A Sound Understanding — An In-Situ Deployment of an Accessible Audio-Media Player with People Living with Aphasia

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Audio media – radio, podcasts, audiobooks – structures everyday life: we keep up, wind down, and share moments through long-form listening. Yet for people living with aphasia – a communication disability that affects audio comprehension – unsupported audio often means losing the thread and marring the experience. While accessibility advances have focused on print, web, and audiovisual content, audio-only remains unconsidered; oftentimes optimised for marketisation rather than sustained understanding. We report a three-week in-situ deployment of <Anon> app, an audio media player which meets the people at the moment of comprehension difficulty. With ten adults living with aphasia, we show how people assemble personal repertoires of small, co-present communication cues that repair in the moment and support recall. Grounded in lived experience, we argue for personal, source-proximate scaffolds that help make long-form audio more understandable and enjoyable.

CCS Concepts: • **Human-centered computing → Accessibility theory, concepts and paradigms**.

Additional Key Words and Phrases: Accessibility, aphasia, audio, deployment, complex communication

ACM Reference Format:

Anonymous Author(s). 20XX. A Sound Understanding — An In-Situ Deployment of an Accessible Audio-Media Player with People Living with Aphasia. In *Title (XYZ 'XX), Month A–Month B, 20XX, City, Country*. ACM, New York, NY, USA, 30 pages. https://doi.org/xxx

1 Introduction

Ensuring inclusive access to audio media is essential. Alongside the growth of other audio tools, formats like podcasts, audiobooks, music streaming apps, and radio dramas have become increasingly popular. The audiobook industry provides a telling example: after eight consecutive years of double-digit revenue growth, audiobooks became particularly important during the pandemic [65]. 2024 OFCOM (UK Office for Communication) report [60] highlights the importance of audio media – 92% of people in the UK listen to some form of audio content (e.g., radio, podcasts, or audiobooks), at least once a week. Similarly, BBC media report [11] states that in $Q3$ 2024 there were 4.6 million users across the mobile app, website, TV and voice activated devices with a total of 226 million plays of on-demand radio and podcast content. Spotify, the largest audio platform with almost 700 million active monthly users, offers 200, 000+ audiobook titles [59]. Notably, increased listening habits also include older audiences; the UK-based Entertainment Retailers Association identified the "over 55" group as the fastest growing audience [7]. However, the industry coverage and the advancements are still driven mainly by the habits and interests of younger audiences and neurotypical listeners. Recently, [14] have brought attention to accessible audio media listening raising concerns about the current under-representation of disabled audio media consumers, especially a group of people living with complex communication needs (CCN).

Research on accessibility in audio-only media is sparse, primarily focused on auditory impairments (e.g., [84, 85]) and with a larger share of accessible research on audiovisual media and focusing on sensory disabilities (see [56] for a review). Ongoing developments – such as internet-delivered content with high potential for individualisation [5, 6]

Manuscript submitted to ACM

– offer opportunities to bridge this gap and extend accessibility to diverse audiences. However, despite the promise of these advancements, we still lack a clear understanding of how such interventions can support users with CCN and address their unique challenges. This study is focused on such under-represented group of audio media listeners – people living with aphasia. Aphasia is a language impairment that can affect a person's reading, writing, speaking, and listening abilities, often resulting from a stroke or other brain injury [33, 54]. The nature and severity of aphasia can vary from person to person, which means that individuals living with aphasia may experience the same piece of audio-media in vastly different ways.

This paper advances the agenda of audio-media accessibility through an in situ study of (Anon [1]) app, a podcast player designed with and for people with aphasia. The app integrates accessible features such as read-along highlighting, multi-level summaries, adjustable pacing, chapter-based navigation, glossary look-ups, and quick "return to sense-making" tools. Following an Research Through Design (RtD) methodology [93] we report findings from a three-week field deployment with people living with aphasia, examining how they appropriate combinations of these interventions in everyday listening.

Our contributions are threefold: (1) an empirical account of real-world audio media use by listeners with aphasia; (2) first in situ deployment of audio media accessibility features that support people living with aphasia and (3) key design guidelines for platform-level audio media accessibility that offers better audio content comprehension and navigation.

2 Related Work

2.1 Aphasia Auditory Comprehension Difficulties

People living with aphasia (PWA) frequently experience auditory comprehension breakdowns, often as a result of speech that is too fast – lexically, syntactically, and temporally. Often, lexical activation and integration are slowed, so people living with aphasia might need more time (and/or better advance cues) to stabilise a word's meaning and bind it into the unfolding sentence [9]. Classic cueing effects – shorter words, higher imageability, semantic/phonetic support, repetition priming, and brief response delays – reliably boost performance [53].

Many people with aphasia have trouble noticing quick changes in speech sounds, which makes it hard to follow how speech flows naturally. This 'smearing' of sounds can cause mix-ups or misunderstandings, especially when cues are weak [43]. These challenges get worse in noisy or busy places, such as group conversations, cafés, or transport hubs, where background noise and multiple voices compete for attention [80]. In these real-life situations, it becomes even harder to focus on the speaker, making it difficult to understand and follow the conversation. For instance, eye-tracking evidence shows that a small, well-placed pause before a critical noun can lift comprehension for both PWA and neurotypical controls by giving lexical activation time to "catch up" [10]. Put simply, by the time a PWA recognises a word, the syntactic slot it must fill may have already scrolled past [2].

Cognition – especially verbal working memory and temporal order processing – further constrains what listeners can hold, integrate, and retrieve. PWA with poorer auditory comprehension tend to score lower on verbal working memory and on tasks requiring detection of rapid sequences or judging the order of brief tones [20]. Missed micro-silences make clause boundaries bleed into one another where by the end of a sentence, the beginning is no longer reliably in mind. In continuous media (radio, podcasts, audiobooks), this often results in a characteristic drift where listeners lose track of the narrative – not due to lack of interest, but because the temporal cues provided are insufficient to fully support their memory needs [14].

[1]The app name is anonymised as it is derived from the Charity Organisation's name to facilitate easier recall and identification on users' phones. The app also features the Charity Organisation's logo.

It is important to emphasise that most studies on auditory comprehension challenges in people living with aphasia draw from short, laboratory-based investigations conducted in carefully controlled, therapist-led environments [27, 81]. There remains a notable gap in our understanding of how people with aphasia manage long-form listening in everyday contexts – where ambient noise, divided attention, varying interest levels, and fluctuating energy demands impose additional challenges [25, 48]. Consequently, real-world listening environments such as social gatherings or busy public spaces can further impair comprehension and participation [24]. Moreover, there is still little development of personalisation strategies tailored to the individual needs of people living with aphasia [56]. Furthermore, previous research [14] highlights both pathways and opportunities to translate envisioned audio media futures and broad guidelines into practical, accessible features for aphasia support.

2.2 Media Accessibility

Screen-based media, audio-only formats, and social media are no longer just ways to communicate; they actively support participation by connecting people into social networks, amplifying civic voices, and carrying culture forward [52, 57, 90, 92]. In this context, accessibility is not simply an optional extra but a fundamental requirement to ensure everyone can participate fairly and equally.

Recently, there has been notable progress in improving accessibility for audiovisual content, reflected in updated broadcasting guidelines and industry practices [71]. Much of this progress builds on the foundation laid by audiovisual translation techniques such as subtitling, dubbing, adaptations, voice-over, audio description, sign interpreting, and re-speaking [17]. Human-Computer Interaction (HCI) has largely followed suit, prioritising captioning and description technologies [41, 44, 61, 62, 67]. Although Mack et al. [49] note a welcome growth in overall accessibility research, audiovisual HCI work still predominantly centres on hearing and visual impairments and the traditional "screen viewing" contexts [56]; 93.9% of research is directed at work with hard of hearing (DDH) and blind and visually impaired (BVI) communities. Meanwhile, media consumption has shifted strongly toward internet-native platforms like TikTok and live streaming [26, 32, 69], where interactivity and customisability are standard. This shift broadens the design opportunities for accessibility, yet research often remains anchored to familiar television-like environments and existing accessibility supports [56].

Emerging AI capabilities have the potential to increase design opportunities for access significantly. Deep learning and Large Language Models (LLMs) now make it feasible to generate audience-aware scaffolds – e.g., simplified summaries of long or complex material [28] – and even to offer "instant" summaries on-the-fly [2]. These tools create an opportunity to design beyond making content merely available, toward making it meaningfully understandable and navigable for different users [73]. Yet, audio-only media has conspicuously lagged behind these advances [22]. In much of the literature, audio access appears either as a component inside audiovisual interventions or as access to non-digital environments [34], rather than as a primary focus for radio, podcasts, and audiobooks. Radio remains widely used [88]; at the same time, the category of "sound media" itself has changed, blurring the boundaries between hearing and seeing [13].

Crucially, the audience for audio accessibility must extend beyond the traditional focus on hearing and vision to include people with CCN, such as those living with aphasia [14]. For these listeners, accessibility is as much about sense-making as it is about signal quality and listening. Supports for pacing, segmentation, advance organisers, and simplified comprehension cues can be as important as transcripts and captions. While workshop studies and short demo

[2]Such as https://summarize.ing for YouTube video summaries.

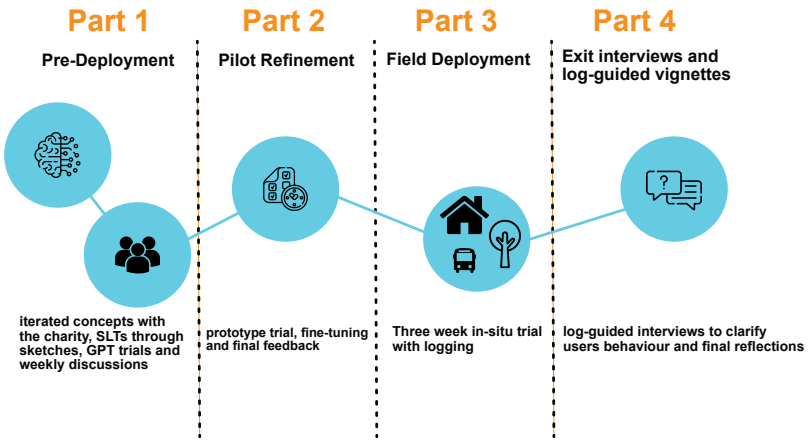


Fig. 1. Four-part study timeline

evaluations are beginning to explore such supports [14], there is an absence of longitudinal, in situ deployments that examine how accessible audio tools are actually taken up – how they fold into routines, how preferences and energy budgets shape use, and how benefits persist (or fade) over weeks and months.

