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Human Communication Disorders: A Scientometrics Study of Publication outputs from Scopus during 2012-2021

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Abstract

Objectives: Analyses were done on the Indian publication outputs on communication disorder (Deafness, Tinnitus, Hearing Disorder/Hearing Loss/Hearing Impairment/Hearing Disability/Hearing Handicap, Central auditory processing disorder, Auditory Neuropathy Spectrum Disorder, Communication Disorder, Language Disorders, Specific Language Disorders, Language Impairment, Speech Impairment, Speech, Speech Sound, Stuttering, Voice, Fluency and Articulation Disorders, Autism, Aphasia and Dysarthria)research during 2012-2021, on several parameters, including contribution and citation impact of the most productive countries, India's overall contribution, its growth pattern, citation impact, the share of international collaboration, identification of the significant

participating countries in India's international collaboration, contribution and impact of different types of communication disorders, productivity and impact of leading Indian institutions and authors, and pattern of communication of Indian output in most productive journals. **Materials and Methods:** The Citation Database has been used to retrieve the data for 10 years (2012-2021) by searching with the keyword 'Hearing Disorder/Hearing Loss/Hearing Impairment/Hearing Disability/Hearing Handicap' in the combined Title, Abstract, and Keywords field. **Results:** The developed countries showing an increase in their publication share are Italy by 0.33%, followed by Switzerland (0.36%), U.K. (0.25%), Australia (0.23%), Canada (0.14%), Austria. (0.09%), Belgium (0.07%), and Greece (0.07%), as against a decrease in Japan by 1.97%, followed by USA (0.51%), France (0.31%), Germany (0.18%), Spain (0.21%), Turkey (0.09%), and Poland (0.06%) from 2009 to 2018. India's global publication share increased from 1.63% in 2009 to 19.41% in 2018. In terms of impact and citation quality, the average citation per article registered by India's publications was 6.78 during 2012-2021. **Conclusion:** High quality research in India is grossly inadequate and requires strategic planning, investment and resource support. There is also a need to improve the existing communication disorder education system, which should foster research culture.

Keywords: Audiology, clinical disorders, communication disorders, research trend, speech and hearing

1. Introduction

For a good communication, certain imperative parameters have to be normal like speech, language and hearing. Speech refers to verbal expression of thought, feelings or ideas using the movements of articulators. The parameters of speech are voice, articulation and fluency and also prosody. The voice is the sound produced by the vibration of vocal folds. The vocal folds are a pair of structures located inside the larynx, voice box in the throat. The parameters of voice are pitch, loudness and quality. For the correct production of each and every sound, the structure inside the mouth such as tongue, soft palate and lips move in a particular pattern and is referred to as articulation. The fluency is defined as the smooth forward flow of speech without any breakdown. The parameters of fluency are rate, continuity and effort.

Hearing, one of the five senses of human being. Speech and language (communication development) are mainly acquired through hearing. Sounds in the environment vary in terms of loudness and pitch. Squirrels and Giraffe produce high and low frequency (pitch) sounds, respectively. Likewise, females and males produce high and low pitch voice, respectively. Our human ears are capable of hearing sounds varying between 15 Hz to 20,000 Hz. Above these frequencies of sounds are called as ultra sounds and below the 15 Hz sounds are called infra- sounds where our human ears are not sensitive enough to perceive them.

2. Literature Review

Hugar (2019) analyzed the scientific publications of the University of Goa that appear in the Scopus database for the period 2008 to 2017. In this study, there were a total of 1218 articles, of which 497

articles with international collaborations are chosen for analysis. The study found that the majority of 315 (25.86%) publications are listed under the selected categories belong to Chemistry subjects. Author also observed that the relative growth rate of total research output is decreased gradually and mentioned that SJR and the h-index are the highest for the magazine "Fungal Variety".

Suresh, N., and Thauskodi, S., (2019) explored the research productivity of ICAR-IIHR, Bangalore for the period 1989-2018 using the Scopus database for collecting the data. The study identified 1095 research publications. Document type "Journal article" is the highest with 90.13%. IIHR researchers mostly preferred to publish their work in Indian journals. USA has gained top position for collaboration with IIHR.

