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# Conversational Discourse and Cognitive Impairment: Implications for Alzheimer's Disease

## *Les échanges verbaux et les troubles cognitifs : implications au niveau de la maladie d'Alzheimer*

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**Key words:** conversation, cognition, Alzheimer's disease

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### Abstract

Our understanding of the conversational skills of individuals with Alzheimer's disease (AD) has increased in the past decade. Findings show differential declines in various components of conversational competence, especially related to disease onset and progression. The recent development of more clearly defined models of human memory and attention and a better understanding of memory and attention problems of individuals with AD have advanced our understanding of the influence of cognitive impairments on conversational performance in AD. The purpose of this paper is to discuss the possible links between cognitive impairments in AD and the conversational performance of individuals with AD. Examples of compensatory strategies that consider conversational features in terms of the associated underlying cognitive impairments are presented to illustrate the relevance of these links to intervention.

### Abrégé

*Au cours de la dernière décennie, nous avons accrue nos connaissances sur l'aptitude des personnes atteintes de la maladie d'Alzheimer (MA) à soutenir une conversation. Les observations révèlent des pertes différentielles quant à plusieurs aspects de la capacité à avoir des échanges verbaux, en particulier à l'installation et durant l'évolution de la maladie. L'élaboration récente d'un modèle plus précis de la mémoire et de l'attention chez l'être humain et une meilleure compréhension des problèmes de mémoire et d'attention des personnes souffrant de la MA nous ont aidés à saisir davantage l'influence des troubles cognitifs sur la performance des malades dans les échanges verbaux. Le présent article examine des liens possibles entre les carences cognitives des personnes atteintes de MA et leur performance sur le plan de la conversation. Suivent des exemples de stratégies palliatives en vertu desquelles les échanges verbaux sont examinés sous l'angle des troubles cognitifs sous-jacents qui s'y associent et illustrent la pertinence des liens précités avec l'intervention.*

Over the past decade, researchers and clinicians have become more interested in the natural and spontaneous conversations of various populations of individuals with communicative disorders. The shift in interest from linguistic competence to communicative competence has been motivated by several factors, including calls by colleagues for more theoretically and ecologically valid diagnostic and intervention approaches, as well as demands by health professions, governments, and family care providers for accountability and evidence of therapeutic effectiveness. These factors have led to a surge of collaborative research among speech-language pathologists, cognitive neurologists, cognitive psychologists and neuropsychologists, socio- and neurolinguists, sociologists, and social psychologists. A more recent occurrence in this cross-fertilization of ideas is research in the neurosciences, especially in the areas of cognitive psychology and cognitive neuropsychology. The current evolution of cognitive theories of language processing is recognized as an important advancement in our understanding of the linguistic and cognitive deficits in disorders such as aphasia, dementia, and traumatic and right brain injuries. The usefulness of these theories for understanding the phenomenon of conversation, however, has been subject to insightful criticism on several fronts, such as their lack of consideration of and relevance to pragmatic and discourse theories, and their limited value for therapeutic planning. What has gone unacknowledged in the debates but certainly warrants mention is the utility of the models to identify cognitive processes that influence conversation.

The purpose of this paper is to examine several cognitive processes that are believed to influence the conversations of individuals who manifest cognitive, linguistic, and communicative problems associated with dementia. The discussion will focus on the conversational performance of

individuals with Alzheimer's disease (AD). In particular, conversational features will be explained in terms of possible underlying cognitive impairments. The relevance of this relationship to intervention will be illustrated through examples of conversational strategies that consider both the conventions of conversation and the nature of common cognitive impairments associated with AD. The discussion is not intended to address how such strategies can best be identified in assessment, nor how they are best implemented in intervention. Rather, the discussion is intended to advance dialogue on the relevance and importance of examining conversational discourse from a cognitive viewpoint in conjunction with the traditional frameworks established by pragmatic and discourse theories.

### Conversation and Cognition

When asked to define the term conversation, researchers, clinicians, and students in speech-language pathology often describe several different concepts and components, all of which are quite sound theoretically and clinically. When the same request is presented to representatives of other health and social science disciplines, further differences emerge. Why is this so, especially considering that conversation is by far the most prevalent genre of human interaction? One reasonable explanation is that conversation is a multifaceted, complex form of communication, sometimes far more intricate than we realize. Like the unique descriptions from several blind-folded individuals who are able to feel only one part of an elephant, definitions of conversation vary depending on theoretical, discipline, research, clinical, and personal perspectives (see Garcia & Orange, this issue, for a more detailed discussion of several of these perspectives).

