Title: UK speech and language therapists' views and reported practices of discourse analysis in aphasia rehabilitation

Running head: SLTs' practices of discourse analysis in aphasia

Authorship: Madeline Cruice[1], Nicola Botting[1], Jane Marshall[1], Mary Boyle[2], Deborah Hersh[3], Madeleine Pritchard[1], Lucy Dipper[1]

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Contact details:
Dr Madeline Cruice
Associate Professor
Ph: +44 020 7040 8290
m.cruice@city.ac.uk

Dr Lucy Dipper
Associate Professor
Ph: +44 020 7040 4658
L.T.Dipper@city.ac.uk

Professor Jane Marshall
Ph: +44 020 7040 4668
J.Marshall@city.ac.uk

Professor Nicola Botting
Ph: +44 020 7040 8314
Nicola.Botting.1@city.ac.uk

Dr Madeleine Pritchard
Madeleine.Pritchard.1@city.ac.uk

[1]Division of Language and Communication Science
School of Health Sciences
City, University of London
Northampton Square
London EC1V 0HB
England, UK

Professor Mary Boyle
[2]Department of Communication Sciences and Disorders
Montclair State University
1 Normal Avenue
Montclair, New Jersey 07043
United States of America
Ph: 973 655 7356
boylem@montclair.edu

Associate Professor Deborah Hersh
[3]School of Medical and Health Sciences
Edith Cowan University
270 Joondalup Drive
Joondalup WA 6027
Australia
Ph: +61 8 6304 2563
d.hersh@ecu.edu.au

Abstract

Background: Discourse assessment and treatment in aphasia rehabilitation is a priority focus for a range of stakeholder groups. However, a significant majority of speech and language therapists (SLTs) infrequently conduct discourse analysis, and do not feel competent in doing so. Known barriers identified in other countries, specifically a lack of time, training, expertise and resources, affect use of discourse analysis in clinical practice.

Aims: This study investigates UK SLTs' reported practices and views of discourse analysis, barriers and facilitators, and clinical feasibility in aphasia rehabilitation.

Methods & Procedures: An online survey of 52 questions adapted from existing research and incorporating behaviour change literature was created for this study and piloted. UK SLTs working in aphasia rehabilitation for at least 6 months were invited to participate. Potential participants were contacted through national and local clinical excellence networks, a National Health Service (NHS) bespoke email list, national magazine advertisement, and the study was also advertised on social media (Twitter). Therapists read an online Participant Information Sheet and submitted individual electronic consent online; then progressed to the Qualtrics survey. Descriptive, correlational and inferential statistical analyses were conducted, and content analysis carried out on the questions requiring text.

Outcomes & Results: 211 valid responses were received from primarily female SLTs, aged 20-40 years, working full-time in the NHS in England, in community, inpatient and acute/ subacute multidisciplinary settings. 30% SLTs collected discourse analysis often, were mostly very experienced, and working part-time in community settings. Years of experience was predictive of use. Discourse was most often collected using standardised picture descriptions and recounts during initial assessment. Samples were infrequently recorded, and typically transcribed in real-time. Most SLTs (53-95%) reported making clinical judgements or manually counted words, sentences, communication of ideas and errors, and were confident in doing so. Barriers included time constraints; lack of expertise, confidence, training, resources and equipment; and patient severity. Discourse 'super-users' were distinguished by significantly higher professional motivation for discourse and workplace opportunity than other SLTs, and 'non-users' were distinguished by significantly less knowledge and skills in discourse analysis than other SLTs. SLTs reported a desire and need for training, new/ assistive tools and time to do more discourse analysis in practice.

Conclusions & Implications: Clinicians were highly engaged and relatively active in at least some aspects of discourse analysis practice. Interventions that target individual clinicians as well as organisations and systems are needed to improve the uptake of discourse analysis in practice.

What this paper adds

What is already known on the subject?

Discourse in aphasia rehabilitation is a priority in clinical practice and research. However, the majority of clinicians infrequently collect and analyse discourse. Research in Australia and the United States of America indicated that lack of time, assessment resources, and relevant knowledge and skills are the main barriers to use.

What this study adds

Compared to existing research, UK SLTs were more likely to see discourse analysis as part of their role and experienced fewer barriers, and more SLTs did it at least sometimes in clinic. However, practices were limited by a lack of training, giving rise to challenges in selecting and interpreting findings for clients. More use was predicted by more experience and commitment to discourse analysis, particularly where workplaces supported this approach. Less use was associated with less knowledge and skills in discourse analysis. Practice and decision-making were influenced by client factors and constrained to a lesser degree by logistical challenges.

What are the potential or actual clinical implications of this study?

Education and training in discourse analyses and in specific procedures are needed to improve individual clinicians' knowledge, skills and confidence in using discourse analysis for clients' rehabilitation. Equally, organisational and systems changes are needed to promote, support and reinforce discourse analysis in the workplace.

Keywords: discourse analysis; aphasia; clinical practice; speech and language therapist; survey

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Introduction

All key stakeholders in aphasia rehabilitation – researchers, people with aphasia, family members, clinicians, and professional bodies – have identified discourse as important and a priority in aphasia rehabilitation. Discourse measurement in aphasia research was the subject of a recent clinical forum in the journal *Aphasiology* (volume 32, issue 4, 2018) with 8 articles discussing the value and merits of discourse. Furthermore, it can be considered a means for evaluating effectiveness of aphasia rehabilitation. In their review of 57 randomised controlled trials (RCTs) of speech and language intervention, for 3002 people with aphasia, Brady and colleagues (2016) highlight that for treatments that aim to improve communicative ability, the primary outcome measure should reflect communication activity in real world settings. These outcome measures should evaluate functional communication skills, i.e. successful transmission of messages via spoken, written and/or non-verbal

modalities. Discourse analysis is considered an ideal primary outcome measure of functional communication and was used in 4 RCTs reviewed.

In an international study of 68 people with aphasia and family members from seven countries, Wallace and colleagues (2017a) identified priority outcomes for future aphasia rehabilitation research that included improved communication for people with aphasia. This included several outcomes relating to discourse: improved verbal and written expression, improved discourse at sentence level, to have normal and meaningful conversations, to have complex conversations including giving explanations and conversation via the telephone, and to be included in conversation and group conversations. In a related study of aphasia clinicians and managers, consensus was gained on an outcome pertaining to discourse, specifically that the person with aphasia can communicate more than their basic needs such as memories and opinions (Wallace *et al.* 2017b). It is unsurprising that people with aphasia have recovery of communication as a key goal of speech and language therapy, and similarly highlight the range of communication functions, from expressing basic needs to opinions (Worrall *et al.* 2011).

Finally, discourse treatment is acknowledged and recommended in the latest expert reviews and clinical guidelines. For example, the evidence-based and expert-endorsed best practice statements for aphasia rehabilitation recommend people with aphasia be offered therapy to gain benefits in communication in everyday environments, and treatment to improve word retrieval can include discourse treatment (Power *et al.* 2015). The *Canadian Stroke Best Practice Recommendations* recommend treatment to improve functional communication to include language therapy including production and comprehension of words, sentences, and discourse (Herbert *et al.* 2016).

To summarise in the words of Dietz and Boyle (2018), discourse assessment and treatment in aphasia rehabilitation research has reached the *tipping point* (p460). Discourse as a trend has permeated all stakeholder groups; it unites researchers, clinicians, clients, family members, and professional bodies in the collective quest to improve everyday communication outcomes for people with aphasia, and thus should shape service provision and research agendas. Despite this swell of interest and attention, the field is challenged by limitations in clinical expertise and the research evidence-base, which are discussed in turn below.

Several studies indicate that discourse analysis is not embedded in routine practice in aphasia rehabilitation and highlight reasons for this. The most relevant of these is the survey conducted by Bryant and colleagues (2017) of 123 aphasia clinicians in Australia, New Zealand, Canada, USA, and the UK regarding their clinical linguistic discourse analysis practices and views. Whilst a significant minority of clinicians (almost 40%) reported using discourse analysis *always* or *usually*, almost half the sample used it *sometimes* or *rarely*, and a fair proportion (14%) *never* conducted discourse analysis, citing lack of time, training, expertise, and resources as reasons, as well as it not being required by their employer (Bryant, Spencer and Ferguson 2017). Two thirds of clinicians reported that availability of clinical time influenced which discourse genres they sampled in assessment, and a significant minority (40%) cited availability of assessment resources. Lack of available clinical time affected transcribing a recording of discourse for most clinicians surveyed, and approximately one fifth felt they did not have the knowledge or skills needed for transcription, or believed it was not necessary to transcribe in order to adequately assess a

client. Thirty percent of clinicians felt competent using linguistic discourse analysis whereas just over 40% did not, citing lack of use, experience, knowledge and training. Clinicians identified the steps of transcription and analysis as significant barriers to undertaking discourse analysis, and more than two thirds wanted more time, access to assistive tools, and professional development opportunities in this field. These findings are to be viewed positively in the context of earlier research in Australia, where 70 clinicians reported more broadly on their aphasia management practices; the notable finding of relevance here was that only 2 of 180 assessments reported were instances of discourse analysis (Verna, Davidson and Rose 2009).

Low use of discourse analysis is not uncommon; Simmons-Mackie and colleagues' study (2005) of 94 North American clinicians reported 13 instances of discourse or natural speech analysis as an outcome measure for aphasia rehabilitation among 336 tools reported. This compares to 153 instances of linguistic and cognitive outcome measures, and 79 instances of functional communication assessments as outcome measures. Similarly, approximately half of an Australian sample of 188 aphasia clinicians reported limited knowledge and confidence in discourse approaches, and limited use in aphasia rehabilitation (Rose *et al.* 2014). Clinicians in this study also identified sentence level and discourse treatments as one of 18 priorities for future aphasia rehabilitation research (Rose *et al.* 2014).

Finally, it is useful to look to other adult language impaired populations. Frith and colleagues (2014) report on 265 speech pathologists' practices in five countries in the management of cognitive communication deficits in people with traumatic brain injury. Here they found that 44.3% of clinicians reported routinely assessing discourse; *more experienced* clinicians (>10yrs experience) were more likely to assess discourse; and that discourse and/or pragmatic skills assessment was significantly more likely to be conducted in the *community* setting, compared to other settings (Frith *et al.* 2014). Interestingly though, clinicians appeared to be primarily assessing discourse as pragmatic skills using formal assessments of perceived communicative ability and social perception, rather than undertaking linguistic discourse analysis e.g. word counts. In a qualitative study of speech pathologists treating people with non-aphasic acquired brain injury, Maddy and colleagues (2014) reported time constraints, lack of standardised data, and lack of formal education in discourse assessment and treatment as affecting clinicians' practices.

In summary, at best around 40% of clinicians routinely assess discourse of patients with aphasia in regular clinical practice; there are no agreed-upon assessment tools that are used; discourse is rarely measured as an outcome; most clinicians do not feel competent in conducting discourse assessment; and lack of time, expertise (including training), and resources are prominent barriers affecting use. Conduct of discourse analysis may vary based on geographical location (i.e. country), age of clinician, years of experience, and setting (Bryant, Spencer and Ferguson 2017; Frith *et al.* 2014), and where relevant these variables should be considered in future research.

There has been a paradigm shift in aphasiology away from measuring treatment effects at word and sentence levels and towards measuring treatment effects at the discourse level (Dietz and Boyle, 2018; see also six commentaries to this forum article). Whilst Brady *et al.* (2016) propose analysis of naturalistic discourse as the ideal gold standard for assessing spoken language production, inspection of studies' outcome

measures reveals that very few trials used discourse in this way with researchers preferring functional communication assessments. One likely explanation is the state of the current evidence base for psychometrics of discourse measures. Dietz and Boyle (2018) highlight that while there has been a proliferation in the *number* and *type* of discourse measures, with many idiosyncratic measures being developed, their reliability, validity and stability are unknown. As such, they may not be appropriate for research purposes, let alone able to be transferred into clinical practice (Dietz and Boyle 2018). Indeed, Pritchard and colleagues (2017) concluded that discourse information measures lacked the psychometric quality needed to justify their use as sole diagnostic or outcome measurement tools in aphasia. In their review of 76 studies (48 descriptive, 27 treatment), they found #Correct Information Units (CIUs) and #main concepts to be the most reliable, and #CIUs and % main concepts with strongest known groups validity, out of 58 different discourse information measures considered (Pritchard *et al.* 2017). Dietz and Boyle raise an urgent call to arms for considered investigation of outcome measures that consider levels and genres of discourse, and that demonstrate appropriate psychometrics, so that collectively the emerging evidence base can be accumulated across studies effectively.

A further challenge is that reviews show a lack of consensus in the field about which are the best discourse measures to use (Bryant, Ferguson and Spencer 2016) and studies adopt numerous measures with no clear indication of preference (Pritchard *et al.* 2017). Bryant *et al.* reviewed 165 studies (78 descriptive, and 87 treatment) and counted 536 different measures of linguistic elements, spanning language productivity, information content, and grammatical complexity. As highlighted above, Pritchard *et al.* reviewed 76 studies and counted 58 functional and structural discourse measures. The variability in process and outcome illustrated by these studies makes clear the lack of consensus in discourse analysis in research, which in turn provides no direction or guidance for practitioners wishing to assess and treat patients' discourse in rehabilitation. It is of interest then in the current research to see what measures of discourse clinicians use in practice. Some consensus does exist on elicitation stimuli and genre though. Most studies used only structured language samples, mostly typically elicited using the Cookie Theft Picture Description and the Cinderella fairytale telling from a wordless picture book; and narrative was the most common discourse genre, although exposition, procedure and conversation were also identified (Bryant *et al.* 2016).

