

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,

Petitioner,

v.

JAWBONE INNOVATIONS, LLC,

Patent Owner.

Case IPR2022-01027

Patent No. 8,467,543

Declaration of Shauna L. Wiest Regarding *Stevens*

I, Shauna L. Wiest, state and declare as follows:

I. Introduction

1. I have prepared this Declaration in connection with the Petition for *Inter Partes* Review of U.S. Patent No. 8,467,543, which I understand will be filed concurrently with this Declaration.

2. I am currently a senior research analyst with the Research & Information Services team at Finnegan, Henderson, Farabow, Garrett & Dunner LLP, located at 901 New York Avenue, NW, Washington, DC 20001-4413.

3. I am over eighteen years of age, and I am competent to make this Declaration. I make this Declaration based on my own personal knowledge, and my knowledge of library science practices.

4. I earned a Master of Science in Library Science from the University of North Carolina at Chapel Hill in 1999, and a Bachelor of Arts in Political Science from the University of California at San Diego in 1989. I have worked as a law librarian for over twenty years. I have been employed in the Research & Information Services Department at Finnegan, Henderson, Farabow, Garrett & Dunner LLP since 2021. Before that, from 2000-2015, I was employed as a Law Librarian at Stoel Rives LLP, and from 2015-2016, I was employed as a Competitive Intelligence Specialist for Nossaman LLP.

II. Standard Library Practice for Receiving, Cataloging, and Making Materials, Including Serial Publications, Publicly Available

5. I have knowledge of and experience with standard library practices regarding the receipt, cataloging, shelving, and making materials, including serial publications, available to the public. I have knowledge of and experience with the Machine-Readable Cataloging (MARC) system, an industry-wide standard that libraries use to catalog materials.

6. The MARC system was developed during the 1960s to standardize bibliographic records so they could be read by computers and shared among libraries. By the mid-1970s, MARC had become the international standard for bibliographic data and cataloging. It still used today. Many libraries provide public access to their MARC records via the Internet and/or their electronic cataloging systems at the library.

III. Serial Publications

7. A serial publication, often known as a “journal,” is a resource that is issued in successive parts and has no predetermined conclusion. These successive parts are commonly referred to as “issues,” and each issue is usually chronologically numbered and dated. The presence of enumeration, years of coverage, and/or other chronological information also indicates a serial publication.

8. There are significant differences between cataloging finite resources (books/monographs) and continuing resources (serials). For serials, the catalog record

provides information about the serial-as-a-whole, including the first or earliest available issue. It also provides information as to holdings – the volumes and issues, with dates, received by the library and made available to the public. In serials cataloging, there are identifying characteristics unique to serials that are slightly different from monographs (books). The issue date for a print serial publication, for example, generally appears on the cover (front or back), the masthead page, the title page (if any), the table of contents page(s), or on the pages of the individual articles contained in the issue. More information regarding the unique aspects of cataloguing serials can be found at this link: <https://www.loc.gov/aba/pcc/conser/scctppt/Basic-2014/Basic-Trainee-Mannual.pdf>

IV. MARC Records

9. The MARC record system uses a specific three-digit numeric code (from 001-999) to identify each field in a catalog record. For example, field tag 008 provides the six-digit date the item was cataloged (*Date entered on file*). The first six characters of field tag 008 are always in the “**YYMMDD**” format. Field tag 245 identifies the full title statement for the work; field tag 260 identifies the place of publication, name of publisher, and copyright date of the publication; and field tag 310 denotes the current frequency of the publication. Field tag 362 identifies the numbering to be used for chronological cataloguing of individual issues of continuing resources (serials). The designations within field tag 362 determine at what point in time the serial began, which guides how issues are checked in, processed, and added to the library’s main

collection. Finally, the 9XX field tags are available for local holdings information, according to various descriptions by local systems, system vendors, MARC service providers, etc.

10. Based on standard library practice, when a library receives an item, it stamps the item with the library name and often with a date that is within a few days or weeks of receipt. Next, the library will catalog the item within a matter of a few days or weeks of receiving it.

