

How Is AI Being Used Across Communication Disorders?

A Review of the Research

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Today's Roadmap



Why This Study?

The growing AI landscape in communication disorders



How We Did It

Scoping review, keyword extraction, & network analysis



What We Found

Results across five disorder areas with key entry points



What It Means

Clinical implications, future directions, & open resources



Q & A

Open discussion



Why This Study?

The Growing AI Landscape in Communication Disorders

The Landscape Is Changing

AI technologies — from machine learning to large language models — are increasingly shaping how we assess, diagnose, and treat communication disorders.

Researchers from computer science and engineering are contributing alongside SLPs, creating a truly multidisciplinary research landscape.

Yet this literature is scattered across clinical journals and CS conference proceedings, making it hard to see the full picture.

The Gap We're Addressing

For Clinicians

Literature is scattered across venues with different terminology, accessibility, and research conventions — hard to find relevant AI tools.

For Researchers

Disciplinary boundaries between CS and SLP communities may limit collaboration and slow translational progress.

For Educators

No comprehensive map exists to help prepare students for an increasingly AI-informed clinical field.

Study Aims

1 Map the Landscape

Provide a comprehensive map of AI research across five major communication disorder areas, increasing mutual visibility of work in CS and non-CS venues to facilitate interdisciplinary collaboration.

2 Identify Entry Points

Using network science measures, identify publications that are densely connected to many other studies — serving as effective entry points for clinicians, researchers, and educators.



How We Did It

Scoping Review, Keyword Extraction, & Network Analysis

Study Design & Paper Selection

PRISMA-ScR Methodology

Search Strategy

Databases: Omni (Scopus, PubMed, ProQuest, Springer Nature, IEEE), ACL Anthology, ISCA Archive (Interspeech)

Time range: 2010–2025

Key search terms combined AI terms (machine learning, deep learning, NLP, LLMs, ASR) with disorder terms (aphasia, dysarthria, apraxia of speech, stuttering, dysphagia, voice disorders)

Eligibility (PCC Framework)

Population: Individuals with communication disorders

Concept: AI methodologies (ML, DL, ASR, NLP, neural networks, LLMs)

Context: Clinical, educational, or research settings relevant to SLP

Screening & Classification

3,619

Records Identified



Dedup + Screen

1,173

Articles Retained

Two independent reviewers screened titles and abstracts; discrepancies resolved through discussion with a third reviewer.

Classified Into Five Disorder Areas

n = 158

Language Disorders
(Aphasia)

n = 401

Motor Speech Disorders
(Dysarthria, Apraxia)

n = 138

Fluency Disorders
(Stuttering)

n = 216

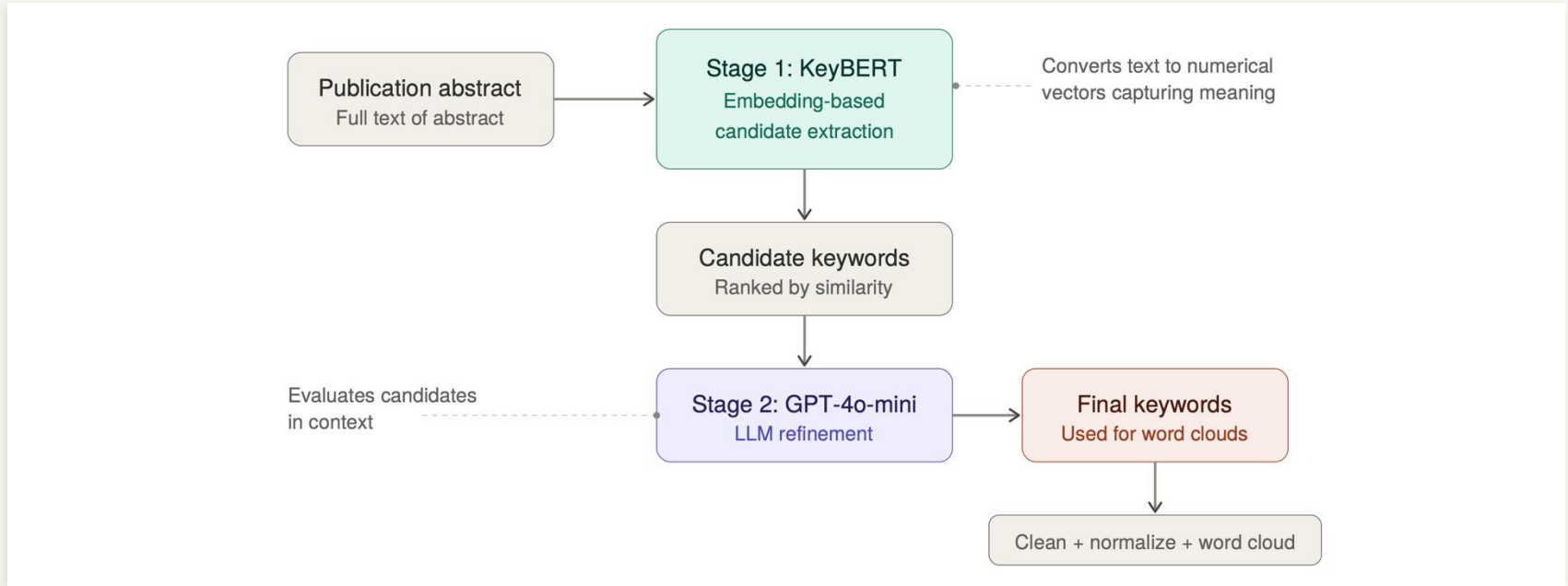
Swallowing Disorders
(Dysphagia)