Media accessibility is foundational to social, civic, and cultural participation [52, 57, 90, 92]. The research community has built powerful practices for audiovisual contexts [17, 41, 44, 61, 62, 67, 71], but audio-only media remains underserved even as "listening" becomes hybrid and ubiquitous [13, 26, 32, 56, 69, 88]. The next wave of research should prioritise audio accessibility, leverage AI judiciously [28], invest in information-access companions [36], and study these interventions in situ [14].

3 Methodology

In this section, we outline the overarching Research-through-Design (RtD) methodological approach that guided our project, comprising four distinct but interconnected stages. It guided our project providing a flexible, reflective framework [75] exploring audio media challenges through different scenarios. Initially, we treated ideas, sketches, GPT mock-up collaborative sessions as artefacts [29] iterating through creative refinement and casual feedback engagements with people at the charity. A piloting stage then yielded critical reflections that informed adaptations. Deployment immersed the project in real-world use where emergent issues shaped further iterations (i.e., deciding to create log-vignettes). In this study, we primarily focus on the final stage results, both because it offers a systematic presentation of overarching data and because it yielded valuable lessons for equitable access to audio media. We next discuss our study design, outlining how the key features of <Anon> app (Section 3.4) emerged.

3.1 Study Design

In practice, the study unfolded in four phases.

3.1.1 Pre-Deployment Design Iteration. We devoted the four months preceding the field deployment to iteratively materialising and testing ideas with the aphasia community who would ultimately become the end-users. The goal was to move from abstract requirements to concrete, discussable artefacts, using short cycles of ideation–provocation–feedback to probe what might count as accessible audio support for PWA in everyday listening. This work combined literature

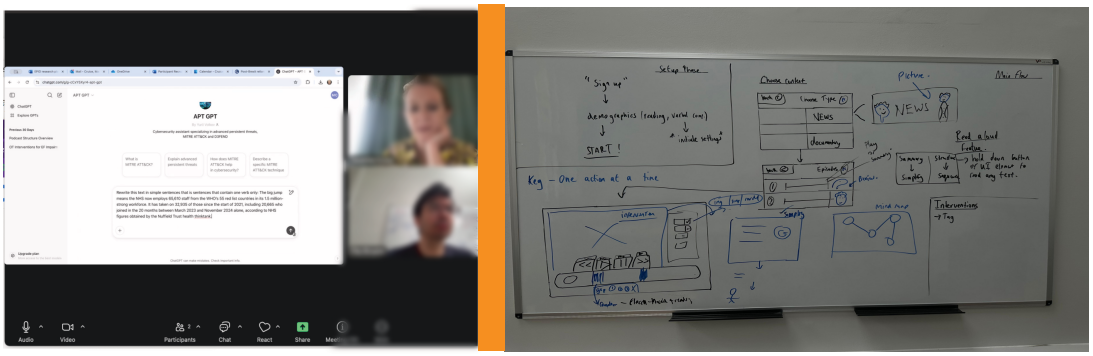


Fig. 2. Pre-Deployment phase - early sketches and GPT-testing

review research in aphasia and accessible media (e.g., prior co-design insights from Bircanin et al. [14]) with practice-led exploration and situated engagement at our partner charity.

Research team sessions produced low-fidelity sketches, storyboards, and paper interfaces that we could rapidly revise and take back to the field. In parallel, we ran GPT mock-ups with our team's speech and language therapist (SLT) to test feasibility and tone for candidate features: multi-level summaries, word explanations and glossaries, story-map scaffolds for organising narrative, and story-grammar [87] prompts to structure content (see Figure 2). These sessions let us trial prompt strategies and evaluate outputs against aphasia-friendly conventions (i.e., concrete vocabulary), yielding a deck of "aphasia-friendly summary" cards we later used in the deployment as AI-generated but predefined and static – ie., part of the Full Summary accessibility feature (See Table 2). In addition, we ran exploratory meetings with Master's student's projects examining how programme metadata (titles, descriptions, speaker names, segments) could be leveraged to drive accessible supports within an Accessible Media Player.

Concurrently, the first author conducted weekly visits to the charity, keeping ethnographic field-notes on conversations with PWA and SLTs about current listening practices, barriers (e.g., memory load, fatigue), and opportunities for situated support. Selected sketches and paper walk-throughs were shown to PWA to elicit concrete feedback – what looked usable, what felt confusing, and where additional scaffolds might help. Feedback fed directly into successive designs (e.g., testing summary length and granularity) and helped us articulate a small set of candidate interventions for deployment (see Table 2 and fig 4). In this way, the pre-deployment phase functioned as a series of cycles: artefacts were used to stage conversations, those conversations re-shaped the ideas, and this ongoing negotiation progressively stabilised the design space we then brought into three-week field trial. We identified core conceptual sticking points through iteration and recurring navigational pains in existing apps, sharpening our design ideas.

3.1.2 Pilot Refinement. Building on the prior phase, we established a set of design requirements, developed a working prototype, and conducted a preliminary trial with four individuals at our partner charity. Our intention was not merely to engage participants abstractly but to offer a concrete prototype that they could directly interact with and comment on – an approach particularly important for people with aphasia, for whom language-based co-design abstraction can be challenging [89]. The trial gathered formative feedback on accessibility features, user interface aesthetics, navigation, and audio content choices. This process resulted in minor app edits, including a distinct charity logo to facilitate easier navigation and the introduction of cover images to aid selection of audio content. Additionally, the text summaries were simplified by reducing length and refining AI-generated output to produce easy-to-follow summary snippets

characterised by Subject-Verb-Object sentence structures. We also discussed what Audio Book genre can be added as a content. These changes aimed at improving accessibility by applying Flesch-Kincaid readability principles [3], ensuring that the content meets readability levels appropriate for diverse users, including those with aphasia (see Table 2 for final set of interventions). In this phase, we learned the importance of text overload and the need for more diverse group of people to stress accessibility.

3.1.3 3 Week Field Deployment. After recruitment (for details see Section 3.2), participants underwent an intake stage consisting of brief (40 minutes) entry semi-structured interview. During the interview, participants reflected on their current audio media practices and reported challenges consistent with prior findings [14], including sustained attention, cognitive load associated with memory and comprehension, mental fatigue, stress regulation, sensitivity to listening pace, and difficulties achieving episode completion. We additionally discussed participants' levels of digital literacy and their preferences regarding the devices on which they would install and use the application (e.g., smartphones or tablets). Subsequently, a 15 minute demonstration session was conducted, in which the app's functionality was presented screen-by-screen to each participant. During this session, participants were guided through the app's features, and the data logging process was explained to ensure informed engagement. After approximately 10 days, we ran a brief check-in to capture obstacles early and reduce attrition; this led to two pragmatic edits: resume from where you left off (*recall*) and a *visual progress bar* per episode (See Fig 4 - "Content Selection"), plus minor content additions requested by participants. We identified person-specific patterns of use during the deployment while simultaneously exchanging recommendations.

3.1.4 Exit Interviews with Log-Guided Vignettes. At the conclusion of the third week, we conducted semi-structured interviews centred around the app's core features and participants' initial challenges, which primarily encompassed comprehension, memory, mental fatigue, and focus. To structure these interviews and ground discussions in concrete user experience, the research team prepared individualised daily vignettes for each participant derived from their logged app use data. Each vignette consisted of a concise daily summary (approximately 400 words) that captured key observations – such as repeated pauses or returns to summaries ("On the 25th, you went back and forth changing the complexity level; can you tell us what happened there?") – and was used as a prompt to elicit detailed explanations and clarifications about the participant's behaviour [79]. These vignettes and the accompanying interview questions were presented in plain, accessible language tailored for people with aphasia, allowing participants to see, read, and listen to the prompts. To enhance comprehension, the materials incorporated simple illustrations, emojis, thumbs-up icons, and screenshots of app features, ensuring multimodal accessibility [40].

3.2 Recruitment

We recruited through a partner aphasia charity. A simple poster was displayed for two weeks; enrolment followed a first-come, convenience basis until 10 participants had consented. Inclusion criteria were: (1) interest in or prior experience with radio/podcast/audio listening, and (2) self-reported challenges with current audio media (platforms used, interest level, nature of difficulties). Three people from earlier Part 1 and Part 2 (see Figure 1) sessions opted in to the deployment.

All participants were informed that in-app logs would be collected and used to support exit-interview discussions (vignettes); data were pseudonymised, and interviews accommodated aphasia-friendly practices [37] (large print, plain language, one question per screen/page, time for responses).

