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# An Aphasia Research Agenda – a Consensus Statement from the Collaboration of Aphasia Trialists

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## Abstract

**Introduction**: Coordination of international aphasia research would minimise duplication of effort, support synergistic international activities across languages and multidisciplinary perspectives, and promote high quality conduct and reporting of aphasia research, thereby increasing the relevance, transparency and implementation of findings. The Collaboration of Aphasia Trialists (CATs) sought to develop an aphasia research agenda to direct future research activities, based on priorities shared by people with aphasia, family members and healthcare professionals.

**Methods**: Our established international research network spanning 33 countries, contributed to this activity. Research literature reporting the priorities of stakeholders was reviewed and synthesized (phase 1). Representatives from Working Groups on Aphasia Assessment & Outcomes, Prognosis & Predictors of Recovery, Effectiveness of Interventions, and Societal Impact & Reintegration participated in a two-day research agenda-setting meeting. The CATs expert panel refined research objectives and identified constituent components of research and methodological developments required to address these research components. The objectives and research components were grouped into overarching themes (phase 2). The resultant list was then circulated to more than 180 CATs members for review, revision and approval. Consensus on the final aphasia research agenda and roadmap was reached by CATs executive committee (phase 3).

**Results**: The expert panel identified five overarching research themes: (i) evidence-based interventions for people with aphasia, (ii) effective interventions to support those communicating with people with aphasia, (iii) cross-linguistic assessment and core outcomes for aphasia research, (iv) predictors of language recovery, and (v) clinical implementation of research findings. Within these broad themes, 30 research objectives and 91 individual aphasia research components were identified and sequentially ordered.

**Conclusion**: This agenda builds on research priorities identified by people with aphasia and their families, and includes priorities of healthcare professionals and researchers, and will support the rehabilitation and recovery of people with aphasia. Our internationally relevant research agenda promotes rigor in methodology, considers international applicability, synergistic activities and sharing of resources and expertise.

## Introduction

Aphasia research benefits from a range of disciplinary perspectives including speech and language therapy, neurolinguistics, neurology, sociology, epidemiology, and neuropsychology (Vallumrød S, Oddvang TK, & Severinsson E, 2016; Gyorfi A & Rebec-Nagy G, 2015). Historically, aphasia research has often been discipline-, language- and country-specific, with limited interdisciplinary involvement (Jensen LR, 2009), presence of language barriers (e.g., lack of adapted language assessment tools: (Fyndanis V et al., 2017; Ivanova MV & Hallowell B, 2013)), linguistic biases, e.g. English-focussed (Beveridge MEL & Bak TH, 2011), and few cross-cultural considerations (Penn C & Armstrong E, 2017), leading to variability in the quality and relevance of aphasia research (Obler LK, Goral M, & Albert ML, 1995) and constraints on effective international collaborations (Brady MC et al., 2014).

People affected by aphasia are diverse, reflecting a range of medical histories, recovery patterns, access to treatment and support (Lazar RM & Antoniello D, 2008) socio-economic backgrounds and living contexts. The impact of aphasia is not bound by geography, nor limited to the person with aphasia (Fotiadou D, Northcott S, Chatzidaki A, & Hilari K, 2014); it also extends to spouses, families, carers, support groups, employers and society (Grawburg M, Howe T, Worrall L, & Scarinci N, 2014; Ellis C, Simpson AN, Bonilha H, Mauldin PD, & Simpson KN, 2012). With such a wide impact, aphasia research priorities may vary depending on the stakeholder and geographical location (Shrubsole K, Worall L, Power E, & O'Connor DA, 2017). An international approach to aphasia research that considers not only the person with aphasia and their families, but also the geographic, socioeconomic and health care resource needs would progress the field.

The Collaboration of Aphasia Trialists (CATs) was established with the aim of supporting and enhancing internationally coordinated aphasia research activities. Initially funded by the European Cooperation in Science and Technology (COST Action IS1208, 2013–2017) and more recently by the

Tavistock Trust for Aphasia (2017–2024), CATs established an international network of linguists, speech and language therapists, neurologists, neuropsychologists, neurolinguistics and other researchers, who, in partnership with charity and stakeholder affiliates, seek to develop international aphasia research activities.

The aphasia research landscape is evolving, with opportunities to capitalise on use of routinely collected data, standardise outcome measurement and promote international knowledge exchange. Several high quality research studies have investigated aspects of aphasia interventions such as different therapy intensities (Breitenstein C et al., 2017) (Stahl B et al., 2018) and time points for intervention (Godecke E et al., 2019). However, many research questions remain in this field, including the speech and language therapy interventions that work best, the best way to assess, diagnose and manage depression in people with aphasia, and the impact of aphasia on significant relationships for example with family and friends (Franklin S, Harhen D, Hayes M, McManus S, & Pollock A, 2018).

Agreement and application of a shared aphasia research agenda would enable a co-ordinated multidisciplinary international research response to tackle the most pressing matters faced by people with aphasia and their families. Consideration of international perspectives is essential to reflect the needs of a global aphasia population, enable an exchange of ideas, techniques and knowledge, encourage the development of high-quality studies and the generalisation of results. International coordination could also minimise research waste through reducing the risk of duplication in research activities, promoting shared use of resources and expertise, thereby ensuring that the highest quality of aphasia research is taken forward in an efficient manner.

We sought to collate reported aphasia research priorities and existing research activities to elucidate gaps in aphasia research and generate an international aphasia research agenda and roadmap that reflects the perspectives of international stakeholders and multidisciplinary researchers working within varying research infrastructures, and resources.

## Method

### *Participants*

Participants in Phase 1 of this activity were leads and deputy leads of CATs Working Groups and experts in the field of aphasia. Phases 2 & 3 included more than 180 wider CATs members. Consensus on the final list was established by the CATS Executive Committee.