The study described here is one phase within a multi-phase developmental research study seeking to establish proof-of-concept of a novel discourse intervention for people with chronic aphasia using personal narratives. Core to the future successful implementation of any novel intervention in routine practice (once tested for efficacy) is an understanding of the capacity of the existing workforce in adopting the intervention and how it interfaces with current practice, preferably underpinned by theory, and in this case, a theoretical understanding of behaviour change and professionals' behaviour (Michie, Atkins and West, 2014). The field of behaviour change acknowledges that "*changing the incidence of any behaviour of an individual, group or population involves changing one or more of the following: capability, opportunity and motivation, relating to either the behavior itself or behaviours that compete with or support it*" (Michie, Atkins and West, 2014:60). Clinicians' views or beliefs can help or hinder behaviour i.e. whether they analyse aphasic clients' spoken discourse. We drew specifically on the Theoretical Domains Framework (TDF; Cane, O'Connor and Michie 2012) as a means of framing clinicians' current and future behaviour.

Knowing clinicians' perceived capability, opportunity and motivation for discourse analysis informs researchers' design and delivery of subsequent interventions e.g. education and training. To this end, we undertook a scope of practice study investigating current practices in discourse analysis by practising UK therapists in any setting involving aphasia rehabilitation with the overall aims to:

1. Characterise speech and language therapists' (SLTs) current practice of discourse analysis and its application in management of clients with aphasia (i.e. to what extent SLTs use discourse analysis; how they elicit, prepare and analyse discourse);
2. Explore facilitators and barriers to using discourse analysis in the clinical setting (i.e. what helps and hinders actual use, as well as therapists' views and beliefs which can help or hinder); and
3. Explore potential clinical feasibility of discourse analysis (i.e. questions pertaining to the extent to which SLTs would be prepared to spend time eliciting, transcribing, and analysing discourse).

As there is some indication that experience and stage/ continuum of care influence use (Bryant, Spencer and Ferguson 2017; Frith *et al.* 2014), we hypothesised that clinicians who were more experienced (>10years) and clinicians in community settings would conduct discourse analysis more frequently than those who are less experienced or working in other settings. Similarly, because of the known barriers (Bryant, Spencer and Ferguson 2017), we hypothesised that clinicians who reported available clinical time, available resources, and considered themselves skilled in discourse analysis would conduct discourse analysis more frequently.

Methods

Design

We used an open web-based survey in the Qualtrics platform to reach a large cross-section of speech and language therapists. Our reporting meets the recommended reporting guideline CHERRIES (Eysenbach 2004) and is detailed in Supplementary Material 1.

Participants

Individuals were eligible to participate in the study if they were (1) a qualified speech and language therapist registered with the Health and Care Professions Council; (2) currently working in aphasia rehabilitation in the United Kingdom (or had worked within the last 6 months to accommodate individuals between posts or on leave); and (3) had been practising in the UK for 6 months or more.

Survey Design

The survey was adapted from Bryant, Spencer and Ferguson (2017) who provided their survey questions via personal communication. Participant background information was adapted to be relevant to terminology used specifically within the UK, and minor alterations were made to wording throughout the survey following team review. The two novel

sections added for our study are explained in the next paragraph below. The survey had 52 questions across 10 sections (three about process and seven about content) as well as two information screens explaining the screening process and defining discourse for this study (Appendix 1). The first section was screening (3 questions); the ninth section was survey submission; and the tenth section was an optional invitation to participants to answer two questions on how they heard about the survey, and whether they wished to share anything with the research team e.g. any difficulties experienced when completing the survey, or something further that had occurred to them during the survey where there was no opportunity to reflect this in the predetermined survey questions. Content sections comprised: Participant demographics and clinical background; Frequency of use of discourse analysis; Methods used to collect samples for discourse analysis; Preparation of discourse samples; Analysis measures and methods applied to discourse samples; Feasibility of discourse analysis in the clinical environment; and Perspectives on discourse analysis in aphasia.

Novel sections on feasibility and perspectives were created for this study. As lack of available clinical time was identified as a substantial barrier (Bryant, Spencer and Ferguson 2017), it warranted further investigation in this study. *Feasibility* thus explored length of time that respondents estimated they spend in preparing, administering, scoring, interpreting, and goal planning from *standard* language and communication assessments, to understand the context in which a novel discourse package (assessment, treatment, outcome measurement) could be conceived in the clinical setting. *Perspectives on discourse analysis* was inspired by the behaviour change and TDF literature. Drawing on the research of Huijg and colleagues (2014), survey questions probed nine theoretical domains, and are referred to hereafter in relation to the broader three constructs that are known to affect behaviour change. The first was Capability, covered by three questions (8.1; 8.2; 8.9) which asked about respondents' awareness of discourse analysis, skills in discourse analysis, and whether or not they followed a protocol[1]. The second was Opportunity, which was covered by four questions (8.7; 8.8; 8.10; 8.11). These covered support in the workplace, the availability of resources and of time[2]. The third was Motivation, which was covered by four questions (8.3-8.6) exploring feelings associated with discourse analysis and the degree to which this was perceived as part of the respondent's role[3]. Other questions in the survey additionally addressed theoretical domains e.g. respondents' confidence (Belief in capabilities) and resources (Environmental Context and Resources).

The majority of survey questions were designed for respondents to select either a single response, or multiple responses (*tick all that apply*). One section used a Likert scale of agreement; and two survey questions required a free text response (Q5.3 and 6.3). Branch and skip logic were used to move respondents efficiently through the survey, for example by omitting questions that were rendered irrelevant by prior responses (see Appendix 1). Branch logic was used to move respondents answering 'Never' to Q3.1 *how often they collected and used analysis of discourse samples* through then irrelevant questions to section 7.3 to complete remaining relevant questions. Skip logic was also employed at Q3.2 and Q9.1 (see Appendix 1). The two open text questions were not compulsory; otherwise,

[1] These questions tapped the Knowledge, Skills, and Behavioural Regulation theoretical domains.
[2] These questions tapped the Social Influences, and Environmental Context and Resources theoretical domains.
[3] These questions tapped the Emotion, Social/Professional Role & Identity, Beliefs about Capabilities, and Belief about Consequences theoretical domains.

all questions were mandatory, and respondents were prompted to complete any questions before progressing to the next page. The survey was piloted with several speech and language therapists on paper and in Qualtrics including trialling across devices (desktop, laptop, tablet, mobile) and operating systems (Microsoft Windows, and macOS). Minor adjustments were made following piloting, for example reducing the length of the definition of discourse (to improve likelihood respondents read it rather than moving on) and improving the clarity of wording of questions.

Recruitment and Data Collection

The study was approved by the Division of Language and Communication Science Proportionate Review Ethics Committee, City, University of London on 07/08/2018. The Participant Information Sheet (4 pages) and Consent Form (1 page) were online, and once the respondent had given named and dated electronic consent, they then progressed through to the survey itself. This was a separate file in Qualtrics ensuring unlinked data and that anonymity of respondents was preserved. The survey was open from 10/08/2018 to 04/12/2018. Potential participants were targeted strategically through organised professional networks, Twitter (@LUNA_Aphasia) project handle and authors' personal account handles) and the project website (blogs.city.ac.uk/luna), and a National Health Service (NHS) Expression of Interest email list created specifically for the broader research project. Organised professional networks included (1) British Aphasiology Society (BAS); (2) the Royal College of Speech and Language Therapists (RCSLT) Clinical Excellence Networks (CEN) – South West Aphasia CEN, Stroke East CEN, West Midlands Neuro Rehabilitation CEN, Aphasia Therapy CEN, ABICEN, London Adult Neurology CEN, and Northern Ireland Acquired Communication Disorders CEN; and (3) the RCSLT Hubs network Basecamp messaging system. The survey was also advertised by a quarter page print advertisement in the RCSLT professional monthly magazine *Bulletin*. An NHS emailing list was created from the 60 expressions of interest submitted by SLT Managers/ Therapy Leads. Information regarding the survey including the Qualtrics survey link was emailed to representatives from each organisation and to the nominated email addresses of NHS managers, as well as posted on the project website and tweeted. Representatives agreed to cascade information to their emailing lists and/or include it in newsletters. Monthly reminders including updates on survey completion numbers were provided to contacts throughout the live period.

Data Analysis

Data was exported from Qualtrics into Microsoft Excel and reviewed. Incomplete i.e. un-submitted responses were removed from analysis, in line with project ethics and participant information sheets, which stated that only complete and submitted responses would be analysed. The section at which individuals stopped responding was noted (see footnote 4). Detailed descriptive statistics are provided in Supplementary Material files, with main findings reported in the Results. Percentages reported in the text are rounded to the nearest whole number. Data were analysed using chi-square analyses, ANOVA and regression analyses where appropriate. The large number of participants meant that parametric analyses were robust even where the measures were ordinal in nature. Free text responses for questions 5.3 and 6.3 and free text options (i.e. *Other* responses throughout

survey) were copied to Microsoft Word and content analysis applied (Hsieh and Shannon 2005), analysed by authors DH and MC with peer debriefing conducted with the team. Content analysis, a research method used to analyse text data, was used in two ways with the survey data. Question 6.3 elicited some list-type responses which were analysed quantitatively through counting occurrences and descriptive statistics. Open, free-text responses were read through several times and analysed qualitatively using conventional content analysis and inductive, thematic category development (Renz, Carrington and Badger 2018).

Results

A total of 269 responses was recorded in Qualtrics of which 211 responses were eligible and complete (ineligible or did not respond to eligibility screening questions n=15; incomplete n=43[4]). The majority of the sample was female (96%), aged 20-40 years, working in England, in the NHS (78%) and in multidisciplinary teams (86%), in full time positions (57%), and mostly in community, inpatient rehabilitation, or acute/subacute settings (Table 1). There was a good range of educational background, years of clinical and aphasia experience, and aphasia representation on caseloads. Respondents with less experience in aphasia (<5yrs) tended to work in acute/subacute and inpatient settings, and respondents with more experience (16+yrs) tended to work in other settings mainly community. Within the sample, 167 respondents completed optional Q10.1, which explored how they knew about the survey: via a RCSLT CEN (n=58), email correspondence forwarded on by work colleagues and managers/leads (n=50), Twitter (n=31), NHS EOI email list (n=29), BAS (n=25), and RCSLT HUB communication (n=8), and *Bulletin* advertisement (n=3) (the question allowed more than one option to be selected). Participants took on average 31 minutes and 9 seconds to complete the survey.

Research Aim 1: Current Practice

Thirty percent (30%) of respondents collected and used discourse analysis often (i.e. *always* and *usually*), 37% *sometimes* used discourse analysis, and 32% used it infrequently (i.e. *rarely* and *never*) (Figure 1 and Supplementary Material 2). These three subgroups can be considered Super-users, Users, and Non-users. Super-users were most likely to be part-time and/or community-based[5] therapists with many years' experience of aphasia[6] (16+). However, a significant minority (30%) were full-time, hospital-based[7] therapists with less than 16 years' experience (Figure 2). When age, qualifications, work setting, part vs full-time, NHS vs non-NHS and years of aphasia experience were entered into a stepwise regression analysis, only years of experience with aphasia was a significant predictor of discourse analysis use in practice, and this factor only explained 2% of the variance in discourse analysis use (adj.r2 =0.024, F(1,210)=6.24, p=0.013, □=0.17). Subsequent analysis

[4] 4 respondents exited at Demographics, 9 at Frequency, 7 at Methods, 6 at Preparation, 7 at Analysis, 4 at Feasibility, 4 at Perspectives and 2 at Optional thereby indicating no specific pattern for attrition.

[5] Community comprised Early supported discharge, Community, Private Practice, Not-for-profit organisations, University and Other

[6] Response to survey question 2.6

[7] Hospital comprised Acute/subacute, and Inpatient and Outpatient rehabilitation

also showed no significant interactions between years of aphasia experience and the other factors.

Insert Figures 1 and 2 about here

Elicitation and Genres

The majority of respondents collected discourse samples within an initial assessment battery (~70%). Standardised test picture descriptions i.e. Cookie Theft were most used approaches for collecting discourse samples (92%). Self-devised protocols were used by 27% of the sample and are summarised as follows. Respondents used picture description that was informal/ complex/ composite/ sequenced and drew on local and Trust-specific pictures or used published resources (n=13). They also used personal narratives or recounts (n=7 e.g. tell about work/ family/ favourite memory or topic/ hobby/ holiday or events that happened during the week); procedural recounts (make a cup of tea, scrambled eggs, change a tyre; n=5); and informal/ bedside language or communication screening assessments (n=5). Some also described a combined-samples approach (n=7) such as video story retell and procedural narrative, or non-standardised picture description and autobiographical discussion. There were single instances of informal discussion and conversation, use of magazines, retelling a children's story, and use of a rating scale by patient and clinician. One response was notable for its creativity: "*Use a video making app on my iPad which asks 'icebreaker' type questions and records the person's answer - it is not an app for aphasia - just a generic 'fun' movie maker app"* (ID93). *Other* approaches were reported (n=24) and overlap was noted with the previous response option content. Approaches and elicitation tasks not already mentioned were discourse subtests from the Measure of Cognitive-Linguistic Abilities (MCLA: Ellmo, 1995), spontaneous speech samples based on news, dinner party narratives, describing Pixar short films, recalling Cinderella fairytale, and references to the methods of the Novel Approach to Real-life communication: Narrative Intervention in Aphasia (NARNIA: Whitworth *et al.* 2015) and Promoting Aphasics Communication Effectiveness (PACE: Davis, 2005).

Picture description, recount (personal and procedural), and conversation were the main genres of discourse used by respondents (Figure 3). *Other* methods (group conversation, video retell) were reported by 5%. Diagnosis and prognosis of the client (51-73%) as well as time constraints and availability of resources (48-53%) influenced respondents' sampling choices. A significant proportion (27%) reported *other* influencing factors, primarily related to the client (n=38), and to a lesser degree to the value of discourse analysis to the rehabilitation process (n=9, goals and purpose of assessment, aim of intervention, and implications for or usefulness of in guiding therapy). Client-related factors included: goals/ priorities/ concerns; abilities (including language/ aphasia severity, cognitive ability, medical status, health, stamina, confidence); interests (likes, dislikes, hobbies); and needs.