Senthil Kumar,N., Radhakrishnan,N., Hadimani, Nagesh, Prabahar,P., (2018) have investigated the research performance of CSIR-CECRI, Karaikudi for the period 2010-2015 and retrieved 650 articles using Scopus database. The highest number of publications was noticed in the year of 2011 with 131 papers. South Korea was the top country to have collaborated with CECRI by its contribution with 36 (5.5%) followed by the USA with 17 (2.62%) and Japan with 16 (2.46%). The study analyzed year-wise publications, document type, subject-wise distributions, highly cited articles and most favored authors as well.

Kumar, Satish (2018) evaluated the research productivity of ARIES, Nainital. The study focused on 574 research papers which were published during 2001-2015 using the Scopus data. 510 research publications were found to be refereed papers out of 574 and the remaining were conferences, symposiums and bulletins etc. Further, the study analyzed active authors, citations, H-index and collaborating institutions.

3. Objectives

The main objective of this study is to analyze the communication disorder research output in India during 2012-2021. The study has the following objectives:

1. To study the contribution and citation impact of 20 of the most productive countries,
2. To study India's overall contribution, its growth pattern, and citation impact,
3. To study the share of international collaboration in India's overall research output and the identification and contribution of leading countries,
4. To study the Indian contribution and impact of different types of Hearing Disorder/Hearing Loss/Hearing Impairment/Hearing Disability/Hearing Handicap by subfields and by different age groups,
5. To study the productivity and impact of leading Indian institutions and authors, and
6. To study the pattern of communication of the Indian output in the most productive journals.

4. Materials and Methods

This study used the Scopus International Database to extract relevant data on the Communication disorder research of the world and other 20 most productive countries, for a period of 10 years (2012-2021). An advanced search strategy, involving 'Hearing Disorder/Hearing Loss/Hearing Impairment/Hearing Disability/Hearing Handicap' as the keyword, was used to search and download data by using the Title, Abstract, and Keywords fields, resulting in the downloading of

5487 records related to the Indian communication disorder research. Separate strategies were developed in terms of keywords for identifying different types of communication disorder diseases, communication disorder research outputs by subfields, and by different age groups. For analyzing significant institutions and authors, separate search strategies were developed, which later combined with the main string to lead to the generation of the desired output.

5. Experimental Results

5.1 Global Publication Share and Rank

The global publication share of the top 20 most productive countries in communication disorder research varies from 1.24 to 28.46% during 2012-2021. The United States tops the list, with a publication share of 28.46% during 2012-2021. China ranks at the second position with a 14.71% publication share, followed by Japan (12.66% share, third rank), Italy (8.14% share, fourth rank), Germany (7.12% share, fifth rank), U.K. (6.21% share, sixth rank), France (6.14% share, seventh rank), Spain, South Korea, Taiwan, Canada, and India with publication shares ranging from 3.28 to 4.91% and ranking from eighth to twelfth positions. Australia, Turkey, Switzerland, Brazil, Belgium, Greece, Poland, and Austria rank from the thirteenth to twentieth positions, with publication shares ranging from 0.57 to 2.18%. The developed countries showing an increase in their publication share are Italy by 0.33%, followed by Switzerland (0.36%), U.K. (0.25%), Australia (0.23%), Canada (0.14%), Austria. (0.09%), Belgium (0.07%), and Greece (0.07%), as against a decrease in Japan by 1.97%, followed by USA (0.51%), France (0.31%), Germany (0.18%), Spain (0.21%), Turkey (0.09%), and Poland (0.06%) from 2009 to 2018.

