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## **Discourse Treatment for Word Retrieval Impairment in Aphasia: The Story So Far**

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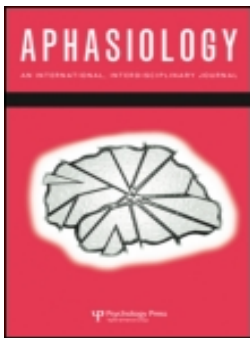
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## Discourse treatment for word retrieval impairment in aphasia: The story so far

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*Background:* Impairment-focused aphasia treatment has an ultimate goal of improving language production in connected speech and communication in daily life. Although impairment-based treatment has typically been carried out in words or sentences, investigations have begun to explore the efficacy of treatment during discourse production. Focusing treatment on an impaired linguistic process during discourse production is a complex and challenging endeavour.

*Aims:* This paper aims to review investigations of discourse treatment for word retrieval impairment in aphasia in order to identify and discuss variables that emerge as being important considerations in clinical practice and continued research.

*Main Contribution:* Seven investigations that applied treatments during structured discourse production to improve word retrieval in participants with aphasia were reviewed. Treatment methods used in the investigations included phonologic and orthographic cues, semantic feature analysis, contingency-based cueing hierarchies, and repeated conversational engagement. The discourse contexts used for treatment were structured conversations or structured narrative discourse. All investigations reported positive outcomes for improved word retrieval abilities. Although treated vocabulary items did not improve in all cases, improvements in general processes of word retrieval were reported. Focusing treatment on the linguistic process of word retrieval resulted in changes to discourse macrostructure, at least in terms of the informativeness of the discourse. When attitudes and perceptions of the participants with aphasia or of naïve judges were assessed, the outcomes were generally favourable. One investigation provided evidence that treatment in structured discourse was related to improved word retrieval in real-life conversations.

*Conclusions:* There are several promising discourse treatment approaches for word retrieval impairments in aphasia. Systematic analysis of changes in the macrolinguistic processes of discourse, in real-life conversations, and in the attitudes and perceptions of participants with aphasia and others in future discourse treatment studies would enhance our insights about their efficacy.

**Keywords:** Aphasia; Aphasia treatment; Discourse treatment; Word retrieval impairment.

There has been a great deal of activity in the past two decades in developing treatments at the discourse level for people with aphasia. These investigations reflect a variety of orientations to aphasia treatment. A review of the literature reveals two

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broad areas of concentration: treatments that focus on naturally occurring (real-life) conversations and those that focus on improving linguistic performance by treating within a structured discourse context. The treatments focused on real-life conversations are typically described as social approaches or as consequence-based treatments because they attempt to address the consequences of aphasia in an individual's life (Holland, 2008; Simmons-Mackie, Elman, Holland, & Damico, 2007; Thompson, & Worrall, 2008). Such treatments attempt to provide people with aphasia with communicative experiences that resemble natural communication in everyday social life in order to enhance communicative confidence (Simmons-Mackie et al., 2007).

The social approach to aphasia treatment is usually contrasted with impairment-based treatments, which focus on direct treatment of the language impairment (Thompson, & Worrall, 2008). Investigations of impairment-based treatments typically focus treatment and outcome measures at the word or sentence level, although recently many studies have assessed whether these treatments of more basic linguistic units result in changed discourse production (Boyle, 2004a; Boyle & Coelho, 1995; Cameron, Wambaugh, Wright, & Nessler, 2006; Coelho, McHugh, & Boyle, 2000; Edmonds, Nadeau, & Kiran, 2008; Faroqi-Shah & Virion, 2009; Rider, Wright, Marshall, & Page, 2008; Schwartz, Saffran, Fink, Myers, & Martin, 1994). In part because the changes in discourse have been inconsistent, investigators have developed treatments that require people with aphasia to work on specific linguistic skills (e.g., word retrieval or syntactic formulation) while they are producing discourses. The aim of these discourse treatments is to improve linguistic skills in communicative activities that are similar to, but more structured than, those used in everyday communication (Simmons-Mackie et al., 2007) in hopes of effecting change at a level that is likely to have a consequence in the person's everyday life.

Focusing treatment on a specific language process during discourse production is a complex and challenging endeavour. In addition to considering how to improve the targeted language process, investigators must consider the kind of discourse to use as a context for treating the language process, how to elicit a robust number of exemplars of the target process in the discourses, and how to measure the outcome of treatment. The aim of this paper is to explore some of these challenges and to review how they have been approached in investigations of discourse treatment for word retrieval impairment. The review is limited to data-based papers in English and to investigations that are focused on treatment that occurs at least in part during discourse production, with discourse-level outcomes reported. The review is also restricted to aphasia that is caused by stroke or traumatic brain injury; treatments for progressive aphasia are not included.