n = 260

Voice Disorders

Analysis: Keyword Extraction

Two-stage pipeline to extract meaningful research themes from abstracts

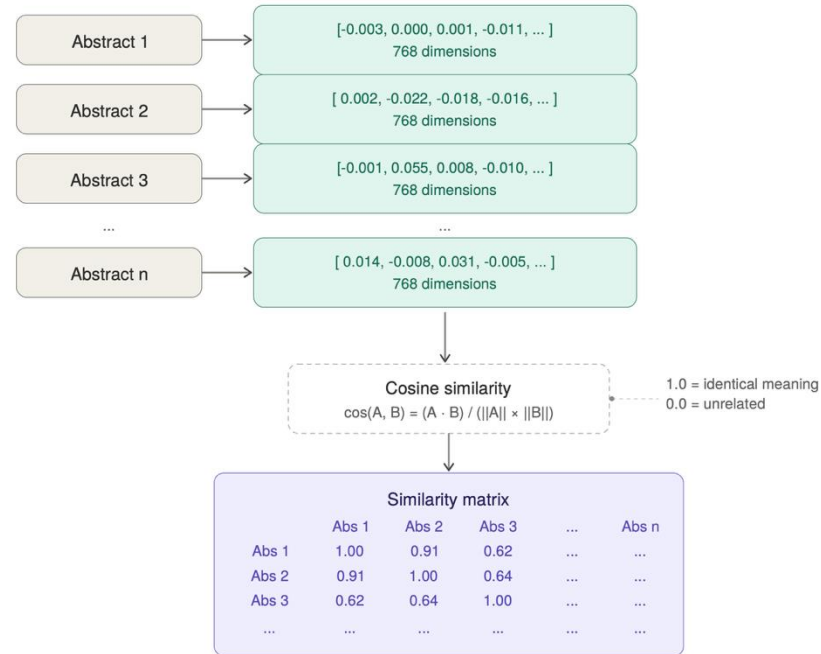


Stage 1: KeyBERT extracts embedding-based candidate keywords → Stage 2: GPT-4o-mini refines candidates in context

Analysis: Semantic Network Construction

- 1 Embed** Each abstract → 768-dim vector capturing its meaning (all-mpnet-base-v2)
- 2 Compare** Cosine similarity between all pairs of abstracts → similarity matrix
- 3 Filter** TMFG method removes weak connections → keeps only strongest links
- 4 Cluster** Leiden algorithm detects communities of thematically related publications
- 5 Identify** Highest-degree node in each cluster → recommended entry point