### *Design:*

We employed a 3-phase approach between September 2016 and January 2020 to develop an international aphasia research agenda (Figure 1) including an exploration of literature, a face-to-face meeting, and a final phase during which participants reviewed, adjusted and finalised the aphasia research agenda.

Figure 1 about here

## Phase 1

Existing research priorities were identified from literature searches, scoping reviews, existing research networks, the James Lind Alliance Priority Setting Partnerships (Franklin S et al., 2018; Pollock A, St George B, Fenton M, & Firkins L, 2012), international clinical guideline documents, Cochrane systematic reviews and best practice statements. These reflected priorities from stakeholders including stroke survivors, carers, health care professionals, charity organisations, and professional bodies. These were cross referenced with completed, ongoing and planned national and international projects. Research priorities were collected electronically (September 2016), and then submitted for discussion at a face-to-face meetingin phase 2.

## Phase 2

In October 2016, our expert group (comprising two participants from each CATs Working Group, the Research and Dissemination Officers, and additional experts leading in the field in aphasia research) met in a two-day face-to-face workshop to discuss and refine the priorities identified in phase 1, according to their collective knowledge of existing and current research in the field. A list of research priorities was reviewed by the participants. Those priorities that were, at the time of the meeting, being investigated by ongoing work were set aside, as it was anticipated that those priorities would either require refinement following reporting of the findings or would be addressed within the active project. Participants then itemised the priorities that remained unaddressed (Table 1). The remaining unanswered priorities were then expanded to identify their constituent research components (Table 2) and described in terms of areas of overlap (Figure 2). Research components were then arranged sequentially in a research roadmap, with completion of each component advancing knowledge and enabling further high-quality research to be developed. (Figure 3). This was then reviewed, discussed and refined by the group. A final list of aphasia research themes, objectives and components was generated at the end of the face-to-face meeting.

## Phase 3

The draft list of aphasia research themes, objectives and components was then circulated via email amongst all CATs members (a pool of more than 180 members in April 2019) for review, comment, addition and refinement in two rounds, with comments from round 1 integrated into round 2. The final list of objectives and their constituent components was then reviewed again by the CATs members over email to confirm the final agenda items (April-October 2019), and then approved by the CATs Executive Committee in January 2020.

## Results

### *Phase 1: Identification of Existing Aphasia Research Priorities*

Thirty-four existing aphasia research priorities were identified from 226 unique uncertainties related to life after stroke, generated by the James Lind Alliance priority setting partnership work between stroke survivors, carers and health care professionals (Pollock A et al., 2012); aphasia was named twice in the top ten research priorities for life after stroke (Pollock A et al., 2012) (Table 1). The 34 unanswered aphasia-related priorities were further refined in priority setting partnership work resulting in generation of the top 10 research uncertainties specifically related to aphasia following stroke (Franklin S et al., 2018) (Table 1).

Table 1 here

Examination of the organisational landscape by our expert group highlighted some planned and ongoing work within the James Lind Alliance and the Stroke Association (UK) (The Stroke Association, 2021). Aphasia United has also called for best practice recommendations for aphasia screening, diagnosis, intervention and discharge (Simmons-Mackie N et al., 2017). At a national level, a comprehensive overview of 82 best practice statements for aphasia rehabilitation was developed by the Australian Aphasia Rehabilitation Pathway (Australian Aphasia Rehabilitation Pathway, 2019). Each of these existing activities were presented at the face-to-face meeting of the CATs expert group to inform discussion and refinement of the initial list of priorities.

### *Phase 2 & 3: Face-to-Face Meeting & Broader Consensus*

### *Participants*

The CATs expert group meeting comprised 10 participants including speech and language therapists, aphasia trialists, linguists, neuroscientists and data managers. The broader consensus group comprised more than 180 multidisciplinary participants across the CATs network.

### *Overarching themes identified for inclusion in the aphasia research agenda*

Following the 2-day meeting and broader consensus amongst the CATs members, and finalisation by the executive committee, aphasia research objectives were identified, discussed and refined across the following five overarching themes (Table 2): (i) evidence-based interventions for people with aphasia, (ii) effective interventions to support those communicating with people with aphasia, (iii) cross-linguistic assessment and core outcomes for aphasia research, (iv) predictors of recovery, and (v) clinical implementation of research findings. Additional research methodology and infrastructural needs were also discussed and themes were identified. Participants acknowledged the synergistic nature of the identified research objectives and themes (Figure 2). These were arranged into a roadmap to highlight the sequential nature of the research themes, objectives and components that need to be addressed before moving on to the next objective (Figure 3).

Table 2

Figure 2

Figure 3

***Theme 1: Evidence-based interventions for people with aphasia***

Within theme 1, nine research objectives were identified relating to goal setting, treatment design, the contribution of cognitive (executive) functions, asset-based approaches, multilingual interventions, maintenance of therapy gains, access to non-speech therapy interventions, optimisation of mental health and wellbeing in aphasia, and the effectiveness of specific aphasia and language rehabilitation interventions. Within each of these research objectives, constituent research components broadly related to clinical and cost effectiveness of various interventions, the essential effective components of care, the impact of the order of treatment approaches on outcomes and best practices to optimise management of mental health in people with aphasia; identification of unmet needs were also acknowledged (Table 2).

### *Theme 2: Effective interventions for those communicating with people with aphasia*

Within research theme 2, five research objectives were identified. These related to addressing the unmet needs of spouses/families of people with aphasia, the core elements and effectiveness of communication partner training (CPT), treatment effectiveness across the continuum of care, and the long-term maintenance of CPT. Associated research components included investigation of spouse/family/ carers' unmet needs at different time points following aphasia onset, elucidation of quality of life in this group, and investigation of the critical components, effectiveness and long term gains of CPT (Table 2). A need to define the theoretical approach, the optimum regimen, and delivery model for CPT was also identified.