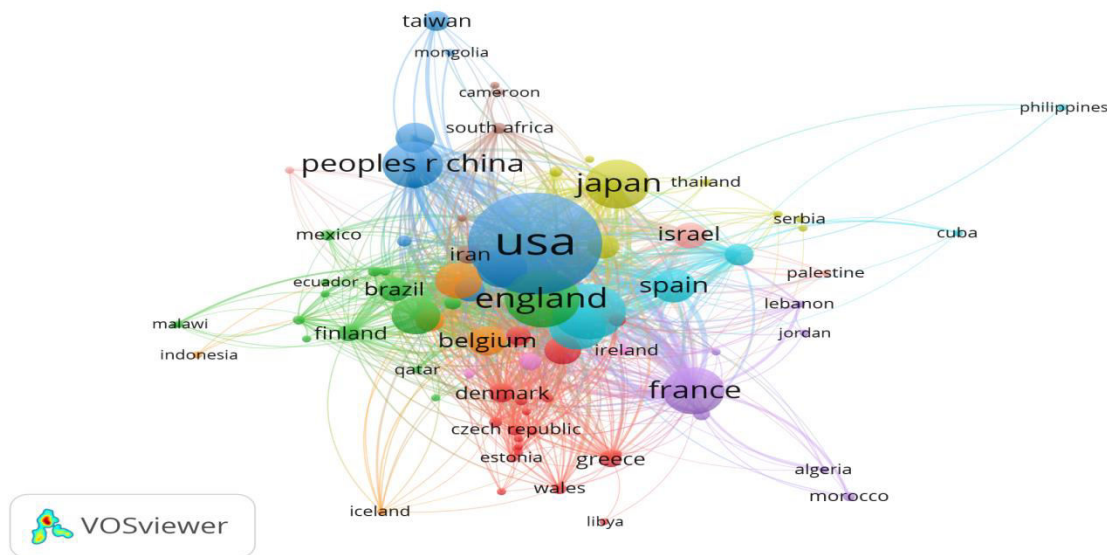


Fig 1. Publication output of Journals using the keywords : Hearing Disorder/Hearing Loss/Hearing Impairment/Hearing Disability/Hearing Handicap

All developing countries on the other hand, have shown a rise in their publication share in communication disorder research: China by 5.84%, followed by South Korea (2.58%), India (0.31%), Brazil (0.14%), and Taiwan (0.10%) from 2009 to 2018.

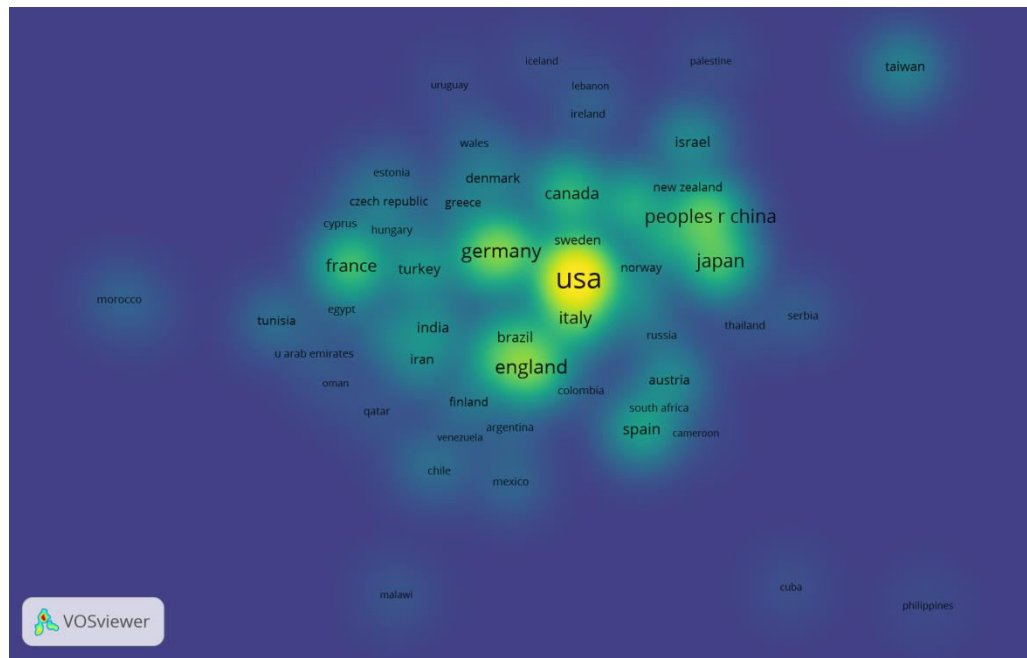


Fig 2. Visualization output of Countries using the keywords : Hearing Disorder/Hearing Loss/Hearing Impairment/Hearing Disability/Hearing Handicap

India ranks may be last rank compare to another important country among the most productive countries in communication disorder research, with its global publication share of 3.26% during 2012-2021. China, South Korea, Taiwan, and Brazil rank second, ninth, tenth, and sixteenth, with global publication shares of 12.17, 4.25, 3.58, and 1.46%, respectively, during 2012-2021. India's global publication share increased from 0.86 to 0.99%, compared to China.

