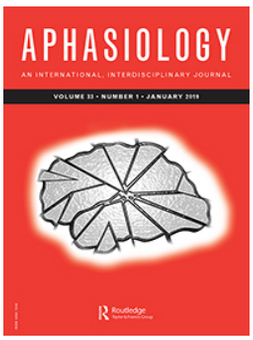

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Implementation of discourse analysis in aphasia: investigating the feasibility of a Knowledge-to-Action intervention

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ABSTRACT

Background: Linguistic discourse analysis is frequently used in aphasia research but is met with frequent calls for greater clinical application by speech pathologists and discussion of barriers and facilitators to clinical use. When examined in the clinical context, applications of linguistic discourse analysis were reportedly limited by knowledge and time-based barriers. Implementation science was used to guide the development of an intervention to overcome these barriers and bridge a Knowledge-to-Action gap.

Aims: This study aimed to examine whether speech pathologists were able to translate knowledge and skills acquired during an implementation intervention to the assessment of a person with aphasia. The content of the intervention and the feasibility of the implementation strategy were also investigated. Transcription-based and transcription-less approaches to linguistic discourse analysis were compared.

Methods & Procedures: Twenty-nine students in their final year of Australian speech pathology university degrees participated in a preliminary Knowledge-to-Action Intervention. Four intervention conditions targeted different evidence-based modes of discourse analysis: one transcription-less approach (judgement-based analysis) and three transcription-based approaches (manual, computer-assisted, and automated analysis). Participants completed evaluations at pre- and post-intervention and a six-month follow-up examining the knowledge acquisition, application, and implementation to practice. Outcomes were subject to content and statistical analysis to examine changes across time-points.

Outcomes & Results: Following the intervention, participants set significantly more goals within contexts of discourse production and described significantly more discourse-based therapy approaches. Knowledge and skills acquired during the intervention were adapted by participants, with moderate maintenance observed at follow-up. Participants reported a lack of opportunity to implement their newly acquired skills to clinical practice.

Conclusions & Implications: Specific training in the use of discourse analysis led to significant changes in assessment outcomes across all discourse analysis conditions. However, training alone did not remove the challenges involved in implementation.

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Participant feedback will help guide a more comprehensive intervention strategy with refined content to better facilitate the implementation of linguistic discourse analysis research in speech pathology practice.

Introduction

The assessment of linguistic structures in discourse, referred to as *linguistic discourse analysis* in this paper, typically examines the transactional elements of the communicative contributions of a single speaker (Sinclair & Coulthard, 2013). In the field of speech pathology, linguistic discourse analysis adds to psycholinguistic assessment procedures by allowing clinicians to examine language function in purposeful communication and the generalisation of intervention effects to the context of language in use (Ferguson & Spencer, 2015). When accessing speech pathology services, people with aphasia and their family members identified their primary goal as the use of language to engage in activities of daily living and social participation, to improve quality of life outcomes (Wallace et al., 2016; Worrall et al., 2011). Clinical recommendations have suggested that discourse analysis and intervention could contribute positively to the lives of people with aphasia by directly targeting these personal goals (Clinical Centre for Research Excellence (CCRE) in Aphasia Rehabilitation, 2014; Winstein et al., 2016).

Practice guidelines recommending the use of linguistic discourse analysis in aphasia are based on a wealth of available research evidence. However, it has been suggested that barriers such as the time (Armstrong, Brady, Mackenzie, & Norrie, 2007) and knowledge (Marini, Andreetta, del Tin, & Carlomagno, 2011) required to complete discourse analysis may limit applications within clinical practice. The presence of these barriers illustrated that the mere development of research is not sufficient to influence practice within clinical settings (Olswang & Prelock, 2015). Consequently, a *Knowledge-to-Action* gap is created between research and practice (Graham et al., 2006). This paper presents outcomes of a preliminary intervention trial to investigate methods of bridging the gap and facilitating ongoing evidence-based practice for the clinical assessment of discourse in aphasia through implementation research.

Implementation research is a growing field within the study of communication disorders (Douglas, Campbell, & Hinckley, 2015). Such studies have investigated the barriers affecting research translation (Miao, Power, & O'Halloran, 2015) and strategies and interventions to promote the adoption of innovations into clinical environments (Molfenter, Ammoury, Yeates, & Steele, 2009; Pennington et al., 2005; Simmons-Mackie et al., 2007). Simmons-Mackie and colleagues (2007) used a combined education-and-training-based implementation strategy to improve the ways in which speech pathologists supported the communicative access and decision making of people with aphasia. A two-day intervention resulted in improved knowledge with modest maintenance to six-month follow-up. However, they identified that clinical environment, particularly the acute setting, held specific barriers that limited that implementation of learned skills. A similar intervention strategy applied to the use of Surface Electromyography (SEMG) for dysphagia rehabilitation illustrated successful translation within the rehabilitation setting. However, when an education strategy was trialled without an active training

component implementation was unsuccessful. This comparison showed that training to support the practical application of skills was needed to promote implementation (Molfenter et al., 2009).

Motivated by the success of these combined education and training strategies, an implementation strategy was designed to target the use of linguistic discourse analysis for the assessment of people with aphasia. The intervention design was informed by the research translation process of Graham and colleagues (2006). Their conception of implementation described a continuous *action cycle* with multiple steps: a review of existing knowledge, identification of the problem, assessment of barriers and facilitators, adaptation to context, tailoring and implementation of an intervention, monitoring of knowledge use, and evaluation and maintenance of outcomes (Graham et al., 2006). The continuous nature of the cycle showed that the process could be repeated to adapt and improve implementation procedures.

In line with this conception of a Knowledge-to-Action intervention, the authors of this paper conducted a systematic review to investigate the use of linguistic discourse analysis in the assessment of aphasia (Bryant, Ferguson, & Spencer, 2016). The review identified a substantial evidence-base for the knowledge and tools associated with linguistic discourse analysis of language in aphasia. The review also identified that while linguistic discourse analysis was often used in the research context, there were frequent calls for greater clinical application and discussion of possible barriers and facilitators. Based on the findings of this review, the authors then surveyed over 100 speech pathologists working with people with aphasia from five English-speaking countries to determine their perceptions of barriers and facilitators to use of discourse analysis in clinical settings (Bryant, Spencer, & Ferguson, 2017). The survey found that while speech pathologists reported the clinical usefulness of linguistic discourse analysis, they considered that limited knowledge regarding methods of analysis and lack of time presented major barriers to the implementation of research evidence in to practice. These findings were consistent with those of a survey by Rose and colleagues of over 180 speech pathologists that examined their clinical practices with people with aphasia (Rose, Ferguson, Power, Togher, & Worrall, 2014).

The critical comparison of findings from the review of available knowledge and survey of current practice highlighted major differences between research and clinical practice in the modes used for linguistic discourse analysis. Researchers reported using a transcription-based manual pen-and-paper approach to analysis and computer-assisted methods (e.g., MacWhinney, Fromm, Forbes, & Holland, 2011; Miller & Iglesias, 2016) to overcome the barrier of time. While surveyed speech pathologists also identified time as a barrier, they reported completing linguistic discourse analysis without transcription, using professional judgement and clinical observation as a more time-efficient mode of analysis (Bryant, Spencer, & Ferguson, 2017). Similarly, in a survey of over 250 Australian speech pathologists working with children and adolescents conducted by Westerveld and Claessen (2014), the time barrier was frequently reported with the added suggestion of the usefulness of automated, outsourced means of transcription-based analysis as a potential solution (Westerveld & Claessen, 2014).