11. Generally, after an item is cataloged, the public may access the item by searching a catalog, browsing the shelves, and either requesting or electronically accessing the item from the library. Standard library practice is to make the item available to the public within a few days or weeks of cataloging it.

V. Print Holdings and MARC Record for *Stevens*

12. This Declaration relates to the dates of receipt and public availability of the following: K.N. Stevens, K.N. Kalikow, T.R. Willemain, “*A Miniature Accelerometer For Detecting Glottal Waveforms and Nasalization*,” *Journal of Speech and Hearing Research*, September 1975, Vol. 18 (No. 3) 594-599. (“*Stevens*”). Exhibit 1008 to the concurrently filed Petition is a true and accurate copy of *Stevens*.

13. **Appendix A** to this declaration is a true and accurate copy of the print journal cover, front matter, table of contents, and library date stamp for the issue of *Journal of Speech and Hearing Research* containing *Stevens*, held by The Ohio State

University Library. Appendix A also includes pages 594-599 containing the article entitled “*A Miniature Accelerometer For Detecting Glottal Waveforms and Nasalization,*” (*Stevens*). The date stamp on the front page of Vol. 18 No. 3 indicates that *Stevens* was received by The Ohio State University Library on October 9, 1975.

14. Based on the information in Appendix A, it is clear that the issue of Journal of Speech and Hearing Research containing *Stevens* was received by The Ohio State University Library on or before October 9, 1975. Based on standard library practice, *Stevens* would have been processed and cataloged by The Ohio State University Library within a matter of a few days or weeks of October 9, 1975.

15. Accordingly, *Stevens* would have been made available to the public within a few days or weeks of being checked-in and cataloged. Members of the interested public could have accessed *Stevens* by browsing the Library’s shelves or by searching the Library’s catalog within a few days or weeks of October 9, 1975.

16. **Appendix B** to this declaration is a true and accurate copy of The Ohio State University Library MARC record for its holdings of Journal of Speech and Hearing Research containing *Stevens*, which was downloaded from: <https://library.ohio-state.edu/search~S7?/.b1242306/.b1242306/1%2C1%2C1%2CB/marc~b1242306> on May 16, 2022.

17. **Appendix C** to this declaration is a true and correct copy of The Ohio State University Library public catalog record for its copy of Journal of Speech and

Hearing Research containing *Stevens*, including holdings and location information, which was downloaded from: <https://library.ohio-state.edu/record=b1242306~S7> on May 16, 2022.

18. The Ohio State University Library MARC record (**Appendix B**) for Journal of Speech and Hearing Research containing *Stevens* confirms the fixed data elements of MARC field tag 008 as 751101d19581996dcubrp0a0engd. As discussed above, the first six characters “751101” are in typical “**YYMMDD**” format and indicate that the Journal of Speech and Hearing Research was initially cataloged by The Ohio State University Library on November 1, 1975. The publication status code “d” along with the dates immediately following the status code appearing in MARC field tag 008 refers to “continuing resource ceased publication” indicating that the Journal of Speech and Hearing Research began publication in 1958 and ceased publication in 1996.

19. The Ohio State University Library MARC record field tag 245 denotes the title and statement of responsibility for the work as “Journal of speech and hearing research :|ba publication of the American Speech and Hearing Association Neurology.”

20. The Ohio State University Library MARC record field tag 362 provides a chronological designation of the issues comprising Journal of Speech and Hearing Research. In this MARC record for Journal of Speech and Hearing Research, the

sequential serial designation begins with: Vol. 1, in Mar. 1958; and ceased with Vol. 39, no. 6 in Dec. 1996.

21. Finally, The Ohio State University Library MARC record field tag 910 identifies the holdings, location, and call number for its print copy of Journal of Speech and Hearing Research. The MARC record lists the location as Thompson Library Bound Journals, the holdings as v.1(1958)-v.39(1996), and the call number as QP306A1J6. This information confirms that the print issue of Journal of Speech and Hearing Research containing *Stevens* is publicly available and held in the Thompson Library Bound Journals at Call Number QP306A1J6.