3.3 Participants

Table 1. List of participants in the deployment, along with demographic data and communication challenges. ASR provides an index of the severity of the aphasia from 0 (speech, writing and/or auditory comprehension are not functional) to 4 (Although the individual feels that they have a problem with language, this is barely apparent to the listener who may not detect any problem)

Name	Gender	Age	ASR score
Tim	Male	66	1
Ethan	Male	63	2
Joel	Male	67	3
Eliot	Male	73	2
Sophie	Female	45	3
Mara	Female	82	1
Amy	Female	65	3
Rose	Female	63	3
Nina	Female	42	3
Nick	Male	53	2

Participant sampling was purposive to span severity, age, and ethnicity; given the small, exploratory nature of the study, our aim was breadth of experience rather than statistical representativeness. We enrolled 10 adults with aphasia (42-82 years; M = 61.9, SD = 12.2; 5 women, 5 men), predominantly English L1 (8/10), with additional languages Italian (n = 1) and Tagalog (n = 1). Stroke year ranged 2009-2024, with a mean of 9.5 years post-onset at the time of study. Aphasia Severity Ratings (ASR)– on a 1-4 clinician scale where higher indicates greater impairment – ranged 1-3 in this sample (1: n = 2, 2: n = 3, 3: n = 5; none at 4). Self-reported technology experience centered at 3/5 (median = 3). We received ethical approval from the <anonymous university> Ethics Board. Participants were recruited through <anonymous charity> (weekly drop-in sessions where two authors volunteer) and the <anonymous> mailing list at <anonymous university>; all 10 completed the in situ deployment. Materials were aphasia-friendly, co-developed with an experienced SLTs and aligned with relevant guidelines. No participant used high-tech augmentative alternative communication devices during study interactions; one participant's significant other supported a remote exit interview. Each participant received £100 in vouchers.

3.4 The <Anon> App

The system developed for this study was a progressive web application that participants installed on both Android and iOS devices of their choice. The application provided access to a curated audio library organised into five categories: History, News and Politics, Science, Wellbeing, and Audiobooks. Each category contained on average three items, with an average duration of 26.3 minutes per item [3]. All spoken-word news and documentary materials were provided by the <anonymous> partner broadcaster for research purposes, while audiobooks were sourced from the freely available LibriVox collection [4]. For every audio file, a transcript was generated, forming the basis for the accessibility features described below.

[3]The total amount of content was 472 minutes (around 8 hours).
[4]https://librivox.org/

The design of the application minimised reliance on text input. There was no search functionality; instead, content was structured into clearly defined categories to facilitate direct access. The integrated audio player incorporated several accessibility features targeted at individuals with communication and comprehension challenges (see Table 2). These included synchronised transcripts with real-time word highlighting, playback speed adjustment, and chapter-based navigation.

Beyond these core functions, the player supported user-driven, AI-assisted engagement by suggesting follow-ups and supporting curiosity about preferred audio content. Participants could pause the audio at any point and generate a summary of the immediately preceding segment. They could extend the recap duration incrementally if desired. Suggested follow-up questions accompanied each generated summary, allowing users to explore the content further by tapping a question to receive an immediate answer, eliminating the need for typed input. Additional features included a dictionary-style word lookup tool, which automatically saved queried terms for later review, and a graphical "story map" visualising the narrative structure of each item.

Content accessibility was further enhanced through adaptive readability and progress-tracking tools. Each episode was accompanied by a summary available in multiple levels of textual complexity, adjustable by the user according to Flesch-Kincaid readability scores (5th-grade band, 7th-grade band and 10-12th-grade band difficulty). The system also recorded and displayed listening progress for each audio item, allowing participants to resume seamlessly.

All user interactions were logged providing detailed records of engagement patterns and key performance indicators (e.g., time spent per item, transcript interactions, dictionary lookups, and recap requests). The application was deployed directly on participants' personal smartphones and tablets, requiring no additional equipment. Accessibility within the interface was additionally supported through larger font sizes, increased word spacing, and simplified navigation structures. Participants first attended a live tutorial session introducing the application, after which they engaged with it independently.

Table 2. List of interventions

Feature	Description
Read Along	Displays subtitles alongside audio playback
Highlight Toggle	Highlights the current word in real time
Playback Speed Change	Adjustable speed to support comprehension (x0.8; x0.6; x0.4)
Go to Selected Chapter	Episode Navigation – chapter segmentation. Jump to predefined sections of the audio
Live Recap	Live Summary – automatic recap of recent audio (30s-300s)
Follow Up Suggestion	GenAI suggested (3) follow-up questions (plus answers) about the covered content
Word LookUp	Single-word 'simplified' explanations (AI generated) with option to 'bookmark' words
Story Map	AI generated pictorial map (main theme – illustration – + nodes connecting story parts)
Full Summary	Summaries with adjustable complexity (3 readability levels using Flesch-Kincaid)
Progress tracking	Saves playback position across sessions
Full Summary Read Aloud	TTS (default Firebase Voice) for Full Summary
Live Recap Read Aloud	TTS (default Firebase Voice) for Live Recap

3.5 Data Collection and Analysis

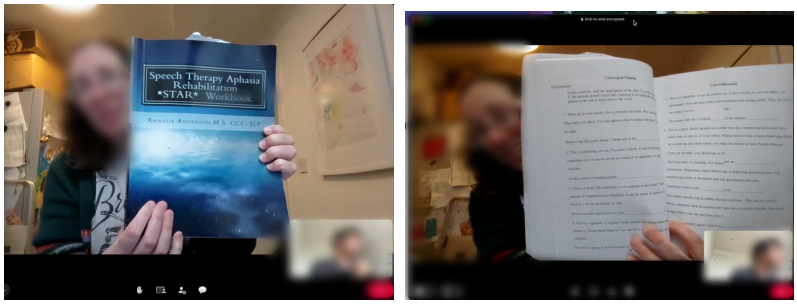
This study employed a triangulated, qualitative-led analytic strategy integrating two evidence strands: (i) in-app usage logs captured during a three-week field deployment and (ii) semi-structured exit interviews scaffolded by participant-specific, log-guided vignettes. Qualitative materials (interviews and vignette discussions) were analysed using reflexive thematic analysis [15]. The team first familiarised themselves with the corpus and conducted open coding in NVivo, generating 146 inductive codes spanning challenges and feature use (e.g., summary-level adjustments, slowed-playback routines, resume/progress cues). Codes were iteratively clustered into candidate themes, interrogated against disconfirming cases, and refined with reference to each participant's log traces. Log data were reduced to participant-level profiles and episode-level traces. Engagement baselines comprised sessions, active days, median session length, and total minutes; feature appropriation encompassed summary-level preferences and stability, slowed-speed use, pause/rewind behaviour, segmentation jumps, transcript/glossary/TTS calls, recap/resume events, and progress/completion. Crucially, the analysis was qualitative-first: the interview/vignette corpus provided the primary interpretive frame, while logs and descriptive summaries were used to strengthen, inform, and clarify those interpretations and, where feasible, to infer patterns of user behaviour that interviews alone could not fully specify (e.g., the stability of preferences or the timing and sequencing of feature use). Analysis therefore prioritised descriptive statistics and visual summaries of individual tendencies, examining relationships among profile scenarios (feature combinations) only insofar as they deepened or qualified the qualitative accounts.

4 Results

4.1 Fit before Fix

Engagement with the app reflected selective curiosity bounded by agency, effort, and perceived risk. Audio media labels and representations that matched language profiles felt *for me* and invited use; verbose or unfamiliar labels raised instrumental uncertainty (fear of losing place, disrupting flow) having a tendency to avoid audio content.

4.1.1 Fit as the First Gate. Users often reported that they avoided some content or use of features because of the large amounts of text, such as Ethan's instant reaction to text-heavy pages *"I do not want to engage because it is too much. Just don't want to see it "*. Rose, Sophie and Nina shared a similar sentiment *"slow, slow, very slow" – Rose* demonstrating their reading skills and a risk to abandon the context quickly; *" And...And...And...A lot of information" - Nina.*



(a) Cover page of a therapy book. (b) Example internal page.

Fig. 3. Example therapy workbook used alongside the app during at-home practice

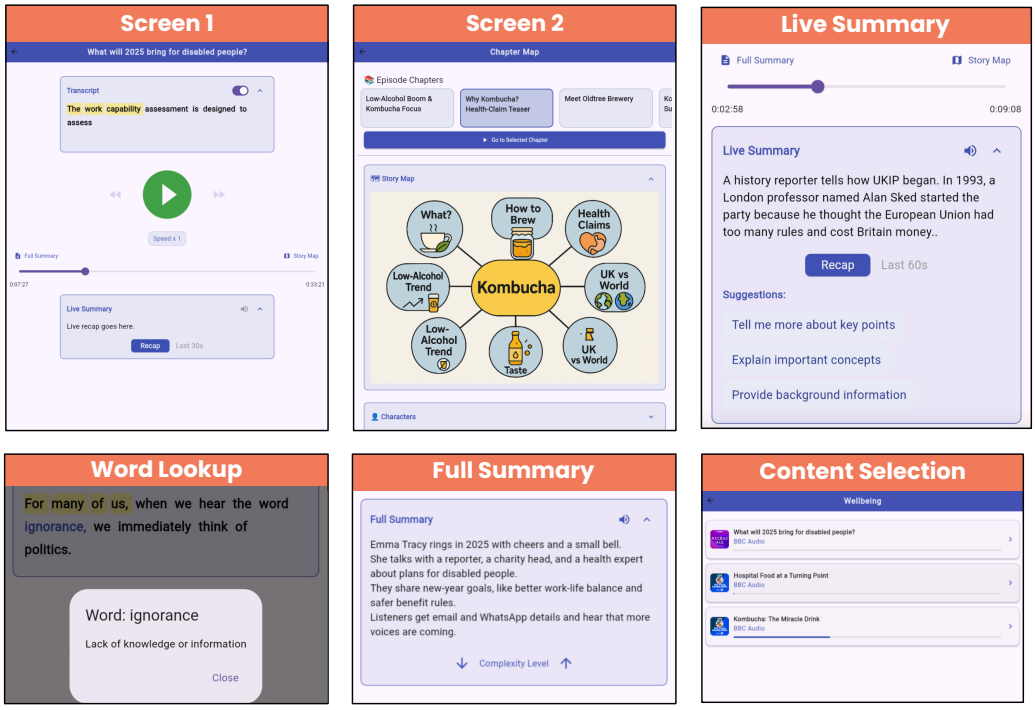


Fig. 4. The <Anon> app. Clockwise — Screen 1, which is the main 'play' screen of the app, which supports comprehension with an interactive transcript and live summary for recap • Screen 2, which allows the user to explore deeper through infographics, chapter-by-chapter browsing and by key characters • Live Summary (from Screen 1), which summarises content and provides suggested prompts • Content Selection, which allows the user to select the episode • Full Summary, which allows for varying levels of complexity in the content • and finally Word Lookup (Screen 1), which allows users to press words and get a definition.