## IMPAIRMENT-BASED DISCOURSE TREATMENT

### Microlinguistic and macrolinguistic discourse impairments in aphasia

The microlinguistic structure of discourse (e.g., lexical and grammatical forms) is generally described as being more impaired by aphasia than its macrolinguistic structure (the conceptual, narrative, and pragmatic organisation of discourse) (Bloom, 1994; Davis, 2007; Glosser, 1993). Disruptions of the microlinguistic structure that have been reported to occur in the discourse of people with aphasia include lexical errors, syntactic errors, and reduced syntactic complexity (Glosser, 1993; Rochon, Saffran, Berndt, & Schwartz, 2000; Saffran, Berndt, & Schwartz, 1989).

Despite the fact that people with aphasia “can tell a good story” (Davis, 2007, p. 138), there is some evidence that the macrolinguistic structure of their discourse is affected by their microlinguistic impairments. The literature indicates that, compared to neurologically intact adults, people with aphasia omitted essential propositions, produced fewer propositions, and repeated propositions in discourses (Christiansen, 1995; Nicholas & Brookshire, 1995). Christiansen (1995) attempted to relate these macrolinguistic difficulties to the microlinguistic impairments. For example, she proposed that participants with anomic aphasia omitted entire propositions because of their word retrieval problems, and that this resulted in incomplete narratives. She suggested that participants with conduction aphasia produced multiple repetitions of entire propositions in their attempts to self-correct their paraphasic or paragrammatic errors. Other investigators have reported that people with aphasia produced incomplete cohesive ties and a limited range of connective forms compared to neurologically intact adults (see Bloom, 1994, for a review). Bloom suggested that these aphasic impairments contributed to the production of vague and ambiguous discourses. Impairment-based discourse treatment focuses on improving the microlinguistic impairments in order to improve the macrolinguistic processes underlying discourse construction and thus enhance communicative effectiveness.

### Structured discourse versus real-life discourse

Adults typically use conversational discourse to communicate in their everyday lives, but the complexity of such real-life discourse can be a difficult context for impairment-based treatment. Within the conversational exchange of questions and comments, participants may tell their partners about events (narrative discourse), provide directions or instructions (procedural discourse), describe something in detail (descriptive discourse), or explain something in depth (expository discourse). In everyday conversations participants interrupt and overlap each other (i.e., there are no rigid turns) and they share control of topics (Simmons-Mackie et al., 2007). In real-life discourse speakers are free to switch between discourse types and to vary the specific words and syntactic structures that they use. This freedom poses a challenge when treatment is focused on specific linguistic impairments in discourse, because unless some structure is imposed on the discourse, the person with aphasia may not have many (or any) opportunities to produce the process that is targeted for improvement. For example, a real-life discourse might not contain any examples of a specific syntactic structure. Likewise, depending on the topic, the variety of nouns and verbs that are produced may be very limited, reducing the number of different words that need to be retrieved. In such cases the person with aphasia would not have many opportunities to practise the targeted language process. With little opportunity to practise, the likelihood that the process will improve is limited.

In order to evoke targeted processes frequently during treatment sessions, investigators employ structured discourse instead of real-life discourse. The “structure” of structured discourse typically includes limiting the discourse to one type, controlling the topic(s), allocating turns, and eliciting responses. In this way structured discourse is more similar to traditional impairment-based aphasia therapy than it is to real-life discourse. Another difference between structured discourse and real-life discourse is in the provision of feedback, correction, and evaluation by the clinician. This contrasts with real-life discourse, in which participants add comments or seek new information

from partners rather than evaluating and correcting a partner's comment or response (Simmons-Mackie et al., 2007).

### Evaluating outcomes of impairment-based discourse treatments

In order to assess the effects of impairment-based discourse treatment, the clinician must decide whether to evaluate changes at the microlinguistic level, the macrolinguistic level, or both. Microlinguistic analysis methods aim to measure change of the targeted linguistic process in discourse. Macrolinguistic measures are used to examine whether the organisation, structure, or pattern of discourse changes. Aside from speculations like those of Christiansen (1995) and Bloom (1994) cited earlier, there are few data available to assist clinicians and researchers in determining how specific changes at the microlinguistic level of discourse might affect its macrolinguistic structure. Therefore it is difficult to make an informed choice about which macrolinguistic measure might best capture a specific microlinguistic change.