5.2 India's Publication Output in Communication Disorder Research

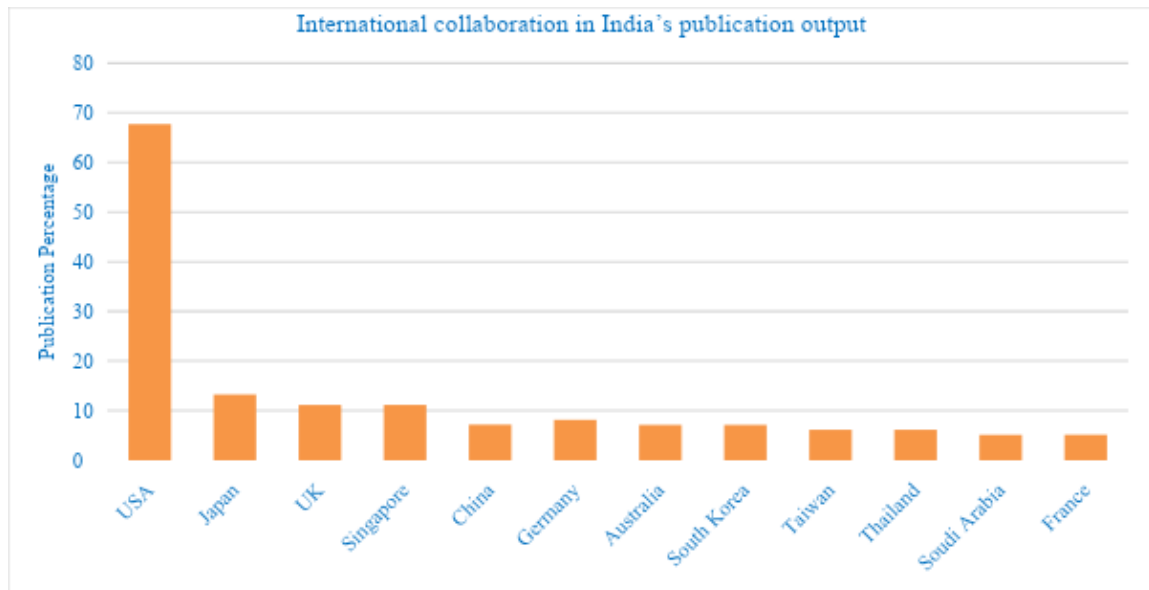
The world cumulative publication output in communication disorder consists of 1,21,623 articles during 2012-2021, increasing from 5254 articles in 2009 to 22,256 articles in 2012, witnessing an annual average growth rate of 9.97%. India's cumulative publication output in communication disorder consists of 5780 articles, accounting for 3.74% of the share in the global publication output, during 2012-2021. It increased from 510 articles in 2009 to 8778 articles in 2012, with an average number of articles per year at 438, and an annual average growth rate of 14.12%. The cumulative publication output of India in communication disorder research increased from 438 articles during 2009-2008 to 4526 articles during 2009-2012, witnessing a growth of 75.24%. India's global publication share increased from 1.63% in 2009 to 19.41% in 2018. In terms of impact and citation quality, the average citation per article registered by India's publications was 6.78 during 2012-2021.

5.3 International collaboration in India's publication output

The total number of Indian articles on communication disorder involving international collaboration during 2009-2008 was 865, which accounted for a 12.25% share in the cumulative publication output of India in research. The share of India's international collaborative publications increased from 13.15% during 2009-2008 to 16.84% during 2012-2021.

Table 1: International collaboration in India's publication output

S.No	Country	Percentage
1.	USA	67.75%
2.	Japan	13.25%
3.	UK	11.14% (share)
4.	Singapore	11.15%
5.	China	7.18% (share)
6.	Germany	8.14% (share)
7.	Australia	7.12%
8.	South Korea	7.12%
9.	Taiwan	6.14%
10.	Thailand	6.14%
11.	Soudi Arabia	5.12%
12.	France	5.14%



Among the major Indian international collaborators, 18 countries have published 10 or more collaborative articles with India during 2012-2021. United States was the major collaborating partner for India during 2009-2008, accounting for a 67.75% share of the total collaborative publications, followed by Japan (with 13.25% share), U.K.(11.14% share), Singapore (11.15% share), China (7.18% share), Germany (8.14%), Australia and South Korea (7.12% each), Taiwan and Thailand (6.14% each), Saudi Arabia (5.12%), France (5.14%), and other countries between 1.75 and 4.15%.