22. The Ohio State University Library's public catalog record for Journal of Speech and Hearing Research (**Appendix C**) sets forth the holdings and onsite location information for members of the public seeking the print issue containing *Stevens*. The public catalog record indicates that the print issue containing *Stevens* is located in the Thompson Library Bound Journals 3rd Floor at Call Number QP306.A1 J6 v.18 1975.

23. Based on this evidence, it is my opinion that Exhibit 1008 is an authentic document, which would have been made publicly available and publicly accessible within a few days or weeks of October 9, 1975.

VI. Conclusion

24. In signing this Declaration, I understand it will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I understand I may be subject to cross-examination

in this case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

25. I declare that all statements made herein of my knowledge are true, that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on May 17, 2022, in Washington, DC.

A handwritten signature in black ink, appearing to read "Shauna L. Wiest", written over a horizontal blue line.

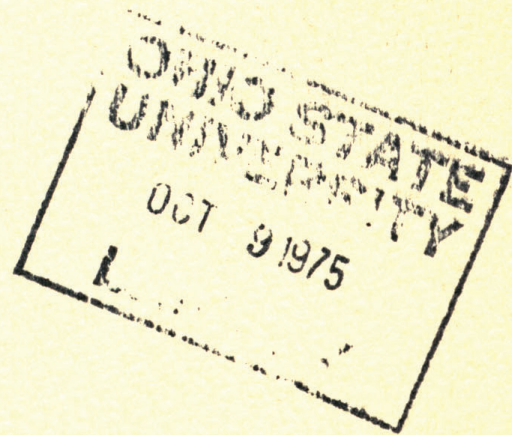
Shauna L. Wiest

APPENDIX A

English Speech
Enaid

Journal of Speech and Hearing

RESEARCH



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*Edited by Robert C. Bilger, Ph.D., who served as JSHR Editor, 1971-1974.

A MINIATURE ACCELEROMETER FOR DETECTING GLOTTAL WAVEFORMS AND NASALIZATION

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Massachusetts Institute of Technology, Cambridge, Massachusetts

D. N. KALIKOW

Bolt, Beranek and Newman, Inc., Cambridge, Massachusetts

T. R. WILLEMAIN

Massachusetts Institute of Technology, Cambridge, Massachusetts

A lightweight accelerometer has been used to obtain a waveform related to the glottal acoustic output when attached to the neck of a speaker, and to provide an indication of acoustic coupling to the nasal cavities when attached to the external surface of the nose. Examples of signals produced by the accelerometer are shown, and possible clinical applications are discussed.

This paper describes the use of a lightweight transducer to produce a waveform representative of the glottal acoustic output when attached to the throat of a speaker, and to provide a measure of the degree of acoustic coupling to the nasal cavities through the velopharyngeal opening when attached to the external surface of the nose.

The transducer is a miniature accelerometer (Bolt, Beranek, and Newman Model 501). It is housed in a cylindrical casing of height 0.33 inch and diameter 0.31 inch, and its total weight is 1.8 grams. The casing contains both a piezoelectric transducer and a preamplifier circuit. Figure 1 shows the accelerometer attached to the neck and to the nose, and illustrates the small size of the device. Nominal sensitivity of the unit is 8 mv/g. The frequency response is flat to within 5% over the range of 8 to 20,000 Hz. The accelerometer can withstand shocks of 10,000 g's without damage. The preamplifier requires 1 ma of current at 9 vDC. These features of light weight, good sensitivity, wide band width, ruggedness, and low power consumption make the device suitable in applications where speech-related signals need to be extracted and displayed, such as speech-reception aids for the deaf, speech training of the deaf or of patients with velopharyngeal incompetence, training of pronunciation of a second language, or even speech pick-up in high-intensity noise en-

