International Journal of Speech-Language Pathology, 2026; 28: 112–125

Image use in aphasia rehabilitation: Practices of speech-language pathologists in South Africa and international contexts

BHAVANI SARVESHVARI PILLAY[1], JEANNIE VAN DER LINDE[1], MARIEN ALET GRAHAM[2] & SHAKILA DADA[3]

[1]*Department of Speech-Language Pathology and Audiology, Faculty of Humanities, University of Pretoria, South Africa,* [2]*Department of Early Childhood Education, Faculty of Education, University of Pretoria, South Africa,* [3]*Centre for Augmentative and Alternative Communication, Faculty of Humanities, University of Pretoria, Hatfield, South Africa*

Abstract

Purpose: The study aimed to explore speech-language pathologists' practices regarding image selection and use in the treatment of people living with aphasia. Images are widely utilised with people living with aphasia, however, supporting their communication optimally remains challenging.

Method: Ninety-two speech-language pathologists from South Africa, Australia, USA, and the UK completed a custom-designed online survey. Descriptive and inferential statistics, with structured-tabular thematic analysis were used.

Result: Sixty-two (82.7%) of the 75 participants who conduct assessments with people living with aphasia mostly use images. Sixty-seven (72.8%) of the total sample include images during treatment. South African respondents reported using black-and-white line drawings (28.1%) less frequently than speech-language pathologists from other countries (9.8%). Coloured images were preferred overall. South African participants significantly reported culture (62.5%) and religious orientation as "always important" (63.3%) compared to their counterparts (34.1%, 12.2%). Respondents use images to support learning and language; and less frequently in discourse with people living with aphasia. The more experienced a respondent was, the more knowledgeable and confident they felt incorporating images. Themes of client considerations and clinical settings for images emerged. Speech-language pathologists' perceived barriers were time, larger caseloads, people living with aphasia's variable responses to images, and lack of resources.

Conclusion: Speech-language pathologists in this sample have a knowledge base of image types and factors that may contribute to image interpretation in people living with aphasia. However, further research globally is needed. A structured approach to image selection is lacking in both low and middle-income, and high-income countries. Considering people living with aphasia's skills, preferences, and communication partner involvement may optimise image use. Development of a framework for systematically organising image features for people living with aphasia is warranted.

Keywords: *images; people with aphasia; speech-language pathologist; survey; visuographic supports; practices*

Introduction

People living with aphasia (PWA) face numerous challenges that impact their participation in everyday contexts due to chronic language impairment (Simmons-Mackie & King, 2013). Processing of symbolic content may be challenging for PWA (Beukelman & Light, 2020). Some PWA have relatively preserved visual processing skills and fairly good cognitive abilities, allowing them to process and interpret images swiftly (Brown & Thiessen, 2018).

Globally, images are widely utilised speech-language pathology clinical tools for assessment and treatment of PWA (Brown & Thiessen, 2018). Speech-language pathologists (SLPs) use various image types in aphasia rehabilitation including line drawings, photographs, picture scenes, and visual scene displays. In formal language assessment tools, for example, line drawings are used to evoke language expression in PWA (Kagan & LeBlanc, 2002). Multimodal approaches to therapy for PWA employ

Correspondence: S. B. Pillay, Department of Speech-Language Pathology and Audiology, Faculty of Humanities, University of Pretoria, South Africa. bhavani.pillay@up.ac.za

Supplemental data for this article can be accessed online at https://doi.org/10.1080/17549507.2024.2434229.

ISSN 1754-9507 print/ISSN 1754-9515 online © 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.
Published by Taylor & Francis
DOI: 10.1080/17549507.2024.2434229

images to augment natural speech (Simmons-Mackie & King, 2013) and/or to replace verbal communication. Images may also serve as a conversation starter or a means to convey specific information (Simmons-Mackie & King, 2013), facilitating communication and fostering social closeness (Baier et al., 2018). However, formal assessment materials include predesigned visual stimuli, which restrict SLPs' choices in image selection and use. Additionally, variability exists in SLPs' selection and inconsistent use of images in informal assessment and treatment tasks (Brown & Thiessen, 2018). The variety of image types available and the potential effects on different tasks, such as naming, present a challenge for SLPs in determining the most appropriate images when working with PWA.

Findings from a roundtable discussion at the 2016 Aphasiology Conference revealed that prior clinical experience and therapeutic instinct were key contributors to SLPs' decision-making practices (Brown & Thiessen, 2018) regarding the selection and use of image-based supports to augment PWA's communicative-linguistic abilities. SLPs require research evidence that informs clinical decisions (Dada et al., 2017). However, limited research in this area may require gaining better insight into factors SLPs consider during routine selection and use of images with PWA to generate evidence for future decision-making; an important objective of a practice-based evidence model (Dada et al., 2017).

An image must be recognisable to the PWA to be of use in assessment and treatment tasks. Image quality may either facilitate or restrict PWA from recognising depicted concepts (Reymond et al., 2019). Image characteristics like colour, shape, size, orientation and luminance are encoded during early visual processing and can affect object recognition (Heuer, 2016; Heuer et al., 2017). This may influence the PWA's performance on comprehension and naming tasks because of impaired processing of image characteristics or insufficient processing due to poor image saliency (Dietz et al., 2009; Heuer et al., 2017; Reymond et al., 2019). Visual saliency refers to certain parts of an image that are distinctive or noticeable in an image (Heuer, 2016). A possible solution is for SLPs to control image characteristics in assessment and treatment materials (Brown & Thiessen, 2018; Heuer, 2016) to increase the likelihood that a PWA's responses are due to linguistic processing and not confounded by visual stimuli (Dyson et al., 2022; Heuer et al., 2017). A recent study showed that image features such as colour and shading could be employed to create graphic representations that may have similar results to photographs across the same task (Reymond et al., 2023).

Images may portray different degrees of information. Content refers to information depicted within an image, whereas context includes the information presented in the setting or background of an image

Figure 1. Examples of image types in relation to context.

(Brown & Thiessen, 2018; Knollman-Porter et al., 2016), shown in Figure 1.

Low-context images, one could argue, may be used to communicate basic needs; while high-context images may facilitate more complex communication (Brown & Thiessen, 2018; Pampoulou, 2019; Wallace et al., 2012). Simple line drawings may facilitate visual processing and reduce distraction (Heuer, 2016). Additionally, a study investigating the development of semantic test stimuli found that coloured photographs and pictures, when controlling for size and minimal background information (i.e. no- or low-context), were adequate for picture-matching tasks (Dyson et al., 2022). Dada et al. (2019), however, found that high context images may provide additional information to improve PWA's comprehension due to fewer demands on working memory. Gains obtained from using different image types with PWA may be task dependent.

Literature suggests that PWA prefer photographs over other image types because they reveal connections between the people and objects portrayed (Dietz et al., 2009; Knollman-Porter et al., 2016; McKelvey et al., 2010). Detail in photographs may better facilitate recognition due to the surface shape, which is curved through colour and texture, over line drawings that lack depth (Price and Humphreys, 1989). Personalised photographs have improved picture-word matching accuracy in PWA and may positively influence communication effectiveness (Brown & Thiessen, 2018). SLPs, however, have yet to determine the types of image-based supports that PWA find most helpful (Brown & Thiessen, 2018; Knollman-Porter et al., 2016).

Variables such as type and aphasia severity, the PWA's differing linguistic/communication needs and strengths, and the cultural relevance of the image influence performance with image-based supports (Mazumdar et al., 2020; Reymond et al., 2023). Increased age and aphasia severity may lead to impaired visual scanning and inaccurate image selection (Heuer et al., 2017). Additionally, specific vocabulary that images depict may or may not reflect the PWA's culture and is an important consideration

in multilingual and multicultural settings (Pampoulou & Fuller, 2020).

