International Journal of Language & Communication Disorders

Assessment and treatment of gesture in neurogenic communication disorders: An international survey of practice

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Abstract

Background: Gesture and speech collaborate in conveying meaning, and gesture is often leveraged by people with neurogenic communication disorders, such as aphasia, cognitive-communicative impairments and primary progressive aphasia, when words fail them. Because gesture is imagistic, transitory and holistic, there are inherent challenges when assessing and treating it.

Aims: The survey had three primary research questions: (1) what gesture assessment practices, and (2) what gesture treatment practices, are employed by speech and language therapists (SLTs) internationally; and (3) what are the factors that influence these practices?

Methods and Procedures: An online survey of practice using Qualtrics was piloted and then disseminated to practising SLTs working with people with neurogenic communication disorders. In addition to descriptive statistics summarising across the three research questions, statistical comparisons were made for two independent groups: primary work setting (research versus clinical), and primary work setting considering years of experience specific to neurogenic communication disorders (research, high; research, low; clinical, high; and clinical, low).

Outcomes and Results: A total of 130 international SLTs completed the first two parts of the survey. A total of 107 completed all four sections of the survey. Fifty percent of respondents reported assessing gesture sometimes/for some clients, with only 5% reporting that they never assessed gesture. Nearly 70% of respondents reported never using a published test to evaluate gesture, with qualitative results suggesting a lack of formal assessments. This was further highlighted by the most prominent barrier being a lack of published tests (50% of respondents said this). The primary reason for evaluating gesture was to assess nonverbal communication. There was no significant difference in gesture assessment practices across comparison groups. The research group, and those within the research group with most years of experience, tended to target gestures during

treatment and write treatment goals containing gesture more than other respondents. The most common facilitator to assessing or treating gesture was that the family or individual prioritised gesture for enhancing communication (53.1% of respondents). No group differences were identified for barriers/facilitators.

Conclusions and Implications: Findings indicate that whilst gesture is a critical nonverbal communicative behaviour, there is an unmet need for empirical and standardised methods for assessing gesture in speech and language clinical practice and there is a lack of gesture-specific treatment resources. SLTs working in research settings may feel more able, or have more resources, to include gesture during treatment. Essential next steps include creating empirical and standardised methods for assessing gesture in speech and language clinical practice.

KEYWORDS

aphasia, assessment, gesture, progressive neurological disorders, speech and language therapists, speech and language therapy

WHAT THIS PAPER ADDS

What is already known on the subject

- Gesture is a complex and crucial aspect of communication. It is a key part of the role of speech and language therapists (SLTs), as described in clinical guidelines, to assess people with aphasia's use of gesture and consider whether it could be enhanced through treatment.

What this study adds to existing knowledge

- This is the first international survey of practice focusing on gesture assessment and treatment. It highlights the variety of methods used by SLTs to assess and treat gesture, the importance they attach to this area and the need for standardised assessment tools and treatment resources.

What are the clinical implications of this work?

- This study provides a comprehensive overview of practices for assessing and treating gesture in neurogenic communication disorders, as well as a list of gesture resources being actively used by clinicians and researchers. These may be useful for clinicians looking to expand their understanding of approaches and resources for assessment and treatment in this domain. The study also reports on the reasons clinicians assess gesture and the barriers and facilitators they encounter which may inform clinical practice in this area.

INTRODUCTION

Human communication is multimodal, with gesture and facial expression crucial and universal components (Feyereisen & de Lannoy, 1991). For people affected by acquired neurogenic communication disorders, non-verbal communication can take on a more significant role (van Nispen et al., 2017), but can also be impaired, with people with aphasia typically using a more restricted range of gesture types (Cocks et al., 2013; Mol et al., 2013). Factors affecting gesture abilities in people with aphasia have been a source of debate, with researchers exploring the complex impact and interplay of semantic impairments (e.g., Cocks et al., 2013; Kong et al., 2015; van Nispen et al., 2016), limb

apraxia (e.g., Hogrefe et al., 2012; van Nispen et al., 2016), aphasia severity (e.g., (Hogrefe et al., 2013; Mol et al., 2013; Stark & Oeding, 2024) and executive functioning (e.g., de Beer et al., 2020; Purdy & Koch, 2006) on gesture production. A recent systematic review argues that limb apraxia impedes the communicative success of gesture in aphasia, whereas semantic impairments and aphasia severity do not (De Kleine et al., 2024).

A key part of a speech and language therapist's (SLT) role is to assess which aspects of their client's communication have been impacted by neurological damage and how the client is compensating for their impairments. Following this, they agree goals for treatment, which may involve activities targeting non-verbal communication, such as gesture, and working with communication partners to support the use of a variety of communication strategies. While the principle of assessing and treating non-verbal communication is well established in clinical guidelines (e.g., National Institute for Health and Care Excellence, 2003), there are a variety of barriers and complexities that SLTs must tackle to evaluate and treat gesture. These relate to the characteristics of gesture, attitudes to using gesture and tools available.

Firstly, gesture is transitory, holistic and conveys information spatially (McNeill, 1992). Gesture does not have fixed forms and meanings, as a language does. The accuracy and appropriateness of gestures therefore depends on the context in which they are used, meaning that analysis is complex and subjective. Their transitory nature poses challenges for recording gesture use. Although video can be used to capture the moving forms of gesture, busy clinicians may not have time to go back and observe recordings. In gesture research, analysis typically involves transcription of conversation and detailed description of the forms and timing of gestures (e.g., van Nispen et al., 2017). However, this is a labour-intensive process that is not feasible in clinical practice.

A second potential barrier to targeting gesture in treatment can be the attitudes of clients and their families towards Alternative and Augmentative Communication (AAC), with some expressing concern that focusing on non-verbal strategies will impede the recovery of verbal communication. Some treatment approaches also reinforce this perception. For example, Constraint-Induced Aphasia Therapy (CIAT, Pulvermüller et al., 2001) is based on the principles of neuroplasticity and emphasises the need to focus exclusively on verbal output to aid recovery. However, recent research has highlighted the potential of AAC strategies to augment recovery (Dietz et al., 2018). According to the theory of intersystem reorganisation, access to weaker systems (e.g., speech) can be improved through strengthening links with stronger visual or motor systems, such as gesture (Luria, 1970). Working on gesture can therefore serve the dual purpose of providing

an alternative means of expression and supporting verbal communication recovery.

Thirdly, there is a paucity of tools available to SLTs for the assessment and treatment of gesture. While many formal aphasia assessments include a subtest assessing gesture, these typically assess only the use of particular types of gesture used in isolation. For example, the Comprehensive Aphasia Test (Swinburn et al., 2004) includes a five-item 'Gesture Object Use' subtest. The client is shown pictures of everyday objects, such as a toothbrush and clothes peg, and asked to show what they would do with them. As well as being limited to only assessing pantomime gestures, the assessment criteria are restrictive and subjective. Gestures are rated on a scale of 0–2 with brief scoring criteria provided. For example, clinicians are guided to describe all 'body part as object' gestures as errors, even though these may be appropriate and comprehensible, for example, using a finger to represent a toothbrush. No commonly used aphasia assessment batteries assess gesture comprehension (Adjei-Nicol, 2023).