Table 2: International collaboration in Global publication output

S.No	Country	Percentage
1.	USA	67.75
2.	Japan	5.76
3.	UK	1.32
4.	Singapore	5.32

5.	China	2.75
6.	Germany	4.45
7.	Australia	2.65
8.	South Korea	4.76
9.	Taiwan	1.28
10.	Thailand	3.36
11.	Soudi Arabia	2.15
12.	France	3.56
13.	Spain	4.89
14.	Belgium	3.56
15.	Malaysia	1.43
16.	Philippines	4.45
17.	Pakistan	2.25
18.	Canada	2.55

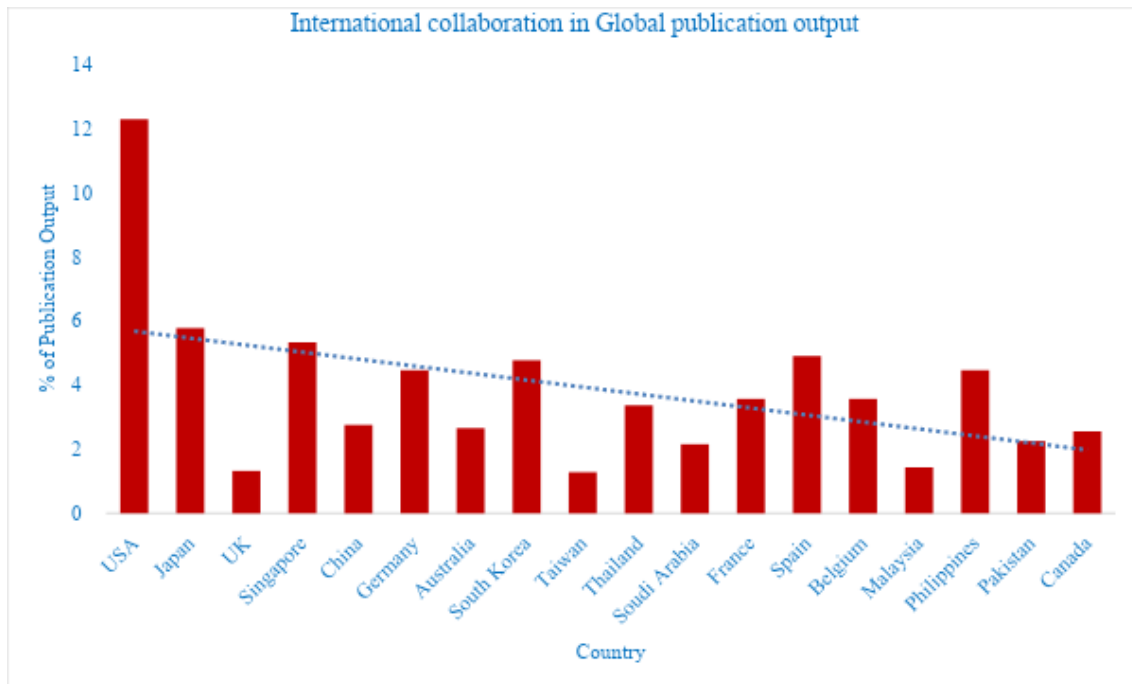


Fig. International collaboration in Global publication output

Among the 18 collaborating countries, the publication share has increased by 5.32% in Singapore, followed by Japan (5.76%), Spain (4.89%), South Korea (4.76%), Belgium (3.56%), France (3.56%), Australia (2.65%), Saudi Arabia (2.15%), Canada (2.55%), Malaysia (1.43%), UK (1.32%), and Taiwan (1.28%), as against a decrease in United States by 10.45% followed by Philippines (4.45%), Germany (4.45%), Thailand (3.36%), Pakistan (2.25%), and China (2.75%) from 2003-2007 to 2008-2012.