The South African population living with aphasia is mostly bilingual or multilingual with Africa having the highest prevalence of multilingualism (Khokhlova, 2015; Penn, 1993). Seventy-seven percent of the South African population speak a language other than English, however, SLPs generally have English and/or Afrikaans as their first or most dominant language (Khoza-Shangase et al., 2018). Cultural diversity and cultural beliefs about health, disease, and communication impairment often influence the seeking of speech-language pathology services and adherence to treatment (Penn & Watermeyer, 2018). South Africa is a developing middle-income country with rising noncommunicable diseases and injuries related to violence (Achoki et al., 2022), which likely leads to more individuals affected by acquired neurogenic communication disorders in a fragmented healthcare system. These factors present challenges for South African SLPs in adapting the more traditional Western-style approaches to aphasia treatment (Penn, 1993). A review of speech-language pathology services within Sub-Saharan Africa, called for a paradigm shift in incorporating Western perspectives like those of high-income countries (USA, UK, and Australia) but reframing them with unique African social, linguistic, and cultural dimensions (Lüdtke et al., 2023).

Developing clear images that can be used in clinical settings requires a well-defined, thorough, and systematic approach (Reymond et al., 2023). Exploring SLPs' practices in different settings, both from a South African and international perspective may provide initial insight into decision-making when using images in aphasia rehabilitation. The current research study aimed to describe South African SLPs' current knowledge and practices with international settings regarding the selection and use of images during the assessment and treatment of PWA.

Method

Survey

A quantitative custom-designed online survey was compiled primarily based on the work by Brown and Thiessen (2018) and Dada et al. (2017). The survey consisted of five subsections including (a) biographical information, (b) assessment and treatment practices, (c) SLP's knowledge, (d) attitudes, and (e) experience. Thirty-eight closed-ended questions predominated with one open-ended question included. Yes-no type questions, nominal response options (e.g. "What is your assessment approach for PWA?"), and ordinal 5-point Likert-type items were included. Additionally, different images were provided, requesting respondents to indicate which image they thought PWA would prefer. The open-ended question: "Briefly add any comments regarding your experience of using images with people who have aphasia", concluded the survey.

Instrument quality assurance

As the survey was a custom-designed questionnaire, reliability and validity had to be established. Reliability: Cronbach's alpha is the most widely used statistic for establishing reliability; however, it is often inappropriately applied to factors with few items (<10) as they are vulnerable to underestimation (Robertson & Evans, 2020). The inter-item correlations (IIC; for factors with two items) and mean IIC (MIIC; for factors with three more items) are more appropriate measures of factor reliability, with recommendations ranging from 0.1 (Pallant, 2020), to 0.3 (Hajjar, 2018), or higher as acceptable. When the IIC or MIIC is lower than 0.1, it is unlikely that a single score represents item complexity (Pallant, 2020). Validity: Construct validity was considered, consisting of convergent- and discriminant validity. For convergent-validity, items loading on the same construct should significantly correlate, whereas, for discriminant-validity, items belonging to different constructs should not be as strongly correlated as those belonging to the same constructs (Cohen et al., 2018). Prior to computing Cronbach's alpha coefficients and correlations, three exploratory factor analyses (EFAs) were performed to explore the underlying factor structure of section 2 (assessment practices), section 3 (treatment practices) and section 4 (SLP's knowledge, attitudes, and experience), respectively. For all three EFAs, the component correlation matrices showed correlations between the factors, and accordingly, oblique rotation (specifically, principal components analysis using promax rotation) was used. For the EFAs: (a) necessary assumptions for conducting an EFA were confirmed, e.g. Bartlett's test of sphericity ($p < 0.05$) and items negatively phrased were reverse-scored, (b) number of factors extracted was based on eigenvalues > 1, (c) items with communalities < 0.4 (Eaton et al., 2019) and items loading <0.6 were dropped (Yen et al., 2014), and finally (d) factors, where only one item was extracted, were dropped. EFA 1: One 5-point Likert-type question in section 2 requested respondents to indicate their level of agreement with 12 statements relating to assessment practices of PWA and images. After removal of four statements, four factors were extracted, which explained 73.7% of the variance. EFA 2: two 5-point Likert-type questions in section 3, totalling 14 statements, to which frequency of image use during treatment activities to support PWA were indicated. After removal of three statements, four factors were extracted, explaining 74.5% of the variance. EFA 3: Four 5-point Likert-type questions asked respondents to indicate their level of agreement, totalling 12 statements related to their knowledge, confidence and experience (a) working with PWA, (b) addressing image selection during assessment, (c) image selection

Table I. Extracted factors, reliability and validity.

Survey section	Extracted factors	Item	r_s, or MIIC (p-values)
Section 2: Assessment practices of PWA and images Response options: 1 = "strongly disagree" to 5 = "strongly agree"	Perspectives on the use of line drawings	18.7 PWA understand line drawings more than photographs	$r_s = 0.541$ ($p < 0.001$)**
		18.8 Line drawings with a white background is best for naming and identification tasks	
	Perspectives on personalised photos	18.6 Personalised photographs elicit more effective communication from PWA than generic photographs	$r_s = 0.475$ ($p < 0.001$)**
		18.11 PWA respond more to personalised images than other image types	
	Perspectives on the use of photos	18.4 Photographs depicting a scene is often confusing for PWA*	$r_s = 0.412$ ($p < 0.001$)**
		18.10 A picture that has more context (i.e. setting/background) elicits more communication from PWA	
	Perspectives on selecting visual graphic symbols	18.2 Using pictures that I select results in more information obtained from PWA	$r_s = 0.226$ ($p = 0.049$)**
		18.9 Photographs with a white background is best for naming and identification tasks	
Section 3: Treatment practices of PWA and images Response options: 1 = "never" to 5 = "always"	Image use in discourse	Q21_7: Recall activities	$r_s = 0.447$ to 0.611 MIIC = 0.553 (All $p < 0.001$)**
		Q21_5: Expressing feelings or opinions	
		Q21_6: Telling or retelling a story	
		Q21_4: Sequencing activities	
	Images as a cognitive support	Q26_6: Support as an external memory aid	$r_s = 0.530$ to 0.764 MIIC = 0.649 (All $p < 0.001$)**
		Q26_3: Organisational or daily schedules	
		Q26_4: To improve interpersonal communication	
	Image as a language support	Q26_1: Support for expressive language	$r_s = 0.648$ ($p < 0.001$)**
		Q26_2: Support for receptive language	
	Image learning in treatment	Q21_2: Object identification activities	$r_s = 0.507$ ($p < 0.001$)**
		Q21_1: Matching activities (e.g. object to picture, picture to written word/phrase)	
Section 4: Knowledge, attitudes and experience of the SLP Response options: 1 = "strongly agree" to 5 = "strongly disagree"	Knowledgeable, experienced, and confident in selecting images for assessing different areas of language and communication in PWA	Q34_1: I am knowledgeable in the selection of images for assessing different areas of language and communication in PWA	$r_s = 0.557$ to 0.871 MIIC = 0.729 (All $p < 0.001$)**
		Q34_3: I am experienced in selecting images for use during the assessment of PWA	
		Q34_2: I feel confident selecting images for assessing different areas of language and communication during the assessment in PWA	
		Q35_1: – I am knowledgeable in the selection of images addressing different areas of language and communication during treatment of PWA	
		Q35_3: – I am experienced in selecting images for use during the treatment of PWA	
		Q35_2: – I feel confident selecting images for addressing different areas of language and communication during the treatment of PWA	
	Knowledgeable, experienced, and confident working with PWA	Q33_1: I am knowledgeable working with PWA	$r_s = 0.862$ to 0.876 MIIC = 0.869 (All $p < 0.001$)**
		Q33_2: I feel confident working with PWA	
		Q33_3: I am experienced in working with PWA	
	Knowledgeable, experienced, and confident in using images to support the communication needs of PWA	Q36_2: – I feel confident using images to support the communication needs of PWA	$r_s = 0.734$ to 0.788 MIIC = 0.758 (All $p < 0.001$)**
		Q36_1: – I am knowledgeable about using images to support the communication needs of PWA	
		Q36_3: – I am experienced in using images to support the communication needs of PWA	

*Item reverse-scored.
**Statistically significant ($p < 0.05$).

addressing areas of language and communication during treatment, and (d) image use to support PWA's communication. All 12 statements were retained and three factors were extracted, explaining 83.5% of the total variance. Table I shows extracted factors for the three EFAs, the IIC (same as Spearman correlations, r_s) and the MIIC. Spearman correlations were used due to the type of data obtained (i.e. ordinal Likert-scale items).