How It Works: From Abstracts to Networks



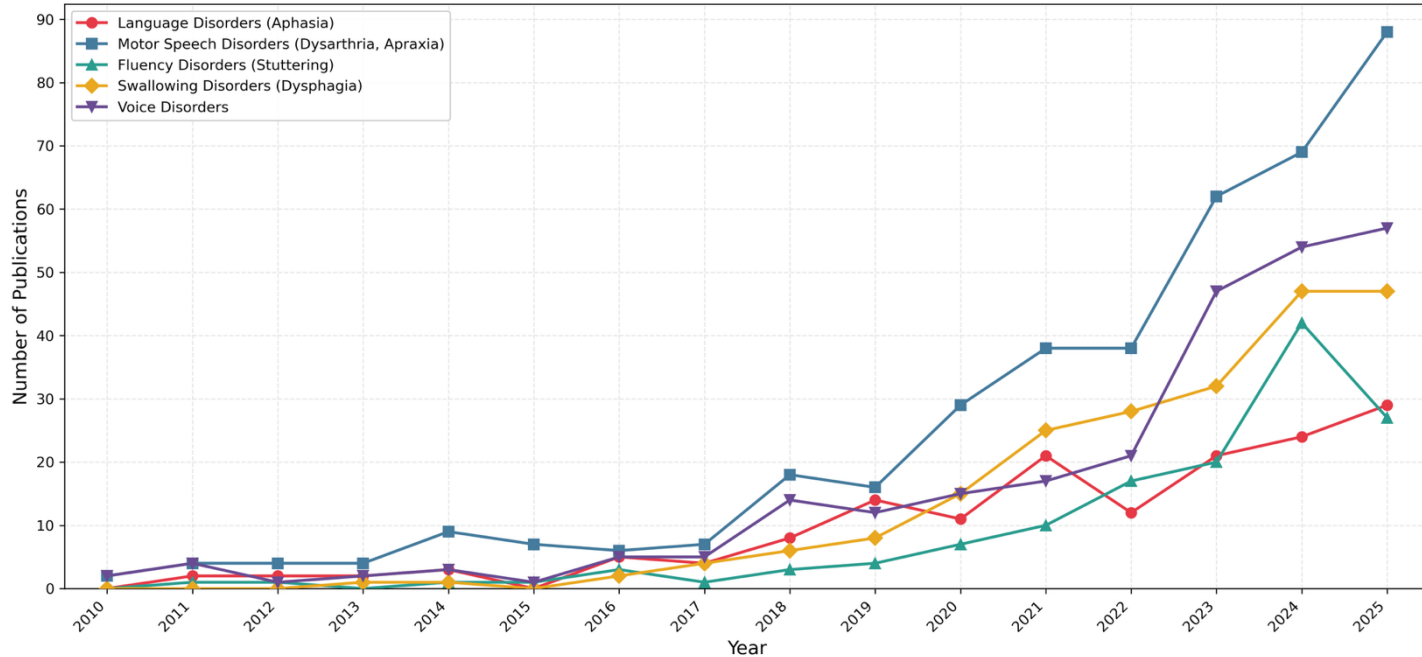


What We Found

Results Across Five Disorder Areas

Publication Trends (2010–2025)

AI in Communication Disorders: Publication Trends (2010-2025)



What the Trends Tell Us

Explosive Growth Since 2018

All five areas show a sharp uptick, coinciding with the deep learning revolution and transformer architectures.

Motor Speech Leads

Consistently the largest share of publications (n=401), driven by ASR and intelligibility enhancement research.

All Areas at Their Peak

By 2025, every disorder area reached its highest-ever annual publication count — the field is accelerating.

Language Disorders (Aphasia)

158 publications · 6 community clusters identified

Language Disorders (Aphasia): Key Entry Points

Highest-degree publication per community cluster — recommended starting points for exploring each research theme

Cluster	Publication	Year	Degree
1	Generative AI applied to AAC for aphasia: a pilot study of Aphasia-GPT	2025	21
2	Part of Speech Production in Patients With Primary Progressive Aphasia: An Analysis Based on NLP	2021	18
3	NUVA: A Naming Utterance Verifier for Aphasia Treatment	2021	13
4	Towards automatic assessment of aphasia speech using ASR techniques	2016	16
5	Machine learning-based multimodal prediction of language outcomes in chronic aphasia	2021	16
6	Predicting Severity in People with Aphasia: An NLP and ML Approach	2021	17

Motor Speech Disorders (Dysarthria, Apraxia)