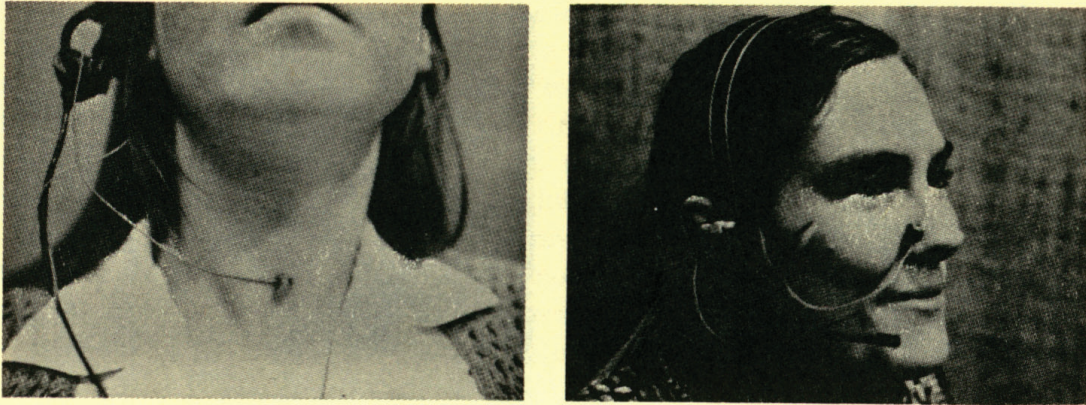


FIGURE 1. Pictures showing the accelerometer in position for detection of glottal and nasal signals.

vironments, since the accelerometer is relatively insensitive to airborne sound.

The accelerometer may be easily attached to the neck or nose of a speaker by means of double-sided adhesive tape. Once in place, the accelerometer is barely perceived by subjects. They can wear it for hours without discomfort.

GLOTTAL WAVEFORM

One application of a neck-attached accelerometer is to obtain a waveform from which glottal periodicity or fundamental frequency can be conveniently extracted. Derivation of fundamental frequency is more complex with the signal derived from a microphone mounted near the mouth, since this signal has a richer harmonic structure and may include interference from background noise. While real-time pitch extraction can be achieved from voice signals alone, a procedure based on neck-derived signals is simpler and more reliable. The waveform from the accelerometer is also potentially useful in basic studies of speech production and perhaps in diagnosis of abnormalities of the larynx or in the subglottal airways (since an acoustic resonance of the subglottal system can be observed in the waveform, as noted below). Other kinds of neck-attached sensors have been used for the purpose of obtaining a harmonic-free glottal waveform, but in general these have been less convenient and more bulky than the accelerometer described here (Sugimoto and Hiki, 1960; Porter, 1963; Tjernlund, 1964; Fourcin and Abberton, 1971).

Figure 2 shows the simultaneous throat accelerometer and microphone waveforms of a male speaker uttering several vowels. The voice signal was recorded using an Electro-Voice RE 15 microphone at a distance of 12 inches in front of the subject's lips. The accelerometer provides a waveform with relatively little harmonic content and fairly uniform amplitude. For these utterances, the accelerometer was mounted in the midline between the thyroid cartilage and the sternal notch. The time lag between the accelerometer waveform and the output of the voice microphone is about 1.5 msec, approximately the time needed for sound to propagate from the glottis to the