While gesture is often assessed in isolation, gesture research has revealed how tightly intertwined gestures are with verbal communication. Verbal and non-verbal communication work together to convey meaning and gesture research is enriched by examining the interplay of these two modalities (Clough & Duff, 2020). The City Gesture Checklist is the first clinical tool designed to assess gesture in a functional communication context without the need for transcription (Caute et al., 2021). It can be used to observe a conversation, record the types of gesture used (iconic, emblems, pointing, numbers, air writing, other) and how often they occur. It also includes questions encouraging clinicians to reflect on whether the client is using their dominant hand, perseverating or experiencing motor difficulties; on how effective their gesture is, whether they are using it alongside other strategies; and if particular gesture types are absent. However, the psychometric properties of this assessment, its responsiveness to change and the feasibility of using it in clinical practice require further investigation.

There are few formal assessments of gesture available in languages other than English. This is particularly problematic as gesture is universal across all human languages but is influenced by cultural and linguistical factors (Kita, 2009). It is therefore important that clinicians consider and understand cultural differences in the use of iconic gestures (Adjei-Nicol, 2023).

Regarding treatment, research studies have followed two broad approaches, either aiming to improve the use of gesture as a compensatory means of communication or using gesture to facilitate verbal communication (Clough & Duff, 2020; Pierce et al., 2019). Compensatory studies have shown that gesture therapy can lead to improved production of single, treated items (e.g., Marshall et al.,

2012; Roper et al., 2016). Multimodality treatments, such as multimodal communication treatment (Purdy & Wallace, 2016), aim to achieve increased and flexible use of a variety of non-verbal communication strategies, leading to improved use of gesture for some participants with severe aphasia. Other compensatory treatment approaches, such as conversation therapy (e.g., Best et al., 2016) or Promoting Aphasics Communicative Effectiveness (Davis, 1980) involve encouraging the use of gesture alongside other communication strategies, without specifying methods for developing and enhancing its use.

Combined gesture and verbal therapies have been found to improve naming of nouns and verbs, although it is unclear how much benefit comes from the gestural component (Rose et al., 2013). For example, a recent randomised-controlled trial compared intensively delivered Multimodality Aphasia Therapy (M-MAT) and Constraint-induced Aphasia Therapy (CIAT-Plus) with usual care (Rose et al., 2022). While M-MAT used verbal prompts, gesture, writing and drawing to facilitate naming, CIAT-Plus focused solely on verbal production. Ninety-seven percent of the 201 participants had mild or moderate aphasia. The study reported significant and lasting gains in naming of treated items following both M-MAT and CIAT-Plus when compared to usual care. Gains in functional communication and communication related quality of life were also observed after both interventions, but not maintained at follow-up.

Little is known about how clinicians around the world address the challenges inherent in assessing and treating gesture when working with people who have acquired neurogenic communication disorders. A small-scale survey of 18 SLTs in the United Kingdom found that most respondents carried out assessment and treatment of gesture in their clinical practice (Caute et al., 2021). They all reported using informal methods of assessing gesture, while approximately half used a formal assessment. Ten respondents described the specific techniques they used to elicit and encourage gesture use (e.g., modelling), treatment targets (e.g., using gesture to describe picture cards) and general therapeutic principles (e.g., building on success, ensuring the client was motivated and providing opportunities for practice). Only one SLT named a published treatment procedure, Visual Action Therapy (Helm-Estabrooks et al., 1982).

No previous study has explored how SLTs around the world assess and treat gesture and the factors that influence their practices. This study therefore addresses the following research questions:

1. What assessment practices do SLTs use?
2. What treatment practices do SLTs use?
3. What factors influence SLTs' gesture practices?

METHODS

Ethical approval

The study was approved by Indiana University, City St George's, University of London and the University of Essex.

Development of survey

The research team drafted a survey exploring current practice in assessing and treating gesture. This was piloted with 15 SLTs in 11 different countries. Respondents gave feedback about the clarity of the questions and the terminology used which led to edits. The feedback ensured that the questions were applicable to an international audience, for example, using relevant terminology for different types of healthcare settings. The pilot survey was administered online using Qualtrics. No technical difficulties were encountered.

Recruitment

After the survey was finalised, we advertised for research participants internationally. It was an open survey and was publicised via social media, specifically Facebook and Twitter. It was also advertised via email and professional networks such as the Royal College of SLTs, the American Speech Language Hearing Association and the Indian Speech and Hearing Association. Recruitment materials informed potential participants of the purpose of the study, the length of time required to complete it and how long it would remain open (from September to December 2021). Information was provided about ethical approval and data storage. No incentives were offered for participation. Recruitment criteria were speech and language pathologists/therapists who were currently working in a clinical or research capacity with adults with neurogenic communication disorders, or who had done so in the past. The survey was open to clinicians who had and had not actively integrated gesture into their practice. Respondents needed to have a working proficiency in English, as the survey was not available in other languages.

Participant information and consent

Potential respondents were provided with information about the survey, including that it would take 10–15 min to complete, the names of the investigators and a contact email. Participants gave consent electronically before commencing the survey. The survey began with three

questions to check participants' eligibility, before respondents could proceed to the main survey. Key terminology (e.g., neurogenic communication disorder, gesture) was defined to assist participants in responding to the eligibility questions.

Main survey

The finalised survey comprised 27 questions. It was divided into four sections: Section 1 asked respondents for demographic information, including their clinical experience, location, linguistic context and work setting (Questions 1–9). Section 2 explored gesture assessment practice (Questions 10–18) and Section 3 investigated gesture treatment practice (Questions 19–22). These sections comprised mostly multiple-choice questions exploring the frequency of different practices. However, some questions asked for examples (e.g., of formal assessments used) or descriptive responses (e.g., of informal assessment methods). The final section explored barriers and facilitators to assessing gesture and targeting gesture during treatment, using a combination of multiple choice and free text responses (Questions 23–27). The main survey was presented over five pages.

The main survey was administered anonymously via the online platform Qualtrics. Participants were not able to review and change their responses after submitting them. Data from Qualtrics were exported without identifiable information and stored securely on OneDrive.

A total of 159 participants consented to take part in the survey; $n = 145$ progressed past the consent stage, of which $n = 7$ failed to complete the Demographic (first) section, and $n = 8$ were excluded based on not being currently practicing SLTs. The final survey comprised $N = 130$ respondents. The survey completion rate (i.e., ratio of users who finished the survey/users who agreed to participate) was $130/159 = 81.76\%$. The survey did not require respondents to complete every question and therefore there are some missing data; this is discussed in the Results. We analysed all responses including those with missing items. When describing the findings of the open-ended questions we reported the number of respondents to each question.

The final survey PDF is included in the Open Science Framework (https://osf.io/8dqhm/) files for this project.