From Table I, IIC and MIIC are greater than 0.1, indicating that the instrument is reliable. Regarding validity: for conciseness, not all correlations are shown here; however, construct validity was established where items loading onto the same construct correlated significantly (Table I), and those loading onto different factors correlated less strongly.

Data collection and sampling technique

Data collection commenced once the institutional review board granted permission (HUM042/0721). Convenience sampling was used to recruit SLPs who were (a) adequately qualified and/or registered with the respective professional bodies in the four countries, (b) English-proficient, (c) with recent experience within the past five years working in aphasia rehabilitation. A pilot study was conducted with three SLPs recruited from social media platforms (USA -

special interest group, Australia - speech pathology email chats (SPECS) group; and the first author's professional network (South Africa - colleague in private healthcare) who met the inclusion criteria. Pilot participants provided feedback using a template adapted from the work of Muungo (2016). The questionnaire's ease of use and comprehensibility were assessed and amended by including more response options to biographical questions (e.g. academic setting), minor rephrasing of two items, and adding pictorial examples of the different image types to enhance clarity.

The final 39-item survey was distributed via a Qualtrics-XM software link on professional bodies and online social media platforms once permission was granted. The SLPs mailing list from the Health Professions Council of South Africa (HPCSA) and three local social media platforms for SLPs and allied healthcare professionals were used to advertise the invitation to participate and included the survey link. An invitation with the survey link was also posted on the Australian-based online international forum, SPECS; the Royal College of Speech and Language Therapists' (RCLST) newsletter in the UK, as well as the American Speech-Language-Hearing Association's (ASHA) special interest group dedicated to neurogenic communication disorders (SIG 2). Snowball sampling was also employed, together with the researcher's existing network of professional colleagues, whereby SLPs were encouraged to share the survey link with others. The survey remained open for eight weeks with regular reminders posted from 29 January to 29 March 2022 due to the reduced response rate from participants in some countries. Consent, incorporated into the electronic questionnaire design, was confirmed by each participant before the commencement of the survey.

Data analysis

Descriptive statistics were used to summarise demographic information, aspects of clinical experience and service provision to PWA. The Statistical Package for Social Sciences (SPSS) version 27 was used to conduct all statistical tests, and a 5% level of significance was used. Extracted factors in Table I were created by averaging items that loaded onto each factor, constituting continuous variables. The Shapiro-Wilk test was used to test normality of these continuous variables, and since not all p-values were greater than 0.05, normality could not be assumed for all variables. Nonparametric tests were used where the median (*Mdn*) and interquartile range (*IQR*) are reported along with the mean (*M*) and standard deviation (*SD*). Structured tabular thematic analysis (ST-TA), designed for short textual data (Robinson, 2022), was used to analyse the open-ended question. This variation of thematic analysis includes aspects of Braun and Clarke's (2006) thematic analysis method and Boyatzis (1998) thematic analysis phases. Steps of ST-TA were followed as outlined for inductive thematic analysis, generating themes in response to the research question.

Result

Respondents from each country did not answer every question, and response rates differed from sections related to image selection and use in the assessment and treatment of PWA.

Participants

Ninety-two SLPs consented and completed the online survey. Forty-one (44.6%) SLPs were from South Africa and 51 (55.4%) SLPs were from Australia, UK and the USA. Table II displays participant demographic information. Forty-one (44.6%) respondents were registered in South Africa, followed by respondents from the USA ($n = 24$; 26.1%), Australia ($n = 17$; 18.5%), and the UK ($n = 10$; 10.9%). The majority ($n = 61$; 66.3%) of participants were between the ages of 18 and 39, with approximately one-third ($n = 27$; 29.3%) between 40 and 59 years old. Approximately half ($n = 45$; 48.9%) of the participants had been practicing as an SLP for more than a decade (Figure 2).

Independent sample proportions z-tests were performed to determine whether there were statistically significant differences in the demographic categorical variables between South African SLPs in low- and middle-income settings and those from the other three countries, high-income settings. South African respondents had significantly more ($z = 2.241$, $p = 0.025$) respondents with six to ten years of experience practicing as an SLP ($n = 9$ out of 41; 22.0%) compared to other countries ($n = 3$ out of 51; 6.0%). SLPs from the three countries had significantly ($z = 2.484$, $p = 0.013$) more respondents with greater than 15 years experience ($n = 19$ out of 51; 37.3%) compared to their South African counterparts ($n = 6$ out of 41; 14.6%).

Nearly 60% of participants ($n = 52$ out of 92; 56.5%) had more than five years of experience working with PWA, with 50% ($n = 46$ out of 92) reporting less than half of their caseload, and 26% ($n = 24$ out of 92) reporting half, or more of their caseload included PWA at the time of the study. South African respondents reported significantly ($z = 2.034$, $p = 0.042$) more than half their caseload includes PWA (13 out of 41; 31.7%) compared to the other countries (7 out of 51; 13.8%). Clinical work settings, displayed in Figure 3, mostly included rehabilitation facilities ($n = 34$ out of 92; 37.0%), state-funded ($n = 24$ out of 92; 26.1%), private healthcare and hospitals ($n = 24$ out of 92; 26.1% and $n = 18$; 19.6%), outpatient rehabilitation ($n = 22$ out of 92; 23.9%), and university or other tertiary institutions ($n = 15$ out of 92; 16.3%). South African respondents had significantly ($z = 3.291$, $p = 0.001$) more

Table II. Participant characteristics ($n = 92$).

	n	%
Age (years)		
18–29	30	32.6
30–39	31	33.7
40–49	15	16.3
50–59	12	13.0
60 and older	4	4.3
Highest qualification obtained		
Bachelor's degree	45	48.9
Master's degree	33	35.9
Doctoral degree/ PhD	14	15.2
Professional bodies/ boards		
Health and Care Professions Council (UK)	8	8.7
Health Professions Council of South Africa (SA)	41	44.6
State Licencing Board (USA)	16	17.4
Speech Pathology Australia (AUS)	14	15.4
American Speech-Language-Hearing Association (USA)	8	8.7
Royal College of Speech and Language Therapists (UK)	1	1.1
Council for Professions Allied with Medicine (Cayman Islands, UK)	1	1.1
Local Health district (AUS)	1	1.1
Nil – professional registration not mandatory in Australia (AUS)	1	1.1
Other (not specified)	1	1.1
Years practicing as an SLP		
Less than 3 years	23	25.0
Between 3 and 5 years	12	13.0
Between 6 and 10 years	12	13.0
Between 11 and 15 years	20	21.7
More than 15 years	25	27.2
Experience working in aphasia rehabilitation (years)		
Less than 1 year	10	10.9
Between 1 and 2 years	16	17.4
Between 3 and 5 years	14	15.2
Between 6 and 10 years	15	16.3
Between 11 and 15 years	17	18.5
More than 15 years	20	21.7
Healthcare sector		
Public health care (state-funded)	28	30.4
Private health care	42	45.7
Academic setting (University or research lab)	15	16.3
NPO/NGO	5	5.4
Public health care (state-funded) and private health care and academic setting	2	2.2
Clinical setting*		
Public hospital (state-funded)	24	26.1
Private hospital	18	19.6
Primary healthcare setting	1	1.1
Private practice	24	26.1
Rehabilitation facilities	34	37.0
University or other tertiary education facility	15	16.3
Community	11	12.0
Outpatient rehabilitation	22	23.9
Aged care	7	7.6
Not-for-profit organisation	7	7.6
Other	1	1.1
Caseload providing care for PWA		
Less than half	46	50.0
Half	24	26.1
More than half	20	21.7
All	2	2.2

Note. NPO – Not-for-profit organisation, NGO – Non-governmental organisation, PWA – person(s) with aphasia.
*Could select more than one option leading to there being more than 92 responses.

respondents in the private healthcare sector ($n = 27$ out of 41; 65.9%) compared to the other countries ($n = 15$ out of 51; 30.0%).

