



The Birth of Speech Synthesis

The Work and Life of Umeda Noriko

EAJRS 2024

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TTS system Text to Speech

EMBER 2, 1972

The New York Times

BU

s Rise Decline

Northern Is g to Raise rint Price

RD WILCKE

Northern Paper
division of the
ern Nekoosa Cor-
nounced yesterday
raise the price of
wsprint manufac-
mills by \$5 a ton,
p. 1.

ise will bring the
ewsprint in New
169 a ton. Other
major newsprint
makers had no
immediate com-
ment on Great
Northern's move.
The International
pany said it was
e action.

thern acted about
r several Canadian
akers raised prices
and Quebec. The
ere averaged \$3 to

orthern also an-
corresponding in-
groundwood print-
by a range of \$5
ton. These papers
for textbooks and

actions, Canadian
er Mills, Ltd., said
that it would in-
price for softwood
sold in the United
7, to \$169 a ton in
es funds. The new
nto effect Jan. 1.
Chemical Company



Mrs. Noriko Umeda, of Bell Laboratories, co-inventor of system that converts printed text into synthetic speech.

Computer Reads Aloud

Producer of Artificial Talk Converts Printed English Into Synthetic Speech

By STACY V. JONES

Special to the New York Times

WASHINGTON, Dec. 1—
Computers can be taught to
convert a printed English text
into synthetic speech. Some-
day a surgeon about to per-
form an operation may be

able to have
pages from a
medical textbook
read to him in
this way. Cecil H.

thing, Dr. Coker has ex-
plained, people naturally
change the sound of a word
when the meaning changes.
Timing cues must be pro-
vided to distinguish such ex-
pressions as "a nice man"
and "an iceman."

The computer sounds like a
vigorous man of foreign birth
who knows what he is saying
but has some trouble with

S.E.C. IS ACCUSED OF A PBW 'DEAL'

Casey Denies Charge Made by Connecticut Official on Institutional Membership

Special to The New York Times

WASHINGTON, Dec. 1—The
Securities and Exchange Com-
mission was accused today of
having made a "secret deal" to
resolve the issue of institutional
membership on stock exchanges
in such a way as to bar them.

The accusation was made by
Robert I. Berdon, the Treasurer
of the State of Connecticut.

Appearing at the S.E.C.'s
institutional-membership hear-
ings, which closed today, he
said he might ask Congress to
investigate the hearings.

Mr. Berdon wants his state
to be able to become a member
of the PBW Stock Exchange so
that it can do its own stock
trading and save the commis-
sion charges that it now must
pay to brokers.

The PBW, formerly known
as the Philadelphia-Baltimore-
Washington Stock Exchanges,
was taking the position, until
earlier this week, that big in-
stitutional investors, such as
pension funds and mutual funds
—and possibly state treasurers
—should be allowed to become
its members. But this week the
PBW agreed to stop fighting the
S.E.C.'s proposed rule largely
banning such membership if
the commission would agree to
some transitional rules easing
the problems for its present
members.

Exchange Fought Rule

Mr. Berdon said that the com-

Needha Stock

Optimistic Rep on Vietnam He to Spur Uptur

By VARTANIG G. VAR

The stock market
strong yesterday after
days of consolidation, sp
by optimistic reports t
Vietnam cease-fire was r

Glamour issues moved
er, regaining some of
lost luster. During the l
weeks, blue-chip issues l
market to record heights

The Dow-Jones industr
erage, posting its best a
of the week, moved ahea
points to finish at 1,023
11:30 A.M., the Dow sco
best reading of the c
1,027.09.

The record closing fo
blue-chip indicator — a
close is the significant fi
came one week ago at 1,

Buoyant Tone

A jump in New York
Exchange volume under
the buoyant tone of the
Turnover rose to 22.57
shares from Thursday's
million shares.

International Busines
chines ran up 7 points
in the glamour category.
4 points in the previous
when the glamour rebot
under way.

Before the opening t
Associated Press dispat
that "authoritative" offi
Washington, looking for
the resumption of Pari
talks on Monday, indica

New York Times.
December 2, 1972.