The information acquired from the review of research knowledge and investigation of current clinical practice informed the next steps in the Knowledge-to-Action cycle – the development and evaluation of an implementation intervention. A narrative review of

implementation in speech pathology highlighted the importance of preliminary implementation trials to demonstrate "how, why, and under what conditions a given strategy works to facilitate practice change" (Campbell & Douglas, 2017, p. 5). To hasten this process, Curran and colleagues (2012) proposed an approach to translational interventions that blended aspects of both clinical effectiveness and implementation research. Such "hybrid" research investigated both changes in behaviour following intervention and the impact of different tasks on clinically related outcomes (i.e., the effect of different discourse analysis methods on assessment results) (Curran et al., 2012; Douglas et al., 2015). Accordingly, the research presented in this paper can be described as a preliminary Knowledge-to-Action intervention targeting the use of linguistic discourse analysis in aphasia. This exploratory hybrid trial examined the effects of different modes of linguistic discourse analysis on knowledge use, and the outcomes of the intervention.

The Knowledge-to-Action intervention was trialled with two aims:

(1) to examine the effects of linguistic discourse analysis, following training, on to the assessment of a person with aphasia compared to psycholinguistic assessment alone. The effects of four approaches to discourse analysis were investigated – one transcription-less approach (judgement-based analysis) and three transcription-based approaches (manual, computer-assisted, and automated analysis).
(2) to evaluate how the content and intervention strategy influenced the implementation of knowledge and skills to speech pathology practice.

With reference to these aims, the study addressed the following questions.

Aim one:

(1) What differences were observed in participants' identification of linguistic features, goal-setting, and therapy planning when they assessed a case study of a person with aphasia using linguistic discourse analysis?
(2) What differences, if any, were observed in the assessment of a case study of a person with aphasia when different modes of linguistic discourse analysis were used?

Aim two:

(1) How did participants maintain, translate, and apply skills and knowledge acquired in the Knowledge-to-Action intervention to their clinical practice of speech pathology?
(2) In what ways did these outcomes differ for participants performing different modes of linguistic discourse analysis?

Although this research was at the exploratory stage, increased observation of discourse-level language was expected following training regardless of the mode of analysis used, as this was the focus of the intervention. Based on the results of previous education-and-training-based implementation studies (e.g., Molfenter et al., 2009;

Simmons-Mackie et al., 2007), it was expected that participants would show improved knowledge of and confidence using linguistic discourse analysis following the intervention. However, some decay in skills was expected in the period to follow-up.

Method

Participants

Speech pathology students in their final year of tertiary study – providing an accredited entry-level professional qualification – were recruited to participate in a preliminary trial of a hybrid Knowledge-to-Action intervention. Final year students were recruited as a participant sample as they possessed similar levels of clinical experience and theoretical knowledge in speech pathology given their stage of education, comparable across many individuals (The Speech Pathology Association of Australia, 2011), minimising the confounding impact of practice experience on research outcomes.

Australian universities with speech pathology programmes were approached to participate in the research project. Based on convenience sampling, five universities were approached, and four universities agreed to participate. All final year students in speech pathology programmes were invited to participate in data collection and the Knowledge-to-Action intervention workshop by contacting the researchers. Of those students who expressed interest, 29 individuals (47.5%) consented and participated in the intervention and data collection.

Implementation intervention

The implementation intervention workshop was designed to provide knowledge and skills to participants on evidence-based approaches to linguistic discourse analysis. Evidence from research (for review, see Bryant et al., 2016) and from reports of practising speech pathologists (see Bryant, Spencer, et al., 2017) was combined to generate an understanding of the use of discourse analysis in clinical settings. The evidence was compiled into a detailed description of discourse analysis processes, with variations in the ways to conduct discourse analysis included. This evidence formed the content of the intervention, which was manualised to provide an explicit explanation to guide completion of discourse analysis. The manual was adapted to a workshop format, combining linguistic discourse analysis evidence with practical worked examples to facilitate knowledge and skill acquisition and application. An implementation-effectiveness hybrid design was used to support the comparison of different modes of linguistic discourse analysis and inform the design of future research trials. The intervention was presented as a short workshop, tailored to promote feasibility of delivery in the speech pathology workplace. All workshops ran for three and a half hours and were presented by the first author.

Workshop conditions

Four different modes of linguistic discourse analysis were identified during the compilation of research and practice evidence.

(1) Transcription-less judgement-based discourse analysis – an analysis completed using professional knowledge and reasoning to observe and identify linguistic behaviours in discourse as it is elicited. Speech pathologists reported using this mode of analysis (Bryant, Spencer, et al., 2017), though limited research evidence existed to support its use in clinical practice (Armstrong et al., 2007).
(2) Transcription-based manual analysis – an analysis completed from a transcript. Transcription was performed by the clinician using a recorded language sample and linguistic features were analysed using a traditional pen-and-paper approach to coding and counting (e.g., the number of words/complete sentences/fillers/paraphasias, etc.). Manual analysis was used most frequently by researchers in reviewed literature (Bryant et al., 2016), and by surveyed speech pathologists (Bryant, Spencer, et al., 2017).
(3) Transcription-based computer-assisted analysis – analysis combining manual pen-and-paper analysis with assistive software for transcription (e.g., Dragon NaturallySpeaking, Nuance Communications Inc, 2014) and analysis (e.g., Systematic Analysis of Language Transcripts (SALT), Miller & Iglesias, 2016). Researchers and surveyed speech pathologists reported using assisted analysis software (Bryant et al., 2016, 2017). While voice-to-text software had not previously been used for transcription, it had been applied to language in aphasia for therapeutic purposes (see e.g. Bruce, Edmundson, & Coleman, 2003).
(4) Transcription-based automated analysis – analysis that utilised an outsourced transcription service and computerised linguistic analysis software (e.g., SALT, Miller & Iglesias, 2016) to complete the linguistic analysis of discourse. Westerveld and Claessen (2014) examined interest in this mode of discourse analysis as a theoretical means of overcoming time barriers to the use of discourse analysis in clinical settings.

Each mode of linguistic discourse analysis was adapted to a workshop condition specifically addressing application to the clinical population of people with aphasia. The manual analysis condition represented the most common and traditional means of completing discourse analysis, while the other conditions offered potential solutions to overcoming the time barrier that limited implementation. The content of the workshop across intervention conditions was identical where possible. Participants across all intervention conditions received the same education on eliciting discourse samples, selecting discourse measures and interpreting and applying the results of assessment to ongoing aphasia management. The four conditions differed in the transcription, coding, and analysis processes required to complete the discourse analysis, though they were all applied using the same example and case study recordings (see Appendix A). Each of the four participating universities were randomly assigned to one of the four conditions by the first author using a chance-matching procedure. One workshop session (including data collection) was held at each university. Participation in each workshop condition was as follows: judgement-based, eight participants; manual, five participants; computer-assisted, nine participants, and, automated, seven participants.

Clinical case application

Participants completed evaluation questionnaires at three time-points within the intervention: immediately prior to the implementation workshop (pre-intervention), immediately after the workshop had concluded (post-intervention) and six months after the intervention session (follow-up). Pre- and post-intervention evaluations were hand-written forms completed by participants. The follow-up questionnaire was hosted via Survey Monkey® and was distributed to participants via email. The survey remained open for one month for each research site or until all participants had responded.

At pre- and post-intervention, participants were asked to apply their existing assessment knowledge to a presented case study of a person with aphasia, Agnes.[1] Agnes was a 74-year-old right-handed woman with chronic anomic aphasia (Western Aphasia Battery Classification) following left hemisphere stroke eight years prior to the assessment. Her medical history, as reported by staff at the aged-care facility in which she lived, also indicated additional suspected strokes resulting in left hemianopia and hemiparesis with decreased mobility and use of a wheelchair.