The choice of microlinguistic analysis methods depends on the linguistic impairment that is the target of treatment. These methods might focus on lexical diversity (Rider et al., 2008), production of specific word types like nouns and verbs (Mayer & Murray, 2003), instances of word-finding difficulties (Boyle, 2004a; German, 1991), or analysis of morphological and syntactic production (Rochon et al., 2000; Saffran et al., 1989). The choice of macrolinguistic analysis methods is influenced by the type of discourse elicited. For narrative discourses, these methods might include assessing cohesion and coherence (Bloom, 1994; Glosser, 1993), quantifying the amount of information and the efficiency with which it is produced (Nicholas & Brookshire, 1993), assessing whether main concepts or essential propositions are conveyed (Christiansen, 1995; Joanne & Goulet, 1990; Nicholas & Brookshire, 1995), or analysing the global structure or story grammar (Ulatowska, Freedman-Stern, Doyel, Macaluso-Haynes, & North, 1983). For conversational discourse, macrolinguistic methods might include elements of conversation analysis (Oelschlagel & Damico, 1998) or ethnographic methodology (Albright & Purves, 2008).

Because impairment-based discourse treatment studies apply treatment within the context of structured discourse production, it is not surprising that outcomes are also assessed in structured discourse. However, improvement in structured discourse may not necessarily result in changes in real-life discourse given the differences between these two communication activities. Investigations vary in terms of what outcomes are assessed and in terms of the methods chosen to assess them. This variability across investigations is probably related, at least in part, to the exploratory nature of impairment-based discourse treatment studies. These treatments are still in the discovery stage of clinical outcome research; that is, the treatment approaches are being developed, refined, and assessed to determine whether they show promise of being efficacious (Cherney, Patterson, Raymer, Frymark, & Schooling, 2008; Robey, 2004). During this period of exploration, some investigators have concentrated solely on assessing whether the targeted linguistic process improves without assessing any other outcomes. Other investigators have also assessed whether there are changes beyond the linguistic process; for example, they tried to determine whether there were associated changes at the macrolinguistic level, in real-life discourse, in other aspects of life participation, or in the attitudes of the participants toward their communicative abilities. This variation is understandable at this early stage of research. It does, however, make it difficult to predict whether a particular treatment approach is likely to have consequences beyond the discourse task used in the treatment study.

## Discourse treatments for word retrieval

Table 1 lists studies that have targeted word retrieval in discourse treatment. Seven investigations, all single-participant designs or case reports, involved 16 participants with a variety of aphasia types. The most commonly used discourse contexts for treatment were structured conversation and narrative discourse. All investigations assessed outcomes in structured discourse. Other outcome measures varied across the investigations.

*Phonologic and orthographic cueing.* Two investigations used phonologic and orthographic cues in treatment (Greenwood, Grassly, Hickin, & Best, 2010; Herbert, Best, Hickin, Howard, & Osborne, 2003). In both instances the investigators added structured conversational tasks to the study design after discovering that word retrieval improvements made in single-word confrontation naming tasks did not generalise to word retrieval in structured discourse. During the discourse phase of treatment in these studies, phonologic and orthographic cues were provided to assist in word retrieval as necessary while the participants engaged in two structured conversational tasks. The first was a barrier task, which is essentially a structured conversational exchange that constrains the topics and the forms of the interchanges (i.e., the participant attempts to communicate the name of a hidden stimulus to the investigator). The second task was a structured conversational exchange about a topic related to the vocabulary items that were targeted in treatment.

Although the two investigations used similar treatment strategies, the microlinguistic outcomes that they assessed were different. Herbert and colleagues (2003) assessed microlinguistic changes in structured conversation and reported that none of the six participants improved their production of treated nouns. The investigators noted that although production of the treated nouns did not improve, the participants' responses in structured conversation were more communicatively appropriate after treatment because they were "able to access vocabulary that explained their needs or thoughts more effectively" (pp. 1176–1177). It appears, then, that even though the target vocabulary items did not improve, some general process of word retrieval ability did improve.