On the other hand, concise, familiar labels and visibly recoverable actions (i.e., Word LookUp) invited use. For instance, nine of ten participants used Word LookUp and reported as safe, reversible, and directly helpful *"no, no, no. Explain! Explain!"- Joel*. During pilot and demo sessions, several participants hesitated to press unfamiliar buttons due to uncertainty about recoverability.

R	You look at the symbol, picture, is that how you do it?
Nina	I can read a simple (break) - unfinished sentence
Nina	I can spell simple things!
Nina	And I do it on my own (signs of pride)
Nina	Paragraphs are tricky for me!
R	Hmm
Nina	I can read enough but not a paragraph

However, where there was an increased level of interest in the audio content or some perceived gain, participants were willing to 'push through' language hurdles. Nina described shopping – a valued pre-stroke routine she wanted to maintain – as a case where she would actively decode unknown words on another platform (i.e., sometimes simply googling unknown words). Similarly, Mara explains *"I look it up on Google, it said the founder of UK party"*. The clear payoff (getting the task done) shifted the cost-benefit: the extra effort felt justified, the word-finding path was predictable and tangible, and peoples' sense of control remained intact. In these moments, purpose and sense of achievement and agency outweighed cognitive economy.

Nina's, seemingly odd, behaviour reflects the same logic: even with a marked reluctance toward unfamiliar text, Full Summary accounted for (72.22%) of her interactions. Sophie showed a similar pattern (see Figure 5). This was not a preference for "more text", but what they later described in the exit interview as a preference for **low-risk text** - short, predictable phrasing with familiar vocabulary that reduced cognitive load, minimised the likelihood of misinterpretation, and facilitated smoother navigation through the content. Paired with Highlight Toggle, Full Summary, Full Summary Read Aloud and Live Recap = Read Aloud acted as a safe scaffold: it preserved position (no fear of losing one's place), chunked information and let users control pace – turning sometimes intimidating language *"not read, not read" - Joel* into a reversible, low-cost probe. Practically, unfamiliar or verbose labels were skipped, while familiar, recoverable text frames were embraced.

R	It seems you always listen before you read the summary
Nina	Yeah
Nina	I can read it on its synchronous form
Nina	But I do not need to
Nina	I can read enough but not a paragraph

Intervention	**Amy**	**Eliot**	**Ethan**	**Joel**	**Mara**	**Nick**	**Nina**	**Rose**	**Sophie**	**Tim**
Full Summary	29.7	50.4	17.9	11.6	30.6	50.0	72.2	17.2	66.3	65.2
Highlight Toggle	12.2	11.9	66.7	26.7	10.2	25.0	1.6	15.5	12.3	8.7
Follow-Up Suggestion	0.0	1.5	0.0	0.0	5.7	0.0	5.6	20.7	0.0	4.4
Word LookUp	9.5	7.4	0.0	36.1	6.4	5.0	1.6	3.6	1.5	4.4
Live Recap	14.9	5.9	0.0	2.3	9.6	0.0	4.8	5.2	1.5	0.0
Characters LookUp	6.8	0.0	0.0	3.5	7.6	10.0	6.4	8.1	2.2	0.0
Key Takeaways	0.0	0.0	0.0	7.0	8.3	0.0	2.4	7.4	1.8	8.7
Story Map	6.8	0.0	0.0	1.2	10.8	0.0	4.0	7.4	0.0	0.0
Live Recap = Read Aloud	1.4	3.7	0.0	0.0	0.0	0.0	0.8	10.4	0.7	0.0
Go to Chapter	1.4	3.0	0.0	5.8	5.7	0.0	0.8	4.2	1.1	4.4
Read Along Turned On	9.5	8.9	6.0	0.0	3.8	10.0	0.0	0.0	0.0	0.0
Playback Speed Changed	5.4	0.0	8.3	0.0	0.0	0.0	0.0	0.0	6.9	4.4
Forward 10s	0.0	0.7	1.2	3.5	1.3	0.0	0.0	0.3	5.1	0.0
Rewind 10s	2.7	6.7	0.0	2.3	0.0	0.0	0.0	0.0	0.7	0.0

Fig. 5. Proportion of interventions used by each participant as a percentage.

4.1.2 Identification Makes Content Usable (or Refutable). Recognition in the content acted as the on-ramp to attention. When an episode "clicked" with a person's experiences or language capacity, the perceived payoff rose and the cost of

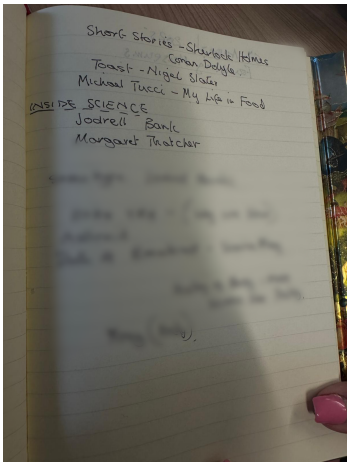


Fig. 6. Photo of handwritten notes on content to add to the app

entry fell. Pieces tied to shared, lived situations (e.g., "Hospital Food" podcast episode) were easier to start, follow, and finish *"When I had my rehab in the hospital, food in there was incredible – Eliot"*. Similarly, Sophie attached a negative valence to the "Hospital Food" episode rooted in her post-stroke hospital experience but was curious enough to play it *"I didn't like food"*. Participants used paratexts as quick cues: Characters, Mind Map, and topical titles acting as identity signals. Sophie, for instance, scanned Characters for Irish names to align with her cultural and linguistic capacity; when that alignment was missing, she moved on. Joel's choice of the "British Miners' Strike" episode followed the same logic: the Mind Map cue "1984" and the caption "20 pounds" triggered autobiographical recognition – *"That is me "* – turning a potential effortful listen into a motivated one.

Sophie	There is an Irish person there
R	Oh, so there is an Irish person in the kombucha episode.
R	(Researcher shares screen: discussing *Unexpected History of the Body*)
R	(Reads out the Full Summary)
Sophie	(Immediately) Is he Irish?

For some, recognition stabilised engagement; for others it surfaced ambivalence and loss. Sophie and Nina described Full Summary as both bridge and mirror of language change – her most-used aid that also surfaced sadness (*"It's the [stammers] I am not the same…"*). Content and features that reflected post-stroke life did more than attract attention – they shaped how people felt about listening. The only two participants, Sophie and Nina, who were in the range (1-2 year post-stroke) had more affective responses to either content or app features. On the other hand, Mara – 7 years since she had a stroke – gravitated to content that jogged those memories (i.e., *Wellbeing* audio content category), narrating the "boundary zone" of acquired disability as she still quite often reflected on her post-stroke hospital days.

When the topic 'fit', participants tolerated rough edges in accessibility; when it did not, polished supports could not rescue engagement. The majority of the whole cohort (8/10) requested additional book chapters (unprompted), they already listened to (only three chapters were imported into the working prototype). Joel put it bluntly: *"But BBC better"* insinuating the content abundance and audio quality. Rather than reading this as accessibility being irrelevant, the pattern shows that accessibility features act as *enablement* once value is established: the sheer volume of requests we received from our participants (see Figure 6) during the deployment illustrates how non-desirable content can depress perceived accessibility if the content requirement is not met. Crucially, accessibility still mattered: in the exit interview all 10 participants rated the app's usefulness and pleasure as "highly useful", signalling that – once content fit was present – the supports were materially helpful most of the time.

4.1.3 Summaries as Adjustable Launchpads. Across the cohort, summarisation was the dominant intervention; all Full Summary variants were used. Half of the participants escalated complexity (to Levels 2 and 3), but for different reasons. We observed two stable strategies: **front-loading**, those participants who expand summaries before pressing 'play' to prime understanding; and **back-filling**, those participants who return to Full Summary after listening to consolidate, check details, or repair gaps *"When I finish I go back and read it again" - Rose*; *"R: Were you reading the full summary after? Nina: Finishing. Yeah"*. In both cases, summaries worked as graduated scaffolding – a reversible, on-demand ramp between *"just a gist" (Nick)* and *"detailed" (Rose)*. If the episode seemed complicated and hard to grasp from the episode title or the chapter's topical title the participants would spend more time front-loading. For instance, on the day before the interview, Nina spent 7 minutes just on Full Summary feature moving between complexity levels 20 times (re-reading and re-listening – ie., Read Aloud) before pressing the play button. She explained simply this as her desire to re-enter the world of news (referencing the "Ignorance in Politics" episode), *"practice"* and get familiar with the political argumentation as she was finding this challenging post-stroke. Rose used a similar pattern on what for her the difficult episode themes:

R	It seemed like you are changing a levels, a lot? You are getting like more information about it? (brief pause)
R	Is that right?
Rose	Yep, yep, yeah
R	You like the summary?
Rose	Yeah, Yeah, Yeah!

Visual presentation mattered. As the first and longest block of text many encountered, the Full Summary drew suggestions for aphasia-friendly presentation. Even at a Flesch-Kincaid 5th-grade band with simple sentence structure S-V-O, participants wanted more control over formatting – e.g., a bullet-point view (*"Like the actual bullet points" – Nina*). Others asked to extend the Highlight Toggle to Read Aloud so that words highlight in sync with audio across all complexity levels (*"It would help if same as subtitles, if it is highlighted so you go word by word" – Nick*) and font size and emphasis *"bigger and bold" – Tim.*

4.2 Scaffolded Sense-Making

Participants assembled light, reversible representations to keep the thread, repair, and recall – preferring features that were clustered near the audio media player source and easy to undo.