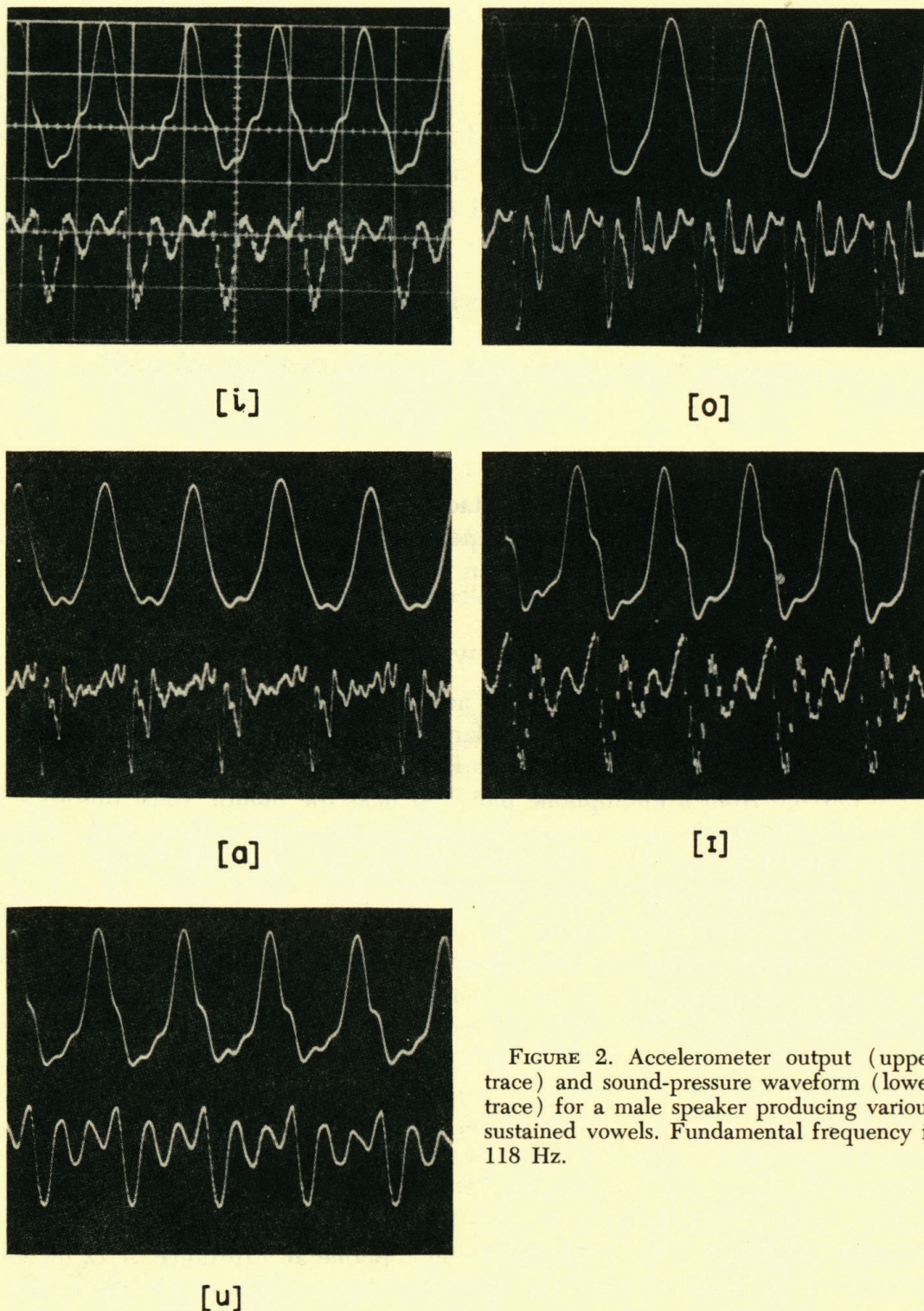


FIGURE 2. Accelerometer output (upper trace) and sound-pressure waveform (lower trace) for a male speaker producing various sustained vowels. Fundamental frequency is 118 Hz.

microphone. The ripple visible on the accelerometer output has a frequency of about 500 Hz, irrespective of vowel; its amplitude depends somewhat on the vowel. Observations of waveforms recorded from other speakers confirm the presence of a similar ripple whose frequency is vowel-independent but

speaker-dependent, the frequency of the ripple for females being higher than that for males. This ripple is presumably the result of acoustic excitation of a natural frequency of the subglottal system in the vicinity of 500 Hz (Fant et al., 1972; Henke, 1974). It is apparent from Figure 2 that the accelerometer gives a peaked waveform that can be used with simple signal processing techniques to provide an indication of glottal periodicity.

Experiments were performed to determine the amplitude of the accelerometer output and the amount of harmonic content as a function of the mounting position on the neck. The results indicate that a point midway between the thyroid cartilage and the sternal notch and in the midline gives waveforms with maximal amplitude and minimal harmonic content. With the accelerometer in this location, there is little variation in waveform from one vowel to another. The exact positioning of the accelerometer in the vicinity of this point is not critical.

The neck-attached accelerometer, together with frequency-measuring and interfacing circuitry, is currently being used in a computer-based system of speech-training aids for deaf children (Nickerson and Stevens, 1973), and in a similar system for the training of pronunciation of a second language (Kalikow and Swets, 1972). The pitch extractor operates reliably over a range of subjects including adult males, adult females, normal-speaking children, and deaf children.