Assessment, treatment, and image use with PWA

Approximately 80% ($n = 75$ out of 92; 81.5%) of the total respondents conduct assessments when providing intervention to PWA. Regarding the assessment of PWA, more than two-thirds of the 75 participants reportedly use images most of the time ($n = 33$ out of 75; 44.0%) or always ($n = 29$ out of 75, 38.7%). Almost three-quarters ($n = 67$ out of 92; 72.8%) of the total sample responded to questions regarding treatment and selecting or using images with PWA. The frequency at which participants use various image types is displayed in Figure 2. Ratings of 'sometimes, mostly and always' per image type were grouped together.

How often SLPs use image types during the assessment and treatment of PWA

Majority of the 75 participants reported frequently using coloured photographs ($n = 68$ out of 75; 90.7%), coloured picture scenes ($n = 67$ out of 75; 89.3%), coloured line drawings ($n = 61$ out of 75; 81.3%), and black and white line drawings ($n = 55$ out of 75; 73.3%) during assessment. A comparison between South Africa and the other three countries was conducted for the 75 SLPs who

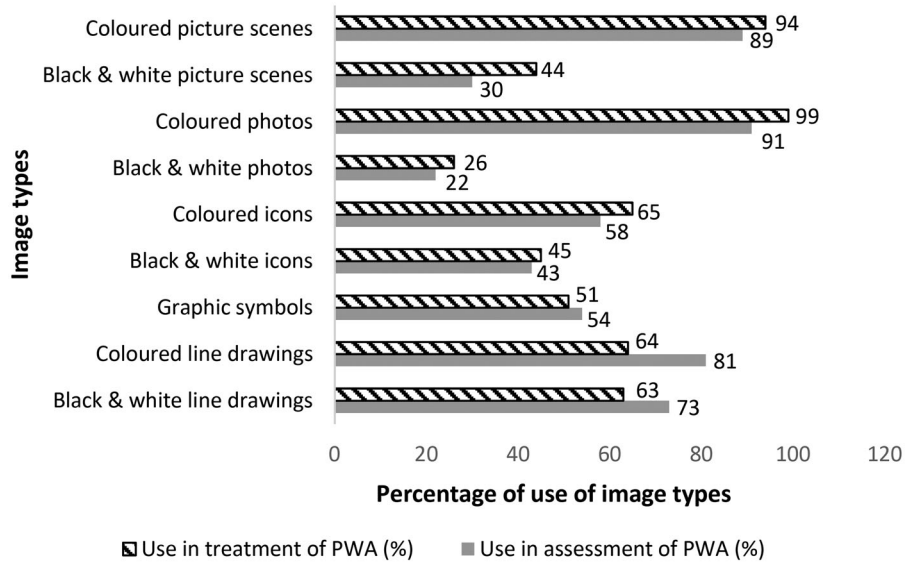

Figure 2. Frequency of image use during assessment and treatment of PWA.
Note. PWA – person(s) with aphasia.

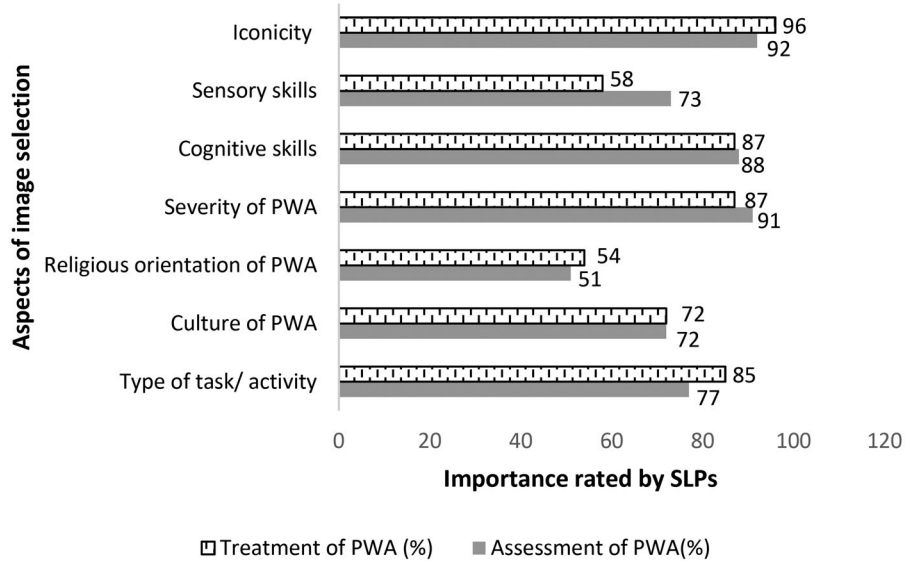

Figure 3. Perceived importance of aspects to image selection.
Note. PWA – person(s) with aphasia.

conduct assessments with PWA regarding the frequency of use of the different image types. SLPs were asked to rate the frequency of use from 1 = "never" to 5 = "always". It should be noted that, for all z-test discussions that follow in this section, not all the 75 respondents indicated the use of each image type, and 'no answer' was thus treated as a missing value.

It is interesting to note that South African participants ($n = 9$ out of 32; 28.1%) reported "rarely" using black and white line drawings significantly more ($z = 2.034$, $p = 0.042$) compared to their counterparts from other countries ($n = 46$ out of 41; 9.8%). There were no significant differences in the frequency of use of coloured line drawings, black and white icons, coloured icons, black and white photographs, and black and white picture scenes. Coloured photographs (South African: $n = 9$ out of 32; 28.1% versus non-South African: $n = 2$ out of 41; 4.9%) and coloured picture scenes (South African: $n = 7$ out of 32; 21.9% versus non-South African: $n = 2$ out of 41; 4.9%) were significantly used more by South African participants than SLPs in the other countries (coloured photographs: $z = 1.881$, $p = 0.006$; coloured picture scenes: $z = 2.197$, $p = 0.028$).

The most important facets that the 75 participants would consider when selecting images during the assessment of PWA were: iconicity of images ($n = 69$ out of 75; 92.0%), severity of PWA ($n = 68$ out of 75; 90.7%), PWA's cognitive skills ($n = 66$ out of 75; 88.0%) and the type of assessment task ($n = 58$ out 75; 77.3%) (see Figure 3). When asked to rate the importance of culture ($z = 2.409$, $p = 0.016$) and religious orientation ($z = 4.246$, $p < 0.001$) of the client, South African participants significantly reported

Table III. Descriptive statistics of factors extracted relating to image selection and use in SLPs' assessment and treatment practices.

Survey section	Extracted factors	*M (SD)*	*Mdn (IQR)*
Section 2: Assessment practices of PWA and images Response options: 1 = "strongly disagree" to 5 = "strongly agree"*	Perspectives on personalised photos	4.18 (0.61)	4.00 (0.50)
	Perspectives on selecting visual graphic symbols	3.71 (0.52)	4.00 (0.50)
	Perspectives on the use of photos	3.43 (0.65)	3.50 (1.00)
	Perspectives on the use of line drawings	2.67 (0.78)	2.50 (1.00)
Section 3: Treatment practices of PWA and images Response options: 1 = "never" to 5 = "always"**	Image learning in treatment	4.24 (0.74)	4.50 (1.00)
	Image as language support	4.10 (0.68)	4.00 (1.50)
	Images as cognitive support	3.63 (0.82)	3.67 (1.00)
	Image use in discourse	3.61 (0.78)	3.50 (1.25)

*Mean (median) below the midpoint of 3 indicates disagreement, and values above 3 indicate agreement with statements.
**Values above the midpoint of 3 indicate that respondents tended more towards "always" regarding frequency of use, whereas values below 3 tended towards "never".
Note. PWA – person(s) with aphasia.

culture ($n = 20$ out of 32; 62.5%) and religious orientation as "always important" ($n = 19$ out of 30; 63.3%) compared to their counterparts from other countries for culture ($n = 14$; 34.1%) and religious orientation ($n = 5$; 12.2%).