### *Theme 3: Cross-linguistic assessment and core outcomes for aphasia research*

Research theme 3 comprised six research objectives including placing aphasia outcome measures in the context of overall post-stroke impairment, optimising outcome assessment and evaluation, the availability and use of multilingual tests (including cognition), measurements of participation, activity, functional and linguistic outcomes. Specific research components included the role of evaluators in the measurement of subjective outcomes, how assessments can be adapted and optimised for international use, guidelines for reporting assessment properties, and strategies to improve responsiveness, amongst others (Table 2).

With more than 6,000 different languages in regular use across the globe, comparability of the research data and cross-linguistic investigations in aphasia that enhance clinical practice in monolingual and multilingual contexts were highlighted as key priorities. In addition, the need to quantify the minimal important change as well as the minimal statistically reliable individual change scores of aphasia outcome measurement instruments, provide training and certification to maximise validity and accuracy of assessments, and blinded centralised adjudication of assessments were highlighted as especially important for international, multi-site aphasia research studies, if the field is to progress.

### *Theme 4: Predictors of recovery*

Research theme 4 comprised two specific research objectives related to neurobiological and psychological predictors of recovery. Research components within these objectives involve investigations of specific genetic, neurobiological and imaging-related markers of aphasia recovery. Additionally, research into interventions to support wellbeing in people with aphasia, their spouses, families and carers was identified as an issue of great importance (Table 2), given the established link between communication and psychological well-being and social health in people with aphasia (Thomas SA, Walker MF, Macniven JA, Haworth H, & Lincoln NB, 2013).

### *Theme 5: Implementation*

Within research theme 5, eight different research objectives and 16 different research components were identified. Objectives included describing the worldwide impact and costs of aphasia (related to items in theme 3), increasing awareness of aphasia, representation of people with aphasia, their spouses and families in research, the relationship between aphasia and the availability and uptake of wider rehabilitation services, communicating with people with aphasia, use of technologies, multinational and multicultural approaches, adherence to rehabilitation not specific to aphasia and the subsequent outcomes. A need to examine aphasia service delivery models, and between-country differences in service availability, was also highlighted (Table 2).

We further arranged the research components and topics into a sequential order to indicate a roadmap to advance the field (Figure 3). This identified key components of research (e.g. establishing the unmet needs of people with aphasia, spouses and families) that have to be addressed before appropriate treatments can be designed. Similarly, optimisation of outcome assessments needs to take place before treatment efficacy can be explored. All components should be underpinned within an environment where international research methodology and infrastructure has been optimised including the availability of psychometrically sound outcome measurement instruments for aphasia across various languages.

## Discussion

Our international expert group identified a total of 30 priority research objectives across five broad themes, enumerating 91 individual research components. We expand the previously reported top 10 aphasia research priorities (Franklin S et al., 2018) by identifying the individual components of each priority (the research components) that need to be answered in order to address the area of need. This shared research agenda was agreed upon and endorsed by more than 180 CATs members. In order to support future collaborative and synergistic approaches to aphasia research we published this agenda to promote shared collective effort which will benefit people with aphasia and their families.

The identified research objectives aim not only to promote high-quality research but also to inform current clinical practice. Many identified objectives also relate to a need for compelling, data-driven arguments with which to support future funding applications. Data on aphasia prevalence, incidence, severity, recovery trajectory, adequate treatment methods, long-term service and support needs, impact and resource use in relation to other stroke-related impairments will place the need for aphasia research in context, and strengthen grant applications.

### *Theme 1: Interventions for people with aphasia*

Current knowledge gaps include the recovery of reading comprehension and writing (where data are lacking (On behalf of the RELEASE Collaborators, 2021), the course of spontaneous recovery in post-stroke aphasia, the most effective treatment approach(es), and the relationship between participant subgroups (demographic features and characteristics of aphasia) and optimum outcomes (On behalf of the RELEASE Collaborators, 2021). Goal setting concepts are congruent with a move towards more patient-centred care (Coulter A, 2002). Further research is needed to demonstrate how collaborative goal setting impacts on patients' rehabilitation and outcomes (Rosewilliam S, Roskell CA, & Pandyan AD, 2011), and to develop aphasia accessible approaches to goal setting (Brown SE, Scobbie L, Worall L, & Brady MC, 2018). Interventions to improve mental health and well-being for people with aphasia, including level 1 and 2 stepped care interventions delivered by the multidisciplinary team are much needed (Baker C et al., 2018); related research has recently been published (Hilari K et al., 2021). Furthermore, long-term unmet needs following post-stroke aphasia need to be clarified in order to build a more detailed roadmap to direct future research.

### *Theme 2: Interventions to support those communicating with people with aphasia*

Previous work has indicated that needs exist in relation to support, information, role change, training and day/respite care (Denman A, 1998). Further work is needed to fully clarify needs across the spectrum of aphasia chronicity and predictors of quality of life in caregivers (Patricio B, Jesus L, & Cruice M, 2013). Interventions also need to be developed in response to the evaluation of unmet needs. Furthermore, the clinical and cost effectiveness of CPT was highlighted as a priority area. Systematic reviews report that more evidence is needed to inform recommendations related to the impact of partner training on people with acute aphasia, the impact of CPT on language impairment, psychosocial adjustment, or quality of life for either the person with aphasia or the communication partner (Simmons-Mackie N, Raymer A, Armstrong E, Holland A, & Cherney L, 2010; Brady M, Kelly H, Godwin J, Enderby P, & Campbell P, 2016).