Insert Figure 3 about here

Purpose of discourse analysis

The majority of respondents collected discourse within initial assessment, however 42% also used discourse analysis to follow up from standardised results. Respondents used analysis

primarily to contribute to profile strengths and difficulties (92%) and clients' goal setting (94%), and less for diagnosing type and/or severity of aphasia (62%) and measuring intervention outcomes (68%, see Supplementary Material 2).

Recording and transcription

A minority of respondents recorded samples (16-33%, see Supplementary Material 2) with transcription in real time being most favoured (69%) and analysis in real time *without transcription* also popular (36%). Respondents used *Other* to provide more detail about frequency and equipment used in recording. Once collected, making a clinical judgement of language ability was most favoured (95%) and detailed analysis was undertaken by only 16%. Most respondents *rarely* (48%) or *never* (18%) transcribed with only 5% transcribing *usually* or *always* (see Figure 1). The majority (75%) undertook their own transcription and 6% used other means including SLT or rehabilitation assistants, students, or paid research assistants.

Analysis of Discourse Samples

Manual counting (53%) and information and fluency judgements (37%) were the most frequently reported analytical procedures, with the majority (61%) following no specific procedure (Supplementary Material 2). One respondent used a known protocol, and there was no use of computerised procedures. Data from closed question 6.2 (Figure 4) and open-ended question 5.3 (*What are you looking or listening for in clients' discourse*? Supplementary Material 4) largely mirrored each other. The vast majority of respondents (85-98%, Figure 4) analysed word finding difficulties (WFDs), word classes, use of content words, sentence structure, communication of ideas, and errors. Story structure and cohesion were analysed by three quarters of respondents, and efficiency least analysed (50%). *Other* responses (6%) included using test guidelines, criteria, and rating scales (Comprehensive Aphasia Test, Quick Aphasia Battery, MCLA) and protocols (Profile of Word Errors and Retrieval in Speech; Nicholas and Brookshire). Respondents identified the three discourse behaviours they were *most* and *least* confident in analysing accurately (Q8.12 & 8.13, see Supplementary Material 2). Considering both questions together, respondents were: (1) most confident in analyzing WFDs, word classes, and communication of ideas; and (2) least confident in analyzing efficiency, cohesion, morphology, story structure, and lexical diversity. Analysis confirmed that respondents were significantly more confident at word level analysis (WFDs and word class) reliably choosing these behaviours in their top three more often than other behaviours (Friedmans'Cochran $Q(12)=629.08, p<0.001$) and significantly less confident at morphology and story structure behaviours choosing these reliably more often in their bottom three behaviours (Friedman's Cochran $Q(12)=559.77, p<0.001$). Super-users were more likely to analyse cohesion (56/64; 87.5%) than other respondents in the sample (93/147; 63.2%) (Fisher's exact $p<0.001$). None of the confidence variables was associated with whether respondents transcribed or not.

Insert Figure 4 about here

Qualitative findings echoed respondents' emphasis on words, sentences and errors as per above but also demonstrated that respondents considered a number of factors when doing discourse analysis. These included: a broader range of macro-structure behaviours specifically completeness of information, sequencing of ideas, coherence and ability to convey gist; and novel[8] behaviours such as (1) awareness and insight (of own language and listener's needs, self-monitoring, use of strategies, self-corrections, problem solving, success of self-repair, and ability to use strategies when prompted); (2) spontaneous or prompted use of strategies and effect/success of these; and (3) effectiveness of functional ability to convey message and also pragmatics (topic selection, maintenance, repair, and non-verbal behaviours and other modalities). Respondents were also mindful of wider factors, for example evidence of cognitive influences (attention, orientation, memory, and sequencing), emotional aspects (confidence, frustration, distress), and co-occurring difficulties (e.g. dyspraxia, dysarthria, sensory impairment). Respondents (n=202) indicated the following frequency of use: MLU (n=42, 21%), main concepts (n=31, 15%), CIU (n=22, 11%), story grammar (n=18, 9%), coherence (n=10, 5%), and TTR (n=6, 3%). Respondents also described their own measures, the most frequent of which were information carrying words (n=11) and grammar (n=6). Many did not respond to this question n=37) and many responded indicating none/ not applicable (n=54).

Research Aim 2: Barriers and Facilitators

The main barriers to collecting samples were time constraints (78%), lack of expertise (43%), lack of training (39%), and no access to computer hardware or software (38%, see Supplementary Material 3). *Other* main reported barriers were aphasia severity (severely impaired patients who have no verbal output or limited to single word output) and clinician's judgment or impression (not considered applicable, appropriate or necessary for the patients'/clients' abilities or goals, not relevant or appropriate for patients in the acute setting). Additional individual barriers included lack of knowledge, skills and confidence in discourse analysis and using findings to inform treatment planning; unclear about evidence base for discourse therapies compared to other therapies; and lack of an appropriate space to listen back to recordings.

Nearly all aspects of the analysis process were barriers for the majority: transcribing (55%), selecting (71%) and completing (67%) the analyses, and interpreting the results (54%). *Other* reported barriers included lack of time, no recording equipment (e.g. negative experience of equipment loss in one trust meant staff not supported to collect recordings), and challenges in storing audio recordings and/or written transcripts in electronic patient systems. Barriers also included perceived inappropriateness of discourse analysis for acute patients/ patient's abilities, uncertainty about how to use information gained or how relates to therapy approaches, and highly individualised challenges e.g. *"hospital requirements to complete formal mental capacity assessment prior to consent to audio record, and also gain agreement of patient's consultant psychiatrist.....very time consuming"* (ID199).

Respondents reported needing mainly professional development training (76%), access to assistive tools (74%), more time (71%), and new analytical tools (54%) to increase use of discourse analysis in the clinic (Supplementary Material 3). *Other* suggested

[8] Novel in that these were not listed in the possible options presented in Q6.2

facilitators included: equipment for voice recording of samples and making this easier, faster computer-based analysis, administration support for transcribing, addressing storage issues within electronic patient record systems, online training updates, evidence of value to warrant changing current approach, support from team lead, and increasing the priority for clinician and client.

Responses to TDF-framed questions (Qs 8.1-8.11) show clear barriers and facilitators. Data are reported below in a series of three figures with the theoretical domains categorised according to Capability, Opportunity and Motivation (see Methods: *Survey design*). Questions within each were summed to create total scales. Statistical analysis of these three scales showed borderline acceptable internal consistency (Cronbach's α=0.65, 0.72 and 0.60 respectively) and so total scale findings (further below) should be treated with caution. Considering Capability (Figure 5), awareness was a facilitator for 47% of the sample, sufficient skill was a facilitator for 35%, and lack of a protocol was a clear barrier for the majority (84%). Regarding Opportunity (Figure 6), insufficient resources (including time) was a clear barrier for 61-68%, more than half of the sample had mixed views about workplace support (51-58%), and encouragement and collegial support was a facilitator for only 15-22%. With respect to Motivation (Figure 7), cultural acceptance of discourse analysis was a clear facilitator (83-90%), lack of confidence was a barrier (47%), and respondents varied in how they felt (confused/ frustrated or not) in response to completing discourse analysis. Although above and below the Capability, Opportunity and Motivation findings are calculated and analysed independently, this separation does not reflect the interplay of factors as demonstrated by participant ID209 unsolicited[9] quote:

> *Every stroke patient you meet says "I just want to be able to talk again". In reality this means discourse, but my pre-reg training was very focused on single word level interventions and not discourse, so it's so hard to know a time-efficient and clinically evidence-based approach for discourse analysis. I'm highly motivated to do it, but time-poor and would really value training.*

Three independent one way ANOVAs comparing subgroups (Super-users, Users and Non-users) on the 3 scales revealed significant differences for Capability ($F(2,210)=7.2, p=0.001$); Opportunity ($F(2,210)=5.2$, $p=0.006$) and Motivation ($F(2,210)=11.5$, $p<0.001$). Post-hoc Scheffé analyses showed that for Capability, Non-users felt significantly less capable than Users ($p=0.024$) and Super-users ($p=0.002$) with no difference between the Users and Super-users ($p=0.56$). For Opportunity, Super-users reported significantly more opportunity than Users ($p=0.032$) and Non-users ($p=0.013$), with no difference between the Users and Non-users ($p=0.91$); and this pattern was also seen for Motivation where Super-users reported significantly more motivated than Users ($p=0.004$) and Non-users ($p<0.001$), with no difference between Users and Non-users ($p=0.32$).

Insert Figures 5, 6, and 7 about here

Research Aim 3: Clinical feasibility

[9] Respondent wrote this in the optional survey section 10

Respondents reported on their general *language and communication assessment* practices to provide context for clinical feasibility of discourse analysis/ assessment. Focusing on modal responses, respondents spent 30-60 minutes on preparing and administering assessments, 15-30 minutes on scoring and interpretation, and 15-30 minutes on planning subsequent therapy goals (Figure 8 and Supplementary Material 4). Various factors affected assessment practice, the main ones being respondents' experience (87%) and knowledge of assessments (81%), communicative ability of clients (84%), availability of tools (77%), and session time and administration time constraints (77% and 55% respectively, see Figure 9). *Other* reported factors related almost entirely to the client (goals, needs, priorities, views, abilities, mood, cognition, medical status and ability to engage in assessment, time post onset), purpose and aims of assessment (including how they link to goals of treatment often indicated as functional goals and practicality and usefulness to the patient), request from multidisciplinary team, extra time available in private practice, and extreme time constraints imposed in order to meet referral to treatment targets. Finally, based on a hypothetical scenario – i.e. a comprehensive discourse analysis package that included preparation, administration, scoring, interpretation, and therapy goal identification – the main findings were that 40% of respondents would be prepared to spend up to 90 minutes in practice implementing it, and 35% would be prepared to spend up to 60 minutes only (Supplementary Material 4).

Insert Figures 8 and 9 about here

Main Findings Summary

According to self-report, 30% of respondents collected and used discourse analysis often. These respondents were mostly very experienced and working part-time in community settings, although a small group within these were less experienced and working full-time in hospital settings. Years of aphasia experience was predictive of discourse analysis use, however most variance (98%) in frequency of use remained unexplained. Respondents used discourse analysis mainly to profile client's abilities and set goals, and less for diagnosis and outcome measurement. Seventy percent (70%) of respondents collected discourse samples within an initial assessment battery using standardised test picture descriptions; other common genres included personal and procedural recounts. Factors relating to the client and to availability of resources influenced genre sampling choices. Few respondents recorded samples (<33%); as such transcription in real time was most favoured (69%) and carried out rarely (48%) with only 5% transcribing regularly. Analysis without transcription was also popular (36%). Most respondents made clinical judgements (95%) with detailed analysis carried out by only 16%. Most respondents followed no procedure for analysis and undertook manual counting of structures and/or made clinical judgments about information and fluency. Small numbers of respondents (<20%) calculated mean length of utterance (MLU) and CIUs and counted main concepts and story grammar. Most respondents analysed word finding difficulties (WFDs), word class, use of content words, sentence structure, communication of ideas, and errors, and were confident in analysing word level behaviours. Respondents also considered macro-structure discourse level behaviours, awareness and insight, strategy use, effectiveness of functional ability, and other influences (cognition,

emotion, and co-occurring communication disorder or sensory impairment). All aspects of the analysis process were barriers for more than half the sample, but notably selecting and completing the analyses were the most prohibitive. Several barriers to conducting discourse analysis in aphasia rehabilitation were revealed, the most substantial of which was time constraints (78%). Other barriers included a lack of expertise, confidence, training, and resources/ equipment, and not having a set protocol to follow. Patient aphasia severity and clinician judgment of discourse goals as *not applicable* to patient were also influential. Respondents were also uncertain about workplace support and encouragement to carry out discourse analysis, and similarly varied in emotional response to discourse analysis. More than half the respondents wanted training, assistive tools, more time, and new analytical tools. Most respondents considered discourse analysis within the SLT role and important in overall management. Discourse analysis Super-users (the 30% *usually* or *always* carrying it out) reported higher scores on the Opportunity and Motivation scales than other respondents. Non-users (the 32% *rarely* or *never* carrying it out) reported lower scores on the Capability scale than other respondents. Finally, respondents spent between 60-120 minutes preparing, administering, scoring, interpreting and setting goals from language and communication assessments. This time was influenced by clinicians' experience and knowledge of assessments, clients' communicative ability, availability of assessments, and time available (session and administration). Ultimately, 35% of respondents wanted discourse analysis to take no more than 60 minutes, and a further 40% were prepared to spend up to 90 minutes in the clinic implementing a new discourse package.

Discussion

Findings are first considered in the context of existing literature, then the novel contributions of this study are highlighted and explanations for findings are offered. It is plausible that discourse analysis in aphasia assessment is increasing. Earlier research studies in Australia and North America indicated that only 1-4% reported assessment or outcome measures were discourse related (Simmons-Mackie, Threats and Kagan 2005; Verna, Davidson and Rose 2009). In the current study, 30% of SLTs regularly collected and used discourse analysis in aphasia assessment, and Bryant *et al.* (2017) found 37% of SLTs did this. A confound here is the different study designs, wherein earlier research asked clinicians to report on *broader* aphasia management practices and may have attracted different clinicians volunteering to participate than those clinicians interested in discourse surveys. Nonetheless, researchers have noted an increase in the use of discourse analysis in aphasia research over time (Brady *et al.* 2016; Bryant, Ferguson and Spencer 2016; Dietz and Boyle 2018), and recent clinicians' consensus research also emphasises dyadic communication as a priority outcome in aphasia treatment (Wallace et al., 2017). Similar to Frith *et al.*, regular discourse analysis was more likely to be carried out by more experienced SLTs (significant in our study; trend in Frith *et al*.) and those based in the community (significant in Frith et al.; significant but not in regression in our study). There may mediating or confounding factors for the effect of increased experience. SLTs who are more experienced may have had more time to develop their expertise in discourse analysis, may have had more opportunity to engage in training, may consider discourse more suited to tracking long-term outcomes for clients with aphasia, and finally they may have had different educational experiences. Overall though, whilst experience was a significant predictor in our study, it accounted for only 2% variance, so most variation in practice remains unexplained.