Sociologically-based definitions of conversation describe it as a form of naturally occurring, casual, spoken social interaction in which language is used in a systematic and reciprocal manner, and which has important social and interpersonal aspects and functions (i.e., establishing and developing relationships) (Goffman, 1976; Myllyniemi, 1986; Schegloff, 1968). Others note that conversation captures relatively informal collaborative interactions where roles of speakers and listeners are interchanged in a nonautomatic manner (McLaughlin, 1984; Milroy & Perkins, 1992; Psathas, 1995). The definition of conversation by Poyotos (1982) provides far more detail:

A back-and-forth series of verbal and nonverbal exchanges between two or more participants who observe certain rules and also violate them in an irregular flow of speaker's and listener's turns, acceptable and unacceptable simultaneous activities, acoustic and visual pauses, and a number of other positive and negative behaviors

within each turn, differently oriented between speaker and listeners or among listeners, and conditioned by personality, situational context, and cultural background (p. 156).

While these descriptions identify several distinguishing features of conversation and outline several important roles, little consideration is given to the cognitive processes that underlie spontaneous talk. Recent work on neural network models and constructive mental schemas has expanded our understanding of the complexity of conversation and added a new analytic approach to understanding this aspect of human interaction, especially for individuals who suffer cognitive, linguistic, and communicative impairments (e.g., dementia) (Daly, Weber, Vangelisti, Maxwell, & Neel, 1989; Kellerman, Broetzmann, Lim, & Kitao, 1989; Turner & Cullingford, 1989). For example, Schank and Abelson (1977) described the importance of the schematic structure of discourse to the establishment of coherence; that is, the overall clarity and relevance of the discourse. They emphasized the importance of the knowledge of scripts, general conversational structures (i.e., topic manipulations), and mental organizational frameworks in the development of coherent communication. The underlying assumption in their work, and in the more recent work of others, is that cognitive integrity is key to the pattern of conversational cohesion at microstructural levels (i.e., within sentences) and coherence at macrostructural levels (i.e., across sentences).

Definitions of cognition, like those of conversation, vary widely, depending on the perspective and bias of the user of the term. For the purposes of this paper, we are considering cognition to comprise numerous simultaneous, serial- and modular-based interrelated mental activities that receive, encode, store, decode, and analyze information. Several important cognitive operations, which exert the most obvious influence on conversational performance and which have direct relevance for the discussion of conversational features of individuals with AD include attention, memory systems, and manipulation of knowledge (i.e., judgement, reasoning, planning, problem solving, set shifting, and abstraction). The potential roles that each of these critical areas of cognition play in the conversation skills of individuals with AD will be discussed in relation to what we know currently about the pattern of conversational and cognitive impairments in AD.

### Conversation and Alzheimer's Disease

While our understanding of the linguistic communicative performance of individuals with AD has grown steadily over the past two decades, interest in and understanding of their conversational skills has surged over the past five years. The recent text by Bloom, Obler, De Santi, and Ehrlich (1994),

and the edited work in progress by Paradis contain several cogent chapters on the conversational performance of individuals with AD and other forms of dementia. Table 1 provides a brief summary of studies that identified the most salient features of conversation in AD.

Before discussing the conversational performance of individuals with AD, four key points are worth mentioning. First, it is widely accepted that language and conversation features can be described based on the clinical stage of AD (Bayles, Tomoeda, & Trösset, 1992; Obler & Albert, 1984). Second, the literature shows that there is great variability in language and conversation in AD, not all of which can be accounted for by differences in clinical stage. This suggests the importance of other factors not yet clearly identified. Moreover, the variability in linguistic and conversational performance in the normal aging population provides an additional consideration to our understanding of performance measures in AD. Third, work over the past decade suggests that several different subgroups of Alzheimer's disease exist (Blennow, Wallin, & Gottfries, 1994), with evidence for associated differences in linguistic, communicative, and cognitive abilities. Finally, early work on language and communication included less than robust diagnostic and selection criteria for AD. Collectively, these issues raise questions concerning the early descriptions of the nature of linguistic and conversation performance in AD. Specifically, there may be limitations in the extent to which conclusions based on findings from one set of AD individuals can be used in the interpretations of findings from a different set.

Early accounts of the conversational performance of individuals with AD were derived primarily from anecdotal observations. It was noted that their utterances are egocentric and that individuals show less adherence to conversation maxims governing normal conversations (Bayles, 1984). It also was observed that individuals with AD neither ask questions of their partner nor comment on their own utterances, and exhibit a shrinking vocabulary, digressions, ideational impoverishment, and overly long vague answers to questions (Alpert, Rosen, Welkowitz, & Lieberman, 1990; Bayles & Kaszniak, 1987; Lebrun, Devreux, & Rousseau, 1987; Stevens, 1985). Bayles and Kaszniak (1987) stated that anecdotal reports suggest participants with dementia exhibit "difficulty maintaining the topic, taking turns, being insensitive to others in the conversation, saying either too much or too little, and failing to repair misunderstandings" (p. 175).