### *Theme 3: Cross-linguistic assessment and core outcomes for aphasia research*

A core outcome set for aphasia has been previously recommended by the Research Outcome Measurement in Aphasia (ROMA) group (Wallace SJ et al., 2019) and suggestions have been made for multilingual adaptations of assessment tools for international use (Fyndanis V et al., 2017). However, additional work is needed to establish how selected outcome measures relate to conventional stroke disability and severity scales (with a special focus on defining a ‘gold standard’ for aphasia treatment success), and how comparable such measures are across languages and cultures. This would contribute to the body of evidence needed to establish the role of aphasia on stroke related burden and enable quantification of the impact of aphasia compared with non-language, stroke-related impairments. Sound outcome measurement instruments in combination with robust health economic measures for people with aphasia are essential in order to provide funders and policy makers with information about the impact of aphasia relative to other stroke-related impairments, and provide an accurate profile of the impact of aphasia on quality of life in general. Though many aphasia-related outcome measurement instruments are available in English, few aphasia assessments are published in non-English languages (On behalf of the RELEASE Collaborators, 2021). Thus, the importance of developing and/or facilitating access to common, comprehensive, easy-to-use assessment tools, and collecting international data using psychometrically sound measurements across languages and cultures was highlighted. While some indications of minimal important changes in certain outcome measures (such as for the SAQOL-39g) (Guo YE et al., 2017) exist, this as well as the smallest (statistically) detectable change score are yet to be determined for the majority of outcome measures. The establishment of such definitions would have an immediate impact on evaluation of interventions.

### *Theme 4: Predictors of recovery*

Previous studies (El Hachioui H et al., 2013; On behalf of the RELEASE Collaborators, 2021) have examined the impact of certain participant related factors on recovery of specific language domains such as overall language ability, auditory comprehension and naming. However, the neurobiological and cognitive predictors of recovery remain elusive. Future work will need to involve collation and examination of large datasets, informed by neuroimaging data (examining neuro-imaging markers of aphasia severity and associations between lesion patterns on MRI and recovery potential), collation of data on cognitive assessments and examination of additional biomarkers. The nature of genetic variants affecting long-term clinical outcomes after aphasia onset is still largely unclear (Kessler T & Schunkert H, 2019) and warrants further investigation: apolipoprotein E (APOE) genotype and PRNP 129 codon status are associated with increased risk of primary progressive aphasia. Polymorphisms within forkhead box P2 (FOXP2) gene are also associated with language impairment (Premi E et al., 2012). Thus, examination of the roles of these genes on aphasia following stroke remains to be clarified.

### ***Theme 5: Implementation of research findings***

International implementation of research findings requires a dedicated multinational, multicultural component, whereby the applicability of research for increasingly ethnically and linguistically diverse populations need to be considered (Penn C, 1993). Representation of different ethnicities, cultures, and languages needs to be evident in future research studies(Centeno JG, Kiran S, & Armstrong E, 2020), as well as in strategies to implement existing research findings across contexts with differing health systems and resources. Furthermore, the development, acceptability and feasibility testing of new technology-based interventions for use in clinical practice is needed (Des Roches CA & Kiran S, 2017), including making better use of new and emerging technologies in therapy. Although awareness of aphasia  is improving, basic knowledge on aphasia has not (Hill A, Blevins R, & Code C, 2019; Code C, 2020). Therefore, a need for improved communication about aphasia was also highlighted, including the development of awareness in both the general population and within healthcare professions.

### ***International research methodology and infrastructure***

Further use of coordinated and cross-institutional research and knowledge-exchange programmes would progress the field. Use of big data methods to aggregate aphasia datasets is underway within the CATs Collaboration. Use of datasets for secondary analyses in this manner would reduce research waste.

Our development of a shared interventional aphasia research agenda and roadmap has several strengths. Our approach included literature searches for research and policy documents, engagement with multidisciplinary aphasia researchers, the involvement of clinical and research networks, remote and face-to-face discussions to identify, refine and agree main research objectives and components to include as part of a worldwide aphasia research agenda. Our international approach sought involvement and review from over 180 members across 33 countries and included multidisciplinary members of CATs. We also sought aphasia research objectives across a range of areas including assessments, prognosis, predictors of recovery, interventions, societal impact and reintegration; not only considering gaps in research, but also the wider policy and infrastructure needs. Members included those that are affiliated with wider organisations such as Aphasia United, which is an umbrella organisation that represents voices of existing aphasia organisations throughout the world, including a range of stakeholders. Our activities, based on and expanding on priority research components related to post-stroke aphasia, shows that best-practice research should address problems of importance to the populations in question (Chalmers I & Glasziou P, 2009).

There are certain limitations to our activities; while we aimed for truly international coverage, we were restricted by the lack of representation from African and many Asian nations. Increasing the diversity of aphasia researchers participating in CATs is an ongoing goal of the collaboration and will feed into future prioritisation initiatives. Despite this limitation, our work could be the basis for future surveys that will include nations and languages that are not currently represented in the network. While this agenda setting activity built on existing priorities from stroke survivors and carers (phase 1), our development and refinement of research objectives and associated research components (phases 2 & 3) did not directly involve people with aphasia, family or carers. Future work could further expand on our identified priorities to reflect the diverse population of people with aphasia, families and carers, exploring differences as well as commonalities between the specific priorities held by different countries and communities.

Nevertheless, our international CATs aphasia research agenda will support the development, conduct and implementation of research activities which address the priorities shared by people with aphasia, their families and healthcare professionals.

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**Table 1) Existing Aphasia Research Priorities**

| Research Group | Priorities | Focus |
|---|---|---|
| **Aphasia United (Worrall, 2013)** | 1. Build capacity amongst consumer organisations<br>2. Build consensus about best practice<br>3. Raise awareness | Global coordination of research and representation efforts. |
| **James Lind Alliance Priority Setting Partnership for Life After Stroke (Pollock et al., 2012)** | 1. What are the best ways to help people recover from aphasia?<br>2. How can stroke survivors and their families be helped to cope with speech problems? | The group aimed to identify research priorities related to life after stroke, two priorities of which related to aphasia. |
| **James Lind Alliance Priority Setting Partnership for Aphasia (Franklin et al., 2018)** | 1. Which speech and language therapy treatments work best for aphasia?<br>2. Speech and language therapy for aphasia: how soon should it begin, how intensive should it be and how long does it continue to be effective?<br>3. What is the best way to assess, diagnose and manage depression in people with aphasia and to understand the impact of aphasia on significant relationships?<br>4. Can trained volunteers and carers impact on communication?<br>5. Do communication aids and software packages improve communication in patients with aphasia? | From the previously identified research priorities related to life after stroke, stakeholders examined and -identified priorities specifically related to aphasia. |