401 publications · 13 community clusters identified

Motor Speech Disorders (Dysarthria, Apraxia): Key Entry Points

Highest-degree publication per community cluster — recommended starting points for exploring each research theme

Cluster	Publication	Year	Degree
1	Fine-tuning Parakeet-TDT for Dysarthric Speech Recognition	2025	13
2	End-to-End Speech Recognition Using Model Adaptation for Dysarthric Speakers	2020	30
3	Enhancing Dysarthria Diagnosis With Deep Learning Techniques	2024	36
7	Perceptual disturbances in dysarthric speech and ASR performance	2016	22
8	Efficacy of Current Dysarthric Speech Recognition Techniques	2023	33
11	An Investigation to Identify Optimal Setup for Automated Assessment of Dysarthric Intelligibility using Deep Learning Technologies	2023	16

Fluency Disorders (Stuttering)

138 publications · 7 community clusters identified

Fluency Disorders (Stuttering): Key Entry Points

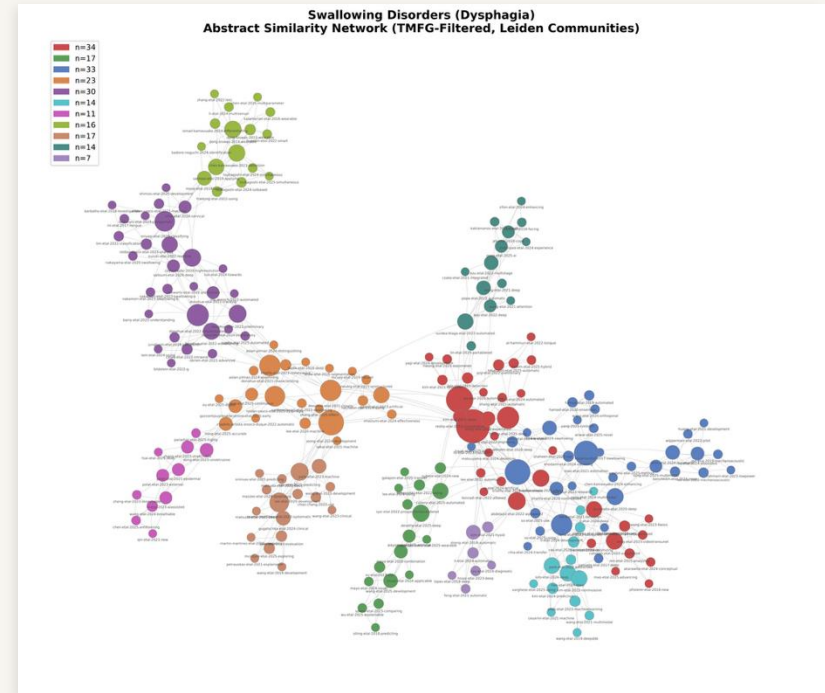
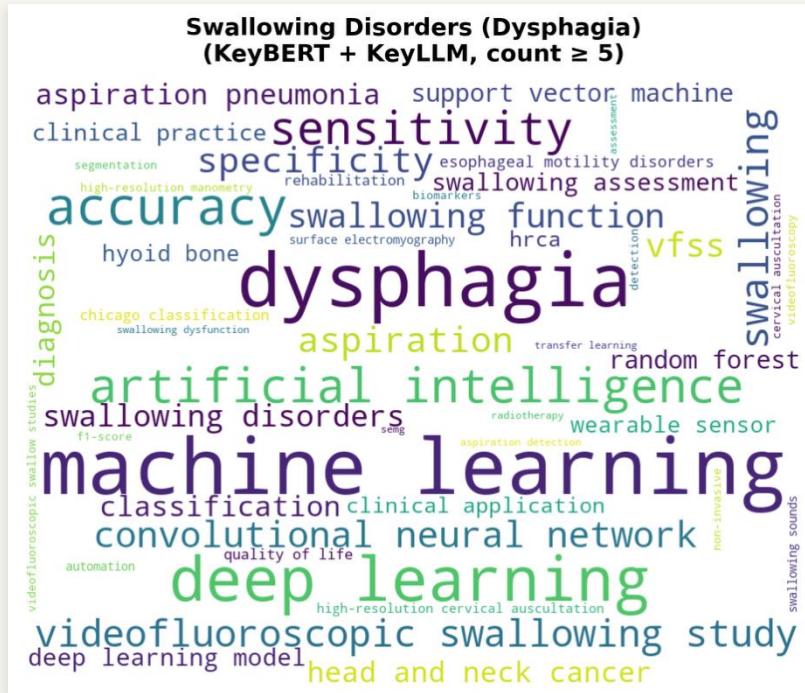
Highest-degree publication per community cluster — recommended starting points for exploring each research theme