Using systematic methodologies to collect and analyze data, other investigators reported that the ability of individuals with AD to engage in extended discourse is impaired, and that partners often are unable to follow the

incoherent verbal output because of the frequent use of indefinite deictic terms, disrupted reference, topic digressions with abrupt topic shifts, and inappropriate intrusion of words and themes from previous conversations (Fuld, Katzman, Davies, & Terry, 1982; Garcia & Joannette, 1994; Mentis, Briggs-Whittaker, & Gramigna, 1995; Nicholas, Obler, Albert, and Helm-Estabrooks, 1985; Ripich & Terrell, 1988; Sandman, Norberg, & Adolfsson, 1988). Verbal perseverations are frequent, particularly in the form of ideational repetition. Irigaray (1967) described how individuals with AD are apt to digress and to ramble at length, and attributed this to disinhibition, which is often seen in dementia.

Recent evidence shows, however, that individuals with AD retain several important aspects of conversation, even with advanced progression of the disease. For example, while individuals with AD exchange turns more often than normal controls, they appear to employ similar turn-taking strategies (Hutchinson & Jensen, 1980; Ripich & Terrell, 1988; Ripich, Vertes, Whitehouse, Fulton, & Ekelman, 1991). They also use, appropriately and frequently, requests for clarification, specification, and confirmation, and participate in repairing misunderstandings and mishearings (Hamilton, 1994a, 1994b; Goldfein, 1990; Ripich et al., 1991; Orange, Lubinski, & Higginbotham, in press; Orange & Mathew, 1994; Sabat, 1991). Features that are relatively spared among late stage individuals include maintaining some control of topic, turn-taking, making and understanding presuppositions, (i.e., a measure of cohesion and deixis), greeting and providing their own name, using elementary gestures, and making directives (Bayles & Tomoeda, 1994; Causino Lamar, Obler, Knoefel, & Albert, 1994). Sabat and Harré (1992) noted the correct and somewhat frequent use of the deictic pronouns I, me, and myself by late stage AD individuals, which they attributed to the retained ability to identify the existence of an intact self (i.e., a personal identity).

## Cognition and Alzheimer's Disease

The impairment of cognition is recognized as a key diagnostic feature of AD. Currently accepted research criteria are based on progressive declines in multiple areas of cognition (American Psychiatric Association - DSM IV, 1994; McKhann, Drachman, Folstein, Katzman, Price, & Stadlan, 1984). These areas include orientation to place and time, memory, language, praxis, attention, visual perception, problem solving, and social functioning. For the purposes of this paper, the cognitive processes that relate primarily to the impairments in conversation observed in individuals with AD will be discussed. As noted earlier, these include attention and memory systems, and the manipulation of knowledge.

**Table 1.** Summary of Selected Studies of Conversation in Individuals with Alzheimer's Disease

<b>Studies</b>	<b>Conversational Features</b>
Alpert et al., 1990; Bayles, 1984; Bayles & Kaszniak, 1987; Lebrun et al., 1987; Stevens, 1985; Sandman et al., 1988	<ul style="list-style-type: none"> <li>• egocentric</li> <li>• less adherence to conventions of conversation</li> <li>• do not ask for clarification</li> <li>• fluctuating relevance and accuracy of responses to questions</li> <li>• topic maintenance and turn-taking problems</li> <li>• insensitive to others in conversation</li> <li>• failing to repair misunderstandings</li> <li>• shrinking vocabulary</li> </ul>
Fuld et al., 1982; Nicholas et al., 1985; Richardson & Marquardt, 1985; Ripich & Terrell, 1988; Hutchinson & Jensen, 1980; Irigaray, 1967; Garcia & Joannette, 1994; Mentis et al., 1995; Sandman et al., 1988; St.Pierre, Wilk, & Orange, 1995	<ul style="list-style-type: none"> <li>• intrusions of words and themes, unable to engage in extended discourse</li> <li>• partners unable to follow verbal output</li> <li>• disrupted reference</li> <li>• inappropriate utterances to context, ideational verbal perseverations</li> <li>• abrupt topic shifting</li> <li>• topic change and introduction problems</li> </ul>
Santo Pietro et al., 1990	<ul style="list-style-type: none"> <li>• content of utterances disordered</li> <li>• group termed 'Empty Speech' use indefinite terms primarily</li> <li>• group termed 'Violators of Conversation Conventions' use brief affirmations primarily</li> </ul>
Ripich & Terrell, 1988;	<ul style="list-style-type: none"> <li>• structural cohesive devices used more effectively than semantic cohesive devices</li> </ul>
Ripich et al., 1991	<ul style="list-style-type: none"> <li>• absence of nominal reference units contributes to disrupted coherence</li> <li>• propositions and cohesion devices used in manner similar to normal elders</li> <li>• twice the disrupted cohesion in individuals with Alzheimer's disease versus normals</li> <li>• discontinuity in semantic cohesion (absent referents and missing units of information)</li> <li>• more words and shorter conversation turns</li> <li>• independent judgements describe output as incoherent</li> </ul>
Hutchinson & Jensen, 1980; Ripich & Terrell, 1988; Ripich et al., 1991	<ul style="list-style-type: none"> <li>• shorter turns but able to engage in turn-taking</li> </ul>
Bohling, 1991; Hamilton, 1994a; 1994b; Penn, Sonnenberg, & Schnaier, 1988; Ripich et al., 1991; Sabat, 1991 Orange et al., in press; Orange & Mathew, 1994	<ul style="list-style-type: none"> <li>• correctly use requests for clarification, specification, and confirmation</li> <li>• increase percentage of discourse errors and Wh questions by mid-stage</li> </ul>
Bayles & Tomoeda, 1994; Causino Lamar et al., 1994	<ul style="list-style-type: none"> <li>• late stage participants able to maintain aspects of topic control, turn-taking, use and understanding of presuppositions and directives</li> </ul>