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| | 6. What are the best ways to manage adverse feelings caused by a communication difficulty?<br>7. What is the best way to improve understanding after stroke?<br>8. What stimulation techniques are useful for enhancing the engagement of stroke patients with severe cognition and communication impairments?<br>9. How can carers and others be helped to communicate with someone with aphasia?<br>10. What is the best way to help people with aphasia return to driving after stroke? | |

**Table 2) Aphasia Research Agenda**

| **Theme 1: Interventions for people with aphasia** | |
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| **Objective** | **Research Component** |
| 1. Optimising Goal setting | • How effective is goal setting for people with aphasia?<br>• What components need to be worked on in order to reach those goals? (theoretical underpinnings) |
| 2. Enhancing Treatment design | • Does the order of delivering different aphasia interventions impact on language outcomes?<br>• What are the long-term unmet needs for people with aphasia, and how can studies be designed to address these needs? |
| 3. Exploring Executive Function | • Are therapy interventions that simultaneously target executive tasks and verbal behaviour more effective (in long-term improvement of daily conversation) than usual language rehabilitation approaches for people with aphasia?<br>• Do executive functions improve as a consequence of (intensive) language interventions? |
| 4. Exploring Asset-based approaches | • What is the added value of asset-based approaches to traditional rehabilitation and third sector (charity) recovery services?<br>• What is the clinical and cost effectiveness of asset-based approaches for people with aphasia following stroke? |
| 5. Investigating multilingual interventions | • What are the effective approaches to management (assessment & treatment) of patients from varied cultural and linguistic backgrounds?<br>• How does recovery and rehabilitation compare cross-linguistically and cross-culturally? |
| 6. Maintaining language/ therapy/rehabilitation gains | • Are language benefits maintained over time?<br>• What are the long-term gains of aphasia interventions?<br>• How can we effectively support maintenance of gains made?<br>• Is one approach more beneficial for maintenance than another? |
| 7. Determining access to non-SLT interventions | • Do people with aphasia experience differential access to other rehabilitation interventions compared to stroke peers without language impairment?<br>• Do people with aphasia experience differential access to medications?<br>• Do concomitant non-SLT interventions have a beneficial (additive) or detrimental effect on the outcome of language interventions? |

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| 8. Optimising mental health and wellbeing in aphasia | • What are the best practices for the neuropsychological management of people with aphasia?<br>• What is the feasibility of a modified cognitive behavioural therapy (CBT) to manage mental health in aphasia?<br>• What is the effectiveness of level 1 and 2 stepped care for mental health in aphasia provided by the multidisciplinary team? |
| 9. Investigating aphasia and language rehabilitation interventions | • What is the relevance of the frequency of specific item repetitions to language recovery and long-term maintenance?<br>• What is the optimum duration of aphasia therapy in order to elicit lasting effects?<br>• How much spontaneous recovery takes place, and when?<br>• What is the optimum selection and order of treatment methods, and how does this depend on patient characteristics, on specific linguistic and/or neuropsychological impairments or on more general factors (motivation, workload capacity, etc.)?<br>• Which treatment is effective for which patient?<br>• What patient selection criteria should be applied for the different interventions?<br>• What factors affect which patients can participate in which intervention components? (single therapies OR integrated therapy package – which achieves the goal/ outcome more efficiently and effectively)?<br>• What are the alternative approaches to the provision and augmentation of therapy intervention regimens and how effective are they?<br>• What are the effective interventions for recovery of reading and writing following aphasia?<br>• How does augmentation of intensity and dosage, using prescribed home practice tasks, impact on outcomes?<br>• What is the best intervention for recovery of auditory comprehension?<br>• Is intensity (measured in hours per week) or dosage (total hours spent in therapy) critical for effectiveness and/or maintenance of intervention?<br>• How effective is an outpatient therapy setting compared to an inpatient setting?<br>• How effective are SLT-adjuvant interventions like non-invasive brain stimulation or pharmacological strategies?<br>• What treatment is most effective in improving natural conversation and participation in life situations for people with aphasia?<br>• Which intervention components facilitate the generalisation of impairment-based gains to functional contexts? |

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| | • What is the feasibility of a peer-led aphasia group program, and what is the comparative efficacy of peer-led or professional led community aphasia programs?<br>• What are the comparative language outcomes when delivering Language Impairment and Functioning Therapy (LIFT) in-home via telerehabilitation (LIFT-HOME) against the standard in-clinic delivery of LIFT.<br>• What is the impact of patient profile in response to distributed or intensive aphasia interventions?<br>• What is the impact of patient profile in response to varying doses of aphasia interventions? |
| **Theme 2: Interventions to support those communicating with people with aphasia** | |
| **Objective** | **Research Component** |
| 1. Establishing spouse’s/ families of people with aphasia’s unmet needs? | • What are the unmet needs of family/carers of people with aphasia at different time points?<br>• How do we improve family members/ carers’ life situation, health & quality of life?<br>• Which interventions would respond to those needs? |
| 2. Establishing the core elements of Communication Partner Training (CPT)? | • Do these core elements differ for different communication partners?<br>• How do these differ depending on target |
| 3. Determining effectiveness of CPT | • Are CPT methods for training family member, carer, volunteer, health professions or other health located staff to support communication, increase participation and social inclusion clinically and cost effective in terms of:<br>i. theoretical approaches<br>ii. components<br>iii. regimen (duration, frequency, intensity, dose, etc.)<br>iv. delivery model (computer based, volunteers, etc.)<br>v. provider (volunteer, healthcare professional, third sector, self-help) |
| 4. Maintaining long-term Communication Partner Training gains | • What are the long-term outcomes of CPT?<br>• How long-term are the effects of CPT, i.e., how well maintained are they?<br>• Do trained CP maintain taught/ learned behaviours effectively?<br>• How can we optimise knowledge, understanding and implementation of learned behaviours? |
| 5. Describing treatment effectiveness across the continuum of care | • What is the effectiveness, feasibility, and sustainability of an enhanced communication environmental implementation package during hospital stays? |