Data analysis

Descriptive statistics were employed to summarise respondent data. We anticipated that the amount of time respondents had spent working in the field may have an influence on survey findings. In addition, we recognised that the research community commonly have additional time and provision allocated to focus on detailed assessment and specific analyses of therapy outcomes when compared to the clinical community. Therefore, additional statistical analysis was employed to stratify the respondent data in two ways: (1) primary work setting and (2) primary work setting alongside calculated years of working with the neurogenic communication disorder population. We asked participants to indicate their primary work setting and grouped these into primarily clinical ($n = 89$) and primarily research ($n = 43$). We also calculated their years of working with neurogenic communication disorder population using the reported years of clinical work multiplied by percentage of clinical work involving the specific population). For this reason, data are stratified by primary work setting groups using chi-square tests. Given the significantly higher years in the research group, a median split was used to divide the groups by overall years median, which was 6.35 years across the 130 respondents. This stratification enabled further evaluation of the impact of role *and* years on gesture practices. Respondents therefore fell into the following four categories: clinical with years lower than the median ($n = 48$), clinical with years higher than the median ($n = 39$), research with years lower than the median ($n = 17$) and research with years higher than the median ($n = 26$). Fisher Exact tests were used to evaluate the four-group comparison (clinical lower, clinical higher, research lower, research higher) to deal better with smaller and unequal sample sizes. All tests were two-tailed. All quantitative analyses were completed by author B.C.S. in RStudio 2023.06.0 Build 421 using R version 4.2.2 (2011-10-31 ucrt) on a Windows x86_64 system. The RStudio data analysis file, and data itself, is in the Open Science Framework, detailed under Data Availability.

For Assessment Practices section, respondents ($N = 130$) were asked to respond to: 'Thinking broadly, why do you assess gesture? To evaluate …. (1) limb apraxia, (2) hemiparesis/plegia, (3) nonverbal / functional communication, (4) cognition, (5) language, (6) social communication/pragmatics, or (7) other.' The answer options were 'no', 'occasionally', and 'yes'. To simplify statistical analysis, responses to this question were grouped into those who said *No* and those who said *Yes* or *Occasionally*. Then, respondents ($N = 130$) were asked to respond to the following quantitative questions: (1) in general, do you assess gesture currently?, (2) do you make notes about a person's use of gestures in your case notes?, (3) do you assess gesture to use as an outcome of treatment?, (4) do you formally (using a published test of some kind) assess gesture?, and (5) do you informally (using an in-house assessment, observations, etc.) assess gesture ($n = 129$; one

missing datapoint)? The answer options were never/for no patients, sometimes/for some patients, about half the time/for about half the patients, most of the time/for most patients and always/for all patients. For these questions, three response types were combined to ascertain a better understanding of when gesture was evaluated: 'about half the time/for about half the patients', 'most of the time/for most patients' and 'always/for all patients'. This grouping will be referred to as 'at least half the time/at least half the patients'.

For the Treatment Practices section, respondents (*n* = 120) answered two survey questions probed treatment practices: (1) do you use/target gesture during treatment? and (2) how often do your treatment goals contain gesture? For the following questions, three response types were combined: 'about half the time/for about half the patients', 'most of the time/for most patients', and 'always/for all patients'. In Results, this grouping will be referred to as 'at least half the time/at least half the patients'.

Five survey questions had free text responses which were analysed qualitatively. For four of these (Q16. Describe how you assess gesture; Q18, For which types of patient is it most appropriate to *assess* gesture; Q21. For which types of patients is it most appropriate to *treat* gesture; and Q22. List any resources or methods you use to treat gesture) the following systematic coding procedures was used. Response themes were extracted by authors A.C. and A.R. They independently coded a subset of data from each question and then came together to discuss and refine codes. Following discussion, a refined set of codes were developed and applied to 25% of the data independently. Remaining data were then coded by one coder [first author]. The coding structure developed for questions 18 and 21 was the same. Codes for 16 and 22 were different. Inter-rater agreement for the four coding structures was found to be as follows: Q16 = 90% = 60/67 codes; Q18 = 91% = 89/98; Q21 = 95% = 80/84; Q 22 = 92% = 59/64. Outcomes of these questions are presented in table and text format in the Results. Responses to the fifth free text question, regarding respondents' 'top tips' for working with gesture were coded into three themes of assessment, intervention and other [by author A.R.]. Results for this question are reported as a text summary alongside results for RQ1, RQ2 and RQ3 respectively. All qualitative analyses were completed in NVivo version 14.

Data availability

The de-identified data and analysis are available in Open Science Framework (https://osf.io/8dqhm/).

RESULTS

One hundred and thirty international SLTs completed at least the demographic section of the survey. The same number went on to complete the quantitative questions of the survey to the end of Section 2 (Assessment), with one missing data-point for the last quantitative question. One hundred and twenty SLTs completed it to the end of Section 3 (Treatment). One hundred and seven SLTs completed all four sections of the survey. When analysis results are discussed, specific sample sizes are included.

Participant demographics

The largest proportion of the 130 respondents were from the United Kingdom of Great Britain and Northern Ireland (30.8%) and the United States (34.6%), with 15 countries represented in total. Respondents reported working in a variety of service settings, including acute (17.7%), community/home health (22.3%), inpatient (23.1%), outpatient (18.5%), research or university (13.1%) and skilled nursing/care home (4.6%). The mean years of experience working with neurogenic communication disorder was 13.4 years (SD = 10.5 years), and mean percentage of caseload comprising neurogenic communication disorder clients was 68.5% (SD = 26.4%). Most individuals tended to primarily work with individuals with acquired brain injury (61.5%). (See Table S1 for details.) Although most respondents were English-speaking, 22 languages were represented.

Chi-square tests indicated that people from different primary work settings did not statistically work with different types of participants (cognitive-communicative; progressive aphasia; acquired aphasia) (see Table S2, all *p* > 0.20, *N* = 130). This held true when primary work setting and calculated years were considered (four groups: clinical lower, clinical higher, research lower and research higher) (acquired brain injury, $x^2 = 2.61$, $p = 0.46$; cognitive-communicative disorder, $x^2 = 2.85$, $p = 0.42$; or progressive disorder, $x^2 = 2.84$, $p = 0.42$).

Assessment practices

If, why and for whom?

One hundred and thirty responded to this section, which asked them if, why and how often they assess gesture. Fifty percent of respondents reported assessing gesture sometimes/for some clients, with only 5% reporting that they never assessed gesture (Table 1). Most respondents

TABLE 1 Major quantitative findings of assessment and treatment practices related to gesture, in 130 respondents.