4.2.1 Effort Budget and Small Incremental Wins. Completing an episode, grasping a hard segment, or capturing a note felt like accomplishment. Visible micro-progress (progress bars, bookmarked words) were enough to motivate and rebuilt self-achievement: *"A tick or cross, the whatever, it doesn't matter" - Ethan.*

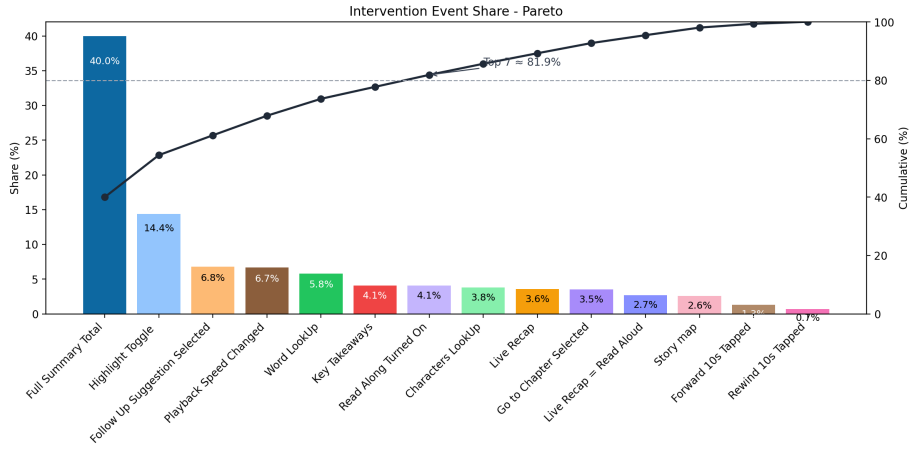
For instance, Eliot who initially reported a difficulty completing a podcast show or radio program as *"extremely difficult"* praised the Visual Progress Bar.

Eliot	Finding it better now, because you put the bar in (refers to progress bar)
Eliot	So, I can see how long I've gone
... R	But what about remembering the actual content you were listening to?
Eliot	Still hard. My total memory is bad

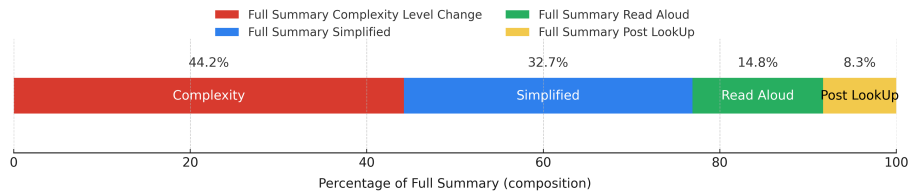
This was a shared sentiment among three other participants. Tim reflected on the immediate post-stroke period of uncertainty and low confidence, when small – even *trivial* – successes mattered: *"immediately after my stroke I would, I would, have liked to finish the whole episode. It would have given me a* ***sense of achievement*** *– Nina".* At those early stages, small wins – finishing a short episode, seeing the progress bar move – were especially valuable for listeners like Nina, Sophie and Amy who struggled even with single words. As Mara put it reflecting on her difficult times soon after stroke, *"I would have got a tremendous kick out of listening to an entire short episode."* These quick, visible completions converted effort into momentum and effectively recharged the effort budget.

The smallest scaffold that changed behaviour, on most occasions, seemed to be often enough. Time-synchronised read-along highlighting, over time as evidenced by Ethan made the content consumable and kept attention anchored. More complex navigation like Go to Selected Chapter was engaged by 8/10 participants, but accounted for only 3.5% (see Figure 7a) of all interactions. Nina, Sophie and Rose expressed this by saying that they struggled if they did not recognise the word in the title chapter and they would just skim and skip *"not understand the chapter, and I won't try".* Getting simple cues right - especially at the start of listening - mattered more than piling on complexity – especially when early impressions decided whether people stay or leave.

The "Audio Books" were the most consumed material (31%) - those participants who played and completed a chapter. The "Wellbeing" category took second place with 28% of the total share of selections. When asked why they liked the Audio Book content, participants articulated three reasons. First, **rhythm and prosody** scaffold timing and prediction, making segmentation easier: Mara -*"yeah yeah so because purity has that rhythm you know that's sort of that helps you, with you speech".* Second, **reduced scene complexity** lowers cognitive load: Tim – *"it is accessible because it is just one person"* narrating which removed the turn-taking uncertainty and voice-switch costs *"I do not mind it is American" - Ethan.* Third, three people in particular stated the book chapter's **episode length** as a decisive factor - the *median* value of the audio book chapters - in total 3 books and 9 chapters for each - was 14 minutes long (IQR 10-34). All together, monologic, rhythmically regular narration – with slower rate, reduced length, and clear phrasing – was experienced as less effortful.



(a) Pareto share of total interventions



(b) Percentage breakdown of summary-related interactions

Fig. 7. Distribution of intervention use and summary composition

However, people were still eager to take risks *"I think as a person with aphasia you have to take risks" - Mara* and put the goal-oriented work sometimes just out of frustration *"I was stressed. I want to know what's happened" - Sophie.* Full Summary accounted for 40% of single-feature interactions (see Figure 7), followed by Highlight Toggle (14.4%). Within a full spectrum of summary actions specifically, Full Summary Expanded - increasing the complexity level made up 44.2% of all summary interactions. Taken together, this points to a front-loading pattern: participants' willingness to familiarise themselves with the audio content before pressing play – also echoed in exit interviews, where 8/10 said they typically read the default Full Summary first (with occasional skips and later returns, e.g., Rose and Tim). Anticipated audio media challenges reported during the entry interviews and demo sessions likely contributed to this behaviour, given. Notably, once playback began, most other interventions clustered *at the source of listening* – Highlight Toggle, Word LookUp, Follow Up Suggestion, Word Tapped, Playback Speed Change, Live Recap = Read Aloud – indicating in-the-moment repair, greater sense of control and orientation rather than prolonged browsing (see section 4.2.2.

Early effort only paid off when entry costs were kept low. Needless to say, Full Summary was key for some and supportive for many, but it worked best as part of a low-friction bundle rather than a stand-alone fix. In particular, short, simply presented episodes (i.e., AudioBook Chapters) acted as warm-ups that rebuilt confidence, with visible completions turning effort into momentum – *"I did three short book chapters in one go!" - Tim.* In the exit interview, Nina and her husband pointed to current AI tools to trim episodes to her attention window (max 25 minutes) and to convert Full Summary into short audio teasers. In practice, front-loaded support worked best when it reduced

time-to-commitment and preserved place: shorter runtimes, compact previews, and in-place summaries that could be sampled safely.

R	Yes, we can explore how we can use AI for this
Nina's husband	You simply take a two hour content and reduce it to half an hour?
Nina	Yeah!

4.2.2 Micro ⇔ Macro Sense-Making. The app offered two complementary app screens (see Figure 4). Screen 2 was intentionally focused on macro-structural elements (i.e., Go to Selected Chapter, Characters and Key Takeaways) as supra-structural scaffolds. Most interactions occurred on Screen 1; although 8 out of 10 people have visited the screen/page 2 at least once, however, overall percentage use by each participant was very low in comparison to other features on Screen 1.

Screen 2 often required less time once discovered (chapter navigation, skim characters, glance at key takeaways), so total minutes spent here were lower (125.68 minutes, = 16.8% of total time spent between the two screens).

Screen 2 was also easily skimmed/forgotten and two people during the exit interview evidenced this *"Uh huh yeah. I did look at it when "reading" the War of the Worlds. Have to look up at it again" - Eliot*; *"Totally forgot about it" - Tim.* With progressive disclosure, participants settled quickly on effective tools largely on the app's home screen (screen 1). The majority of interventions were concentrated in this blended micro↔macro supported layer near the audio player stream. As Nick points out, the first screen is already *"straight-forward and easy to use"* already judging the app just on the grounds of the first screen use **"it is a good app"** similar to Joel *"No, no, no, no, no. It was simple"*. This has already been evidenced by the ubiquity of Full Summary, which comprised the most frequently used intervention. This was a shared sentiment between Tim, Rose and Amy. Although Screen 2 attracted use, it was mostly as a glanceable wayfinding scaffold – used in short bursts.

Practically, the second screen worked as a light *memory scaffold* rather than a place to drive understanding – occasionality good for rehearsing the big picture, less good for staying with the audio. In particular the Key Takeaways and Story Map were seen as a tool for delayed recall and exposition to aid argumentative expression i.e., *"I don't know about Tim, but you could use it to talk about it with a Trump dude" – Eliot.*

4.2.3 Recognition-first Wayfinding. Participants wanted navigation *through* visuals in a recognition-first sense: format cues (clean layout, clear hierarchy), scene photos that convey "where/who/what" at a glance, and short, concrete text that can be skimmed without lexical search.

We expected multimodality (especially visual aids) to improve macro-level understanding as suggested in previous work [14] offered on Screen 2. In practice, only half the cohort used Story Map; across the five users who did, it accounted for <5% of all interventions (see Figure 5). As Mara cautioned in her exit interview discussing the visual representation, story maps *"tend to divide people"* suggesting its variable success. Some used them just *before* listening – although rarely – to access episodes with complicated *"constructions and a lot of characters" – Mara*, or *after* listening as a memory jog *"help a lot with my memory"* - Ethan). Three of ten participants experienced them as genuine *macro-organisation of language support* (*"it describes everything"* – Rose).

For others, the representation did not land: *"It's not really in my head. Yeah, I have to (pause) And then I know the person" – Sophie.* In the exit interview, Sophie could name concrete elements on a specific map (Kombucha episode: *"It says high and low alcohol"*) yet struggled to integrate relations into a coherent storyline. She preferred person-centred visualisation while others preferred the in situ power of narration *"story, not pictures" – Joel*, or felt other interventions already delivered the understanding they needed *"Just the two I used frequently"*. The remainder of the cohort simply did not feel a need for pictorial scaffolds offered.