Greenwood and colleagues (2010) assessed microlinguistic changes in a structured narrative discourse (the Cinderella story) rather than in a structured conversational task similar to the one used in treatment. They reported that the participant did not significantly improve on a measure of word retrieval in structured narrative discourse. These investigators also assessed whether the participant's word retrieval changed during real-life conversations with his usual conversational partner. To do this they asked the participant and his partner to record 10 minutes of natural conversation (without topic restrictions) in their home. They analysed the middle 5 minutes of the sample using procedures reported in Herbert, Hickin, Howard, Osborne, and Best (2008), which assess content word production and content word errors. The participant's production of content words in the real-life conversations improved after treatment and this improvement was maintained after treatment was withdrawn. The occurrence of content word errors in the real-life conversations decreased after treatment, but returned to pre-discourse-treatment levels at follow-up.<sup>1</sup>

<sup>1</sup>Herbert and colleagues (2003) reported that they also assessed microlinguistic changes in the Cinderella narrative and in real-life conversations, but they did not report the results in their paper.

TABLE 1  
Summary of investigations targeting spoken word retrieval with discourse treatment

Investigation	Number of participants	Aphasia type	Treatment	Outcomes: Word/sentence level	Outcomes: Structured discourse	Outcomes: Real-life discourse	Outcomes: Life participation, personal identity/attitude/feelings
<b>PHONOLOGIC/ORTHOGRAPHIC CUEING</b>							
Herbert, Best, Hickin, Howard, & Osborne (2003)	6	3: Broca's 2: Anomic 1: Wernicke's	Phase 1: Noun picture naming, half of targets treated with phonologic cues and distractors and half with orthographic cues and distractors provided in a contingency-based hierarchy, beginning with minimal information and adding phonemes or letters until the item was named or the whole word had been presented for repetition; 50 items never treated  Phase 2: Tasks designed to systematically move from picture naming toward conversational speech with same stimuli as Phase 1: naming to definition, PACE activity ( <i>structured conversation</i> ), producing spoken lists of treated items in goal-directed categories, using treated words in <i>structured conversation</i>	Phase 1: 1 participant improved naming of treated and untreated items, 4 improved naming of treated but not untreated items, 1 did not improve  Phase 2: 5 improved naming of treated but not untreated items, 1 did not improve  Maintenance: All participants maintained improvement 8 weeks after treatment withdrawn	Structured conversation: Phase 1: Not assessed Phase 2: No improvement on target nouns, all participants improved communicative appropriateness of responses (change for 1 participant was statistically significant)  Maintenance: Not reported  Narrative discourse: Cinderella re-tell: Results not reported in paper	Conversation with friend or relative: Results not reported in paper	Communication views questionnaire: Authors questioned reliability of instrument; provided responses for only one participant

(Continued)



TABLE 1  
(Continued)

<i>Investigation</i>	<i>Number of participants</i>	<i>Aphasia type</i>	<i>Treatment</i>	<i>Outcomes: Word/sentence level</i>	<i>Outcomes: Structured discourse</i>	<i>Outcomes: Real-life discourse</i>	<i>Outcomes: Life participation, personal identity/attitude/feelings</i>
Greenwood, Grassly, Hickin, & Best (2010)	1	Anomia	<p><i>Phase 1:</i> 60 nouns for picture naming using combined phonologic and orthographic cues with up to 3 distractors; 60 items using combined phonologic and orthographic cues without distractors; both conditions provided in a contingency-based hierarchy as above; 50 items presented every session for naming but no cueing; 50 items presented only in probe sessions</p> <p><i>Phase 2:</i> Same as Phase 2 in Herbert et al. (2003) above, with an additional set of 75 multisyllabic nouns added to stimuli</p>	<p><i>Phase 1:</i> Improved naming of treated and untreated items</p> <p><i>Phase 2:</i> No additional improvement of any items from Phase 1, but multisyllabic words introduced in this phase improved</p> <p><i>Maintenance:</i> Improvements maintained 8 weeks after treatment withdrawn</p>	<p><i>Narrative discourse:</i> Cinderella re-tell: No change</p>	<p><i>Conversation with usual conversational partner:</i> Increase in content words and decrease in content word errors</p> <p><i>Maintenance:</i> Increase in content words maintained 8 weeks after treatment withdrawn</p>	<p><i>Communication Disability Profile<sup>a</sup>:</i> Improved scores in activities, participation, and emotional consequences</p>

## SEMANTIC FEATURE ANALYSIS

Boyle (2004)

3

Conduction  
Broca's  
Broca's

*C-SFA*: Naming of 10 pictured nouns while clinician systematically guided participants to produce semantic features associated with target, as they were produced; 10 pictured nouns reserved for probes