Our findings indicate more UK SLTs did discourse analysis *sometimes* compared to Bryant *et al.* (2017) and 10-20% less considered time, training and resources as barriers in doing so. Genre sampling choices were largely similar to Bryant *et al.*, although there was more use of recounts and less use of conversational samples by UK SLTs. Recording and transcription practices, and main analytical practices (manual counting and following no procedure) were similar across both studies. Contrastingly, there was no use of any formal protocol or any computerised analytical approaches in the UK SLTs compared to Bryant *et al*. where 12-25% used these. The general pattern for more word category analyses and fewer discourse (story structure and cohesion) category analyses is similar across studies, however 15-20% more UK SLTs analysed sentence structure, communication of ideas, word classes and content words compared to Bryant et al; and ~10% fewer UK SLTs calculated MLUs and CIUs. Regarding beliefs, 33% more UK SLTs perceived discourse analysis important to the SLT role and subtle differences in question wording may likely to explain this finding. Similar proportions felt skilled in discourse analysis, and whilst similar proportions considered transcribing and completing discourse analyses a barrier, 15-30% more UK SLTs consider selecting and interpreting the analyses for clients a barrier. More time, tools and training are recognised as needed to enable more discourse analysis in future practice, however UK SLTs emphasised training more than time with the reverse seen in Bryant *et al*. Available clinical time is a substantial factor influencing practice in both studies. We posit national differences between samples, wherein UK SLTs considered discourse analysis more their role and experienced barriers a little less than Bryant's sample, thereby more did it at least sometimes in clinic. However, UK SLTs' practices were limited by a lack of training generally and specifically in formal protocols, giving rise to challenges in selecting and interpreting findings for clients and subsequently emphasising training needs.

The predominant picture emerging from the UK is that clinicians collected discourse samples via standardised test picture descriptions and recounts during initial assessment, which were sometimes or infrequently transcribed, but analysed nonetheless by manual counting or judgments made of word level behaviours, sentence structure, communication of ideas and errors, and clinicians were confident in doing most of these accurately. Less formal practices were perhaps deemed suitable for profiling and goal setting which were the main purposes of discourse analysis in this study. Substantial barriers were noted. All aspects of discourse analyses were challenging with some likely to be influenced more than others by a simultaneous lack of expertise. This is coupled with time constraints and a lack of resources including actual recording equipment as well as assistive tools to speed up discourse practice. In the face of such challenge, it is heartening to see so much discourse sampling and analysis actually undertaken by those surveyed. Overall though it would seem that detailed linguistic discourse analysis from a transcript following an established protocol (undertaken typically by an experienced analyst with adequate time and resource) is a gold-standard practice largely reserved for research. Several aspects are worthy of discussion here in contrasting clinical and research practice.

Clinicians sampled the top three most frequently reported discourse genres used in research studies namely single picture description, personal recount and procedural recount (Bryant, Ferguson and Spencer 2016). There was however much less use of fictional story retell by clinicians compared to researchers which is no doubt explained by the different purpose that discourse samples are intended to serve in these two contexts. It is noted that

sampling across multiple discourse genres is desirable and demonstrated in practice (Bryant *et al.* 2017) and a common feature of research (Bryant *et al.* 2016). Our findings (see Figure 3) indicate that the most popular genres were each assessed by over 80% of respondents, indicating that there was at least a degree of sampling across genres in the current study. Genre is known to impact on semantic and syntactic performance in speakers with and without aphasia (Dipper *et al.* 2018).

In both research and clinical practice, transcription was typically completed manually, and there was similar limited use of computerised analysis tools. In stark contrast to research, *verbatim* transcription in the clinic was limited to just half the sample, with most clinicians making judgements rather than undertaking detailed analysis. Interestingly, transcription-less approaches to discourse analysis have been previously mooted. Armstrong and colleagues (2007) trained final year SLT students for 5 hours in a transcription-less method which students then applied to three discourse tasks from individuals with aphasia. The transcription-less analysis was then compared to transcription-based analysis, with positive results in both terms of validity and reliability. However, this positive finding does not yet license researchers and clinicians to analyse discourse without first transcribing because of the restricted measures explored in that study. With the exception of concept use, there is little overlap between measures in Armstrong *et al.* (2007) and the current study as well as both studies by Bryant and colleagues (2016, 2017). As such, transcribing rather than not transcribing should remain a preferred step in the discourse analysis process until demonstrated otherwise.

Regarding categories or measures of discourse behaviours, clinicians were much more interested than researchers (Bryant *et al.* 2016) in analysing WFDs, story structure or schema, and cohesion; similar to researchers in analysing syntactic complexity or sentence structure; and much less interested than researchers in analysing sample length. Note that the latter is the *most frequently reported* measure across the studies reviewed by Bryant *et al.* (2016). Similar to research, in the clinic there is a tendency to analyse multiple discourse measures or behaviours in one or across several samples. Again, sampling across different levels of behaviours is advised (Marini *et al.* 2011; Sherratt 2007) but as yet there is no consensus on which measures or behaviours constitute a core set (Dietz and Boyle 2018). Uniquely in this study, clinicians also used discourse to assess other macro-structure behaviours (sequencing, coherence, gist), awareness and insight (into own language ability and listener's needs), strategy use, and effectiveness in conveying message. These behaviours may be construed as reflecting more pragmatic and functional elements of discourse performance, and contrast with the emphasis in research on linguistic discourse analysis (measures of language productivity, information content and grammatical complexity, Bryant *et al.* 2016) or the traditional understanding as informativeness and efficiency.

A number of conclusions can be drawn from the TDF findings with respect to effecting behaviour change. Cultural acceptance of discourse analysis within the SLT remit is strong, meaning there is limited need for *persuasion* overall that discourse analysis is relevant and valuable (Michie, Atkins and West, 2014). However, clearly further training - educational meetings and materials - is needed to increase use (EPOC, 2015). This should focus the pre and post -registration levels, so that SLTs enter the profession feeling equipped to undertake discourse analysis and have opportunities to refresh and develop their skills once practising. Developing a set protocol for discourse analysis, with careful

regard to clinical feasibility, would likely further promote uptake, particularly if training were hooked to that protocol. Training needs to also equip SLTs to be able to make appropriate clinical decisions regarding which analyses to employ for which clients with aphasia, acknowledging the multi-faceted and variable presentation of aphasia, and also acknowledging the broad definition of discourse. Supporting SLTs to become competent and proficient in the protocol may be aided by taking a stepped approach, focusing on individual analyses in turn until each is mastered. Furthermore, targeting the clients for whom discourse therapy is most relevant may reinforce the value of the approach for SLTs helping to strengthen their belief in the consequences/ usefulness of discourse analysis. Support in the workplace, for example involving buddying and team-based processes, might address the low opportunity felt by non-users. In behaviour change terms, this might represent identifying local opinion leaders and developing local or broader communities of practice to support clinicians to become and remain engaged (EPOC, 2015). The problem of time, flagged by almost all respondents, calls for a multi-pronged approach, including managerial support and systems change. Here, as well, greater use of technology might achieve efficiencies, particularly with respect to transcription. Very recent research has explored the clinical feasibility of using automated speech recognition (ASR) software for transcribing the speech of stroke survivors with aphasia and apraxia (Jacks *et al*. 2019) with positive preliminary findings, however efficiency benefits of ASR were not investigated and remain a focus for future investigation.

A novel finding of this study is clinicians' substantial attention to individual clients with whom they work. SLTs' decision making regarding their general assessment practices, broad views about appropriacy of discourse analysis for all clients with aphasia, and specific choices around sampling of discourse genres was strongly influenced by clients' diagnoses and prognoses as well as their broad abilities (language, cognition, medical status, health, stamina, confidence), needs, goals/ priorities/ concerns and personal interests. Severely impaired clients (those with no verbal output or limited to single words), those in the acute setting with rapidly changing profiles, and those whose goals did not consider discourse were unsurprisingly not considered likely candidates for discourse analysis and subsequent therapy. Whilst this individualised approach does come at the expense of the benefits afforded by more standardised approaches (namely consistency in behavioural regulation, automaticity and speed in skilled analysis and so on), it highlights the attunement of clinicians to clients' needs and aligns with patient-centred care in stroke (Lawrence and Kinn 2012). This is particularly important given that stroke patients with communication impairments continue to be excluded or minimally included in stroke insider perspective literature (Lawrence and Kinn 2012). It is possible that SLTs are mindful of the therapeutic relationship they create and develop with their patients/ clients, which is important for patient engagement in rehabilitation (Bright *et al.* 2018). These findings also resonate with existing person-centred and social approaches in aphasia rehabilitation (Chapey *et al*. 2000), which are popular in clinical practice (Rose *et al*. 2014), and align with emphases on natural interaction, authentic communication contexts, and incorporating the perspective of those affected (Simmons-Mackie, 2008).

Finally, very practical and logistical issues face SLTs and make the task of discourse collection and use even more challenging. Data security concerns exist at many points along the discourse analysis process including at outset as highlighted earlier in the Results. Subsequent physical and virtual storage of data (both actual recordings as well as written

transcripts) also poses a challenge for some SLTs using electronic record systems for patients, wherein there is no actual mechanism for importing and storing relevant patient data (and presumably a requirement to deposit all patient data within this system). There is a clear need for guidelines that support secure recording, transcription, and storage of discourse analysis.

Limitations

Five key limitations are acknowledged. First, there is good representation within the sample for all demographic and clinical variables except for geographical location. Despite the UK wide promotion of the survey, all bar 20 respondents were based in England, meaning that Scotland, Wales and Northern Ireland were poorly represented in the sample. Secondly, our study is based on clinicians' self-report and what they say they do may not actually reflect their practice. An audit of clinical documentation or an observational study would address this limitation. Thirdly, our approach to behaviour and behaviour-change as Capability, Opportunity and Motivation with subsequent independent analysis implies these fields are distinct from one another which is limiting as there is suggestion that they are interdependent (see earlier quote from ID209 in Results) and any subsequent interventions need to consider this interplay of factors. Fourthly, the self-selecting nature of the participant sample introduces possible bias, and indeed, the majority agreed discourse analysis was important in client management and part of the therapist role. Finally, there is evidence within the data that clinicians are interested in using assistive tools, but limited information was gained. When adapting the original survey from Bryant *et al.* (2016), questions on clinicians' use and attitudes towards computer programmes and analysis software were omitted to reduce respondent burden. Such information would have been valuable.

Implications

Professional development training is both wanted by those surveyed and warranted by the study's overall findings. Training in specified procedures and protocols would address the capability barriers identified and should ideally build on existing strengths (e.g. word level analyses) in the clinical workforce to scaffold knowledge, skills and confidence. Protocols need to bear in mind what is clinically useful for client profiling and goal setting, which are the main clinical uses of discourse currently. Given the concerns around lacking psychometrics for discourse measures (Dietz and Boyle 2018; Pritchard *et al.* 2017), it may be that using discourse analysis for outcome measurement in the clinical setting is premature. Developing the psychometric evidence base is an emerging field. For example, Pritchard *et al.* (2017) have noted that main concepts and CIUs had the best reliability and validity findings amongst all the studies reviewed. Boyle (2014) also identified these measures as reliable (amongst other measures including number of words) and made an important distinction between measures appropriate for group analysis in research studies versus those appropriate for clinical decision making for individual clients. Further research by Pritchard and colleagues (2018) identified story grammar, topic coherence, reference chains, and predicate argument structure as being psychometrically robust. Time is a pervasive influential factor that warrants careful consideration in developing and advocating

any such protocol. If the discourse assessment-to-goal-setting process could take 60 minutes or less, 75% of those surveyed would implement it in future clinical practice. Clearly time-efficient procedures *and* time-saving measures must be pursued. Assistive tools would clearly be advantageous, for example speeding up elicitation and transcription through voice recognition software, and automated language analyses and reporting. Various ethical issues arise (e.g. confidentiality, data security, storage and access), however these will need to be tackled and surmounted to take up such patently useful technological opportunities. In addition to post-registration training, this study may serve as encouragement to university teachers to reflect on discourse analysis in the current curriculum.

The current findings also have implications for future research. In both clinical and research practice, multiple genres are being sampled (as is advised) and multiple discourse measures/ behaviours are being analysed (also advised). The challenge facing researchers thus is investigating the ideal core set of genres as well as discourse measures/ behaviours that appropriately profile and baseline an individual's performance with sensitivity to change for future outcome measurement from discourse treatment.

Conclusion

Clinicians were highly engaged and relatively active in at least some aspects of discourse analysis practice. Clinicians reported largely utilising standardised test picture descriptions and personal and procedural recounts which they sometimes or infrequently transcribed but then reported analysing nonetheless for mainly word and sentence behaviours, communication of ideas and errors. Super-users were distinguished by more opportunity and motivation than other clinicians, and tended to be experienced, part-time and community based although a significant sub-group were less experienced, full-time and hospital based. Time, training and tools, such as a standard protocol for discourse analysis were desired. Making these available might assist in making detailed analysis of clients' discourse a routine feature of aphasia therapy.