Immediately prior to the intervention, participants watched a five-minute video of Agnes completing the Western Aphasia Battery – Aphasia Quotient (WAB-AQ) subtests (picnic picture description task; auditory comprehension task – yes/no responses; and naming and word finding tasks – object naming, word fluency, and responsive speech) and were provided with a complete summary of her WAB results (Kertesz, 2006). They were then asked to complete an evaluation where assessment knowledge and WAB-AQ results were applied to assessment and management outcomes for Agnes by: identifying up to five linguistic features relating to the diagnosis Agnes's aphasia, setting two possible therapy goals, and planning one approach to therapy.

Immediately following the intervention, participants watched another five-minute video of Agnes completing three discourse tasks, two of which were based on the cookie theft picture: a description (tell me what is happening in this picture) and a narrative (tell me a story with a beginning, a middle, and an end; as in Olness, 2006); and a spontaneous personal narrative. Participants again completed an evaluation and were encouraged to use the approach to linguistic discourse analysis as taught during the intervention to support formulation of assessment and management outcomes: identifying up to five linguistic features of Agnes's aphasia, setting two possible therapy goals and planning one approach to therapy.

At all three time-points, participants completed a series of five-point Likert scales investigating perceived confidence and competence and attitudes towards using linguistic discourse analysis. These scales asked participants to indicate their level of agreement with statements (strongly disagree, disagree, unsure, agree, strongly agree). At post-intervention and follow-up, participants answered a series of open and closed questions to evaluate knowledge acquired during the intervention. These questions required participants to recall knowledge from the workshop related to the elicitation, preparation, and analysis of discourse samples. Additional questions were asked in the follow-up questionnaire to examine participants' practice experience in the period from the conclusion of the intervention and their opportunity to apply their skills and knowledge within practice of speech pathology.

Data analysis

Pre- and post-intervention evaluation responses were transcribed verbatim to a typed format and were compiled in a Microsoft Excel Spreadsheet. Following the close of the follow-up survey for all research sites, responses were downloaded and exported from Survey Monkey® and were added to the spreadsheet. Different components of the data collected during the intervention were subject to different analyses (described below).

Qualitative analysis

Qualitative analysis was used for the following elements of the research: 1) the assessment and management outcomes – linguistic features, goals, and therapy approaches identified at pre- and post-intervention; and 2) responses to open-ended evaluation questions. These data were imported to NVivo (version 11.3.2.779, 64-bit) software for Windows (QSR Software, 2016) for content analysis. Content analysis supported the use of statistical methods to identify changes in the application of assessment knowledge to the clinical case study resulting from the intervention (Franzosi, 2008). Clinical assessment outcomes were repeatedly reviewed by the first author, with initial thoughts and interesting points noted to guide preliminary coding.

A directed approach to content analysis was used, with codes sourced deductively from the content of the intervention, existing theory in the field and from existing models used previously by the authors of this paper (Bryant et al., 2016). Additional codes were added to this model through iterative analysis where participant responses did not fit with existing codes. The directed approach to content analysis allowed a comprehensive description of the data with reference to current clinical understanding (Hsieh & Shannon, 2005; Kondracki, Wellman, & Amundson, 2002).

The full coding schema used to classify the assessment and management outcomes was specific to Agnes and should not be generalised to other clinical cases. These outcomes were analysed and coded across the three separate tasks: identified linguistic features, goals that were set, and planned approaches to therapy. Supplementary file 1 is a text file that details the full coding schema and individual coding categories that were used in qualitative analysis of assessment and management outcome data. Briefly, the following key content areas were identified:

(1) Linguistic features – linguistic behaviours and characteristics relating to the diagnosis Agnes's aphasia. Three key content areas were identified: i) *indication of ability* defined whether the linguistic features identified a strength or weakness in Agnes' language; ii) *diagnostic alignment* classified whether identified features were consistent with a full diagnostic assessment of Agnes' aphasia; and iii) *communicative domains* coded identified linguistic features within general categories of language behaviours.
(2) Goals – target outcomes and aims of therapy to be the focus of service delivery for Agnes. Two content areas were identified: i) *linguistic targets* coded the general communicative domains of linguistic behaviours that were targeted through goals; and ii) *therapy context* coded the level of language production

(e.g., words, sentences, task-specific discourse, conversation, functional and structural) at which participants targeted goals for Agnes

(3) Therapy approaches – a brief description of a planned programme of therapy that would be used to remediate Agnes' aphasia symptoms. Three content areas were identified: i) *linguistic targets* coded the general communicative domains of linguistic behaviours that were targeted through therapy; ii) *therapy context* coded the level of language production (e.g., words, sentences, task-specific discourse, conversation, functional and structural) at which participants aimed to provide therapy for Agnes; and iii) *therapy tasks* coded the type of therapy activity that would be used.

Rigour in qualitative coding was established through several processes to ensure the credibility, integrity, consistency, and applicability of qualitative analysis (Noble & Smith, 2015). The processes implemented by the first author were: (1) creating an audit trail of field notes, memos, and journal entries throughout the analysis process; (2) peer debriefing between the first, second, and fourth authors during regular meetings to discuss all coding decisions; (3) revision and recoding of all data to ensure consistency; and (4) a process of coding by consensus between the first, second and fourth authors. All disagreements were resolved through discussion and supported by revision of the audit trail in order to minimise any potential coding and interpretation bias (Hsieh & Shannon, 2005; Noble & Smith, 2015; Sandelowski, 1993).

Case-study data. Following discussion between the first, second, and fourth authors to establish coding consensus on 10% of data, any problematic responses that remained unclear (a further 9.43% of data) were reviewed by at least two authors to achieve a clear-coding consensus.

Open-ended questions. All coding decisions were initially made by the first author and subsequently reviewed by the second author, with no disagreements arising in coding.

Statistical analysis

Questionnaire and content data were exported to SPSS Statistics (version 24.0.0.1) for Windows for statistical analysis (IBM Corp, 2016).

Case-study content and Likert scale outcomes. Pre- and post-intervention data were examined using Linear Mixed Models (LMM) analysis to evaluate the effects of the educational intervention (through examination of pre- and post-evaluation time-points) and discourse analysis condition on all outcomes. Linear mixed modelling was used to provide a robust analysis of data. As some data points were missing due to evaluation questions not being answered by some participants, LMM analysis permitted the inclusion of all available data in analysis (Brown & Prescott, 2006). Each content area (as in Supplementary File 1) was modelled with fixed and repeated effects. Participant identification and response time-point were entered as repeated effects within the model. Three fixed effects were added for analysis: evaluation time (pre- or post-intervention, and follow-up for Likert scale responses), intervention condition (the four conditions described above), and the interaction between time and condition. Covariance patterns

of compound and unstructured symmetry were compared to identify the model of best fit (as indicated by lower values of Akaike's Information Criteria (AIC) and Schwartz's Bayesian Criterion (BIC)), reported in the results. Many statistical tests were performed and so the risk of type I error should be acknowledged in the interpretation of results. Due to the exploratory nature of the investigation, results with a p-value <.05 were considered significant with the higher alpha value retained to minimise the risk of type II error. The consistency of findings is discussed to further evaluate the significance of results.

Knowledge acquisition outcomes. Responses to closed questions in the post- and follow-up questionnaires that examined knowledge acquisition, maintenance, and application were entered into SPSS and analysed using descriptive statistics. The results of content analysis of open-ended questions were also analysed using descriptive statistics.

Ethics approval

This study was reviewed and approved by the Human Research Ethics Committee of the University of Newcastle (H-2016–0431). Additional approval was granted by the Human Research Ethics Committees of each participating university.