## Attention

There are several different categories of attention: divided, switching, sustained, and selective (McDowd & Birren, 1990). Divided attention refers to the process by which a person can attend to two tasks simultaneously. Switching allows individuals to alternate their monitoring between two or more sensory inputs. Sustained attention, also referred to as vigilance, involves maintaining performance on a task over a prolonged period of time. Selective attention requires that individuals attend to a primary task or stimulus while filtering out irrelevant distracting information.

Deficits in attention are well known to occur in AD, most notably in divided and selective attention processes. Increasing the amount of auditory or visual information over which individuals with AD must divide their attention results in poorer performance compared to normal controls (Grady, Grimes, Patronas, Sunderland, Foster, & Rapoport, 1989; Mohr, Cox, Williams, Chase, & Fedio, 1990; Nebes & Brady, 1989). Tasks that demand suppressing attention to a set of competing stimuli (regardless of sensory input), while consciously processing a primary set of stimuli (e.g., letter search tasks), often are performed poorly. Slower response times and greater absolute differences in performance between individuals with AD and age-matched normals are well documented (Nebes, 1992).

## Memory

The hallmark feature of AD is impairment of memory processes (Nebes, 1992). Before reviewing the nature of these deficits in AD individuals, a brief discussion of terminology is necessary. Several different classification systems for memory are used in the literature. Some systems are based on temporal distinctions (e.g., primary, secondary, and tertiary, which are differentiated along a continuum of immediate to remote recall). Others are based on the type of information stored in and the processing characteristics of the particular system. For the purposes of this discussion, we will use the terminology of the authors cited, equating terms, where possible, to terminology of different classification systems. It is important to recognize, however, that because the conceptualizations of classification systems are different, their respective terminologies are not always equivalent. Detailed discussion of the differences between classifications systems and terminology is beyond the scope of this paper. The reader is referred to Nebes (1992) for further discussion and definitions.

Deficits in secondary memory versus those in primary memory are more severe and pervasive in AD individuals, and are affected to a greater degree by disruptions in

encoding, storage, and retrieval (Kaszniak, 1986). Further evidence for greater deficits in secondary memory come from studies of primacy and recency effects, in which the ability of participants with AD to recall the last (versus first) words presented in a list is interpreted as support for relatively better primary memory (Nebes, 1992).

Another perspective of short-term memory is that of working memory, which is conceptualized as being responsible for acquiring and retaining briefly (i.e., milliseconds) new information. Working memory is hypothesized to comprise three components: an articulatory loop, a visuospatial scratch pad, and a central executive system (CES) (Baddeley, 1992). The first two components function as limited passive stores of phonological information and visual images which are rehearsed before being shunted to the CES. The CES, which is believed to be the critical component of the three comprising working memory, is responsible for coordinating multiple attention and cognitive processes. Individuals with AD are believed to suffer greater disruption of the CES portion of working memory, which results in shorter memory spans (Baddeley, Logie, Bressi, Della Sala, & Spinnler, 1986; Nebes, 1992).

Other memory systems which are particularly relevant to the deficits of AD individuals are episodic memory and semantic memory (Tulving, 1972). Episodic memory refers to the store of unique past events encoded as information within spatial and temporal contexts (e.g., birth dates). Semantic memory is organized knowledge about words, facts, and concepts with their meanings and associations that have no spatial or temporal relationship (e.g., word meanings, alphabet, rules of arithmetic).