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APPENDIX 1: SURVEY QUESTIONS

1.0	**[Information screen]** **LUNA (Linguistic Underpinnings of Narrative in Aphasia): UK SLT Survey** This questionnaire is about UK discourse practice in aphasia. The questions should take no longer than 20-30 minutes to complete, and are split into sections: • Participant background information • Frequency of discourse analysis • Methods used to collect discourse samples for analysis • Preparation of discourse samples • Analysis methods and measures applied to discourse samples • Feasibility of discourse analysis in the clinical environment • Perspectives on discourse analysis
1.1	**Section 1: Screening questions** The bar at the top of each screen will show your progress through the survey. Please use the forward and back buttons if you need to at any point in the survey. You can also pause the survey and return to it at a later time. Please confirm you are a qualified Speech and Language Therapist, registered with the HCPC [Yes/ No] **'No' response → exit survey**
1.2	Please confirm you currently work in aphasia rehabilitation in the UK (or worked within the last 6 months) [Yes/ No] **'No' response → exit survey**
1.3	Please confirm you have been practising in the UK for 6 months or more [Yes/ No] **'No' response → exit survey**
2.1	**Section 2: Participant Background Information** My gender is O Male O Female O Other/ Prefer not to disclose
2.2	The age range I fall into is O 20-30 years O 31-40 years

	O 41-50 years O 51-60 years O 61- 64 years O 65+ years
2.3	My current work region is O Scotland O Northern Ireland O Wales O Greater London O South East England O South West England O Midlands and East England O North England
2.4	My highest level of academic achievement is: O Bachelor O Honours O PG Cert/ PG Dip O Masters O PhD/DPhil
2.5	Years of clinical experience O 1 year, I am a new graduate O 2-5 years O 6-10 years O 11-15 years O 16-20 years O Over 20 years
2.6	Years of aphasia experience O 1 year O 2-5 years O 6-10 years

	O 11-15 years O 16-20 years O Over 20 years
2.7	I currently work O In the NHS O In a non-NHS setting O In both NHS and non-NHS settings
2.8	I currently work in (tick all that apply): O Acute/ subacute O Inpatient rehabilitation O Outpatient rehabilitation O Early Supported discharge O Community O Long-term care O Nursing homes O Private practice O Not-for-profit organisation O University O Other (please specify) [open text box]
2.9	My main work setting is: (Tick one box only) O Acute/ subacute O Inpatient rehabilitation O Outpatient rehabilitation O Early supported discharge O Community O Long-term care O Nursing homes O Private practice O Not-for-profit organisation O University

	○ Other (please specify) [open text box]
2.10	Do you work in a multidisciplinary team? A multidisciplinary team is defined here as a team of health professionals including some or all of the following: medical, nursing, and allied health including Occupational Therapist, Physiotherapist, Speech and Language Therapist, Social Worker, and Dietitian. ○ Yes ○ No
2.11	My current work pattern: ○ Full time ○ Part-time
2.12	My current work pattern: ○ Permanent ○ Fixed term ○ Casual
2.13	The approximate percentage of my caseload that contains people who have aphasia: ○ 5% or less ○ 10% ○ 30% ○ 50% ○ 75% ○ 100%
2.14	The approximate number of clients with aphasia seen per week: ○ 0 ○ 1-5 ○ 6-10 ○ 11-15 ○ 16-20 ○ >20
2.15	**[Information screen]** The next questions focus on your discourse practice.

	By discourse, we mean everything above a single simple sentence. Discourse can be informal e.g., describing something or telling a story within a conversation, or formal e.g., describing a scene within a clinical assessment.
2.16	**[Information screen]** We are asking about spoken discourse that is produced as a monologue or within a dialogue (i.e., conversation). However, we are *not* asking about conversation, conversation partner training, or written discourse. There are lots of different ways clinicians and researchers analyse discourse. We are asking what you do in your practice. There are no right and wrong answers.
3.1	**Section 3. Frequency of use of discourse analysis** How often do you collect and use analysis of discourse samples for assessment of aphasia? O Never O Rarely O Sometimes O Usually O Always [Branch logic: if 'Never' is selected, proceed to question 7.3]
3.2	**[Skip logic: Display this question if 'How often do you collect and use analysis of discourse samples for assessment of aphasia?' 'Always' is <u>not</u> selected i.e., respondent answers Never, Rarely, Sometimes, Usually.]** What factors influence your decision not to analyse discourse samples for assessment of aphasia? (Tick all that apply) O Lack of training O Time constraints O Lack of expertise O No access to computer hardware or software O Not mandated by employer O Other (please specify) [open text box]
4.1	**Section 4. Methods used to collect discourse samples for analysis** How do you typically use discourse analysis to assess aphasia? (Tick all that apply) O As an initial assessment O Within an assessment battery

	O To follow up on standardised assessment results O Other (please specify) [open text box]
4.2	What approaches do you use to collect a sample of discourse? (Tick all that apply) O Standardised Test (e.g., Boston Diagnostic Aphasia Examination 'Cookie Theft', Western Aphasia Battery 'Picnic Scene') O Existing protocol (e.g., Nicholas and Brookshire discourse protocol, Story Retell Procedure, AphasiaBank protocol) O Self-developed protocol (please provide details) [open text box] O Other (please provide details) [open text box]
4.3	What types of discourse samples do you use to assess discourse in aphasia? (Tick all that apply) O Conversation (with children, family member, carer, etc.) O Role play (of a familiar interaction) O Personal recount (e.g., of stroke, a holiday, etc.) O Opinion (e.g., of a current event or news-piece) O Retell of a fictional story (e.g., a fairy tale, such as Cinderella) O Description of a single picture (e.g., The Cookie Theft) O Story from a sequence of pictures O Procedural recount (e.g., how to make a cup of tea) O Other (please specify) [open text box]
4.4	When making a decision regarding the discourse samples collected, what factors do you take into consideration? (Tick all that apply) O Age of client O Diagnosis of client O Suspected prognosis of client O Time constraints O Availability of resources O Employer/ departmental guidelines O Other (please specify) [open text box]
5.1	**Section 5: Preparation of discourse samples** Do you typically record the discourse samples you collect? (Tick all that apply) O Yes- audio record

	O Yes- video record O No- transcribe in real time O No- analyse in real time without transcription O Other (please specify) [open text box]
5.2	Once you have collected a discourse sample, which steps do you undertake? (Tick all that apply) O Listen to the recorded sample O Transcribe verbatim O Clinical judgement of language ability O Detailed analysis from transcripts O Other (please specify) [open text box]
5.3	What are you looking or listening for in clients' discourse? [open text box]
5.4	How often do you transcribe spoken discourse samples for detailed analysis? O Never O Rarely O Sometimes O Usually O Always
5.5	Who typically transcribes your discourse samples? O I do O No one- samples are not transcribed O Other (please specify) [open text box]
6.1	**Section 6: Analysis measures and methods applied to discourse samples** How do you analyse your discourse samples? (Tick all that apply) O CLAN- Computerised Language Analysis O SALT- Systematic Analysis of Language Transcripts O Other computerised analyses (please specify) [open text box] O QPA- Quantitative Production Analysis O LARSP- Language Assessment, Remediation and Screening Procedure O DLS- Derbyshire Language Scheme (e.g., information carrying words) O Information and fluency, as according to standardised assessments (e.g., WAB-Western Aphasia Battery)

	○ No specific procedure ○ Other (please specify) [open text box]
6.2	What behaviours do you assess in discourse? (Tick all that apply) ○ **Sentence structure** ○ **Use of morphology** ○ **Word classes used (e.g., nouns, verbs)** ○ **Volume (amount) of language (e.g., total number of words)** ○ **Rate of speech** ○ **Use of content/ information words** ○ **Communication of ideas** ○ **Range of vocabulary** ○ **Word finding difficulties/ behaviours** ○ **Cohesion of language** ○ **Appropriate story structure** ○ **Efficiency- rate of information exchange** ○ **Errors** ○ **Other (please specify) [open text box]**
6.3	What specific discourse measures do you use regularly in your analysis of discourse samples (e.g., TTR- Type Token Ratio, MLU- Mean Length of Utterance, CIUs- Correct Information Units, Main Concepts, Story Grammar, Coherence ratings) [open text box]
7.1	**Section 7: Feasibility of discourse analysis in the clinical environment** *Blank screen. Participants who earlier selected "Never" returned to the survey at 7.3.*
7.2	Do you analyse discourse in order to: (Tick all that apply) ○ Diagnose type and/or severity of aphasia ○ Profile strengths and difficulties ○ Contribute to setting goals for therapy/ intervention ○ Measure outcomes from intervention
7.3	On average, how much time do you spend when assessing a client on preparing and administering the language and communication assessments you use? ○ <15 minutes

	O 15-30 minutes O 30-60 minutes O 60-90 minutes O 90-120 minutes O More than 120 minutes
7.4	On average, how much time do you spend when assessing a client in scoring and interpreting the language and communication assessments you use? O <15 minutes O 15-30 minutes O 30-60 minutes O 60-90 minutes O 90-120 minutes O More than 120 minutes
7.5	On average, how much time do you spend when assessing a client in using language and communication assessment findings to plan goals for intervention? O <15 minutes O 15-30 minutes O 30-60 minutes O 60-90 minutes O 90-120 minutes O More than 120 minutes
7.6	Which of the following factors affect how/ what you assess? (Tick all that apply) O Personal reasons/ preferences O Clinical experience O Knowledge of assessments O Training in assessment methods O Workplace policy O Service delivery model O Team support and knowledge O Availability of tools O Session time constraints

	O Administration time constraints O Funding O Communicative ability of clients O Family involvement O Knowledge of current research O Other (please specify) [open text box]
7.7	Hypothetically, if you were to learn a new discourse analysis for therapy technique (encompassing preparation, administration, scoring, interpretation, and therapy goal identification in one package), how long would you spend in clinic implementing this new technique for a client? O <60 minutes O 60-90 minutes O 90-120 minutes O 120-150 minutes (i.e., 2-2.5 hrs) O150-180 minutes (i.e., 2.5-3 hrs)
8.1-8.11	**Section 8: Perspectives on discourse analysis in aphasia.** Answer the following 11 items, indicating how much you agree/ disagree with each statement. O Strongly disagree O Disagree O Neutral- neither, or both disagree / agree O Agree O Strongly agree 8.1 I am aware of discourse analysis I could use with my clients 8.2 I have sufficient skills to carry out discourse analysis 8.3 I am confident in carrying out discourse analysis 8.4 I find discourse analysis confusing and/or frustrating 8.5 Discourse analysis is important in overall SLT management in aphasia 8.6 Carrying out discourse analysis is part of the SLT role 8.7 I am positively encouraged by my service/ workplace to carry out discourse analysis

	8.8 I am supported by my SLT colleagues and/ or team to carry out discourse analysis 8.9 I follow a specific discourse analysis protocol or process in my service/ workplace 8.10 I have sufficient resources (e.g., clinical tools) in my job to carry out discourse analysis 8.11 I have sufficient time in my job to carry out discourse analysis
8.12	With reference back to an earlier question, list up to three discourse behaviours you feel *most* confident about identifying accurately? O Sentence structure O Use of morphology O Word classes used (e.g., noun, verbs) O Volume (amount) of language (e.g., total number of words) O Rate of speech O Use of content/ information words O Communication of ideas O Range of vocabulary O Word finding difficulties/ behaviours O Cohesion of language O Appropriate story structure O Efficiency- rate of information exchange O Errors
8.13	With reference back to an earlier question, list up to three discourse behaviours you feel *least* confident about identifying accurately? O Sentence structure O Use of morphology O Word classes used (e.g., noun, verbs) O Volume (amount) of language (e.g., total number of words) O Rate of speech O Use of content/ information words O Communication of ideas O Range of vocabulary

	O Word finding difficulties/ behaviours O Cohesion of language O Appropriate story structure O Efficiency- rate of information exchange O Errors
8.14	What parts of the analysis process do you find most limit your application of discourse analysis for aphasia in the clinic? (Tick all that apply) O Collecting a discourse sample O Transcribing the discourse sample O Selecting analysis methods O Completing the analysis O Interpreting results O Other (please specify) [open text box]
8.15	What resources are needed to increase your use of discourse analysis in the clinic? (Tick all that apply) O More time O Access to assistive tools O New analysis tools O Pre-registration training O Professional development training O No resources needed O Other (please specify) [open text box]
9.1	Thank you for completing this survey. We appreciate your time and contribution toward this topic. On the next page, there are two optional questions- relating to how you heard about this survey, and whether you have anything further you wish to tell the research team. You are not obliged to complete these questions and can exit now. O Complete two optional questions O Exit survey **[Skip logic: If 'Exit survey' is selected, skip to: End of survey]**
10.1	How did you hear about this survey research? (Tick all that apply) O British Aphasiology Society

	○ One of the RCSLT Clinical Excellence Networks ○ Expression of interest to participate in LUNA Phase 4 (SLT training programme) ○ Twitter ○ Other (please specify) [open text box]
10.2	Is there anything you wish to share with the research team? This may include any difficulties you may have experienced in completing the survey, or anything further that has occurred to you whilst completing the survey and there was no opportunity to reflect this in the predetermined survey questions. [open text box]

Table 1. Participant demographic and clinical setting data (N=211)