Results

Assessment and management outcomes

Participants completed an evaluation at pre- and post-intervention, applying assessment knowledge to an aphasia case study, Agnes. Participants completed an evaluation where assessment knowledge was applied to assessment and management outcomes for Agnes by identifying linguistic features of aphasia, setting goals and describing a therapy approach. Due to the large number of statistical tests performed, only those results that indicated significant changes and differences at post-intervention are reported.

Linguistic features

At both pre- and post-intervention, participants identified up to five linguistic features of aphasia observed in the language of the case study. Analysis revealed three key content areas in the linguistic features identified by participants (see Supplementary File 1): *indication of ability, diagnostic alignment,* and *communicative domains*.

Indication of ability. When participants applied knowledge acquired during intervention to the assessment of the clinical case study (Agnes), a significant increase was observed in the number of linguistic features that represented areas of reduced ability (i.e., linguistic behaviours that indicated difficulty producing language) ($F = 40.787$; $p < .001$). No significant change was observed in participants' identification of features that represented ability (i.e., relative strengths, or "good" communicative features).

Diagnostic alignment. Linguistic features identified by participants were examined in terms of their similarity to those identified in the diagnostic assessment (WAB) completed by the first author and confirmed by Agnes's treating speech pathologist (i.e., their "alignment"; see Supplementary File 1). At post-intervention, a significant increase was observed in the mean number of aligned features identified by participants (i.e., features consistent with Agnes's assessment that were not defining features of anomic aphasia, such as the provision of tangential information content; $F = 29.815$; $p < .001$).

Participants across intervention conditions also differed significantly in the degree of change in aligned features content from pre- to post-intervention ($F = 4.221$; $p = .015$). Pairwise comparisons demonstrated that participants performing judgement-based ($F = 32.184$; $p < .001$), computer-assisted ($F = 9.052$; $p = .006$), and automated modes of discourse analysis ($F = 9.195$; $p = .006$) identified significantly more aligned features at post-intervention. However, participants performing the manual mode of discourse analysis demonstrated no change.

Communicative domains. Communicative domains were defined as general categories of language behaviour (refer to Supplementary File 1). Participants identified linguistic features that fell within 16 communicative domains, though no significant changes were observed in 12 of these – word finding, fluency, syntactic structure, semantic information, efficiency, lexical information, lexical diversity, language volume, morphology, word classes, speech output, and conversation. However, significant changes were observed for the remaining four communicative domains. Participants demonstrated a significant decrease in mean number of features of receptive language ($F = 11.603$; $p = .002$) identified post-assessment. Their identification of extra-linguistic features such as gestures also decreased significantly ($F = 12.352$; $p = .002$). These changes were mirrored by a significant increase in the identification of features of schema-related information ($F = 7.318$; $p = .012$) by participants when discourse analysis was used in the post-intervention evaluation. Participants also identified significantly more cohesion and coherence-related elements of communication at post-intervention ($F = 11.841$; $p = .002$).

Perception of identified features. Participants demonstrated a statistically significant improvement in their confidence in ($F = 52.597$, $p < 0.001$) and perceived diagnostic accuracy of ($F = 26.735$, $p < .001$) their identification of linguistic features at post-intervention, measured using responses to evaluative Likert statements (see Appendix B). Confidence in their identification of linguistic features represented a clinically meaningful improvement, with participants indicating confidence at post-intervention when they had not been confident at the pre-intervention stage. However, change in perceived accuracy of diagnosis did not appear to be clinically meaningful as participants indicated they remained *unsure* following the intervention.

Goals

At both pre- and post-intervention, most participants identified two therapy goals they would set for Agnes. The content of goals fell within two main content areas: *linguistic targets* and *goal context*.

Linguistic targets. The linguistic targets of goals set by participants were classified within the same communicative domains as identified linguistic features. While goal targets fell within 15 different domains, significant changes were only observed in participants' use of two of these. A significant increase was observed in participants' identification of goals that targeted schema-related information (e.g., creating narratives with a clear beginning, middle, and end; $F = 8.277$; $p = .008$). Participants also formulated goals that targeted conversation (eg., turn-taking and conversational initiation) more at post-intervention ($F = 6.121$; $p = .021$).

Goal context. Context content codes identified the level of language production (e.g., words, sentences, task-specific discourse, conversation, functional, and structural) at which participants aimed to target goals and provide therapy for Agnes. At pre-intervention, participants formulated many goals that contained no identifiable context in which language production would be targeted; that is, participants identified a goal target, but provided no information on the context in which the goal would be achieved (e.g., word level, sentence level, or in discourse). Participants' formulation of goals with no identifiable context significantly decreased at post-intervention ($F = 4.926$; $p = .036$) as participants added a defined context to their goals for Agnes. Participants generated significantly more goals at post-intervention that aimed to improve the use of language in functional contexts such as *"in social situations"* and *"daily life activities"* ($F = 7.909$, $p = .009$) and through the production of task-specific discourse ($F = 17.522$; $p < .001$) – that is, discourse produced in response to specific questions or stimuli including picture descriptions and scripted conversations.

Perception of goals set. Participants showed a statistically significant change from pre- to post-intervention in the perceived benefit of the goals they had formulated ($F = 23.884$, $p < .001$). This statistically significant change also represented a clinically meaningful improvement. At pre-intervention, participants were unsure of the benefit of their goals, though they agreed with the statement "*I have set goals that will benefit the person with aphasia*" at post-intervention.

Therapy approaches

Participants described one possible therapy approach they would use to target the aphasia symptoms of the case study at pre- and post-intervention. Therapy descriptions contained *linguistic targets, therapy contexts* and *therapy tasks*.

Linguistic targets. The linguistic targets of therapy approaches described by participants were classified within the same communicative domains as identified linguistic features. Significant changes were only observed in three domains, with participants demonstrating a shift in therapy approaches away from those targeting word finding, and towards those aimed at discourse structures. Participants targeted word finding most frequently in therapy approaches described at pre-intervention. These decreased significantly at post-intervention ($F = 12.279$; $p = .002$), though remained the most dominant target domain. Conversely, participants described therapy approaches that targeted schema-related information ($F = 10.362$; $p = .004$) and conversation ($F = 5.157$;

p = .032) significantly more at post-intervention in the therapy approaches they described.

Participants who performed different modes of discourse analysis only differed significantly in their description of therapy approaches targeting word finding features (F = 6.188; p = .003). Participants using judgement-based (F = 20.710; p < .001) and manual (F = 8.284; p = .008) modes of discourse analysis described significantly fewer therapies targeting word finding at post-intervention than at pre-intervention. They instead identified a greater number of goals targeting other communicative domains, though these changes were not significant. No significant change was observed in type of therapy approaches for participants in the computer-assisted and automated discourse conditions.

Therapy context. As with goal context, participants identified language production contexts (i.e., words, sentences, task-specific discourse, conversation, functional, and structural) in the therapy approaches they described. Participants only demonstrated a significant increase in task-specific discourse contexts within therapy approaches to post-intervention (F = 11.530; p < .002). Task-specific discourse contexts provided therapy to Agnes using discourse produced in response to specific questions and stimuli (for example, the procedure of baking a cake).

Therapy tasks. Therapy tasks were identified as the type of therapy activity participants would use with Agnes. At pre-intervention, more than half of participants described naming-based tasks including drill, confrontation naming and semantic feature analysis. However, their use of these naming-based therapies decreased significantly at post-intervention (F = 18.090; p < .001). In contrast, participants described significantly more discourse therapies at post-intervention (F = 24.853; p < .001) including the use of scripted conversations to improve language use and the use of verbal and visual prompts to guide the production of a task-specific discourse sample.