Of the 67 participants using images in treatment, almost all used coloured photographs ($n = 66$ out of 67, 98.5%) and coloured picture scenes ($n = 63$ out of 67; 94.0%). Coloured icons and coloured line drawings ($n = 43$ out of 67; 64.2%) are also used frequently in treatment activities with PWA. Considerations from the 67 participants when selecting images during treatment of PWA included: Iconicity of images ($n = 64$ out of 67; 95.5%), severity of PWA ($n = 58$ out of 67; 86.6%), cognitive skills ($n = 58$ out of 67; 86.6%), and the type of treatment activity ($n = 57$ out of 67; 85.1%).

Regarding the assessment and treatment of PWA, four factors about image types were extracted respectively from the factor analysis (Table III). The mean (median) for "perspectives on personalised photos", "perspectives on selecting visual graphic symbols", and "perspectives on the use of photos" during the assessment of PWA were above 3, indicating agreement, whereas "perspectives on the use of line drawings" were below 3, indicating disagreement relating to this factor. These results indicate that respondents are more likely to incorporate photographs than line drawings within the assessment during naming and identification tasks (i.e. photos with white backgrounds), and reportedly to elicit more communication from PWA.

All means (medians) for treatment practices with PWA (section 3) are above 3, indicating that respondents use images for learning, as a cognitive and language support, as well as for discourse (Table III). However, respondents tend to mostly use images for learning (i.e. matching activities), followed by supporting receptive and expressive language. Images tend to be used to a lesser degree in storytelling and expressing emotions ("image use in discourse").

SLPs' views of the image type PWA would select in a given context

SLPs in this study were asked to select an image they thought a PWA would likely use as an image-based support for communication in each scenario. Questions were related to objects/nouns (e.g. "Which image do you think a person with mild to moderate aphasia would prefer to use to request for a 'tissue'?") and activities/actions (e.g. "Which image do you think a person with mild to moderate aphasia would prefer to use to tell someone about 'being sick' or 'having a picnic'?"). Forty-one percent ($n = 28$ out of 67) and 71.6% ($n = 48$ out of 67) of participants selected coloured photos of objects (i.e. umbrella and tissue box) as likely image-based supports. With regards to actions such as being sick, 68.7% ($n = 46$ out of 67) of participants selected a coloured photograph of an individual holding a tissue to the nose. For events, coloured photographs and picture scenes were selected of either individuals sitting on a picnic blanket on the grass (34.3%; $n = 23/67$) or a picnic basket on a blanket on the grass (28.4%; $n = 19/67$).

Knowledge, attitudes and experience

The more experienced a respondent, the more they tended to agree with being: "knowledgeable, experienced, and confident in selecting images for assessing different areas with PWA" ($rs = -0.378$, $p = 0.002$); "knowledgeable, experienced, and confident working with PWA" ($rs = -0.439$, $p < 0.001$), and "knowledgeable, experienced, and confident in using images to support PWA's communication needs" ($rs = -0.534$, $p < 0.001$). Respondents were more in agreement with being knowledgeable, experienced, and confident: In image selection for assessment of PWA; confident working with PWA; and using images to support PWA's communication (see Table IV).

Sixteen responses were obtained when SLPs in this sample were asked to comment on their experiences using images with PWA. Two main themes, each

Table IV. Descriptive statistics of factors extracted relating to SLPs' knowledge, attitude and experience.

Survey section	Extracted factors	*M* (*SD*)	*Mdn* (*IQR*)
Section 4: Knowledge, attitudes and experience of the SLP Response options: 1 = "strongly agree" to 5 = "strongly disagree"	Knowledgeable, experienced, and confident in selecting images for assessing different areas of language and communication in PWA	2.19 (0.73)	2.00 (0.67)
	Knowledgeable, experienced, and confident in using images to support the communication needs of PWA	2.07 (0.70)	2.00 (0.83)
	Knowledgeable, experienced, and confident working with PWA	1.97 (0.89)	2.00 (1.33)

*A mean (median) below the midpoint of 3 indicating respondents tended to be more in agreement with statements.
Note. PWA – person(s) with aphasia.

with three subthemes, developed from the qualitative analysis (Table V). Considerations for image selection and use related to client factors, and respondents' perceptions of PWA's responses to image types and use in different communication environments are shown.

SLPs commented on the client's individual needs and unique circumstances when considering image-based supports. Management of PWA requires a perspective that acknowledges the adult population and varying needs when supporting PWA's communication. A functional perspective of image selection and use for the client to enhance the incorporation of image-based supports outside the clinical setting is needed. Factors such as aphasia severity, age, home environment, and culture were reiterated in the qualitative information.

Considerations relating to the SLP's clinical setting, perceived barriers, and needs to improve image selection and use are described. SLPs highlighted a dynamic approach to image selection and collaborating with the PWA and significant others regarding possible ways to optimally incorporate image types into everyday interactions. Images may be limited regarding what information they convey, and PWA's needs concerning image-based supports should be monitored. Guidelines were the most pressing need for SLPs in this sample.

Discussion

SLPs in this sample perceived images as an important tool used in the assessment and treatment of PWA. Coloured images such as coloured pictures and photographs rather than black-and-white images like line drawings, are used more frequently in assessment and treatment tasks. Line drawings have a long-standing tradition in assessment materials as they are simple and have been shown to possibly offer increased focus on the main aspects of an object or scene, likely enhancing the meaning of the image (Reymond et al., 2019, 2023). However, the use of coloured pictures and photographs has increased due to accessibility and possible gains for PWA, which is reflected in the findings from the factor analysis, where photographs with white backgrounds are preferred by SLPs during assessment in naming and identification tasks. Previous studies have indicated that coloured pictures and photographs may have advantages in naming and picture description with PWA when compared to black-and-white line drawings and photographs (Griffith et al., 2014; Heuer, 2016; Mohr, 2010). Image types selected and used are an important consideration in aphasia rehabilitation as they may have different effects on task performance in PWA (Brown & Thiessen, 2018).

Iconicity of images and the type of task were important considerations for SLPs in this cohort. Literature has widely discussed the iconicity of images in terms of relevant transparency or the degree of similarity of the image to its referent (Brown & Thiessen, 2018; Dada et al., 2013; Heuer & Hallowell, 2007; Knollman-Porter et al., 2016, McKelvey et al., 2010; Pampoulou & Fuller, 2020). SLPs in this research study acknowledged the variables that may influence image iconicity such as the image type and background, colour, complexity (i.e. level of detail and concreteness), and individual characteristics of life experience and culture (Dada et al., 2013). The more the image type relates to the referent, and the more concrete the concept (e.g. nouns versus verbs), the more iconic an image tends to be (Brown & Thiessen, 2018; Dada et al., 2013). Individual factors such as age and educational level may further influence perceptions of image iconicity. Specifically, SLPs also reported cognitive-linguistic considerations such as the nature and severity of aphasia. PWA may have reduced world knowledge, symbol experience, and language competence to rely on when interpreting graphic representations (Heuer & Hallowell, 2007). Additionally, similar performance on tasks can be achieved when image features such as colour and shading are controlled (Reymond et al., 2023). Image features thus must be carefully considered to ensure that results during assessment tasks and subsequent treatment are due to the nature of the language impairment and not image effects (Brown & Thiessen, 2018; Reymond et al., 2023).

Approaches to image selection and use in this sample appear to be dynamic and within person-centered care. In line with the Living with Aphasia: Framework for outcome measurement (A-FROM), based on the International Classification of Functioning [(ICF), 2001] and designed for determining real-life outcomes (Kagan et al., 2008), the process of image selection requires SLPs to analyse

Table V. Themes outlined with participants' verbatim responses.