Cluster	Publication	Year	Degree
2	Daily Monitoring of Speech Impairment for Early Parkinson's Disease Detection	2023	10
3	StutterNet: Stuttering Detection Using Time Delay Neural Network	2021	17
4	Evaluative comparison of ML algorithms for stutter detection and classification	2024	22
6	Towards Fair and Inclusive Speech Recognition for Stuttering (Chinese dataset)	2024	17
7	Automated Dynamic Stuttered Speech Recognition System using Mel Filter & Enhanced LR Model	2024	26

Swallowing Disorders (Dysphagia)

216 publications · 11 community clusters identified

Swallowing Disorders (Dysphagia): Research Themes & Network



Swallowing Disorders (Dysphagia): Key Entry Points

Highest-degree publication per community cluster — recommended starting points for exploring each research theme

Cluster	Publication	Year	Degree
1	Deep learning-based video analysis for detecting penetration/aspiration in VFSS	2025	26
3	Autonomous Swallow Segment Extraction Using DL in Neck-Sensor Vibratory Signals	2023	19
4	AI Video Analysis-Based Web App to Diagnose Oropharyngeal Dysphagia	2024	19
5	Characterizing Effortful Swallows Using HRCA Signals and MBSImP Scores	2022	16
8	Detection of Fluid Intake Swallowing Events Using Acoustic Signals and Template Matching	2023	11

Voice Disorders

260 publications · 10 community clusters identified

Voice Disorders: Key Entry Points

Highest-degree publication per community cluster — recommended starting points for exploring each research theme

Cluster	Publication	Year	Degree
1	Inter classifier comparison to detect voice pathologies	2021	25
4	Voice Pathology Detection Using CNN and Data Augmentation	2025	24
5	Hierarchical Multi-Class Classification of Voice Disorders Using Self-Supervised Models	2023	39
6	Analytical Study of Speech Pathology Detection Based on MFCC and Deep Neural Networks	2022	35
7	Learning Strategies for Voice Disorder Detection	2019	30
9	Deep Learning for Vocal Fold Disease Prediction Through Voice Recognition	2021	24



What It Means

Clinical Implications & Future Directions

Key Takeaways

AI Research Is Accelerating

All five disorder areas show exponential growth, especially since 2018. This isn't a passing trend — AI is becoming a core part of communication disorders research.

Distinct Thematic Communities

Each disorder area has clearly identifiable clusters of research, from ASR adaptation to wearable sensors to LLM-based tools, revealing the diversity of AI applications.

Entry Points for Engagement

The highest-degree publications in each cluster serve as navigational anchors — start here to efficiently explore an unfamiliar research area.

Bridging CS and Clinical Worlds

Including conference proceedings alongside journal articles reveals significant research contributions that standard clinical reviews miss.

Future Directions

Cross-Disorder Analysis

In-depth exploration comparing thematic patterns, shared methods, and unique challenges across all five disorder areas.

Cluster Deep-Dives

Characterizing each community cluster's focus, tracking its evolution over time, and identifying specific gaps in clinical implementation.

Open Science

All bibliographic records and analysis code will be publicly available upon manuscript submission to support reproducibility.

Full Manuscript

Expanded analysis targeting the Journal of Speech, Language, and Hearing Research (JSLHR).

A Reflexive Note

We used AI methods (embedding models, LLM-based keyword refinement) to map AI research in communication disorders.

This reflexive quality — AI studying itself in our field — highlights both the power of these tools for knowledge synthesis and the importance of understanding their capabilities and limitations.

Our goal: Make this rapidly growing, interdisciplinary field more accessible and navigable for clinicians, researchers, and educators.

Thank You!

Questions & Discussion

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All bibliographic records and analysis code will be publicly available upon manuscript submission.