Episodic memory problems are prominent in individuals with AD and manifest as impaired recall and retrieval of stores of factual information and word lists (Salmon, Heindel, & Butters, 1995). Semantic memory also is impaired in individuals with AD. Mounting evidence shows that individuals with AD have lost semantic knowledge they once possessed and also experience difficulty accessing, retrieving, and recalling meaning and associative elements within semantic memory stores (Chertkow, Bub, & Seidenberg, 1989; Ober, Dronkers, Koss, Delis, & Friedland, 1986). What remains unclear, however, is the exact nature and degree of the impairment(s), as several conflicting findings point to variables such as losses and degradation of semantic information versus multiple breakdowns in access, retrieval, and storage processes (Nebes, 1992; Smith, Faust, Beeman, Kennedy, & Perry, 1995). Interestingly, procedural memory (memory for learned skills such as tying shoelaces or making a sandwich) is better preserved in AD (Eslinger & Damasio, 1986).

Tertiary memory (sometimes referred to as remote memory or remote autobiographical memory) is a less well agreed upon category within the human memory system. It is believed to be responsible for the store and retrieval of information learned in the distant past (Kaszniak, 1986). In more recent accounts of autobiographical memory, it has been differentiated by some authors (e.g., Conway, 1990) from episodic memory in that it contains experiential knowledge specific to the individual (i.e., it provides storage and retrieval of memories of events, both recent and remote, in which the individual participated). Sensitive to temporal gradient declines, recent information stores in tertiary memory are more susceptible to deterioration than are remote stores (Nebes, 1992). Clinical observations, caregivers' reports, and comparative studies of AD versus pure amnesic participants (e.g., individuals with Korsakoff syndrome) have provided evidence for differential remote memory abilities of individuals with AD, where their older remote memories are better preserved than are their more recent remote memories (Nebes, 1992).

#### **Judgement and reasoning, planning, set shifting, and abstraction**

Frontal and prefrontal cortical regions, in conjunction with associative connections from subcortical structures of the limbic system (including the hippocampal-amygdal complex), help modulate and control higher order cortical functions such as judgement and reasoning (problem solving), personality, executive abilities (planning, set shifting, and attention), and abstraction, among other abilities (Absher & Cummings, 1995). The integrity of frontal and prefrontal functions is particularly important for successful participation in conversational interactions. These areas, however, are sites of significant neuropathological deterioration in AD which lead to the manifestation of impaired frontal lobe functions.

Disturbances specific to impaired judgement and reasoning in individuals with AD have been challenging to identify because of overlapping disruptions in several other cognitive operations and the degree of difficulty of the tasks (Nebes, 1992). However, poor performance on nonverbal reasoning tests and the lack of insightfulness on questions of moral concern are particularly apparent in AD (Cummings & Benson, 1992; Nebes, 1992). Personality and social behaviour are not often impaired early in the course of AD, but are more disturbed and become inappropriate with disease progression (Cummings & Benson, 1992). Difficulties in planning and executing the completion of a series of steps in an activity, problems switching from one task to another (i.e., perseveration), and difficulty maintaining performance within a set of tasks are evident in AD (Nebes, 1992).

#### **Relationship Between Conversational Features and Cognitive Impairments in AD**

How do the disrupted and retained conversational abilities of individuals with AD relate to their cognitive impairments? In this section we will address potential answers to this question by examining three selected aspects of conversation that have been studied the most in individuals with AD, that is, turn-taking, topic manipulation, and conversational repair. Examples of potentially successful compensatory, interactive strategies that are based on cognitive impairments associated with disrupted conversation are presented in Table 2. These examples are not meant to suggest a one-to-one relationship between cognitive impairments and compensatory strategies. Such a relationship undoubtedly is unrealistic for it fails to recognize the interactions among cognitive, linguistic, social, and conversational deficits and preserved abilities. Nevertheless, the examples are provided to illustrate the importance of considering specific cognitive impairments in the development of compensatory strategies.

#### **Turn-taking**

As noted previously, individuals with AD are able to take and relinquish their turn in conversations. They do so, however, more frequently and with fewer utterances and fewer words per turn than do normal controls (Hutchinson & Jensen, 1980; Ripich & Terell, 1988; Ripich et al., 1991). The ability to follow turn-constructive conventions and to participate collaboratively in interactions has been observed even well into the advanced stage of AD (Bayles & Tomoeda, 1994; Causino Lamar et al., 1994). Most studies on turn-taking in AD have used quantitative analyses, that is, counting the number of turns or the length (in utterances or words) of turns. Few, if any, however, have examined qualitatively the collaborative turn-keeping, turn-relinquishing, or turn-taking signals (language, speech, and nonverbal) used by AD individuals and their partners.