Umeda Noriko Biography

-Before moved to the US-

- **1933 Born in Kobe**
- **1957 BA in Linguistics, The University of Tokyo**
- **1959 MA in Linguistics, The University of Tokyo**
- **1962 Completed the doctoral course in Linguistics, The University of Tokyo**
- **1962 Started working at ETL**
- **1969 Moved to the US and started working at Bell Laboratories**

Synthetic speech & Umeda Noriko's work

- **1961 “Daisy Bell” Computer programmed song created at Bell (not Text To Speech)**
- **1964 TTL research of synthetic speech began using vocal tract model by Teranishi & Umeda**
- **1968 “2001: A Space Odyssey” released introducing HAL.**
- **1968 “Sleeping Beauty” used the vocal tract model speech by Umeda & Teranishi introduced at 6th International Congress of Acoustic.**

Development of Vocal Track Model

Umeda & Teranishi at ETL

- 1964 音声模型の声 男、女、子供、カラス (Title on the label)
- 1966 桃太郎 (Title on the label)
- 1968 Sleeping Beauty (Title on the label)

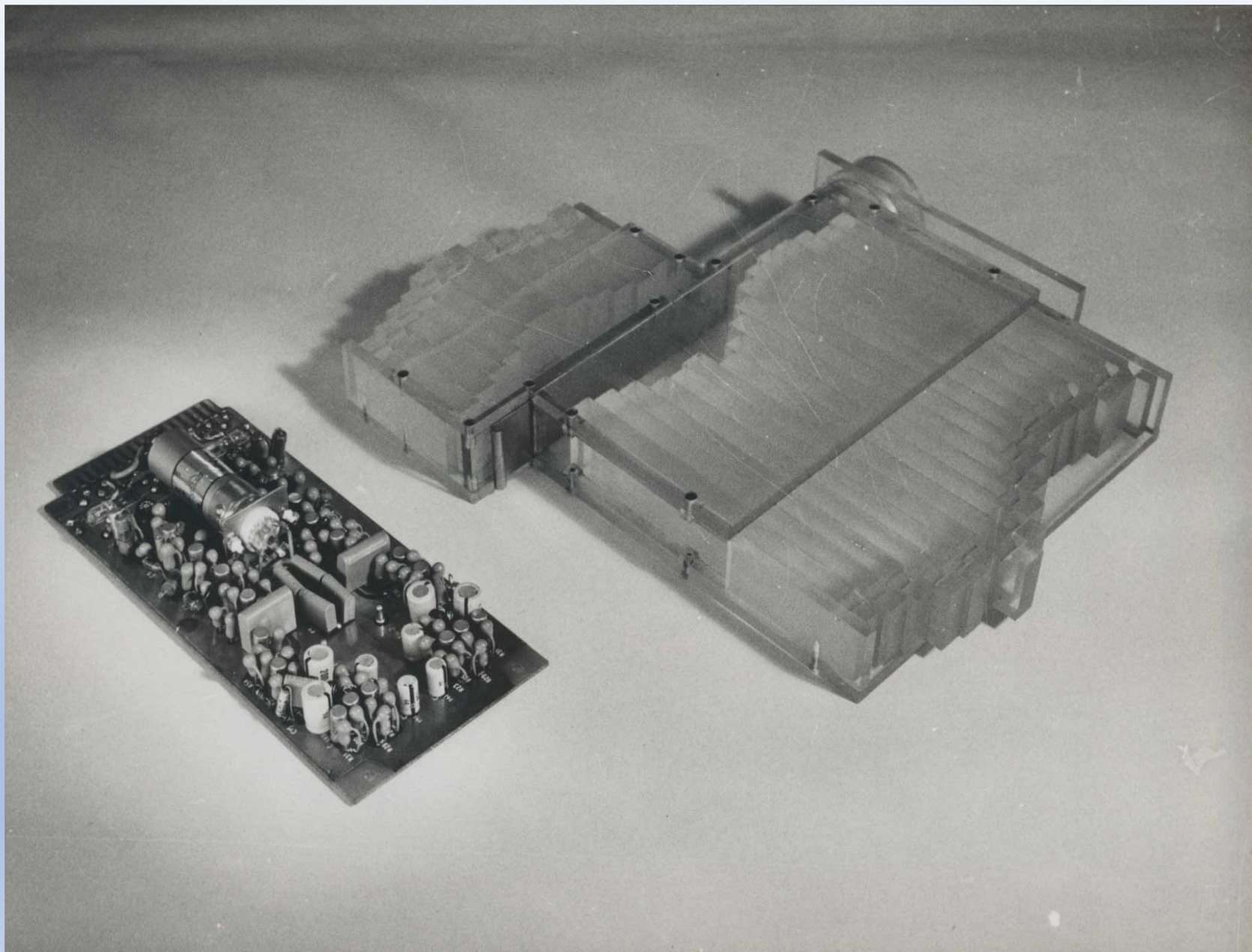


Photo from Umeda
Noriko Archives

Photo from Umeda
Noriko Archives

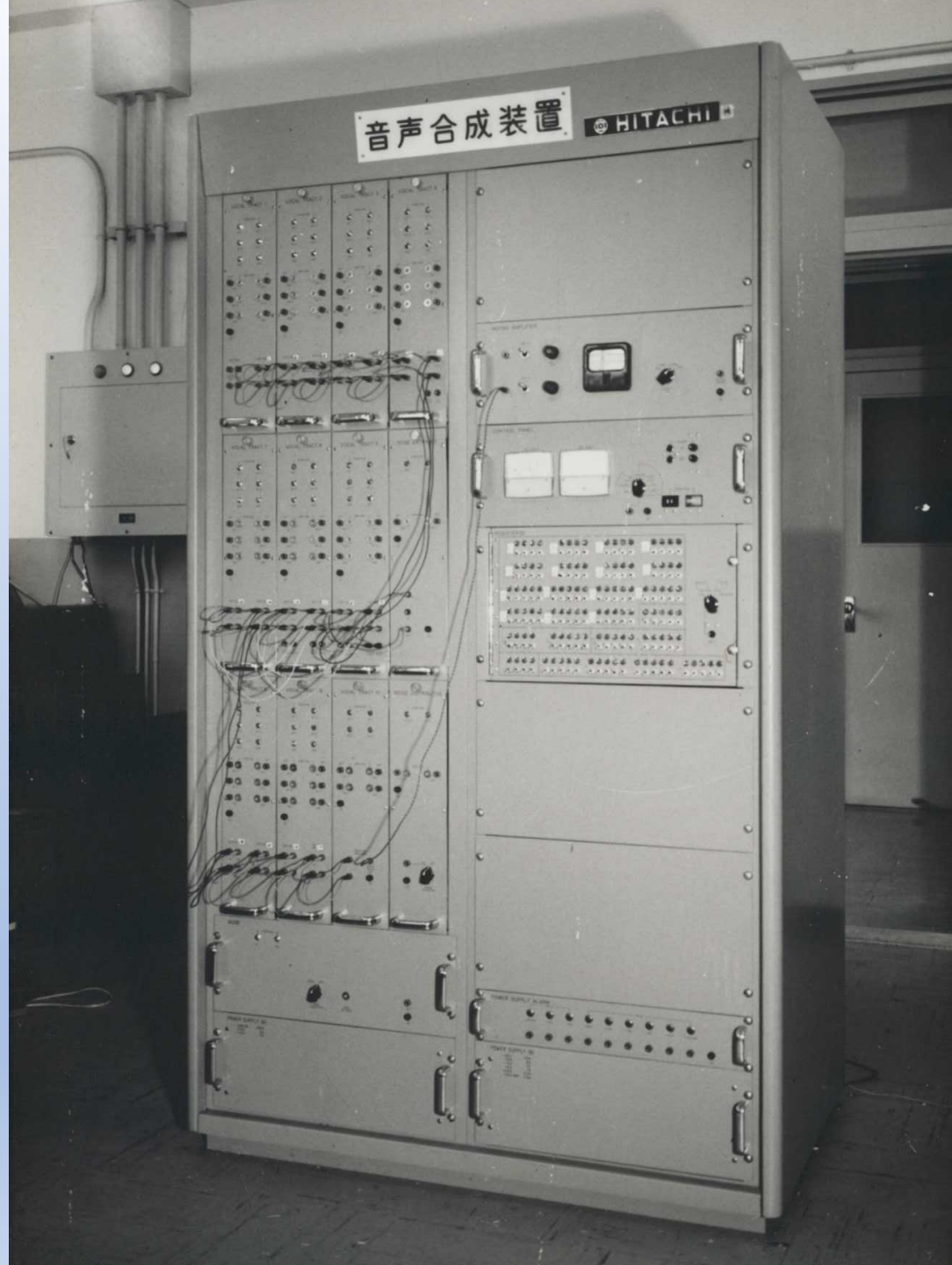
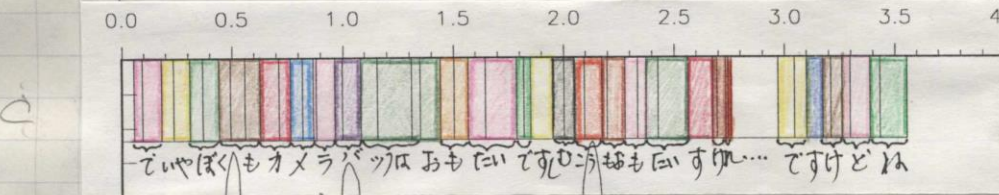
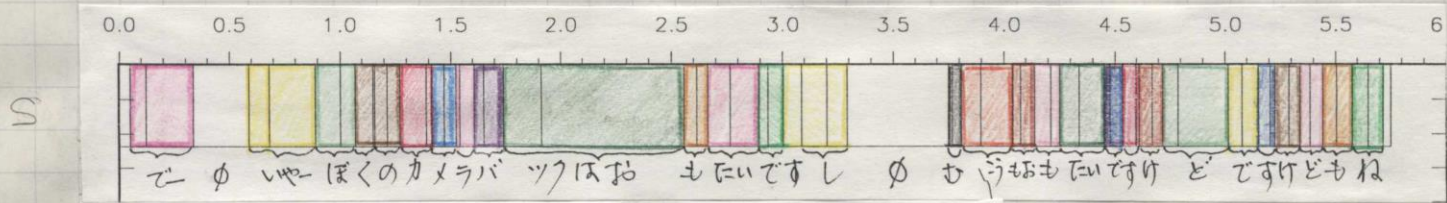