Participants performing different modes of discourse analysis differed significantly in the degree of change from pre- to post-intervention in their use of naming-based (F = 3.261; p = .038) and discourse (F = 3.583; p = .028) therapy tasks. Those participants using judgement-based (F = 21.014; p < .001) and manual (F = 4.728; p = .039) discourse analyses showed a significant decrease in their use of naming-based therapies to post-intervention (see Figure 1). However, the participants in the computer-assisted and automated discourse analysis conditions showed no significant change from pre- to post-intervention. The use of discourse therapy tasks by participants performing three of the four modes of discourse analysis increased significantly to post-intervention (see Figure 2). Participants performing judgement-based (F = 17.539; p < .001), manual (F = 7.016; p = .014), and automated (F = 8.909; p = .006) discourse analyses described significantly more therapy approaches utilising discourse-based tasks at post-intervention.

Perception of therapy approaches. A significant change was observed in participants' belief that the therapy approaches they described targeted the linguistic features they had previously identified (F = 13.014, p = .002; see Appendix B for exact question used). While statistically significant, visual inspection of means indicated that, clinically, change

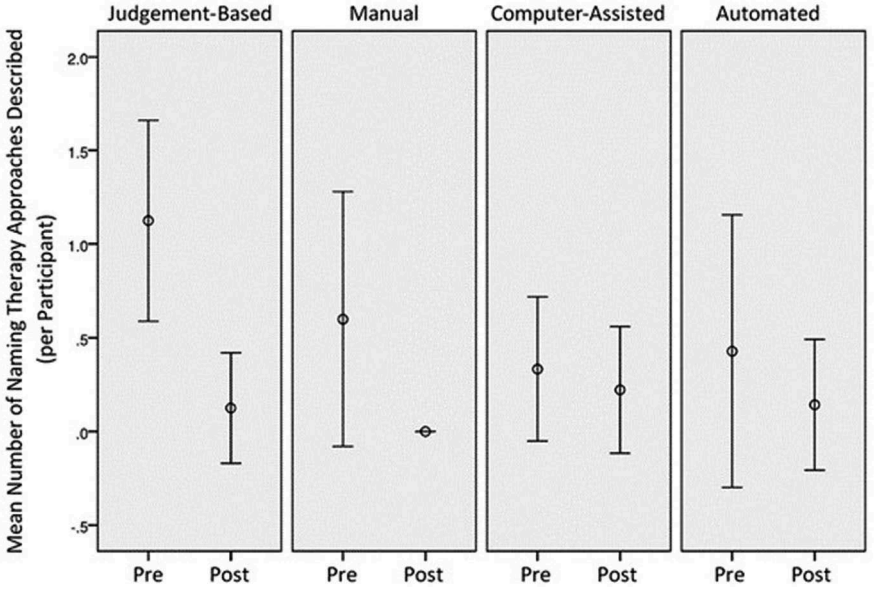

Figure 1. Changes in the identification of naming-based therapy tasks from pre- to post-intervention across discourse analysis conditions.

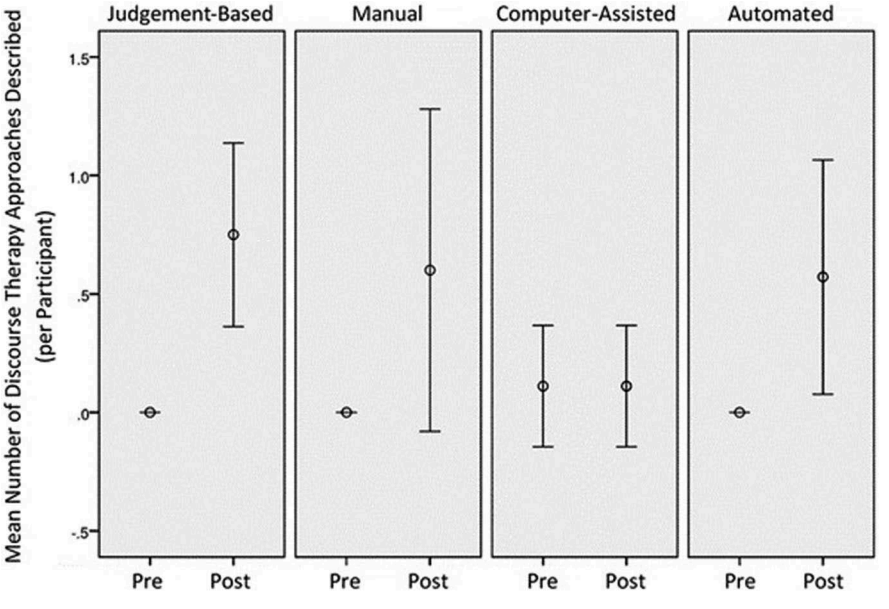

Figure 2. Changes in the identification of discourse therapy tasks from pre- to post-intervention across discourse analysis conditions.

represented only a small improvement from *unsure* to *agree*. Participants also demonstrated a change in opinion when asked their agreement with the statement "*my therapy will aim to improve the persons" [case study] daily communication*' ($F = 10.271$, $p = .004$).

However, this change was not clinically meaningful with participants indicating that they agreed with this statement at both pre- and post-intervention.

Implementation outcomes

Of the 29 participants who completed the Knowledge-to-Action intervention, 25 completed the follow-up questionnaire, representing an 86% retention rate to follow-up. Seventy-six per cent of study participants (19/25) reported having clinical experience practising speech pathology in the six months from the intervention to follow-up. This experience was obtained through degree-based clinical placements (44%; 11/25), and through employment as a speech pathologist (32%; 8/25). The duration of practical experience ranged from eight to 85 days (mean = 28.4; *SD* = 20.4).

In the six months to follow-up, participants reported clinical experience within a single clinical setting (44%; 8/25), and across multiple settings (32%; 8/25) (see Table 1). At post-intervention and prior to any reported clinical experience, participants reported that linguistic discourse analysis would be most valuable in the rehabilitation setting, and least useful in an acute inpatient setting due to time constraints and competing medical priorities (see Table 1). No meaningful differences were observed in the identification of settings across intervention conditions.

Implementation and intent

Only one participant (4%) reported use of linguistic discourse analysis in the six months between post-intervention and follow-up. However, 24% (6/25) reported that they had the opportunity to assess people with aphasia during that period. Seventy-six per cent (19/25) of participants reported that they had not used linguistic discourse analysis since the education, citing two key reasons: an absence of opportunity (63.2%; 12/19), and no time to complete analysis (15.8%; 3/19). Despite having not implemented discourse analysis, 72% (18/25) reported intent to use it in their future clinical practice. Only one participant (4%) stated that they did not intend to use linguistic discourse analysis in their future speech pathology practice, stating a need for further practice and training. Participants identified a range of clinical populations and clients that they intended to assess using their learned skills, including the target population of people with aphasia (see Figure 3).

Table 1. Settings of reported practice experience, and perceived value of linguistic discourse analysis in these settings.