Themes with subthemes	Explanation	Examples of participants' responses
Theme 1: Client considerations to image selection and use		
• The PWA is unique	SLPs reiterated the unique individual needs of PWA regarding preferences for certain image types and variations in image use across activities.	P2: *"PWA react differently to images"*. P3: *"PWA are each different and unique … .and treatment is adapted to suit their needs"*.
• Perceptions on PWA's response to image types and use as a communication support	SLPs also commented on including images that were appropriate for adults; clear and simple images of everyday life that have a personal meaning to the PWA. Additionally, PWA may use images more in treatment sessions, which evidently reduces frustration during communication attempts. However, images were perceived to be used less frequently in other everyday settings.	P5.: *"Real life, coloured pictures or photos that have personal meaning to the PWA seems to promote better engagement with therapy and are more likely to be used as a communication support"*. P7: *"It does reduce the frustration of the PWA within therapy sessions and with caregivers. This is not always the case within social, generalised settings"*.
• Personal and environmental factors	The personal factors mentioned by SLPs relating to image selection and use were: aphasia type; degree of anomia; age; culture and language; vision and the presence of visual perceptual difficulties. The home setting and communication partners were the environmental factors named.	P10: "*It largely depends on the culture of the client and the language spoken by the client and therapist as well as home context"*.
Theme 2 SLP and clinical setting: Considerations when selecting and using images with PWA		
• Following a person-centered care approach	Elements of a person-centered care approach were mentioned. Respondents felt that each PWA had certain responses and preferences to image types and personal views on image use. The need to observe the PWA in an assessment and later in treatment when using images and considering their understanding of, and experiences with images, was highlighted. An SLP should not rely only on one's own clinical reasoning. Significant others' perceptions were also perceived to influence a PWA's use of image-based supports.	P12: *"We all need to use more observation and empathy. From simple visual assessment of a PWA to being an open-minded sceptic about images- clarity, level of ambiguity, personal, and cultural relevance"*. P6*:" Responses to the use of images with PWA varies, mostly due to significant others' perception and "buy in" of aided communication"*.
• Perceived barriers to image selection and use	Perceived barriers to image selection and use with PWA were identified: time and larger caseloads, PWA may respond differently to images and have a reluctance to use as image-based communication supports, images are limited in the amount of information they can convey, and the lack of appropriate resources and evidence to guide SLPs. A respondent expressed that there is an increased reliance on practice-based evidence and an insufficient amount of time dedicated to analysing images and the reason for image selection.	P2: *"PWA often accept the use of images in assessment but don't usually accept communication aids containing images. It is not clear whether this is due to their perception of using images to communicate as demeaning or limited, types of images used or their understanding of the purpose of using a picture communication aid"*. P4: *"So much of practice is practice-based-evidence because of time and resource constraints – you don't even realise that you are not practicing at the state of the art/ science"*.
• SLP's needs	The most pertinent need SLPs' in this sample identified was that of guidelines including image types, selection criteria and recommendations for use with PWA. Utilising opportunities to collaborate with occupational therapists (OT) and keeping informed about recent literature was an important consideration mentioned by two respondents.	P8: *"Guides for SLPs to select images would be helpful"*. P4: A *library of "vetted" images available to the SLP, along with information about why the representations were chosen"*. P12: *"I don't think SLPs work enough with OTs on the area of visual perception …. We need to think more deeply about stimuli … and the reasons behind its use"*. P4: *"I think taking this survey has helped me realise that I need to re-examine what I know about using images and look at more recent literature"*.

Note. PWA – person(s) with aphasia.

the PWA's unique strengths, challenges, preferences, and personal characteristics (Brown & Thiessen, 2018; Garrett & Lasker, 2013; Heuer, 2016). SLPs in this study highlighted impairment-specific factors of aphasia severity and type, degree of anomia, and cognitive skills when selecting images for PWA. These factors are important in image selection as Brown and Thiessen (2018) emphasise that image-based supports can be used for different levels of cognitive-linguistic tasks from naming and matching, to higher-level tasks, like aiding topic maintenance. PWAs' visual perception and processing was an aspect highlighted in the qualitative findings. There may be differential processing and cognitive effort necessary when interpreting various images and the way the images may be displayed (Brown et al., 2019). Collaboration with allied health professionals such as occupational therapists likely contribute to a better understanding of visual perception and processing abilities that may affect image interpretation. A

dynamic approach during intervention with PWA would be beneficial to refine the process of selecting images that may best support communication interactions.

Other personal factors including age, culture, and home environment that SLPs reported in this study are relevant to image selection. Age is an important consideration due to a decrease in brain neuroplasticity with increasing age (Kristinsson et al., 2022). South African respondents viewed the PWA's culture and religious orientation as quite an important consideration, more so than international respondents. South Africa has diverse cultural and linguistic backgrounds, and multilingualism has increased (Dada et al., 2013); thus culture and language history are likely factors most often taken into account. In addition, South African respondents tend to use line drawings less frequently than their international counterparts. This may be due to international SLPs considering iconicity of symbols more than other aspects when selecting images for clients with aphasia. A study surveying UK and Greek SLPs' graphic symbol choices to support clients' communication found that iconicity of images was the most important consideration in their sample (Pampoulou, 2017). In a follow-up study comparing Greek and Texan SLPs' practices showed that culture in some geographic regions may be an important consideration where various cultures are present (Pampoulou & Fuller, 2020). Culture and home settings are inherent to the PWA's identity and world experience and are contributing factors to rehabilitation outcomes related to PWAs' participation (Watermeyer, 2020).

When considering environmental factors, SLPs expressed concern that PWAs' use of images to support communication in everyday settings was limited and significant others' perceptions thereof may influence the PWA's image use outside the therapeutic setting. There are identified benefits of training communication partners to capture images for use in conversation with loved ones with aphasia (Kagan, 1998). However, the burden is on the communication partner, likely confining these supports to a few individuals within the PWA's immediate environment. Another plausible explanation for reduced image use in everyday interactions may be related to personal relevance.

SLPs felt that images should have personal meaning to the PWA. Personally relevant photographs are shown to be more successful than generic icons or photographs in matching tasks (McKelvey et al., 2010) and during expressive tasks (Griffith et al., 2014) with PWA. Thus, PWA may have reduced use of images to support their communication if these images are not meaningful or relevant to the context of the communication interaction. SLPs perceived PWA to use more coloured pictures and photographs for objects and actions when asked to select an option that a PWA would choose to support their communication. SLPs selected images that differed in context (i.e. low context for nouns and high context for activities) and preferred a picture scene with task-engaged individuals (i.e. having a picnic). A study found that PWA engage more with task-engaged scenes than camera-engaged scenes and may visually attend to images differently than SLPs (Thiessen et al., 2016). A possible solution is to involve the PWA in selecting images or taking photographs themselves to enhance relevance (Galliers et al., 2012; Thiessen & Brown, 2021). However, this may be time-consuming for both the SLP, PWA, and significant others as indicated by the barrier of time constraints SLPs identified in this study. The feasibility of capturing and selecting personalised images for PWA, indicated by Brown and Thiessen (2018), and deciding on the use thereof, needs further investigation.

Treatment areas that are noteworthy from the findings: Respondents tend to mostly use images for learning, for example, during matching activities; and to support receptive and expressive language tasks. SLPs tend to use images less frequently in discourse and expressing emotions. This can be understood from the perspective that symbols that accurately represent their referents are likely easier to learn, as with images used in matching activities, than those with a minimal visual relationship (Pampoulou & Fuller, 2020). The relative concreteness of images as mentioned before, plays a role in the ease of interpreting images. More abstract ideas such as actions and emotions are likely more difficult to represent and discuss. Context-rich images such as high-context photographs have been shown to possibly enhance reading and auditory comprehension in PWA during narrative tasks, however, explicit training of the PWA and communication partner would be necessary to successfully use image-based supports (Dada et al., 2019). Visual scene displays are also contextualised images representing objects and people in natural settings that enable PWA to swiftly determine themes and differing complexity in the detail portrayed (Beukelman et al., 2021). These image types could be incorporated into treatment activities targeting more abstract ideas like emotions.