R	Would you like a picture of something or picture of nouns and items like picture of bottles and then you know all it's about the bottle.
Sophie	Yes
R	You like the summary?
Sophie	Yeah, Yeah, Yeah!

Not anti-visual – just not the right visuals. No one rejected visualisation per se. Participants valued concrete, lightweight visuals (e.g., progress bars, cover images) and suggested alternatives: a scene-setting photo on the first screen; more *interactive* relation views; or picture-by-picture depictions of key nouns/verbs. For users who struggled with pronouns and prepositions (i.e., Amy and Sophie), *specificity* mattered: seeing the *people*, *place* (room/studio), and *objects* anchored comprehension better than abstract node – link graphs such as in Mind Map *"Because I know what it is and then I, oh yeah, I can picturise a thing" - Sophie.* Nina and her husband suggested moving Story Map – and any other visualisations – onto Screen 1 to scaffold the text in place; the two-screen hop made wayfinding overwhelming *"putting it, placing it, on the first screen" – Nina.*

Navigating by cover photos and plain titles – *with little to no typing* – was praised across the cohort (*"no search, it is difficult to type"* -Nina). Step-by-step screens with scene-setting photos, short text, and progressive disclosure felt *"easy to navigate"* (Tim) and *"easy logging"* (Mara), echoing what we saw even in demos: when wayfinding is recognition-first and co-located with the audio, people living with aphasia are more likely to start, stay oriented, and finish (see section 4.1.1). In addition, Nina said that she was able to spot the Bookmark feature (Saved Word LookUp) words as it was distinct and placed at the bottom of the Category screen.

4.2.4 In Situ Repair and Recall. In the deployment stage participants referred to *comprehension* and *completion* challenges as "quite difficult" during listening, with memory problems and high mental effort sitting underneath those difficulties. People described *"Losing the thread" – Ethan* and then needing to recover it before they could continue. When content load spiked in terms of complexity or fast-paced speech, listeners paused, reduced demands, and re-established context. The audio content was paused roughly 4 minutes on average per session. Two reliable repair routines emerged. First, **in-line repair**: pause → intervention → resume. People used Word LookUp as a quick "mental note" and Read-Along Highlight to re-cue context, and short scrubs – although the slider was often imprecise and fatiguing - *"10, 20 seconds is good but slider terrible" - Joel.* For instance, Joel's two most used interventions (Highlight Toggle and Word LookUp) show how he focused on in situ repair interventions *"I like the subtitles"* confirmed by other participants who actively reconstructed language in the midst of the speech *"It helps me reconstruct what the words are saying"*

– *Ethan* (referencing Read Along and Highlight). Second, **spaced repair**: pause → short break → summary revisit (Full Summary) → resume. Many returned to the default or simplified summary to reconstitute gist, then pressed play again as evidenced in Nina's and Amy's case. For them, the inability to recognise even one or two words within a sentence led to immediate loss of comprehension flow, requiring them to frequently pause and mentally rehearse and actively reconstruct the audio content.

Another pathway we observed was *deferred decoding*: rather than forcing every word into clarity, for instance, Eliot let 'understanding' to arrive on a slower cadence. He allowed pockets of not-understanding while the narrator's voice carried him forward; Highlight Toggle and Read Along gradually aligned gaze with cadence and did the repair. In this co-regulation of sound and text-audio as guide, it was a natural fit, the single-voice prosody while listening to audio book chapters easing the handover to Read Along:

Eliot	But then you're reading and have a sound with, reading. Sound with someone's voice
R	Hmm. confusing
Eliot	It can be probably helpful at times but it can be very confusing. As you said probably at the beginning. It's like what the hell is
R	Happening. Yeah
Eliot	I mean I found I was listening to begin with maybe and then I'd start following the words.
Eliot	I'd start following the words. Not on a conscious level.
Eliot	It was me just reading for the sake of reading. Because as you say you can hear what the person is saying anyway.
Eliot	So the words are just there.

Unexpectedly, participants focused on the form of Read Along. A moving, word-by-word highlighter (cursor) beat a flat colour presentation: it chunked text cleanly, marking onsets and offsets, reducing the visual muddle (*"It doesn't do it as a yellow highlight, it's only the colour" - Nick*, comparing other platforms like Spotify). Three participants contrasted colour versus highlighter, seeking clear boundaries while opening up a discussion about meaningful *pauses* beyond simple speed shifts (*"It's not for me" - Nina*; *0.8× felt "too gappy" - Eliot*). Pace mattered but preferences diverged – from Ethan's *"I've got more time to work out what they're saying"* to Sophie finding slowed audio *"too slow"* even though she reported severe audio comprehension challenges. Only Tim offered a concrete fix: add phrase-level pauses within Read Along to slow rhythm and create 'natural breaks'.

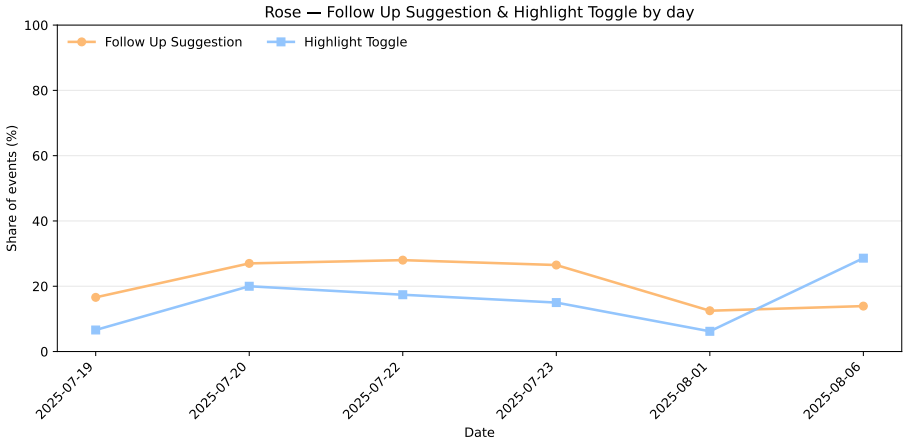


Fig. 8. Two-level intervention use over time

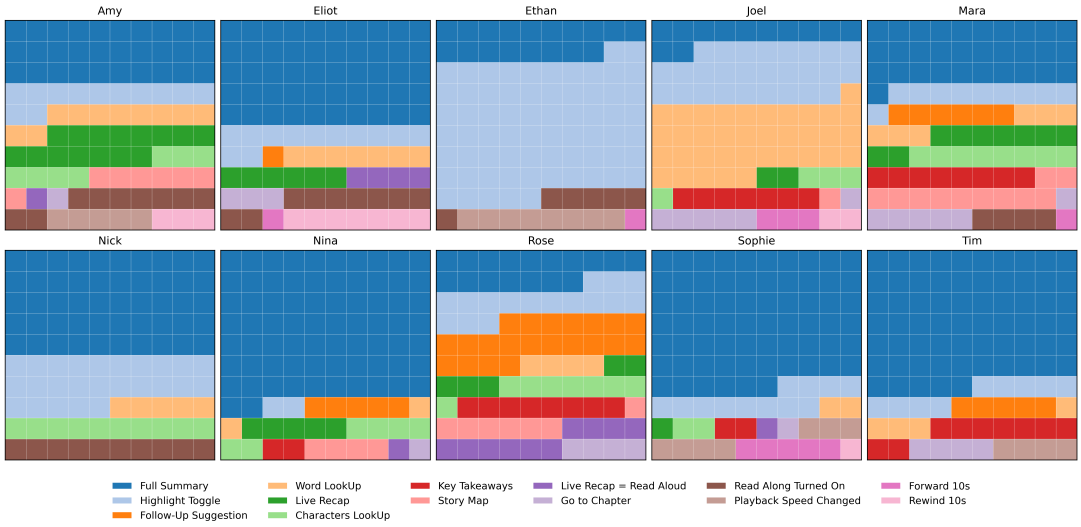


Fig. 9. Waffle Chart. Share of total interventions per user

4.3 Everyday Agency - From Therapy Adjacent to Authentic Conversations

4.3.1 Stable Routines – Idiosyncratic Listening Repertoires. The group of participants differed in terms of use patterns. We can see that some people preferred either a "single" best intervention (i.e., Sophie, Tim, Nina, Tim – see Figure 9) or utilised compatible two or three level repertoires used to fit their goals and energy budgets (i.e., Rose see see Figure 8).

The participants picked low-cost heuristics that worked, and through situated action adapted controls to the activity at hand with graduated scaffolding (small, reliable aids over heavy-handed assistance). Most participants minimised control costs by leaning on a familiar routine while still leaving space for exploration and curiosity (see Mara, Amy and Rose in Figure 9).

R	You had your own thing, which is you pick the content, you change the speed to 0.8 (refers to her logs)
Rose	Yes
R	You seem to mostly use two or three features?
Rose	Yeah.
R	It helps you to finish the episode?
Rose	Yes

Context mattered and this is how most people determined what intervention is best suited for the context: home, park, and bus rides produced distinct use profiles confirmed in our exit interviews. This progressive build-up of the idiosyncratic routine was confirmed by most people talking about their own unique ways of using the app which is poignantly explained by Mara *"Everyone has their own aphasia"*, a reminder of the importance of personalisation and the right fit to listen.

Furthermore, this is demonstrated by how participants chose the listening context. Tim praised the audio content quality as this simply enabled him to listen through *"noisy"* environments recalling his effort to listen on a bus. Three participants in total listened outside the context of home (Tim, Rose, and Ethan) and occasionally this flew through a transient state - preparing in one setting for success in another – for example, skimming a simplified Full Summary or using a Story Map at home as evidenced by Rose, then listening later in the park with fewer aids - offloading effort to a time/place where it is more convenient. The rest of the cohort found *Home* to be the safest for low-demand listening. This said, the participants carefully considered a low-demand context and made adaptive adjustments to how they listen *"There is nobody here (referring to home), and I like that"* – *Sophie*.