Practice Setting	% Participants with Experience (*n* = 25)	% Participants' Perceived Usefulness (*n* = 29)	
		More Useful	Less Useful
Education	28%	6.9%	0%
Community Health	28%	6.9%	0%
Acute	24%	3.4%	65.5%
Inpatient Rehabilitation	24%	0%	0%
No Experience	20%	0%	0%
Outpatient Rehabilitation	16%	69.0%	0%
Aged Care	8%	0%	0%
Private Practice	8%	3.4%	3.4%
Disability Services	4%	3.4%	0%
Telecare	4%	0%	0%
Palliative Care	0%	3.4%	0%

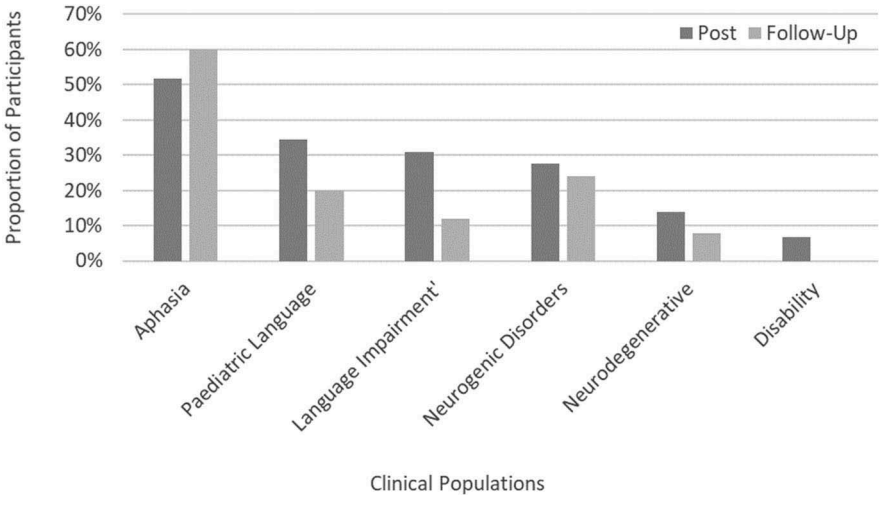

Figure 3. Clinical populations identified by participants for assessment using linguistic discourse analysis.

Knowledge maintenance

Participants were asked a series of open and closed questions to investigate how they would elicit, prepare and analyse discourse samples. Their responses illustrated how the knowledge learned during the intervention was maintained in the six months to follow-up (see Table 2).

Elicitation. Participants showed a decrease in the average number of discourse samples they would elicit from post-intervention to follow-up. This decrease was evident for participants in all intervention conditions, except manual analysis. At both post-intervention and follow-up, participants most frequently identified that they would elicit narrative discourse samples, with 82.14% identifying narrative samples at post-intervention, and 44% at follow-up. Participants in judgement-based, computer-assisted, and automated analysis

Table 2. Proportion of participants reporting intended application of discourse knowledge for sample elicitation, recording and analysis at post-intervention and follow-up.

	Intervention Conditions									
Discourse Analysis Process[a]	Judgement-Based		Manual		Computer-Assisted		Automated		Total	
Time-Point	Post	F-up	Post	F-up	Post	F-up	Post	F-up	Post	F-up
Sample Elicitation										
Mean no. samples Elicited	3.3	1.3	1.2	1.4	3.6	0.6	3.7	1.7	3.1	1.2
Sample Recording										
No Recording	12.5%	16.7%	0%	0%	0%	0%	0%	0%	3.4%	4%
Audio Only	12.5%	33.3%	0%	20%	0%	12.5%	14.3%	50%	6.9%	28%
Audio-Visual	75%	50%	100%	40%	100%	87.5%	85.7%	33.3%	89.7%	56%
Transcription	25%	66.7%	60%	60%	55.6%	87.5%	14.3%	83.3%	37.9%	76%
Analysis										
Consistent with Training	87.5%	66.7%	20%	60%	11.1%	12.5%	100%	66.7%	55.2%	24%
Mixed Approach	0%	16.7%	0%	20%	0%	50%	14.3%	50%	3.4%	36%

[a]At post-intervention $n = 29$; at follow-up $n = 25$.

intervention conditions also identified narrative discourse samples most often at both post-intervention and follow-up. Participants who learned manual discourse analysis responded differently, with 40% of participants identifying procedural samples at post-intervention, and 40% identifying expositional and conversational samples at follow-up.

Approach to analysis. At post-intervention, over half of participants (55.2%; 16/29) indicated that they would perform discourse analysis in a manner consistent with the training they had received. Participants who learned the judgement-based and automated approaches to discourse analysis were more likely to describe an analysis procedure consistent with their training (87.50% and 71.43% respectively). The proportion of participants performing an analysis consistent with training decreased to 24% (6/25) at follow-up, with half of these participants (12%; 3/25) in the judgement-based analysis intervention condition. A mixed approach to analysis was most common at follow-up, used by 36% of participants, combining judgement-based and manual analysis (16%); judgement-based, manual and computerised analysis (12%), or; judgement-based and computerised analysis (8%).

Attitudes and perspectives

Participants responded to a series of five-point Likert scales addressing their attitudes towards linguistic discourse analysis, and their self-reported confidence and competence using linguistic discourse analysis to assess people with aphasia (for a full list of the evaluative statements used, see Appendix B). These scales were completed at three time-points across the evaluation period – immediately prior to the intervention, immediately following the intervention, and at the six-month follow-up. Participants performing different approaches to discourse analysis showed no significant changes in their attitudes or perspective resulting from the intervention; however, overall differences were observed.

Confidence and competence. Participants indicated significant change in their confidence ($F = 56.327$, $p < .001$) and perceived competence ($F = 42.332$, $p < .001$) using linguistic discourse analysis over the evaluation period, measured in their responses to evaluative Likert statements (see Appendix B). Pairwise comparisons showed that confidence significantly increased to post-intervention (mean diff. = 1.512, $p < .001$), though decreased from post-intervention to follow-up (mean diff. = -.647, $p = .022$). However, confidence at follow-up also remained significantly higher than that indicated prior to the intervention (mean diff. = .865, $p = .005$). Similarly, when examining perceived competence, pairwise comparisons showing significant differences between all three time-points: from pre- to post-intervention (mean diff. = 2,047, $p < .001$), from post-intervention to follow-up (mean diff. = −1.012, $p < .001$), and between responses at follow-up and pre-intervention (mean diff. = 1.035, $p < .001$). Changes in both confidence and competence were clinically meaningful, with mean scores showing that participants disagreed with both evaluative statements at pre-intervention, agreed at post-intervention and were unsure at the six-month follow-up (see Figure 4).

Opinions on discourse analysis. Participants showed a statistically significant change over time in their belief that linguistic discourse analysis was a useful ($F = 9.147$, $p = .002$) and important ($F = 13.167$, $p < .001$) tool for assessing language in aphasia. Participants'

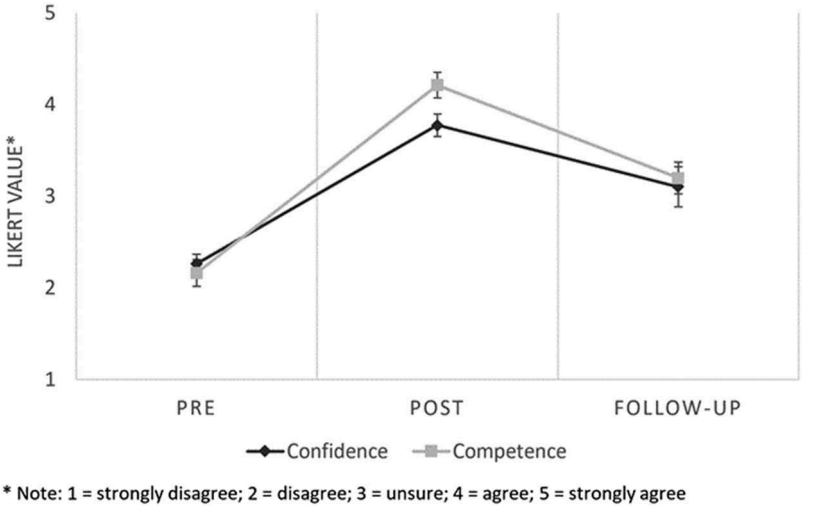

Figure 4. Participant's average perceived confidence and competence using discourse analysis across time-points.

opinion also changed significantly when asked their agreement with the statement "*I plan to use discourse analysis in the future*" ($F = 7.575$, $p = .001$). However, these changes were not clinically meaningful, with participants indicating agreement at all three time-points. No significant change was observed when participants were asked if they would recommend the intervention to other speech pathologists and students. Participants agreed that they would recommend the intervention at both post-intervention and follow-up ($F = 3.877$, $p = .062$).