Information indicated in this paper is novel as SLPs were surveyed regarding experiences of and factors considered in, selecting and using image-based communication supports with people who have mild to moderate aphasia in South Africa and three international contexts. Although the findings have shed light on possible factors important to image selection and use with PWA, SLPs in this study felt that they over-rely on clinical experience. This recognised barrier to optimal service delivery for PWA may be due to a lack of guidelines for image selection and facilitating use with PWA to support their communication. This sentiment is echoed by findings of similar recent research where opportunities to improve knowledge

of image characteristics and types, as well as supporting SLPs in matching them to the PWA's skills and communication requirements, are needed (Brown & Thiessen, 2018; Pampoulou & Fuller, 2020). Brown and Thiessen (2018) recommend the development of a framework for systematically organising image features and the application thereof for PWA.

Limitations and future recommendations

This study is the first to probe SLPs' knowledge and practices of image selection and use incorporating various image types in assessment and treatment tasks with individuals who have mild to moderate aphasia across different settings. However, limitations of the study are acknowledged. Reduced response rates from international countries restricted generalisations in those settings. Snowball sampling was used, which resulted in no response rate calculated. A larger stratified sample size is required before generalisations can be made. Due to the rapid technological development of image collections, research should globally explore SLPs' practices in-depth across different settings, using quantitative and qualitative methods, like focus groups. Factors such as availability of images, familiarity, iconicity, ease of learning (Pampoulou & Fuller, 2020), and representation of specific vocabulary concerning individual needs are important to investigate across different linguistic and cultural backgrounds. PWA may be included in future research to rate visually similar images in different conditions (e.g naming versus picture description) or word classes (nouns versus verbs) to investigate how images may be processed (Dyson et al., 2022). Additionally, SLPs' experiences with image selection and use in individuals with severe aphasia should be further investigated. PWAs' preferences regarding image types and factors that may influence the selection thereof should also be explored.

Conclusion

It is evident that this small sample of SLPs have a knowledge base of image types and appear to understand some crucial interrelated factors that may contribute to image interpretation in PWA. However, there is a lack of an organised approach to the way images are selected and to what extent PWA's skills, preferences, and communication partner involvement may be considered to optimise image use to support communication. Collaborative endeavours facilitated between researchers and clinicians could gain a better understanding of current practice-based trends that may inform research efforts to alleviate challenges faced when selecting and using images in aphasia rehabilitation.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Bhavani Sarveshvari Pillay http://orcid.org/0000-0002-7839-8384
Jeannie Van Der Linde http://orcid.org/0000-0002-8706-6605
Marien Alet Graham http://orcid.org/0000-0003-4071-9864
Shakila Dada http://orcid.org/0000-0001-6170-4763

References

Achoki, T., Sartorius, B., Watkins, D., Glenn, S. D., Kengne, A. P., Oni, T., Wiysonge, C. S., Walker, A., Adetokunboh, O. O., Babalola, T. K., Bolarinwa, O. A., Claassens, M. M., Cowden, R. G., Day, C. T., Ezekannagha, O., Ginindza, T. G., Iwu, C. C. D., Iwu, C. J., Karangwa, I., … Naghavi, M. (2022). Health trends, inequalities and opportunities in South Africa's provinces, 1990–2019: Findings from the Global Burden of Disease 2019 Study. *Journal of Epidemiology and Community Health*, *76*(5), 471–481. https://doi.org/10.1136/jech-2021-217480-

Baier, C. K., Hoepner, J. K., & Sather, T. W. (2018). Exploring Snapchat as a dynamic capture tool for social networking in persons with aphasia. *Aphasiology*, *32*(11), 1336–1359. https://doi.org/10.1080/02687038.2017.1409870

Beukelman, D. R., & Light, J. C. (2020). *Augmentative & alternative communication: Supporting children and adults with complex communication needs* (5th ed.). Brookes Publishing Co.

Beukelman, D. R., Thiessen, A., & Fager, S. K. (2021). Personalization of visual scene displays: Preliminary investigations of adults with aphasia, typical females across the age-span, and young adult males and females. *Topics in Language Disorders*, *41*(3), e1–e11. https://doi.org/10.1097/TLD.0000000000000256

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. SAGE.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Brown, J., & Thiessen, A. (2018). Using images with individuals with Aphasia: Current research and clinical trends. *American Journal of Speech-Language Pathology*, *27*(1S), 504–515. https://doi.org/10.1044/2017_AJSLP-16-0190

Brown, J., Thiessen, A., Freeland, T., & Brewer, C. H. (2019). Visual processing patterns of adults with traumatic brain injury when viewing image-based grids and visual scenes. *Augmentative and Alternative Communication*, *35*(3), 229–239. https://doi.org/10.1080/07434618.2019.1609578

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.

Dada, S., Huguet, A., & Bornman, J. (2013). The iconicity of picture communication symbols for children with English additional language and mild intellectual disability. *Augmentative and Alternative Communication*, *29*(4), 360–373. https://doi.org/10.3109/07434618.2013.849753

Dada, S., Murphy, Y., & Tönsing, K. (2017). Augmentative and alternative communication practices: A descriptive study of the perceptions of South African speech-language therapists. *Augmentative and Alternative Communication*, *33*(4), 189–200. https://doi.org/10.1080/07434618.2017.1375979

Dada, S., Stockley, N., Wallace, S. E., & Koul, R. (2019). The effect of augmented input on the auditory comprehension of narratives for people with aphasia: A pilot investigation. *Augmentative and Alternative Communication*, *35*(2), 148–155. https://doi.org/10.1080/07434618.2019.1576766

Dietz, A., Hux, K., McKelvey, M. L., Beukelman, D. R., & Weissling, K. (2009). Reading comprehension by people with chronic aphasia: A comparison of three levels of visuographic contextual support. *Aphasiology*, *23*(7-8), 1053–1064. https://doi.org/10.1080/02687030802635832

Dyson, L., Morgan, J., & Herbert, R. (2022). Novel matched stimuli for assessment of lexical semantics. *Aphasiology*, *36*(7), 831–853. https://doi.org/10.1080/02687038.2021.1924354

Eaton, P., Frank, B., Johnson, K., & Willoughby, S. (2019). Comparing exploratory factor models of the brief electricity and magnetism assessment and the conceptual survey of electricity and magnetism. *Physical Review Physics Education Research*, *15*(2), Article 020133. https://doi.org/10.1103/PhysRevPhysEducRes.15.020133

Galliers, J., Wilson, S., Cocks, N., Marshall, J., Muscroft, S., & Pring, T. (2012). *Words are not enough: Empowering people with aphasia in the design process* [Paper presentation]. Twelfth Participatory Design Conference. https://doi.org/10.1145/2347635.2347643

Garrett, K., & Lasker, J. (2013). Adults with severe aphasia. In D. Beukelman & P. Mirenda (Eds.), *Augmentative and alternative communication: Supporting children and adults with complex communication needs* (4th ed., pp. 405–447). Brookes Publishing Co.

Griffith, J., Dietz, A., & Weissling, K. (2014). Supporting narrative retells for people with aphasia using augmentative and alternative communication: Photographs or line drawings? Text or no text? *American Journal of Speech-Language Pathology*, *23*(2), S213–S224. https://doi.org/10.1044/2014_AJSLP-13-0089

Hajjar, S. T. (2018). Statistical analysis: Internal-consistency reliability and construct validity. *International Journal of Quantitative and Qualitative Research Methods*, *6*(1), 27–38.

Heuer, S. (2016). The influence of image characteristics on image recognition: A comparison of photographs and line drawings. *Aphasiology*, *30*(8), 943–961. https://doi.org/10.1080/02687038.2015.1081138

Heuer, S., & Hallowell, B. (2007). An evaluation of multiple-choice test images for comprehension assessment in aphasia. *Aphasiology*, *21*(9), 883–900. https://doi.org/10.1080/02687030600695194

Heuer, S., Ivanova, M. V., & Hallowell, B. (2017). More than the verbal stimulus matters: Visual attention in language assessment for people with aphasia using multiple-choice image displays. *Journal of Speech, Language, and Hearing Research*, *60*(5), 1348–1361. https://doi.org/10.1044/2017_JSLHR-L-16-0087

International classification of functioning, disability, and health [ICF]. (2001). Geneva: World Health Organization.