4.3.2 Therapy Adjacent Listening. 6 Participants repurposed the app for language work (Rose, Amy, Ethan, Sophie, Mara and Nina): looping segments, pairing audio with text, stepping speed up/down, using summaries before or after listening and additionally suggested features that would support their language recovery. These were personal, repeated, goal-directed routines (e.g., Sophie reading along with a therapy workbook (see Figure 3); Mara/Nina stockpiling words for practice). Rather than "doing therapy," they enacted therapy-adjacent workflows that align with language rehab and learning mechanisms still eager to learn new words, practice pronunciation, and derive meaning from longer sentences.

While we do not know the precise details of how Sophie used her therapy book together with her mother in parallel with the app, she did mention *first book and then app"*. Our understanding from the exit interview is that it was used in conjunction with the Full Summary feature, which was her most frequently used intervention. Meanwhile, to increase their communicative capital, Rose and Eliot utilised the Word Meaning tool to look up confusing words and establish connections to semantic and phonological mapping, expressing the process as *Yeah, repeating it, practice it, practice it" - Rose*. Sophie relied on effortful word-by-word parsing, constructing meaning incrementally and using Read Aloud for confirmation.

All six participants (Amy, Rose, Nina, Sophie, Mara, and Ethan) consistently employed a methodical strategy, particularly evident in their preference for the lowest complexity level (Flesch-Kincaid), where simplified sentence structures – exemplified by Nina – facilitated detailed, word-by-word comprehension (see section 4.1.3 and Figure 4).

During exit interviews, participants reported that they typically engaged first with the default Full Summary level 1 feature; as Ethan stated, *I'd first read the Summary"*, echoed by Rose: *Yeah, yeah, read it every time"*. Mara further reflected on the utility of such an app in a hospital setting, identifying dual roles: an *informative* and *affective* function, noting *"Hospital environment to me was so hostile. Something like fairy stories, to take you out of the immediate circumstances"*. She also suggested clinical applications, proposing simple language recovery exercises, including multiple-choice Q/A sessions following audio episodes: *You can simply quiz people"*. The app also rekindled interest in reading for some participants, notably Ethan and Tim, with audiobooks – the most consumed content – bridging entertainment and information, supporting synchronous reading and listening practice. Eliot described this experience as *"it's like a weird, weird feeling not having read for so long to actually sort of read. I think the transcripts and the listen word, both going on the screen at once"*.

As previously discussed in section 4.2.4, people living with aphasia demonstrate a strong motivation to engage in repair processes, particularly through features such as Word LookUp. Sometimes, there is an obvious friction and careful balancing between when and how to invest such effort. However, more linguistically skilled participants invested considerable effort in correcting minor errors, including misspellings and misplacements of topical titles and sentences. During regular charity meet-ups, research team members were frequently approached by participants, notably Tim, Eliot, and Mara, who presented lists of corrections they wished to be implemented. Many inconsistencies identified in features such as Follow Up Suggestion, Full Summary, and Story Map were attributable to AI-generated content errors, which required explanation to participants.

4.3.3 Social Scaffolds - Gateway to Authentic Conversations. Participants used the app less as a stand-alone listening tool and more as a primer for talk. By packaging episodes into explicit, digestible cues (e.g., Key Takeaways), the app supplied ready-to-say fragments that helped people rehearse and reclaim social roles – speaker, listener, recommender – within and beyond the group setting, mimicking an already adopted behaviour of using notes to rehearse what to say in conversations. The app functioned as a boundary object that different users could pick up and use to build common ground; turning listening into a shared object for discussion and coordination, not just comprehension.

In the charity's peer-led groups, this played out as post-listening circulation: people exchanged their own anecdotes, and used them to open conversations about books, films, and pop culture:

Tim	Can you please add the rest of the War of Worlds chapter"
Ethan	Funny thing you say that, yesterday I watched the movie"
Tim	I also want the Hitchhiker's Guide to the Galaxy
Eliot	I downloaded the storybook app
Ethan	I also want to go back into reading

The app invited audience participation – sometimes replacing conventional therapy prompts with topical, lived-in material that felt easier to start from and easier to stay with. Four participants explicitly credited features like Key Takeaways for *"giving me something to say" Ethan* while others described organically using the app to kick off chats (i.e., Mara) with their family members. This particular aspect was emphasised by Tim, Mara, Rose and Eliot who

saw Key Takeaways to play this role as an almost subtle and quick way to put together either and argument or start a conversation - *"interesting feature, I have not seen this anywhere else - Mara"* or *" yeah, it is a little feature, I could just look at the percentage vote and then talk to someone about it. Not to that old grumpy Tim" - Ethan* Together, these patterns show the app enabling the work of representation: it scaffolds the move from media to meaning to social exchange, helping participants turn listening into interaction and interaction into belonging.

5 Discussion

Our study illustrates how accessible audio interventions can responsibly inform quality audio media consumption. These interventions aim to strengthen people's capacity for language mediation including preparedness planning, and careful and meaningful execution of available accessibility features.

5.1 Tailored Simplicity: Not More Features, But Our Own Features

Our field deployment revealed that users with aphasia can benefit significantly with a small set of well-tailored accessibility features. Participants naturally gravitated toward compact listening repertoires that met their personal needs and cognitive budgets.

First, our study calls for consolidating already existing accessibility features and expanding efforts to provide accessible transcripts (e.g., echoing the work of Chelsey [18]). The 2021 push for "subtitles for podcasts," amplified through the Spotify Research forum, catalysed community interest and preceded the platform's rollout of automated transcripts in 2023 [58]. However, what is widely available today tends to function as caption-style, read-along text rather than full, editable transcripts. Although creators can download and revise auto-generated text [76], this workflow remains underutilised [22]. Our findings indicate that transcripts should go beyond simple word rendering to support comprehension and navigation for people with disabilities, including aphasia (e.g., Sophie's preference for speaker stamps). In particular, detailed transcripts should include reliable speaker diarisation [78], consistent timestamps, and clear structural markers (e.g., sections, headings) to enable scanning, selective rereading, and accessible search. We therefore recommend platform-level tooling and workflows that make high-fidelity transcripts the *default*: integrate diarisation, surface confidence scores, support human-in-the-loop correction, and enable export to open, accessible formats.

Secondly, our results show that by introducing supports gradually – through *progressive disclosure* – the app allows listeners to discover what works for them without being overwhelmed. Participants encountered features incrementally through context-sensitive prompts maintaining users' agency. Early trials produced immediate benefits for legibility of audio content (e.g., clearer lexical boundaries with read-along, visible progress bar) which functioned as competence cues and increased self-efficacy. As confidence accumulated, participants consolidated a small set of preferred controls. Combined with a *front-loading* pattern our study points to the importance of *select and settle* behaviour [30]. However, this behaviour is not a panacea for accessibility. While the promise of object-based audio (OBA), which attaches metadata to audio for adaptive playback, offers a encouraging personalised solution [82] for users to settle on a set of preferred features, it is still far from a straightforward matter. Adaptation relies on metadata granularity and system interpretability [36, 63]: if the content is not annotated at a fine level, adjustment can miss the mark. Even when metadata-driven adaptations improve intelligibility, they do not guarantee comprehension. Our participants encountered moments where cognitive fatigue or spikes in discourse complexity overwhelmed their "settle" configurations. Participants in our study valued having agency to adjust supports on the fly as well – indicating the importance to carefully balance automatic aids with user empowerment [74]. We believe that by coupling intelligent

content annotation with interactional scaffolds, and keeping the user in control, accessible audio systems can adapt to real-world complexities (fatigue, attention lapses, shifting comprehension) in ways a purely algorithmic solution cannot. This approach moves accessibility beyond passive personalisation toward a more participatory, *listener-led experience*, aligning with calls in disability studies to empower users as active agents in their technology use rather than passive recipients of "adaptive" content.

Finally, to prioritise access, there is a need to shift focus away from market-driven objectives when developing audio content tools. Much of the current research and innovation in podcast technology – from topic segmentation [64] for easier browsing and AI-generated podcast teasers to goal-driven recommendation systems [47] – is still rooted in the logic of maximising shareability, listener growth, and follower counts [83]. This market-centric approach has clear limitations for accessibility, often prioritising metrics like engagement. Our results show that participants placed higher value on accessibility features and accessible curation, preferring community-led listening experiences and authentic conversations over algorithmically optimised content. Socially grounded recommender systems, such as those leveraging trust networks and peer recommendations [38, 77], align better with our cohort's preferences than systems fixated purely on individual click-throughs.

Crucially, an accessibility-first perspective [45] challenges several assumptions often derived from market-oriented research. For example, a recent study on podcast summarisation quality found that high-rated summaries tend to be dense with nouns, determiners, and adverbs, while comparatively underusing verbs [68]. Our results underscore the importance of aphasia-friendly summaries and highlight the risks of uncritically adopting such design requirements. Verbs are central to constructing meaning: while verb recognition and understanding can undermine sentence comprehension and connected speech in people living with aphasia [4] it does not mean it should be excluded; on the contrary, eliminating it from summaries could weaken both clarity and listener engagement. Future accessible solutions should prioritise meaningful language use, lived experience, and community value over marketability, helping to bridge the gap between mainstream media practices and the diverse needs of listeners.