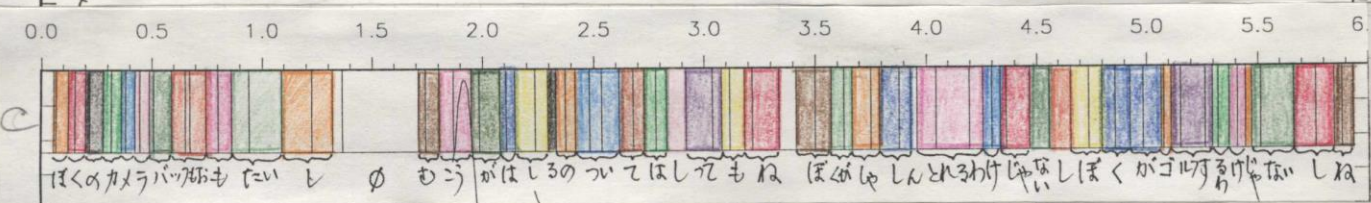
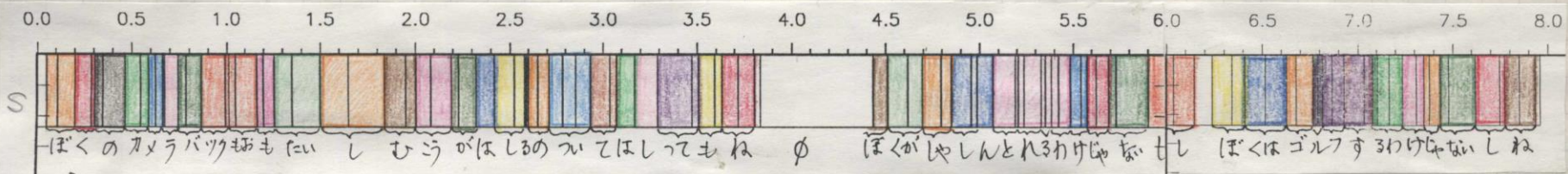
Photo courtesy of
Kazumi Umeda