Respondents	Always/for all patients	Most of the time/for most patients	About half the time/for about half the patients	Sometimes/for some patients	Never/for no patients	Missing data
In general, assesses gesture	10 (7.7%)	30 (23.1%)	20 (15.4%)	64 (49.2%)	6 (4.6%)	0 (0%)
Uses gesture as an outcome measure	3 (2.3%)	12 (9.2%)	20 (15.4%)	64 (49.2%)	31 (23.8%)	0 (0%)
Formally assesses gesture	2 (1.5%)	5 (3.8%)	6 (4.6%)	26 (20.0%)	91 (70.0%)	0 (0%)
Informally assesses gesture	13 (10.0%)	31 (23.8%)	17 (13.1%)	53 (40.8%)	15 (11.5%)	1 (0.8%)
Uses gesture as a treatment target	0 (0%)	18 (13.8%)	17 (13.1%)	76 (58.5%)	9 (6.9%)	10 (7.7%)
Treatment goals contain gesture	0 (0%)	11 (8.5%)	16 (12.3%)	78 (60.0%)	15 (11.15%)	10 (7.7%)

indicated *Yes* or *Occasionally* for limb apraxia (58.5%), nonverbal functional communication purposes (75.4%), cognition (58.5%), language (66.9%), and social communication and pragmatics (65.4%). Evaluating gesture in hemiparesis/hemiplegia was less common (*Yes* or *Occasionally*, 36.2%). 14.6% respondents said that gesture was evaluated for other reasons. For all comparisons of why gesture was assessed, no significant differences (all $p > 0.05$) were identified between settings (clinical versus research) and years of experience (clinical, higher years versus clinical, lower years versus research, higher years versus research, lower years) relating to why or for whom gesture was assessed (see Table S3 for full statistics).

Methods of assessing gesture

For at least half the time/at least half the patients, 61.9% of respondents tended to make notes about client's use of gestures; 46.2% tended to assess gesture, generally; 46.9% used informal testing; 10% used formal assessments to evaluate gesture; 61.5% made notes about a person's gesture use in their case notes; and 26.9% assessed gesture to use as an outcome of treatment at least half the time/at least half the patients. Notably, nearly 70% of respondents reported never using a published test to evaluate gesture (Table 1). For all comparisons of why gesture was assessed, no significant differences (all $p > 0.05$) were identified between settings (clinical versus research) and years of experience (clinical, higher years versus clinical, lower years versus research, higher years versus research, lower years) relating to how gesture was assessed (see statistics in Table S3).

Eighty-six participants provided a response to the open-ended question, 'please describe how you informally assess gesture'. The results are first presented in table format by numbers of responses coded at the top-level code and any established subcodes (Table 2). Within tables, codes and subcodes are presented in order of size. Findings and common responses are then summarised in text following each table.

The most used methods of informally assessing gesture were activities to elicit gestures (93 references) and carrying out observations (90). Within these codes a large variety of methods were used. The mostly frequently stated methods for eliciting gestures were using picture cards (18), copying gestures or mime (18) and gesturing object use (17). When making observations, the majority of responses reported carrying these out during everyday conversation and/or observing spontaneous gesture (32).

Responses to this question varied considerably in their depth and scope. Many participants responded with brief answers, for example, 'Ask about gestures used' (P39) or 'By observation' (P123). Some described using a range of different approaches, for example, 'Observation within supported conversation. Gesture elicitation using picture cards. Copying gesture (apraxia assessment)' (P134). Others described their practice in detail, for example, in terms of the sequence of informal assessment approaches, for example, 'If working on gesture in particular, will start by suggesting that simple gesture is used to support WFD [word-finding difficulty], may offer gesture myself to begin with to support my own speech so the idea is introduced. Where WFD are identified a gesture model can be offered to copy to see if the patient [pt] is able to form/process the accompanying gesture. If successful then can see if the pt can then make a gesture for an action/word with a verbal prompt to do so and practice this. If that is successful then a pt may start to spontaneously use gesture to support their communication.' (P100). Some respondents described their informal assessment practice in depth explaining how they used informal gesture assessment to assess underlying processes, for example, 'I score the gestures for hand shape and movement, size of gesture and orientation of movement. I am most interested to see the thinking behind the visual communication as this is often an indication of semantic understanding and problem solving. (e.g., when using a pinching gesture to distinguish peg from camera or bird you need to include a reference to clothes on the washing line, camera must be held to the eye, bird must include eye gaze to the sky).

TABLE 2 Responses to 'please describe how you informally assess gesture'.

Code [number of responses]	Subcodes [number of responses] (*Sub-subcodes [number of responses]*)
Eliciting gestures [93]	Copying gestures or mime [18], Using picture cards [18] *(Using word prompts [10], Object picture cards [6], Verb picture cards [5])*, Gesturing object use [17], Eliciting conventional gestures or emblems [11], Barrier games [4], Everyday tasks or procedural gestures [4], Eliciting pointing using alphabet chart, object cards or words [3], Hierarchical cueing [2], In response to questions [2], Using message prompts [2], Hand-over-hand modelling [1]
Observations [90]	Everyday conversation or spontaneous gesture [32], During assessment [8], During communication breakdown or word finding difficulties [7], Expressing emotions through gesture, Gesture comprehension [6], Within supported conversation [5], Semantics [4], During narrative production [3], During therapy tasks [2], Pointing or observing precision of pointing [2], During simulated conversations [1], Non-manual gestures [1], Planning or problem solving [1], Proxy observations [1], Responses to modelled gestures [1]
Informally scoring or describing gestures [19]	Communicative effectiveness [4], Iconic versus non-iconic [2], Movement [2], Praxis [2], Count frequency [1], Formal classification for example, McNeill [1], Handshape [1], Orientation [1], Size of gesture [1]
Case history/gathering information [11]	
Evaluating client's/ partner's/ carer's awareness of gesture use [4]	
Dynamic assessment [3]	
Unpublished test [2]	
Unclassified [1]	

I may deliberately select items of the same shape which need to be distinguished by use (e.g., ball, pizza, clock).' (P132).

One hundred and eighteen participants responded to this question: 'In your opinion, for which types of patients is assessing/making notes about gesture most appropriate?'. (Note. A response from one participant may contain multiple codes so codes do not necessarily reflect the sole answer given by a respondent). Table 3 details qualitatively coded responses to this question.

There are numerous factors given in response to this question. Some people identify just one or two factors whereas others consider multiple factors ('People with aphasia, mild–severe; People with acquired apraxia, mild–severe; People with dysarthria, moderate–severe' (P32); 'For patients who need to support their verbal language skills. For patients who can not [sic] use verbal language. For patients with problems understanding language. For patients with apraxia of speech'. (P123))

The most stated factors in deciding for which patients to evaluate gesture were diagnosis (156 references), severity (70) and description of difficulty (65). Seventeen respondents identified that they would assess/make notes about gesture for most or all of their patients. Twenty-six respondents reported that they would consider patient characteristics (e.g., 'Not so much repopulation or severity but nature of the individual and their communication strengths and needs'. P44).

What are SLTs using to assess gesture?

Forty-one people reported the formal assessments of gesture they had used (some participants listed multiple items, making the total 63 items). Table 4 details qualitatively coded responses to this question.

There were 18 other assessments listed only once—these are listed in Table S6, available on the Open Science Framework.

Top tips

Twelve people provided top tips for gesture assessment. These included recommendations to observe and note clients' gestures in natural communication with others and to make video recordings of communication for later review. The Scenario Test was also highlighted by one respondent here: 'It can capture if gesture is used to good effect'. (P84).