*D-SFA*: Participants produced *narrative discourses* about progressively longer picture sequences (26 wordless comic strips and 7 wordless picture books); same feature generation production and cueing as above, but only when participants could not produce a noun while telling the stories

All participants improved naming of treated and untreated nouns

*Maintenance*: Improvements maintained 1 month after treatment withdrawn

*Narrative discourse*: All participants increased the number of correct information units

2 participants increased the percentage of correct information units

1 participant reduced the percentage of nouns evidencing retrieval difficulty

*Maintenance*: Improvements maintained 1 month after treatment withdrawn

Not assessed

Naïve raters considered one participant to demonstrate better word retrieval, convey more information, and communicate more efficiently after than before treatment

(Continued)

TABLE 1  
(Continued)

<i>Investigation</i>	<i>Number of participants</i>	<i>Aphasia type</i>	<i>Treatment</i>	<i>Outcomes: Word/sentence level</i>	<i>Outcomes: Structured discourse</i>	<i>Outcomes: Narrative discourse:</i>	<i>Outcomes: Real-life discourse</i>	<i>Outcomes: Life participation, personal identity/attitude/feelings</i>
Antonucci (2009)	2	Conduction Anomic	Group treatment. 2 sessions: C-SFA treatment as outlined above in Boyle (2004) <i>Structured conversation:</i> 12 sessions: modified PACE procedure – participants took turns describing increasingly complex picture stimuli that other could not see, using SFA cueing when participants could not produce a word	No improvement in confrontation noun naming	<i>Narrative discourse:</i> Both participants increased the percentage of nouns retrieved Both participants increased the number of correct information units in discourse 1 participant increased correct information units produced per minute <i>Maintenance:</i> Both participants maintained improvements 6 weeks after treatment withdrawn	Not assessed	Not assessed	Unsolicted anecdotal self-reports of improved word retrieval in daily communication

Peach & Reuter (2010)	2	Anomic	Participants described pictured scenes depicting two or more events ( <i>narrative discourse</i> ) and answered procedural questions ( <i>procedural discourse</i> ). Following clinician production, selected failed lexical items from discourses and used C-SFA treatment as outlined above in Boyle (2004), but targeting both nouns and verbs	Both participants improved confrontation naming of untreated nouns and verbs <i>Maintenance:</i> Improvements maintained 4.5 months after treatment withdrawn	<i>Narrative discourse:</i> Both participants improved verbal productivity (number of words per T-unit) and informativeness (percentage of correct information units) Neither participant reduced word-finding behaviors	Not assessed	Not assessed
				<i>Maintenance:</i> Participant 1 maintained improved productivity 4.5 months after treatment withdrawn; Participant 2 not available for follow-up			

(Continued)

TABLE 1  
(Continued)

<i>Investigation</i>	<i>Number of participants</i>	<i>Aphasia type</i>	<i>Treatment</i>	<i>Outcomes: Word/sentence level</i>	<i>Outcomes: Structured discourse</i>	<i>Outcomes: Real-life discourse</i>	<i>Outcomes: Life participation, personal identity/attitude/feelings</i>
<b>OTHER BARRIER TASK TREATMENT PARADIGMS</b>							
Goral & Kempler (2009)	1	Nonfluent aphasia	Sentence repetition Sentence reading <i>Structured conversation:</i> Modified constraint-induced aphasia treatment: participant constrained to use verbal communication containing a verb during informative verbal exchanges: card games, script generation, picture description, story co-construction, video recounts); requirements for participant's responses progressed from words/phrases to sentences to narratives; clinician used contingency-based cueing hierarchy if no verb was produced	Not assessed	<i>Narrative discourse:</i> Increased number of words produced per narrative, percentage of verbs produced per narrative, and verb-noun ratio, but not percentage of nouns produced <i>Maintenance:</i> Improvements maintained 10 weeks after treatment withdrawn	Not assessed	Naive raters judged post-treatment narratives more favourably

Hengst, Duff, & Prior (2008); Hengst, Duff, & Dettmar (2010)	1	Anomic with severe memory impairment	<i>Semi-structured conversation:</i> Barrier task protocol: Clinician and participant worked together to place twelve target cards in identical arrangements on their playing boards through collaborative verbal referencing, which involves conversational repetition of card labels within and across sessions, while unable to view each other's boards. Focus was on repeated engagement rather than repeated behaviour	Not assessed	<i>Semi-structured conversation:</i> Improved labelling of all treated items	Not assessed	Not assessed
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<sup>a</sup>Swinburn and Byng (2006).