Question	Number	Percent
Gender		
Male	8	3.79
Female	202	95.73
Other/ prefer not to disclose	1	0.47
Age Range		
20-30 years	63	29.86
31-40 years	76	36.02
41-50 years	38	18.01
51-60 years	30	14.22
61-64 years	2	0.95
65+ years	2	0.95
Current work region		
Scotland	10	4.74
Northern Ireland	5	2.37
Wales	4	1.90
Greater London	31	14.69
South East England	37	17.54
South West England	30	14.22
Midlands and East England	34	16.11
North England	60	28.44
Highest level of academic achievement		
Bachelor	44	20.85
Honours	63	29.86
Postgraduate Certificate/ Diploma	27	12.80
Masters	65	30.81
PhD/DPhil	12	5.69
Years of clinical experience		
1 year	14	6.64
2-5 years	63	29.86
6-10 years	37	17.54
11-15 years	29	13.74
16-20 years	23	10.90
Over 20 years	45	21.33
Years of aphasia experience		
1 year	13	6.16
2-5 years	67	31.75
6-10 years	36	17.06
11-15 years	30	14.22
16-20 years	27	12.80
Over 20 years	38	18.01
Current workplace		
In the NHS	164	77.73
In a non-NHS setting	22	10.43
In both NHS and non-NHS settings	25	11.85
Current work settings (tick all that apply)		

Acute/ subacute	80	37.91
Inpatient rehabilitation	92	43.60
Outpatient rehabilitation	70	33.18
Early supported discharge	56	26.54
Community	114	54.03
Long-term care	17	8.06
Nursing homes	62	29.38
Private Practice	30	14.22
Not-for-profit organisation	6	2.84
University	13	6.16
Other	7	3.32
Main work setting (tick one only)		
Acute/ subacute	36	17.06
Inpatient rehabilitation	44	20.85
Outpatient rehabilitation	14	6.64
Early supported discharge	22	10.43
Community	73	34.60
Long-term care	0	0
Nursing homes	0	0
Private Practice	14	6.64
Not-for-profit organisation	2	0.95
University	3	1.42
Other	3	1.42
Work in a multidisciplinary team		
Yes	181	85.78
No	30	14.22
Current work pattern		
Fulltime	121	57.35
Part-time	90	42.65
Approximate percentage of caseload that contains people who have aphasia		
5% or less	7	3.32
10%	20	9.48
30%	52	24.64
50%	78	36.97
75%	45	21.33
100%	9	4.27
Approximate number of clients with aphasia seen per week		
Zero	3	1.42
1 to 5	127	60.19
6 to 10	59	27.96
11 to 15	16	7.58
16 to 20	4	1.90
>20	2	0.95

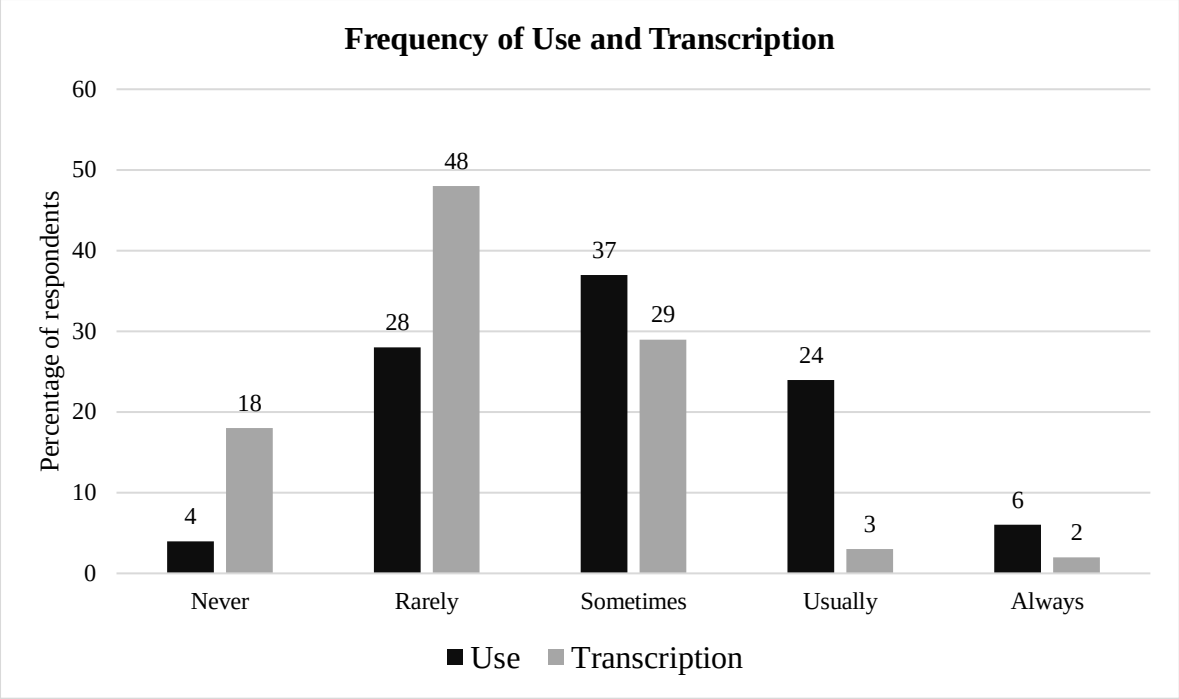

Figure 1: Frequency of discourse analysis use and transcription

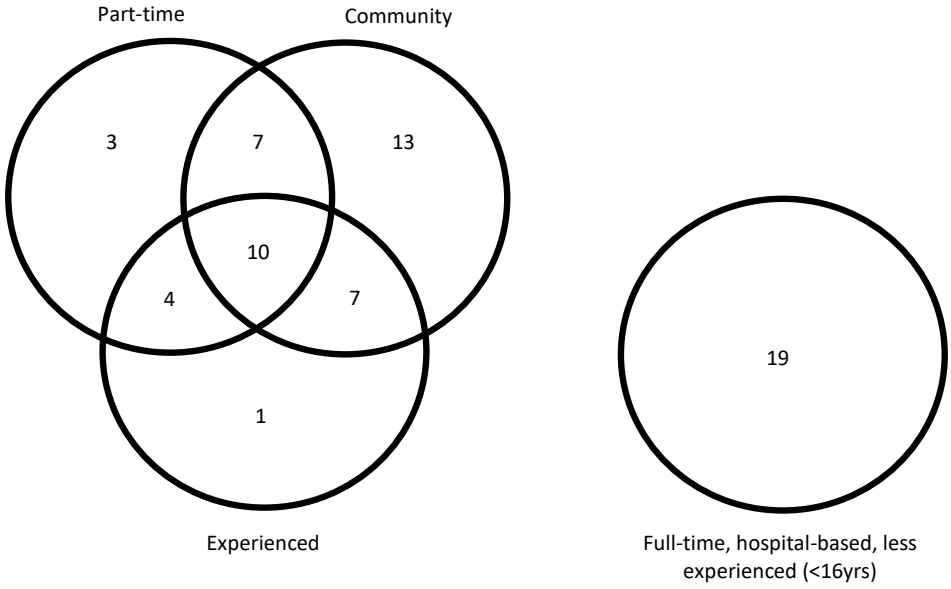

Figure 2: Characteristics of Super-users (N=64)