NASALIZATION DETECTION

When, during voiced speech (that is, during portions of utterances produced with the vocal folds vibrating), the speaker lowers his velum, acoustic energy emanating from the glottis is modified by both the mouth and nasal cavities. The effects of the nasal cavities on the characteristics of the acoustic speech wave as transduced by a microphone are subtle, whereas the signal at the nose provides a more direct indication of a lowered velum. The acoustic energy propagated through the velopharyngeal opening into the nasal cavities is signaled unequivocally by an increase in the vibration of the skin of the nostril.

To provide an instantaneous indication of this correlate of velopharyngeal opening, the output of the accelerometer attached to the nose (Holbrook and Crawford, 1970) is filtered, rectified, and smoothed with an averaging time of about 20 msec. With the aid of a computer, this smoothed signal is sampled at 10-msec intervals, log-converted, and displayed on an oscilloscope.

The degree to which a display of this type can indicate differences between nasal and nonnasal speech sounds is illustrated in Figure 3. This figure shows the display of the nasal accelerometer output for three phrases produced by a normal adult male speaker: one phrase (*his father*) contains no nasal consonants, another (*his mother*) contains one nasal, and a third (*my money*) contains several nasal consonants. Quantitative measurements have shown that the output for nasal sounds is 10-20 dB above that for nonnasal vowels

(Stevens et al., 1974). The difference is greatest for nonnasal, nonhigh vowels, and is as small as 10 dB only for the nonnasal vowel /i/. The curves clearly show the regions of the speech in which there is a velopharyngeal opening and demonstrate the well-known fact that the nasalization for a nasal consonant extends into vowels adjacent to the consonant.

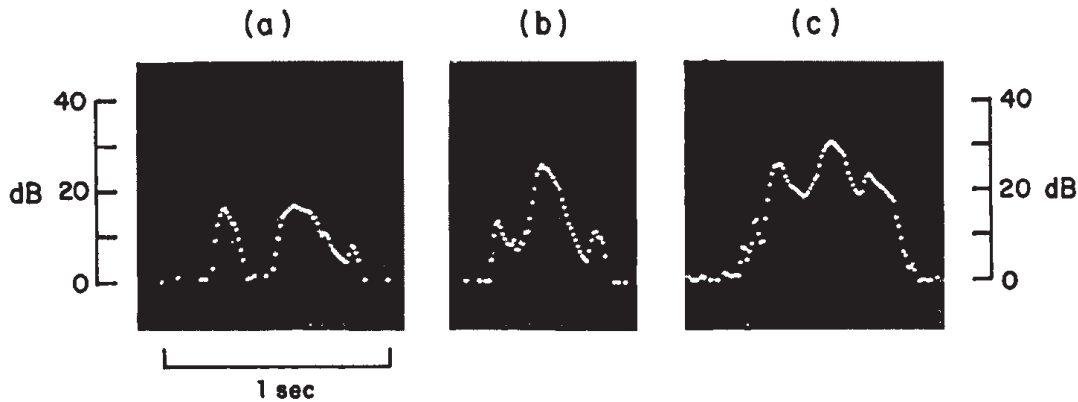


FIGURE 3. Computer-derived and -displayed "nasalization function" for three phrases produced by a normal male speaker: (1) *his father*, (2) *his mother*, and (3) *my money*.

A display of the type shown in Figure 3 can be used, therefore, to indicate presence or absence of nasalization in speech sounds, whereby nasalization we mean the presence of a velopharyngeal opening sufficient to cause substantial acoustic coupling between the oropharyngeal and nasal cavities. The question of how a measure obtained from this display correlates with subjective judgments of nasality remains to be answered. This question is discussed in more detail elsewhere (Stevens et al., 1974).