The microlinguistic outcomes reported by these two investigations suggest that improvements made in one kind of discourse task (e.g., structured conversation), won't necessarily result in improvements in a different kind of discourse task (e.g., structured narrative discourse). They also suggest that production of specific vocabulary items targeted in treatment may not improve in probe tasks. However, there may be a general improvement in the word retrieval process of participants in discourse tasks that are similar to those used in treatment.

Neither Herbert et al. (2003) nor Greenwood et al. (2010) assessed macrolinguistic discourse changes, but both assessed changes in the participants' views about their ability to communicate. Herbert and colleagues expressed dissatisfaction with the reliability of the attitude questionnaire that they used and, although they reported results for one of the participants, the investigators stated that they did not feel that it was a useful outcome measure. Greenwood and colleagues used a published measure of activities, participation, and attitude (Swinburn & Byng, 2006) and reported that the participant's ratings of his activity, participation, and emotions improved after treatment.

*Semantic feature analysis.* Three investigations (Antonucci, 2009; Boyle, 2004b; Peach & Reuter, 2010) employed variations of semantic feature analysis (SFA) (Boyle, 2010) as a treatment in discourse. The investigations by Boyle (2004b) and by Peach and Reuter used sequential and complex pictures, respectively, to elicit structured narrative discourses. Whereas Boyle applied SFA immediately during the narrative production when a participant failed to retrieve a noun, Peach and Reuter applied SFA to problematic nouns after the participants finished producing the discourse. Antonucci used SFA procedures in group rather than in individual treatment. During the group sessions, participants performed PACE barrier-task activities using increasingly complex picture stimuli and narrative retells of fairytales and movie plots. Thus, the participants produced structured narrative discourses within the structured conversational discourse of the barrier task.

All three of these investigations assessed microlinguistic- and macrolinguistic-level outcomes using the stimuli developed by Nicholas and Brookshire (2003) to elicit structured narrative and procedural discourses. At the microlinguistic level, the investigators assessed changes in word retrieval in different ways. Antonucci (2009) examined the percentage of nouns produced, which increased for both participants after treatment. Neither of the other two investigations assessed this variable. Peach and Reuter (2010) assessed verbal productivity in terms of the number of words produced per T-unit. They reported that both participants improved on this measure after treatment. Neither of the other two investigations assessed this variable. Both Boyle (2004b) and Peach and Reuter (2010) assessed whether behaviours associated with word-finding trouble decreased. There was a positive outcome for only one of five participants (Boyle, 2004b). Although the microlinguistic measures varied across the investigations, it is worth noting that all of them employed general measures of word retrieval rather than examining for improvement of the specific vocabulary items that were targeted in treatment. As was the case with the phonologic and orthographic cueing studies of discourse treatment, the outcomes for these general measures of word retrieval were positive.

To assess change at the macrolinguistic level, all three investigations (Antonucci, 2008; Boyle, 2004b; Peach & Reuter, 2010) used measures of information content developed by Nicholas and Brookshire (2003). All participants in all of the studies

increased production of informational content in some way, although the exact measures that improved varied among participants. Two of three participants in Boyle's study, one of two participants in Antonucci's study, and both participants in Peach and Reuter's study increased the percentage of correct information units (CIUs) in their discourses. Antonucci and Boyle reported that all participants increased the number of correct information units produced during discourse; Peach and Reuter did not assess this measure. One of two participants in Antonucci's study produced more CIUs per minute after treatment; neither of the other investigations assessed this variable. In summary, at the macrolinguistic level, all of the investigations reported improvements in informativeness of structured narrative discourses following treatment. The fact that not all participants demonstrated changes on the same informativeness measures may be related to participant factors such as type and severity of aphasia or pattern of word retrieval breakdown, or it may be related to the fact that not all of the investigations reported all of the informativeness measures.

None of the investigations assessed changes in real-life discourse, although Antonucci (2010) reported unsolicited anecdotes indicating that one participant improved word retrieval in daily communication. Boyle reported that naïve judges rated one of three participants as more successful in finding and saying the correct words after treatment. This was the same participant whose word-finding behaviours decreased after treatment, a fact that will be discussed in more detail later.

Thus it appears that SFA narrative discourse treatment for word retrieval impairment was associated with improvements in informativeness of the discourses at the macrostructural level. The exact components of informational content that improved varied among the participants. This highlights the importance of systematically examining this relationship in future investigations so that we can better understand how the nature and/or severity of the microlinguistic impairments influence the macrostructure of the discourses that are produced.

