

Article: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9023650/>

- The paper introduces the Objective Hypernasality Measure (OHM) for assessing hypernasality in children with cleft palate.
- It highlights the challenge of extensive perceptual training required for clinicians to evaluate hypernasality, especially on a large scale internationally.
- The OHM is a speech-based algorithm trained on healthy speech data using a deep neural network.
- Validation against clinician ratings shows significant correlation with perceptual hypernasality ratings.
- The OHM does not require any clinical data for training, making it potentially accessible in regions with limited resources.
- It aims to address health disparities by providing a reliable and objective tool for assessing hypernasality in children with cleft palate, which is crucial for treatment decisions and long-term outcomes.
- The paper discusses the importance of such objective measures in improving diagnosis and treatment, particularly in regions lacking trained clinicians or resources for extensive perceptual training.

Citation:

Mathad, Vikram C. "A Deep Learning Algorithm for Objective Assessment of Hypernasality in Children with Cleft Palate." *National Library of Medicine*, 20 Sept. 2021, [www.ncbi.nlm.nih.gov/pmc/articles/PMC9023650/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9023650/). Accessed 1 Mar. 2024.

Article:

[https://www.researchgate.net/publication/333257990\\_Automatic\\_Hypernasality\\_Detection\\_in\\_Left\\_Palate\\_Speech\\_Using\\_CNN?\\_tp=eyJjb250ZXh0Ijp7InBhZ2UiOiJwdWJsaWNhdGlvbiIsInByZXZpb3VzUGFnZSI6bnVsbH19](https://www.researchgate.net/publication/333257990_Automatic_Hypernasality_Detection_in_Left_Palate_Speech_Using_CNN?_tp=eyJjb250ZXh0Ijp7InBhZ2UiOiJwdWJsaWNhdGlvbiIsInByZXZpb3VzUGFnZSI6bnVsbH19)

- The paper presents an algorithm using a Convolutional Neural Network (CNN) to detect hypernasality in cleft palate speech, aiming to facilitate diagnosis by speech-language pathologists.
- It achieves high average F1-scores for hypernasality detection in both children's and adults' speech datasets.
- The algorithm utilizes speech spectrograms as input, exploring the influence of spectral resolution on hypernasality detection performance.
- CNN learns efficient features via two-dimensional filtering, outperforming shallow classifiers and achieving the highest F1-score.
- Results show that a convolutional filter of size  $1 \times 8$  achieves the best hypernasality detection performance compared to other filter sizes.

- The vowel /i/ is identified as the most sensitive to hypernasality.
- The CNN-based system demonstrates better detection performance compared to existing literature, handling speech variability effectively.
- Deep learning, particularly CNN, offers automatic feature learning capabilities, eliminating the need for manual feature engineering and addressing challenges in speech signal processing caused by variability among speakers and nonstationary noise parameters.

Citation:

Wang, Xiyue, et al. "Automatic Hypernasality Detection in Cleft Palate Speech

Using CNN." *ResearchGate*, 2019, [www.researchgate.net/publication/](http://www.researchgate.net/publication/333257990_Automatic_Hypernasality_Detection_in_Cleft_Palate_Speech_Using_CNN?_tp=)

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eyJjb250ZXh0Ijp7InBhZ2UiOiJwdWJsaWNhdGlvbilIsInByZXZpb3VzUGFnZSI6bnVsbH19.

Article: <https://link.springer.com/article/10.1007/s11042-023-14913-0>

- Speech impairment encompasses various disorders, ranging from mild to severe, affecting the fluency and articulation of speech.
- Childhood apraxia of speech (CAS) is identified as the most common speech disorder in children globally, affecting 1 out of 12 children.
- Advances in speech assessment tools have become crucial for diagnosing speech impairments, gaining popularity among pediatricians and teachers working with preschoolers.
- Automatic speech tools are noted to be more accurate in detecting speech sound disorders (SSD) compared to human-based assessment methods.
- A systematic literature review covering 88 studies and more than 500 children from over 10 countries discusses state-of-the-art assessment methods for speech-impaired children.
- Notable outcomes in detecting speech impairments using various assessment methods are summarized, along with discussions on limitations such as universality, reliability, and validity.
- Challenges and future directions for research in speech impairment assessment tools are considered, aiming to provide a foundation for subsequent studies.
- Various speech disorders are outlined, including language speech impairment (LSI) and speech sound disorders (SSD), which can affect children's language development and social interactions.
- Cultural and linguistic competency among speech-language pathologists (SLPs) is highlighted as essential for effective patient service, especially in diverse demographic contexts.
- The rising prevalence of speech and language impairments in children indicates a growing need for efficient and cost-effective treatment methods.

- Conditions such as cleft palate lip and tongue-tie are identified as common causes of speech difficulties in children, requiring speech and language therapy.
- Perceptual measures and systematic speech pathology assessment tools play crucial roles in evaluating speech impairments and predicting intervention outcomes.
- The systematic literature review aims to establish current trends and findings in the domain of speech impairment detection tools, focusing on educational relevance.

Citation:

Usha, G.P., Alex, J.S.R. Speech assessment tool methods for speech impaired children: a systematic literature review on the state-of-the-art in Speech impairment analysis. *Multimed Tools Appl* 82, 35021–35058 (2023).  
<https://doi.org/10.1007/s11042-023-14913-0>