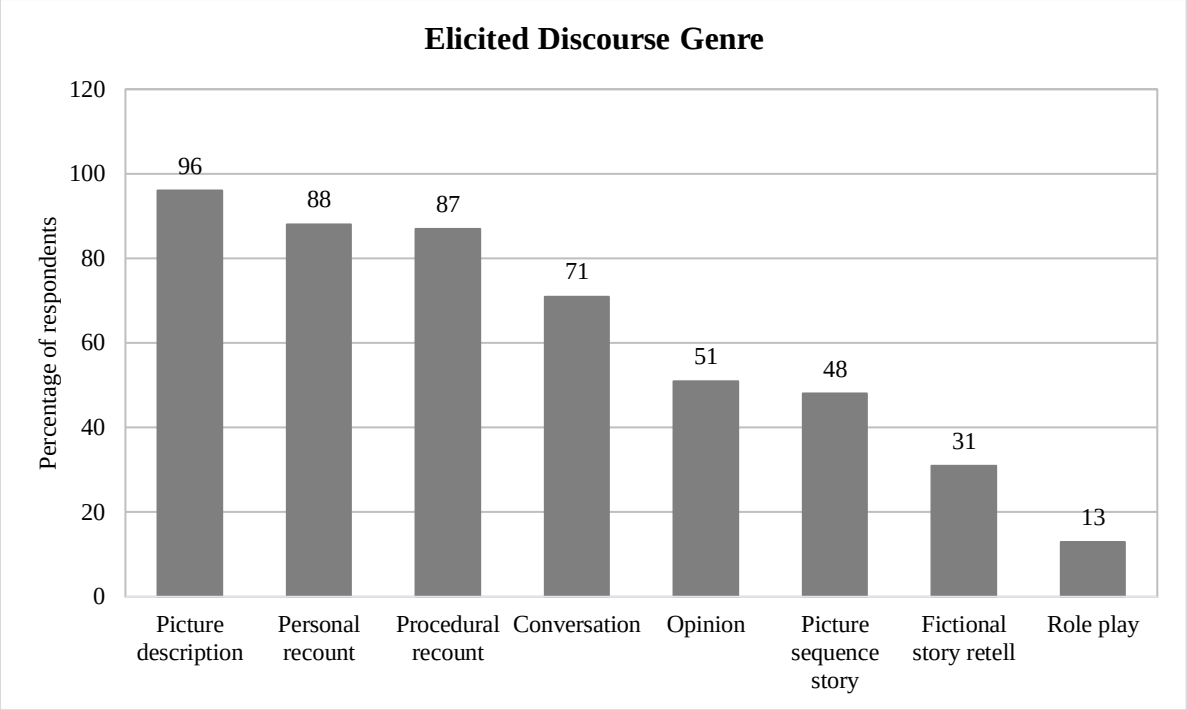

Figure 3: Genres of discourse elicited by respondents

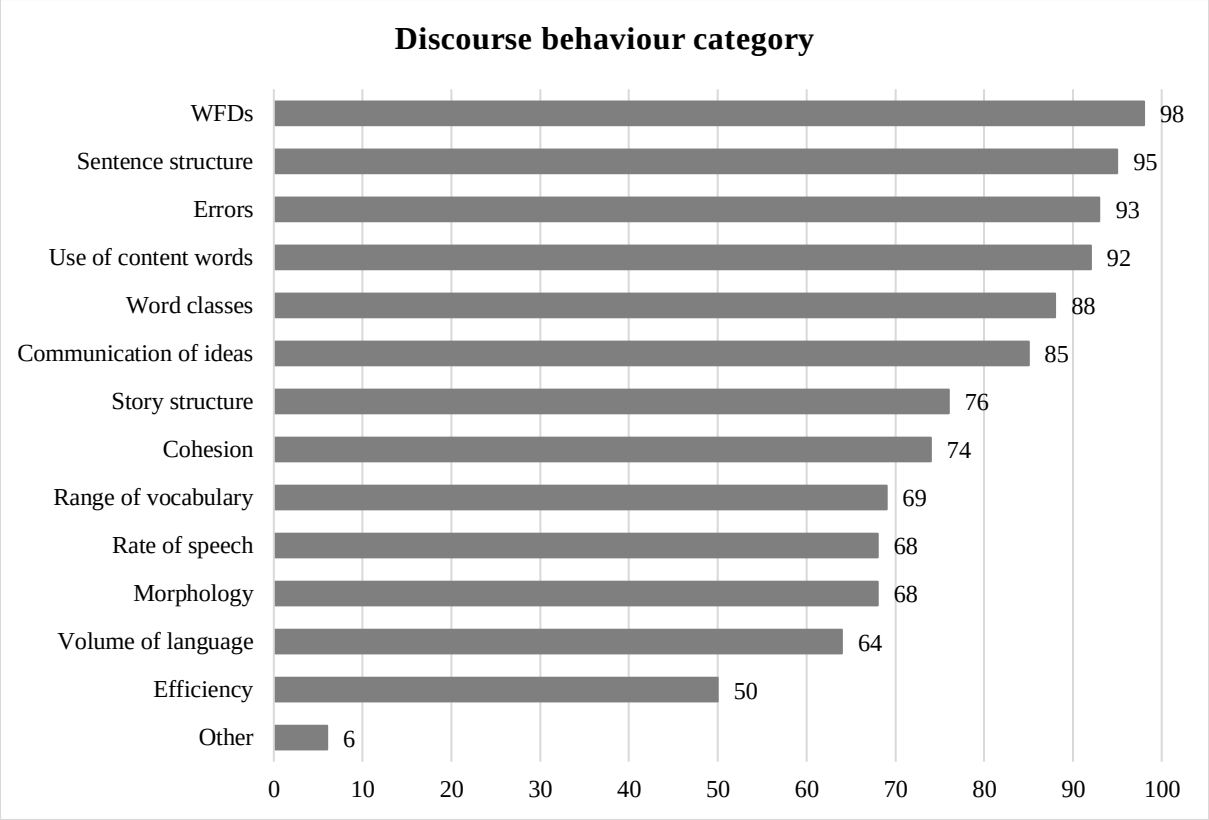

Figure 4: Categories of discourse behaviours analysed by % respondents

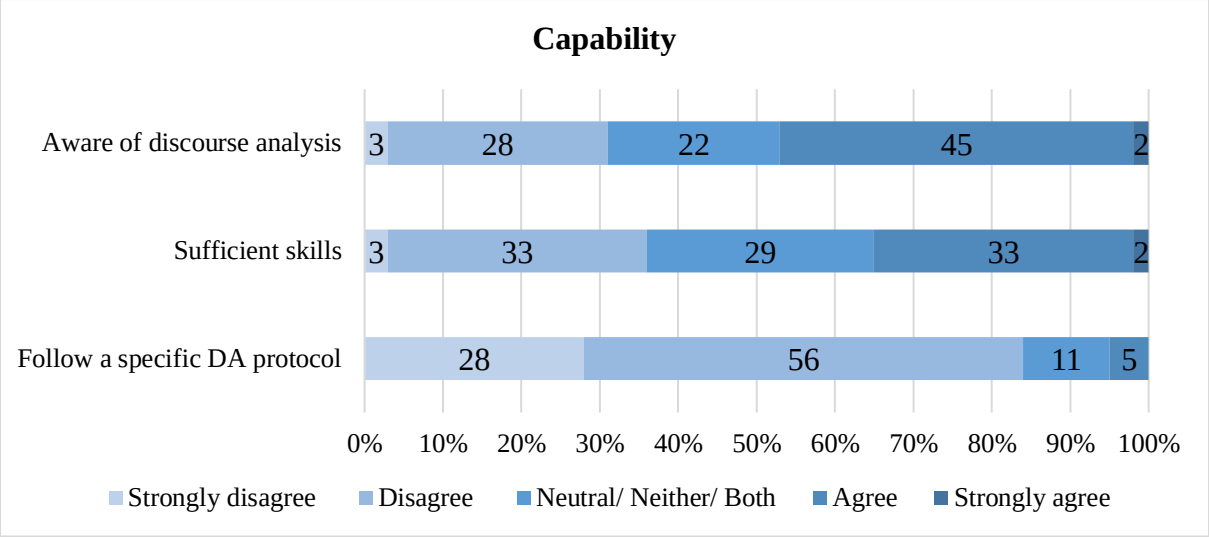

Figure 5: Capability findings

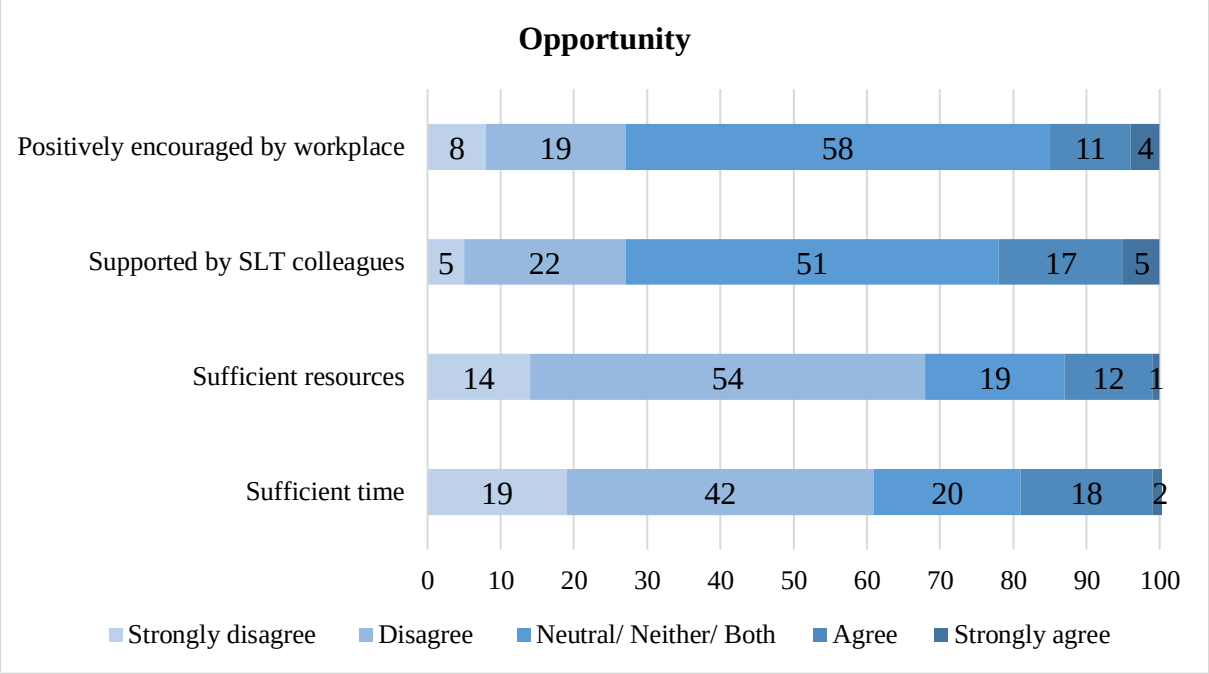

Figure 6: Opportunity findings

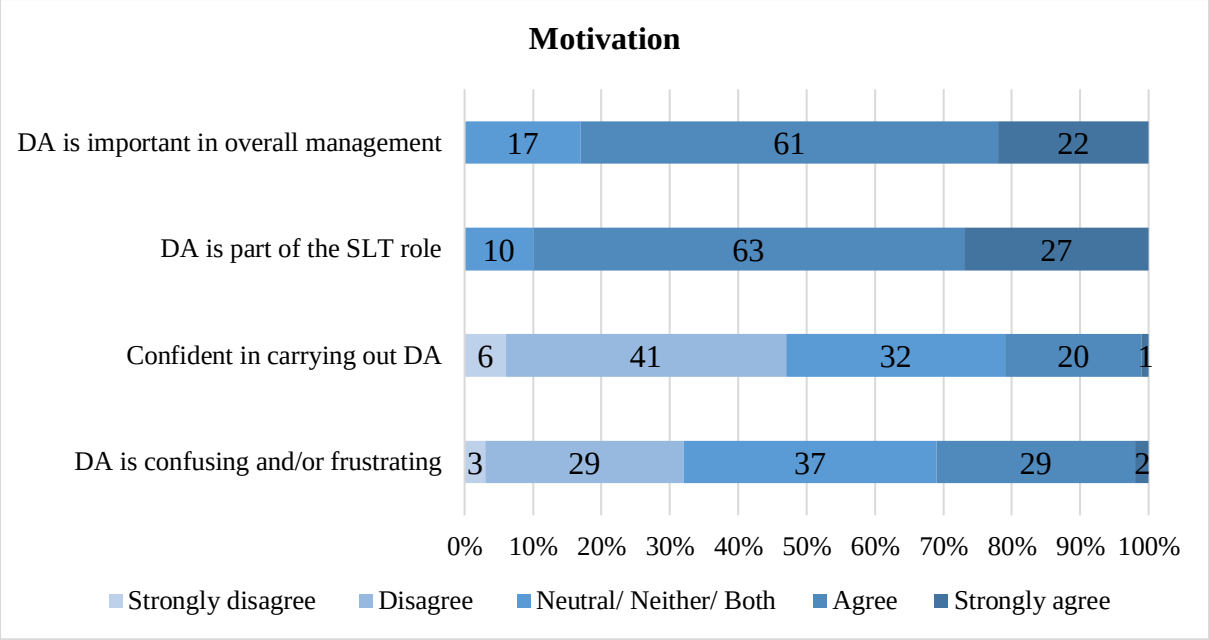

Figure 7: Motivation findings

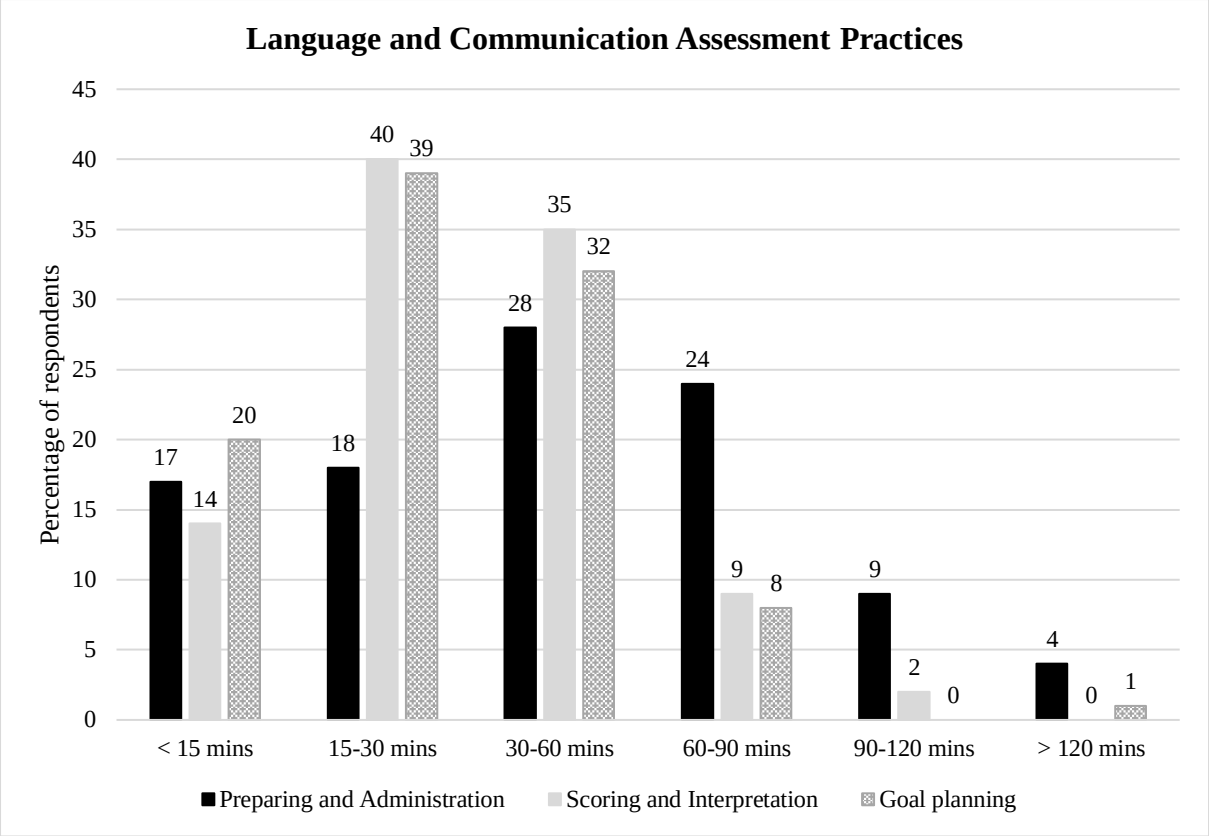

Figure 8: Time spent in language and communication assessment in aphasia rehabilitation

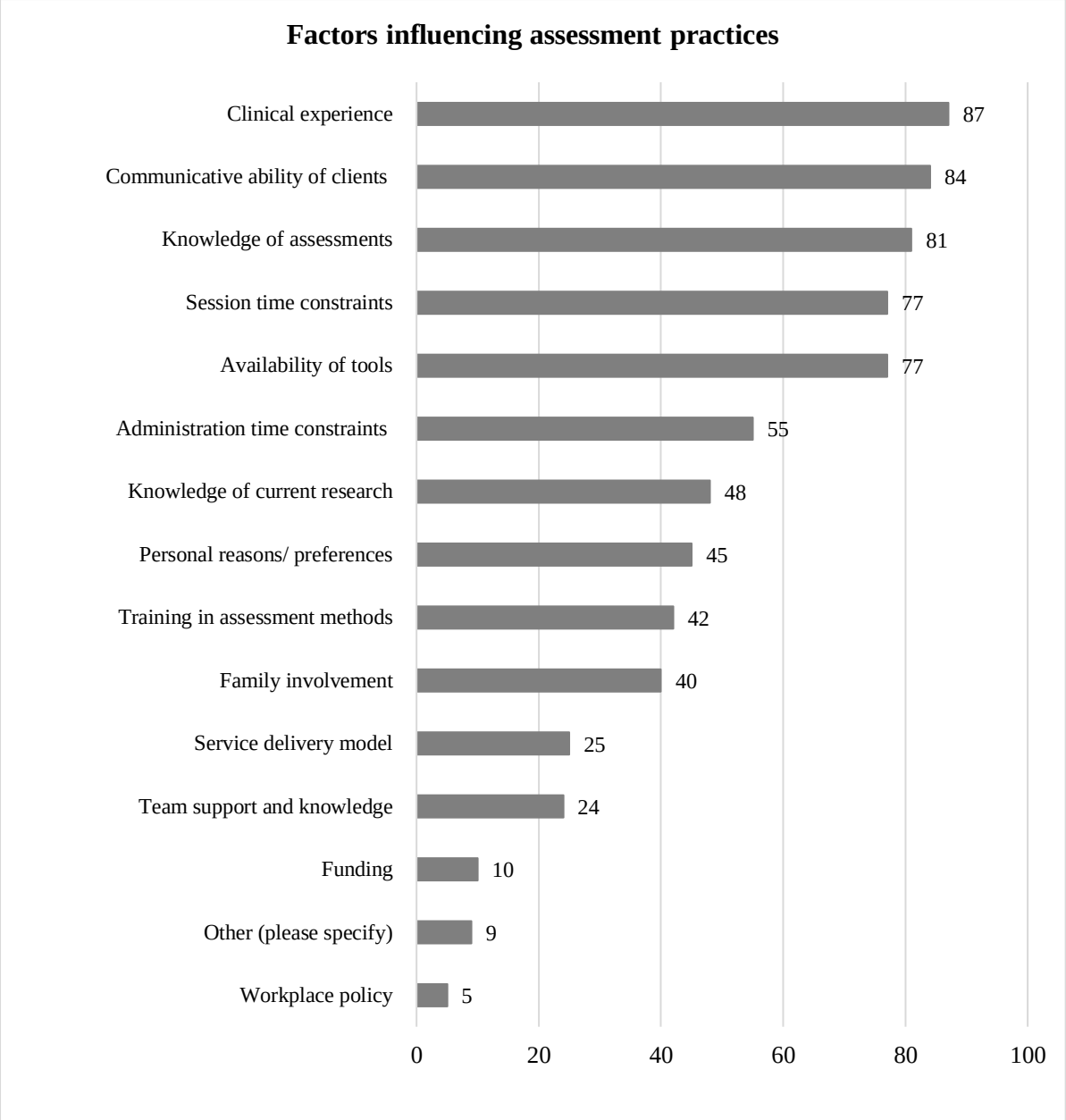

Figure 9: Factors affecting how and what to assess in aphasia rehabilitation as selected by % of respondents

SUPPLEMENTARY MATERIAL 1: Checklist for web-based survey design and reporting (Eysenbach, 2004)