*Other barrier task treatment paradigms.* Two investigations employed the structured conversational exchanges of barrier tasks to treat word retrieval, but they used markedly different treatment approaches within these tasks. Goral and Kempler (2009) modified constraint-induced aphasia treatment procedures to target verb retrieval. Their treatment tasks progressed from the typical request–response card games of the constraint-induced treatment protocol to narrative discourse tasks like story co-construction. When the participant had difficulty producing a verb, the researcher provided a contingency-based cueing hierarchy. After treatment, the participant improved on microlinguistic measures (total number of words, percentage of verbs, and verb–noun ratios) in structured narratives. This provides another instance, like those reported in the phonologic–orthographic cueing studies and in the SFA studies, in which measures of general word retrieval ability showed positive changes after discourse treatment. Macrolinguistic discourse outcomes were not assessed. Naïve judges rated post-treatment narratives more favourably than pre-treatment narratives on a social-communicative effectiveness questionnaire, suggesting that the discourse-level verb treatment was associated with language changes that positively affected the perception of the participant's communication.

In another barrier-task discourse treatment for word retrieval, Hengst and colleagues (Hengst, Duff, & Dettmar, 2010; Hengst, Duff, & Prior, 2008) required the participant and the clinician to collaborate in constructing verbal labels for people and places in a semi-structured conversation task that focused on repeated engagement.



In this paradigm, although the topic of conversation was constrained, production of the labels was permitted to vary freely as it does in real-life conversational repetition, thus allowing natural convergence to agreed-upon labels across the treatment sessions rather than requiring repetition of the same label in each session. The participant, who had a severe memory impairment in addition to anomia, improved his ability to use the co-constructed labels for all treated items at the end of treatment. The investigators did not assess macrolinguistic discourse changes or report effects of improved labelling in the participant's everyday life. This was an exploratory study designed to assess whether this non-traditional approach to treating word retrieval impairment was a viable option. The positive outcome suggests that it is. However, its potential efficacy as a treatment method would be even more evident if information about outcomes in discourse situations other than the treatment task had been reported. This kind of information might attract clinicians and other investigators to explore the repeated engagement approach in their own work.

## DISCUSSION AND CONCLUSIONS

Seven investigations applied treatments during structured discourse production to improve word retrieval in participants with aphasia. Treatment methods included phonologic and orthographic cues, semantic feature analysis, contingency-based cueing hierarchies, and repeated conversational engagement. Although conclusions about treatment efficacy are premature at this point in the research process, some preliminary observations might be useful for clinicians and researchers to consider as treatment research in this area moves forward.

### Discourse treatment for word retrieval impairment can improve word retrieval in discourse

All investigations that assessed microlinguistic changes relating to improved word retrieval abilities reported positive outcomes (Antonucci, 2009; Goral & Kempler, 2009; Greenwood et al., 2010; Hengst et al., 2008, 2010; Herbert et al., 2003; Peach & Reuter, 2010). Interestingly, the vocabulary items targeted in treatment were not necessarily the items that improved on these outcome measures. Hengst and colleagues reported that the participant in their investigation improved his ability to produce the labels that were the focus of treatment, but they only assessed this outcome in the treatment task, not in other discourse situations. Herbert and colleagues, in contrast, reported that participants' ability to produce the treated nouns did not improve in other structured conversational discourse tasks after treatment. These investigators noted, however, that participants' responses were more communicatively appropriate after treatment, and they attributed this to improved ability to access other vocabulary items. The remaining investigators who assessed microlinguistic outcomes used measures that were reflective of a generalised improvement in word retrieval abilities rather than improved retrieval of specific vocabulary items. These measures included the total number of words, the number of content words, the percentage of nouns or verbs, the number of words per T-unit, and the verb-to-noun ratio. The outcomes reported by these investigators suggest that the discourse treatments were improving the *process* of word retrieval rather than improving the ability to name specific items. Certainly this is a desired outcome for the participants with aphasia, since improvement of the

process rather than of specific vocabulary items should be the primary goal of treatment to improve word retrieval. For clinicians and researchers, these results suggest that stimuli to assess outcomes need not be constrained to include treated vocabulary items as long as measures that capture changes in the general process of word retrieval are used.

