affirming positive care interaction strategies for older adults (Ryan, Byrne, Spykerman & Orange, 2005) et al., 2005). These include the following. Firstly, recognize that older adults are known by and possess unique characteristics or name(s). Using respectful forms of address (e.g., Mrs., Mr., Dr., etc. vs. first or nick-names) and explicitly acknowledging their accomplishment or social status will go a long way to reinforcing personhood and their self profile. Secondly, consult and negotiate with older adults. Consult with them about preferences, choices, and needs. This may mean offering a range of choices for assistive listening devices along with listing the strengths and weakness of each option so that older adults become informed decision makers. Thirdly, provide validation of older adults' reality, and acknowledge their feelings, connectedness and person within the context of their hearing problems. This means showing empathy toward the physical, social and emotional difficulties that they may be experiencing as a result of their hearing impairment. Fourthly, collaborate with older adults by aligning your goals with theirs. Engage together in task completion by working as a unified unit to achieve hearing related goals. This means adopting their perspective as decisions are made concerning hearing device options. Finally, act as the catalyst for older adults to accomplish what they would otherwise be unable to do without your help. This may mean providing missing parts of intended actions such as being an advocate for them as you work together with government, insurance or philanthropic service agencies for hearing health care supports.

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