Discussion

Aim one: assessment outcomes

Significant changes following the intervention indicated that participants' training in the use of discourse analysis altered their assessment and management decisions for a case study person with aphasia. The features identified most frequently by participants at both pre- and post-intervention were classified within the domains of word finding and fluency. This finding was expected, given Agnes's Western Aphasia Battery diagnosis of anomic aphasia, a non-fluent impairment characterised by breaks in fluency associated with difficulties with word retrieval (Potagas, Kasselimis, & Evdokimidis, 2017). Goals and therapy approaches targeting these features were also observed with high frequency, consistent with the expectation that therapy would target the most pervasive features of impairment (Kong, 2016).

While the identification of these major features of impairment did not change post-intervention, participants demonstrated a significant decrease in the identification of extra-linguistic behaviours and features of receptive language. This was likely a product of the type of language assessment used – the pre-intervention assessment approach contained items that directly addressed comprehension and extra-linguistic impairments (see Kertesz, 2006). Conversely, post-intervention increases in macro-structural discourse-

level features involved identification of features of schema-related information content, cohesion and coherence and conversation. Such discourse-level communicative domains could not be examined using psycholinguistic assessments, which do not typically elicit sufficient language longer than the sentence level (Murray & Coppens, 2017). Participants' training in the use of discourse assessment appeared to draw their attention to macrostructural features of discourse when performing their assessment.

These macrostructural, discourse level features represented communicative domains in which the case study, Agnes, demonstrated communicative difficulty. Therefore, the increase in these domains was consistent with the increased identification of aligned features and features of reduced ability (language difficulty) at post intervention (see Supplementary File 1). A large volume of the linguistic features identified by participants recognised areas in which language appeared to be impaired. This was likely a result of the evaluation task, where participants were also required to formulate goals and describe therapy approaches that would be used with the Agnes. However, during the intervention participants received specific instruction on the use of discourse analysis to identify communicative strengths that could be used to motivate clients and build functional communication skills (see Appendix A). Despite this, they showed no significant change in the identification of features representing *ability* and identified very few of Agnes' communicative strengths.

Training in the use of linguistic discourse analysis also appeared to influence the nature of goals and therapy approaches described by participants at post-intervention. Increased identification of discourse-level (i.e., task-specific and functional) contexts at post-intervention was mirrored by a similar increase in participants' descriptions of discourse-based therapy tasks. Participants described significantly more therapy approaches post-intervention that targeted linguistic structures through the construction and production of language above the level of the sentence. Such approaches are in line with Aphasia Rehabilitation Best Practice Statements (Clinical Centre for Research Excellence (CCRE) in Aphasia Rehabilitation, 2014) which recommend that "people with aphasia should be offered therapy to gain benefits in receptive and expressive language, and communication in everyday environments" (*p*. 18).

The four different modes of linguistic discourse analysis – transcription-less judgement-based analysis and three transcription-based approaches of manual, computer-assisted, and automated analyses – appeared to have little effect on assessment outcomes. While significant differences were observed in the descriptions of diagnostically aligned linguistic features and naming-based therapy targets and tasks for some participant groups, these differences existed prior to the intervention. Higher average scores at pre-intervention were likely the result of sampling procedures, as each condition involved participants from separate universities who may have been exposed to different curriculum material throughout their degree programmes in relation to discourse analysis and aphasia. With the additional education and training provided through the intervention, participants using all four modes of linguistic discourse analysis identified similar numbers of diagnostically aligned features and naming-based therapy tasks at post-intervention. Similarly, significant differences in the frequency with which participants described discourse-based therapy tasks were unlikely to indicate meaningful differences between modes of discourse analysis. This significant difference across conditions was only observed in the description of discourse-based therapy tasks, and not in the identification of linguistic

features, goals targeting discourse constructs, or the situation of goals or therapy approaches within discourse-level contexts. Therefore, as this significant result was inconsistent with other findings it may represent a false-positive.

Aim two: implementation

Evaluation of participants' knowledge immediately following the intervention and again six months later showed a moderate maintenance of knowledge acquired during the education workshop. At post-intervention, most participants described elicitation, recording, and analysis procedures consistent with what they had been taught. However, some differences were noted, even immediately following the intervention, between what participants learned and the analysis process they would reportedly use. For example, participants in the manual condition elicited fewer discourse samples than the number recommended during the intervention and those in the judgement-based condition recorded samples when the recording process was not taught as part of the judgement-based analysis procedure. These differences were more notable at follow-up six months after the intervention. Participants explained elicitation procedures with fewer discourse samples, a less rigorous recording procedure, and a mixed analysis process combining a range of analysis approaches – judgement-based, manual, and computerised analysis. Participants' combination of modes of analysis may have been favoured to provide them with the skills to perform discourse analysis as they were confronted with the realities of clinical practise which may have re-enforce perceived barriers to its use, particularly the associated time demands (Smith, Power, Cruice, & Swann, 2017). The mixed approach to discourse analysis adopted by participants suggested that the content of future iterations of the Knowledge-to-Action intervention should combine all modes of analysis.

While participants demonstrated that knowledge was acquired and maintained, only minimal implementation was observed in the period to follow-up. The lack of generalisation of knowledge and skills suggested that the narrow focus of the intervention – discourse analysis for the assessment of people with aphasia – limited the vision of some participants to apply what they had learned beyond the target population. This was particularly evident following periods of non-practice to follow-up, where participants reported intent to use discourse analysis with other clinical populations less frequently. To overcome the narrow focus of implementation, a more generalised approach to discourse education and training may be necessary. Entry-level speech pathologists may require more diverse training to apply their skills to a range of clinical populations and influence true translation of evidence to clinical practice. A further trial of the intervention with practising speech pathologists in the clinical setting will more clearly illustrate implementation outcomes. This will allow the intervention to better address barriers related to clinical culture and policy including available time, resources, professional development, and mentoring.

While the workshop elements of the intervention that trained participants to apply skills and knowledge were effective, participants acknowledged the need for additional practice and support to sustain their confidence and ongoing use of discourse analysis. This was reflected in the significant change in participant's self-reported confidence and competence in the period to intervention follow-up. As expected, the absence of

practice and ongoing experience led to deterioration in participants' belief in their own ability to perform discourse analysis despite the training they had received. This change was consistent with the phenomenon of skill decay (Arthur, Bennett, Stanush, & McNelly, 1998). The initiation of the implementation strategy at the early stage of participants' careers was beneficial in establishing agents of change, with one participant reporting change in their employer's policy to necessitate the use of discourse analysis. However, to support skill maintenance and prevent decay, the strategy needed to prolong contact with the participants and offer ongoing education and training. An online training module may be an ideal future strategy to facilitate this outcome. Further, the amount of practice could be increased through changes in the design of the workshop, as the short duration (three-and-a-half hours) limited the volume of guided, hands-on practice that the participants received. Ongoing confidence and competence may have been better supported by an extended workshop delivered over a period of days in line with that provided by Simmons-Mackie and colleagues (2007). Similarly, this increased practice of newly acquired skills may have improved confidence immediately following the intervention in the accuracy of assessment when linguistic discourse analysis was used. While confidence and competence decayed following the intervention, participants maintained a belief in the importance and utility of linguistic discourse analysis as an aphasia assessment, and this was reflected in the ongoing intent to use discourse analysis in practise reported by most participants. The intent and reinforced belief in the beneficial role and outcomes of using discourse are important factors in motivation, an instrumental component in behaviour change to promote implementation (Cane, O'Connor, & Michie, 2012).