Summary of assessment practice findings

Most respondents tended to assess gesture for the purposes of evaluating functional communication, and this was not significantly different by setting (clinical, research) or years of experience. A majority of respondents tended to

TABLE 3 Responses to 'In your opinion, for which types of patients is assessing/making notes about gesture most appropriate?'.

Code [number of responses]	Subcodes [number of responses] (*Sub-subcodes [number of responses]*)
Diagnosis [156]	Aphasia [87] (*Global [11], Expressive [8], Broca's [4], Fluent [2], Receptive [1], Jargon [1], Non-fluent [0]*), Apraxia [20] (*Apraxia of Speech [8], Limb apraxia [1]*), Dysarthria [17], Progressive neurological [9] *(PPA[4])*, Stroke [9], ABI/TBI [5], Aphonia [2], Cognitive communication disorder [2], Communication disorder [0]
Severity [70]	Severe [34], Moderate-severe [15], Regardless of severity/all severities [11], Mild [4], Significant difficulties [2], Moderate [1]
Description of difficulties [65]	Limited or little verbal output [15], Non-verbal [11], Expressive language [8] (*Anomia/WFD [1], Empty speech [1]*), Cognition [7], Receptive language [6], Speech [6] (*Intelligibility [6]*), Cognitive communication difficulties [5], Impaired limb movement [2], Intellectual disabilities [1], Literacy [1], Movement disorders [1], Semantic integrity/skills [1], Social pragmatic skills [1]
Patient factors [26]	Characteristics [26], Preferences [0]
All patients/most patients [17]	
Clinical setting [5]	Acute/early on [3], Community/later stages of rehab [1], Rehab setting [1]
Contraindication/groups gesture is not used with [3]	Clients with global or Wernicke's aphasia who 'are less likely to spontaneously incorporate functional use of gestures than individuals with Broca's aphasia' [1], Patients with primary motor speech disorders [1], Those with 'very limited volitional movement, or if volitional movement causes pain, distress or significant fatigue' [1]

Abbreviations: PPA, Primary Progressive Aphasia; WFD, word-finding difficulty.

TABLE 4 Formal assessments of gesture reported at least twice.

Assessment Name	Citation	Count
Comprehensive Aphasia Test (CAT)/CAT Gesture subtest	Swinburn et al. (2004)	14
Western Aphasia Battery (WAB)/WAB-Revised	Kertesz (1982, 2007)	10
Apraxia Battery for Adults (ABA)/ABA-2	Dabul (2000)	5
Communication Activities of Daily Living (CADL)/CADL-3	Holland et al. (2018)	4
Porch Index of Communicative Ability (PICA)	Porch (1967)	4
Boston Assessment of Severe Aphasia (BASA)	Helm-Estabrooks et al. (1989)	3
Boston Diagnostic Aphasia Examination (BDAE)	Goodglass et al. (2001); Goodglass and Kaplan (1972)	2
City Gesture Checklist (CGC)	Caute et al. (2021)	2
The Scenario Test (TST)	van der Meulen et al. (2010)	2

make notes about the client's use of gestures, but less than half described assessing gesture, with a very small proportion using formal assessments to do so. These findings were likewise not significantly different by setting or years of experience. When gesture was assessed with formal and informal means, methods and tools varied widely.

Treatment practices

One hundred and twenty respondents completed this section. For at least half the time/at least half the patients, 26.9% indicated they used gesture during treatment (thus, 73.1% sometimes or never used gesture during treatment)

and 20.8% indicated that their treatment goals contained gesture (thus, 79.2% sometimes or never included gesture in their treatment goals; Table 1). Chi square tests compared roles (clinical; research/clinical) using the simplified metric ('for at least half the time/at least half the patients' versus the group containing 'never' or 'sometimes'), finding significant differences in whether gesture was a target during treatment ($\chi^2 = 4.89$, $p = 0.027$, adjusted p value using false discover rate (FDR) = 0.027) and how often treatment goals contain gesture ($\chi^2 = 7.69$, $p = 0.006$, adjusted p value using FDR = 0.011) (Table S4A). That is, the research group was far more likely to target gesture during treatment at least half the time/for at least half the patients (41.9%) compared to the clinical setting group

(19.5%). This pattern was similar for how often treatment goals contain gesture, with the research group being far more likely to have goals containing gesture at least half the time/for at least half the patients (37.2%) compared to the clinical setting group (12.6%).

Fisher Exact tests identified a unique pattern when adding in years of experience (clinical, higher years; clinical, lower years; research, higher years; research, lower years), finding a significant difference for whether gesture was a target during treatment ($p = 0.003$, adjusted p value using FDR = 0.006) and how often treatment goals contain gesture ($p = 0.006$, adjusted p value using FDR = 0.006) (Table S4B). Examination of the tabular data suggests that the higher years research group ($n = 25$, one missing data point) was most likely to target gesture during treatment (53.8% saying at least half the time/for at least half the patients), compared with lower years research group ($n = 17$, 23.5%, no missing data), higher years clinical group ($n = 34$, 10.3%, five missing data points), and lower years clinical group ($n = 44$, 27.1%, four missing data points). Examination of the tabular data for how often treatment goals contain gesture showed that, overall, it was the research group regardless of years that tended to have treatment goals containing gesture at least half the time/for at least half the patients (higher years, 38.5%; lower years, 35.3%) compared with the clinical groups (higher years, 5.1%, lower years, 18.8%). Figure 1 shows a visual of research question two results, stratified by the two statistical comparisons.

One hundred and seven participants provided a response to the question: 'In your opinion, for which types of patients is targeting gesture during therapy most appropriate?'. (Note. A response from one participant may contain multiple codes so codes do not necessarily reflect the sole answer given by a respondent). Table 5 details the qualitative analysis for this question.

As for the question regarding candidacy for gesture *assessment*, there are numerous factors given in response to this question about candidacy for gesture *treatment*. Some people identify just one factor whereas others consider multiple factors (e.g., 'aphasia with word finding difficulties; Severe apraxia of speech; low intelligibility' (P97); 'Global aphasia, severe expressive aphasia, apraxia of speech. Pt has to show some initiative towards using other methods than speech, motivation and excecutive [sic] function plays a role also, in my experiance [sic].' (P28)). The most commonly stated factors in deciding which patients to target gesture for in therapy were diagnosis (115 references), severity (76) and description of difficulty (57). Thirteen respondents reported that they would take into account patient characteristics (for example: 'Not so much re population or severity but nature of the individual and their communication strengths and

needs'. (P44)). No contra-indications were identified in relation to therapy candidacy.

Sixty-seven participants provided a response to this question: 'If you target gesture during therapy, please list any particular resources or methods you use for this'. (Note. A response from one participant may contain multiple codes so codes do not necessarily reflect the sole answer given by a respondent). Table 6 details the qualitative analysis for this question.