Contributions of Text to Speech at Bell

- What About Tomorrow? On The Side Of Man by ABC TV.
- Improved female voices, natural speech, and synthetic speech for people with disabilities.
- First female chairman at the Acoustic Research Department, Bell Laboratories
- 1975 PhD in Engineering from Tohoku University
- 1981 Left Bell and became a professor of New York University

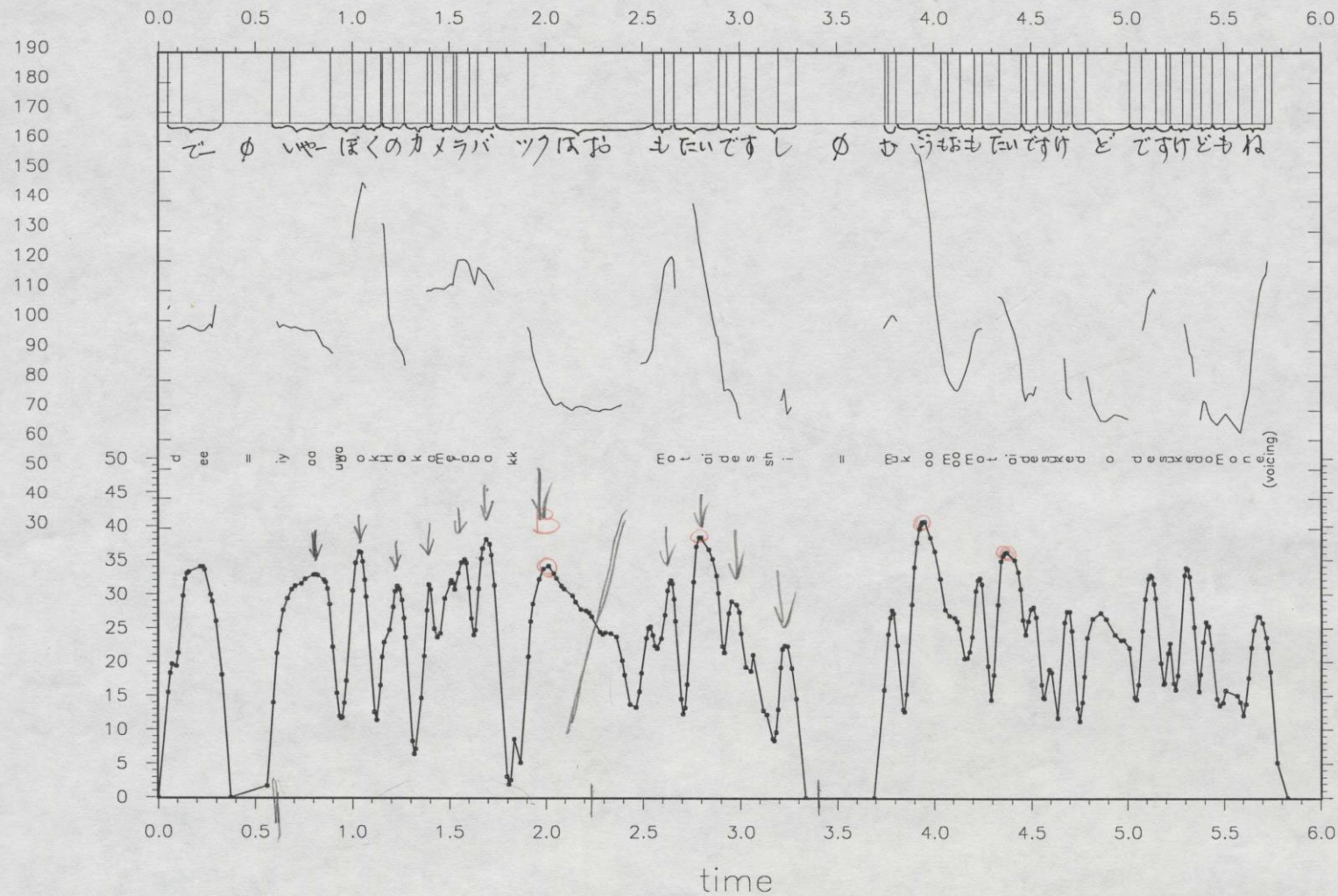


50



51

Hz dB



| conv_seg | conv_seg_length | sent_seg | sent_seg_length |
|----------|-----------------|----------|-----------------|
| d | 0.040 | d | 0.070 |
| e | 0.085 | ee | 0.214 |
| i | 0.056 | = | 0.253 |
| ya | 0.075 | iy | 0.093 |
| b | 0.058 | aa | 0.209 |
| o | 0.072 | b | 0.113 |
| k | 0.053 | o | 0.069 |
| u/m | 0.065 | k | 0.078 |
| o | 0.068 | u | 0.007 |
| k | 0.086 | n | 0.058 |
| a | 0.053 | o | 0.056 |
| m | 0.055 | k | 0.118 |
| e | 0.049 | a | 0.027 |
| r | 0.014 | m | 0.055 |
| a | 0.082 | e | 0.053 |
| b | 0.035 | r | 0.018 |
| a | 0.084 | a | 0.066 |
| kk | 0.073 | b | 0.044 |
| wu | 0.153 | a | 0.088 |
| a | 0.039 | kk | 0.171 |
| o | 0.093 | uwa | 0.564 |
| m | 0.061 | o | 0.083 |
| o | 0.064 | m | 0.058 |
| t | 0.080 | o | 0.051 |
| ai | 0.142 | t | 0.100 |
| d | 0.029 | ai | 0.129 |
| e | 0.032 | d | 0.040 |
| s/sh(i) | 0.101 | e | 0.068 |
| m | 0.051 | s | 0.083 |
| u | 0.046 | sh | 0.115 |
| k | 0.046 | i | 0.091 |
| oo | 0.080 | = | 0.458 |
| m | 0.023 | m | 0.018 |
| oo | 0.080 | u | 0.040 |
| m | 0.058 | k | 0.089 |
| o | 0.039 | oo | 0.143 |
| t | 0.055 | m | 0.036 |
| ai | 0.137 | oo | 0.062 |
| s | 0.111 | m | 0.073 |
| k | 0.018 | o | 0.042 |
| e | 0.040 | t | 0.087 |