### **Discourse treatment for word retrieval impairment does not necessarily result in long-lasting reduction in overt manifestations of word retrieval difficulty**

Although one might suppose that overt evidence of word retrieval difficulties would decrease as word retrieval abilities improved, this was not always the case. Three investigations assessed behaviours that signalled word retrieval difficulties such as paraphasias, delays, and empty words. Greenwood and colleagues (2010) reported that the proportion of content words signalling word retrieval difficulty decreased following discourse treatment but returned to pre-discourse-treatment levels at the follow-up probe. Boyle (2004b) assessed the percentage of T-units that contained evidence of word retrieval difficulty and reported that they decreased for one of three participants after discourse treatment. Peach and Reuter (2010) assessed the number of word-finding behaviours per T-unit and reported that they did not decrease for either participant as a result of treatment. In fact, Peach and Reuter reported that for one participant, as more words were retrieved throughout the treatment period, more behaviours that signalled word-finding trouble were produced as well. Because two of the investigations achieved limited success in reducing overt manifestations of lexical retrieval difficulties, it appears that these behaviours are amenable to change. There is some evidence that reduction of these behaviours might influence the perception of word retrieval ability, at least in naïve judges: the only participant in Boyle's investigation rated as better at finding and saying the right words after treatment was the sole participant whose overt manifestations of word retrieval difficulty decreased. Thus it might be useful to target the reduction of behaviours that signal word retrieval problems if these contribute to negative perceptions about a speaker's abilities. Assessment of this outcome in future investigations could provide valuable information and insights in this regard.

### **Focusing discourse treatment on microlinguistic impairments can change the macrolinguistic processes of discourse**

Three investigations (Antonucci, 2009; Boyle, 2004b; Peach & Reuter, 2010) reported that aspects of informativeness improved as a result of discourse treatment for word retrieval impairment. Five of seven participants in the semantic feature analysis treatment studies increased the percentage of correct, informative words in their discourses. None of the seven investigations reviewed in this paper, however, assessed other macrolinguistic discourse changes. Apart from speculation by a few investigators (Bloom, 1994; Christiansen, 1995), there are few data to help us understand whether or how reducing the severity of a specific linguistic impairment like word retrieval impairment will improve the conceptual, narrative, or pragmatic organisation of discourse. Systematic collection and analysis of such data would provide valuable information about whether impairment-based treatment affects more global aspects of communicative effectiveness.

## Discourse treatment for word retrieval impairments can change the attitudes and perceptions of the participants with aphasia and of others

One investigation used a published tool to solicit the participant's views about how the treatment had affected his life and attitude (Greenwood et al., 2010), two obtained social-validation ratings from naïve judges (Boyle, 2004b; Goral & Kempler, 2009), and one reported unsolicited anecdotal observations from the participants (Antonucci, 2009). Most of these outcomes reported positive changes in attitudes and perceptions, the exception being the lack of perceived change in word-finding behaviours for two of the three participants in Boyle's investigation. Kagan and colleagues (2008) reported that policy makers and funding sources recommend the use of patient-reported outcomes when assessing the effects of treatment. Cupit, Rochon, Leonard, and Laird (2010) suggest that social validation measures may serve as proxy measurements for participants' success in interacting with community members. Both forms of outcome measures have the potential to provide information about the impact of treatment on the everyday life of participants with aphasia. Positive results on such measures reinforce the value of a treatment. Negative results on such measure may indicate ways in which the treatment can be modified to improve its effect on everyday functioning.

## There is some evidence that discourse treatment for word retrieval impairment can improve word retrieval in real-life conversations

Only one of seven investigations formally assessed change in real-life conversations (Greenwood et al., 2010). One other investigation (Antonucci, 2009) reported unsolicited anecdotes from participants or family members that the improvements seen in treatment were affecting the participants' everyday communication. If real-life change is our ultimate treatment goal we must become more diligent about assessing it systematically. It is understandable that few investigators are able to spend time observing participants in their daily lives. However, there are other means of accomplishing this kind of assessment, as demonstrated by Greenwood and colleagues (2010). They asked the participant to record conversations with a regular communication partner in his home. This method was not without its pitfalls: the investigators reported that they had to exclude one of the real-life conversations from analysis because when they listened to it they discovered that it was actually more of a monologue than a conversation. Nevertheless, they succeeded in gathering enough real-life conversations to demonstrate a positive change in them. Routinely adding such a procedure to discourse treatment investigations and clinical practice might be an efficient way to extend outcome assessments to participants' daily lives. This would add significantly to our knowledge about the actual life consequences of our treatments. In whatever way it is accomplished, functional performance in actual life situations needs to be assessed in order to understand whether and how our treatments are actually affecting the daily lives of our clients and research participants. This would be the strongest possible evidence that treatment makes a difference.

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