Among therapists who target gesture in treatment, the most cited method was to use techniques to elicit or prompt the use of gestures (64 references). These techniques included a variety of different activities for eliciting gesture (23), such as barrier games, using word or message prompts or picture cards. Other activities related to the communication context, such as eliciting gesture in conversation, role-play or storytelling tasks. There were 23 references to named approaches to gesture treatment. Eighteen of these were treatment approaches, for example, Visual Action Therapy (Helm-Estabrooks et al., 1982), Constraint Induced Therapy (Pulvermüller et al., 2001) or the Language Activity Resource Kit (LARK) Activity Resource Kit (Dressler, 2005). There were five references to formal sign systems, for example, baby signs, Amerind, German or American Sign Language. There were eight references to multimodal methods, including treatments combining gestural and verbal therapy (six) and multimodal therapy or communication training (two). Other techniques focused on the type of facilitation techniques used, for example, copying, hand-over-hand modelling, faded cues (eight). There were two comments about eliciting particular types of gestures, for example, counting, pantomime, pointing, emblems or iconic gestures.

Twenty-one references indicated that the respondent carried out gesture treatment but did not use any particular methods. For example, one respondent commented, 'I don't have a specofic [sic] method. I just try to use gesture as much as possible to show the patient the effect of multimodal communication strategy' (P109). Fifteen responses described working with others to deliver gesture treatment, with references to working with communication partners (6), the client (4), the multidisciplinary team (MDT) (2) or carrying out gesture therapy in a group setting (3). Thirteen responses described recommending or encouraging the use of gesture, with ten respondents describing how they model and positively reinforce the use of gesture.

The responses varied in their level of detail and scope. Many respondents gave brief or very general responses, while others offered detailed information about the techniques used and context, including case examples, for example 'often considering personally relevant gestures and then demonstration/facilitation/barrier
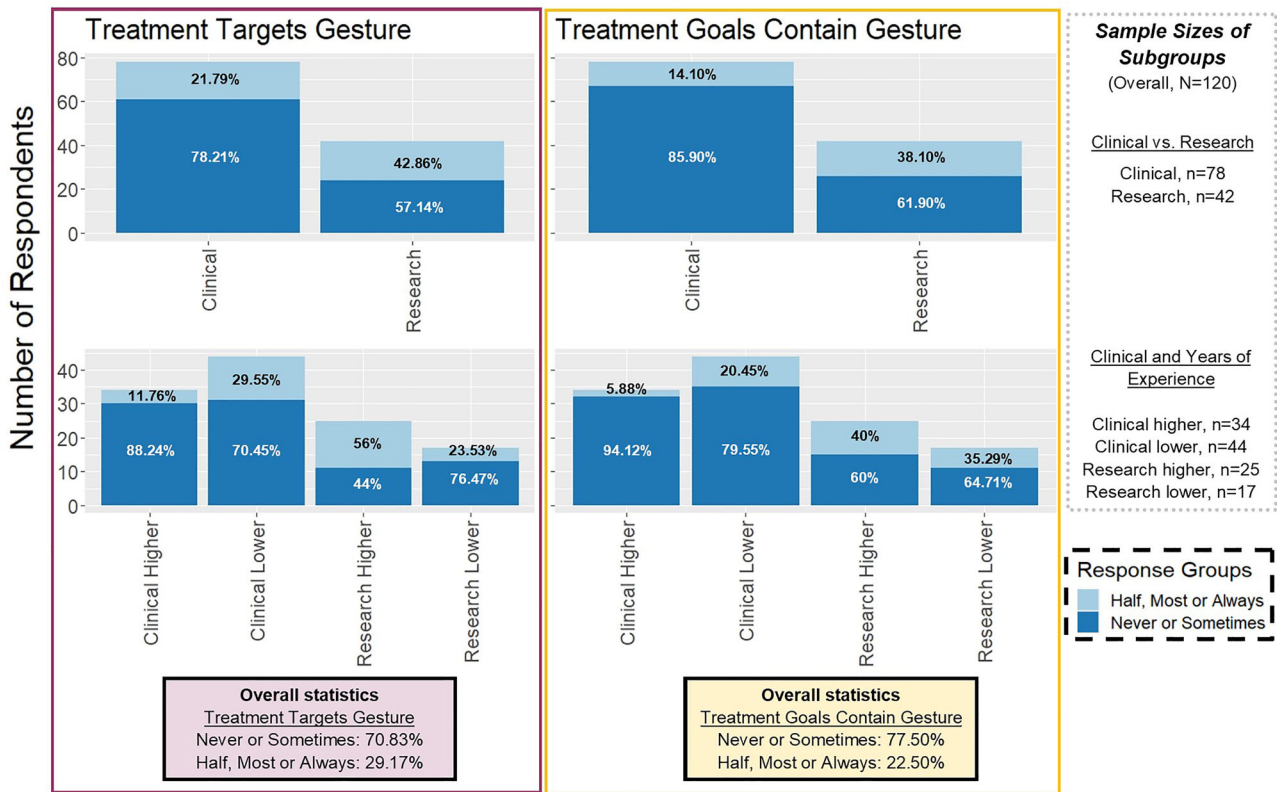
FIGURE 1 Stacked bar graph providing a visual summary of research question 2: intervention, comparing primary work settings (top row) and primary work setting considering years of experience (bottom row). In primary work setting, more members of the research group tended to target gesture during treatment and have treatment goals containing gestures statistically more than the clinical group. There was also a group difference when adjusting for years of experience (bottom row), with the difference primarily driven by the research group, once again.

TABLE 5 Responses to 'In your opinion, for which types of patients is targeting gesture during therapy most appropriate?'.

Code [number of responses]	Subcodes [number of responses] (*Sub-subcodes [number of responses]*)
Diagnosis [115]	Aphasia [66] (*Expressive [10], Global [9], Fluent [4], Broca's [3], Non-fluent [1], Receptive [1], Jargon [0]*), Apraxia [21] (*Apraxia of speech [10], Limb apraxia [3]*), Dysarthria [11], Stroke [6], Progressive neurological [5] (*PPA [4]*), ABI/TBI [1], Cognitive communication disorder [1], Communication disorder [1], Aphonia [0]
Severity [76]	Severe [35], Moderate-severe [19], Mild [5], Moderate [5], Significant difficulties [5], Regardless of severity/all severities [4]
Description of difficulties [57]	Expressive language [14] (*Anomia/WFD [2], Empty speech [1]*), Limited or little verbal output [9], Cognition [6], Non-verbal [6], Receptive language [6], Speech [5] (*Intelligibility [4]*), Semantic integrity/skills [3], Cognitive communication difficulties [2], Intellectual disabilities [1], Movement disorders [1], Impaired limb movement [0], Literacy [0], Social pragmatic skills [0]
Patient factors [13]	Characteristics [10], Preferences [2]
Clinical setting [9]	Acute/early on [3], Community/later stages of rehab [3], Rehab setting [2], AAC service [1]
All patients/most patients [6]	
Contraindication/groups gesture isn't used with [0]	

Abbreviations: AAC, Alternative and Augmentative Communication; ABI/TBI, Acquired Brain Injury/Traumatic Brain Injury; PPA, Primary Progressive Aphasia; WFD, word-finding difficulty.