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| | • What are the effects on healthcare communication of using the Aphasia App, compared to standard (no App) care?<br>• What is the effectiveness of an eHealth CPT program in helping professionals communicate in real-life aphasia settings? |
| **Theme 3: Cross-linguistic assessment and core outcomes for aphasia research** | |
| **Objective** | **Research Component** |
| 1. Establishing relationships between aphasia and global stroke severity measures | • What is the relationship between aphasia outcome measures identified for collection in aphasia core outcome sets and global measures of post-stroke disability? |
| 2. Optimising evaluators’ ratings | • What are the factors that contribute to differences in subjective measurement of outcomes – for example does this differ across assessors’ backgrounds, experiences, and countries? |
| 3. Optimising multilingual cognitive tests | • How can multilingual cognitive tests (linguistic and non-linguistic test for clinical and research purposes) that are suitable for people with aphasia be developed, validated and implemented? |
| 4. Developing/adapting participation and activity measures in multiple languages | • How can multilingual versions of suitable tool(s) measuring participation and activity of people with aphasia be developed for use in different language populations? |
| 5. Optimisation of outcome assessment: examination of psychometrics and validation of assessments across countries | • How can the feasibility of assessment tool use be optimised for international studies?<br>• Does assessment of the same aphasia outcome measure vary across different countries/languages?<br>• How can we improve psychometric properties of outcomes?<br>• How can we standardise reporting on psychometric properties (e.g. inter-rater reliability) for aphasia assessment tools?<br>• How can we develop best practices for consistent methodology in studies and reporting on studies?<br>• What strategies/criteria can be employed to optimise inter-rater reliability?<br>• What is the clinical significance of numerical changes in aphasia outcome measures?<br>• How can we identify and validate health economic outcome measures for people with aphasia? |
| 6. Describing functional communication outcome measures and linguistic outcome measures | • What is the relationship between functional communication outcome measures and linguistic measures?<br>• How does this relate to the intervention? |

| **Theme 4: Predictors of recovery** | |
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| **Objective** | **Research Component** |
| 1. Establishing neurobiological predictors of recovery | • What are the neurobiological predictors of aphasia recovery?<br>• What is the role of FOXP2 and other genes in post-stroke aphasia recovery?<br>• What is the role of behavioural and neurolinguistics behavioural testing in prediction of aphasia recovery?<br>• Are neurological markers of aphasia severity and aphasia recovery related and how?<br>• How can MRI, DTI (NODDI/HARDI), fMRI, and rs-fMRI be used to optimize prediction of aphasia recovery?<br>• What is the influence of structural brain damage and structural and functional connectivity on language and communication recovery following language and communcation therapy?<br>• What is interaction between structural brain damage/structural and functional connectivity and patient psychosocial factors on language and communication recovery? |
| 2. Establishing psychosocial predictors of recovery | • What are the available support resources at the individual, family and social levels? |
| **Theme 5: Implementation** | |
| **Objective** | **Research Component** |
| 1. Establish the worldwide impact and costs of aphasia | • What is the global burden of aphasia (disease) following post-stroke aphasia, including resource use, direct & indirect costs, and loss of income?<br>• What proportion of the overall stroke burden does this account for?<br>• How do health utilities differ in matched populations with and without post-stroke aphasia? |
| 2. Explore increased representation of people with aphasia in research | • What are the best approaches to ensure inclusion of people with aphasia in stroke clinical research across the spectrum of chronicity and for different types of rehabilitation interventions? |
| 3. Explore representation of spouses/family of people with aphasia in research? | • When and how should spouses/family members be included in design of new research and interventions? |

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| 4. International contexts | • What impact does aphasia have internationally on:<br>i. uptake of stroke services/rehabilitation (including but not limited to SLT)?<br>ii. adherence and use of [adherence / dose] rehabilitation services (SLT, physio., OT and nursing) compared to peers with stroke in the community? |
| 5. Access to and uptake of stroke rehabilitation services | • What impact does aphasia AND socioeconomic status have internationally on:<br>i. access to rehabilitation<br>ii. adherence to intervention compared to peers with stroke in the community? |
| 6. Healthcare-related communication with people with aphasia | • How can aphasia awareness be improved:<br>i. In the general population<br>ii. Within health care professionals<br>• What is best practice for communicating complex health information to people with aphasia? |
| 7. Technology | • How can new technology-based assessment tools be used for people with aphasia?<br>• How can new technology-based intervention tools be used for people with aphasia?<br>• How can technology be used to enhance effective resource utilisation, cost-effectiveness and implementation of interventions in the aphasia population?<br>• Should transcranial magnetic stimulation (TMS) or transcranial direct current stimulation (tDCS) be used in post-stroke aphasia rehabilitation? How should TMS/ tDCS be implemented in terms of:<br>• protocols<br>• duration<br>• intensity<br>• and in combination with other therapies? |
| 8. Multinational, multicultural approaches | • What are SLTs’ education, assessments used, treatment possibilities, and treatment methods in different countries?<br>• How do service delivery models compare across countries?<br>• What are the practices of SLTs for assessment and treatment of multilingual people with aphasia? |

**Additional Areas of Need**

| **Research Infrastructure Priorities** |
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| 1. Methodology | • More aphasia research is needed from non-English speaking countries. Recruitment of non-English speaking participants would enhance the representativeness of the aphasia research population.<br>• Synthesis and use of big data on aphasia is beneficial in order to answer core research questions and eventually address new. |
| 2. Infrastructure | • An internationally coordinated post-graduate research programme would benefit knowledge exchange, improve research and clinical practice, and progress the field. |