Figure 4 shows the nasalization display for a deaf child with severe problems in controlling the velum; for comparison, the display is also shown for a normal speaker producing the same sentence. The sentence for the deaf child is longer than for the normal speaker. Some vowels show too much nasalization

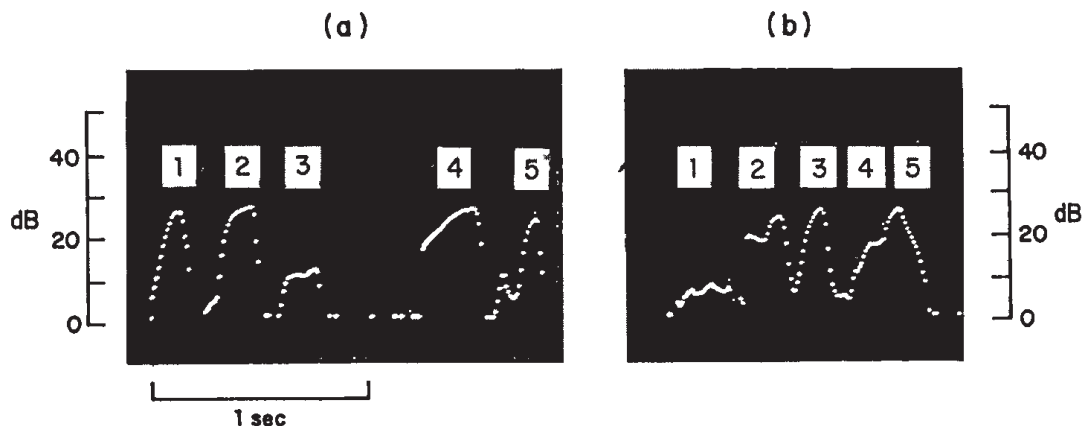


FIGURE 4. Nasalization display for the sentence, "You can drink your milk," produced by: (1) a deaf child with problems of velar control and (2) a normal adult male speaker. The five syllables in the sentence are indicated above each version.

(the vowels in *you* and *your*), and some nasal consonants are replaced by stops (the nasal consonants in *drink* and *milk*).

This type of nasalization display has been incorporated in the above-mentioned system of speech-training aids for deaf children. Provision has been made for setting a nasalization threshold on the display under the control of a clinician, to provide a target for the student. The student attempts to maintain the contour below this threshold during a nonnasal utterance or during the nonnasal portion of an utterance. The system also permits the clinician's nasalization trace to be stored on one part of the display, to allow visual comparison of the utterances of student and clinician. The display is proving to be successful in indicating to a deaf student when his velopharyngeal port is closed. Training procedures are being devised and experiments are in progress to determine how a display of the type shown in Figures 3 and 4 can be most effectively used for speech training with deaf children who have inadequate control of the velum but who presumably have an intact neuromuscular system for manipulating the velum.

ACKNOWLEDGMENT

This work was supported by the U.S. Office of Education, Media Services and Captioned Films Branch of the Bureau of Education for the Handicapped, under Contract No. OEC-0-71-4670(615), and the Advanced Research Projects Agency under AFOSR Contract No. F44620-71-C-0065. Programming and other advice and assistance were provided by D. Dodds, R. S. Nickerson, and Ann Rollins. Requests for reprints should be sent to Daniel N. Kalikow, Bolt, Beranek and Newman, Inc., 50 Moulton Street, Cambridge, Massachusetts 02138.

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Received November 6, 1973.

Accepted October 15, 1974.

APPENDIX B

[The Ohio State University Libraries](#)

Library Catalog

Through the end of Spring term 2022, materials will not be requestable from the OhioLINK Central Catalog. More information in the FAQ. Most materials will be available through Interlibrary Loan.