TABLE 6 Responses to 'If you target gesture during therapy, please list any particular resources or methods you use for this'.

Code [number of responses]	Subcodes [number of responses] (*Sub-subcodes [number of responses]*)
Techniques to elicit or prompt use of gestures [64]	Activities to elicit gesture [23], Named approaches [23] (*Formal sign systems or languages [5], Treatment approaches [18]*), Facilitation techniques [8], Multimodal methods [8] (*Multimodal therapy or communication training [2], Verbal + gesture treatment [6]*), Types of gesture elicited [2]
No particular methods [21]	
Working with others [15]	Working with communication partners [6], Working with the client [4], In group setting or group therapy [3], multidisciplinary team (MDT) working [2]
Recommending or encouraging use of gesture [13]	Modelling use of gesture [10], No direct treatment [1]

work/situational work (e.g., recent target with young gent with severe apraxia of speech, affected cognition—targeted social gesture (waving) and blowing a kiss so could use on Facetime with partner as covid visiting restrictions still in place. Practiced in real time on face time with partner and all members of MDT to wave hello/goodbye when in session etc)' (P29). Some responses indicated that gesture was the central target in treatment, while others reported that it was 'ancillary' (P79), used to support the patient's other goals.

Top tips

Thirty-three people provided top tips for gesture treatment. These included recommendations for the SLT to model gesture use (five), increase client and family awareness of gesture in communication (four) and to provide positive reinforcement of any observed gestures (three). Eight responses related to appropriate choice of gestures for treatment, suggesting personally relevant or important targets agreed in consultation with the client, and functional gestures that might be used with high frequency and across contexts. The LARK was highlighted by one respondent as an example of a ready-made resource they use for treatment (Dressler, 2005), and another recommended the use of gesture work with pets or therapy animals. Other tips included focusing on successful communication above accuracy, working hierarchically from isolated to more complex tasks and employing game formats.

Summary of treatment practice findings

In most cases, fewer than one-quarter of respondents tended to treat gesture or include treatment goals that contained gesture for at least half the time/at least half the patients. When gesture was included as part of intervention for at least half the time/at least half the patients, it tended to be included by SLTs who worked in research set-

tings and especially by those in research setting with more years of experience.

Factors influencing assessment and intervention practices

One hundred and nine respondents completed to the section of the survey related to facilitators, and 107 completed the section of the survey related to barriers. A majority of respondents acknowledged a lack of published tests or tools (50%), and that a client's skills may preclude assessing or treating gesture (49.2%), as barriers. The family or individual not prioritising gesture for enhancing communication was another barrier (43.1%). Barriers that were not often endorsed by respondents included importance or relevance to client (10%), lack of time to assess gesture or integrate gesture into treatment (11.5%), the clinician's comfort level (7.7%) and the support of the workplace (7.7%). The biggest facilitators for using gesture tended to be a family or client's prioritisation on gesture to improve communication (53.1%), the client's skills (46.2%), importance or relevance to client (41.5%) and support from workplace (40%).

Chi-square tests did not identify significant differences across facilitators or barriers by primary work setting (clinical, research) or when further stratified by years of experience (all $\chi^2 < 1.51$ and uncorrected $p > 0.198$) (Table S5).

Top tips

Two respondents used the final open format 'top tips' question of the survey to leave specific additional comments about the need and requirements for further standardised assessment and therapy: 'I'd like to have a standardised video based assesment [sic] and clear advisory of how to interprete [sic] patients reactions' (P97); 'We may require video-based gesture corpus than pictures. We may require 'frequent gesture corpus and ratings' (P58).

Summary of influential factors findings

Many barriers were identified, with a lack of published tests or tools and that a client's skills precluded assessing or treatment gesture being endorsed by half of respondents. Similarly, many facilitators were identified, with prioritisation of using gesture by client or family being the most common, followed by consideration of the client's skills. These findings were not significantly different by setting or years of experience.

DISCUSSION

This international survey of practicing speech-language pathologists/therapists targeted those with experience of a neurogenic communication disorder caseload and aimed to (1) identify why and for what purposes clinicians are interested in gesture, (2) characterise assessment of gesture and (3) characterise gesture's inclusion in typical treatment.

Only a small proportion of our respondents (5%) reported never assessing gesture. The majority of our respondents assessed gesture, at least sometimes or for some patients, which is encouraging and aligned with recommendations in clinical guidelines (e.g., National Institute for Health and Care Excellence, 2023) to assess and treat non-verbal communication. However, when we grouped the data into those responding 'never or sometimes' and those responding 'half, most or always' (see Table S3) the picture is less positive, with the former group marginally larger than the latter.

For the majority who did assess gesture, at least sometimes, they did so to evaluate nonverbal functional communication, and commonly also used to assess other communicative or higher-level abilities (i.e., language, cognition, social communication and pragmatics). These findings suggest agreement on the value of evaluating gesture for understanding communication, aligning with the recommendations of Clough and Duff (2020) that we should routinely identify the consequences of neurogenic communication disorders on gesture because of the evidence that gesture has essential communicative functions above and beyond speech.

There was a tendency for most respondents to make notes about a person's use of gestures in their case notes. Evaluation of qualitative responses suggested variability in how they chose which patient's gesture to note. The majority tended to provide an answer related to the diagnosis of the client (e.g., aphasia, especially non-fluent varieties), then about the severity of diagnosis (e.g., more severe), and then variable factors such as patient characteristics and preferences, a description of specific difficulties (e.g.,

expressive language impairment), and the clinical setting (e.g., assessing in acute/early stages). There is very little in the aphasia literature to motivate these decisions. Clough and Duff's review (2020) highlights the complexity of the evidence relating to aphasia type or fluency; and (De Kleine et al., 2024) highlight the lack of evidence that aphasia severity or semantic processing deficits are related to the gestural communication success of people with aphasia.

Assessing gesture as an outcome of treatment was far less common and seemed to be related to the finding that respondents rarely used formal tests to assess gesture. Indeed, our explicit questions about barriers highlight this: with half of respondents citing a lack of tools as being a barrier to gesture assessment and treatment. Qualitative results also highlight the lack of formal assessments, presumably leading clinicians and researchers to feel less confident using gesture as a metric of treatment-related change when it cannot be reliably or validly measured. Even informal assessment of gesture was reportedly uncommon. Where it was used there were a variety of methods, including case history information gathering, dynamic assessment, intentionally eliciting gestures, evaluating awareness of gesture use (from client as well as other perspectives), observation and in-house scoring or describing gestures (e.g., formal classification using handshape).

There is a recommended psychometrically robust measure of communication to evaluate multiple modalities, including gesture (the Scenario Test, van der Meulen et al., 2010) but only two of our respondents mentioned it as a tool they used for evaluating gesture. This may seem surprising, given its inclusion in the Research Outcome Measurement in Aphasia Core Outcome Set (ROMA COS; Wallace et al., 2019), which is a set of recommended core outcome measures for aphasia treatment research. However, this may be because these measures are recommended for treatment research rather than clinical practice. While 89 of our respondents identified themselves as primarily clinical, only 43 identified themselves as primarily research focussed, and of those we do not know how many undertake *treatment* research.