Kagan, A. (1998). Supported conversation for adults with aphasia: Methods and resources for training conversation partners. *Aphasiology*, *12*(9), 816–830. https://doi.org/10.1080/02687039808249575

Kagan, A., & LeBlanc, K. (2002). Motivating for infrastructure change: Toward a communicatively accessible, participation-based stroke care system for all those affected by aphasia. *Journal of Communication Disorders*, *35*(2), 153–169. https://doi.org/10.1016/s0021-9924(02)00062-x

Kagan, A., Simmons-Mackie, N., Rowland, A., Huijbregts, M., Shumway, E., McEwen, S., Threats, T., & Sharp, S. (2008). Counting what counts: A framework for capturing real-life outcomes of aphasia intervention. *Aphasiology*, *22*(3), 258–280. https://doi.org/10.1080/02687030701282595

Khokhlova, I. (2015). Lingua franca English of South Africa. *Procedia – Social and Behavioral Sciences*, *214*(June), 983–991. https://doi.org/10.1016/j.sbspro.2015.11.689

Khoza Shangase, K., & Mophosho, M. (2018). Language and culture in speech language and hearing professions in South Africa: The dangers of a single story. *South African Journal of Communication Disorders*, *65*(1), 1–7. https://dx.doi.org/10.4102/sajcd.v65i1.594

Kristinsson, S., Busby, N., Rorden, C., Newman-Norlund, R., den Ouden, D. B., Magnusdottir, S., Hjaltason, H., Thors, H., Hillis, A. E., Kjartansson, O., Bonilha, L., & Fridriksson, J. (2022). Brain age predicts long-term recovery in post-stroke aphasia. *Brain Communications*, *4*(5), fcac252. https://doi.org/10.1093/braincomms/fcac252

Knollman-Porter, K., Brown, J., Hux, K., Wallace, S. E., & Uchtman, E. (2016). Preferred visuographic images to support reading by people with chronic aphasia. *Topics in Stroke Rehabilitation*, *23*(4), 269–275. https://doi.org/10.1080/10749357.2016.1155276

Lüdtke, U. M., Kija, E., & Karia, M. K. (2023). (Eds.). *Handbook of speech-language therapy in Sub-Saharan Africa: Integrating research and practice*. Springer. https://doi.org/10.1007/978-3-031-04504-2

Mazumdar, B., Donovan, N. J., & Sultana, A. (2020). Comparing language samples of Bangla speakers using a colour photograph and a black-and-white line drawing. *International Journal of Language & Communication Disorders*, *55*(5), 793–805. https://doi.org/10.1111/1460-6984.12564

McKelvey, M., Hux, K., Dietz, A., & Beukelman, D. (2010). Impact of personal relevance and contextualization on comprehension by people with chronic aphasia. *American Journal of Speech-Language Pathology*, *19*(1), 22–33. https://doi.org/10.1044/1058-0360(2009/08-0021

Mohr, E. M. S. (2010). *Colour and Naming in Healthy and Aphasic People* [Doctoral thesis]. Durham University.

Muungo, M. (2016). *An assessment of the nature and extent of adoption of strategic planning Processes in the Public Sector. A Case Study of Zambia* [Doctoral thesis]. Heriot Watt University. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ros.hw.ac.uk/bitstream/handle/10399/3069/MuungoM_0416_ebs(3).pdf?sequence=3&isAllowed=y

Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (7th ed.). Routledge.

Pampoulou, E. (2017). Exploring speech and language therapists' and teachers' experiences when choosing graphic symbol set(s) for their students in inclusive primary schools in England and Cyprus. *Journal of Enabling Technologies*, *11*(2), 49–58. https://doi.org/10.1108/JET-07-2016-0014

Pampoulou, E. (2019). Speech and language therapists' views about AAC system acceptance by people with acquired communication disorders. *Disability and Rehabilitation. Assistive Technology*, *14*(5), 471–478. https://doi.org/10.1080/17483107.2018.1463401

Pampoulou, E., & Fuller, D. R. (2020). Exploring AAC graphic symbol choices: A preliminary study. *Journal of Enabling Technologies*, *14*(3), 171–185. https://doi.org/10.1108/JET-03-2020-0013

Penn, C. (1993). Aphasia therapy in South Africa: Some pragmatic and personal perspectives. In A. L. Holland & M. M. Forbes (Eds.), *Aphasia treatment: World Perspectives* (pp. 25–53). Springer. https://doi.org/10.1007/978-1-4899-7248-4

Penn, C., & Watermeyer, J. (2018). *Communicating across cultures and languages in the health care setting*. Palgrave Macmillan. https://doi.org/10.1057/978-1-137-58100-6

Price, C. J., & Humphreys, G. W. (1989). The effects of surface detail on object categorization and naming. *The Quarterly Journal of Experimental Psychology. A, Human Experimental Psychology*, *41*(4), 797–827. https://doi.org/10.1080/14640748908402394258779

Reymond, C., Müller, C., & Grumbinaite, I. (2019). E-Inclusion: Defining basic image properties for illustrated stimuli in Aphasia treatment. *Visible Language*, *53*(3), 21. https://doi.org/10.1080/02687038.2022.2064421

Reymond, C., Widmer Beierlein, S., Müller, C., Reutimann, R., Kuntner, K. P., Falcon Garcia, N., Grumbinaite, I., Hemm Ode, S., Degen, M., Parrillo, F., Karlin, S., Park, S., Renner, M., & Blechschmidt, A. (2023). Naming images in Aphasia: Effects of graphic representations and photographs on naming performance in persons with and without Aphasia. *Aphasiology*, *37*(7), 993–1015. https://doi.org/10.1080/02687038.2022.2064421

Robertson, O., & Evans, M. S. (2020). Just how reliable is your internal reliability? An overview of Cronbach's alpha (α).

PsyPag Quarterly, *1*(115), 23–27. https://doi.org/10.53841/bpspag.2020.1.115.23

Robinson, O. C. (2022). Conducting thematic analysis on brief texts: The structured tabular approach. *Qualitative Psychology*, *9*(2), 194–208. https://doi.org/10.1037/qup0000189

Simmons-Mackie, N., & King, J. M. (2013). Communication support for everyday life situations. In N. Simmons-Mackie, J. M. King, & D. R. Beukelman (Eds.), *Supporting communication for adults with acute and chronic Aphasia.* (pp. 326–336). Brookes Publishing Co.

Thiessen, A., Beukelman, D., Hux, K., & Longenecker, M. (2016). A comparison of the visual attention patterns of people with aphasia and adults without neurological conditions for camera-engaged and task-engaged visual scenes. *Journal of Speech, Language, and Hearing Research: JSLHR*, *59*(2), 290–301. https://doi.org/10.1044/2015_JSLHR-L-14-011527054313

Thiessen, A., & Brown, J. (2021). Personalization of restorative and compensatory treatments for people with aphasia: A review of the evidence. *Topics in Language Disorders*, *41*(3), 269–281. https://doi.org/10.1097/TLD.0000000000000253

Wallace, S. E., Dietz, A., Hux, K., & Weissling, K. (2012). Augmented input: The effect of visuographic supports on the auditory comprehension of people with chronic aphasia. *Aphasiology*, *26*(2), 162–176. https://doi.org/10.1080/02687038.2011.628004

Watermeyer, J. (2020). Towards a community of care for people with aphasia: Some lessons on working in multicultural settings. *Aphasiology*, *34*(11), 1432–1450. https://doi.org/10.1080/02687038.2019.1702919

Yen, C.-F., Hwang, A.-W., Liou, T.-H., Chiu, T.-Y., Hsu, H.-Y., Chi, W.-C., Wu, T.-F., Chang, B.-S., Lu, S.-J., Liao, H.-F., Teng, S.-W., & Chiu, W.-T. (2014). Validity and reliability of the functioning disability evaluation scale – Adult version based on the WHODAS 2.0 – 36 items. *Journal of the Formosan Medical Association = Taiwan yi Zhi*, *113*(11), 839–849. https://doi.org/10.1016/j.jfma.2014.08.008