5.2 Embedding Support near the Audio Media Player

We found that accessibility tools were most effective when they stayed close to the audio media player source, integrated directly into the listening experience. Participants strongly preferred support features that were placed alongside the audio timeline, on the main playback screen (Screen 1, Figure 4), rather than hidden behind menus or on secondary pages. For example, a full summary or follow-up suggestions proved far more useful when they were one tap away during playback, instead of sequestered in a separate section. We believe this is especially important because people living with aphasia often have co-occurring difficulties in attention and memory [20, 53], as observed during the intake phase (Field Deployment - see Figure 1). Consistent with these principles, our participants noted that just-in-time aids helped them stay on track without breaking immersion. Notably, the marked engagement gap between Screen 1 and Screen 2 cannot be merely dismissed as a primacy effect. Participants deliberately departed from the default *Full Summary*, repeatedly choosing the *simplified summary level in situ* on Screen 1 (Figure 4) – indicating that proximity of support, not just initial exposure, drove sustained use. We believe that there is an opportunity for future work to explore how accessible audio platforms could embed support tools directly into playback interfaces, allowing listeners to navigate and comprehend content without detours or undue cognitive effort [91].

5.2.1 Balancing Real-Time Repair and Global Recall. Our study highlights the need for a careful balance between micro-level repairs during listening and macro-level supports for global understanding and recall. Macrostructural aids

(like summaries, previews of topics, or character lists) can play a crucial role in framing the narrative and supporting later recall. Our participants expressed the importance of global context provided early: a brief exposition of the setting (spatio-temporal orientation [1]) and key characters often 'set the stage'; boosting their confidence. These global cues likely help listeners with aphasia form a mental model of the narrative, mitigating memory shortfalls by providing a scaffold for new details. On the other hand, local interventions were equally vital for sustaining understanding. Without the ability to clarify confusing words or replay tricky passages in real time, the value of an initial summary would quickly dissipate. Indeed, users frequently engaged micro-level supports (e.g., tapping the glossary, enabling on-the-fly captions, or slowing the playback) whenever they encountered comprehension difficulties.

Crucially, providing only one type of support in isolation would be insufficient. We observed that a participant might read a summary beforehand, yet still get lost without in-play assistance. Conversely, constantly stopping to check individual word meanings without complete context became laborious and fragmented the story. Putting excessive emphasis on global structure without room for real-time clarification can leave important details misunderstood; yet, too many micro-level interruptions without an overarching narrative can overwhelm or distract. As Bircanin et al. [14] note, *"striking a balance is crucial, as the effort required to enhance understanding could inadvertently impose additional strain"*. Our findings reinforce this delicate interplay: for people with aphasia, both layers of support must work in concert. Designing with this duality in mind – immediate repair and longer-term recall – is essential to making audio content truly accessible and digestible.

Moreover, not all forms of "slowing down" the audio help equally [8, 10, 70]. Simply reducing the speech rate can distort prosody and unintentionally hinder intelligibility as suggested in our study. Evidence suggests that rhythmic structure could help. Regularised timing (i.e., having them more evenly spaced) can aid intelligibility for people living with aphasia, whereas unguided slowing often fails to deliver benefits [70]. Prosodic clarity and predictable timing can be critical as raw speed in supporting comprehension under load [80]. Looking ahead, future work could look to explore technologies that support 'smart pausing' – inserting a brief pause before a critical noun, clause, or between phrases, affording more lexical processing time, aiding comprehension. Future work can strive to design audio players that can incorporate intelligent pacing features that regularise timing or auto-pause at natural breakpoints to aid understanding. Such prosodic adjustments, combined with personalised tuning of global (as opposed to local) supports, represent promising directions for making long-form audio more accessible.

Form Also Matters. Surface design features proved important in our field deployment. For people living with aphasia, font size, line length, line spacing, and text layout were part of the intervention, not decorations. Such observations echo prior findings that accessible formatting (e.g., larger sans-serif fonts, 1.5 line spacing) significantly improves readability and retention for readers with aphasia [31, 72]. Consistent with these results, our participants wanted greater agency over presentation, requesting bullet-point lists, increased white space, bolded keywords, and in-line glosses for difficult terms. These format adjustments do not introduce new content; rather, they reduce parsing effort and make key information stand out, helping listeners extract meaning at a glance.

5.3 Familiarity, Social Impact and Therapeutic Benefits

A key insight from our deployment is that making audio truly accessible requires aligning with the listener's personal context, preferences, and lived experiences. Participants consistently preferred *familiar* and *trusted* content, such as favoured genres or known presenters, with our accessibility features deepening their connection to this material. This behaviour reflects a broader point: emotional bonds with familiar audio [19] make accessibility meaningful in everyday life. Co-design with people with aphasia confirmed that familiar voices and personalised content help rebuild

confidence and comfort [14]. Designing accessible audio requires accounting for socio-cultural context and individual tastes. This highlights the role of community in audio listening. Community radio's cultural and social value is deeply local and participatory [55]. During the exit interviews, some of our participants expressed interest in what others valued, asking for confirmation and seeking a shared common ground. Listening to community-based shows fosters an intimate "structure of feeling," exemplified by Mann's [51] concept of "synchronous listening": collective real-time engagement. Our findings highlight instances of individuals engaging in repair for the benefit of fellow members within the charity. These findings align with prior research that emphasises correction and co-constructed repair as collaborative strategies that preserve conversational progressivity while addressing linguistic challenges experienced by people with aphasia [12]. The active engagement by participants in repair show both a commitment to communication accuracy and a sense of empowerment in managing their interactional environment.

Audio media's role has evolved from entertainment and information to include education [23, 66], counselling [16], and even AI-assisted content creation [42]. Yet its therapeutic potential is often overlooked. Our deployment showed that accessible audio technology supports everyday therapy outside clinics. Participants used the app to practice listening in a low-stress way, transforming leisure into rehabilitation. Following favourite shows with supportive features provided enjoyment and rebuilt communication skills and confidence, serving as both informal therapy and safe practice space for communication recovery.

5.3.1 Generative AI and its Potential Impact. Finally, we must consider the role of emerging AI technologies in sustaining these personalised, everyday accessible experiences. The rise of large language models (LLMs) and, more broadly, generative AI offers new capabilities for generating on-demand summaries, definitions, or even visual storyboards for audio content. Our app already leveraged automated speech recognition, abstractive summarisation [46], and image generation.

Moving forward, more advanced AI could reframe and reword content in real time to better suit a listener's preferences. For example, an AI could generate a parallel simplified narration, offer supra-structural support to improve spatio-temporal framing of the audio content, or answer ad-hoc questions a listener could asks when confused, as evidenced in our study. An AI system could also support browsing by complementing existing search functions, allowing users to narrow down options without constantly refining search queries [39]. By organising information in ways that adapt to personal needs – such as categorising content to better suit people with language impairments – AI can make browsing more intuitive and accessible. For instance, AI can analyse webpage structures and highlight relevant sections, offer context-aware suggestions, and enable voice or gesture-based navigation to reduce cognitive and physical load.

However, there are caveats. Current models often have accuracy issues and lack awareness of specific disabilities or individual user contexts. Simply deploying off-the-shelf AI, as we did, may not address the nuanced needs of someone with aphasia. In fact, indiscriminate use of AI could even undermine accessibility; omitting a key detail or providing false information that the listener with aphasia would struggle to infer later.

Most models have knowledge boundaries, beyond which they tend to produce confident falsehoods and struggle to gauge their own uncertainty, especially on long-tail, domain-specific topics [35]. Current LLMs show limited understanding of disability-oriented interventions, reflecting a bias towards dominant medical perspectives rather than the lived experiences of people with disabilities [86]. This gap highlights the difficulty of relying on these models for nuanced, context-sensitive applications. Instead of merely testing how models perform under constrained scenarios, future efforts should focus on deeply researching and tailoring LLM-generated solutions for specific communities.

Therefore, we advocate for *born-out* accessibility models [50] – a disability-first AI adaptations. That is, customising LLMs and media-focused AIs to understand aphasia-specific challenges (e.g., needing explicit referents for pronouns, avoiding complex idioms, providing extra turn-taking pauses in audio). There is an exciting opportunity to train models on aphasia-friendly language datasets [21], moving audio accessibility beyond the static support of transcripts, and towards more dynamic, responsive approaches.

6 Limitations

Our cohort was small and purposefully selected within a single charity organisation. We excluded people with the most severe aphasia profiles (ASR = 4). The deployment window was relatively short, so findings likely reflect early adoption. Future work could explore long-term routines, relapses, or abandonment over time. Additionally, we focused exclusively on audio interactions, leaving video and hybrid modalities (e.g., captions over video, picture-in-picture), smart-speaker use, and group-listening contexts unexamined. Finally, the ASR/LLM pipeline that powered multiple of our features (such as the summarisation, read-along, follow up suggestion, and story maps) degraded on noisy, atypical, or domain-specific inputs, and we did not systematically audit errors or hallucinations. Incorporating longer deployments, broader content and modalities, more severe communication profiles, and paired behavioural-clinical evaluation with formal model audits would strengthen future work.

7 Conclusion

This in situ deployment demonstrates that enhancing audio accessibility for individuals with aphasia primarily depends on the appropriateness of fit and customisation, rather than the mere breadth of features. Lightweight, convenient supports that could be easily invoked, reversed, and combined facilitated participants' initiation of listening, sustained orientation, and completion of recognisable and relevant audio episodes. Conversely, when topical relevance was low, refinements to the interface alone were insufficient to maintain engagement. The benefits extended beyond individual use; improved clarity of information access also enhanced participation in everyday conversations. Several design and research implications emerge from these findings. Assistance mechanisms should remain proximate to the audio source, be introduced progressively, and be configurable to accommodate diverse user profiles rather than relying on a single homogeneous 'accessible mode'. Information related to the audio, such as segment structures, previews, and summaries, should be considered integral design elements. Although automatic speech recognition and LLM pipelines expand the potential scope of support, they necessitate disability-centred curation and continuous auditing to mitigate the risk of confidently presented errors during critical moments. Future research should assess the durability of these interventions through extended deployments, broaden the scope to encompass a wider array of media and modalities, include individuals with more severe profiles, and correlate use data with both clinical assessments and lived experience outcomes.

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