Conversational participants must take turns, keep turns, and relinquish turns in order to maintain the reciprocal and interactive integrity of conversations. The place within interactions at which turns are exchanged is called the transition relevant place (Levinson, 1983). To participate in turn-taking, individuals must be able to perceive, attend to, process, and integrate at multiple levels the incoming linguistic, speech, and nonverbal cues that signal a transition relevant place. Studies on human neonates (e.g., Trevarthan, 1974; 1979) suggest that turn-taking, at least in some rudimentary form, may be an early developing pragmatic skill in infants, with recognition of transition points involving prosodic, and voice and face familiarity signals rather than linguistic cues.

What then are the cognitive processes that influence turn-taking in AD and how do they relate to what is presented in the literature? Levinson (1983), in his discussion of the rules developed by Sacks, Schegloff, and Jefferson (1978) for determining speaker selection, notes the importance of both listening and processing what is said in order for conversation partners to take full advantage of transition relevant places. Hence, the cognitive processes involved in comprehension (for example, see Kwong See & Ryan, this issue) are engaged to derive meaning. Simultaneously, other cognitive operations are involved for the planning of possible responses. These processes include, but are not limited to, selective attending to the turn-keeping and turn-relinquishing cues, and retrieval of information from episodic, semantic, and autobiographical memories. These memory operations are relevant for processing the ideas that were just discussed within the last few utterances, those that were discussed earlier in the conversation, or those that were

talked about in previous conversations.

It is generally agreed that turn-taking and turn-relinquishing are typically preserved, at least to some extent, in AD, (suggesting some preservation of the ability to recognize transition relevant places). Analyses of the linguistic content of turns describe semantically empty terms that convey little meaningful information or function only as acknowledgments or requests for further information (Ripich et al., 1991; Nicholas et al., 1985). These characteristics, due in part to impairments in episodic, semantic, and autobiographical memory systems, as well as overall cognitive slowing associated with aging and AD (as measured by increased response times) could affect the AD individual's ability to understand fully the previous turn in relation to the overall conversation (i.e., cohesion). The impairments also could affect the AD individual's ability to formulate meaningful responses to statements and questions

**Table 2.** Examples of Compensatory Strategies Targeting Cognitive Impairments

Conversational Behaviours	Possible Cognitive Impairments	Compensatory Strategies
<b>Turn-Taking</b>		
Increased response time	<i>Could be due to:</i>	<i>Consider:</i>
	Cognitive slowing, or	Waiting
	Deficit in semantic memory retrieval, or	Using cueing questions to facilitate turn
	Failure to recognize up-coming turn (divided attention deficit)	Using nonverbal cues or tag questions to signal turn
<b>Topic</b>		
Irrelevant or vague comments	<i>Could be due to:</i>	<i>Consider:</i>
	Deficit in constructing mental schema, or	Stating topic and topic links overtly
	Deficit in semantic memory, or	Using recognition rather than recall requests
	Deficit in working memory	Restating previous comments
<b>Repair</b>		
Failure to clarify referent in response to question	<i>Could be due to:</i>	<i>Consider:</i>
	Deficit in working memory, or	Giving more context with question
	Impaired semantic memory	Guessing at meaning

(e.g., requests for clarification and specification). This problem, combined with a preserved awareness that a turn is required, could result in semantically empty turns.

The expectation of conversational partners regarding turn-taking with an AD individual is that collaborative participation is indeed possible, even well into the advanced stages. Caregivers should be advised, however, of the possibility that their partner will produce fewer utterances and words per turn, that the content of their partner's turns may be vague and semantically empty, that they will be asked to make more frequent transitions between the roles of speaker and listener, and that response times for turn-taking will be longer for their AD partner. Strategies which focus on helping the AD individual to understand a partner's turn and/or to determine what semantic content to include in a response could be useful in extending turns. An explicit invitation for an AD individual to take a turn, using either nonverbal cues such as head nods, or verbal cues, such as tag questions or questions soliciting a response (What do you think of \_\_\_\_\_?), may compensate for any loss of ability to recognize an upcoming transition relevant place. Empirical study to determine the effectiveness of such strategies is needed.

### Topic

More systematic analyses have been undertaken on topic manipulation in AD than on any other feature of conversation. Most studies, however, have used topic-directed interviews to elicit spontaneous talk rather than using a conversational context. As discussed above, individuals with AD produce problematic topic introductions, digress from the topic, make irrelevant responses to questions, produce few topic continuation utterances, do not shift from one topic to another by incorporating part of the previous theme in the new but related topic (i.e., topic shading), and exhibit less coherent talk (Alberoni, Baddeley, Della Salla, Logie, & Spinnler, 1992; Garcia & Joannette, 1994; Hutchinson & Jensen, 1980; Mentis et al., 1995; Ripich & Terell, 1988). Changes in topic manipulation occur also as the disease progresses, as shown in a recent study documenting longitudinal changes in macrostructural aspects of conversational topic in a single AD spousal dyad (St. Pierre, Wilk, & Orange, 1995). Over a period of nine months, the percentage of talk that was context dependent (i.e., social talk surrounding the meal-time context), as well as the percentage of undetermined topics increased dramatically. It was clear that with disease progression, the percentage of talk that contained information from episodic, semantic, and autobiographical memories declined precipitously.