Item category	Checklist item	Y/N	Comments
Design	Describe survey design	Y	Target population as described in method section. Convenience sample.
Institutional Review Board (IRB) approval and informed consent process	IRB approval	Y	From the Division of Language and Communication Science Proportionate Review Ethics Committee, City, University of London
	Informed consent	Y	The Participant Information Sheet (4 pages) and Consent Form (1 page) were provided on the survey link; once respondents submitted the consent form, they were passed through to the survey proper.
	Data protection	Y	Only the research team has access to password-protected data on Qualtrics. Consent forms with electronic consent (named individuals) were stored in one survey in Qualtrics; and unlinked survey data stored in a second survey in Qualtrics, ensuring anonymity of respondents.
Development and pre-testing	Development and testing	Y	As described in Method section.
Recruitment process and description of the sample having access to the questionnaire	Open survey vs closed survey	Y	Open survey
	Contact mode	Y	Initial contact with potential participants was made via relevant clinical organisations via electronic and social media (e.g., mailing lists, Twitter), and advertisement in the national professional magazine and via the project website, as described in method section.
	Advertising the survey	Y	
Survey administration	Web/E-mail	Y	Web
	Context	Y	Survey was available through Qualtrics, a dedicated online survey

			platform, subscribed to by City, University of London.
	Mandatory/voluntary	Y	Voluntary
	Incentives	Y	Nil financial incentives offered.
	Time/Date	Y	10/08/2018 – 04/12/2018
	Randomisation of items or questionnaires	N	Survey items were not randomised or alternated.
	Adaptive questioning	Y	Branch logic was used at 3.1 to move respondents to 7.3. Skip logic was used at 3.2 and 9.1.
	Number of items	Y	52 items in total; and one item per page
	Number of screens (pages)	Y	9 pages
	Completeness check	Y	Forced-response feature selected on Qualtrics
	Review step	Y	Respondents were allowed to move backward and forward through the survey and alter their responses. Note: survey questions were independent of each other.
Response rate	Unique site visitor	N	Not calculated.
	View rate (Ratio of unique survey visitors/ unique site visitors)	N	
	Participation rate (Ratio of unique visitors who agreed to participate/ unique first survey page visitors)	N	
	Completion rate (Ratio of users who finished the survey/users who agreed to participate)	Y	211/254 =83.1% (269 started the survey but 15 were ineligible)
Preventing multiple entries from the same individuals	Cookies used	N	Not undertaken
	IP check	N	Not undertaken
	Log file analysis	N	not undertaken
	Registration	N	Open survey was used
Analysis	Handling of incomplete questionnaires	Y	Only completed surveys were analysed. Completion = respondent pressing the submit button at the end

			of the survey (the Consent Form specified study participation as submitting the survey, with respondents able to withdraw at any time before this). Respondent numbers completing the demographic questions, and subsequent sections were noted, however the data was not analysed.
	Questionnaires submitted with an atypical time stamp	N	
	Statistical correction	N	Not required

SUPPLEMENTARY MATERIAL 2: Detailed descriptive statistics on discourse analysis in practice

Question	Number	Percent
Elicitation		
Q3.2 How often do you collect and use analysis of discourse samples for assessment of aphasia? (N=211)		
Never	99	4.27
Rarely	59	27.96
Sometimes	79	37.44
Usually	51	24.17
Always	13	6.16
Q4.1 How do you typically use discourse analysis to assess aphasia? (Tick all that apply)		
Within an assessment battery	141	69.8
As an initial assessment	140	69.31
To follow up on standardised assessment results	84	41.58
Other	19	9.4
Q4.2 What approaches do you use to collect a sample of discourse? (Tick all that apply)		
Standardised Test (e.g. Boston Diagnostic Aphasia Examination Cookie Theft, Western Aphasia Battery Picnic Scene	185	91.58
Self-developed protocol (please provide details)	54	26.73
Other (please provide details)	49	24.26
Existing protocol (e.g. Nicholas and Brookshire discourse protocol, Story Retell Procedure, AphasiaBank Protocol)	23	11.39
Q4.3 What types of discourse samples do you use to assess discourse in aphasia? (Tick all that apply)		
Description of a single picture (e.g. The Cookie Theft)	193	95.54
Personal recount (e.g. of stroke, a holiday, etc)	178	88.12
Procedural recount	176	87.13
Conversation (with children, family member, carer, etc.)	143	70.79
Opinion (e.g. of a current event or new-piece)	103	50.99
Story from a sequence of pictures	97	48.02
Retell of a fictional story (e.g. a fairy tale such as Cinderella)	62	30.69
Role play (of a familiar interaction)	26	12.87
Other	5	2.48
Q4.4 When making a decision regarding the discourse samples collected, what factors do you take into consideration? (Tick all that apply)		
Diagnosis of client	148	73.27
Time constraints	108	53.47
Suspected prognosis of client	103	50.99
Availability of resources	97	48.02
Age of client	68	33.66
Other	54	26.73
Employer/ departmental guidelines	11	5.45
Recording and transcription		

Q5.1 Do you typically record the discourse samples you collect? (Tick all that apply)		
No – transcribe in real time	140	69.31
No – analyse in real time without transcription	72	35.64
Yes – audio record	66	32.67
Yes – video record	33	16.34
Other	10	4.95
Q5.2 Once you have collected a discourse sample which steps do you undertake? (Tick all that apply)		
Clinical judgement of language ability	191	94.55
Transcribe verbatim	106	52.48
Listen to the recorded sample	76	37.62
Detailed analysis from transcripts	33	16.34
Other	12	5.94
Q5.4 How often do you transcribe spoken discourse samples for detailed analysis?		
Rarely	96	47.52
Sometimes	58	28.71
Never	37	18.32
Usually	7	3.47
Always	4	1.98
Q5.5 Who typically transcribes your discourse samples?		
I do	152	75.25
No one – samples are not transcribed	37	18.32
Other	13	6.44
Analysis		
Q6.1 How do you analyse your discourse samples? (Tick all that apply)		
No specific procedure	123	60.89
Manual counting of words or structures (nouns, verbs, etc.)	107	52.97
Information and fluency, as according to standardised assessments	74	36.63
Other	21	10.4
Derbyshire Language Scheme (e.g. information carrying words)	13	6.44
Language Assessment, Remediation and Screening Procedure	6	2.97
Quantitative Production Analysis	1	0.5
Computerised Language Analysis	0	0
Systematic Analysis of Language Transcripts	0	0
Other computerised analyses	0	0
Q6.2 What behaviours do you assess in discourse? (Tick all that apply)	197	97.52
Word finding difficulties/ behaviours	192	95.05
Sentence structure	188	93.07
Errors	186	92.08
Use of content/ information words	177	87.62
Word classes used (e.g. noun, verbs)	172	85.15
Communication of ideas	139	68.81
Range of vocabulary	138	68.32
Rate of speech	137	67.82
Use of morphology	130	64.36
Volume (amount) of language (e.g. total number of words)	100	49.5

Efficiency – rate of information exchange Other	12	5.94
*Q8.12. With reference back to an earlier question, list up to three discourse behaviours you feel **most** confident about identifying accurately:*		
1. Word finding difficulties/ behaviours	165	78.2
2. Word classes used (e.g. nouns, verbs)	108	51.18
3. Communication of ideas	66	31.28
4. Sentence structure	63	30.33
5. Use of content/ information words	58	27.49
6. Errors	47	22.27
7. Volume (amount) of language (e.g. total # of words)	35	16.59
8. Rate of speech	26	12.32
9. Appropriate story structure	19	9
10. Use of morphology	18	8.53
11. Cohesion of language	11	5.21
12. Range of vocabulary	7	3.32
13. Efficiency – rate of information exchange	4	1.9
*Q8.13. With reference back to an earlier question, list up to three discourse behaviours you feel **least** confident about identifying accurately.*		
1. Efficiency – rate of information exchange	129	61.14
2. Cohesion of language	104	49.29
3. Use of morphology	102	48.34
4. Sentence structure	64	30.33
5. Appropriate story structure	48	22.75
Communication of ideas	27	12.8
6. Range of vocabulary	26	12.32
7. Rate of speech	26	12.32
8. Volume (amount) of language (e.g. total # of words)	19	9
9. Word classes used	16	7.58
10. Errors	11	5.21
11. Use of content/ information words	9	4.27
12. Word finding difficulties/ behaviours	1	0.47
Q7.2 Do you analyse discourse in order to: (Tick all that apply)		
Contribute to setting goals for therapy/ intervention	190	94.06
Profile strengths and difficulties	186	92.08
Measure outcomes from intervention	138	68.32
Diagnose type and/or severity of aphasia	125	61.88

Detailed findings for Q5.3 *What are you looking or listening for in clients' discourse?*

Some responses were short: "*content, structure, breakdown, repair*" (ID80), however most were longer e.g. "*syntax, topic maintenance, amount of detail given, are salient points present, content of response e.g. missing nouns/ verbs etc, paraphasias, sentence structure, complexity of response, time taken to respond, gesture and facial expression, intonation and how this matches with the verbal, word finding difficulties, fluency*" (ID57). Analysis of responses showed that many respondents considered word finding, sentence structure and/or grammar, and errors. Word finding included ability, skills, ease/effort of retrieval, difficulties, hesitations, errors, and response to cues. Grammar and/or sentence structure comprised structure, use, variety, completeness, complexity and integrity. Errors were typically considered in relation to number and type of word finding difficulty (phonological, semantic, neologism), morphology, and

perseveration. Discourse, awareness, strategies, functional ability and pragmatics were frequently raised. Discourse included completeness of information (all key elements included), sequencing of ideas, coherence, cohesiveness, ability to convey gist, and also appropriate elaboration and reference. Awareness or insight comprised problems/ difficulties in language/ discourse and degree of these as well as awareness of listener, self-monitoring, use of strategies, self-corrections, problem solving, success of self-repair, and ability to use strategies when prompted. Spontaneous or prompted use of strategies was examined and the effect or success of these noted. Respondents considered functional ability/ success/ effectiveness to transmit information/ convey message, and pragmatics in terms of topic selection, maintenance, repair as well as non-verbal behaviours. The range of linguistic elements or parts of speech used, and their choice, appropriateness, and diversity were also often raised. Cognitive influences specifically attention, orientation, memory, and sequencing were often raised in relation to discourse elements. Other aspects of verbal fluency, use of nonverbal skills and other modalities to support discourse and convey message, and emotional aspects (confidence, frustration, distress) were variably mentioned. Finally, respondents also considered co-occurring difficulties (e.g. dyspraxia, dysarthria, sensory impairment) and used discourse tasks to check generalisation from treatment. Features that were minimally mentioned included: intonation and prosody, efficiency, length (MLU and length of discourse), humour, and volume.

SUPPLEMENTARY MATERIAL 3: Detailed descriptive statistics on barriers and facilitators

Question	Number	Percent
Q3.2. What factors influence your decision not to analyse discourse samples for assessment of aphasia? (Tick all that apply) (n=198, excludes 13 participants who 'always' collect and use discourse samples)		
Time constraints	154	77.78
Lack of expertise	85	42.93
Lack of training	78	39.39
No access to computer hardware or software	76	38.38
Other	48	24.24
Not mandated by employer	17	8.59
Q8.14. What parts of the analysis process do you find most limit your application of discourse analysis for aphasia in the clinic? (Tick all that apply)		
Selecting the analysis methods	150	71.09
Completing the analysis	141	66.82
Transcribing the discourse sample	117	55.45
Interpreting the results	114	54.03
Collecting a discourse sample	46	21.8
Other	25	11.85
Q8.15. What resources are needed to increase your use of discourse analysis in the clinic? (Tick all that apply)		
Professional development training	161	76.3
Access to assistive tools	157	74.41
More time	149	70.62
New analysis tools	114	54.03
Pre-registration training	23	10.9
Other	11	5.21
No resources needed	1	0.47

SUPPLEMENTARY MATERIAL 4: Detailed descriptive statistics on assessment practices and clinical feasibility

Question	Number	Percent
Q7.3 On average, how much time do you spend when assessing a client on preparing and administering the language and communication assessments you use?		
<15 minutes	36	17.06
15-30 minutes	39	18.48
30-60 minutes	55	26.07
60-90 minutes	51	24.17
90-120 minutes	20	9.48
>120 minutes	10	4.74
Q7.4 On average, how much time do you spend when assessing a client in scoring and interpreting the language and communication assessments you use?		
<15 minutes	29	13.74
15-30 minutes	84	39.81
30-60 minutes	73	34.60
60-90 minutes	19	9
90-120 minutes	5	2.37
>120 minutes	1	0.47
Q7.5 On average, how much time do you spend when assessing a client in using language and communication assessment findings to plan goals for intervention?		
<15 minutes	41	19.43
15-30 minutes	83	39.34
30-60 minutes	67	31.75
60-90 minutes	16	7.58
90-120 minutes	1	0.47
>120 minutes	3	1.42
Q7.6 Which of the following factors affect how/ what you assess? (Tick all that apply)		
Clinical experience	184	87.2
Communicative ability of clients	178	84.36
Knowledge of assessments	170	80.57
Session time constraints	162	76.78
Availability of tools	162	76.78
Administration time constraints	115	54.5
Knowledge of current research	101	47.87
Personal reasons/ preferences	96	45.5
Training in assessment methods	89	42.18
Family involvement	85	40.28
Service delivery model	52	24.64
Team support and knowledge	50	23.7
Funding	21	9.95
Other	20	9.48
Workplace policy	10	4.74
Q7.7 Hypothetically, if you were to learn a new discourse analysis for therapy technique (encompassing preparation, administration, scoring, interpretation, and therapy goal identification in one		

package), how long would you spend in clinic implementing this new technique for a client?		
<60 minutes	74	35.07
60-90 minutes	84	39.81
90-120 minutes	35	16.59
120-150 minutes	11	5.21
150-180 minutes	7	3.32