There is a notable lack of similarly robust tools specifically for gesture, severely impeding the use of gesture as an outcome of treatment as evidenced by our findings. A recent study aimed to alleviate some of these issues by co-designing an assessment of gesture alongside SLTs, specialised for adults with neurogenic communication disorders (Caute et al., 2021). Other recent research has aimed to include gesture assessment as part of a more global assessment of nonverbal ability, for example the Nonverbal Semantics Test (NVST, Hogrefe et al., 2021). These gesture-focussed or gesture-inclusive tools are rare

and only recently emerging. They stand in contrast to many standardised batteries of aphasia, such as the Western Aphasia Battery—Revised (Kertesz, 2007), in which gestures are not explicitly included in scoring criteria. The responses to our survey have made clear that limited options for evaluating gesture is the main barrier for clinical use. Of note here is that few respondents indicated environmental or skills barriers to gesture assessment—with very few reporting that their comfort level, workplace support or lack of time was a barrier to assessing or treating gesture—leading to the conclusion that increasing the availability a reliability of clinical tools for gesture could have a significant impact.

Our results suggest that those respondents who most often treat gesture, and create treatment goals containing gesture, were practicing clinicians whose primary work setting is research or university and who had 6 or more years working clients with neurogenic communication disorders. This suggests a potential under-use of gesture in treatment by others, despite the fact that there is evidence for its benefits, both to address the impact of neurogenic communication disorder on gesture itself and to support the contribution of gesture to the overall communication success of people with aphasia. (Clough & Duff, 2020; de Kleine et al., 2024). Whilst we have no data from this survey to explain the greater implementation of gesture treatment by researchers and by those with more clinical experience, we can speculate that time and resources might be a factor. Less experienced clinicians may also have more diverse, generalist caseloads and therefore be less likely to be able to focus on particular client groups or types of treatment.

When treatment methods were reported in our survey, they were notably diverse with most respondents reporting a variety of techniques to elicit or prompt the use of gestures, ranging from activities (e.g., barrier games), to specific treatments. Twenty-one respondents did not use a particular method, and 15 worked with others (e.g., care partners) to deliver gesture therapy. Although there are published multimodal approaches to aphasia therapy as well as those that support the use of gesture as a therapeutic strategy to improve the communication (Pierce et al., 2019) these paradigms may not have found firm traction in the clinical world.

There are several potential explanations for this, including attitudes of clinicians, clients or their families towards a focus on nonverbal communication and fears that doing so might impede the recovery of verbal communication. In our survey, a notable proportion (43%) said that this was a barrier for assessing or treating gesture. Our findings also indicate that a select percentage of the population seen by SLTs may be deemed to benefit from gesture-inclusive treatment. Respondents most commonly mentioned diag-

nosis (aphasia, especially the expressive kind) and severity (severe being the most common) motivating their decision. However, as noted for assessment, the literature is inconclusive with respect to candidacy for gesture treatment (Clough & Duff, 2020).

Taken together, these findings indicate that more could and should be done to disseminate recent research which highlights the beneficial symbiosis of gesture and speech, and to highlight evidence for the dual impact that can be achieved by providing an alternative means of expression and supporting verbal communication recovery (Dietz et al., 2018). The majority of respondents in our study also noted a family or individual's prioritisation of gesture as a facilitator. In a society that is heavily focused on verbal communication, gesture appears to take a backseat for some, but not all. This leads us to believe that, given proper education and a functional view on communication improvement, improving or leveraging gesture should be included as a potential treatment goal for *all* individuals with a neurogenic communication disorder.

Clinical implications

This study revealed the huge variety in methods and tools used by SLTs, but that there is a lack of consensus on how to assess and treat gesture. This finding reflects the lack of standardised assessments and the scarcity of formal therapy approaches focusing on gesture, as well as the resourcefulness of therapists in drawing on a variety of resources to meet the complex and individual needs of this heterogenous population. The finding that therapists working in research settings who have more years of experience are the most likely to treat gesture may indicate that clinicians find this a challenging and time-intensive area to work with.

The study found that a key facilitator for working with gesture is the priority placed on this modality by clients and their families. This highlights the importance of educating clients and families about the importance of gesture in human communication and the facilitative role it can play in rehabilitation. This may involve demonstrating the use of non-verbal communication in interactions and drawing attention to how it can facilitate understanding and expression (Adjei-Nicol, 2023) as well as using research evidence to dispel fears that focusing on gesture will hinder the recovery of speech.

Limitations

The survey respondents were international but were largely from the United States and the United Kingdom,

and most respondents tended to speak English as their primary language. Therefore, future work integrating less Anglo-centric and more global respondents would be ideal in order to replicate findings and better identify globally relevant needs.

The number of research-oriented clinicians was less than those working primarily in clinical settings. This may have led to some bias in statistical analyses, or indeed, in the representation of those filling out the survey. For example, it may have been that those clinicians working in primarily research or university settings were also those inherently interested in gesture, therefore driving the statistical differences noted in research question two: intervention practices.

The survey was disseminated strategically to SLT networks and also via snowballing method. As is well-known, the snowballing method may result in some bias in representation, such as the reflection of researchers who may have been particularly focused on gesture, as discussed previously.

There were missing data throughout the survey because each question was not made mandatory. This results in some uneven data loss for group comparisons. While the statistics employed are robust in dealing with missing data, and the overall completion rate was high (>80%), future research should consider limiting the survey length or number of questions to encourage completion.

Respondents filling out the survey tended to, overwhelmingly, focus their clinical work on individuals with acquired aphasia rather than those with cognitive-communicative needs or primary progressive aphasias. Results from this survey may not, therefore, generalise to populations where clinicians tend to evaluate gesture across these other neurogenic communication disorders.

Summary

Overall, the responses to this international survey are encouraging, suggesting that clinicians worldwide recognise that communication is multimodal and that, along with many of their clients, they acknowledge the value of gesture in communication success. In line with international clinical guidelines, the clinicians in our survey perceive a key part of their role to be the *holistic* evaluation of their client's communication, including an investigation of the potential for compensatory strategies. The responses to the survey made clear the obstacles to the wider use of gesture clinically: lack of (or lack of awareness of) clinical tools; uncertainty about candidacy; and attitudinal barriers. There were also clear positive indicators, suggesting that there is a desire to expand this clinical area and a growing appreciation of the importance of the interplay of verbal and non-verbal modalities in communication.

CONFLICT OF INTEREST STATEMENT
Authors do not have financial or non-financial conflicts of interest.

DATA AVAILABILITY STATEMENT
De-identified data are freely available on our Open Science Framework project: https://osf.io/8dqhm/

PARTICIPANT CONSENT
Potential respondents were provided with information about the survey, including that it would take 10–15 min to complete, the names of the investigators and a contact email. Participants gave consent electronically before commencing the survey.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.