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210 0 J. speech hear. res
222 0 Journal of speech and hearing research
245 00 Journal of speech and hearing research :|ba publication of
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246 10 JSHR|f<Mar. 1984- >
264 1 [Washington, D.C.] :|bThe Association
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310 Bimonthly,|bFeb. 1991-
321 Quarterly,|b1958-1990
336 text|btxt|2rdacontent
337 unmediated|bn|2rdamedia
338 volume|bnc|2rdacarrier
362 1 Began with: Vol. 1, in Mar. 1958; ceased with Vol. 39,
no.6 in Dec. 1996
500 Description based on: Vol. 17, no. 4 (Dec. 1974); title
from cover
510 1 Education index|x0013-1385
510 1 Excerpta medica
510 2 Annual bibliography of English language and literature
|x0066-3786
510 2 Biological abstracts|x0006-3169
510 2 Computer & control abstracts|x0036-8113|bMarch 1972-
510 2 Current index to journals in education|x0011-3565
510 2 Electrical & electronics abstracts|x0036-8105|bMarch 1972-
510 2 Energy research abstracts|bAug. 1982-|x0160-3604
510 2 Exceptional child education resources|x0160-4309
510 2 Index medicus|x0019-3879
510 2 LLBA, language and language behavior abstracts|x0023-8295
510 2 MLA international bibliography of books and articles on
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|x0024-8215
510 2 Physics abstracts. Science abstracts. Series A|x0036-8091
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LOCATION	CALL NO.	YEAR	STATUS	NOTE
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Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.38:no.4-6	1995	USE IN LIBRARY	
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APPENDIX C

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Library Catalog

Through the end of Spring term 2022, materials will not be requestable from the OhioLINK Central Catalog. More information in the FAQ. Most materials will be available through Interlibrary Loan.

Catalog home	Request this item	Save for export	MARC display	Another search	ILL request
RECORD NO	b1242306			Search Full Catalog	Search

[Permanent link to this record](#)

Title **Journal of speech and hearing research : a publication of the American Speech and Hearing Association**
Imprint [Washington, D.C.] : The Association

CALL #	QP306A1J6
Location	Thompson Library Bound Journals
Lib. Has	v.1(1958)-v.39(1996)
CALL #	QP306.A1J6
Location	Book Depository
Lib. Has	v.1/9(1958/1966)-v./20/22(1977/1979)

LOCATION	CALL NO.	YEAR	STATUS	NOTE
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.39:no.4-6	1996	USE IN LIBRARY	
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.39:no.1-3	1996	USE IN LIBRARY	
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.38:no.4-6	1995	USE IN LIBRARY	
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.38:no.1-3	1995	USE IN LIBRARY	
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.37:no.4-6	1994	USE IN LIBRARY	
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.37:no.1-3	1994	USE IN LIBRARY	
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.36	1993	USE IN LIBRARY	
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.35	1992	USE IN LIBRARY	
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.34	1991	USE IN LIBRARY	
Thompson Library Bound Journals 3rd Floor	QP306.A1 J6 v.33	1990	USE IN LIBRARY	

Description volumes : illustrations ; 28 cm
Frequency Bimonthly, Feb. 1991-
Former Freq Quarterly, 1958-1990
Description text
 unmediated
 volume

Publ History	Began with: Vol. 1, in Mar. 1958; ceased with Vol. 39, no.6 in Dec. 1996
Note	Description based on: Vol. 17, no. 4 (Dec. 1974); title from cover
Citation	Education index 0013-1385
	Excerpta medica
	Annual bibliography of English language and literature 0066-3786
	Biological abstracts 0006-3169
	Computer & control abstracts 0036-8113 March 1972-
	Current index to journals in education 0011-3565
	Electrical & electronics abstracts 0036-8105 March 1972-
	Energy research abstracts Aug. 1982- 0160-3604
	Exceptional child education resources 0160-4309
	Index medicus 0019-3879
	LLBA, language and language behavior abstracts 0023-8295
	MLA international bibliography of books and articles on the modern languages and literatures (Complete edition 0024-8215
	Physics abstracts. Science abstracts. Series A 0036-8091 March 1972-
	Psychological abstracts 0033-2887 1958-
	Chemical abstracts 0009-2258
Note	Issued by: American Speech-Language-Hearing Association, <1979- >
ISSN	0022-4685
Coden	JSPHAH
OCLC/Control #	1754814
Subject	Speech disorders -- Periodicals. Speech -- Periodicals. Hearing -- Periodicals
Other Subject	Hearing. Speech Disorders.
Genre	Periodicals
Add'l Author	American Speech and Hearing Association. American Speech-Language-Hearing Association.
Other Title	J. speech hear. res JSHR <Mar. 1984- >
Absorbed	Journal of speech and hearing disorders 0022-4677
Continued By	Journal of speech, language, and hearing research 1092-4388

Additional Info:

 Journal (Print)



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