5.4 Indian Research Output by Different Types of Communication Disorder

Among the various types of communication disorders in India, the largest number of articles was on viral hepatitis (1286 articles, 54.03% publication share), followed by communication

disorder(729 articles, 30.63% share), fatty communication disorder (496 articles, 20.84% share), autoimmune disorder (106 articles, 4.45%), and genetic communication disorder (129 articles, 5.42% share). In terms of citation impact per article, the largest impact (5.69) was made by fatty communication disorder, followed by viral hepatitis (4.95), genetic communication disorder (4.47), communication parts disorder (4.40), and autoimmune disorder (4.40).

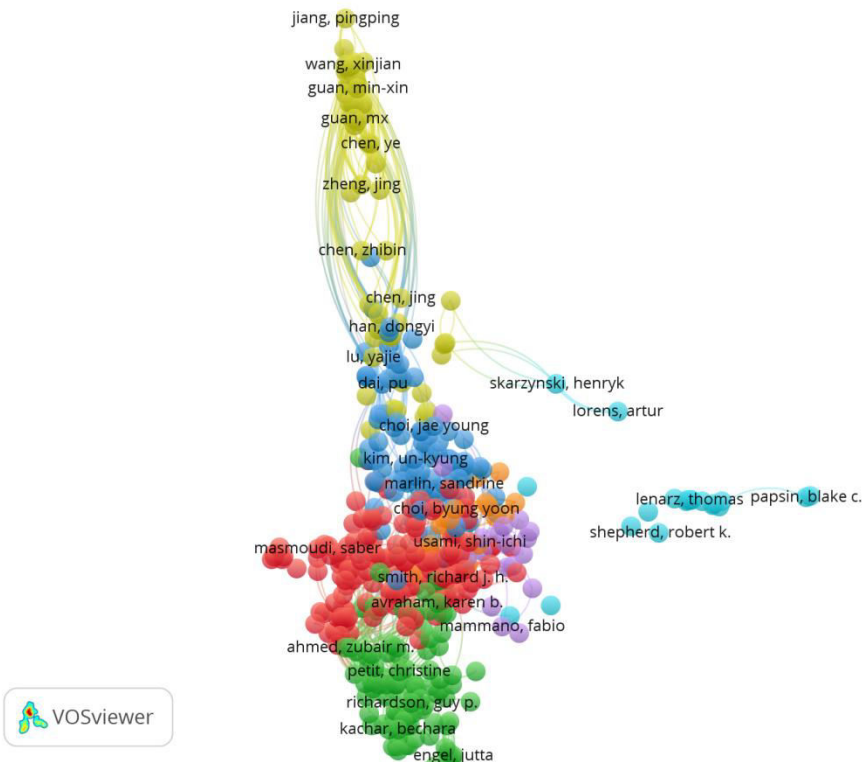


Fig 4: Publication output of Journals using the keywords : Hearing Disorder/Hearing Loss/Hearing Impairment/Hearing Disability/Hearing Handicap

Among autoimmune communication disorders, the largest emphasis was on Central auditory processing disorder (70 articles), followed by Tinnitus (15 articles), and Auditory neuropathy spectrum disorder (five articles). Among genetic communication disorders, the largest emphasis was on Stuttering disease (73 articles), followed by Autism disease (30 articles), Aphasia (23 articles), Dysarthria (eight articles) and alpha 1 antitrypsin deficiency (seven articles).

6. Discussion

The average citation impact per article registered by the Indian publications in communication disorders research was 5.12 during 2012-2021, which has decreased from 8.43 during 2009-2012 to 5.85 during 2013-2018. India is ranked in the twelfth position among the top 20 most productive countries in communication disorder research, with communication disorder suffer from chronic communication problems need recurrent hospitalization and prolonged medical attention. Moreover, increasing poverty coupled with lack of education and awareness prevents people from seeking medical advice until it is too late. In addition, the high cost of treatment causes major obstacles in convincing people about taking treatment. Control strategies must include development of mass awareness programs, development of universal guidelines for immunization, and hygienic life, which

can reduce the communication disease burden substantially in our country. There is a growing need for the government of India to focus on promoting partnerships, mobilizing resources, evidence-based policy, data for action, prevention of transmission, introduction of universal HBV vaccination, free testing and government funding for communication disorder transplantation. Besides this, there is a need to undertake more R and D, develop trained manpower at different levels, and create sufficient infrastructure to handle the problems associated with communication disorder.

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