Finally, this research aimed to examine if the approach to discourse analysis affected the maintenance and implementation of acquired knowledge. Participant reports suggested that judgement-based and computer-assisted analysis approaches would aid in overcoming a major barrier to discourse analysis – the time required to complete it (Bryant, Ferguson, et al., 2016; Bryant et al., 2017). However, participants who completed the intervention conditions that required the use of computerised tools – computer-assisted and automated analyses – reported that knowledge of the analysis process remained a notable barrier as they lacked understanding of specific computer software. While all conditions of the intervention were delivered in the same amount of time, the conditions using computerised analysis tools required participants to learn a greater volume of information including operation of computerised analysis software. The cognitive and memory demands of learning this additional information may have impacted on the ability of participants to retain and apply learned skills, leading to their reports of insufficient knowledge and the need for further education and practice (Sweller, Ayres, & Kalyuga, 2011). While computerised tools offer a highly reliable and significantly faster means of analysis (Long, 2001), implementation supported by such software will need to take this into consideration and include more practical examples to train participants to complete analysis.

Limitations

The exploratory nature of the preliminary, hybrid Knowledge-to-Action intervention described within this paper resulted in limitations to the study which must be considered

in the interpretation and generalisation of results. The results were intended to provide information to guide the content and strategy used in future implementation trials. To provide a comprehensive assessment of the effects of discourse analysis on assessment outcomes, an alpha value of .05 was used to assess the significance of statistical results. With the large number of statistical tests performed, this resulted in a higher risk of type one error – whereby significance was indicated where it may not exist. Caution should therefore be exercised when interpreting these results, which should be considered preliminary. Replication of the intervention with a larger participant sample would be needed to confirm the significance of the outcomes identified here.

Additionally, the sampling method employed in this research recruited participants with comparable, entry-level skills and knowledge in the practise of speech pathology (The Speech Pathology Association of Australia, 2011). However, as participants had completed their education at different institutions, the content of their foundational knowledge was not controlled. Future research will need to investigate different modes of discourse analysis with more controlled sampling to control for the effects of prior knowledge on use of specific discourse analysis tools. Further, the self-reported data collected from participants may have biased the responses provided immediately post-intervention and at follow-up. Observation and confirmation biases may have been introduced through participants' knowledge that responses would be analysed, resulting in data that conformed to what participants thought was expected, rather than what they truly believed (Fadnes, Taube, & Tylleskär, 2008; McCambridge, Witton, & Elbourne, 2014). This bias may have been evident when participants were asked about their plan to use discourse analysis in the future. An affirmative result conformed with expectations since participants had just received training in this area. Attempts were made to minimise bias by reassuring participants that their responses were being observed, but not assessed in terms of "right" and "wrong", and through use of negatively worded items to control for reliability of responses. Future investigations will need to utilise other forms of data collection, including practice observation with informed consent, or approved review of patient records to identify instances where discourse analysis had been used.

Future implementation directions

As a preliminary intervention trial, this study highlighted changes to content and strategy that could be made in future iterations of the intervention to better facilitate use of linguistic discourse analysis in aphasia practice. As discussed above, the results of this trial suggested that the content of the intervention could address the use of discourse analysis more generally to provide participants with the knowledge to apply their skills across different clinical populations. Therefore, the workshop content and case examples could be amended to provide examples of analysis to language of children and adults with language difficulties other than aphasia. Additionally, the four intervention conditions could be collapsed to provide participants with the skills and knowledge to use all modes of linguistic discourse analysis in their practice. Changes to the implementation strategy are also recommended based on the results of the preliminary trial. The three-and-a-half-hour intervention session, although designed to improve the feasibility of intervention delivery, limited the amount of hands-on training and practice that participants received. A longer intervention would be

needed in future trials to ensure participants received more skill-based training particularly targeting the use of computer software for transcription and analysis. An online training module may also be used to extend exposure to training and counteract the effects of skill decay. Finally, an intervention trial within clinical settings, recruiting experienced speech pathologists as participants, would assist in identification of setting specific barriers and problem-solving to better facilitate effective and lasting implementation.

Clinical implications and conclusions

Assessment outcomes of a preliminary intervention strategy indicate that linguistic discourse analysis provides important additional information to the assessment of language in aphasia. When speech pathology students were trained to use discourse analysis in addition to psycholinguistic assessment, they demonstrated improved consideration of discourse-level language production. The effects of discourse assessment were maintained when discourse analysis was trained and completed by a judgement-based transcription-less method or a transcription-based approach. The content of discourse analysis training, therefore, may emphasise any mode of analysis to facilitate integration of goals and therapy approaches targeting language in use into aphasia practice, leading to services that better meet the needs and expectations of clients with aphasia.

This preliminary trial of the implementation strategy offered valuable feedback to guide a more comprehensive approach to implementation in the future. After six-months, moderate maintenance of knowledge was observed. However, participants blended components of different transcription-based and transcription-less approaches to form an analysis to best suit their practise environment. Despite knowledge maintenance, implementation of skills to practice appeared limited. Participants reported ongoing intent to use linguistic discourse analysis in practice, although only one had in the period to follow-up perhaps due to a lack of opportunity. Overall, the combination of knowledge-directed education and training for skill acquisition and application was well received. The implementation strategy used in the intervention provided participants with knowledge and motivation to implement evidence into practice.

Note

1. Name has been changed.

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Appendix A

Detailed description of intervention workshop components

Workshop Component	Judgement-Based	Manual Transcription-Based	Computer-Assisted Transcription-Based	Automated Transcription-Based
Overview	A brief review of research addressing discourse analysis, why it is used, and how discourse may be affected by aphasia			
Discourse Sampling	Procedures used to elicit a discourse sample, including different discourse genres and how they affect the linguistic structures produced by the speaker			
Transcription	None	Manually by clinician from recording	Using voice-to-text software, with manual corrections	Outsourced to commercial transcription service
Coding of Transcript	None	At the discretion of the clinician	Detailed and specific coding required for analysis	At the discretion of the transcription service
Selecting Measures	Methods used to determine what linguistic behaviours to analyse: guided by formal assessment, acknowledging concerns of the client and family, and measure used frequently by researchers and clinicians. All discussion focused on measures that addressed linguistic structure only (see coding domains in Appendix A)			
			Measure selection in terms of measures performed by computer software	
Analysis	Descriptive analyses (counting behaviours) and comparative analyses (comparing to reference sample) discussed and demonstrated to examine deficit and function (areas of communicative strength). Documentation of analysis also addressed.			
	Completed on observation, using professional knowledge.	Manual identification and counting of linguistic structures using pen and paper	Combines manual and automated methods of analysis	Use of computerised linguistic analysis software (SALT)
Interpretation	Training to guide interpretation of analysis outcomes using methods of triangulation, and application to goal-setting for patients with aphasia			

Appendix B

Evaluative statements used to measure participants' attitudes and opinions towards discourse analysis, and towards their assessment and management outcomes for the case study person with aphasia.

Assessment and Management Outcomes

Perception of Identified Features:

I feel confident with the linguistic features I identified
The linguistic features I identified are accurate

Perception of Goals Set

I have set goals that will benefit the person with aphasia

Perception of Therapy Approaches:

My therapy approach will target the linguistic features I identified
My therapy will aim to improve the persons' daily communication

Attitudes and Perspectives towards linguistic discourse analysis

Confidence and Competence:

I feel confident using discourse as part of an assessment of language in aphasia
I do not feel confident using discourse analysis as part of an assessment of language in aphasia
I feel more competent using discourse analysis to assess language in aphasia than I did before the training

Opinions on Discourse Analysis:

Detailed analysis of discourse is important for the assessment of language in aphasia
Discourse analysis is NOT a useful assessment for language in aphasia
I plan to use discourse analysis to assess aphasia in the clinic
I would recommend this education to other speech pathologists