**Figure 1) Study Overview**

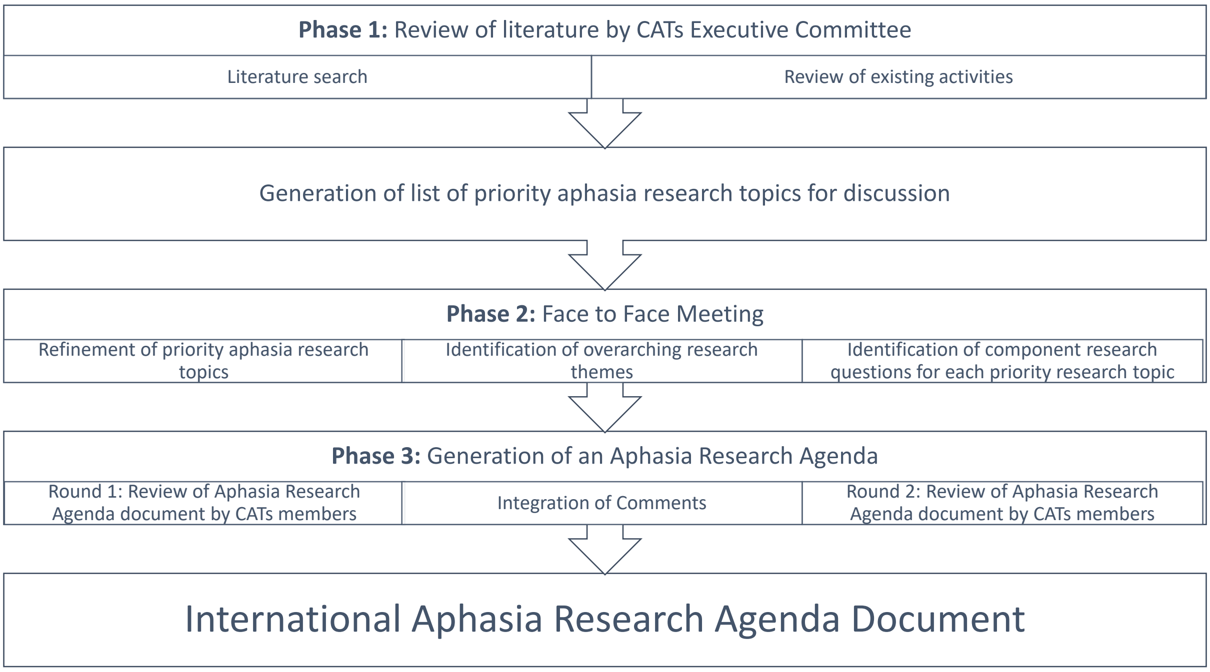


**Figure 2) Relationships between research themes**

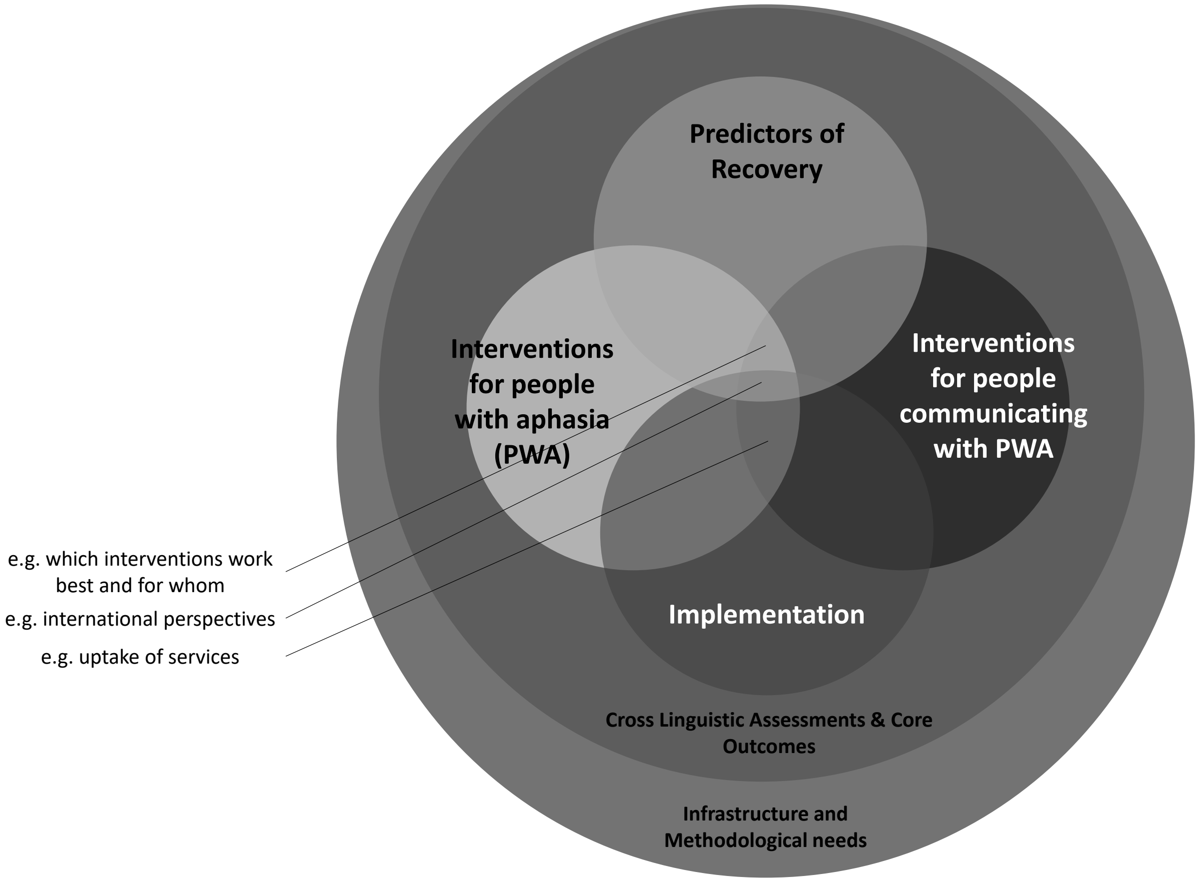
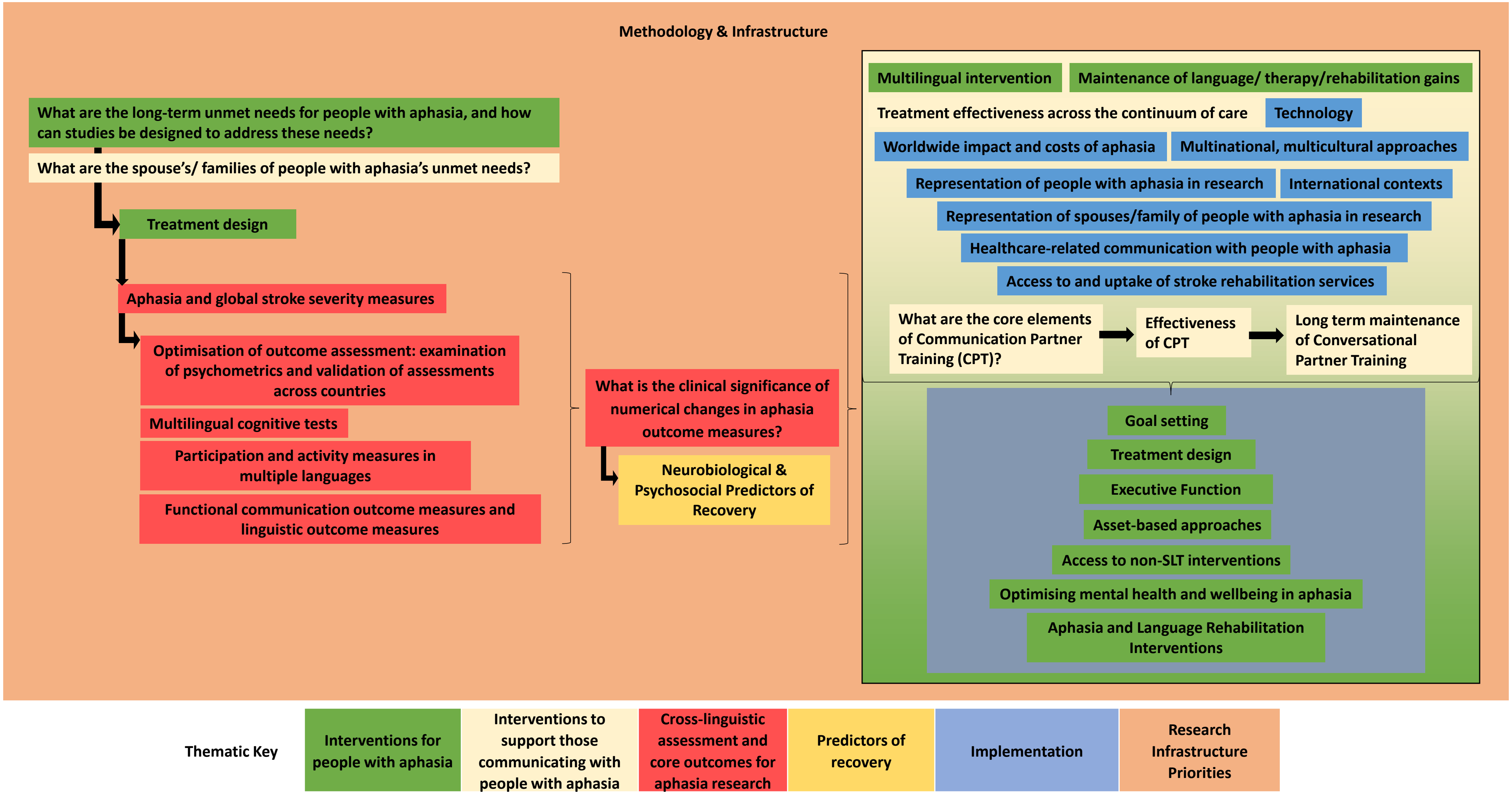


**Figure 3) Research Roadmap**



Methodology & Infrastructure

What are the long-term unmet needs for people with aphasia, and how can studies be designed to address these needs?

What are the spouse's/ families of people with aphasia's unmet needs?

Treatment design

Aphasia and global stroke severity measures

Optimisation of outcome assessment: examination of psychometrics and validation of assessments across countries

Multilingual cognitive tests

Participation and activity measures in multiple languages

Functional communication outcome measures and linguistic outcome measures

What is the clinical significance of numerical changes in aphasia outcome measures?

Neurobiological & Psychosocial Predictors of Recovery

Multilingual intervention

Maintenance of language/ therapy/rehabilitation gains

Treatment effectiveness across the continuum of care

Technology

Worldwide impact and costs of aphasia

Multinational, multicultural approaches

Representation of people with aphasia in research

International contexts

Representation of spouses/family of people with aphasia in research

Healthcare-related communication with people with aphasia

Access to and uptake of stroke rehabilitation services

What are the core elements of Communication Partner Training (CPT)?

Effectiveness of CPT

Long term maintenance of Conversational Partner Training

Goal setting

Treatment design

Executive Function

Asset-based approaches

Access to non-SLT interventions

Optimising mental health and wellbeing in aphasia

Aphasia and Language Rehabilitation Interventions

| Thematic Key | 🟩 | 🟨 | 🟥 | 🟨 | 🟦 | 🟧 |
|---|---|---|---|---|---|---|
| | Interventions for people with aphasia | Interventions to support those communicating with people with aphasia | Cross-linguistic assessment and core outcomes for aphasia research | Predictors of recovery | Implementation | Research Infrastructure Priorities |