| r | 0.011 | ai | 0.113 |
| e | 0.013 | d | 0.027 |
| d | 0.211 | e | 0.057 |
| d | 0.074 | s | 0.061 |
| e | 0.057 | u | 0.012 |
| s(u) | 0.071 | k | 0.060 |
| k | 0.037 | e | 0.046 |

Umeda's work after the Bell

- 1981 Professor of New York University, Department of Linguistics
- 1992 Research Professor of Chiba Institute of Technology
- 1996 Director of the Department of Linguistics
- 2014 Returned to Japan
- Published three books
- 2017 Passed away

Contents of Archives

- Data (paper) : 1955 -2015
- Data (audio & film): 1960-2000
- Publications & presentations
- Studies on synthetic speech and various fields
- Miscellaneous: Photos, communications, class preparations, etc.



Challenges

- **Convert various types of old media to new formats**
- **Apply for grant to support the archives accessible**
- **Ensure compliance with copyright and its limitations when digitizing materials**
- **Cataloging, metadata, finding aids, etc.**

Special thanks to:

Benjamin Lindquist

Kazumi Umeda

Kikuko Sakamoto

Junko Yamazaki

Thomas Ventimiglia

Reference

- *The art of text to speech*. Lindquist, Benjamin. The University of Chicago Press Journals. Vol. 50. Number 2. 2024.
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- 電子技術総合研究所100年史. 電子技術総合研究所創立100周年記念事業実行委員会、100年の歩み委員会. 1995. オーム社、
- Klatt's 'History of speech synthesis' Archive of audio clips. Acoustics Today. <https://acousticstoday.org/klatts-speech-synthesis-d/>
- [What About Tomorrow? On The Side Of Man by ABC TV.](#)



Thank you for your attention!

If you have any questions, please contact Setsuko Noguchi

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