Studies also have focused on preserved features of topic in individuals with AD. A recent study by De Santi, Koenig, Obler, and Goldberger (1994) noted that linguistic activities such as repetition were used frequently to facilitate coherence, but that similar activities were used in different ways by participants with moderate stage AD. One participant used preceding linguistic elements from the partner's talk and added little new information while another participant repeated part of the preceding talk and made on-line comments to extend the topic. Also of relevance to preserved features of topic are Sabat and Harré's (1992) observations of the retention of self-identity of advanced stage AD individuals. The fact that individuals with AD are able to signal and retain a personal deictic perspective, despite severely impaired lexical and semantic abilities, suggests retained abilities that previously were thought lost or inaccessible.

Several investigators of topic in AD have interpreted results from a cognitive perspective, relying primarily on memory models to account for the disruptions in topic management. The most obvious explanations focus on impairments in the processes and capacity of working memory, and in the processes and contents of episodic, semantic, and autobiographical memories. Clearly though, disruptions in attention, especially sustained attention, and problems with planning, set shifting, and abstraction, also may contribute to problems with topic management.

Cognitive operations including frontal lobe executive control functions (such as planning and set shifting) enable a speaker to establish a mental thematic framework within which to develop a topic, much like the frameworks in narrative, expository, and argumentative discourse genres. Frontal lobe functions also support the ability to change lexical and deictic perspectives from one theme to another. Impairment in frontal lobe operations could in part account for the problems noted in both topic introduction and topic shifting. Moreover, impairments in access, retrieval, and storage within episodic, semantic, and autobiographical memory systems would limit the use of conceptual knowledge and spatial and temporally encoded context-dependent information, which would manifest as limitations in the type and range of possible topics (Mentis et al., 1995; St. Pierre et al., 1995). These limitations would contribute to disrupted semantic and lexical cohesion and to perceived problems in coherence.

Disruptions to working memory, especially the central executive system (CES), may account in part for the topic digressions (i.e., tangential utterances) and irrelevant responses to questions by individuals with AD. The inability to retain information in the CES or to process it in relation to knowledge from semantic and episodic memory systems also might contribute to the presence of unrelated comments.

Deficits in sustained and divided attention may contribute to digressions and irrelevance by interfering with the ability to monitor information on-line. In addition, progressive deteriorations in frontal lobe processes such as judgement and reasoning, may contribute to digressions from topic and the production of irrelevant comments. Deteriorations in self-monitoring, partly a function of working memory, attention, and judgement operations, also may lead to topic digressions.

It is clear that conversations with AD individuals can be difficult to carry on, particularly because of breakdowns in topic management and disturbed semantic and linguistic cohesion. Restrictions in range of topics available for discussion, unrelated comments, limited use of topic extension or expansion utterances, and lack of ability to initiate conversation also challenge partners. Adaptive strategies require that partners take the initiative to begin conversations and actively solicit comments from the individual with AD. Extended on-topic talk can be supported by using specific requests that focus on recognition of information in remote memory stores rather than exclusively on its recall (e.g., Tell me about the trip to Italy that you and your wife Nadia took in 1988.). The specific requests, presented along with familiar semantic material, may facilitate recognition and help with access and retrieval of on-topic and related information.

The ability of the individual with AD to develop a mental schema of the conversational topic can be enhanced by a partner stating explicitly that the following comments either are linked with those of the previous topic or are unrelated to it. Linking a new topic, if possible, with the most recently discussed information capitalizes on the recency effect (most recent information remembered best), which appears to be robust in the primary memory system. Comments which appear to be topic digressions may reflect the AD individual's lexical and semantic cohesion difficulties, so that partners must work actively to construct multiple interpretations of the AD individual's semantically empty or poorly cohesive utterances. As Golper and Rau (1983) noted, partners must perform the "mental gymnastics" relative to cohesion and coherence that individuals with AD are no longer able to understand or express well.

### Repair

Conversational misunderstandings and mishearing (i.e., trouble sources), signalling the occurrence of problems, and repairing behaviours were first examined in detail in normal adults (Sacks, Schegloff, & Jefferson, 1974; 1978). The sequence of linguistic, pragmatic, and cognitive events that constitute the three phases has been termed the trouble

source - repair sequence (TSR) (Orange et al., in press). TSR activity in AD dyads has been examined in detail over the past five years.

Recent studies showed that individuals with early and mid-stage AD and their spousal partners create trouble sources more frequently than do normal control spousal dyads (Orange et al., in press). The nature of these troubles is related frequently to discourse and cognitive disturbances among the AD dyads (Drainin, 1995), to semantic breakdowns in the AD individuals' utterances (Santo Pietro, DeCotiis, McCarthy, & Ostuni, 1990), and to contextual influences of speaker relationship with the AD individual (e.g., therapist versus spouse) (Goldfein, 1990; Hamilton, 1994a, 1994b; Ramanathan-Abbott, 1994).

Contrary to previous anecdotal comments that individuals with AD do not use requests for clarification or specification, recent studies have shown that individuals with AD actively and successfully participate in signalling and repairing misunderstandings and mishearings (Causino Lamar et al., 1994; Orange et al., in press; Orange & Mathew, 1994; Ripich et al., 1991). Distinctions in performance also appear to be related to disease onset and progression. For example, early stage individuals with AD use more requests that indicate clearly the nature of their misunderstandings whereas mid-stage individuals use indefinite terms such as *What*, *huh*, and *eh* (Hamilton, 1994a, 1994b; Goldfein, 1990; Orange et al., in press; Orange & Mathew, 1994).

Studies which analyzed repair behaviours revealed that early and mid-stage AD individuals use a variety of options including elaboration, substitution, and repetition of information (Goldfein, 1990; Hamilton, 1994a; 1994b; Orange et al., in press). Interestingly, analyses of cross-sectional data showed that addition of new information as a repair activity (i.e., elaboration), especially by family partners of both early and mid-stage AD individuals, results in the creation of new problems in the conversation (Orange et al., in press).

Cognitive-based interpretations of the results on conversational repair include considerations of the impairments in working, episodic, semantic, and autobiographical memory systems, and the multi-level processes of attention. The evidence that meaning elements in semantic and episodic memories are degraded or lost (especially specific subordinate concepts) may help explain the high proportion of discourse and memory-based related interactional problems produced by individuals with AD. Impairments in attention, particularly sustained attention, also may contribute to the AD individual's inability to track and map referents, propositions, and themes in a conver-

sation, and lead to the production of discourse errors. Context-dependent factors such as the relationship between the individual with AD and their partner (e.g., familiar versus unfamiliar) raises the issue of shared background knowledge and mutual experiences. A spouse, versus an unfamiliar partner, often shares several decades worth of common experiences and mutual knowledge with the AD individual. Thus, a spouse is more likely to use recognition requests to elicit information in conversation, rather than questions requiring recall or retrieval (Ramanathan-Abbott, 1994). The mutual knowledge between the spouse and AD individual may prevent the development of conversational breakdowns and facilitate repair by influencing access, recall, and retrieval from the autobiographical memory system (see Palm & Purves, this issue). Further analyses of these influences are warranted.

The decline in AD individuals' ability to signal the specific nature of their misunderstandings reflects breakdowns in the access, storage, and retrieval of meaning elements in semantic and episodic memories. Similarly, the use of repetitive and non-elaborative utterances by AD individuals to repair/correct misunderstandings shows their difficulties to access and use semantically meaningful terms.

As noted previously in the discussion on topic, partners must use mutually shared knowledge to construct multiple interpretations of what the AD individual said to minimize breakdowns in communication, especially when verbal output lacks specific information (i.e., semantically empty). Moreover, the fact that AD individuals circumlocute and use semantic paraphasias can be used to advantage by partners. For example, partners can develop a mental schema of the intended word(s) or the current theme in the conversation knowing that the spoken word(s) are related lexically to the intended word(s). Partners also must be aware that their use of nonspecific terms to signal misunderstanding provides little support to the individual with AD. Possible guesses at meaning (Do you mean \_\_\_\_?), specific requests for clarification (I am not sure I know what you mean by \_\_\_\_? Tell me what \_\_\_\_ means.), and specific requests for repetition (Say that again slowly.) facilitate access, recall, and retrieval processes of semantic and episodic memory units of information. Also, the strategies help focus the attention of the AD individual onto the proposition within that phase of the constructed conversation.

### Conclusions and Future Directions

In this article, we have attempted to demonstrate how aspects of conversational performance of AD individuals can be explained in terms of cognitive impairments and to illustrate how compensatory strategies should take into

consideration these cognitive deficits. In so doing, we have identified a number of areas in which further research is needed either to examine underlying linguistic, communicative, and/or cognitive processes or to demonstrate the efficacy of suggested compensations. In view of the heterogeneity of the diagnostic category of AD, there are limitations in the extent to which conclusions based on findings from one set of AD individuals can be used in the interpretations of findings from a different set. Hence, it is essential that future research consider communication problems in terms of the cognitive deficits seen in the same individual. Such research could be used to refine theoretical models which account for the role of cognitive operations in conversation, and on which clinicians could develop and evaluate strategies to compensate for breakdowns in conversational abilities resulting from cognitive, linguistic, and pragmatic deficits.

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